Predict Application Control

PAC User's Guide

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PAC User's Guide

Predict Application Control (PAC) is a flexible tool for controlling both Natural and "foreign" (non-Natural and non-Predict) applications throughout the software life-cycle and for ensuring the integrity of applications in the production environment. PAC facilitates and controls the movement of applications through the life-cycle. When an application is implemented into production, it is protected and audited by Predict Application Audit (PAA).

This documentation addresses developers who use PAC to control the life cycle of their programs. It describes how to use PAC and PAA to perform the following functions:

- Develop and enforce site- or application-specific software life-cycles.
- Establish who can promote applications through the life-cycle.
- Control and audit the migration of applications from one location to another.
- Analyze the impact of proposed code changes.
- Track and control maintenance activities.
- Protect the source code for each version of an application component and link it to the executable code.
- Maintain accurate relationships among versions of application components.

This documentation tells you how to manage and control applications using PAC. With this overall goal in mind, it has been divided into parts containing documents, and some appendixes:

Part I: Planning and configuring PAC	This part contains documents describing how to not only prepare the PAC environment, but also how to define objects and entities (the applications, statuses, migrations and other events for both Natural and Predict objects).
Part II: Migration Concepts	In this part the topic of migration is generally discussed as well as how to define and manipulate migration events, and paths and how to authorize and submit an event to PAC. The last part of this section discusses how objects are migrated into, within and out of the PAC environment.
Part III: PAC Maintenance Facilities	These final documents discuss the maintenance of PAC entities and objects themselves once the environment has been defined. These are the ongoing tasks such as object list creation, object maintenance, job creation and control and control log maintenance.
Appendix A	PAC activities checklist for planning, performing and tracking the tasks you must perform to set up the PAC environment.
Appendix B	Defining optional PAC keywords.

1 Concepts and Terms Used in This Documentation

Objects and Types of Code

A PAC object is one of the following:

- A unit of programming code (for example, a program or subroutine);
- A data dictionary definition (for example, a view of a database file);
- A user-written error message.

Natural views (which can be generated from Predict views) are called data definition modules (DDMs). To accommodate the terminologies used at different sites, they are called views/DDMs in this documentation.

An object version is an object that has been compiled in PAC and assigned a version number. An object version is sometimes called a PAC object or versioned object.

Source code means a unit of code written in a high-level language, such as Natural. Source code is equivalent to Natural "saved" code.

Executable code or executable object means a unit of code that has been compiled and can be translated by Natural. Executable code is equivalent to Natural "cataloged" code.

A PAC entity is any of the structures that PAC uses to control or facilitate the movement of objects through the life-cycle.

Applications, Libraries, and Locks

An application is a set of objects that work together to perform a task. Thus, an application object is a component of the application.

A Natural library is a set of Natural objects that are stored together; you can add objects to a library or delete objects from it. A lock prohibits access to a library, application, or object.

System Files

System files are PAC, PAA and Adabas files that contain the following (the name of each system file is in parentheses):

- Software resources (FNAT)
- Application libraries (FUSER)
- Predict information (FDIC)
- Security information (FSEC)

In this documentation, the FUSER file, which contains application objects, is called the user system file. The FDIC file is called the Predict file. In addition to Predict data definitions and cross-reference information, Natural rules and views/DDMs generated from Predict entries are stored in the Predict file. User system files and Predict files are identified in PAC by the database number (DBnr) and file number (Fnr).

In addition, there are three system files reserved to PAC and PAA:

- The PAC ACF file stores the saved and cataloged code for every version of every object under PAC control. The ACF also stores extended information about object versions and PAC entities.
- The PAC PCF file stores cross-reference data, keywords, and the latest version of Natural and Predict objects in the PAC-controlled environment. Natural objects are cataloged and Predict objects are generated in the PCF.
- The PAA file stores audit data for production objects.

Environments and Directories

The user environment is the mix of hardware, operating systems, teleprocessing (TP) systems, and database managers (DBMSs) at a site.

An application environment or operating environment includes the physical locations where application objects are stored and the operating system, TP system, and DBMS with which they are developed, tested or used.

The PAC-controlled environment refers to the PAC ACF and PCF system files and the operating environments that are governed by site-specific procedures defined in PAC.

The PAA-controlled environment refers to production environments that are protected and audited by PAA.

A Natural directory provides information about the environment in which an object was developed, saved,or cataloged.

2 Planning and Configuring PAC

This part tells you how to configure your PAC environment by defining statuses (phases), defining applications to PAC and linking the applications with the statuses, defining migration paths for the applications between/among the statuses, and finally setting up the jobs to perform the events, creating the translation table, and defining and authorizing users of the various migrations.

- **Navigating in PAC**
  describes how to logon to and navigate within PAC. Here, the overall PAC screen structure is explained, the general field structure and information is described as well as the ways that PF keys can be used to move among the various PAC functions.
- **Planning a PAC Environment**
  Define and locate the statuses and associated Predict files from/to which the application can be migrated.
- **Configuring a PAC Environment**
  Define the application to be moved through the PAC controlled environment.
- **Statuses**
  Define the application status links.
- **Applications**
  Define the origin and destination statuses (migration path) for the application. The migration path must be set up before you can set up a migration event.
- **Application Defaults**
  Define the defaults for the application to be processed.
- **Linking Applications and Statuses**
  Set up and select the jobs that run the migration events. A job may be set up at any time before a migration event is authorized or submitted.
- **File Translation Tables**
  Define a file translation table as required.
  Specify the user(s) who may authorize a migration.

3 Navigating in PAC

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- PAC Maintenance and Reporting Facilities 8
- About PAC Menus and Screens 13
- Listing Locked Data 22

This section discusses the facilities provided for navigating in PAC, including the PAC user profiles, logging on to the PAC system, menus and screens, and the maintenance and reporting facilities for PAC entities.

This chapter covers the following topics:

PAC User Profile

Contact the PAC administrator at your site for information about the PAC functions and entities you are allowed to use; these permissions are specified in your PAC user profile. The functions and entities you are allowed to use determine the PAC maintenance and/or reporting menus and screens you can access.

You may or may not be authorized to

- use the PAC administration functions;
- authorize migration event processing;
- submit migration events for processing;
- use the PAC utilities (migration, scan, compare).

Logging On to PAC

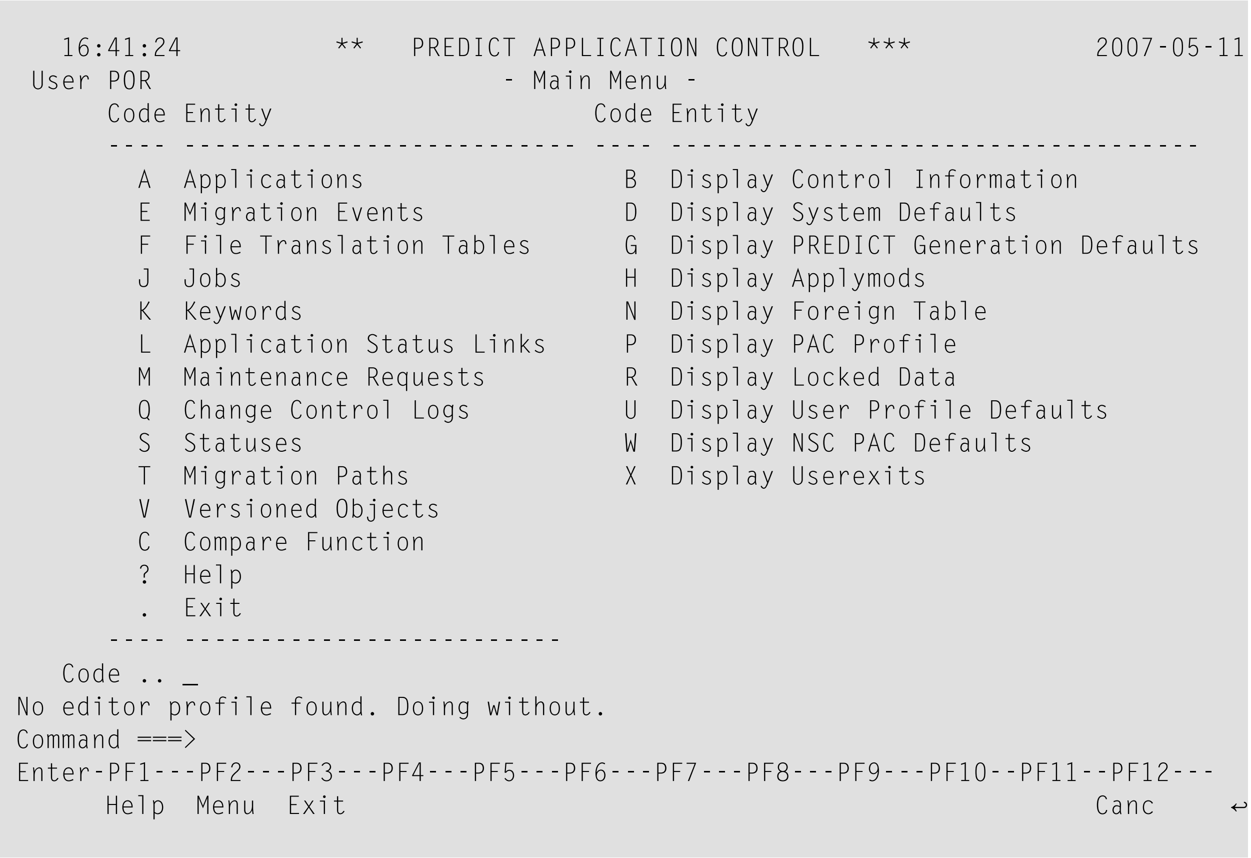
To use the full range of PAC options and functions, log on to the PAC system:

1 Log on to Natural.

2 From the Natural system screen, enter LOGON SYSPAC or simply SYSPAC.

3 Enter MENU on the Logon Accepted screen (if your PAC administrator has configured your system accordingly, the Logon Accepted screen may not appear).

The PAC Main Menu appears listing those PAC entities for which the PAC administrator has assigned maintenance and/or reporting permissions in your user profile. That list will include all or some part of the list shown in the screen below.



```
   16:41:24          **   PREDICT APPLICATION CONTROL   ***            2007-05-11
 User POR                      - Main Menu -
      Code Entity                     Code Entity
      ---- -------------------------- ---- -----------------------------------
        A  Applications                 B  Display Control Information
        E  Migration Events             D  Display System Defaults
        F  File Translation Tables      G  Display PREDICT Generation Defaults
        J  Jobs                         H  Display Applymods
        K  Keywords                     N  Display Foreign Table
        L  Application Status Links     P  Display PAC Profile
        M  Maintenance Requests         R  Display Locked Data
        Q  Change Control Logs          U  Display User Profile Defaults
        S  Statuses                     W  Display NSC PAC Defaults
        T  Migration Paths              X  Display Userexits
        V  Versioned Objects
        C  Compare Function
        ?  Help
        .  Exit
      ---- -------------------------
   Code .. _
No editor profile found. Doing without.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                 Canc
```

Note: If the PAC banner has been activated by your site, the banner will be displayed first.

The PAC entities that may be listed on the Main Menu include the following:

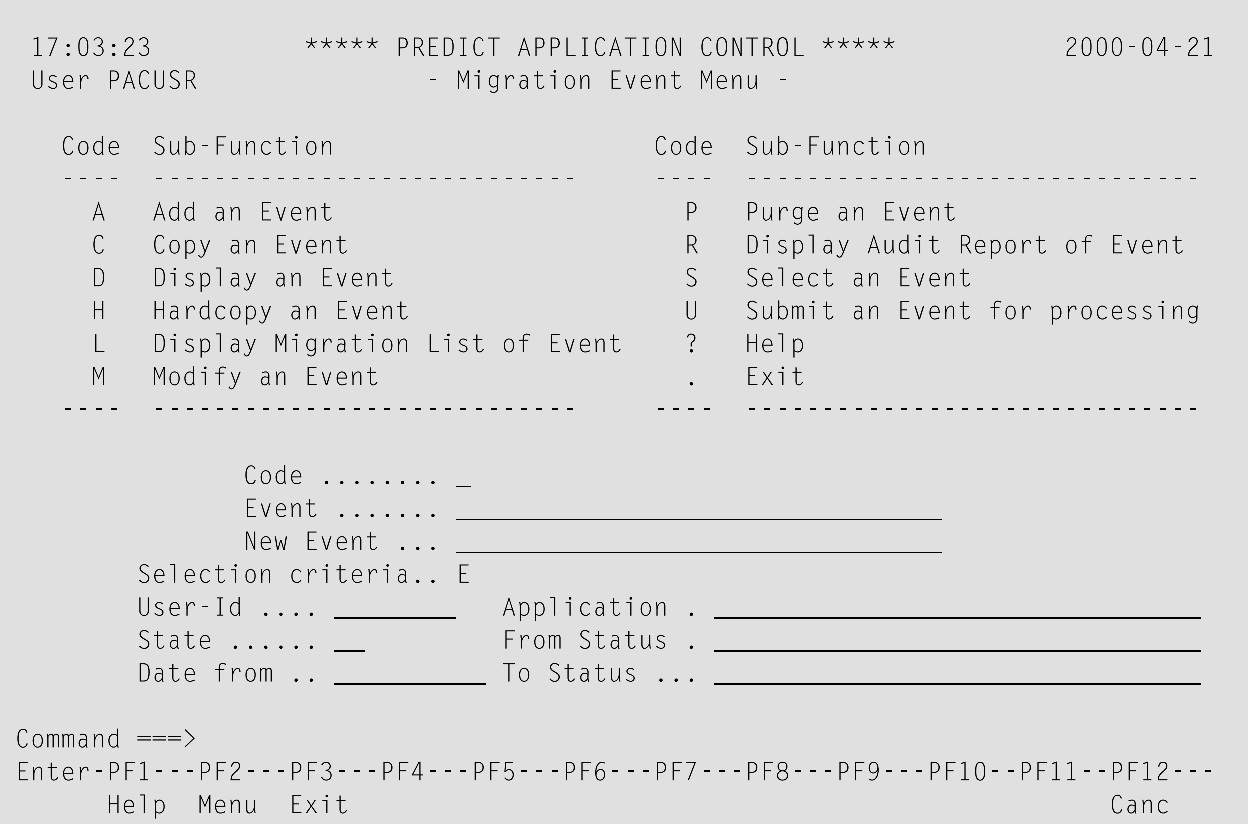
Code	Entity	Description
A	Applications	Maintain applications, which identify and group Natural, foreign, and/or Predict objects and define the default options to be used during their processing.
C	Compare	Compare versioned objects
E	Migration Events	Maintain migration events, which define the tasks/ procedures for migrating application objects from one status to another.
F	File Translation Tables	Maintain file translation tables, which ensure that the correct DBID/FNR set is used in each PAC environment to locate user data referenced by views/DDMs needed by Natural objects at execution time.
J	Jobs	Maintain the JCL used for the batch processing of various PAC functions including migrations.
K	Keywords	Define keywords that may be assigned to PAC entities.
L	Application Status Links	Maintain the subset of status conditions valid for an application life-cycle.

Code	Entity	Description
M	Maintenance Requests	Maintain maintenance requests for defining or tracking problems that are solved by objects defined to PAC.
O	Change Control Logs	The check-out/check-in facility keeps track of the actions taken to maintain objects under the control of PAC.
S	Statuses	Maintain status definitions, which define the physical and logical environments controlled and accessed by PAC.
T	Migration Paths	Maintain migration paths, which define the movement of application objects between two statuses.
V	Versioned Objects	Assign versions to migrated objects, view version information and other related objects/information.
B	Display Control Information	Display system files, release numbers, dates and times and user initializations.
D	Display System Defaults	Display the default settings for PAC.
G	Display Predict Generation Defaults	Display the default settings for generating from Predict.
H	Display Applymods	Display the applymods whose settings influence the behavior of PAC object processing.
N	Display Foreign Table	Display the foreign object types to be accepted by PAC.
P	Display PAC profile	Display the PAC profile for the current user.
R	Display Locked Data	Display the name, lock type, reason and user ID of a locked entity.
U	Display User Profile Defaults	Display profile options for PAC user definitions.
W	Display NSC PAC Defaults	Display NSC PAC user profile defaults for application, FTT and JCL text.
X	Display Userexits	Display the user exits including number and description.

Entering the relevant code accesses another menu that displays a list of sub-functions. The specific functions displayed depend on which permissions the PAC administrator has assigned in your user profile.

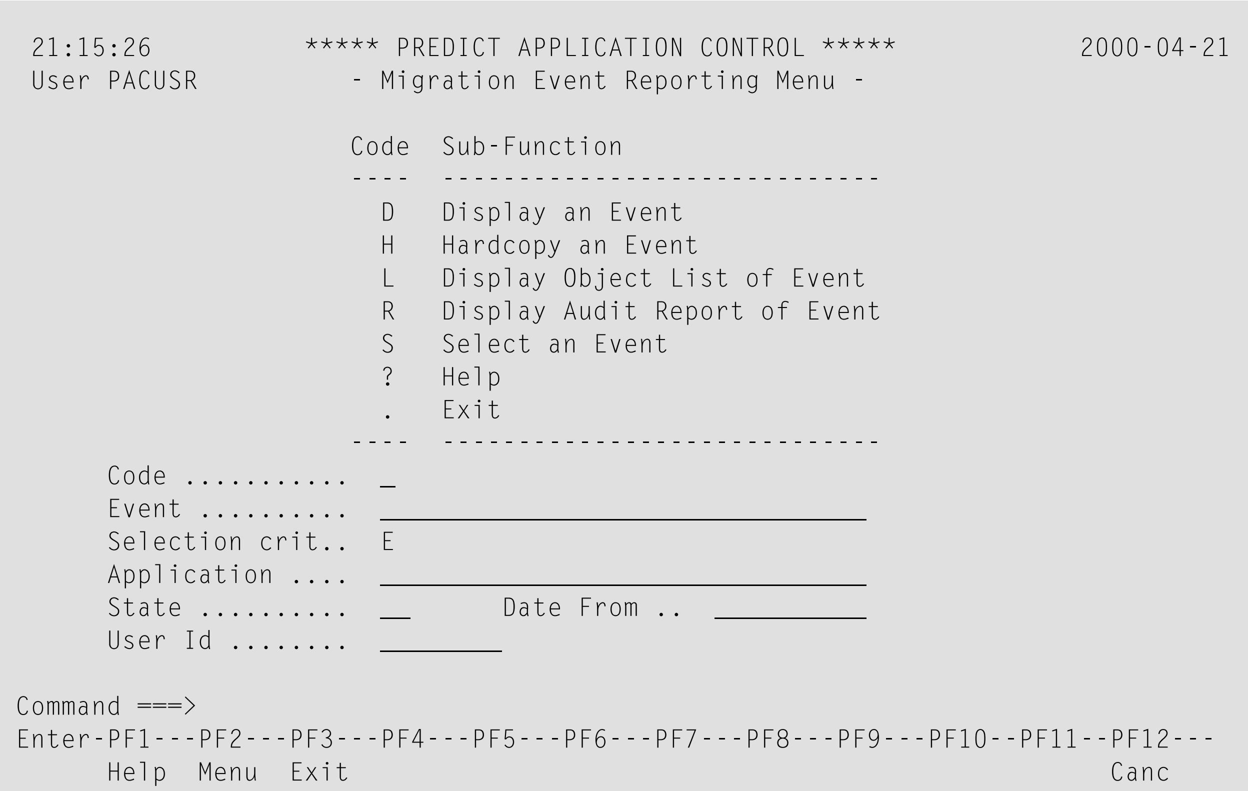
PAC Maintenance and Reporting Facilities

The maintenance subsystem is for defining and maintaining PAC entities. The reporting subsystem allows you to display, list, select, or print information about the PAC environment, including all defined entities. If you have access to the maintenance subsystem, both maintenance and reporting functions are presented on each entity menu (Menu) as shown in the previous screen. If you only have access to the reporting subsystem, a menu presenting only reporting functions is presented for each entity as shown below.



```
 17:03:23          ***** PREDICT APPLICATION CONTROL *****           2000-04-21
 User PACUSR                - Migration Event Menu -

   Code  Sub-Function                       Code  Sub-Function
   ----  ----------------------------       ----  ------------------------------
     A   Add an Event                         P   Purge an Event
     C   Copy an Event                        R   Display Audit Report of Event
     D   Display an Event                     S   Select an Event
     H   Hardcopy an Event                    U   Submit an Event for processing
     L   Display Migration List of Event      ?   Help
     M   Modify an Event                      .   Exit
   ----  ----------------------------       ----  ------------------------------

               Code ........ _
               Event ....... ________________________________
               New Event ... ________________________________
        Selection criteria.. E
        User-Id .... ________   Application . ________________________________
        State ...... __         From Status . ________________________________
        Date from .. __________ To Status ... ________________________________

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

The sub-functions listed on maintenance and reporting menus are primary activities to help you define and maintain and/or retrieve different kinds of information about PAC entities.



```
 21:15:26          ***** PREDICT APPLICATION CONTROL *****           2000-04-21
 User PACUSR          - Migration Event Reporting Menu -

                      Code  Sub-Function
                      ----  -----------------------------
                        D   Display an Event
                        H   Hardcopy an Event
                        L   Display Object List of Event
                        R   Display Audit Report of Event
                        S   Select an Event
                        ?   Help
                        .   Exit
                      ----  -----------------------------
      Code ..........   _
      Event .........   ________________________________
      Selection crit..  E
      Application ....  ________________________________
      State ..........  __      Date From ..  __________
      User Id ........  ________

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

Several sub-functions (for example, Add, Display, Hardcopy, Modify, Select, and Help) are common to most or all PAC entities. Other sub-functions are unique to a particular PAC entity. For example, the following sub-functions are unique to the Migration Event entity shown in the screen examples above:

Code	Sub-Function
R	Display Audit Report of Event (migration event reporting)
U	Submit an Event for processing (migration event maintenance)

You can access a sub-function from an entity menu by entering the appropriate code and additional selection criteria requested in the fields provided.

If you leave the selection criteria fields blank or enter an asterisk (*) or range notation in any of these fields, a Selection List screen is displayed. On this screen, you may select the desired object(s) by entering the relevant number on the command line, or by marking the object with the cursor.

Maintenance and reporting sub-functions can be processed directly from selection list screens accessed with function code S to select from a list.

Refer to the sections **Using Selective Processing** and **Using Range Notation** for more information.

This section covers the following topics:

- Using PAC Maintenance Sub-Functions

- Using PAC Reporting Sub-Functions

Using PAC Maintenance Sub-Functions

You may use the maintenance sub-functions for PAC entities as defined by the PAC administrator in your user profile.

Some fields on the maintenance screens permit data to be entered only at the time the PAC entity is initially defined, and these field values cannot be changed later.

Additional Options allow you to perform additional maintenance functions without having to navigate through a series of menus and screens. Refer to the section **Accessing PAC Additional Options** for more information.

Note: Some of the sub-function names may be used as direct commands that can be entered on the command line. Refer to the PAC Reference documentation.

The following maintenance sub-functions are available to PAC entities:

Code	Sub-Function	Description
A	Add	Add (define) PAC entities on the Add screen. The name must be unique and must begin with an alphabetic character; it may be up to 32 characters in length (maintenance requests may be up to 20 characters). Embedded blanks are automatically changed to the underscore ( ) character.
C	Copy	Copy PAC entities such as applications, jobs, migration events, and file translation tables (FTTs).
E	Edit	Edit PAC entities such as JCL for jobs, keyword descriptions.
L	Link	Link application to status (Application Menu). Link status to an application (Status Menu).
M	Modify	Modify information about PAC entities by entering a unique entity name or alias, or using range notation to select from a list.
P	Purge	Purge (delete) PAC entities. You are told how many subordinate entities will also be purged and you are requested to confirm the Purge request.
R	Rename	Rename jobs.
S	Select	Display a list of PAC entities on the Selection List screen by entering the entity name or using range notation to display the selection list.
U	Submit	Submit a job or migration event for processing.
?	Help	Display help information for a field. Refer to the section **Accessing Field Help** for more information.
	Exit	Exit from a PAC function.

Using PAC Reporting Sub-Functions

You may use the reporting sub-functions for PAC entities as defined by the PAC administrator in your user profile. No maintenance may be performed from reporting subsystem menus.

The reporting subsystem allows you to

- track the activities of previously migrated applications;
- verify the current status of applications;
- verify source changes to objects;
- track the movement of objects;
- view object interdependencies;
- view cross-reference data about objects under PAC control; and
- track maintenance activities for objects under PAC control.

Additional Options allow you to retrieve additional information about PAC entity interdependencies without having to navigate through a series of menus and screens. Refer to the section **Using PAC Additional Options** for more information.

The reporting sub-functions available to PAC entities are described in the following table. The same code may be used for different sub-functions, depending on the particular entity:

Code	Sub-Function	Description
D	Display	Display information about PAC entities by entering an entity name or alias, or by using range notation to select from a list.
H	Hardcopy	Produce a hard copy of a PAC entity. Refer to the section **Using the Hardcopy Sub-Function** for more information.
L	Display	Display object list for a migration event.
L	List	Display JCL for jobs; display keyword descriptions.
N	Display Destination Status	Display the migration path destination status(es) for an origin status.
O	Display Origin Status	Display the migration path origin status(es) for a destination status (Migration Path Menu).
O	Objects for Application Status	Display the objects of an application in a specific status (Application Status Menu).
O	Select All Open Logs	Displays a list of change control logs (Change Control Log Menu).
R	Display	Display audit report of a migration event (Migration Event Menu). Display statuses linked to an application.
S	Select	Display a list of PAC entities on the Selection List screen by entering the entity name or using range notation to display the selection list. Refer to the sections **Using Selective Processing** and **Using Range Notation** for more information.

Code	Sub-Function	Description
T	Display	Display a list of PAC applications linked to a specific status (Status Menu) or statuses linked to a specific application (Application Menu).
U	Display Status	Display status(es) with no application links; display application(s) with no status links.
V	Object Version Audit History	Display the object versions of objects for an application in a specific status.
X	Predict Cross-reference Data	Display the Predict cross-reference data for a specific application.
?	Help	Display help information for a field. Refer to the section **Accessing Field Help** for more information.
	Exit	Exit from a PAC function.

Note: Some of the sub-function names may be used as direct commands from the command line. Refer to the PAC Reference documentation.

About PAC Menus and Screens

PAC is driven by menus that lead you into the system and help you to navigate through subsystems, functions, and sub-functions.

This section covers the following topics:

- Menu/Screen Attributes
- Using Direct Commands
- Using PF Keys
- Accessing Field Help
- Accessing Error Message Text
- PAC Entity Sub-Function Screens
- Using Selective Processing
- Using Range Notation
- Using the Natural Editor
- Using the Hardcopy Sub-Function

- Using PAC Additional Options

Menu/Screen Attributes

The attributes described in the following table are common to all PAC menu screens:

Attribute	Description
Time	The current time appears in the upper left corner of the screen.
Title	The product name (PAC) and the menu title appear in the top center of the screen. The title is modifiable.
Date	The current date appears in the upper right corner of the screen.
User	The user ID of the person currently using PAC is displayed directly under the current time.
Code/Function	The Code and Function or Sub-Function columns list the functions or subsystems available from the menu along with their function codes.
Code	The input field for any of the codes listed in the Code column.
Command	A PAC direct command can be entered on this line.
PF Keys	PF key assignments for use with this menu are given across the bottom of the screen. PF key numbers without assignments are not functional for the particular screen.

Using Direct Commands

PAC allows you to issue direct commands from most screens in the PAC system. Refer to the PAC Reference documentation for more information about PAC commands.

Using PF Keys

The PF keys that are unique to individual screens are explained in context. General PF key assignments are described below:

Key	Function	Description
PF1	Help	Displays the PAC Help facility for this screen.
PF2	Menu	Returns you to the PAC Main Menu.
PF3	Exit	Goes back one screen in the screen structure.
PF4	Opts	Accesses the Additional Options.
PF5	Confirm	Confirms an action.
PF6	--	Goes back to the first screen of a selection list.
	++	Goes forward to the last screen of a selection list.
PF8	+	Goes forward one screen of a selection list.
	-	Goes back one screen of a selection list.
PF10	<	Shifts the screen to the left.

Key	Function	Description
PF11	>	Shifts the screen to the right.
PF12	Canc	Cancels the current function and backs out any changes not yet committed.

Accessing Field Help

Online help is provided for all fields in the PAC system. You can access the Help facility is two ways:

- Press PF1 (Help) to invoke a help screen relevant to the functions of the field where the cursor is positioned; or
- Enter a question mark (?) in the first position of a data entry field (excluding the direct command line) to access a help screen specific to that data entry field.

If there is no help text available for a particular field, a message may be displayed to that effect. In this case, you should verify with your PAC administrator that the help maps and text in the library SYSPACUS are accessible in the SYSPAC library.

Accessing Error Message Text

Where it is available, PAC provides access to extended text for error messages displayed on your screen. You can access error message text in two ways:

- Enter D or DISPLAY on the command line while the error message is displayed;
- Enter a h followed by the message number on the command line; for example, h 7126.

You can exit from the extended error message and return to the previous screen by pressing PF3 (Exit) or entering a period (.).

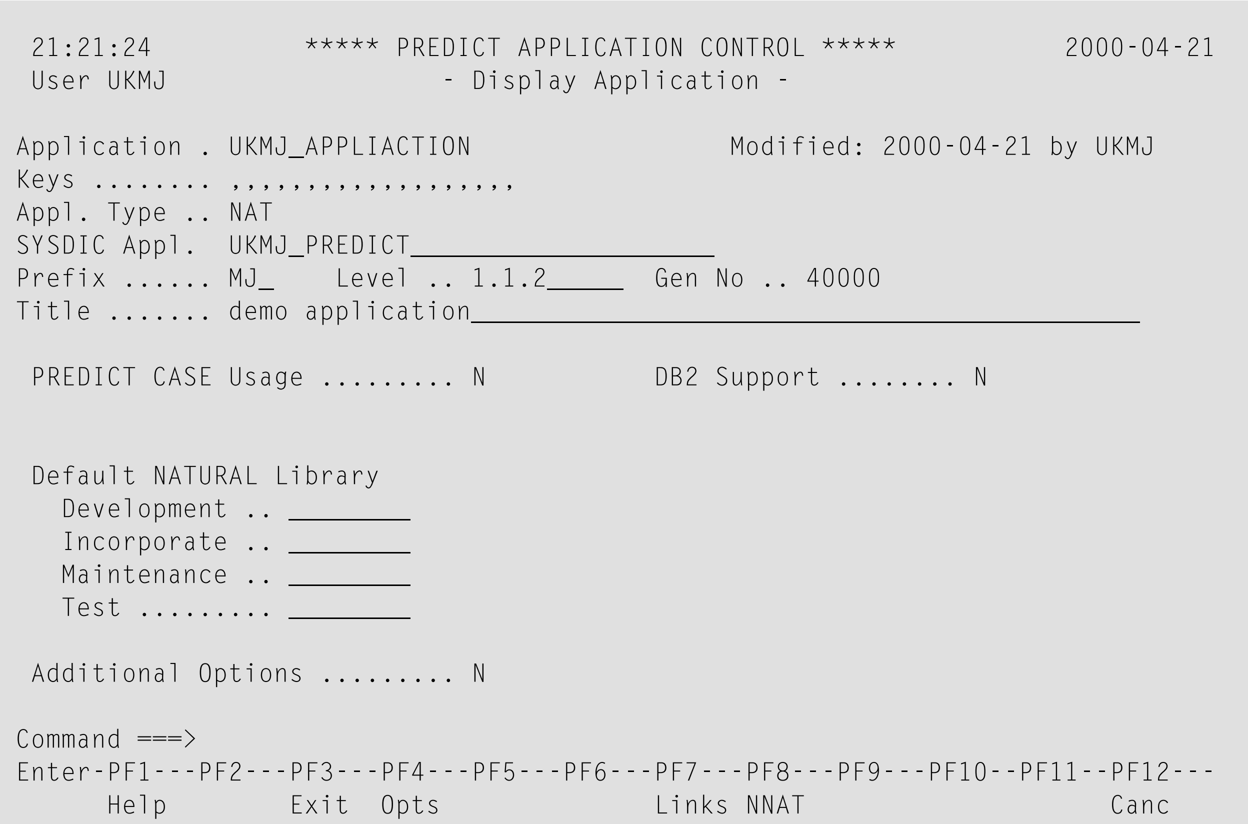
PAC Entity Sub-Function Screens

Certain entity sub-function screens are similar to each other and across all PAC entities. These similarities are discussed in the following paragraphs.

Entity sub-function screens are accessible using menu Codes or direct commands. Refer to the PAC Reference documentation for more information about PAC commands.

Display/Modify Screens

The PAC Display screens allow you to view information about PAC entity definitions. Maintenance may not be performed on display screens. The PAC Modify screens are used to edit PAC entity definitions. Display and modify screens are similar to the Add screen and are available for most PAC entities. The following screen is a typical example:



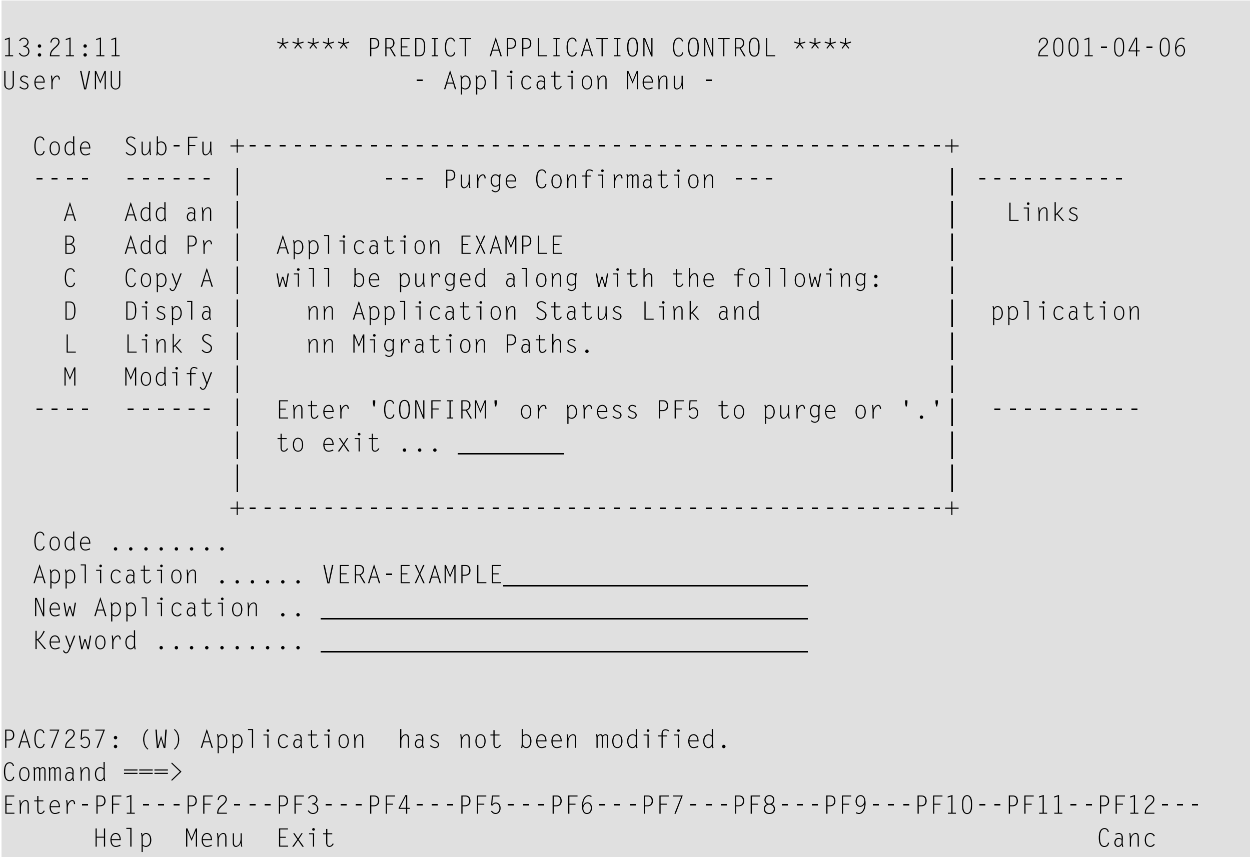
```
 21:21:24          ***** PREDICT APPLICATION CONTROL *****          2000-04-21
 User UKMJ                  - Display Application -

Application . UKMJ_APPLIACTION                 Modified: 2000-04-21 by UKMJ
Keys ........ ,,,,,,,,,,,,,,,,,,,
Appl. Type .. NAT
SYSDIC Appl.  UKMJ_PREDICT____________________
Prefix ...... MJ_    Level .. 1.1.2_____  Gen No .. 40000
Title ....... demo application____________________________________________

 PREDICT CASE Usage ......... N           DB2 Support ........ N


 Default NATURAL Library
   Development .. ________
   Incorporate .. ________
   Maintenance .. ________
   Test ......... ________

 Additional Options ......... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit  Opts              Links NNAT                    Canc
```

Display/modify screens show entity-specific information that was entered on an add/modify screen when the entity was defined to PAC or modified. Most display/modify screens provide

- the name of the entity;
- information about when and by whom the entity was added/modified; and
- access to Additional Options.

Purge Windows

The PAC Purge option is used to delete PAC entities. The following Purge Confirmation window is a typical example:



```
13:21:11          ***** PREDICT APPLICATION CONTROL ****            2001-04-06
User VMU                   - Application Menu -

  Code  Sub-Fu +----------------------------------------------+
  ----  ------ |         --- Purge Confirmation ---           | ----------
    A   Add an |                                              |   Links
    B   Add Pr |  Application EXAMPLE                         |
    C   Copy A |  will be purged along with the following:    |
    D   Displa |    nn Application Status Link and            |  pplication
    L   Link S |    nn Migration Paths.                       |
    M   Modify |                                              |
  ----  ------ |  Enter 'CONFIRM' or press PF5 to purge or '.'|  ----------
               |  to exit ... _______                         |
               |                                              |
               +----------------------------------------------+
  Code ........
  Application ...... VERA-EXAMPLE____________________
  New Application .. ________________________________
  Keyword .......... ________________________________


PAC7257: (W) Application  has not been modified.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

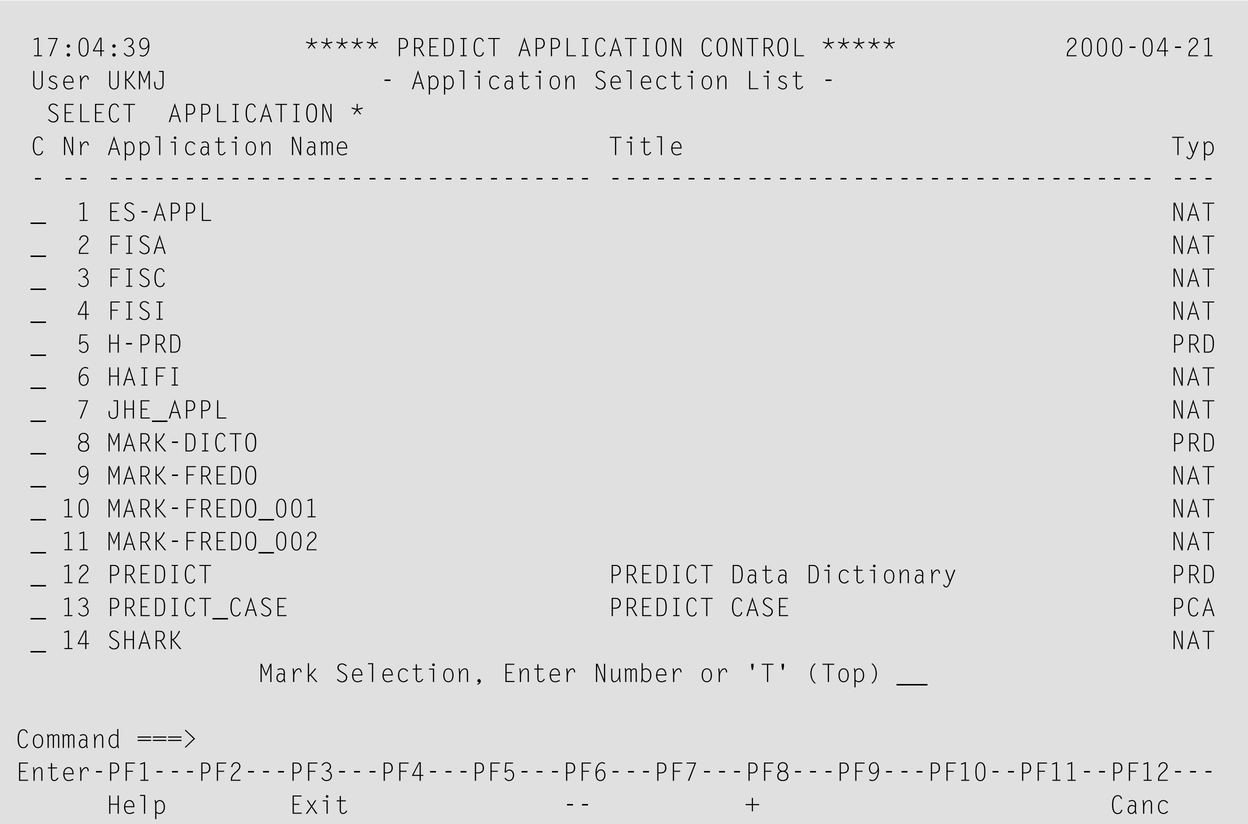
For most PAC entities, the Purge Confirmation window displays information specific to the entity to be purged. This example for purging an application reminds you that the associated application status links, migration path definitions, and file translation tables will be purged along with the application.

From the Purge Confirmation window, you can

- type CONFIRM at the cursor position or press PF5 if you still wish to purge the application;
- type a period (.) at the cursor position or press PF3 (Exit) to return to the Application Menu without purging the application.

Selection List Screens

For most PAC entities, PAC Selection List screens allow you to select a specific entity, or several entities. The following screen is a typical example:



```
 17:04:39          ***** PREDICT APPLICATION CONTROL *****           2000-04-21
 User UKMJ              - Application Selection List -
  SELECT  APPLICATION *
 C Nr Application Name                 Title                                Typ
 - -- -------------------------------- ------------------------------------ ---
 _  1 ES-APPL                                                               NAT
 _  2 FISA                                                                  NAT
 _  3 FISC                                                                  NAT
 _  4 FISI                                                                  NAT
 _  5 H-PRD                                                                 PRD
 _  6 HAIFI                                                                 NAT
 _  7 JHE_APPL                                                              NAT
 _  8 MARK-DICTO                                                            PRD
 _  9 MARK-FREDO                                                            NAT
 _ 10 MARK-FREDO_001                                                        NAT
 _ 11 MARK-FREDO_002                                                        NAT
 _ 12 PREDICT                          PREDICT Data Dictionary              PRD
 _ 13 PREDICT_CASE                     PREDICT CASE                         PCA
 _ 14 SHARK                                                                 NAT
                Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit              --          +                       Canc
```

On most Selection List screens, the SELECT sub-function displayed in the status line directly under the User field indicates that you accessed the screen using

- selective processing;
- range notation or blank in the entity field along with the Copy, Display, Modify, Link, Purge, or Select sub-function; or
- the SELECT direct command.

If you accessed the screen with the S (Select ... from a List) sub-function or the SELECT direct command for one or more of the listed entities, the sub-functions specific to that entity (except Add) may be processed directly by entering the function code for the sub-function in the "C" column.

A period (.) entered in the "C" column returns you to the entity menu.

If you mark the entity with the cursor or enter an X or an S in the "C" column, or if you enter the corresponding number (from the "Nr" column) in the Mark Selection... field, the entity menu along with the name of the specified entity is displayed.

Using Selective Processing

Selective processing is an online facility that allows you to display a Selection List screen containing a list of all entities meeting specified selection criteria. You can access a PAC Selection List from a PAC sub-function menu by

- entering the desired code in the Code field and
  - an asterisk (*) in the fields displayed below the Code field; or
  - nothing (blank) in the fields displayed below the Code field.
- entering code S (Select) and
  - nothing (blank) in the fields displayed below the Code field; or
  - a range as described in the section Using Range Notation, below.

Using Range Notation

Many PAC sub-functions allow attributes to be specified as a range using the following notation:

Notation	Displays a list of . . .
blank or *	all objects/entities beginning with the first item.
value*	objects/entities beginning with the specified value.
value>	objects/entities greater than or equal to the specified value.
value<	objects/entities less than or equal to the specified value.

Using the Natural Editor

Many PAC sub-functions are performed using the Natural editor screen or window. Refer to the PAC Reference documentation for more information about the Natural editor commands used by PAC.

Using the Hardcopy Sub-Function

The hardcopy sub-function is available only on selected PAC menus and only if you are running PAC under the Software AG product Com-Plete. From menus that support the hardcopy sub-function, you can print information about PAC entities by entering

- code H (Hardcopy) in the Code field; and
- the name of the entity you wish to print in the relevant field.

The hardcopy is produced at the destination printer defined to Com-Plete.

Using PAC Additional Options

Additional Options fields allow you to trace the interdependencies of PAC entities and perform sub-functions on PAC entities without selecting a sub-function from a menu. The Additional Options are specific to the particular PAC entity; however, those listed in the following table are common to most PAC entities:

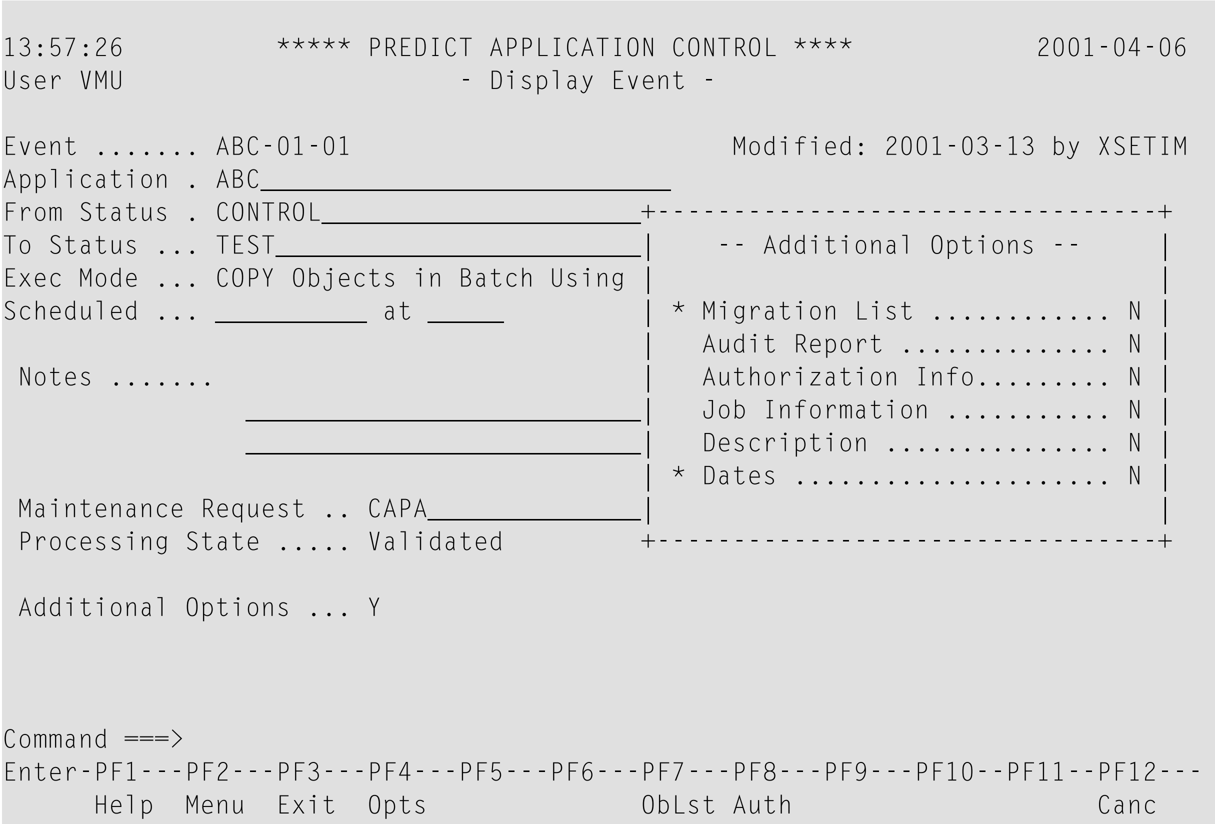
Option	Description
Aliases	Alternative name for a PAC entity such as an application. A window is displayed for adding/editing aliases.
Date	The dates and times a PAC entity was added/modified and the user ID and terminal ID of the person who added/modified the entity.
Description	Description of an entity (for example, application, status).
Keys	List of available keywords for a PAC entity such as an application or a job. A window is displayed for adding/editing. Before a keyword may be used in PAC, it must be defined to the PAC system.

For some PAC entities, Additional Options are processed only after all other changes are made to the rest of the screen. After the options are processed, the user is returned to the original screen.

At this time, all fields, except Additional Options and the command line, are protected so that no further processing may be performed on them. Thus, in the maintenance subsystem, once you enter the Additional Options submenu, all updates on the maintenance screen are locked from further data entry.

Accessing Additional Options from a Window

1. You can access the Additional Options window by pressing PF4 (Opts) or typing over the default with Y (Yes) in the Additional Options field.



```
13:57:26          ***** PREDICT APPLICATION CONTROL ****            2001-04-06
User VMU                      - Display Event -

Event ....... ABC-01-01                         Modified: 2001-03-13 by XSETIM
Application . ABC___________________________
From Status . CONTROL_____________________+---------------------------------+
To Status ... TEST________________________|    -- Additional Options --     |
Exec Mode ... COPY Objects in Batch Using |                                 |
Scheduled ... __________  at _____        | * Migration List ............ N |
                                          |   Audit Report .............. N |
 Notes .......                            |   Authorization Info......... N |
                __________________________|   Job Information ........... N |
                __________________________|   Description ............... N |
                                          | * Dates ..................... N |
 Maintenance Request .. CAPA______________|                                 |
 Processing State ..... Validated         +---------------------------------+

 Additional Options ... Y



Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              ObLst Auth                    Canc
```

An asterisk (*) at an Additional Options field indicates that the field contains unique information and suggests that you access the option. For example, "*Authorization Info" indicates that there are added parameters and information.

2. In the Additional Options window, type over the defaults with Y (Yes) to access the desired option screen. The default in Additional Options fields is generally N (No).

   You may access several options, one after another, by entering Y in multiple fields, then moving from one option to the next by repeatedly pressing ENTER. On Natural editor screens, however, you must enter a period (.) on the editor command line before you press ENTER to move to the next option.

Accessing an Additional Option Directly

On several entity screens, a PF key option is available to access a particular additional option directly without having to access an Additional Options window. For example, PF7 (ObLst) on certain migration event screens allows you to directly access the Object List Editor window. The screen above shows an example of the PF7 (ObLst) key.

Assigning Aliases to a PAC Entity

PAC allows you to assign alternative names to PAC entities so that you can access those entities more easily. All data entry fields that request the name of a PAC entity also allow you to enter the name of a previously assigned alias.

You may not assign the same alias to more than one entity of the same type. Aliases must be at least two (2) characters in length and must begin with an alphabetic character.

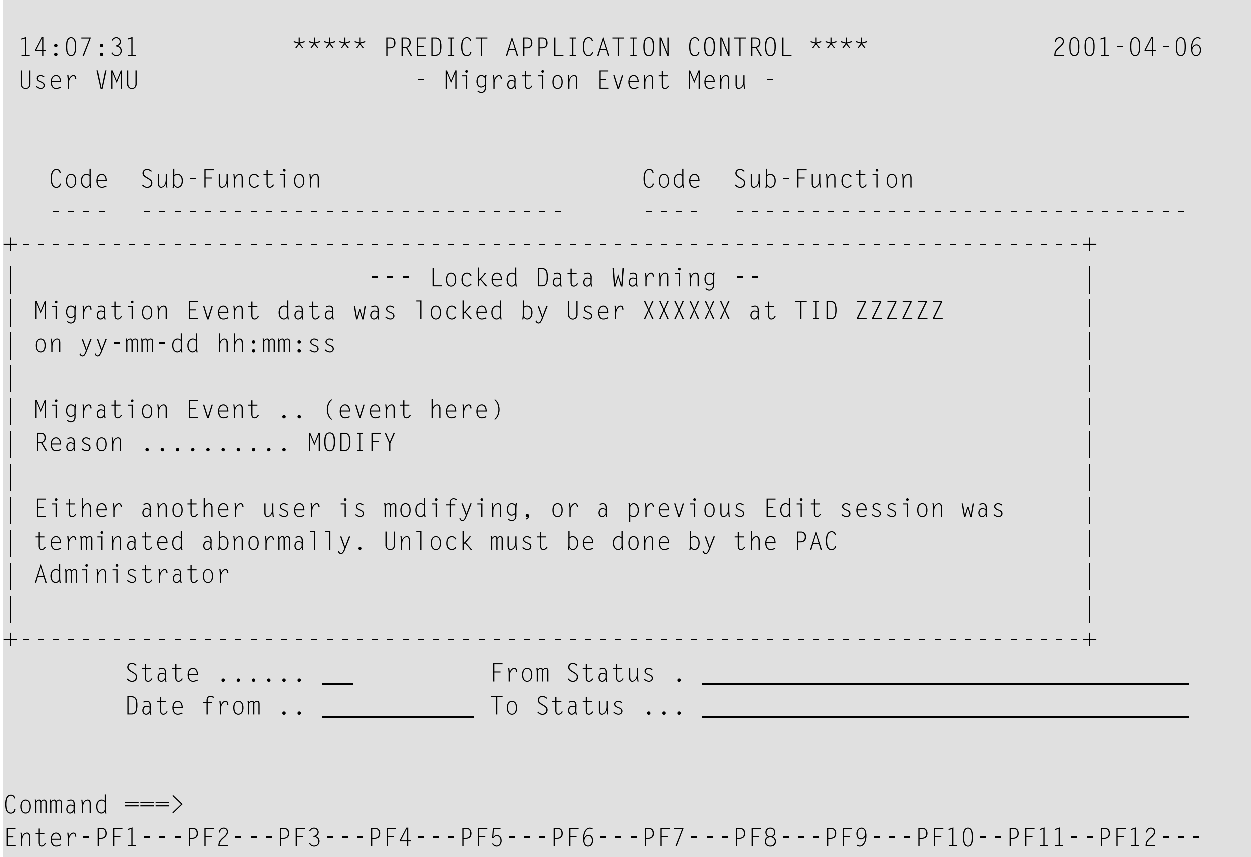
The Alias Names window is accessed using the "Aliases" option on the Additional Options window. You can specify up to sixteen (16) alternate names for the current entity.

Listing Locked Data

To gain exclusive control, PAC locks data by applying a series of unique identifiers to data involved in processing requests or migrations.

If your PAC administrator has specified Y (Yes) for the List Locked Data option in your PAC user profile, the Locked Data screen appears automatically when you log on to PAC. This screen displays a list of all the data entities locked by you or your batch user ID. It identifies the data or entity, data/entity types, the reason for locking (for example, for editing), and the dates and times they were locked.

You may view or release (unlock) only data that has been locked by you. Only a PAC administrator may unlock data that was locked by other users. If you attempt to access data locked by another user while you are using the PAC maintenance sub-functions, the Locked Data Warning window appears as shown in the following example:



```
 14:07:31          ***** PREDICT APPLICATION CONTROL ****           2001-04-06
 User VMU                    - Migration Event Menu -


   Code  Sub-Function                    Code  Sub-Function
   ----  ----------------------------    ----  ------------------------------
+-----------------------------------------------------------------------+
|                       --- Locked Data Warning --                      |
| Migration Event data was locked by User XXXXXX at TID ZZZZZZ          |
| on yy-mm-dd hh:mm:ss                                                  |
|                                                                       |
| Migration Event .. (event here)                                       |
| Reason .......... MODIFY                                              |
|                                                                       |
| Either another user is modifying, or a previous Edit session was      |
| terminated abnormally. Unlock must be done by the PAC                 |
| Administrator                                                         |
|                                                                       |
+-----------------------------------------------------------------------+
        State ...... __         From Status . ________________________________
        Date from .. __________ To Status ... ________________________________


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
```

The Locked Data Warning window provides information about the locked data, and informs you that only a PAC administrator is authorized to unlock the data. Contact your PAC administrator for assistance.

4 Planning a PAC Environment

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Predict Application Control (PAC) is a system for controlling and tracking changes made to Natural or "foreign" (non-Natural and non-Predict) applications throughout the application life-cycle. In the production environment, PAC uses the Predict Application Audit (PAA) subsystem to protect and audit the application.

This chapter covers the following topics:

Application Phases

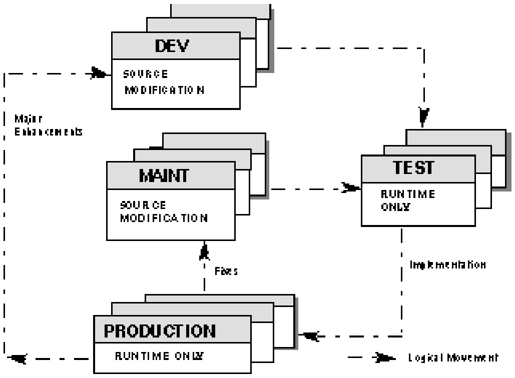
Applications typically move through more or less formal phases or statuses, of development, testing, and production. A maintenance status with unique functions distinct from those in development may also exist. These statuses are summarized in the following table:

Status	Description
Development	The application source code is developed and/or modified and major enhancements are added to fulfill a specific purpose for the organization.
Testing	Modifications and enhancements are tested before the application is put into production. Types of tests might include - Functional - System - Integration
Maintenance	Modifications including minor enhancements to the source code may need to be made apart from development, especially if the development effort is at a different level from that of the code being maintained. If no distinct maintenance phase is recognized, maintenance would be considered part of the development phase.
Production	The application fulfills its purpose within the organization.

Note: When using an external version control software together with PAC the application is linked to a status of type **External**. It is possible to link such an externally versioned application to a status of type Development or Maintenance in parallel. However, the sources stored in the external version control software will not be updated.

Programs are copied to and from locations. These are usually Natural libraries, Predict system files or partitioned datasets (PDSs) for foreign objects. A single application may comprise various objects in a set of locations having a single name. These named location sets are called deployments, and are discussed in **PAC Controlled Environment**.

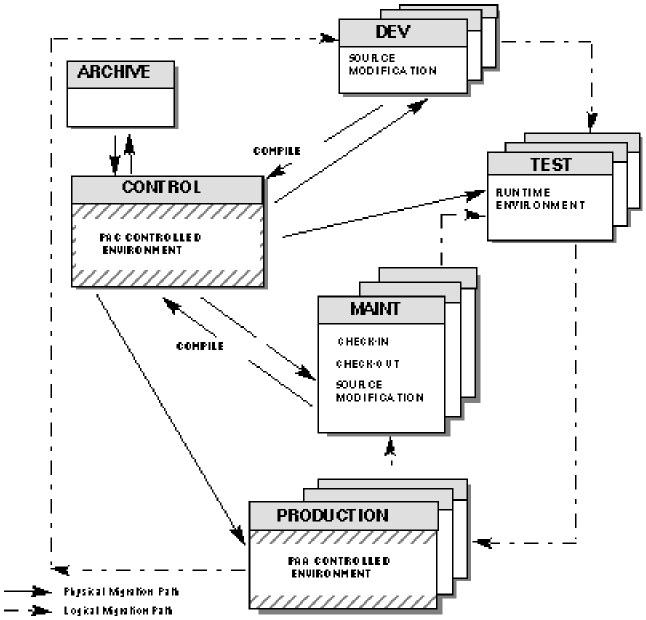
Application statuses are linked by the logical paths typically taken by application objects as they move through the application life-cycle. An Application Environment:



Integrating PAC

You can integrate PAC into your application environment to control the application without significantly changing the way the application moves through its life-cycle. In general, application phases become defined PAC statuses. Application objects are migrated from one status to another.

The following diagram shows the PAC system integrated into the application environment shown above.



The illustration above indicates the physical and logical paths of objects as they are migrated between the PAC statuses in the application life-cycle. Logically, PAC simulates the application life-cycle, but physically, objects are migrated in and out of PAC.

PAC Controlled Environment

Two files are used to physically implement PAC in your environment: the PCF and ACF system files. All applications defined to PAC are linked automatically to the Control status which is represented physically by these two files.

When Predict Application Audit (PAA) is implemented, the PAA system file is also used.

This section covers the following topics:

- Application Control System File - ACF
- Predict Control System File - PCF
- Tracking the Application's Path

Application Control System File - ACF

The PAC ACF file is a protected file that stores:

- Source and executable code for every object version in the PAC-controlled environment;
- Object-version information;
- PAC entity definitions;
- JCL used for batch PAC jobs;
- System and user profile information; and
- Control data about the PAC installation itself.

Predict Control System File - PCF

The PCF file contains the current versions of all objects for all applications under the control of PAC. PAC keyword definitions and generation defaults are also stored on this file.

To guarantee consistency in the PAC controlled environment, Natural objects are saved and compiled here using the current object versions of subordinates as defaults in the compile process. Additionally, Natural rules and views/DDMs are generated here from Predict verifications and userviews.

The file has the same file definition table (FDT) as a Predict file. It is not accessible to a user, but is used as a work area during migrations that involve the development, maintenance, and incorporation statuses.

Tracking the Application's Path

The ACF system file records the state of an application. In most PAC cases, "updating an application" means in fact updating the application's ACF record. Among other things, the ACF tracks the location(s) of the components comprising the application. These combined locations are grouped into a named set called a deployment.

There are five types of deployments:

- Incorporation
- Development
- Test
- Maintenance
- Production

A deployment becomes one of the above types when it is defined in the link between the application and a status. A given location (say, the application's job control in a partitioned dataset) could occur in more than one application-status link; however, it is better to avoid such cases, since marking an application-status link with one of the five deployment types applies to all application-status links for that particular status.

PCF/ACF System File Location

You can decide where to locate the PCF and ACF system files based on the production, development, or test environments. Before you decide, however, you need to consider the security, network, and distributed environments operational procedures (such as backup and recovery) of the location environment.

For example, monthly or even weekly backups may not be adequate because PAC files generally contain "production" data in the development database; that is, objects of applications implemented for production use. On the other hand, placing PAC files in a production database may affect performance due to programmer and quality assurance activities.

When to Implement PAC

Certain physical constraints in your environment may affect the way applications are handled in the PAC (and PAA) systems:

- the responsibilities of users, including those authorized to perform PAC functions;
- the sequence of testing through which the application passes;
- the location of application development, maintenance, testing, and the implementation of the application in production;

- the access to various functions and the movement of objects to various locations according to the environment definition.

Based on the requirements of your environment, you must decide when in its life-cycle you will place your application under PAC control. Two possibilities for implementing PAC are illustrated in the following examples.

Example 1: After the Code is Written

PAC is traditionally implemented into the application environment after the code is written and as the first phase of testing begins.

Advantages: The state or progress of application objects can be tracked during all phases of the application's life-cycle, especially during testing.

Disadvantage: Because the activity of the physical PAC system files is intensified, increased maintenance to these files is required.

Example 2: After the Testing is Completed

Objects may be placed under PAC at a later stage after all testing is completed; the final phase of test and acceptance can then be completed under PAC control.

Advantage: The number of object versions in PAC is reduced. During testing, superseded versions of objects are simply discarded. Only object versions that reach the final testing phase are placed under PAC control and tracked.

Disadvantage: You have less information about the progress of the application; minimal versions of the code are retained.

What PAC Functions to Implement

The PAC architecture allows you to implement its comprehensive set of change management functions and facilities in phases. You can start with basic PAC functions and build expanded PAC capabilities into your environment as and when the need arises.

The first phase includes PAC's basic migration facilities for implementing application(s) from development into production. These migration facilities allow you to

- control the migration process;
- automatically version and track all objects loaded into PAC;
- save time with automated procedures; and
- track all of your activities as you move your application from development into production.

Once you are familiar with the basic PAC migration procedures, you can implement additional PAC capabilities according to your own requirements.

This section covers the following topics:

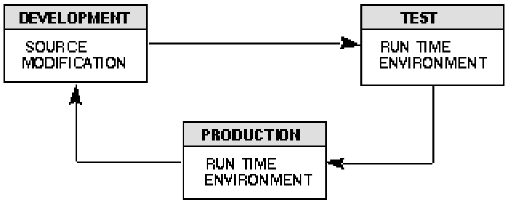
- Sample Application Life-Cycles

Sample Application Life-Cycles

This section contains some basic application examples. They can serve as a guide as you start using PAC and begin to think about how PAC can best serve your individual application needs.

Sample 1: Basic Setup

The basic setup example provides control over the migration of your application from development to testing, and from testing to production. The basic application life-cycle:



If you test during development, you might eliminate the test status. The application life-cycle would then be:

Development ->Production ->Development

Sample 2: Add a Second Test Status and a Maintenance Status

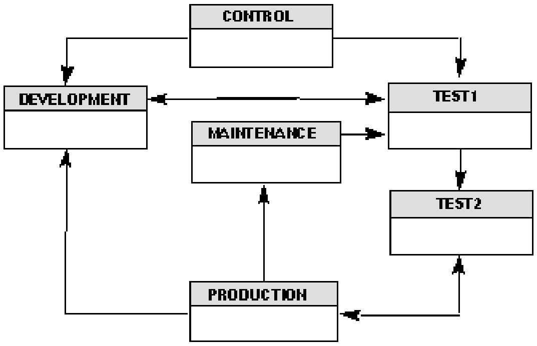
The second example includes an additional test status and a maintenance status.

Additional test statuses can be used if your application testing comprises various phases such as unit, system, and acceptance testing.

The maintenance status accommodates bug fixes and minor enhancements to your production applications. It is separated from development to avoid any conflict with other ongoing development. Maintenance may reflect changes to production while development may contain a later phase of the application that is no longer consistent with the code in production.

The Control status indicates that the application is under the control of PAC. The Control status can be used as an intermediate step when migrating objects; however, if it is not required, migrating directly to the Control status can be deleted from the test plan. When objects are migrated from a development or maintenance environment into PAC, they are always implicitly migrated to the Control status.

The modified life-cycle with test and maintenance phases is represented by the following diagram:



Additionally, you might use an incorporation status for loading objects into PAC initially. The incorporation status allows you to take on an existing application without its objects being recompiled in PAC.

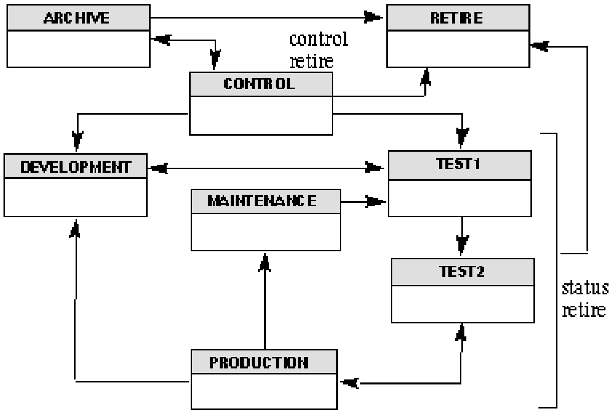
Sample 3: Add the Archive Status and a Retire Status

The third example includes two additional statuses: Archive and Retire.

The Archive status is used to store objects off-line until they are needed again or until they are permanently removed from the PAC system.

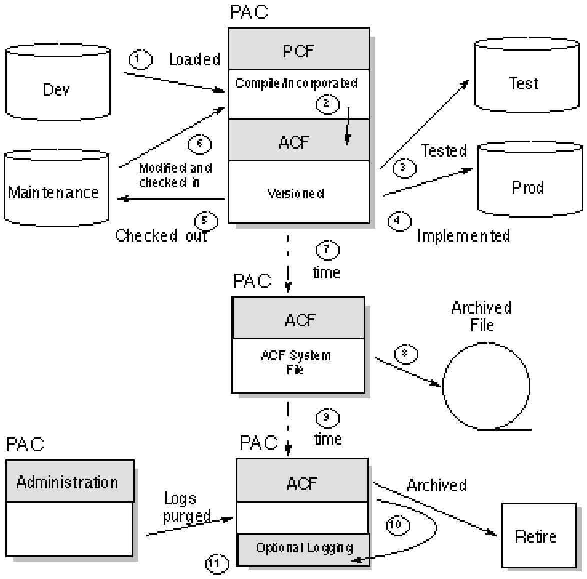
A Retire status may be used to remove an object from a particular status, or out of PAC completely. For example, if an object is migrated to maintenance, and then it is determined that modifications are not needed, it can be "retired" from the maintenance status; that is, the maintenance of the object can be cancelled and the object itself removed from the maintenance environment.

The following diagram shows the life-cycle with archive/retire phases:



Life-Cycle of a PAC Object

Following is an example of a typical life-cycle of an object within PAC illustrating some of the PAC facilities:



The steps illustrated in this diagram are summarized as follows:

Step	Action
1	The object is migrated into PAC.
2	The object is compiled and then versioned.
3	Test the object.
4	Implement the tested object into production.
5	Check the object out for maintenance.
6	Check the modified object back in. The object is then retested and implemented again into production and supersedes the current production version.
7	The superseded object ages.
8	The superseded object is archived and unloaded.
9	The archived object ages.
10	The archived object is retired.
11	If logging of retired (purged) objects has been implemented, the final step is to purge the logs of the purged object and totally remove all audit information for the object from PAC.

Foundations of PAC Control

Three basic principles of change control systems are observed by PAC:

- Objects are compiled only once;
- Only tested code is placed in production; and
- The source code is located in only one place to prevent possible inconsistencies.

Except for foreign objects, objects are compiled by PAC only once for the following reasons:

- To avoid recompiling and all of the effort and resources used to set up an environment with all of the objects to be compiled, including the subordinates (data areas, views, rules, maps, copycode) needed when the object is migrated to a new environment (test or production);
- To prevent anomalies from occurring if objects are recompiled with changed code or with different instances of their subordinates.

For example, if a piece of copycode is modified, it is not necessary for all objects that use it to be recompiled. If the copycode is changed and the object is recompiled, the new version of the object that uses this copycode will be untested and may no longer execute in the same way that the previous version did.

By not recompiling, the PAC methodology of implementing only the tested code is maintained.

The PAC methodology requires that all versions of the code be maintained in a single location so that the latest source code can be located at all times and remains distinct from previous versions of code that have been tested. Programs that use dynamic source variables are the exception to this.

The basic purpose of PAC is to support the integrity of the production environment; therefore, Software AG recommends that source code not be available in the production environment for the following reasons:

- To maintain integrity, PAC must ensure that all objects running in production are synchronized with PAC and have proceeded through the appropriate control and tracking mechanisms inherent in the PAC product and defined by the user (primarily, the migration paths).
- When source code resides in the production environment, changes can be made to it and the code can be recompiled. Such changes are incompatible with the basic tenets of change management.

For foreign objects, PAC assigns versions to both the source and object (loadable) code. PAC does not force a recompilation of these object types; instead, PAC assumes that the source and object code match. Once migrated into PAC, these foreign objects follow the same application life-cycle as Natural-based code.

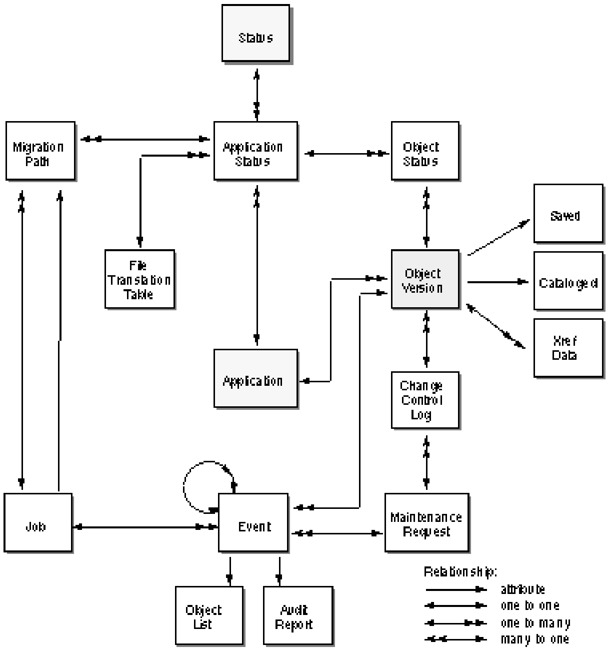
PAC Entities and Their Relationships

An object and any other life-cycle component and path defined to PAC is a PAC entity. The following basic entity types used in the PAC and PAA systems are initially defined to PAC in the following sequence (these and other entity types are described in the glossary):

Order	Entity
1	Status
2	Application
3	Application status link
4	File translation table (FTT)
5	Migration path
6	Job
7	Maintenance request
8	Migration entities (migration event, object list, audit report)
9	Versioned object
10	Change control log
11	Keyword

Once the PAC entities are initially defined, you can add or modify the definitions with minimal concern for the sequence. For instance, entities such as maintenance requests that are not immediately needed can be defined as the need arises.

The relationships among PAC entities are illustrated in the following diagram:



As the individual PAC entities are discussed in the following sections, their immediate relationship to other entities is reiterated.

PAC entities can be identified by optional keywords - user-defined tags for identifying PAC entities or object for reporting purposes. Keywords can identify application components, or the users who own and/or use the entities. Keywords can be user-defined or preassigned by the PAC administrator for automatic assignment whenever a user creates an entity.

For more information on defining keywords, see **Appendix B**. Information on assigning predefined keywords is contained in the later descriptions on creating the respective entities.

PAC Administration Facilities

PAC provides administrators with facilities for performing system-level maintenance functions as described in the PAC Administration documentation:

- Add, modify, and delete user profiles, including authorization levels.
- Maintain defaults for applications, applymods, system profile descriptions, and Predict generation.
- Activate and deactivate user exits.
- Define foreign support for the PAC installation.
- Release locked data.
- Reset migration events so that they can be rerun.

- Maintain table definitions for maintenance requests.
- Maintain security definitions for views.
- Finalize the process of archiving objects.
- Purge change control logs, audit histories, and obsolete object versions. Object versions can be purged with or without first archiving them.

PAC Utilities

PAC provides three types of utilities: migration, scan, and compare. PAC utilities are described in the PAC Reference documentation.

This section covers the following topics:

- Migration Load - MIGLOAD Utility
- Scan Utilities
- Compare Utility

Migration Load - MIGLOAD Utility

The PAC migration load MIGLOAD utility performs the same functions as the Natural utilities NATLOAD, but also creates and uses PAC control information. If you want to use only one utility in a mixed environment, you can use MIGLOAD for non-PAC objects as well.

The MIGLOAD utility loads Natural and foreign saved objects and cataloged objects, views and user error messages. A MIGLOAD report lists the name, type, and version of each object loaded; its destination library, database, and file; whether or not it replaced an existing object with the same name in the destination library; and other information.

You can execute MIGLOAD in either batch or online mode, using menu selections or direct commands.

Scan Utilities

Scan utilities allow you to scan Natural object versions and migration paths. These utilities can be executed in batch or online.

- SCANOBJ is used to scan for any string of characters in the source code of versioned objects that belong to an application defined to PAC. You can specify a range of objects or object types, a version number, a range of version numbers, or all versions in a particular status. The utility supports absolute scans.
- With SCANPATH, you can scan all migration paths for a specified job name. This utility includes options to replace the job name selectively or globally and to modify migration-path defaults.

Compare Utility

The PCA compare utility allows you to compare both Natural and foreign object types. Outside of PAC/PAA only Natural objects can be compared; inside of PAC/PAA, both Natural and foreign objects. You can compare:

- Individual objects as well as lists of objects;
- directory information of objects

It is also possible to compare an object outside of PAC/PAA with one that is controlled by PAC/PAA. For a detailed description of the Compare Utility see the PAC Reference documentation.

Facilities for Customizing PAC

PAC provides Application Program Interfaces (APIs), more than 30 user exits, and more than 30 applymods to help you customize the PAC environment to meet your specific requirements. These facilities are described in detail in the PAC Reference documentation.

This section covers the following topics:

- Application Program Interface - API Facility
- User Exits
- Applymods

Application Program Interface - API Facility

PAC provides an Application Program Interface (API) facility to simplify the process of customizing PAC to meet your site requirements. The APIs provide flexibility in accessing PAC information and interfacing with your existing systems.

PAC APIs are Natural subprograms that can be used to call PAC directly from within a user-written program without invoking PAC with MENU, ADMIN, or SYSPAC commands. For example, you can create a maintenance request or migration event without entering the PAC system. When you enter information on a front-end screen, the information is communicated to PAC.

The maintenance-request API lets you interface an external problem-tracking system with PAC. You can validate maintenance requests against the external system or extract data from it.

Another API lets you retrieve statistics for an object, display source code for an object version, and edit the source code from the work area.

User Exits

At various points in the system, PAC provides user exits that pass control to a user-written Natural program. When activated by the administrator, these exits allow you to

- add site-dependent code into PAC processing for auditing, security verification, or additional rules;
- add functionality to certain PAC processing; or
- override default change-management procedures.

For example, if the user exit PACEX010 is active, it is invoked during the validation of an object list for a migration. The PAC administrator can view each entry in the list and disallow the migration of specific objects.

Applymods

System applymods change certain PAC or PAA processing defaults. For example:

- The user who authorizes a PAC migration event can normally override some event parameters during authorization. Applymod 1 disallows the override.
- By default, PAC creates a new version of an object even if the object fails to compile successfully during a migration from a development or maintenance status. Applymod 14 rejects an object with compilation errors so that no new version is created.

A user who authorizes an event can activate or deactivate applymods by selecting from a list. The PAC administrator establishes the default applymod settings and can prevent specified settings from being overridden by the event authorizer.

5

Configuring a PAC Environment

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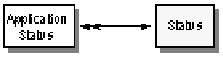
Once you have decided on the life-cycle stages for your application, you need to define the statuses you will use, you need to define your application to PAC, and you need to link the application and the statuses. You need to decide where the user data will reside for each status and for Natural objects, you may need to use file translation tables.

When you have defined the statuses and the application to PAC, and have defined the application status links between them, you need to define the migration paths between statuses that the application will use.

This chapter covers the following topics:

Defining PAC Statuses



Each status represents a distinct phase, stage, or milestone in the life-cycle of an application. Within PAC, each status is an operational environment for an application or object. The type of status determines how PAC handles objects in that status.

- A status defines the location of objects migrated to that status.
- An object may exist in several statuses at any one time.

Status definitions are used to set up statuses in PAC. They establish the defaults to be used when the status is linked to an application. These definitions identify:

- the status type;
- the Natural system file where the Natural objects are located;
- where applicable, the associated Predict file where Predict objects such as cross-reference data, files and verifications are kept;
- options for maintaining cross-reference data for the status.

This section covers the following topics:

- Status Types
- Status Locations
- Foreign Object Support
- Logical Definition
- Defining Applications to PAC
- Application Name
- Copying an Application
- Original Application Library
- Using Other Applications as Steplibs

Status Types

A PAC status type (deployment) determines the rules of migration to/from the status. Although the PAC controlled environment consists of the same basic environments that are typically found in an application environment (development, maintenance, test, production), the PAC status types that correspond to these environments have differing behaviors; therefore, you should select the environment accordingly.

Using PAC, you are free to assign a status type maintenance to an application development environment or a status type test to a production environment. The status type defines the rules; you are free to use the rules as appropriate in your particular PAC system.

A status type cannot be modified; however, a status may be purged if it is not populated with objects. For instance, once an application has passed through a certain status, it may never need to pass through that status again. In those cases, the definition for that status could be removed from the application life-cycle.

All or any combination of status types may be used when establishing a user environment or identifying it to PAC. When you define a status to PAC, you must assign one of the predefined status types to it with the following exceptions:

- You may not assign the reserved PAC status types of Archive, Control and Retire; only PAC designates Archive, Control and Retire statuses.
- A corresponding history status type is defined whenever a production status type is defined to PAC. A history status is optional, however, and may be omitted.

Reserved PAC Status Types

The Archive, Control and Retire status types are reserved to PAC. There is one and only one instance of each type; that instance is predefined in the PAC system and cannot be deleted.

Archive

The Archive status type is a single status named "archive".

It is the status for any versioned object that has been removed either temporarily or permanently from the PAC environment. Objects that exist in test, production, and maintenance statuses are normally not eligible for archiving (but see Applymod 23). Active production objects cannot be archived.

When an object is migrated to the Archive status, it is removed from all other statuses. The object can be unloaded to disk or tape and purged from the PAC system.

Control

Control is a single status named "control".

The PAC controlled environment is synonymous with the PAC reserved status "Control".

All objects are automatically placed into Control status when they first enter the PAC controlled environment, even if they are not explicitly migrated to Control. This means that the source and executable code for all versions of all objects for every PAC-controlled application are always accessible in the Control status and are centrally controlled. When reviewing objects in Control status, you can see all other statuses in which the object exists as well.

The Control status is implicitly used whenever application objects are migrated into and out of PAC; the objects need not be migrated directly to the Control status. If the destination status is a status other than Control, PAC then copies the executable object from Control to the destination library. Thus, an object in a production status could be copied to a maintenance status for changes while the original remains available to users.

If explicitly identified, the Control status may be used as a staging area and a way to distribute authority. Parts of an application may be completed and migrated into the PAC Control status, one part at a time. Once the whole application is ready for testing, it can be migrated as a unit from the Control status to statuses for which migration paths have been specifically defined.

For example, several programmers may be responsible for different parts of an application. The programmers could be allowed to independently migrate their parts of the application to Control. When all the parts have been compiled and stored in the ACF, the project leader could authorize an event migrating the entire application from Control to a designated test status.

Although all versions of objects are accessible from Control, PAC assumes the most recent version is intended when an object is referenced by the status Control.

Retire

A retire status defines a logical location for objects to be purged

- from PAC Control or Archive.

  Objects that exist only in Control status, or objects that have been removed from all other statuses and have been archived, may be physically and permanently removed from PAC, including all audit information stored about the objects.
- from another PAC status.

  Retire from a status other than Control or Archive results in the permanent removal of the object(s) from the specified origin status, and the removal of the object status definition in PAC, but no deletion of the object(s) in PAC itself. Inactive or obsolete objects are good candidates for migration to a retire status. Applymod 23 must be active to retire objects from statuses other than Control or Archive.

User-Definable Status Types

Other status types can have multiple instances defined and named by the user. This is especially useful in distributed or decentralized environments. For instance, if your application is to be moved into production in more than one environment, a production status is recommended for each environment. Each user-defined status must be assigned a status type.

Development

The development environment is usually the location where all new and major ongoing application development occurs. Objects in the development environment are not part of the PAC controlled environment and source code can be modified freely.

Because the development environment has minimal controls or restrictions applied to it, needed controls or security restrictions must be implemented through Natural Security, Adabas security, or other facilities external to PAC.

A development status type defines the location of objects being developed, before they are migrated to the PAC controlled environment.

Only saved objects are migrated into the PAC controlled environment from a development status; they are cataloged in PAC as part of the migration process unless they are identified as dynamic source. Natural command processors are special cases in that they may be migrated into PAC in catalog form without being recompiled during the migration. Foreign datasets may be migrated into PAC either as source or compiled code and are not compiled by default during migration.

External

The link of a PAC application to an External status defines a foreign source from where Natural sources can be transferred into a PAC controlled environment and holds the information about the path into the external version control software. Additionally, a user ID and a password may be defined to such an application-status link. This information is used for every future access to the sources in the external version control software.

The status type External is a mixture of the behaviour of the statuses Development and Incorporation in the following sense: objects to be transferred will be compiled newly and a new PAC version of the object code is created, but it is not possible to transfer objects into such a status.

Maintenance

A maintenance status defines the location of maintenance libraries where saved objects that have been checked out of the PAC controlled environment can be modified to correct problems or add functionality.

Objects in a maintenance status differ from objects in a development status in that maintenance objects are always implicitly tracked by PAC. PAC automatically creates a change control log and performs check-out/ check-in controls for all objects migrated to a maintenance status and tracks their progress. This control allows PAC to keep track of and differentiate modifications made concurrently in two places◎development and maintenance.

When these objects are associated with maintenance requests, PAC allows you to view all objects updated/modified for a particular maintenance request.

The maintenance environment can optionally support a test environment where changes can be tested before being returned to the PAC controlled environment.

When modified objects are returned to PAC control, the saved object is migrated into the Control status and cataloged; that is, "checked in" (unless it is dynamic source). A new version number is assigned to the object, and the old version number is kept as a reference note on the new version.

Both Development and Maintenance

Both a development and a maintenance status type are available in PAC to accommodate the requirements of applications undergoing routine maintenance and development at the same time - an essential consideration when an application continues to be developed after it is implemented in production.

Separating these two environments precludes the possibility of objects being recompiled with the incorrect subordinates userviews, rules, global data areas, maps, and copycode.

If both a maintenance status and a development status are established:

- the development status is generally used for developing the next major implementation of an application as a whole; whereas
- the maintenance status is used for required maintenance to the implementation of the application currently running in production.

If both development and maintenance statuses are defined, they need to be associated with different libraries (and Predict system files, where necessary).

Incorporate

The incorporate status defines the location of an existing application to be "taken on" when PAC is first implemented at a site. Entire applications or certain objects of an application can be incorporated into PAC. Objects incorporated into PAC will not be compiled.

This status type allows you to place under PAC control applications or objects that exist only in catalog form.

Objects can be incorporated to a Control, test, or production status type. The incorporated application establishes a base level for subsequent development, testing, implementation, and maintenance in the PAC environment.

In some cases, you may wish to incorporate your applications into PAC and never compile them in PAC, perhaps because the application originates from a remote location and should not be recompiled unless absolutely necessary.

An object may be incorporated only if a previous version of the object was not compiled in PAC. PAC does not allow an object previously migrated into PAC from a development or maintenance status type to be incorporated, because incorporation could affect the integrity of not only the object itself, but related objects and even the entire application. PAC has no way of synchronizing and controlling subordinate and other objects that may be used by the incorporated object since objects are not compiled when they are incorporated into PAC.

Test

A test status defines the location of objects in a test environment. Test statuses are used to facilitate the testing of applications before they are implemented in production. You may define several user-defined test statuses such as integration test, system test, quality assurance, and user test to accommodate the application test plan.

All objects migrated from PAC to a test status type are implicitly tracked. In principal, test status types have only execution (runtime) requirements and generally need to have objects in compiled (cataloged) form only. Objects that use dynamic source variables are an exception.

During testing, an application may be modified using SYSMAIN or the PAC migrate/load utilities. However, if PAC is not also updated with any changes made, the changes are ignored when PAC migrates objects from the test status. This restriction ensures the consistency of the application.

If you need to maintain a protected environment during application testing, you should consider establishing the test environment as a production type environment. Certain protections can also be implemented using Natural Security.

Separate libraries (and Predict system files, where necessary) are recommended for different test statuses. It is not necessary to use a separate Natural system file.

Production

The primary objective of PAC is to preserve the integrity of the production environment.

Production is normally the ultimate environment in which an application is installed for use by an organization for its business needs. Except for objects that use dynamic source variables, PAC migrates only executable code to a production status.

A production status defines the location of the PAA system files. You may define as many different production statuses as you need to accommodate a distributed production environment.

A production status type is controlled and audited by the Predict Application Audit (PAA) subsystem, an extension of PAC that enforces integrity, consistency, and control. All objects are protected by PAA and cannot be modified.

Although PAA reporting facilities are independent of the PAC reporting facilities, all objects migrated into the production environment are under PAA control and remain consistent with the versioned objects under PAC control. The status of the application and its objects in the production environment is known for any time, present or past.

PAA tracks application activities in the production environment and provides information about

- the sequence of migration events, information that may be important for resolving certain problems;
- the PAC objects that were actually migrated into the production environment;

- the objects that were backed out; and
- the objects that have been activated.

PAA also provides administrative facilities in the production environment.

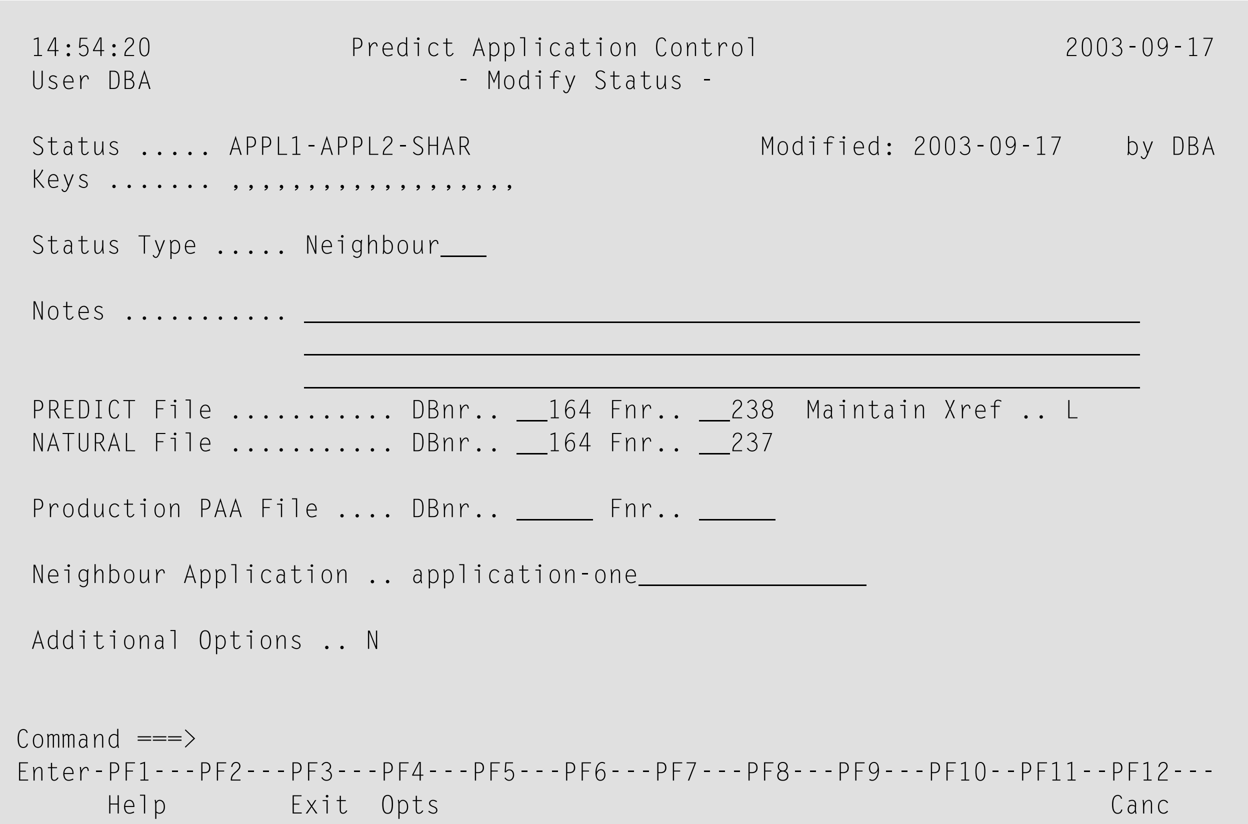
Software AG recommends that the production environment be kept separate from all other PAC environments; that is, the production environment should have a separate Natural system file and a different Predict system file.

Neighbour

A neighbour status (Nbor) is used to facilitate the migration of objects between two separate PAC applications. This status belongs to the user-defined group even though it has an internal function within PAC. The status, when defined can carry any name the user chooses and has to be linked to the receiving application by means of the standard Application-Status link definition. PAC treats this status as a shared central repository for the linked applications.

The functioning of this status can best be described in the form of an example:

A user has two applications defined to PAC with a normal status life-cycle defined for these applications, 'Application-one' and 'Application-two'. After some time the user has a business need to transfer some objects from Application-one into Application-two. The user now defines a new status of type neighbour (Nbor) and calls this status 'appl1-appl2-shar'. During the definition of this new status there is a new field on the status definition screen *termed* 'Neighbour Application' this has to be the name of the application where the objects will be coming from and in our example this is 'Application-one'.



```
 14:54:20             Predict Application Control                    2003-09-17
 User DBA                    - Modify Status -

 Status ..... APPL1-APPL2-SHAR                   Modified: 2003-09-17    by DBA
 Keys ....... ,,,,,,,,,,,,,,,,,,

 Status Type ..... Neighbour___

 Notes ........... _______________________________________________________
                   _______________________________________________________
                   _______________________________________________________
 PREDICT File ........... DBnr.. __164 Fnr.. __238  Maintain Xref .. L
 NATURAL File ........... DBnr.. __164 Fnr.. __237

 Production PAA File .... DBnr.. _____ Fnr.. _____

 Neighbour Application .. application-one_______________

 Additional Options .. N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit  Opts                                              Canc
```

Once this is complete, the new status must be linked to the receiving application 'Application-two'. Then, define a migration path for 'Application-two' between 'appl1-appl2-shar' and Control statuses. Then create a migration event for the above defined migration path and select objects as usual. On completion the selected objects will have been migrated between 'Application-one and 'Application-two.

During the above migration process the following conditions are observed:

- No CATALL is performed.
- No Used-by and Used lists are created.
- All existing components of the object are taken (Srce/Obj/Xref).
- Version numbers are re-created except if the name of the incoming object already exists in the receiving application, then the next incremented version number for that object is used.

Status Locations

By default, a user-definable status points to the Predict file (DBnr/Fnr) and the Natural system files (DBnr/Fnr) that were in effect at the time PAC was initialized. You can modify these file locations to suit your site requirements.

The Predict file and Natural system file locations specified in the status definition are defaults for the status; this information can be modified for any particular link between an application and a status.

When an application is linked to a status, the physical locations of the programming objects that make up the application are specified. The Predict and Natural databases and files where all objects for the application are stored are identified.

Migration of an application or object from one status to another may or may not result in the actual physical movement of that application or object, depending on the particular application status link definition.

In distributed environments, a distributed status definition allows you to maintain multiple states of an application in parallel with one another. Such a status may be a single definition representing multiple physical environments, each of which may be located on a different database and/or machine, or it may be a number of Natural libraries on a single Natural system file.

Foreign Object Support

Non-Natural and non-Predict objects are foreign objects in PAC. Foreign object types are defined to PAC using the Foreign Maintenance Administration PAC function, allowing foreign objects to be included in the application when it is added or changed. The latter is done using the Foreign Support additional options. Once defined for an application, only those foreign objects can be assigned to related foreign locations in the application's links.

Logical Definition

A status definition is a logical definition with an associated physical location (that is, a library, database and file number).

If two different statuses for the same application have the same physical location, and a migration path is set up between them, then the migration path is considered to be a logical path because no objects are actually moved during the migration.

For example, if an application is successfully tested in the USER_TEST status and the application is passed to the ACCEPTANCE_TEST status, it has reached a new milestone in its life-cycle. If the USER_TEST and ACCEPTANCE_TEST statuses have the same physical location (that is, the same Natural library name, the same database ID, and the same file number), then any migrations between the two statuses result in no physical movement of objects; the action is a promotion of the objects to the next logical status.

Natural and Predict Files

A status may be associated with only one Predict file and one Natural system file. The Predict and Natural file locations defined in the status definition are used as the default locations.

When an application is linked to a status, you may specify a different Predict and Natural library name and physical location (database ID and file number) for that application at that status. This option is especially useful if the default status Predict file or Natural system file is not large enough to hold the information for all of the applications linked to the status.

It is recommended that the same physical Predict file be used for cross-reference data and userviews to ensure the consistency, accuracy, and integrity of the Predict information for all applications.

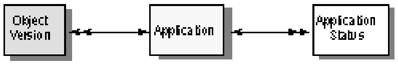
Special Status Location Considerations

A maintenance library can be on the same Natural system file and Predict file as the development environment, but if so, separate libraries are required to prevent ambiguities.

A test library can be on the same Natural system file and Predict file as the development environment, but if so, separate libraries should be used.

The PAA subsystem allows PAC to track applications in production. It is recommended that the production environment be separate from all other PAC environments, that is, have a separate Natural system file and Predict file.

Defining Applications to PAC



An application is a collection of entities configured to accomplish specific data processing tasks.

Most PAC activities are performed at the application level. PAC handles applications as a whole, parts of applications, and individual objects belonging to an application.

An application is defined to PAC by its name and level. It provides default information to be used when objects belonging to the application are processed. The objects that compose the application may change as the application is developed and tested.

Application Name

When objects are migrated into PAC, the migration must be assigned an application name. That application name then becomes the high-level qualifier to identify the object(s) migrated. Because the application name must always be given to identify an object, it is implied that the object is owned by the application. In this way, objects with the same name, type, and version that belong to different applications can be identified as different objects.

An application definition requires a unique name within PAC. You must then set up the default Natural library, foreign datasets, and Predict file for each of the statuses that will be part of the application test plan in your environment.

The application names Predict and Predict Case are reserved for PAC and may not be deleted. These are special-use applications.

Predict Applications

PAC uses a special application type (PRD) to accommodate data dictionary objects. A default application 'Predict' is delivered as standard and this application may not be deleted. The (PRD) type application is handled like any other application under PAC control in that it can be linked to statuses, and the Predict data can be migrated from one status to another using migration events.

The (PRD) type application is used to populate PAC with the data dictionary information from Predict. This information is used by Natural applications defined to PAC. (PRD) type application objects must be migrated into PAC before the application that uses them is populated with its respective objects.

Objects migrated for application type (PRD) can either be a shared resource or an individual one. Many Natural applications can share a single (PRD) application or even use their own individual (PRD) application.

Because Predict objects have properties that differ from those of Natural objects, PAC handles Predict objects differently. See the section **Migrating Predict Objects**.

Predict Case Application

The Predict Case application is used to populate the Predict Case objects used for composing objects for other applications under the control of PAC.

Predict Case application objects are automatically migrated into PAC when the Natural objects that use them are migrated into PAC.

Unlike other applications, the Predict Case application may not be linked to statuses other than Control status.

Copying an Application

Copying an application to create a new application saves time. You can create an application model appropriate for your site and use it as a template for creating additional applications.

When you copy an application, you can copy application defaults, application status links, and migration paths at the same time. Once the application is copied, appropriate default libraries can be specified in the fields provided. These library specifications will be automatically substituted in the application status link definitions for the new application.

Original Application Library

For Natural Objects

When loaded into PAC, the Natural objects of an application are grouped together as a single library. PAC currently limits an application to one library definition per status.

Outside of PAC, a library and an application may be defined as one and the same, or an application may be implemented across libraries.

Suppose an application outside of PAC is implemented across two libraries and there is a MENU program in each library. In order to define the application to PAC, it would be necessary to either group the objects from the two libraries into a single library and rename one of the MENU programs to avoid ambiguity within the application, or define each library as a separate application under PAC.

The original Natural library from which objects are loaded into PAC may be arbitrarily assigned. The execution Natural libraries where PAC delivers objects for actual execution (production or test) may be different, and the Natural library for test may be different from the Natural library for production.

Although an application may have a one-to-one or a one-to-many relationship with a Natural library, PAC currently supports only the one-to-one relationship; PAA, however, supports the one-to-many relationship.

For Foreign Objects

When loaded into PAC, the foreign objects of an application may be located in more than one dataset. Each dataset contains objects of a specific class and type (for example, COBOL, COBOL Load, Assembler Copycode). The classes and types of foreign objects supported are defined for the application.

Foreign objects (datasets) are defined for an application when the application is defined to PAC or modified. This definition limits the support for these objects later in the application status links and also migration events.

Using Other Applications as Steplibs

Another application may own or have defined to it additional and/or common subordinate objects (copycode, maps, data areas) that are required for the successful compilation of objects belonging to your application. In PAC, you can define the "library" of that other application as a step library for use at compile time.

PAC also supports steplibs for use at execution time. In certain circumstances, the Natural objects of an application in a particular library may need to invoke or use at execution time certain objects (global data areas, subroutines, programs, maps, help routines, subprograms) contained in other libraries that were populated by the same application or by other applications. Natural Security must be used to establish execution time steplibs for these libraries as the role of PAC is only to distribute the objects in a controlled and coordinated manner.

Steplibs have the following advantages:

- Duplicate or redundant objects are removed across applications.
- "Common code" is consistent. For example, when compiled, all objects for all applications use the same version of the same copycode.
- When the common code is changed, you have the option of using the Generate and Expand facilities to identify all objects across applications that were compiled against the version of the code. For example, if a piece of copycode used with the steplib facility is changed, all objects (for example, programs, subprograms, subroutines) that use that copycode may be listed for all applications.
- The rules for using an application as a steplib are the same as those for using a library under Natural.

A compile time steplib is used only when objects are compiled during migrations into PAC from development or maintenance statuses or during alignment (a Control-to-Control) migration.

Defining an Application as a Steplib

Any application defined to PAC may be established as a compile steplib for any other application. The compile steplib is specified in the application status link definition. If a default steplib is defined to the application, PAC uses it in the definition for a new application status link.

You can specify a steplib in the application status link only for development or maintenance statuses or for the Control status:

- For a migration from a development or maintenance status, the steplib must be specified in the application status link for the origin (From) status of the migration event.
- For an alignment, the steplib must be specified in the application status link for the Control status.

Example

Application BILLING uses copycode in the ACCOUNTS application; therefore, the development-to-Control application status link for BILLING must specify ACCOUNTS as the compile steplib.

Steplib Objects

The object types of a steplib that can be used during compilation are:

- copycode
- local, global, and parameter data areas
- maps

Using Steplib Objects to Compile

During the migration of objects from development or maintenance status types:

- PAC ensures that the objects in the steplib are available during compile time for any application that uses them. These subordinate steplib objects cannot be specified in the object list for the application that uses them because they do not belong to that application.
- Objects that were originally part of one application may be switched to another application. If, however, the object is a subordinate (for example, copycode), it must be removed from the PCF system file by the PAC administrator or purged from the original application. If subordinates are not found in the current application, the steplib is checked. If the object cannot be found in either location, a compile error will result.

Resulting Steplib Object Information

When the compile is performed, PAC builds versioned cross-reference information about all objects compiled. Cross-reference information includes the following additional information for objects from a referenced steplib:

- The use of objects in the steplib application.
- The name of the application that owns the objects.

In addition, the objects of a steplib application acquire "used by" references for all objects of all applications that used them at compile time. The "used by" reference is always the highest version of the object (rolling is not possible).

New Steplib Object Versions

An object in the steplib application is changed in the same manner as an object for any other (non-steplib) application; however, when the new version of the object is created, you may invoke User Exit 22 (if it is active in your environment) to obtain a list of all objects that used the previous version. This list may be used to verify consistency since the migration of objects may be performed for only one application at a time.

User Exit 22 may be used to print messages, or it may be used to write information to a work file. If the information is written to a work file, that work file may then be used as input to the batch ADD EVENT (GENTYPE and GENLIST) option, using the "I" (read the object list from input) option to generate the object list. A new event may then be run to align the objects of another application to use the new version of the steplib object.

Linking Statuses and Applications

Application
Application Status
Status

Each application defined to PAC must be linked to a series of statuses through which it may pass during its life-cycle. Each status must be specifically linked to the application. The collective set of statuses linked to an application defines the life-cycle of the application. Objects can be migrated only to the statuses and physical locations defined to the PAC system through these application status link definitions.

Notes:

1. A status must be defined to PAC before it can be linked to an application.
2. All applications defined to PAC are linked automatically to the Control status. The Control status is used internally by PAC and its location cannot be changed by the user.

Each application status link identifies, for each application

- the location of the application's Predict data (Xref data, rules, and views/DDMs) for the specified status. The Predict file is defined for each status.
- the location (name and node) of each dataset containing foreign objects of the application for the specified status. The available datasets are defined for each application.
- the physical library name, database and file number of the Natural system file where the Natural objects of the application will reside when migrated to the specified status. This is currently limited to one library.

The link definition may also specify a file translation table to be used in migrations to the status. The section **File Translation Table** describes the function of these tables.

For certain status types, the link definition may specify a step library to be used when PAC compiles objects during a migration to another status. The section **Using Other Applications as Steplibs** describes the use of step libraries.

For the status type External, the link definition also specifies a user ID, password and codepage to be used when accessing PAC applications that are under the control of an external version control software.

Application status links do not identify the sequence of migrations for an application. Allowable migration paths between statuses must be established separately for each application before a migration can occur.

Application/Status Libraries and Datasets

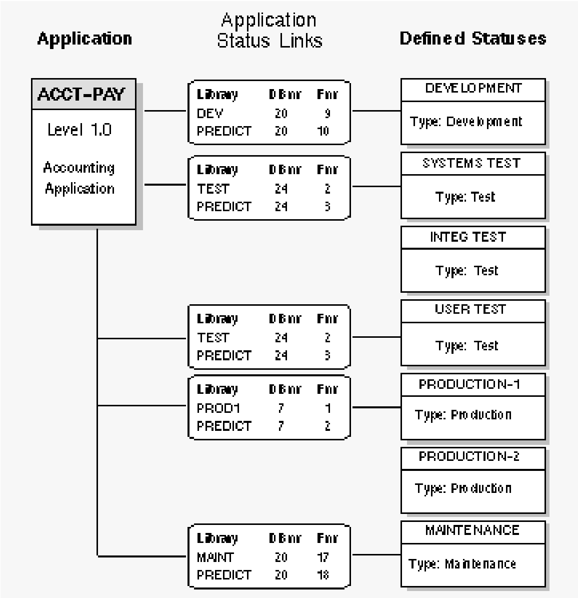
Within PAC, an application is linked to a series of statuses and a specific location is assigned to each status identified for the application. Each application has the following associated libraries and files:

- Natural libraries, each indicating the location of the Natural objects when the application is in a particular status;
- foreign datasets, each indicating the location of foreign objects of a specific class and type when the application is in a particular status; and
- Predict files, each indicating the location of the Predict data when the application is in a particular status.

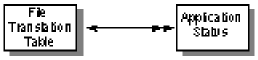
The database and file number of the physical Natural library and Predict file for an application, and the node location of foreign datasets is specific to each application/status link definition, even though the status for two or more applications may be the same.

For example, suppose the applications SPARE-PARTS and GENERAL-LEDGER both have a status name of USER_TEST. However, application GENERAL-LEDGER is at physical location library GL-TEST, database number 1, file number 6, while application SPARE-PARTS is at physical location library SP-TEST, database number 2, file number 9.

The following diagram shows an application linked to a subset of the defined statuses. The figure shows how each application status link defines the Natural library, foreign dataset, and Predict file for the application's objects in that status. Note that the links to Systems Test and User Test share a Natural library and Predict file.



File Translation Tables



The file translation table (FTT) facility is unique to PAC and its use contributes to the effective implementation of the PAC methodology. It resolves the problem of executing the database call to the correct database number and file for each application phase or environment.

When Natural objects are compiled, the views/DDMs referenced identify a set of database/file numbers of user data that the code will access/update at execution time. If an object is then migrated within PAC to an environment where the user data is located on another set of database/file numbers, PAC uses a file translation table (FTT) to translate between these database/file number sets.

When you migrate an object to a status, PAC copies the executable object from the ACF without removing it; thus neither the source code nor the executable code in the ACF is affected.

In PAC, an FTT is assigned to an application status link. During the migration process to an application status with an attached FTT, PAC dynamically recompiles the migrated copies of the objects to resolve the database/file number inconsistency without affecting any of the actual programming logic.

FTTs may be used in all Natural migrations to test and production status types; they can also be used in migrations from Control status to any one of the preceding status types.

This section covers the following topics:

- FTT Versions
- Comparison with the NTTF Macro Facility
- Why a File Translation Table?
- Implementing FTTs in PAC
- Verifying FTTs for a Migration Event

- FTT Examples

FTT Versions

FTTs are versioned to ensure the integrity of the application in a migration.

The current version of an FTT can be modified if it has never been used during the processing of a migration event. The current version is used during the processing of any migration events which require that FTT.

Once the FTT version has been used in a processed migration event, it can no longer be modified. Any attempt to modify it causes PAC to create a new version and assign a new version number to it. This version supersedes any previous versions as the current version and can be modified until it has been used to process a migration event.

Previous versions remain for documentation purposes, but these versions cannot be modified.

For example, if the current version (Version 3) of an FTT has been used in a migration event and you attempt to modify it, PAC assigns Version 4 to the FTT and a "4" is displayed in the Version field on the FTT Allocation screen.

Version 4 may be modified as often as necessary until it is used in a migration event. Version 3 remains as an audit trail for any migration event that used it. The DBnr and Fnr data from the previous version are provided as the base information for the new version.

Comparison with the NTTF Macro Facility

The dynamic recompile function provided with PAC for use with FTTs offers the same functionality as the NTTF macro facility function (that is, the parameter for the translation facility of Natural in the Natural parameter module) and in no way changes the logic of the executable code of the object. The correct database and/or file access is not dependent on the specification of special Natural parameter modules or dynamic Natural parameter modules.

The NTTF macro performs a function similar to that of the FTT, but with the following differences:

- The FTT makes permanent changes to the Natural objects; these changes remain in effect regardless of where the object is migrated.
- The NTTF macro assignment is dynamic, that is, a temporary solution which remains in effect only as long as it is defined in the Natural parameter module of the current Natural session. The correct NTTF must always be specified to ensure that the correct database and/or file numbers are being accessed at execution time for each execution environment.

Why a File Translation Table?

Natural saved objects reference userviews that identify the DBnrs and Fnrs of the physical files to be accessed at execution time. When an object is cataloged, the syntax-checking facility verifies the userview and retrieves the physical file references stored in the cataloged object.

To ensure the integrity of the object and user data accessibility, the object can be executed only against the DBnrs/Fnrs identified when the object was compiled; however, when the object is migrated to an environment where the user data is located on a different set of DBnrs/Fnrs, the object must be recompiled.

Assuming that the DBID=0 option is not used, the following actions would normally be necessary to prepare and implement objects into test or production:

1. Migrate Predict userviews and files;
2. Renumber DBnrs and Fnrs;
3. Regenerate the Natural views (DDMs);
4. Recompile the Natural objects.

Alternatively:

1. Copy Natural views (DDMs);
2. Renumber the DBnrs and Fnrs using SYSDDM;
3. Recompile the necessary Natural objects.

These procedures have the following disadvantages:

- They are time-consuming.
- Inconsistencies may be introduced to the application (if, for example, something has been forgotten) requiring that the previously tested objects be retested.
- Subordinate objects (copycode, maps, data areas) used during the compile may be different from those of the environment where the code was tested, possibly introducing errors and/or inconsistencies.
- They increase the "outage" time for the actual implementation of the objects into the physical environment.

The PAC FTT facility solves the problem by dynamically recompiling ("zapping") the already compiled code with the required changes for DBnrs and Fnrs as it is migrated to the destination environment (status).

Implementing FTTs in PAC

You may use one or a series of file translation tables (FTTs) for each application. You may set up one or more base tables and then create or copy subsets for special requirements. For each table, the origin DBnr and Fnr always represent the DBnr and Fnr of the views/DDMs with which the objects were first placed under PAC's control and compiled.

If the same table is required by two different applications, you can copy it from one application to the other or you can share the table across the applications by specifying all of the other DB-nrs/Fnrs that are valid for each application in the destination status.

Defining and Assigning FTTs

An FTT is defined using the File Translation Table maintenance facility. The table is assigned as part of the Application Status Link definition. If a table is `assigned' before it has been `defined', a dormant FTT is created which will not become active until the database/file translation values have been entered using the FTT maintenance facilities.

An FTT may be defined as valid for all applications and all statuses (shared). Or it may be restricted to one specific application (not shared) and/or one specific status (a separate not shared specification) to provide security or effective usage. The use of an FTT is maximally restricted when it is defined as not shared for both an application and a status; that is, the FTT can only be used when migrating a specific application to a specific status.

Even if an FTT is defined to a specific application and status, the FTT must still be defined to the application status link because there may be more than one FTT assigned to the same application and status.

Note: The status definition is independent of the application status link definition and the FTT is an attribute of (assigned to) the application status link definition, not the status itself.

When an FTT is defined as not shared for an application only, PAC scans the application for all known databases and file numbers that its objects access. PAC then verifies that the most recent versions of views are used, and that all databases and file numbers used have been placed on the DBnr and Fnr origin list. When a migration event is created for the application, the FTT is assigned automatically, but the assignment may be overridden by the event authorizer.

If an FTT is shared (that is, it is neither application- nor status-specific), it may be either formally assigned on the application status link or dynamically assigned by the event authorizer.

Changing Definitions and Assignments

You can change an FTT assignment for a particular application link only if the FTT is defined as shared.

If the FTT is defined as not shared, its application status link assignment cannot be updated to shared. A not shared FTT can be changed to a shared FTT only by redefining the FTT using the FTT maintenance facilities, in which case, a new version of the FTT is created.

AND/OR/IF Operand

You can set up an FTT to translate one DBnr to another DBnr; and/or one Fnr to another Fnr (the OR operand). In this case, PAC looks at and translates the DBnr and Fnr independently. Thus, an FTT set up with the OR operand could result in the following translation for each of the objects being migrated:

- Only the DBnr or only the Fnr;
- Both the DBnr and the Fnr;
- Neither the DBnr nor the Fnr.

You can also set up an FTT to translate one DBnr/Fnr combination to another DBnr/Fnr combination (the AND operand). In this case, PAC processes the database number and file number as a pair. An FTT set up with the AND operand translates any exact database number/file number pair to the corresponding exact database number/file number pair for each object being migrated. If the exact pairs are not matched, the FTT does no translation.

You can also set up an FTT to translate DBnr/Fnr combinations with conditional entries (the IF operand). In this case PAC processes the databse number and file number depending on what conditional option is selected and then further to this is able to evaluate the presence of an inputed value mask. This also enables the user to use conditions such as grater than, less than or between specified values.

Verifying FTTs for a Migration Event

If the FTT is dormant, PAC assumes an error and rejects the FTT table when the migration event is processed, but continues processing normally. If no other application status links use this table, PAC purges the dormant FTT entry.

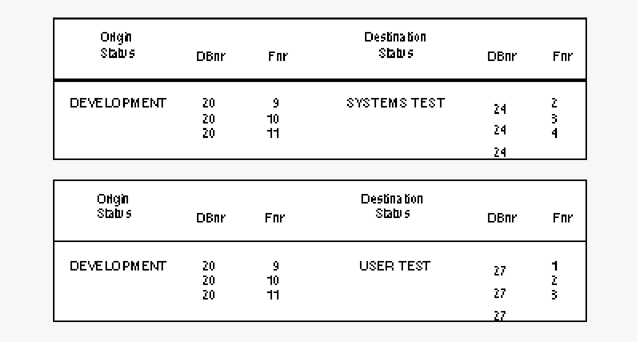
When the migration event is submitted, PAC updates the event with the current version of the FTT used during the migration. The audit facility allows the user to historically verify the specific FTT that was used in the migration.

FTT Examples

The following are examples of using FTTs.

Example 1: General

The following illustration shows excerpts from two FTTs for an application. In both tables, the origin database number (DBnr) and file number (Fnr) are those of the Development status; the numbers are always translated from the numbers referenced in the compiled objects.



Origin Status	DBnr	Fnr	Destination Status	DBnr	Fnr
DEVELOPMENT	20	9	SYSTEMS TEST	24	2
	20	10		24	3
	20	11		24	4

Origin Status	DBnr	Fnr	Destination Status	DBnr	Fnr
DEVELOPMENT	20	9	USER TEST	27	1
	20	10		27	2
	20	11		27	3

In Development status, the source code for the application objects references Fnrs 9, 10, and 11 in DBnr 20. When an object is migrated from Development to Systems Test, PAC compiles it using the same numbers and stores it in the ACF.

PAC then copies the executable object from the ACF and dynamically recompiles it, changing DBnr 20 and Fnrs 9, 10, and 11 to DBnr 24 and Fnrs 2, 3, and 4, respectively. PAC stores the recompiled object in the application library at the Systems Test status.

When the object is migrated from Systems Test to User Test, PAC again copies the executable object from the ACF; dynamically recompiles it to reference Fnrs 1, 2, and 3 in DBnr 27; and stores the recompiled object in the application library at the User Test status. Although Systems Test is the origin status in the migration, PAC translates the DBnr and Fnrs referenced in Development to those referenced in User Test.

Example 2: Migration into PAC

Objects are migrated from DEV status to TEST1 status.

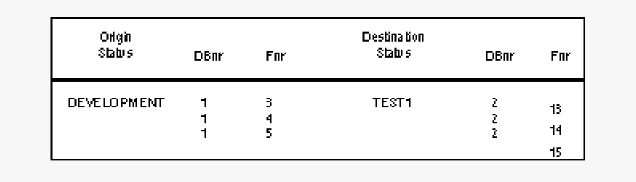
A number of objects are migrated into PAC from a development status type and compiled using three (3) views/DDMs as subordinates.

Note: These DDMs must have been previously generated as a result of a Predict event.

The resulting compiled code accesses the following database/file numbers:

```
Employee  DBnr 1, Fnr 3
Finance     DBnr 1, Fnr 4
Auto           DBnr 1, Fnr 5
```

A file translation table (FTT) is set up with the OR operand to translate databases or file numbers between the origin DBnr/Fnr of the development (DEV) status and the destination DBnr/Fnr of the TEST1 status as shown below:



Origin Status	DBnr	Fnr	Destination Status	DBnr	Fnr
DEVELOPMENT	1 1 1	3 4 5	TEST1	2 2 2	13 14 15

When the objects are loaded into the TEST1 environment, they are dynamically recompiled and translated as follows:

- DBnr 1 is translated to DBnr 2;
- Fnr 3 is translated to Fnr 13;
- Fnr 4 is translated to Fnr 14; and
- Fnr 5 is translated to Fnr 15.

The resulting database and file numbers that the objects will access/update will be the physical locations of the Employee, Finance, and Auto files in the TEST1 status; that is, the Employee, Finance, and Auto files are located on Database 2 and File Numbers 13, 14, and 15, respectively.

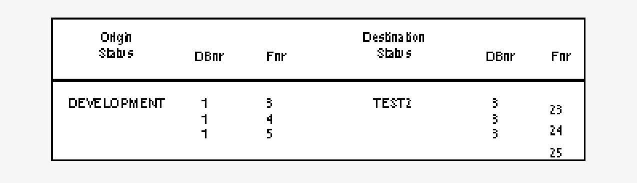
Example 3: Migration Between Test Statuses

The same objects (from Example 2) are then migrated from TEST1 status to TEST2 status.

Because objects are compiled in the Control environment using the views of the DEV status, and because compiled objects are always migrated from Control, the objects have the same origin database and file number (that is, DEV) as they did in Example 2.

The destination DBnr and Fnr is the user data of the files at the TEST2 status; that is, the Employee, Finance, and Auto files are located on Database 3 and File Numbers 23, 24, and 25, respectively.

A file translation table (FTT) is set up to translate databases or file numbers between the origin DBnr/Fnr of the development (DEV) status and the destination DBnr/Fnr of the TEST2 status as shown below:



Origin Status	DBnr	Fnr	Destination Status	DBnr	Fnr
DEVELOPMENT	1	3	TEST2	3	23
	1	4		3	24
	1	5		3	25

When the objects are migrated from TEST1 into the TEST2 environment, they are dynamically recompiled and translated as follows:

- DBnr 1 is translated to DBnr 3;
- Fnr 3 is translated to Fnr 23;
- Fnr 4 is translated to Fnr 24; and
- Fnr 5 is translated to Fnr 25.

The resulting database and file numbers that the objects will access/update will be the physical locations of the Employee, Finance, and Auto files in the TEST2 status.

Defining Migration Paths

Job
Migration Path
Application Status

The migration path is the route between two statuses that an application is permitted to follow during its planned life-cycle. Migration paths secure the restrictions on movement of objects between statuses. Every status and application status link specified in a migration path definition must already be defined to PAC. Events that initiate the migration process may be defined only for two application statuses that have been paired in a migration path.

The information specified in the migration path definition is used by migration events. The migration path definition specifies the origin status (the environment in which the objects currently exist and from which they are to be migrated) and destination status (the environment into which you wish to migrate the objects).

In addition, a migration path definition specifies defaults for the way a migration event that uses the path is to be processed, including

- the authorization controls required: the person(s) or group(s) who may authorize the events;
- the processing mode: whether the events will run online or in batch;
- for batch events, the names of the PAC jobs (JCL/JCS) to be submitted by the event;
- the Workfile Usage option: whether PAC will migrate objects directly from one status to another or use a work file in an intermediate step;
- the migration mode: whether the objects are to be moved or copied into the destination status when the event is processed; or, in the case of development, maintenance, and incorporation status types, whether the objects are to be included from a previously created work file.
- the Auto Expansion option: whether PAC automatically includes related objects in (expands) the list of objects to be migrated and how PAC identifies which versions of the objects to include.

It may be possible to override these defaults when the migration event is authorized. Refer to the section **Customizing the Authorization Process**.

This section covers the following topics:

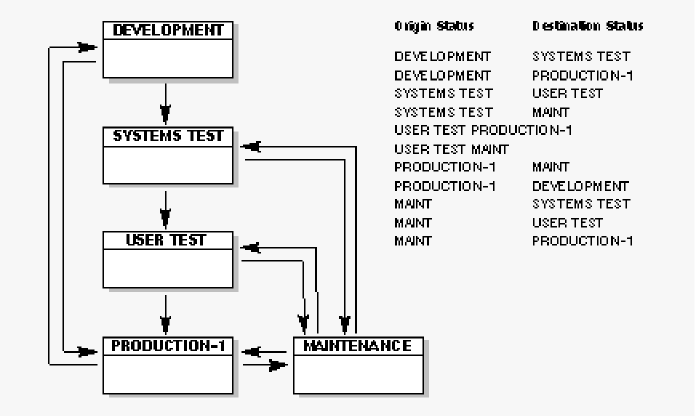
- Origin and Destination Statuses
- Event Authorizers
- Migration Mode: Copy / Move / Include
- Processing Mode: Batch or Online
- Auto Expansion Option

- User Exits and APIs for Migration Paths

Origin and Destination Statuses

The application test plan consists of the application status links and migration paths. The test plan depends on your site requirements. An application test plan may be as rigid or as flexible as needed.

Suppose that an application ACCT-PAY has been linked to each of the statuses shown in the following diagram. The arrows between the statuses indicate the paths that application objects are allowed to follow during migrations. This is the test plan for the application.



Origin Status	Destination Status
DEVELOPMENT	SYSTEMS TEST
DEVELOPMENT	PRODUCTION-1
SYSTEMS TEST	USER TEST
SYSTEMS TEST	MAINT
USER TEST	PRODUCTION-1
USER TEST	MAINT
PRODUCTION-1	MAINT
PRODUCTION-1	DEVELOPMENT
MAINT	SYSTEMS TEST
MAINT	USER TEST
MAINT	PRODUCTION-1

Note: When the origin status is outside of PAC, objects are always implicitly migrated to Control status before being migrated to the specified destination status.

The allowed migration paths in the example test plan are indicated in the following table:

	Development	Systems Test	User Test	Production	Maintenance
Development				x	
Systems Test	x				x
User Test		x			x
Production	x		x		x
Maintenance		x	x	x	

Restrictions on Migration Path Statuses

- The migration path to load Predict objects into PAC must always have a destination status of Control.
- A migration path may not be defined between two development statuses, two maintenance statuses, two incorporation statuses, or any combination of these three status types.
- Incorporation is an origin status only.
- The Control-to-Control migration path is used only for the special migration type Alignment.

Event Authorizers

To ensure the integrity of the application, the decision to migrate any or all of the objects of an application to a particular status must be made at the right time by qualified people. The list of (up to eight) person(s) or group(s) who may authorize the migration events associated with a migration path is specified in the migration path definition. For this reason, the definition of migration paths is a restricted function controlled by an option on the user's profile.

If you are a person authorized (in the user profile) to define a migration path, you have the following options for specifying a migration event authorizer:

- Individual User

  By specifying specific user IDs, you may individually add a person or persons as event authorizers to any migration path for any application. The user ID, however, must be defined in the user profile as being allowed to authorize migration events.

- Group

  If you want the flexibility of adding new authorizers or deleting existing authorizers, you may specify the name of a group that has been defined in Natural Security. This allows you to update the authorizers for several migration paths in one place; that is, in Natural Security.

- Unrestricted or Range

  The @ option implies no authorization, although the user needs to go through the step to "freeze" the event.

  If authorization of the migration event is not restricted, you can use an asterisk (*) to allow any individual users who have the necessary setting in their user profiles to authorize their own or another's event. For example, @* allows any qualified user ID (not a group) to authorize the event.

  You may use range notation to specify authorizers@all user IDs starting with a specific prefix, for instance. This allows new persons to be added to the list automatically. For example, @US1* allows any user whose user ID starts with US1 to authorize the event.

- Other Than Creator

If you want to ensure that someone other than the user or group member who created the event is to authorize it, you may add this restriction by using the Separate Authority Required option in the migration path definition.

Customizing the Authorization Process

The migration event authorization process can be customized using PAC system applymods, user exits, and APIs.

For instance, a migration event authorizer may be allowed to override default values specified in the migration path: whether the event is processed in batch or online, job name, or whether objects are to be copied or moved, or included from a work file.

Applymods

Applymods are activated by the PAC administrator and are used to protect the application during migration by enforcing values for the authorization process. For example, applymod 1 ensures that PAC always uses the default values supplied in the migration path by disallowing any modification of those values during event processing.

User Exits

The PAC administrator can set up user exits to increase flexibility during the migration authorization process. For example, the authorization exit, User Exit 30 (PACEX030), can be used during the authorization process

- to automatically override the default parameters specified on the actual migration path;
- to provide additional audit and security checking of the authorization process;
- to suppress display of the authorization screen.

Application Program Interface (APIs)

The PAC Express APIs provide a useful base for creating a custom system to process migration events quickly and easily. It allows you to change the way events are authorized. For example, the screen displayed can be simplified, or a PF key can be assigned to confirm an authorization.

The Event Authorization API allows you to add or purge information about the authorization for a particular migration event. This API also allows you to display authorization information.

Migration Mode: Copy / Move / Include

The migration mode is set by specifying whether the objects are to be copied, moved, or included from a work file into PAC or between statuses.

Copy Option

Copy maintains the object version in the origin status and stores a copy in the destination status; you can specify the Copy option for Natural objects, foreign objects, and Predict objects.

Move Option

Move removes the object version from the origin status and stores it in the destination status.

If the location of the origin status is

- local, the object version is loaded to the destination and the objects are purged automatically as part of the migration process at the origin location.
- remote (that is, PAC cannot issue a database call to access/update the objects), objects must be purged at the origin status using other methods such as the PACEXDEL user exit.

PACEXDEL allows you to issue delete commands through the SYSMAIN utility or the PAC migration utility MIGUNLD. Multiple delete requests may be issued each time the utility is invoked.

Note: Predict objects may not be moved.

Include Option

The include option allows you to include in a migration objects located in a previously created work file as opposed to migrating objects directly from the Natural system file.

Include copies objects from an external work file rather than directly from a Natural system file and stores them in the destination status. The include option can only be specified for Natural objects and is valid only for batch migrations into the PAC-controlled environment from development, maintenance, or incorporation statuses.

Processing Mode: Batch or Online

A migration event may be processed either online or in batch.

- An event processed online is processed in real time in your current Natural session and the results may be viewed interactively as the processing takes place.
- An event processed in batch is processed as a background task. This is useful for large events or when processing should be asynchronous to the user's current activities.

Auto Expansion Option

The migration path definition specifies the type of object expansion that is to occur during migration event processing. A status may be specified as the Expand status so that subordinate objects added to the list during the expand process are

- migrated to a destination status from the specified Expand status.
- rolled in from the Expand status in the case of migration from a development or maintenance status.

As an option in the migration path definition, the Expand option ensures that the subcomponents to be included in the object list are determined based on the overall PAC environment at the time the migration event is processed.

User Exit 23 may be invoked during expand processing.

User Exits and APIs for Migration Paths

PAC user exits can be used to implement audits and security for the migration path.

APINPATH, the PAC Application Program Interface (API) for migration paths, allows you to add, modify, or display information about a particular migration path.

Contact your PAC administrator for information about user exits or APIs that may be operating in your environment.

Jobs

Job
Migration path
Event

Generally, PAC jobs are used to migrate application objects between statuses. However, other jobs (for example, batch Natural jobs, Adabas utilities) may also be defined and submitted from PAC.

The batch option is the default for migrations and a job must be supplied for batch migrations. The job may be different for different types of migrations. Refer to the following Part II sections on migration for more information.

Working examples of PAC jobs are provided with PAC for all supported operating systems.

Because PAC jobs can be modified to accommodate the operational, restart, and recovery needs of a particular site, they serve to establish standard procedures for migrating objects between environments.

Appendix B presents detailed job information and lists the operating-system-dependent jobs provided with PAC.

This section covers the following topics:

- Multiple-Step Jobs
- Processing Job Steps
- User Exits for Jobs

Multiple-Step Jobs

Natural (and foreign) migrations are normally run as batch jobs that include two or three steps. Although they may be run as one-step jobs in some cases, such jobs are not recommended. The important difference is that normal, multiple-step migration jobs allow you to check the condition code of the previous job step to decide whether the next or any subsequent job steps should be executed; or whether the job should be terminated to resolve errors.

The sample jobs provided with PAC are all multiple-step jobs that allow you to check condition codes between each step. The reasons for using multiple-step jobs are as follows:

- If the origin and destination statuses are located at different locations or on different CPUs, the migration load step must be run in the required physical environment.
- The unlock step should be run only after the successful completion of the MIGLOAD step has been verified, especially when the migration load step is run at a different location. It is especially important to run the unlock step (TRNUNLOK) separately because it indicates that the migration

is complete and, if the Move option has been specified, results in the migrated objects being purged from the origin status.

- For a migration from an incorporation or development status that specifies the Include option, an externally created work file is used as input. In this case, a multiple-step job must be used to ensure that the original input dataset is not overwritten during subsequent migration processing. Multiple-step jobs are strongly recommended whenever work files are used.

Online, Natural (and foreign) migration processing simulates the multiple-step job. If an error is detected in the online display of the audit report, you can decide to terminate the migration process to resolve the error by entering a Natural command at the MORE prompt. After each simulated step, the NEXT prompt appears, again allowing you to interrupt the migration process.

Processing Job Steps

Job steps are processed as described in the following paragraphs unless otherwise stated in this section (for example, Archiving).

The job steps required depend on whether the job is being processed

- online or in batch without the work file option, with or without the Include option;
- in batch with the work file option, with or without the Include option.

If the work file option is not selected, objects are copied directly from Control to a destination status. If the work file option is selected, objects already loaded into PAC Control, whether compiled or not, are unloaded to a work file for subsequent load to a destination status.

In order to process migrations online or without the (output) work file option, PAC must have direct access to the destination status specified on the application links in the migration path definition. This is the case if all environments defined to PAC are located in

- the same physical database;
- multiple databases running with the same SVC or ID Table Manager; or
- multiple databases connected through a network.

If none of these conditions is met, then a work file or some other intermediate medium of transport must be used for migration processing.

If the Include option is specified, the first job step (TRNEVENT) reads from a work file which is defined to PAC as Work File 1 (CMWK01).

Job Steps: Batch With Work File Option

Using Copy/Move Option

Step	Name	Process
1	TRNEVENT	The TRNEVENT job step validates the object list and, if the Expand option is used, expands it to include the specified subcomponents. If the origin status is development, incorporation, or maintenance, new object versions are created, the objects are read directly from the Natural library (or foreign dataset) specified in the application status link definition into the Control status, and are compiled. If the origin status is not development, incorporation, or maintenance, the existing specified object versions are locked for the application. New or existing object versions, as appropriate, are then promoted to the destination status, if it is other than Control, and are unloaded from Control to the dataset specified for Work File 1 (CMWKF01).
2	MIGRATE	The MIGRATE job step is invoked using the LOAD,ALL,* command. The object versions are read from Work File 1 (CMWKF01), which must specify the output dataset created in Step 1, and are loaded to the Natural system file and library specified for the destination status in the application status link definition. If the destination status is in a different or remote physical environment, the MIGRATE job step must be run as a separate job in that environment.
3	TRNUNLOK	The TRNUNLOK job step results in objects being purged from the origin status if the Move option is specified for the migration event. The application and the migrated object versions are unlocked and the migration is updated to the Completed state.

Using Include Option

Step	Name	Process
1	TRNEVENT	The object list can contain only a single entry. The entry may specify a single object, a range of objects (using range notation), or "*,*" to include all objects read from the work file. The TRNEVENT job step reads the supplied work file(s) and selects the objects according to the entry specified in the object list. It then validates and versions the objects included. The objects are read from Work File 1 (CMWKF01), which must have been previously created using the PAC MIGUNLD or the Natural ULDMAIN or NATUNLD utilities. If user error messages are to be processed, they are read from Work File 2 (CMWKF02). The dataset specified for Work File 2 must have been previously created using the Natural ERRULDUS utility. New or existing object versions, as appropriate, are then promoted to the destination status if it is other than Control.

Step	Name	Process
2	TRNUNLD	When using the Include option, TRNUNLD is run as an additional job step separate from TRNEVENT to preclude overwriting the original input work file used in Step 1. Objects to be migrated are unloaded t o Work File 1. The name specified for Work File 1 must be different from the original input dataset supplied for TRNEVENT; otherwise, that dataset will be overwritten. The dataset created in this step (TRNUNLD) must be used as input for the next step (MIGRATE).
3	MIGRATE	The MIGRATE job step is invoked using the LOAD,ALL,* command. The object versions are read from Work File 1, which must specify the output dataset created in Step 2, and are loaded to the Natural system file and library specified for the destination status in the application status link definition. If the destination status is in a different or remote physical environment, the MIGRATE job step must be run as a separate job in that environment.
4	TRNUNLOK	The TRNUNLOK job step unlocks the application and the migrated object versions and updates the migration to the Completed state.

Example Batch Job: Work File Option

If a migration event using a work file is processed in batch and the Copy or Move option is specified, the sample job supplied with PAC is MIGRATE_WORKFILE (or MIGRATE_WORKFILE for z/OS and BS2000).

If a migration event is processed with the work file option and the Include option specified, it must be run in batch to supply the objects to be migrated. INCORPORATE is the sample job supplied with PAC.

- Depending on the origin and destination status combination, you may be able to select the Replace (Y/N) option. If the Replace option is not selectable, the required value is automatically inserted and the field is protected.
- You may specify a valid Auto Expansion option. If you do, you may optionally specify the status from which the objects should be included.
- If applymods have been set up in your environment by your PAC administrator, you may activate or deactivate them.

A batch migration that uses a work file and the Copy/Move options may be run as a single job step. The job syntax requires Work File 1 (CMWKF01) to be specified in the job and the following CMSYNIN cards:

```
LOGON SYSPAC
TRNEVENT @EVENT
MIGRATE
LOAD,ALL,*
TRNUNLOK @EVENT
```

When the Include option is specified, the job may not be run as a single job step to preclude overwriting the original input dataset.

Job Steps: Online or Batch Without Work File Option

Using Copy/Move Option

Step	Name	Process
1	TRNEVENT	The TRNEVENT job step validates and expands the object list to include the specified subcomponents if the Expand option is used. If the origin status is development, incorporation, or maintenance, new object versions are created, the objects are read directly from the Natural library (or foreign dataset) specified in the application status link definition into the Control status, and are compiled, if appropriate, or incorporated. If the origin status is not development, incorporation, or maintenance, the existing specified object versions are locked for the application. New or existing object versions, as appropriate, are then promoted to the destination status if it is other than Control. The promoted objects are then copied directly from PAC Control to the destination status specified on the application status link definition.
2	TRNUNLOK	The TRNUNLOK job step results in objects being purged from the origin status if the Move option is specified for the migration event. The application and the migrated object versions are unlocked and the migration is updated to the Completed state.

Using Include Option

It is possible to process a migration without the (output) work file option, but still use the Include option to supply the list of objects to be migrated from an externally created (input) work file. This is because the (output) work file option indicates how the objects are migrated to the destination status, not how the objects are supplied as input to the migration for processing.

The TRNEVENT and TRNUNLOK steps described in the previous section Using Copy/Move Option apply except that the objects to be migrated are read from Work File 1, not directly from the Natural library (or foreign dataset) specified on the application status link definition.

Work File 1 (CMWKF01) must be specified in the job for the TRNEVENT step and the rules for creating the object list using the Include option apply. See the section Batch Job With Work File Option, Using Include Option earlier in this section.

Example

If a migration event is processed in batch without a work file and the Copy/Move option is specified, the sample job supplied with PAC is MIGRATE.

If the Include option is used, you can copy and modify the MIGRATE job to include the information needed to define Work File 1. A coding example can be found in the definition of Work File 1 in the INCORPORATE job for the TRNEVENT job step.

- You may specify a valid Auto Expansion option. If you do so, you may optionally specify the status from which the objects are to be included.
- If set up in your environment by your PAC administrator, you may activate or deactivate apply-mods.

A batch migration without a work file using the Copy/Move options may be run as a single job step. The job syntax requires the following CMSYNIN cards:

```
LOGON SYSPAC
TRNEVENT @EVENT
TRNUNLOK @EVENT
```

User Exits for Jobs

PAC user exits can be used to

- implement tracking and customized security for jobs;
- make substitutions to the JCL/JCS before a job is submitted;
- specify default parameters that you can modify for batch job submission.

Contact your PAC administrator for information about user exits that may be operating in your environment.

6 Statuses

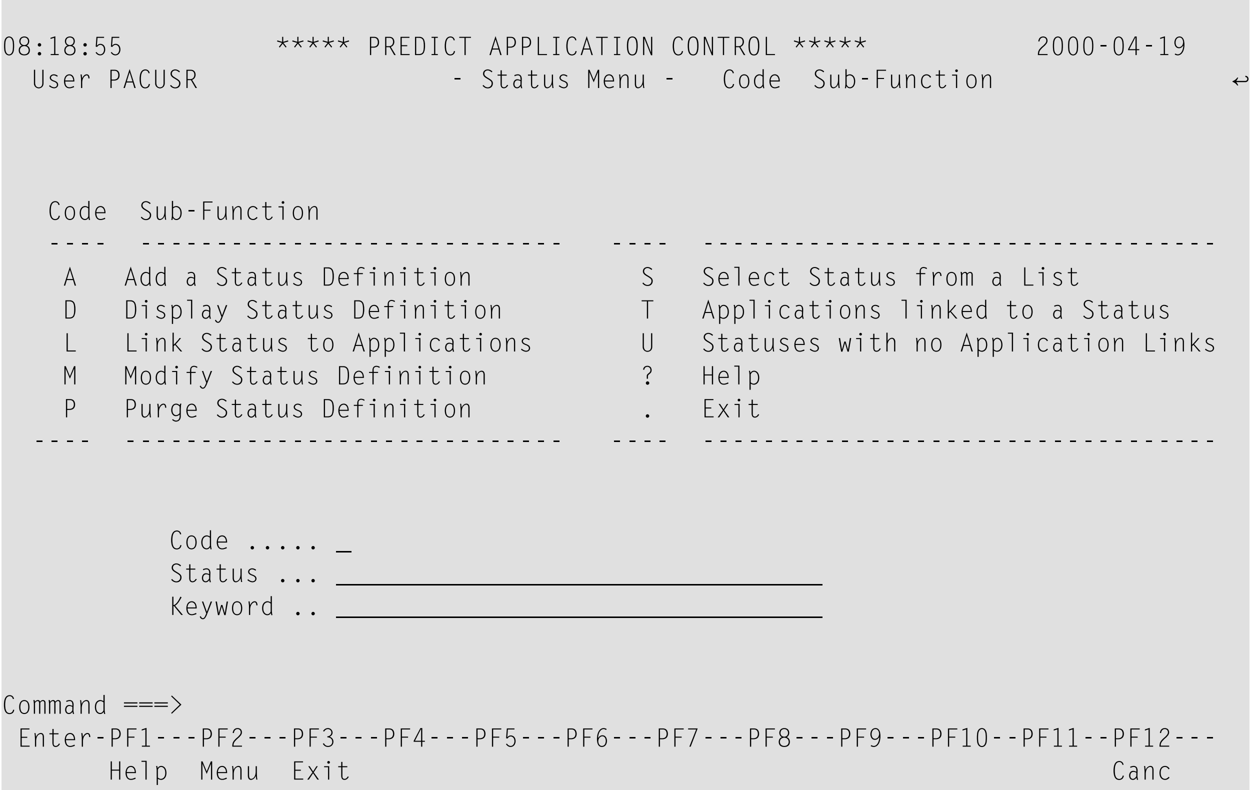
- Adding (Defining) a Status 83
- Displaying/Modifying a Status 85
- Selecting a Status 85
- Linking Applications to a Status 86
- Purging a Status 88

This section tells you how to define, maintain, and report on PAC statuses. For general information about statuses, see **Configuring a PAC Environment**.

A status must be defined to PAC before it can be linked to an application. An environment exists only when statuses are linked with applications.

Access the PAC Status maintenance and reporting sub-functions by entering code S (Statuses) on the PAC Main Menu.

The screen that appears depends on your user profile. The Status Menu shown below combines the maintenance and reporting sub-functions and is used in discussions throughout this section.



```
08:18:55          ***** PREDICT APPLICATION CONTROL *****          2000-04-19
  User PACUSR                      - Status Menu -   Code  Sub-Function         ↩



   Code  Sub-Function
   ----  ----------------------------   ----  ---------------------------------
    A   Add a Status Definition           S   Select Status from a List
    D   Display Status Definition         T   Applications linked to a Status
    L   Link Status to Applications       U   Statuses with no Application Links
    M   Modify Status Definition          ?   Help
    P   Purge Status Definition           .   Exit
  ----  ----------------------------   ----  ---------------------------------



           Code ..... _
           Status ... ________________________________
           Keyword .. ________________________________


Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                 Canc
```

Field	Description
Status	Specifies a new or existing PAC status. You may enter a status name, an alias, or range notation. The status name must begin with an alphabetic character and may be up to 32 characters in length. Embedded blanks are allowed, but are automatically translated to the underscore ( ) character. If a duplicate status name is entered, an error message is displayed.
Keyword	The name of a keyword that has been assigned to the status with the "Keys" Additional Options function.

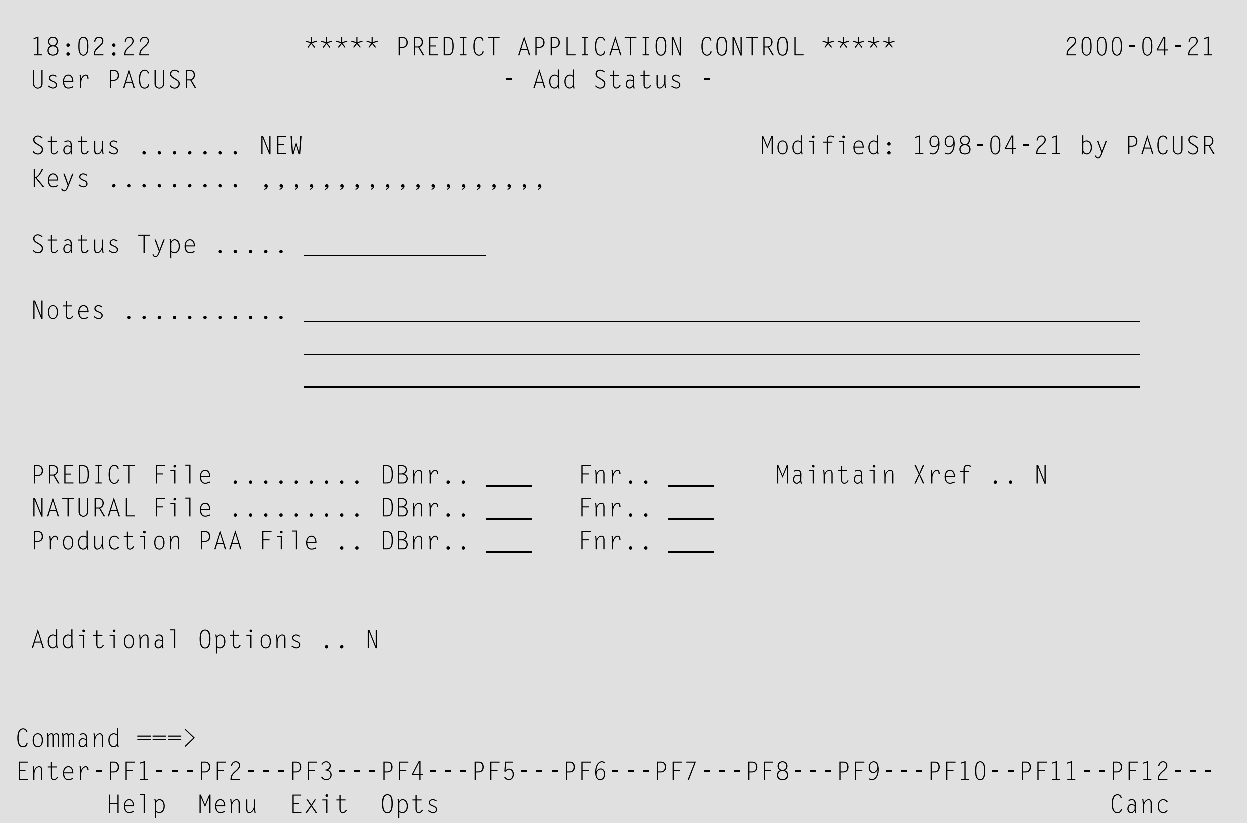
Note: All of the sub-functions on this menu, except Add, may be selected for processing directly from the Status Selection List that is accessed using the Select Status from a List sub-function.

This chapter covers the following topics:

Adding (Defining) a Status

Step 1. Accessing the Add Status Screen

Access the Add Status screen by entering Code A (Add a Status Definition) and a unique status name on the Status Menu. Alternatively, enter the ADD direct command on the command line. Refer to the PAC Reference documentation for the correct syntax.



```
 18:02:22          ***** PREDICT APPLICATION CONTROL *****           2000-04-21
 User PACUSR                    - Add Status -

 Status ....... NEW                              Modified: 1998-04-21 by PACUSR
 Keys ......... ,,,,,,,,,,,,,,,,,,,

 Status Type ..... ____________

 Notes ..........  _______________________________________________________
                   _______________________________________________________
                   _______________________________________________________


 PREDICT File ......... DBnr.. ___   Fnr.. ___    Maintain Xref .. N
 NATURAL File ......... DBnr.. ___   Fnr.. ___
 Production PAA File .. DBnr.. ___   Fnr.. ___


 Additional Options .. N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc
```

Note: Edit all values on the screen before you access the Additional Options. Once the Additional Options are accessed, all other fields on the screen are protected. Values may be modified later with the Modify Status sub-function.

Step 2. Editing the Add Status Screen

1. In the Status Type field, enter a valid status type by typing a valid one-character code or the entire name over the first character of "Unknown".

   For details on the possible status types please refer to the descriptions given in the section **Status Types**.

   Note: Archive, Control and Retire statuses may not be assigned. Only PAC designates Archive, Control and Retire status types.

2. (Optional) In the Notes field, enter comments.
3. In the Predict Data and Natural File fields, enter the database number (DBnr) and file number (Fnr) of the Predict data and Natural files that will be associated with the new status.
4. For the Production PAA File field, specify the DBID and file number of the PAA file that will be active for the application objects transferred to this production status.
5. In the Maintain Xref field, identify the way you want cross-reference data to be maintained by entering one of the following options. The option depends on the status.

Code	Location	Description
L	Local	Cross-reference data is stored within PAC.
R	Remote	Cross-reference data is copied to the Predict file specified by the application status link.
B	Both	Cross-reference data is stored within PAC (Local) and is also copied to the Predict file specified by the application status link (Remote).
N	None	No cross-reference data is maintained.

Step 3. Selecting Additional Options

1. Access Additional Options by pressing PF4 (Opts), or by typing Y (Yes) over the default.
2. From the resulting window, select and edit any of the following options that you wish to specify:

Option	Description
Aliases	Add alias names for the status.
Keys	Add keywords for the status. Keywords must have been previously defined to PAC.
Linked Applications	Add the names of applications you want to link to the status. Refer to the section , Linking Applications and Statuses, on page for more information.

   The Date option displays information about the dates and times the status was added/modified and by whom.

3. Press ENTER to return to the Add Status screen when you have finished editing the options.

Step 4. Adding the New Status to PAC

Add the new status to PAC by pressing ENTER on the Add Status screen.

When you have added the new status, you are returned to the Status Menu where the message "Status has been added successfully." is displayed.

Displaying/Modifying a Status

You may display or modify information about a status on the Display Status and Modify Status screens, respectively. Maintenance may not be performed on the Display Status screen. The section **Add (Define) a Status** provides a similar screen for reference.

To access the Display Status or Modify Status screens from the Status Menu, enter Code D (Display Status) or M (Modify Status) and the name of the desired status. Alternatively, enter the DISPLAY or MODIFY direct commands on the command line of the relevant menus. Refer to the PAC Reference documentation for the correct syntax.

Selecting a Status

To select a status, access the Status Selection List by entering Code S (Select Status from a List) on the Status Menu. Alternatively, enter the SELECT STATUS direct command on the command line of the Application Menu. Refer to the PAC Reference documentation for the correct direct command syntax.

If you accessed the Status Selection List screen with the S (Select Status from a List) sub-function or with the SELECT STATUS direct command for one or more of the listed statuses, you may perform the following sub-functions directly by entering the function code in the "C" column:

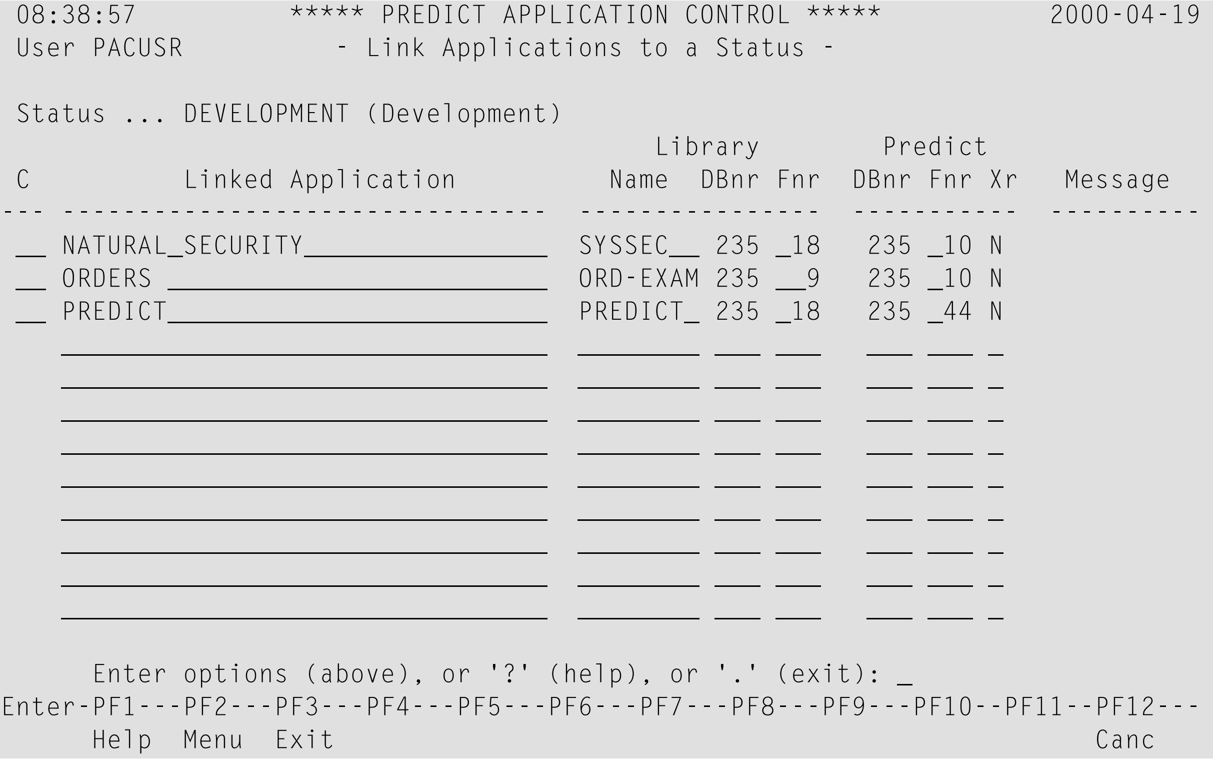
Code	**Sub-Function**
D	Display a status definition
L	Link applications to a status
M	Modify a status definition
P	Purge a status definition
S	Select a status definition
T	Applications linked to a status
U	Statuses without application links
.	(Quit/return to the main menu)

If you mark the status with the cursor or enter an S or a T in the "C" column or if you enter the status number (from the "Nr" column) in the Mark Selection... field, the Status Menu appears with the specified status already displayed in the Status field.

Linking Applications to a Status

You may link several applications to a specified status with the Link Applications to a Status subfunction.

1. From the Status Menu, access the **Link Applications to a Status screen** by entering Code L (Link Applications to a Status) and by either entering the desired status name or by selecting it from the resulting status list.



```
 08:38:57          ***** PREDICT APPLICATION CONTROL *****           2000-04-19
 User PACUSR          - Link Applications to a Status -

 Status ... DEVELOPMENT (Development)
                                           Library        Predict
 C         Linked Application          Name  DBnr Fnr  DBnr Fnr Xr   Message
--- --------------------------------  ----------------  -----------  ----------
 __ NATURAL_SECURITY________________  SYSSEC__ 235 _18   235 _10 N
 __ ORDERS _________________________  ORD-EXAM 235 __9   235 _10 N
 __ PREDICT_________________________  PREDICT_ 235 _18   235 _44 N
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _

      Enter options (above), or '?' (help), or '.' (exit): _
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

   This screen displays existing application status links as well as library and Predict information for the applications.

2. Enter the following information on the blank lines:
   - In the Linked Application column, the application(s) to be linked to the specified status;
   - In the Library columns, the library, database number, and file number where the application status is located.

Note: The library locations used for the Control status, as well as for the Archive (A), Retire (R), Production (P) and Neighbour (N) statuses, are reserved for use by PAC.

- In the Predict columns, enter the Predict database ID number and file number where the cross-reference data is stored.

  Note: If you do not enter a Predict database and file number, the Predict Data database (DBnr) and file number (Fnr) display the values set when the application was defined. You may override these values.

- In the Predict "Xr" column, enter the following cross-reference information: L (Local), R (Remote), B (Both), or N (None). Refer to the explanation in Step 2 "Editing the Add Status Screen" for more information. Available options depend on the status type.
- The Message column displays messages relevant to sub-functions performed on the listed application status.

Refer to the section **Linking Applications and Statuses** for detailed information about linking applications to a status.

This section covers the following topics:

- Selecting Additional Sub-Functions for Linked Applications
- Displaying Applications Linked to a Status
- Displaying Statuses with No Application Links

Selecting Additional Sub-Functions for Linked Applications

You may select additional sub-functions for linked applications without returning to a menu.

1. In the "C" column on the Link Applications to a Status screen, mark the desired application with the appropriate two-character code to display the desired option screen.

   The following sub-functions are available:

Code	Sub-Function
DI	Display Link Definition
AP	Display Application Definition
ST	Display Status Definition
MO	Modify Link Definition
PU	Purge Link Definition

2. To access a list of available options for a PAC object, mark the desired object with a ? or an asterisk (*) in the "C" column at the left of the screen.

   The resulting Options window lists the available sub-functions and their corresponding codes.

3. In the Options window, select the sub-function by entering the relevant code on the command line.

Displaying Applications Linked to a Status

You can display the existing application status links for a specific status on the Applications Linked to a Status screen by entering Code T (Statuses Linked to Application) and the status name. Maintenance may not be performed from this screen.

This screen is similar to the Link Applications to a Status screen described.

Displaying Statuses with No Application Links

You can display a list of statuses not linked to applications by entering Code U (Statuses with No Application Links) on the Status Menu.

Purging a Status

Note: A status may be purged under certain circumstances, but a status type cannot be modified.

To purge a status, enter Code P and the status name on the Status Menu. Alternatively, enter the PURGE direct command on the command line. Refer to the PAC Reference documentation for the correct syntax.

If versioned objects exist in the status under PAC control, the purge request is ignored and the following message is displayed:

"Objects exist for this status. Purge cannot be performed until the objects have been deleted using the PAC Administrator Functions."

Otherwise, the Purge Confirmation window appears reminding you that the associated application status links, migration paths, and fixed file translation tables will also be purged.

- To purge the status, type CONFIRM or press PF5.
- To return to the Status Menu without purging the status, type a period (.) or press PF3.

7 Applications

- Adding (Defining) an Application of Type NAT 92
- Adding (Defining) an Application of Type PRD 100
- Displaying/Modifying an Application 102
- Selecting an Application from a List 102
- Copying an Application 103
- Linking Statuses to an Application 107
- Purging an Application 109
- View Security Maintenance 109

This section tells you how to define, maintain, and report on PAC applications. For general information about applications, see **Configuring a PAC Environment**.

The application is the high level identifier for a set of related objects. An object can be placed under PAC control only as part of an application. An application definition is required for every application placed under PAC control.

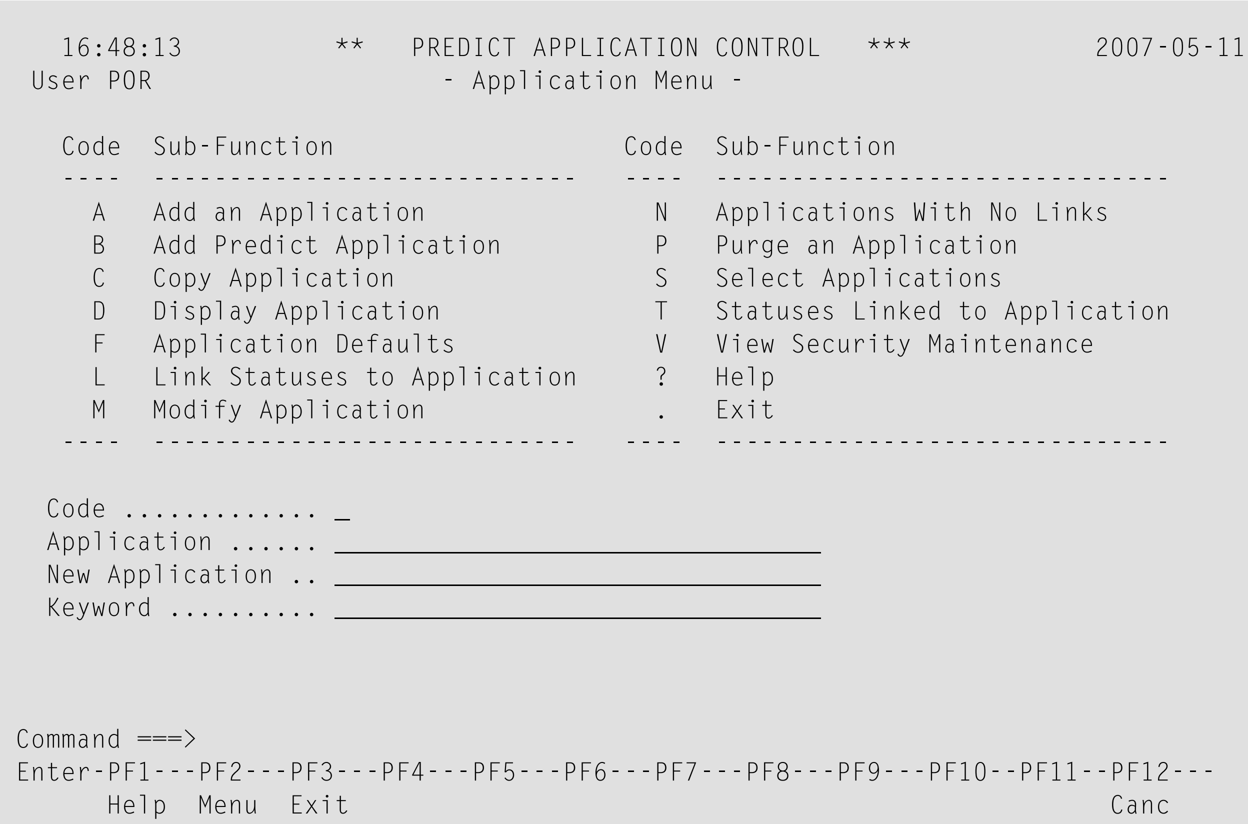
When an application definition is added to PAC, it is automatically linked to the Control status; this link is required and cannot be deleted.

Applications must be linked to predefined statuses. An environment exists only when statuses and applications are linked. The process of linking an application to a status is described in **Linking Applications and Statuses**.

The application names Predict and Predict Case are reserved for PAC and may not be deleted. These are special-use applications. The Predict Case application is used to populate the Predict Case objects used for composing objects for other applications under the control of PAC.

You can access the PAC application maintenance and reporting sub-functions by entering Code A (Applications) on the PAC Main Menu.

Depending on your user profile, either the Application Menu or the Application Reporting Menu appears. Discussions of the PAC maintenance and reporting sub-functions in this section refer to the Application Menu.



```
  16:48:13          **   PREDICT APPLICATION CONTROL   ***            2007-05-11
User POR                      - Application Menu -

  Code  Sub-Function                    Code  Sub-Function
  ----  ----------------------------    ----  ------------------------------
    A   Add an Application                N   Applications With No Links
    B   Add Predict Application           P   Purge an Application
    C   Copy Application                  S   Select Applications
    D   Display Application               T   Statuses Linked to Application
    F   Application Defaults              V   View Security Maintenance
    L   Link Statuses to Application      ?   Help
    M   Modify Application                .   Exit
  ----  ----------------------------    ----  ------------------------------

 Code ............ _
 Application ...... ________________________________
 New Application .. ________________________________
 Keyword .......... ________________________________



Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

Field	Description
Application	Enter either the name of an existing application or a name for a new application. You may enter an application name, an alias, or a range. The name must begin with an alphabetic character and may be up to 32 characters in length. Embedded blanks are allowed, but are automatically changed to the underscore (_) character. If a duplicate application name is entered, an error message is displayed. The application name Predict Case is reserved for PAC and may not be deleted.
New Application	Enter a new application name in the New Application field if you are copying an existing application.
Keyword	This field allows you to enter a keyword that has been assigned to the application with the "Keys" Additional Options function.

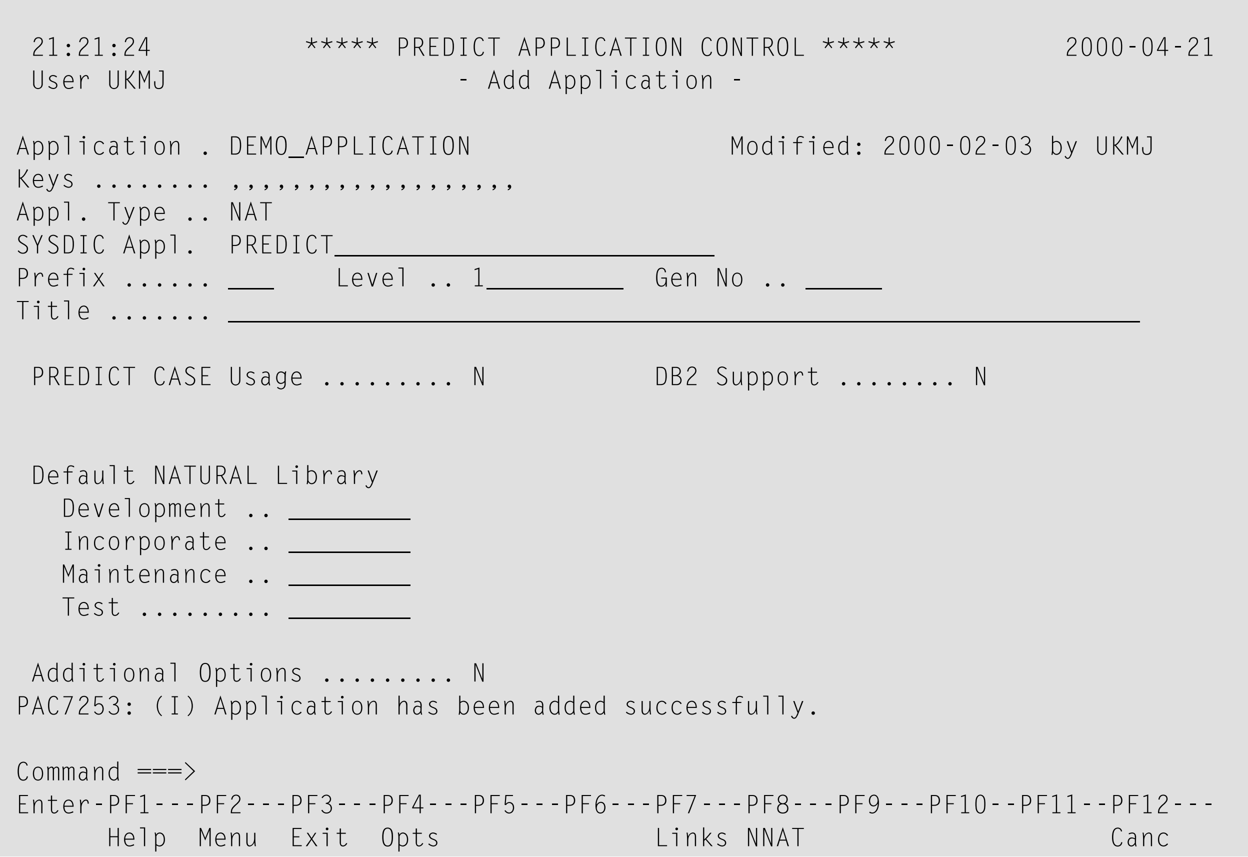
Note: Except for Add, the sub-functions on the Application Menu can be invoked from the Application Selection List displayed when you select sub-function S.

This chapter covers the following topics:

Adding (Defining) an Application of Type NAT

Step 1. Accessing the Add Application Screen

You can access the Add Application screen by entering Code A and a unique application name on the Application Menu. Alternatively, enter the ADD APPLICATION direct command on the command line of the Application Menu; refer to the PAC Reference Manual for the command syntax.



```
 21:21:24          ***** PREDICT APPLICATION CONTROL *****           2000-04-21
 User UKMJ                   - Add Application -

Application . DEMO_APPLICATION                 Modified: 2000-02-03 by UKMJ
Keys ........ ,,,,,,,,,,,,,,,,,,,
Appl. Type .. NAT
SYSDIC Appl.  PREDICT_________________________
Prefix ...... ___    Level .. 1_________  Gen No .. _____
Title ....... ____________________________________________________________

 PREDICT CASE Usage ......... N           DB2 Support ........ N


 Default NATURAL Library
   Development .. ________
   Incorporate .. ________
   Maintenance .. ________
   Test ......... ________

 Additional Options ......... N
PAC7253: (I) Application has been added successfully.

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              Links NNAT                    Canc
```

Step 2. Editing the Add Application Screen

Prefix, Level, and Gen No Fields

These fields require values only if the names of migration events for this application are to be automatically generated.

The Prefix is a 1-3 character designation that functions as the higher level qualifier for the application in the generated migration event name. If you intend to generate migration event names that begin with this prefix, then the first character must be non-numeric because a migration event name cannot begin with a numeric value. The Prefix is most useful if it is a meaningful identifier for the application. The Prefix designation can be subsequently modified.

The Level field can contain a version level designation for the application as a whole. Currently, this designation is not used within the PAC system; it is for documentation purposes only. The format for an entry in this field is not restricted. The version level designation can be subsequently modified.

The Gen No (generation number) is a 5-digit numeric value ranging from 00000-99999. The starting value is set by entering a value in this field. If the number you enter contains fewer than 5 digits, the PAC system adds initial zeros. The value you enter is incremented by one for each migration event defined for the application to ensure a unique value for each event.

The incremented value serves as the "suffix" value following the value specified in the Prefix field. The two values together create a value for the @GEN variable when it is used in the migration event name. If a Prefix has not been defined for the application, the @GEN variable replacement comprises just the suffix value.

The Gen No starting value can be reset at any time by modifying the application definition. However, if a non-unique (duplicate) number is created as a result of resetting the Gen No, an error message is returned along with a request that the user enter a unique name for the event. Non-unique numbers can be avoided by using standard naming conventions; that is, meaningful string prefixes and suffixes.

Note: User Exits 13 and 25 allow you to use additional variables when generating migration event names.

Title Field

You may optionally add a title in the Title field. A title is an expanded name or description of the application. Selection List screens display the titles assigned to PAC entities. The title is free format; up to 60 characters in length.

Predict Case Usage Field

By default, this field has the value N (no) which indicates that Predict Case is not used; that is, Natural objects for this application are not to be composed by Predict Case.

If this application will be using Natural objects composed by Predict Case, you need to overtype the default in this field with Y (yes). In this case, all Predict Case objects used by the Natural objects are versioned in the PAC application.

Note: If you change the default to Y, a Predict Case library must be specified in the development or maintenance status link of the application to link the Predict Case definition to the Natural definition and activate the facility.

Later sections of this manual provide information about using Predict Case with PAC.

DB2 Support Field

By default, this field has the value N (no) which indicates that Natural for DB2 support is not required for the application.

If you are defining a Natural for DB2 application to PAC, overtype the default with Y (yes). PAC supports migrations for both qualified and non-qualified DB2 tables/views, but the migrations must be performed separately. The Truncate Creator option is supported for non-qualified tables/views. Ensure that the Predict generation defaults for views are set correctly before running the migration.

section **Using PAC with Predict Case or Natural for DB2** provides general information about using Natural for DB2 with PAC.

Default Natural Library Fields

You may optionally specify default Natural libraries to be used when linking the application to one of the status types listed.

Step 3. Selecting Additional Options

1. Access the Additional Options window by typing over the default with Y (yes) or by pressing PF4 (Opts).

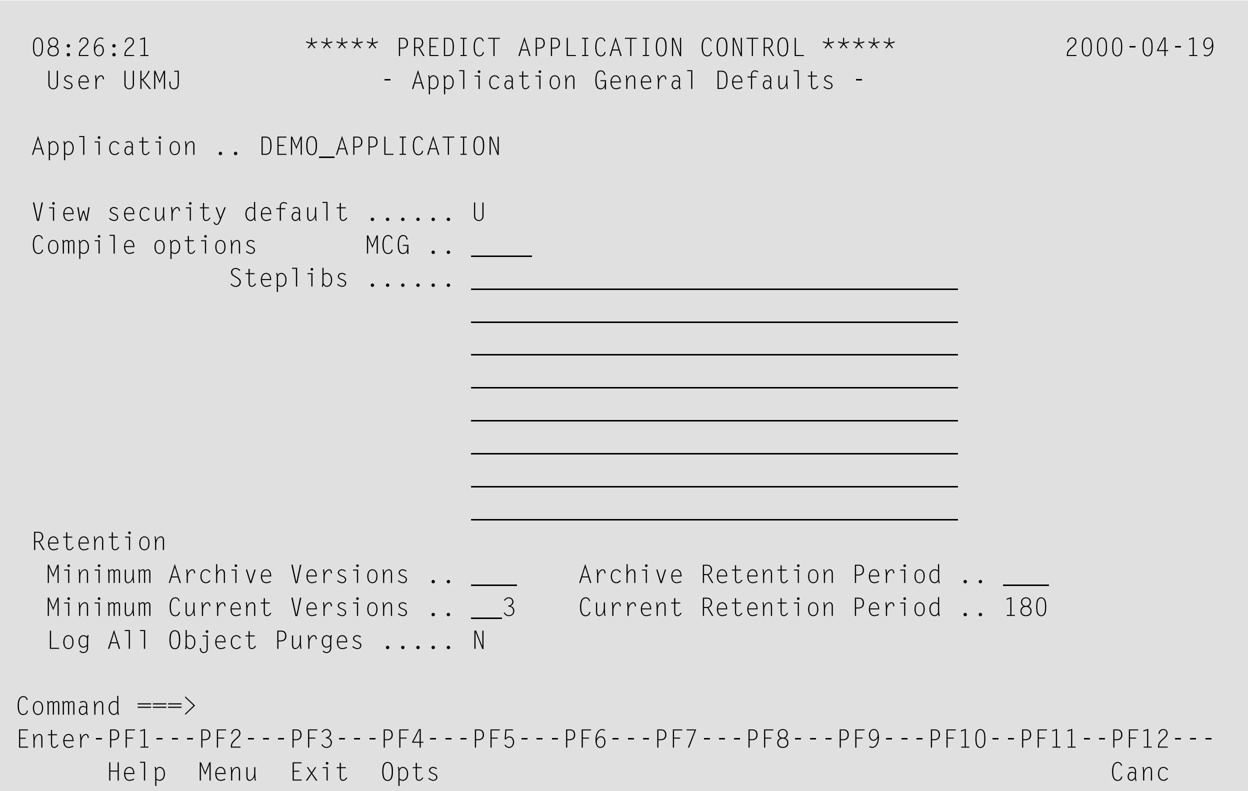
   The Additional Options window displays the following available options:

Option	Purpose
General Defaults	Specifies the Compile Options: MCG, steplibs, Version 2.1 syntax, object version retention, log all object purge options and view security default.
Linked Statuses	Adds statuses you want to link to the application. Refer to the section , Linking Applications and Statuses, on page for more information.
Foreign Support	Defines foreign datasets for the application.
Description	Provides a detailed description of the application.
Aliases	Adds alias names for the application.
Keywords	Adds keywords for the application. Keywords must have been previously defined to PAC.
Dates	Records the date/time that the application was added/modified, the user ID of the person adding/modifying the application, and the terminal ID from which the addition/modification was made.

2. On the Additional Options window, enter Y (yes) to select the options you wish to edit as described in the following steps.

Step 4. Editing the General Defaults

The General Defaults are presented on the Application General Defaults screen:



```
 08:26:21          ***** PREDICT APPLICATION CONTROL *****           2000-04-19
  User UKMJ             - Application General Defaults -

 Application .. DEMO_APPLICATION

 View security default ...... U
 Compile options       MCG .. ____
              Steplibs ...... ________________________________
                              ________________________________
                              ________________________________
                              ________________________________
                              ________________________________
                              ________________________________
                              ________________________________
                              ________________________________
 Retention
  Minimum Archive Versions .. ___    Archive Retention Period .. ___
  Minimum Current Versions .. __3    Current Retention Period .. 180
  Log All Object Purges ..... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc
```

The General Defaults comprise the View security default parameter, Compile Options and Retention Options.

View Security Default

D	disallowed for compilation
A	Access only allowed
U	Update usage is not restricted

The default value will be used at the first time the view is registered. This takes place during Predict object migration.

Compile Options

MCG (Machine Code Generator) Option

Important: As announced with PAC Version 2.5.1, this parameter is going to be retired. For further information, see the PAC 2.5.1 Release Notes.

The MCG option is a Natural profile parameter that activates the Natural OPTIMIZER COMPILER, which must be installed in your environment if you are using this option. Natural OPTIMIZER COMPILER is a Software AG product that extends the optimizing capabilities of Natural to complex statements and statement sequences including array range operations, field concatenation, and optimal base register assignment. If MCG is active, all programs are compiled to machine code. Refer to the Natural OPTIMIZER COMPILER documentation for more information.

This field allows you to specify default values for the MCG option. Valid values are as follows:

Value	Purpose
( )	(blank) Ignores the MCG option; normally used when Natural Optimizer Compiler is not installed in your environment.
N	Turns off the MCG option (other options are not turned on/restored)
Y	Turns on the MCG option. Programs are partly compiled to machine code. Additional features (overflow checking, index checking, mixed mode, optimization of I/O statements) are switched off by default. To activate one or more of these features, add the relevant code(s) listed below:
O	Activates checking in all programs for arithmetic overflows and zero division.
I	Activates checking in all programs for array indexes that are out of bounds (MIX).
M	Activate mixed-mode checking to ensure that the generated object code is compatible with IBM, SNI and Wang mainframes.
W	activate I/O statement compilation to machine code for the following statements: DISPLAY, WRITE, WRITE TITLE, WRITE TRAILER, READ WORK FILE with SELECT option, WRITE WORK FILE.

Specifying O, I, M, and/or W presuppose Y. Multiple options can simply be specified one after the other.

Compile Steplib Option

A steplib is another existing PAC application that has copycode, maps, and/or data areas that are used as subordinates by application objects at compile time. Such steplibs are used in migrations from development or maintenance or during alignment migrations. You may specify up to eight compile steplibs.

The provision made at application level is for default and documentation purposes only and values used here are not used during migrations. The list in the application record is used as a default at the creation of application status links records. For more information, see section **Linking Applications and Statuses**.

Retention Options

These options are used to specify the number of object versions to be retained and the period of retention before the Purge Object Version sub-function is invoked.

Minimum Archive Versions	the number of archived object versions retained by PAC before the oldest version is eligible for automatic purging.
Archive Retention Period	the number of days before an archived object version is eligible for automatic purging.
Minimum Current Versions	the number of object versions retained by PAC before the oldest version is eligible for automatic purging.
Current Retention Period	the number of days before an object version is eligible for automatic purging.

Log All Object Purges Option

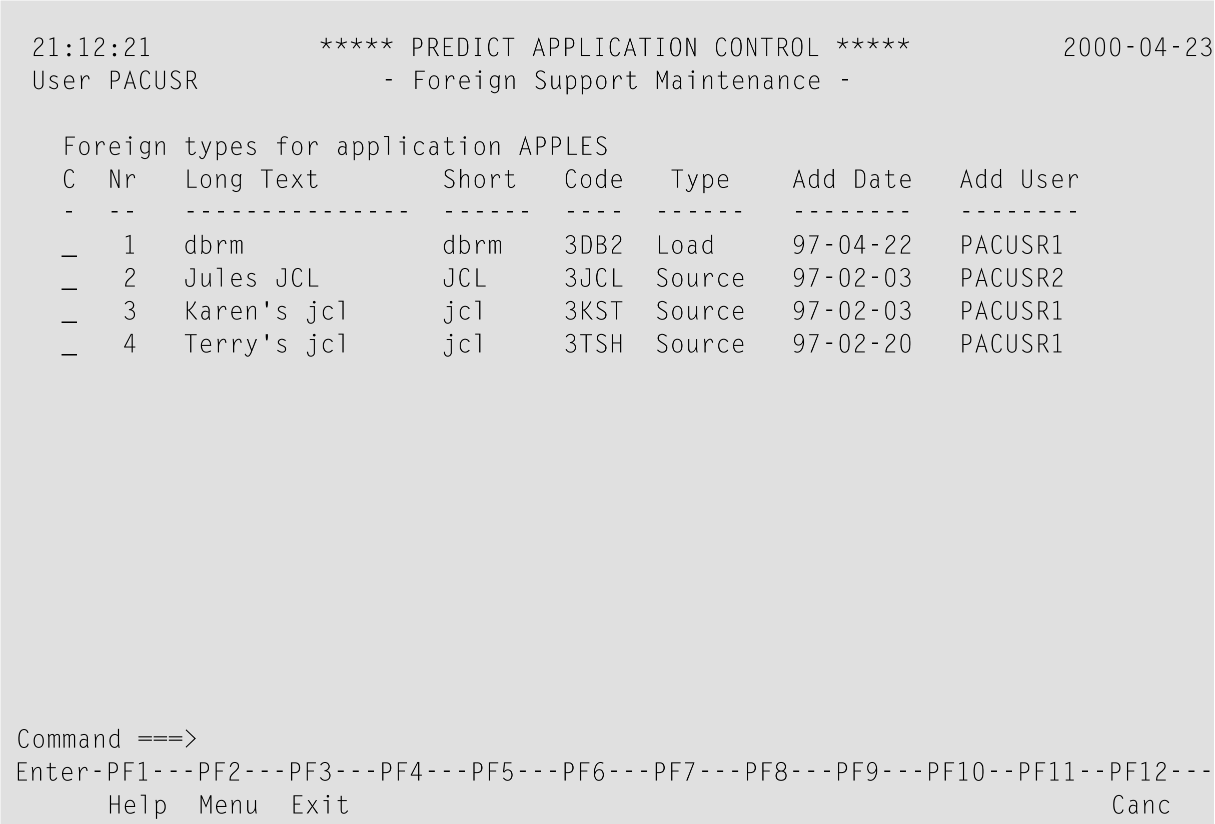
This option indicates whether all purges through the Purge Object Version function are to be logged in the object version audit trail. The default is N (no).

Overtype the default with Y (yes) if you want to create a log in the object version audit trail of the objects purged with the Purge Object Version function.

Step 5. Specifying Foreign Datasets for the Application

The PAC administrator defines the classes and types of foreign datasets that PAC supports for a particular site. You may be responsible for selecting a subset of those dataset types to be used for a particular application.

1. You can view a list of the foreign datasets supported at your site on the Foreign Support Maintenance screen by accessing the Additional Options window from the Add Application screen.



```
 21:12:21           ***** PREDICT APPLICATION CONTROL *****         2000-04-23
 User PACUSR            - Foreign Support Maintenance -

   Foreign types for application APPLES
   C  Nr   Long Text        Short   Code   Type    Add Date   Add User
   -  --   ---------------  ------  ----  ------   --------   --------
   _   1   dbrm             dbrm    3DB2  Load     97-04-22   PACUSR1
   _   2   Jules JCL        JCL     3JCL  Source   97-02-03   PACUSR2
   _   3   Karen's jcl      jcl     3KST  Source   97-02-03   PACUSR1
   _   4   Terry's jcl      jcl     3TSH  Source   97-02-20   PACUSR1













Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

This screen describes the supported foreign datasets, displays the object type code, and indicates whether the dataset contains source code, load (compiled) code, or both.

2. Select the datasets you want to use for the application by marking each with a non-blank character in the "C" column.

Only the types you select on this screen will be displayed in the foreign selection list for the application.

Step 6. Editing Other Additional Options

(Optional) Add for the application

- status links (see section Linking Applications and Statuses on page for more information);
- a description in the Description field;
- alternative names in the Aliases field;
- (previously defined) keywords in the Keys field.

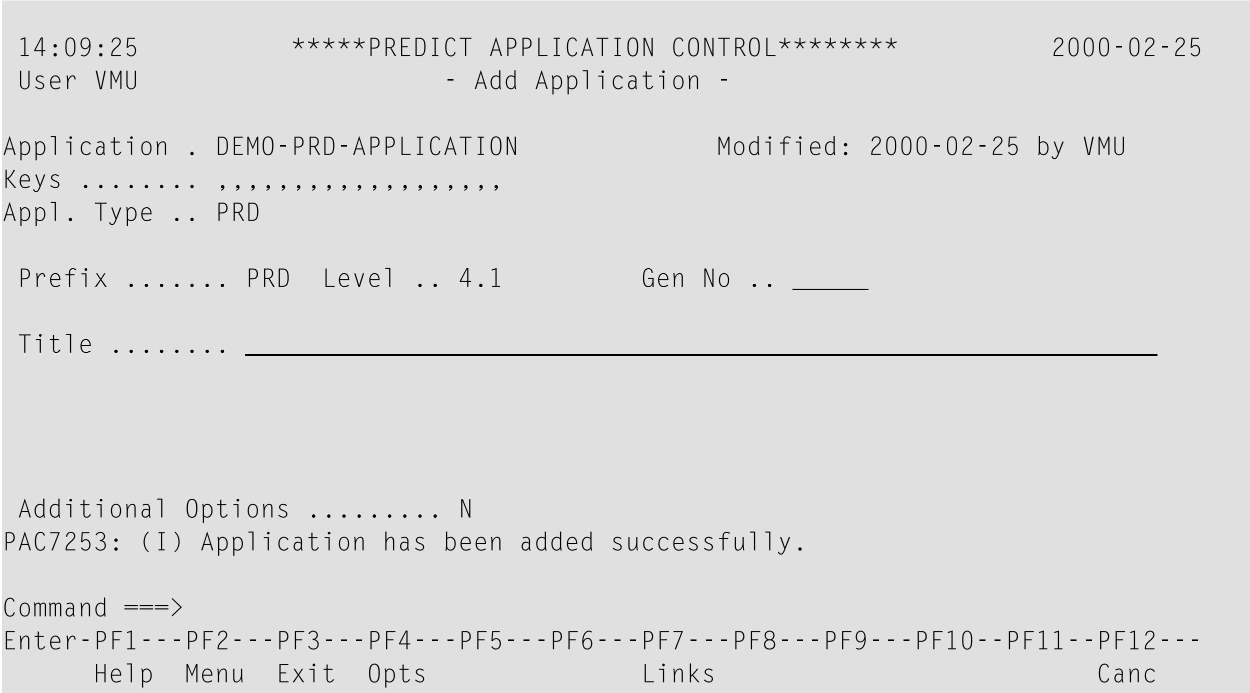
When you have finished editing options for the application, return to the Add Application screen and press ENTER.

If the application has been added, the message "Application has been added successfully" is displayed.

Adding (Defining) an Application of Type PRD

Step 1. Accessing the Add Predict Application Screen

You can access the Add Predict Application screen by entering Code B and a unique application name on the Application Menu.



```
 14:09:25          *****PREDICT APPLICATION CONTROL********          2000-02-25
 User VMU                    - Add Application -

Application . DEMO-PRD-APPLICATION             Modified: 2000-02-25 by VMU
Keys ........ ,,,,,,,,,,,,,,,,,,,
Appl. Type .. PRD

 Prefix ....... PRD  Level .. 4.1         Gen No .. _____

 Title ........ ____________________________________________________________




 Additional Options ......... N
PAC7253: (I) Application has been added successfully.

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              Links                         Canc
```

Step 2. Editing / Displaying the Add Predict Application Screen

These four fields are split into modifiable and fixed fields. The Gen No only requires a value if names of migration events are to be generated.

The Prefix is a 1-3 character designation that functions as the higher level qualifier for the application in the generated migration event name. This value is set to the value of PRD for this type of application.

The Level field reflects the current version of Predict that this installation of PAC is running. This field is not modifiable.

The Gen No (generation number) is a 5-digit numeric value ranging from 00000-99999. The starting value is set by entering a value in this field. If the number you enter contains fewer than 5 digits, the PAC system adds initial zeros. The value you enter is incremented by one for each migration event defined for the application to ensure a unique value for each event.

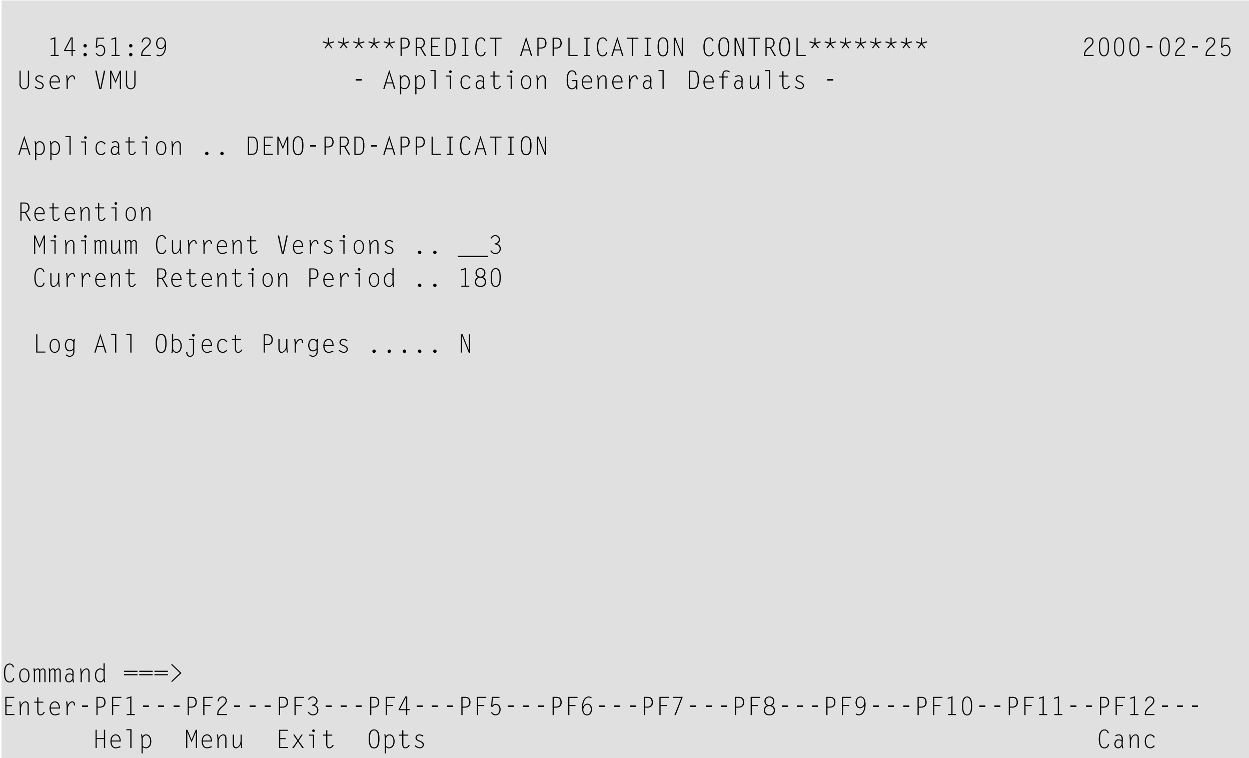
The Title field is optional. You can extend the name of the application by using this field. Selection list screens display the titles assigned to PAC entities. the title is free format; up to 60 characters in length.

Step 3. Selecting Additional Options

Access the Additional Options window by typing over the default with Y (yes) or by pressing PF4 (Opts). See the section **Selecting Additional Options** for more information on these options.

Step 4. Editing the General Defaults

In the Additional Options window enter Y (yes) to select the options you wish to edit as described in the following step. The General Defaults are presented on the Application General Defaults screen:



```
  14:51:29          *****PREDICT APPLICATION CONTROL********          2000-02-25
 User VMU             - Application General Defaults -

 Application .. DEMO-PRD-APPLICATION

 Retention
  Minimum Current Versions .. __3
  Current Retention Period .. 180

  Log All Object Purges ..... N









Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc
```

Retention Options

These options are used to specify the number of object versions to be retained and the period of retention before the Purge Object Version sub-function is invoked.

Minimum Current Versions	the number of object versions retained by PAC before the oldest version is eligible for automatic purging.
Current Retention Period	the number of days before an object version is eligible for automatic purging.

Log All Object Purges Option

This option indicates whether all purges through the Purge Object Version function are to be logged in the object version audit trail. The default is N (no).

Overtype the default with Y (yes) if you want to create a log in the object version audit trail of the objects purged with the Purge Object Version function.

Displaying/Modifying an Application

The Display (non-modifiable) and Modify screens are similar to the Add Application screen. Refer to the section **Add (Define) an Application** for more information.

Access the Display or Modify screens from the Application Menu by entering Code D (Display Application) or M (Modify Application) and the application name. Alternatively, enter the DISPLAY or MODIFY direct commands on the command line of the relevant menus. PAC commands are described in the PAC Reference Manual.

Selecting an Application from a List

You can display a list of existing applications by entering Code S (Select an Application from a List) on the Application Menu. Alternatively, enter the SELECT APPLICATION direct command on the command line of the Application Menu. PAC commands are described in the PAC Reference Manual.

The resulting Application Selection List screen lists the application name and title.

If you accessed the screen with the S sub-function or with the SELECT direct command for one or more of the listed applications, you may process the following sub-functions directly from the list by entering the Code for the sub-function in the "C" column:

Code	Sub-Function
C	Copy an application
D	Display an application

Code	Sub-Function
L	Link an application to a status
M	Modify an application
P	Purge an application
S	Select an application
T	Statuses linked to an application
.	Return to the Application Maintenance Menu.

If you mark the status with the cursor or enter an X or an S in the "C" column, or if you enter the application number (from the "Nr" column) in the Mark Selection... field, the Application Menu appears with the specified status already displayed in the Application field.

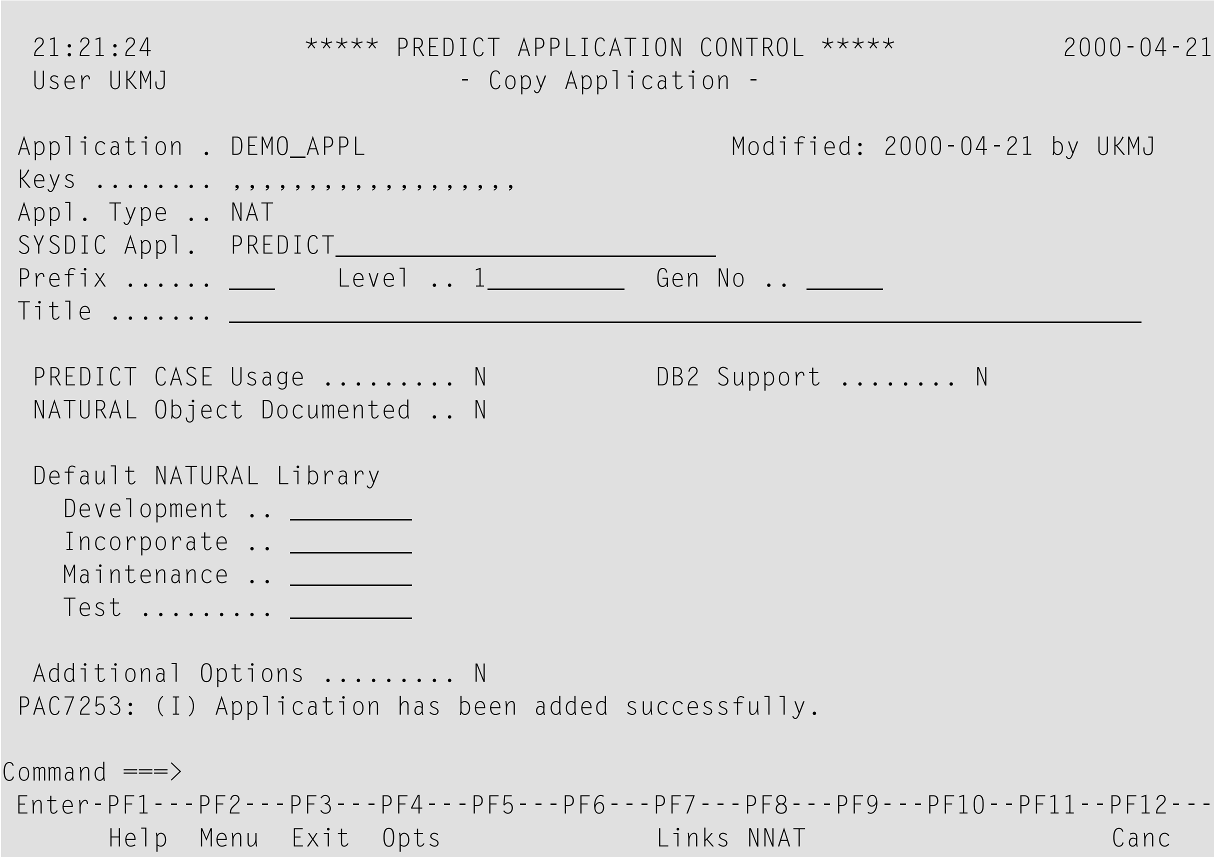
Copying an Application

You can copy the application definition of one application to another and, optionally, copy the associated application status links and migration paths. Application aliases are not copied.

1. To copy an application, enter Code C (Copy an Application), the name of the application to be copied, and a new name for the copy on the Application Menu. If you do not enter the name of an application to be copied, PAC first presents a list of existing applications and you must select one to be copied by entering "C" next to the application.

   You may also copy an application from the Selection Application List screen.

   In both cases, the Copy Application screen appears:



```
  21:21:24          ***** PREDICT APPLICATION CONTROL *****          2000-04-21
  User UKMJ                   - Copy Application -

 Application . DEMO_APPL                       Modified: 2000-04-21 by UKMJ
 Keys ........ ,,,,,,,,,,,,,,,,,,,
 Appl. Type .. NAT
 SYSDIC Appl.  PREDICT_________________________
 Prefix ...... ___    Level .. 1_________  Gen No .. _____
 Title ....... ____________________________________________________________

  PREDICT CASE Usage ......... N           DB2 Support ........ N
  NATURAL Object Documented .. N

  Default NATURAL Library
    Development .. ________
    Incorporate .. ________
    Maintenance .. ________
    Test ......... ________

  Additional Options ......... N
 PAC7253: (I) Application has been added successfully.

Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit  Opts              Links NNAT                      Canc
```

Refer to the discussion of the **Add Application menu** for information about the fields on this screen. You may modify the copied field values except Prefix, Level, and Gen No.

2. Edit the field values of the Copy Application screen to suit the requirements of the new application.
3. Press ENTER to display the Copy Options window:

```
14:21:57          ***** PREDICT APPLICATION CONTROL ****           2001-04-06
User VMU                    - Copy Application -

Application . DEMO_APPL                             Modified: 2001-04-06  by  ↩
VMU
Keys ........ ,,,,,,,,,,,,,,,,,,,
Appl. Type .. NAT
SYSDIC Appl.  PREDICT_________________________
Prefix ...... ___    Level .. 1_________  Gen No .. _____
Title ....... ____________________________________________________________

 PREDICT CASE Usage .........+-----------------------------------------------+
 NATURAL Object Documented ..|                --- Copy Options ---           |
                             |                                               |
 Default NATURAL Library     |  Application .. DEMO_APPL                     |
   Development .. ________   |                                               |
   Incorporate .. ________   |  Copy Application Status Link .. Y            |
   Maintenance .. ________   |  Copy Migration Path ........... Y            |
   Test ......... ________   |                                               |
                             +-----------------------------------------------+
 Additional Options ......... N
PAC7253: (I) Application has been added successfully.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              Links NNAT                  Canc  ↩
```

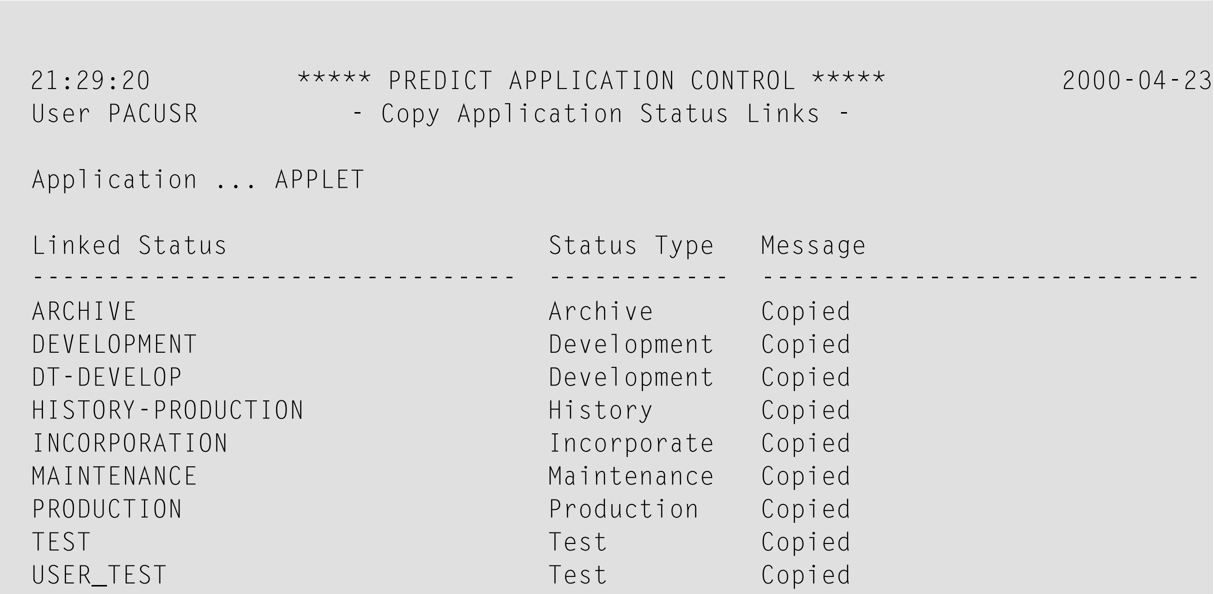
The Copy Options are copied by default.

If you do not wish to copy the application status links or migration paths, type N (No) over the Y defaults.

Note: Migration paths may only be copied if the application status links are also copied.

4. To copy the application status links and migration paths, press ENTER.

   The following screens are those displayed if you elected to copy the application status links and migration paths:

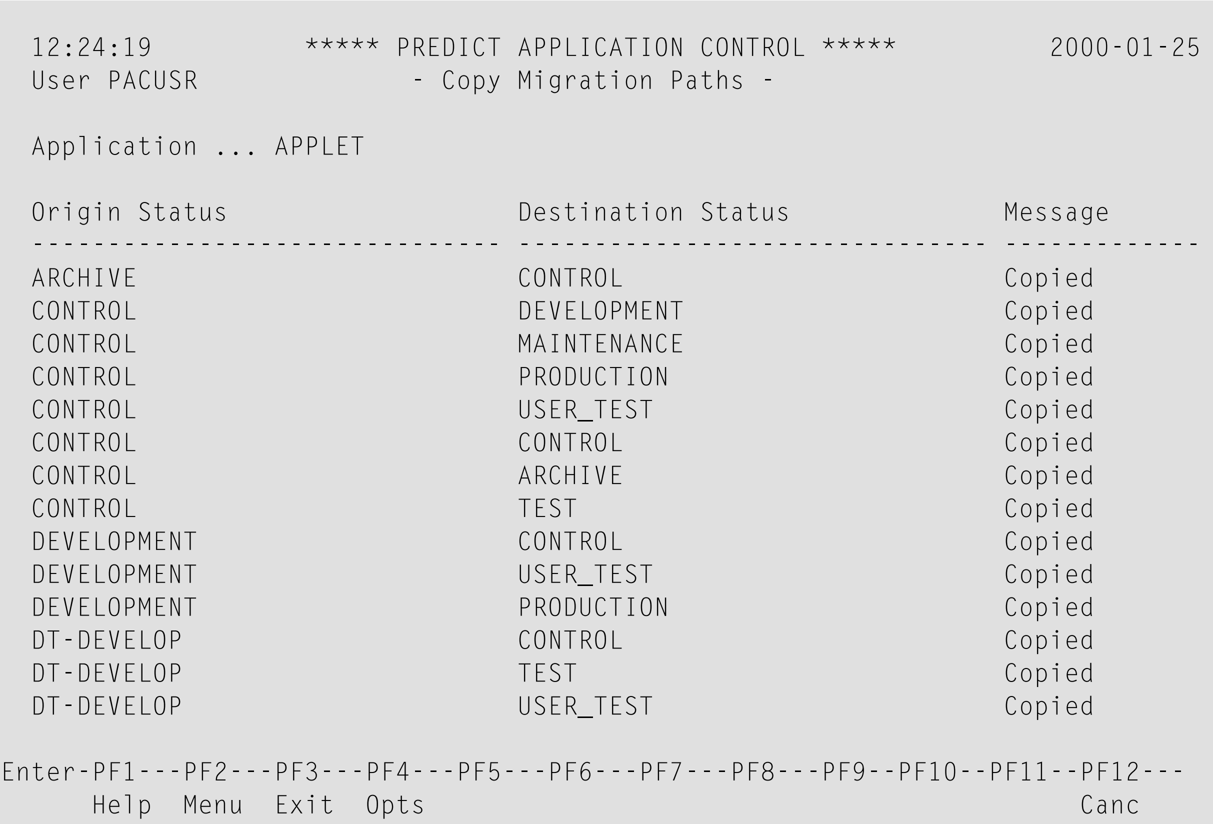


```
 21:29:20         ***** PREDICT APPLICATION CONTROL *****           2000-04-23
 User PACUSR          - Copy Application Status Links -

 Application ... APPLET

 Linked Status                      Status Type   Message
 --------------------------------   ------------  -----------------------------
 ARCHIVE                            Archive       Copied
 DEVELOPMENT                        Development   Copied
 DT-DEVELOP                         Development   Copied
 HISTORY-PRODUCTION                 History       Copied
 INCORPORATION                      Incorporate   Copied
 MAINTENANCE                        Maintenance   Copied
 PRODUCTION                         Production    Copied
 TEST                               Test          Copied
 USER_TEST                          Test          Copied
```

The Copy Application Status Links screen lists the existing application status links (of the copied application) that have been copied (added) to the new application.



```
 12:24:19         ***** PREDICT APPLICATION CONTROL *****          2000-01-25
 User PACUSR              - Copy Migration Paths -

 Application ... APPLET

 Origin Status                    Destination Status              Message
 -------------------------------- ------------------------------- -------------
 ARCHIVE                          CONTROL                         Copied
 CONTROL                          DEVELOPMENT                     Copied
 CONTROL                          MAINTENANCE                     Copied
 CONTROL                          PRODUCTION                      Copied
 CONTROL                          USER_TEST                       Copied
 CONTROL                          CONTROL                         Copied
 CONTROL                          ARCHIVE                         Copied
 CONTROL                          TEST                            Copied
 DEVELOPMENT                      CONTROL                         Copied
 DEVELOPMENT                      USER_TEST                       Copied
 DEVELOPMENT                      PRODUCTION                      Copied
 DT-DEVELOP                       CONTROL                         Copied
 DT-DEVELOP                       TEST                            Copied
 DT-DEVELOP                       USER_TEST                       Copied

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9--PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                             Canc
```

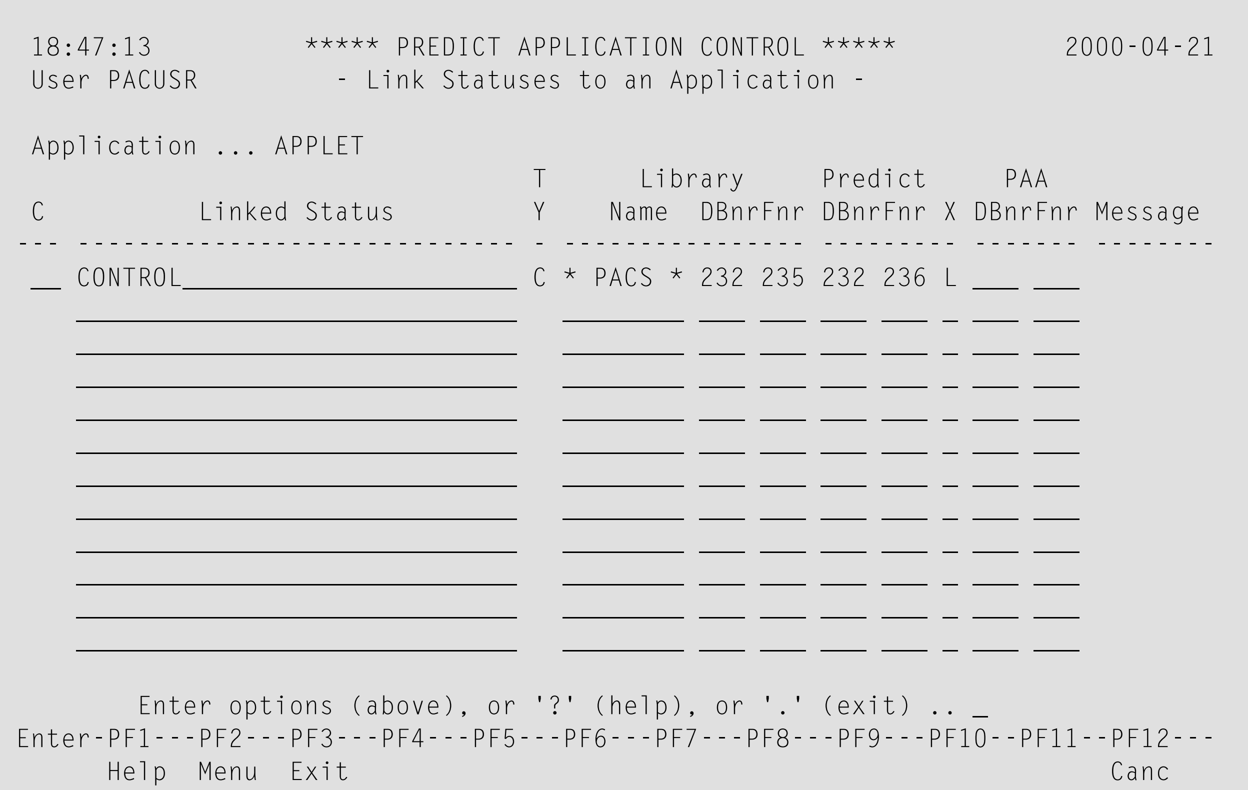
The Copy Migration Paths screen lists the existing migration paths (of the copied application) that have been copied (added) to the new application.

Linking Statuses to an Application

To display a list of applications that are not linked to statuses other than the Control status, enter Code U (Applications with no Status Links) on the Application Menu.

To link several statuses to a specified application, enter Code L (Link Statuses to an Application) and the application name on the Application Menu.

The Link Statuses to an Application screen appears:



```
 18:47:13          ***** PREDICT APPLICATION CONTROL *****           2000-04-21
 User PACUSR         - Link Statuses to an Application -

 Application ... APPLET
                                  T      Library     Predict     PAA
 C          Linked Status         Y    Name  DBnrFnr DBnrFnr X DBnrFnr Message
--- ----------------------------- - ---------------- --------- ------- --------
 __ CONTROL______________________ C * PACS * 232 235 232 236 L ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___
    _____________________________   ________ ___ ___ ___ ___ _ ___ ___

        Enter options (above), or '?' (help), or '.' (exit) .. _
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                 Canc
```

The Link Statuses to an Application screen displays existing application status links as well as the type of status linked and the library and Predict information.

1. In the Linked Status column, enter the status you want to link to the application.
2. In the TY column, enter the status type code (for example, "T" for test).
3. In the Library columns, enter the library, database and file numbers where the application status is located.

> **Note:** The library locations used for the Control status, as well as for the Archive (A), Retire (R), and Production (P) statuses are reserved for use by PAC.

4. In the Predict columns, enter the Predict database and file numbers where the cross-reference data is stored.

   Note: If no Predict database or file number are entered, the Predict Data database (DBnr) and file number (Fnr) display the values set when the application was defined. You may override these values.

5. In the Predict "Xr" column, enter the following cross-reference information: L (Local), R (Remote), B (Both), or N (None). Available options depend on the status type.
6. The PAA DBnr/Fnr field identifies the database number of the PAA file for application objects transferred to this production status. This field is modifiable only for production type statuses; for all other statuses the field is write-protected.

   The Message column displays messages relevant to sub-functions performed on the listed statuses.

Refer to section **Linking Applications and Statuses** for information about linking statuses to an application.

Selecting Sub-Functions for Linked Statuses

1. To display the existing application status links for an application, enter Code T (Statuses Linked to Application) on the Application Menu along with the application name.

   The Statuses Linked to Application screen appears. It is similar to the **Link Statuses to an Application screen**. From this screen, you may directly select additional sub-functions for statuses linked to applications. The following table lists the sub-functions available:

Code	Sub-Function
AP	Display Application Definition
DI	Display Link Definition
DN	Display Foreign
MO	Modify Link Definition
PU	Purge Link Definition
ST	Display Status Definition

   You may access an Options window listing available sub-functions and corresponding codes online by marking the list entry with a ? or an asterisk (*) in the "C" column or by accessing Help (PF1).

2. To select a sub-function and display the corresponding sub-function screen, mark the desired status in the "C" column with the appropriate two-character code, or enter the code on the command line of the Options window.

Purging an Application

To purge an application, enter Code P (Purge an Application) and the application name on the Application Menu.

If versioned objects exist for the application under PAC control, the purge request is denied and the following message is displayed:

"Objects exist for this application. Purge cannot be performed until the objects have been deleted using the PAC Administrator Functions."

Otherwise, the Purge Confirmation window appears and reminds you that the associated application status links, migration path definitions, and file translation tables will also be purged.

From the Purge Confirmation window, you can

- type Confirm or press PF5 to purge the application; or
- type a period (.) or press PF3 to return to the Application Menu without purging the application.

View Security Maintenance

A DDM is transferred to PAC

- either via migration to the Predict application.
- or via generation at migration time from development or maintenance to the Predict application of an Adabas or user file.

If a Natural object, which is being migrated from a development or maintenance to a non-Predict application, needs a DDM at compilation, a version of the DDM must be available in the Predict application; if not, the compilation will fail. If a DDM is used at such a compilation, it is "linked" or "registered" to the application to which the compiled Natural object is migrated.

DDMs can be migrated from CONTROL to those applications to which they are registered, but not from the Predict application.

The view security maintenance facilities allows you to

- register a DDM to an application "by hand" without, or before, using the DDM at the compilation of a Natural object;
- prohibit the use of all DDMs of a particular name during migrations to the location of a particular application;

- restrict the use of all DDMs of a particular name during migrations to the location of a particular application to "access only" - that is, it prohibits the use of the DDM in the compiled objects for storing, updating, or deleting.

Note: At application level you can specify the default value of the view when it is first registered to PAC. Use the parameter "View security defaults".

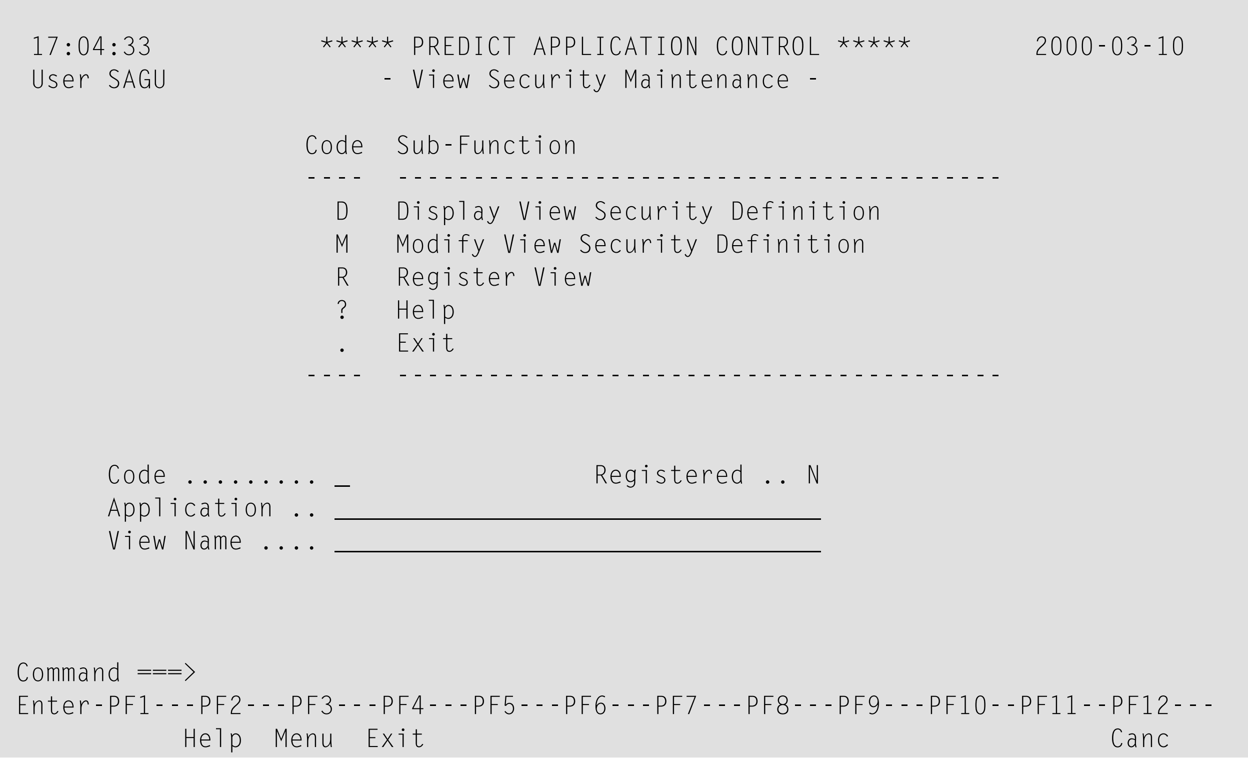
This section covers the following topics:

- View Security Maintenance Menu
- View Security Selection List
- View Registration Selection List

View Security Maintenance Menu

To access the View Security Maintenance functions, enter Code V (View Security Maintenance) on the Application Functions menu.

The View Security Maintenance screen appears:



```
 17:04:33           ***** PREDICT APPLICATION CONTROL *****        2000-03-10
 User SAGU              - View Security Maintenance -

                   Code  Sub-Function
                   ----  ----------------------------------------
                     D   Display View Security Definition
                     M   Modify View Security Definition
                     R   Register View
                     ?   Help
                     .   Exit
                   ----  ----------------------------------------


      Code ......... _                 Registered .. N
      Application .. ________________________________
      View Name .... ________________________________



Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
           Help  Menu  Exit                                             Canc
```

On this screen, you can specify applications or views for which you want to perform view security maintenance and whether you want listed all views in the Predict application ([Registered] = N) or only those with some version registered to the specified application ([Registered] = Y).

To display or modify a view security definition or register a view to an application, enter Code D (Display View Security Definition) or Code M (Modify View Security Definition) or Code R (Register View). Use range notation in the fields Application or View Name to restrict the choice of applications or views respectively.

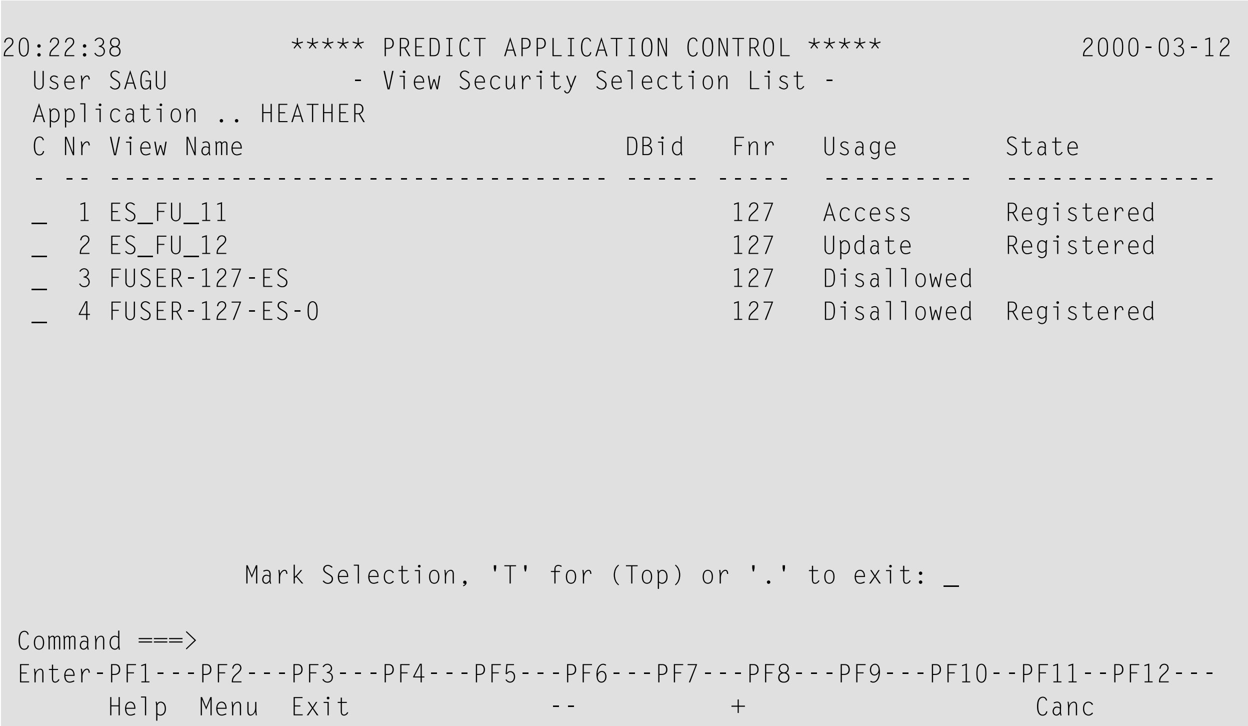
If the Application field is left blank or "*", "<", or ">" is used in it and and if there is an application satisfying the application selection criterion, an Applications window appears in which you can select a single application.

The Registered field can take values N (the default) and Y. N stands for "list all views in the Predict application which satisfy the view selection criterion". Y stands for "list the views in the Predict application which satisfy the view selection criterion and are registered to the application".

View Security Selection List

To display or modify a view security definition, enter Code D or M on the View Security Maintenance screen.

In either case, a View Security Selection List appears:



```
20:22:38           ***** PREDICT APPLICATION CONTROL *****           2000-03-12
  User SAGU            - View Security Selection List -
  Application .. HEATHER
  C Nr View Name                         DBid   Fnr   Usage       State
  - -- --------------------------------- ----- -----  ----------  --------------
  _  1 ES_FU_11                                 127   Access      Registered
  _  2 ES_FU_12                                 127   Update      Registered
  _  3 FUSER-127-ES                             127   Disallowed
  _  4 FUSER-127-ES-0                           127   Disallowed  Registered








                Mark Selection, 'T' for (Top) or '.' to exit: _

 Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit             --          +                   Canc
```

Its C fields are protected if it has come in response to Code D; these fields are unprotected if they are in response to Code M.

The list contains DDM names, not versioned DDMs. The name of the application is displayed in the third line of the screen.

For each view, the database and file numbers of its master file are listed. The number zero is blanked out. Each view is marked with "Update", "Access", or "Disallowed" in the "Usage" column. "Update" means that any version of the DDM can be used without restriction at the compilations concerning migrations to the application's compartment. "Access" means that such a compilation will fail (NAT0975) if an object being compiled contains a STORE, UPDATE, or DELETE statement which uses the DDM. "Disallowed" means that such a compilation will fail (NAT0974) if an object being compiled refers to the DDM.

"Registered" in the "State" column indicates that some version of the DDM has been registered to the application.

A View Security Selection List screen with unprotected "C" fields allows you to modify the usage permissions for the listed views. To assign a usage permission to a view, mark its entry with U for "Update', A' for "Access", or D for "Disallowed".

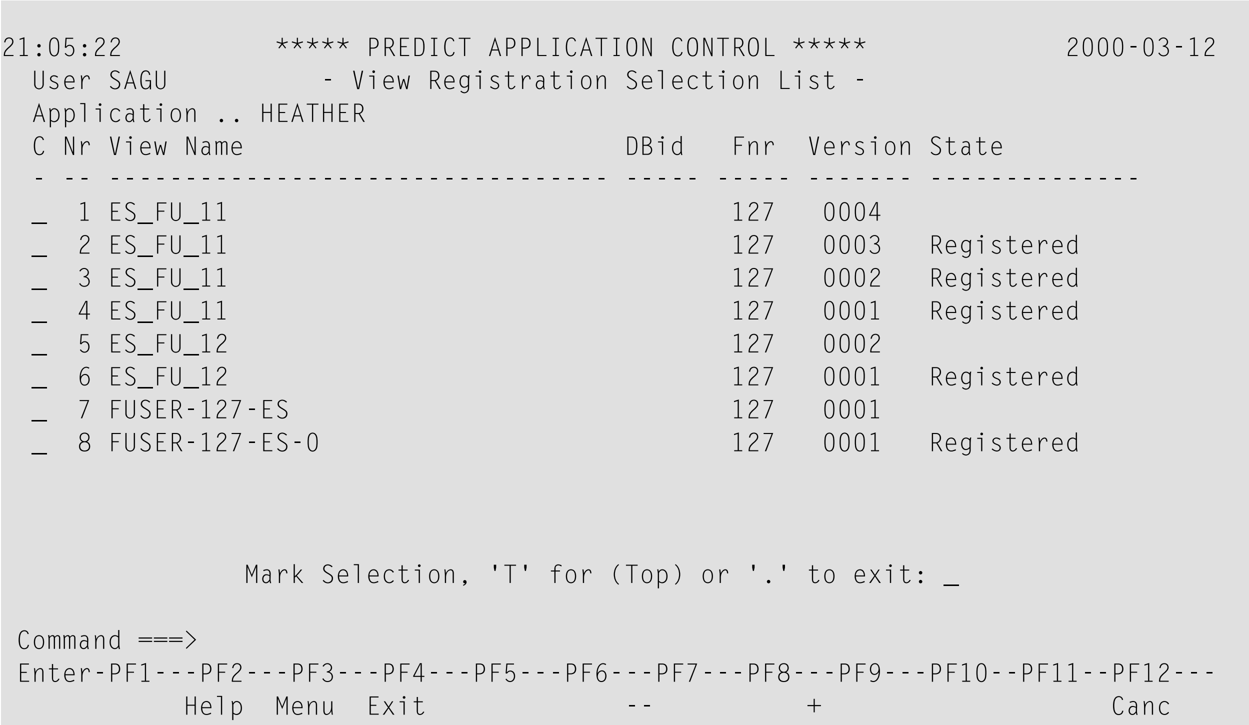
Note: Marking a view's entry with U or A also causes the view to be immediately registered to the application.

Press ENTER to confirm the modifications. Enter a period (.) in the "Mark Selection" field or press PF3 (Exit) to abandon the latest (following the last pressing of ENTER) modifications and return to the View Security Maintenance screen.

View Registration Selection List

To register versioned DDMs to an application, enter Code on the View Security Maintenance screen.

A View Registration Selection List screen appears:



```
21:05:22          ***** PREDICT APPLICATION CONTROL *****             2000-03-12
  User SAGU          - View Registration Selection List -
  Application .. HEATHER
  C Nr View Name                         DBid   Fnr  Version State
  - -- --------------------------------- ----- ----- ------- -------------
  _  1 ES_FU_11                                 127   0004
  _  2 ES_FU_11                                 127   0003   Registered
  _  3 ES_FU_11                                 127   0002   Registered
  _  4 ES_FU_11                                 127   0001   Registered
  _  5 ES_FU_12                                 127   0002
  _  6 ES_FU_12                                 127   0001   Registered
  _  7 FUSER-127-ES                             127   0001
  _  8 FUSER-127-ES-0                           127   0001   Registered



                Mark Selection, 'T' for (Top) or '.' to exit: _

 Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
            Help  Menu  Exit             --         +                   Canc
```

The "C" fields of the screen are unprotected.

Unlike the View Security Selection List screen, it lists versioned DDMs rather than DDM names. It does not show DDM usage permissions.

To register a versioned DDM to the application, mark the entry with an in the "C" column.

8 Application Defaults

To access the application defaults maintenance functions, enter Code A on the General Defaults menu. An Application Name window appears:

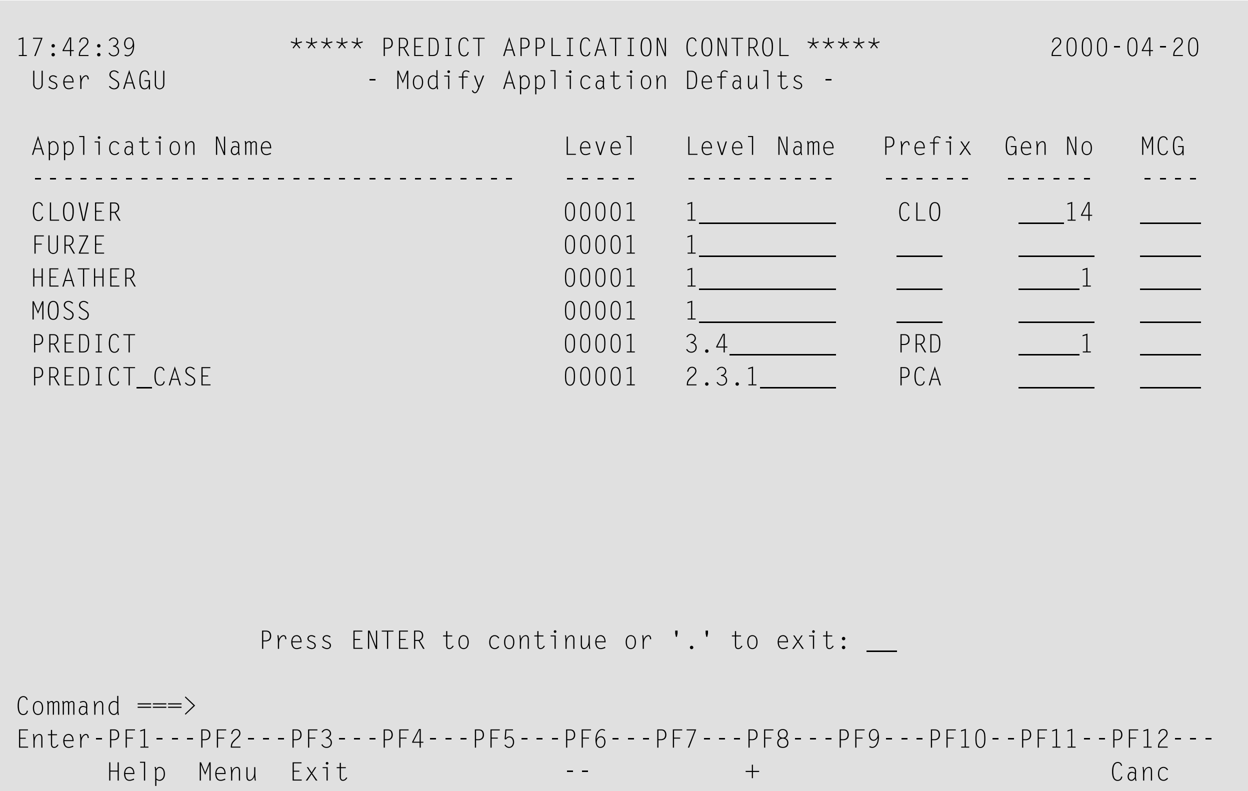
```
+-------------------------------------------------------+         2000-04-20
|               --- Application Name ---                 |
|                                                        |
| Name of the Application to be processed. The           |
| name may be a specific name or a Range of names.       |
| Range is specified as follows:                         |
|                                                        |
|   'val'* - Process all applications beginning          |
|         with the string 'val'.                         |
|   'val'> - Process all applications EQ or GT           |
|        the value of 'val'.                             |
|   'val'< - Process all Application EQ or LT            |
|          the value of 'val'.                           |
|                                                        |
| Enter Application Name below:                          |
|          ____________________________________        |                      ↵

|                                                        |
+-------------------------------------------------------+

 Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                    Canc
```

Enter a range of application names or, to immediately return to the General Defaults menu, press PF3 or enter ".".

If there is an application whose name is in the specified range, a Modify Application Defaults screen appears:



```
17:42:39          ***** PREDICT APPLICATION CONTROL *****           2000-04-20
 User SAGU             - Modify Application Defaults -

 Application Name                   Level   Level Name   Prefix  Gen No   MCG
 --------------------------------   -----   ----------   ------  ------   ----
 CLOVER                             00001   1_________    CLO     ___14   ____
 FURZE                              00001   1_________    ___     _____   ____
 HEATHER                            00001   1_________    ___     ____1   ____
 MOSS                               00001   1_________    ___     _____   ____
 PREDICT                            00001   3.4_______    PRD     ____1   ____
 PREDICT_CASE                       00001   2.3.1_____    PCA     _____   ____









                Press ENTER to continue or '.' to exit: __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

If there is no application whose name is in the specified range, the General Defaults menu is redisplayed with a message.

The values of fields Level Name, Prefix, Gen No, and MCG of each listed application can be modified. They can also be modified at application modification in the Reporting and Maintenance subsystem of PAC.

The Level Name fields will take any character string values, whereby lower-case letters are replaced with their upper-case counterparts. The value of an application's Level Name field appears on the screens and displays the attributes of the application; it has no other significance.

The values of Prefix (a string of 1 to 3 characters) and Gen No (an unsigned integer automatically converted to a five digit sequence) are concatenated to replace "@GEN" at migration event addition. The value of Gen No is automatically incremented by one at the addition for the application of an event with sub-segment "@GEN" in its name. The values of Prefix and Gen No can be freely changed. Duplicate event names and event names beginning with digits are rejected at event addition - regardless of whether they have been entered in full by the user or have undergone "@GEN" replacement.

The value of an application's MGC field may affect the compilation of Natural objects at migration to the application's compartment.

The MCG option is a Natural profile parameter which activates the Natural Optimizer Compiler, which must be installed in your environment if you are using this option. Natural Optimizer

Compiler is a Software AG product that extends the optimizing capabilities of Natural to complex statements and statement sequences including the following: array range operations; field concatenation; optimal base register assignment. If MCG is active, all programs are compiled to machine code.

The MCG field should be left blank if the Natural Optimizer Compiler is not installed. It must be set to "N" if Natural Optimizer Compiler is installed but is not to be used. Apart from these two values, the MCG will take "Y" and any string of "O", "I", "M" or "W".

Value	Description
blank	No MCG.
N	MCG off.
Y	Activates the MCG. Programs are partly compiled to machine code. Overflow checking, index checking, mix compilation, and I/O optimization are deactivated.
I	Activates the MCG and index checking.
O	Activates the MCG and overflow checking.
M	Activates the MCG and mix compilation. (The machine code is generated compatible with IBM and Siemens.)
W	Activates the MCG and the compilation to machine code of the Natural statements: DISPLAY, WRITE, WRITE TITLE, WRITE TRAILER, READ WORK FILE with SELECT option, WRITE WORK FILE.

9

Linking Applications and Statuses

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- Selecting an Application Status Link 131
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- Displaying an Application Status Link 135
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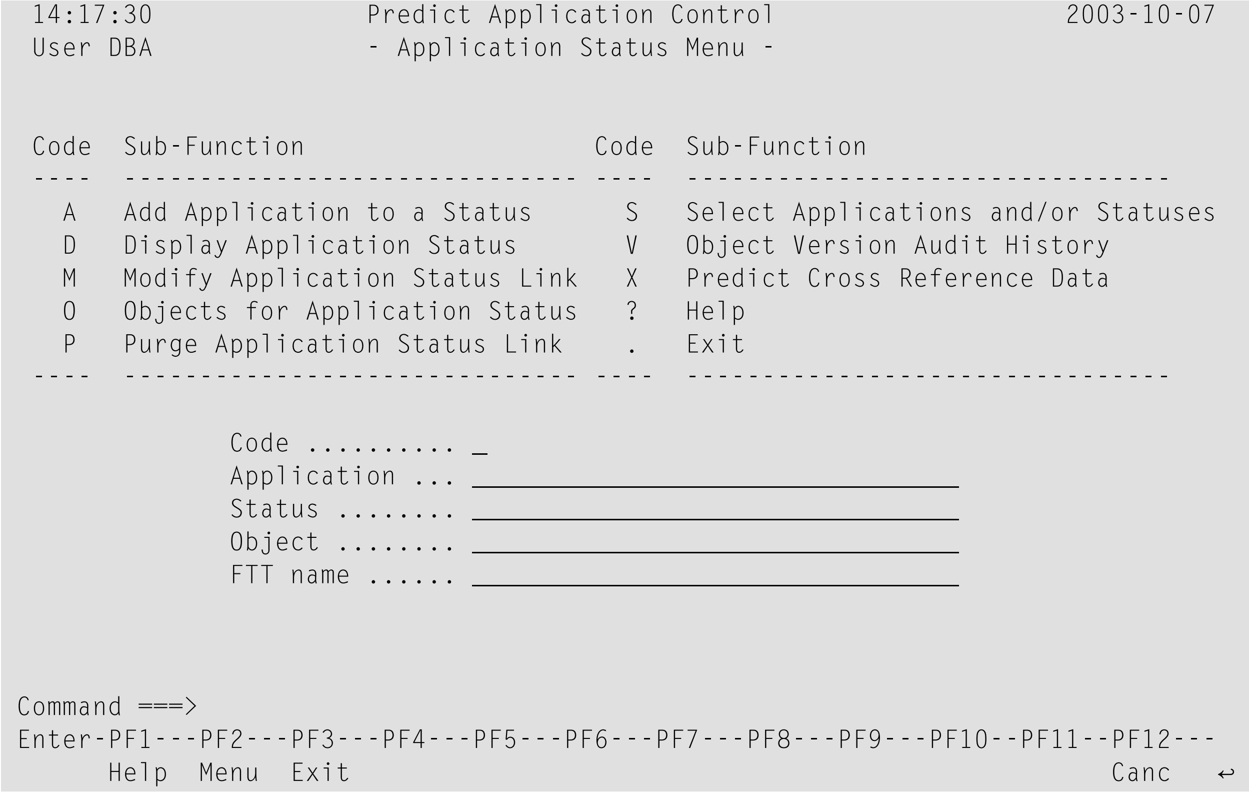
- Displaying Predict Cross-Reference Data 142

Once PAC statuses are defined and an application is defined to PAC, you must link the statuses to the application to define the application's life-cycle.

All applications defined to PAC are linked automatically to the Control status. The Control status is used internally by PAC and its location cannot be changed by the user.



```
 14:17:30              Predict Application Control                   2003-10-07
 User DBA              - Application Status Menu -


 Code  Sub-Function                   Code  Sub-Function
 ----  ------------------------------ ----  --------------------------------
   A   Add Application to a Status      S   Select Applications and/or Statuses
   D   Display Application Status       V   Object Version Audit History
   M   Modify Application Status Link   X   Predict Cross Reference Data
   O   Objects for Application Status   ?   Help
   P   Purge Application Status Link    .   Exit
 ----  ------------------------------ ----  --------------------------------

              Code .......... _
              Application ... ________________________________
              Status ........ ________________________________
              Object ........ ________________________________
              FTT name ...... ________________________________



Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                Canc   ↩
```

1. To access the PAC application status maintenance and reporting sub-functions, enter Code L (Application Status Links) on the PAC Main Menu. Depending on your user profile, either the Application Status Menu or the Application Status Reporting Menu appears. The Application Status Menu is used in this discussion because it includes both maintenance and reporting sub-functions.
2. In addition to the desired Code, enter the name, an alias, or range notation to identify an existing application and status to be linked.
3. Specify the name (with Code O or V) or type (with Code V) of a Natural, foreign, Predict, or user error message object within the specified application.

Note: All of the sub-functions listed above, except Add, may be selected for processing directly from the Application Status Link Selection List that is accessed using the Select Application and/or Status sub-function.

This chapter covers the following topics:

Screens Used to Define Application Status Links

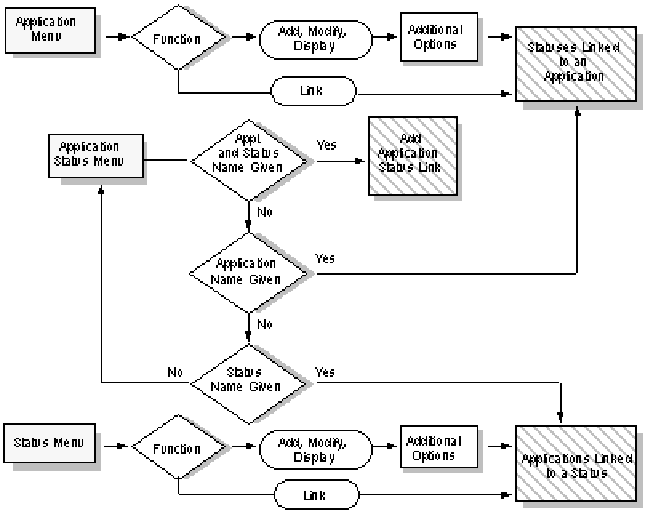
Application status links may be defined from three different screens:

Screen	**Use to add / display / modify . . .**
Application Status Link	each status for an application individually.
Link Statuses to an Application	all statuses for a specified application.
Link Applications to a Status	all applications for a specified status.

The three application status link screens may be accessed as follows:

- Application Status Link
    - Enter Code A, D, or M, an application name, and a status name on the Application Status Menu; or
    - Enter MOdify, DIsplay, or LInk in the "C" column on the Statuses Linked to Application screen; or
    - Enter MOdify, DIsplay, or LInk in the "C" column on the Link Applications to a Status screen.
- Link Statuses to an Application
    - Enter A, D, or M in the code field, an application name, and range notation for the status name on the Application Status Menu; or
    - Enter Code L (Link Statuses to an Application) on the Application Menu; or
    - Access an Application maintenance screen (Add, Display, or Modify) from the Application Menu; invoke Additional Options and select "Linked Statuses".
- Link Applications to a Status
    - Enter A, D, or M in the code field, a status name, and use range notation for the application name on the Application Status Menu; or
    - Enter Code L (Link Applications to a Status) on the Status Menu; or
    - Access a Status maintenance screen (Add, Display, or Modify) from the Status Menu; invoke Additional Options and select "Linked Applications".

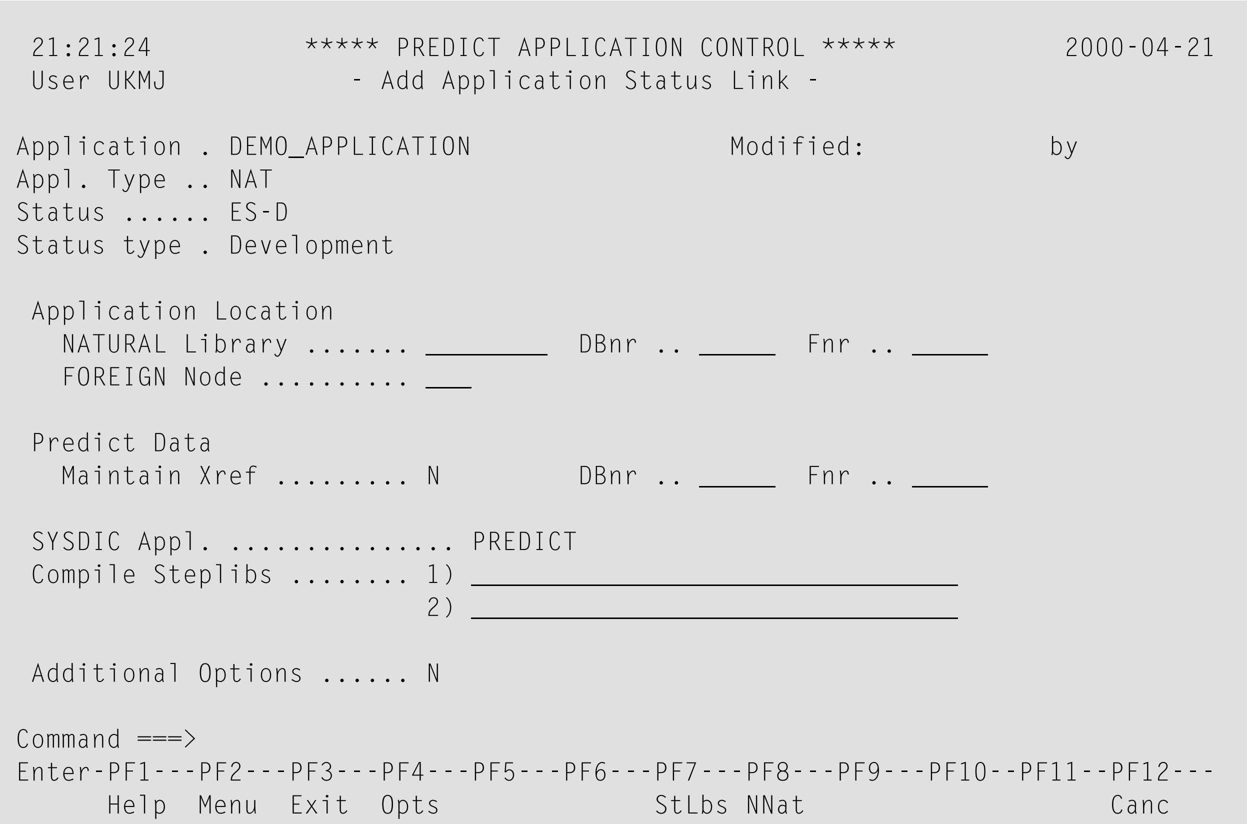
The following diagram illustrates the various routes:



Adding an Individual Application Status Link

Step 1. Accessing the Add Application Status Link Screen

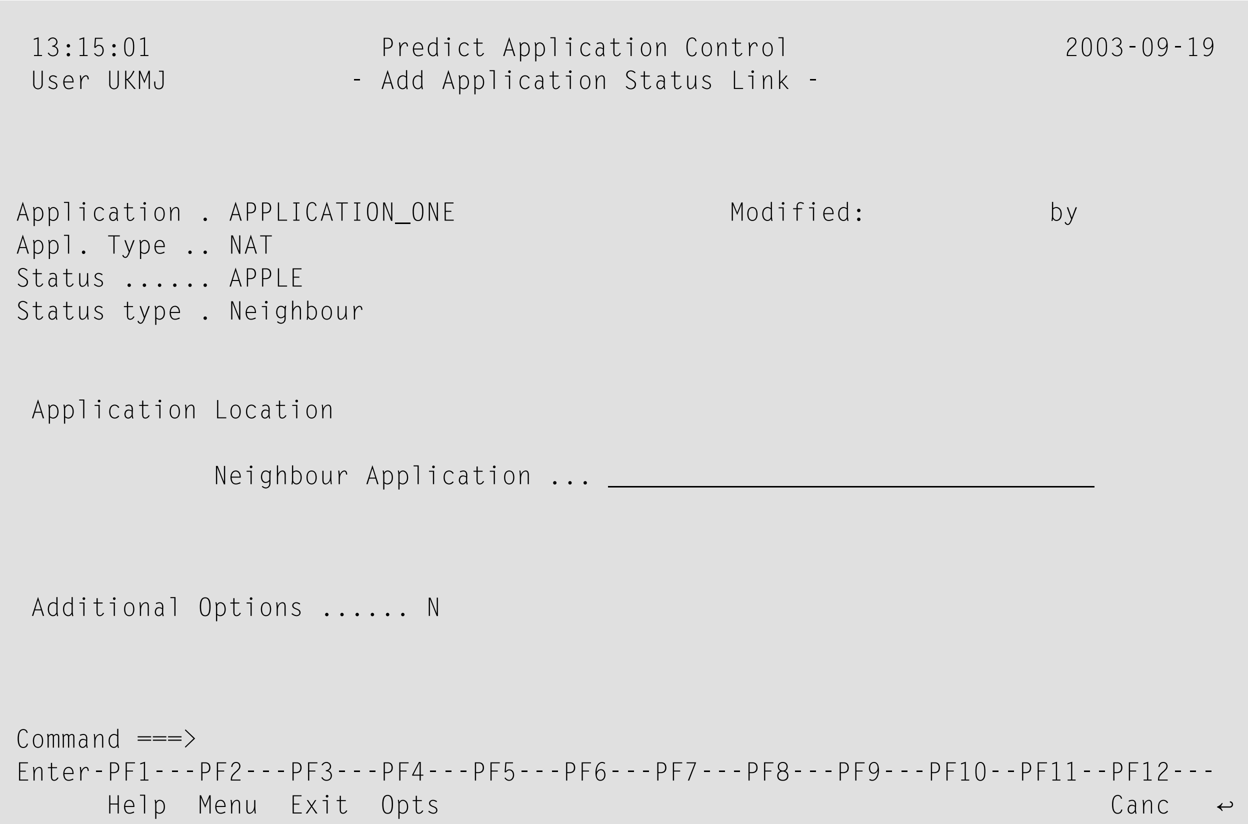
Access the Add Application Status Link screen by entering Code A and the name of an existing application and status on the Application Status Menu. Alternatively, enter the LINK APPLICATION direct command on the command line. Refer to the *PAC Reference* documentation for the correct syntax.



```
 21:21:24          ***** PREDICT APPLICATION CONTROL *****           2000-04-21
 User UKMJ            - Add Application Status Link -

Application . DEMO_APPLICATION                 Modified:            by
Appl. Type .. NAT
Status ...... ES-D
Status type . Development

 Application Location
   NATURAL Library ....... ________  DBnr .. _____  Fnr .. _____
   FOREIGN Node .......... ___

 Predict Data
   Maintain Xref ......... N         DBnr .. _____  Fnr .. _____

 SYSDIC Appl. ............... PREDICT
 Compile Steplibs ........ 1) ________________________________
                           2) ________________________________

 Additional Options ...... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              StLbs NNat                     Canc
```

Except for the application name, status, and status type, all fields on this screen can be modified.

The "Add Application Status Link" screen for a Neighbour (Nbor) status is slightly different to the others (see below):



```
 13:15:01              Predict Application Control                2003-09-19
 User UKMJ           - Add Application Status Link -



Application . APPLICATION_ONE                 Modified:           by
Appl. Type .. NAT
Status ...... APPLE
Status type . Neighbour


 Application Location

             Neighbour Application ... ________________________________



 Additional Options ...... N




Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc   ↩
```

Step 2. Editing the Fields on the Screen

Note: Edit all values on the screen before you access the Additional Options. Once the Additional Options are accessed, all other fields on the screen are protected.

Application Location Fields

The physical location of the programming objects that make up an application is defined when the application and status are linked.

1. In the Library field, enter (type over the defaults) the library name, database ID number, and file number that specify the location of the Natural objects of the application.
2. If foreign objects are in use by the application, enter a valid 3-digit number for the node where the foreign dataset resides; PAC then automatically displays the relevant system type (operating system). The node number is site-specific.

Alternatively, you can enter node information by accessing Additional Options or pressing PF8 (NNAT). See Step 3 on page **Step 3. Editing Foreign Datasets** for more information.

Predict Data Fields

1. In the Maintain Xref field, enter one of the following options:

Code	Location	Description
L	Local	Cross-reference data is stored within PAC.
R	Remote	Cross-reference data is copied to the Predict file specified by the application status link.
B	Both	Cross-reference data is stored within PAC (Local) and is also copied to the Predict file specified by the application status link (Remote).
N	None	No cross-reference data is maintained.

    Available options depend on the status type.

2. Enter the Predict database ID number (DBnr) and file number (Fnr) that specify the storage location of cross-reference information for the application.

Translation Table Fields

1. In the Translation Table field, enter the name of a new or existing file translation table (FTT) that will be invoked when objects are migrated into the status specified on this screen.

    - If an existing FTT is specified, PAC automatically assigns the Shared option if it was specified when the FTT was originally defined. In this case, the Shared option field is protected; the value cannot be modified.

      For an existing FTT, the Shared option may be specified on this screen only if the status was not specified when the FTT was originally defined.

    - If a new name is specified, a "dormant" FTT is created. The name you specify is entered on the FTT list without a version number assigned to it. You must define this dormant FTT later using the Modify File Translation Table sub-function.

    If you specify a new FTT, you must specify the Shared option. If you fail to do so, the following message appears:

    "New transfer table - enter table type."

2. In the Shared field, enter Y (Yes) to allow this FTT to be used by other application status links; enter N (No) to specify that the FTT is not to be shared.

    - Verifies that the FTT is not already in use by another application status link. If the specified FTT is already in use by another application status link and identified as not shared ("N" in the Shared Table field), the use of this FTT by this application status link is rejected.
    - Processes the Shared Option as instructed for this application status link if the FTT is not used by another application status link.

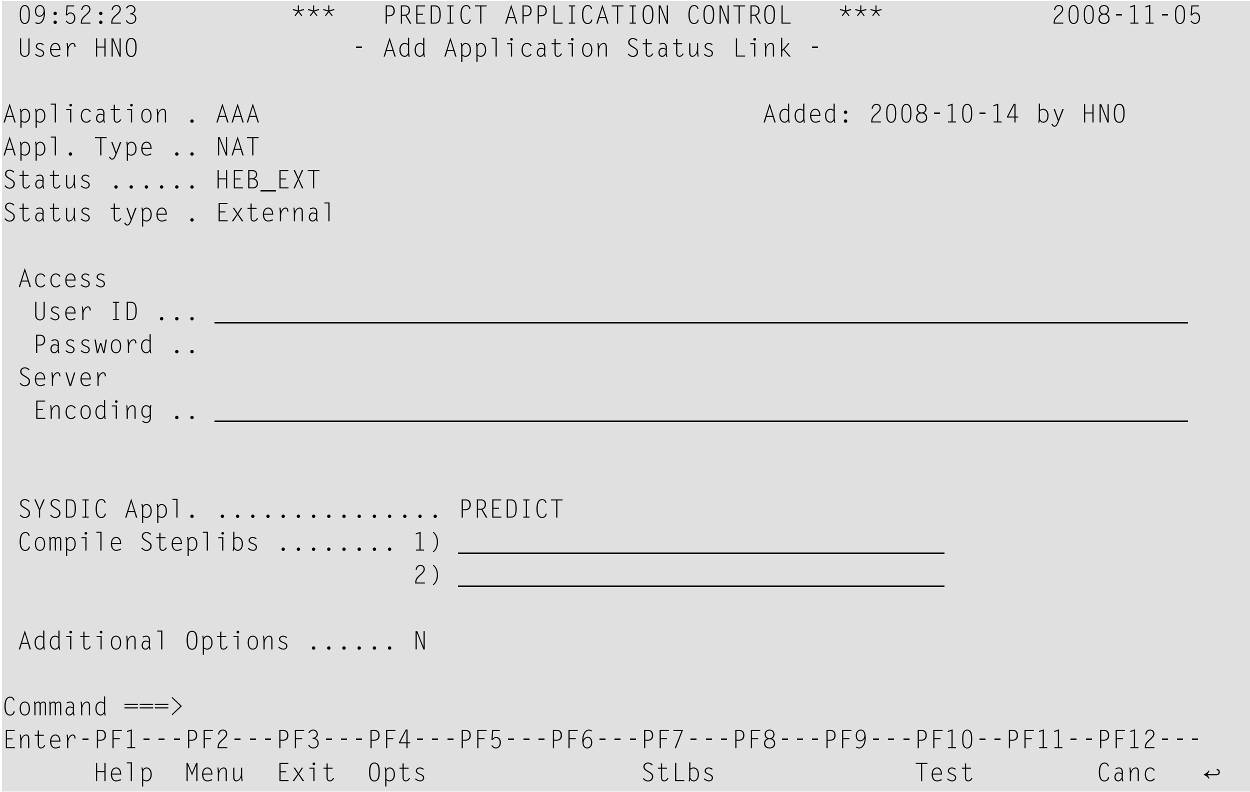
Compile Steplibs Fields

This option is available only for migrations from development or maintenance statuses, or for alignment (Control to Control). A maximum of eight compile steplibs may be specified.

On this screen, you can enter the names of two applications within the PAC system that contain subordinate objects (copycode, maps, data areas) required during compilation. You can specify up to six additional application steplibs by accessing Additional Options or by pressing PF7 (StLbs).

Test Connection to External Version Control Software

This option is available only when adding or modifying an application status link of type External.



```
 09:52:23          ***   PREDICT APPLICATION CONTROL   ***          2008-11-05
 User HNO              - Add Application Status Link -

Application . AAA                                 Added: 2008-10-14 by HNO
Appl. Type .. NAT
Status ...... HEB_EXT
Status type . External

 Access
  User ID ... ________________________________________________________________
  Password ..
 Server
  Encoding .. ________________________________________________________________


 SYSDIC Appl. ............... PREDICT
 Compile Steplibs ........ 1) ________________________________
                           2) ________________________________

 Additional Options ...... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              StLbs             Test        Canc   ↩
```

On this screen, you can enter the URL that is used to connect to the external version control software with a given user ID and password. Press PF10 to test the connection.

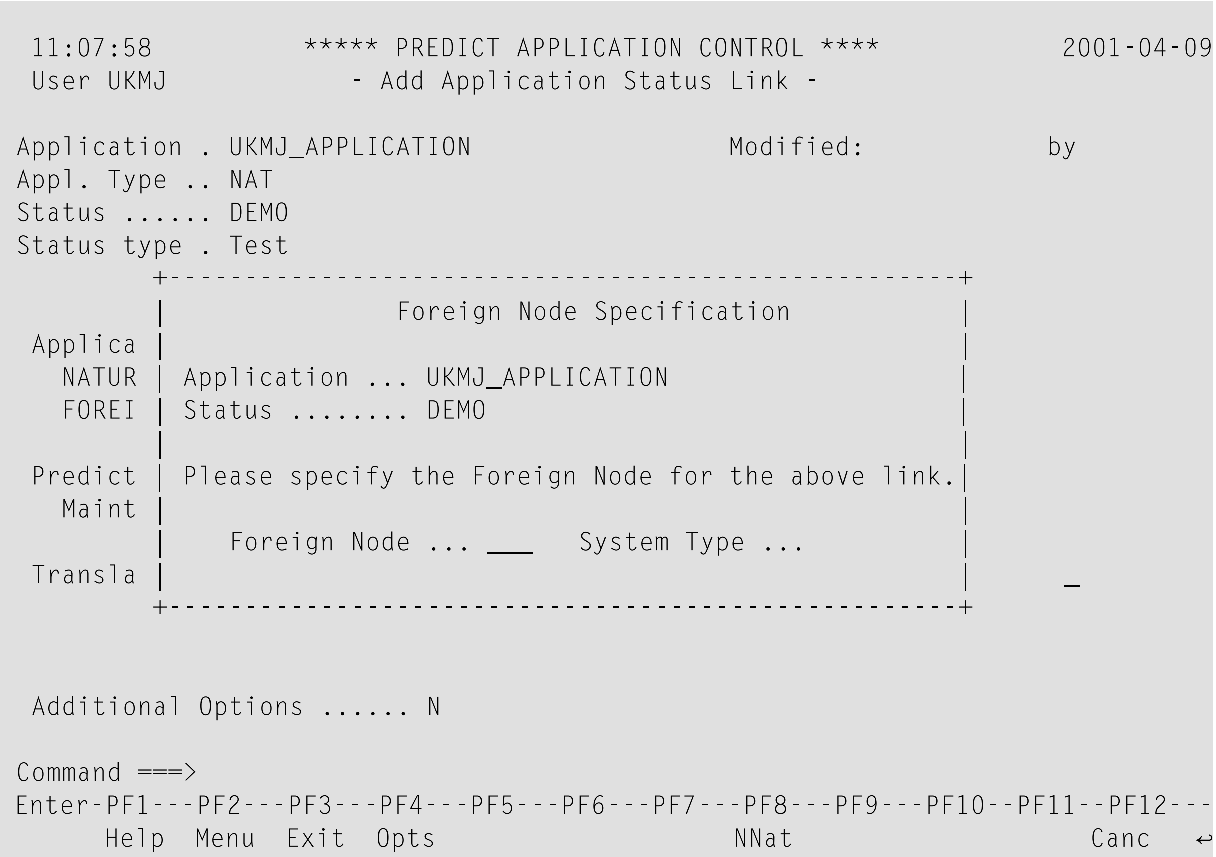
Neighbour Application

This field is modifiable and should contain the name of the receiving application for the inter-application object migrations. All other fields are as per original screen.

Step 3. Editing Foreign Datasets

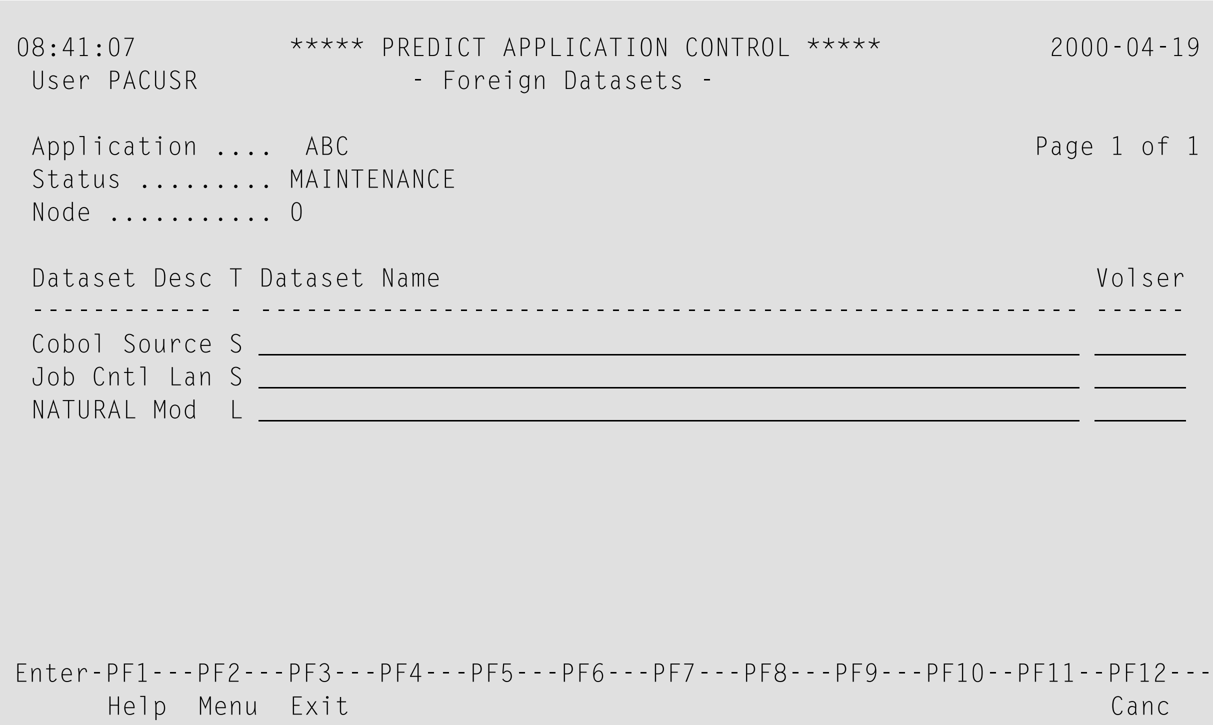
1. To access the Foreign Datasets definition screen, press PF8 (NNAT) on the Add Application Status Link screen, or select the Foreign Datasets Additional Option.

   If you did not enter a node number on the Add Application Status Link screen, the following Non-Natural Node Specification window appears:



```
 11:07:58          ***** PREDICT APPLICATION CONTROL ****           2001-04-09
 User UKMJ            - Add Application Status Link -

Application . UKMJ_APPLICATION                 Modified:            by
Appl. Type .. NAT
Status ...... DEMO
Status type . Test
         +-----------------------------------------------------+
         |               Foreign Node Specification            |
 Applica |                                                     |
   NATUR | Application ... UKMJ_APPLICATION                    |
   FOREI | Status ........ DEMO                                |
         |                                                     |
 Predict | Please specify the Foreign Node for the above link.|
   Maint |                                                     |
         |    Foreign Node ... ___   System Type ...           |
 Transla |                                                     |     _
         +-----------------------------------------------------+


 Additional Options ...... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                   NNat                   Canc   ↩
```

2. Enter the (site-specific) node number; PAC supplies the system type.
3. Edit the datasets and the relevant storage/retrieval types on the resulting screen.



```
08:41:07          ***** PREDICT APPLICATION CONTROL *****          2000-04-19
 User PACUSR              - Foreign Datasets -

 Application ....  ABC                                             Page 1 of 1
 Status ......... MAINTENANCE
 Node ........... 0

 Dataset Desc T Dataset Name                                           Volser
 ------------ - ------------------------------------------------------ ------
 Cobol Source S ______________________________________________________ ______
 Job Cntl Lan S ______________________________________________________ ______
 NATURAL Mod  L ______________________________________________________ ______








Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                 Canc
```

This example screen (for an MVS/ESA node) displays the dataset description and type (T), which are protected fields. Dataset types are defined for the site by the PAC administrator and for the application by the project leader. Some common dataset types are

H	compiler result information (BS2000)
J	link and load modules (BS2000)
L	compiled, load modules (z/OS)
S	uncompiled, source modules
*	(asterisk) all types

The screen also provides information in fields that can be modified:

Dataset Name	dataset naming conventions are site-specific.
Volser	volume/serial number information (z/OS).

Step 4. Editing the Migration Path Additional Option

The Migration Path option is used to create or display migration paths for the current application. For more information, refer to the section **Migration Paths**.

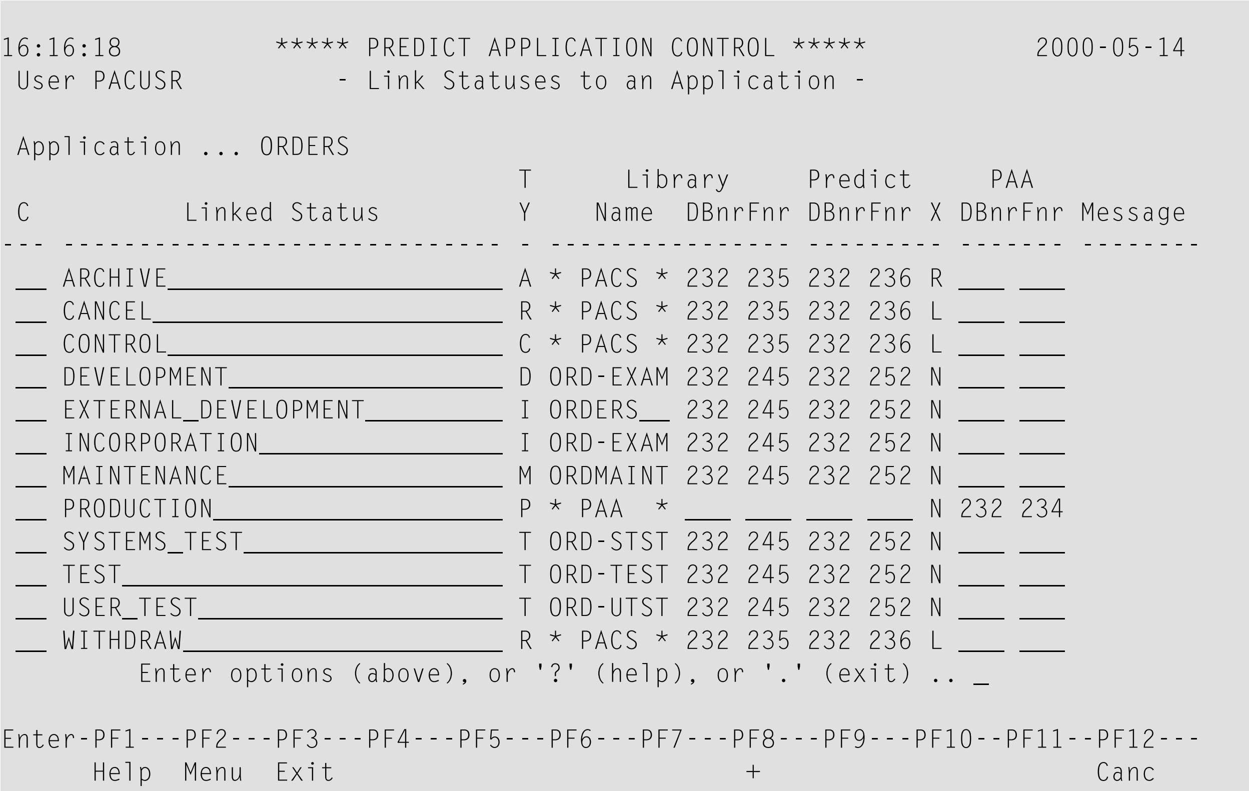
Linking Multiple Statuses or Applications

PAC provides a "mass update" facility to define/modify several applications/statuses at once.

This screen . . .	allows you to define / modify multiple . . .
Link Statuses to an Application	statuses to be linked to a particular application.
Link Applications to a Status	applications to be linked to a specific status.

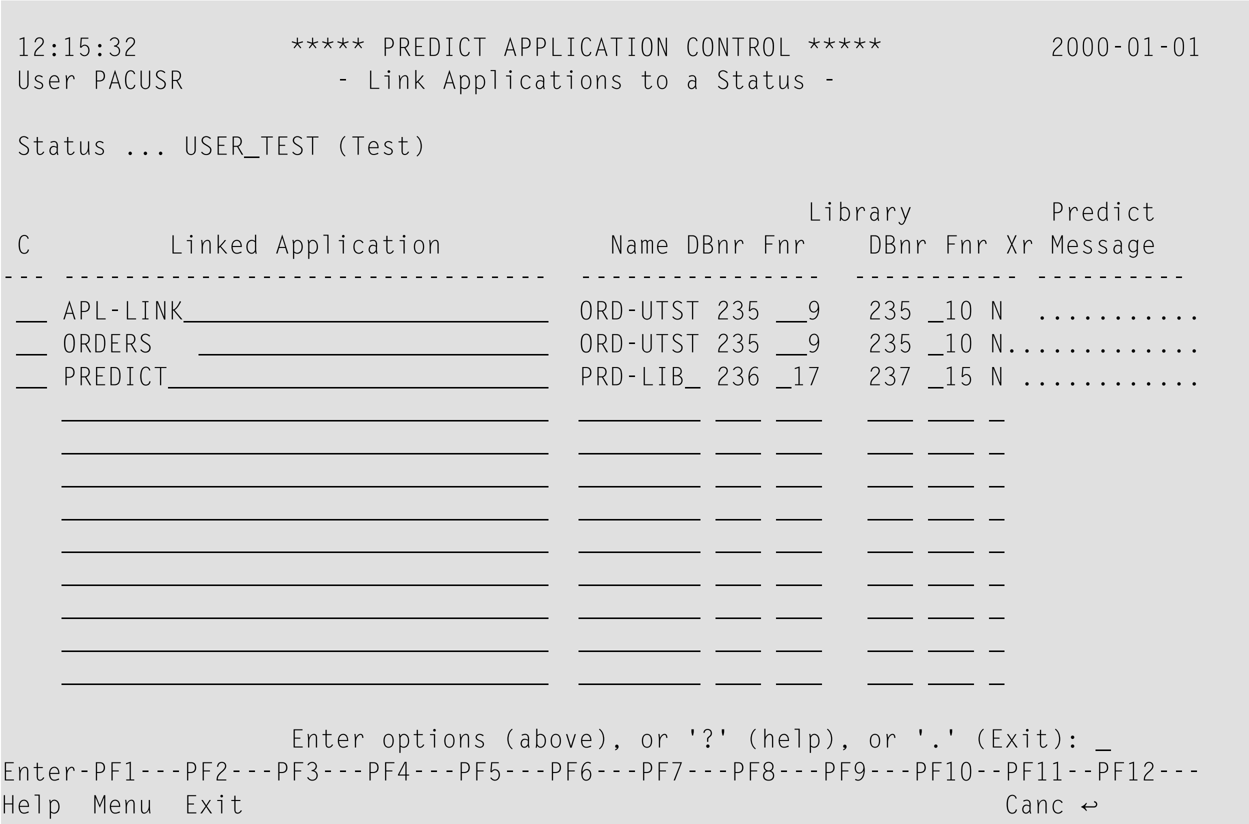
Step 1. Accessing the Appropriate Link Screen

To display a list of the status links already defined for a specified application, access the Link Statuses to an Application screen by entering Code A (Applications) on the PAC Main Menu; then Code L (Link Statuses to an Application) and the application name on the resulting Application Menu. The following screen appears.



```
16:16:18          ***** PREDICT APPLICATION CONTROL *****           2000-05-14
 User PACUSR          - Link Statuses to an Application -

 Application ... ORDERS
                                  T      Library     Predict     PAA
 C          Linked Status         Y    Name  DBnrFnr DBnrFnr X DBnrFnr Message
--- ----------------------------- - ---------------- --------- ------- --------
 __ ARCHIVE______________________ A * PACS * 232 235 232 236 R ___ ___
 __ CANCEL_______________________ R * PACS * 232 235 232 236 L ___ ___
 __ CONTROL______________________ C * PACS * 232 235 232 236 L ___ ___
 __ DEVELOPMENT__________________ D ORD-EXAM 232 245 232 252 N ___ ___
 __ EXTERNAL_DEVELOPMENT_________ I ORDERS__ 232 245 232 252 N ___ ___
 __ INCORPORATION________________ I ORD-EXAM 232 245 232 252 N ___ ___
 __ MAINTENANCE__________________ M ORDMAINT 232 245 232 252 N ___ ___
 __ PRODUCTION___________________ P * PAA  * ___ ___ ___ ___ N 232 234
 __ SYSTEMS_TEST_________________ T ORD-STST 232 245 232 252 N ___ ___
 __ TEST_________________________ T ORD-TEST 232 245 232 252 N ___ ___
 __ USER_TEST____________________ T ORD-UTST 232 245 232 252 N ___ ___
 __ WITHDRAW_____________________ R * PACS * 232 235 232 236 L ___ ___
         Enter options (above), or '?' (help), or '.' (exit) .. _

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                           +                      Canc
```

To list all applications currently defined to a specified status, access the Link Applications to a Status screen by entering Code S (Statuses) on the PAC Main Menu; then Code L (Link Applications to a Status) and the status name on the resulting Status Menu.



```
 12:15:32          ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User PACUSR          - Link Applications to a Status -

 Status ... USER_TEST (Test)

                                                     Library        Predict
 C        Linked Application          Name DBnr Fnr    DBnr Fnr Xr Message
--- --------------------------------  ---------------  ----------- ----------
 __ APL-LINK________________________  ORD-UTST 235 __9   235 _10 N  ...........
 __ ORDERS   _______________________  ORD-UTST 235 __9   235 _10 N............
 __ PREDICT_________________________  PRD-LIB_ 236 _17   237 _15 N ...........
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _
    ________________________________  ________ ___ ___   ___ ___ _

                  Enter options (above), or '?' (help), or '.' (Exit): _
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Help  Menu  Exit                                                 Canc ↩
```

When you access either screen using the Add or Modify sub-function, you can:

- Add a new link by entering a different status/application name on an available blank line in the Linked Status/Application column.
- Change the environment defined for existing link(s) by typing over the information for the library or Predict location.

Note: You cannot change the library name and location information used for the application in the Control, Archive, Retire and Production statuses, which is protected in a special library reserved for use by PAC.

- purge existing links by entering the Purge option (PU) in the "C" column next to the link you wish to delete.
- maintain or display foreign dataset information by entering MN or DN, respectively, in the "C" column next to the application status link. The Foreign Datasets screen appears.
- specify file translation tables (FTTs), steplib(s), and the Predict Case library name (if applicable) by entering the Modify Link Definition option (M or MO) in the "C" column next to the application status link.

Step 2. Linking the Status(es)

Add each status/application as follows:

1. Enter the name of the status/application in the "Linked Status/Application" column.
2. In the Library "Name", "DBnr", and "Fnr" columns, respectively, enter the Natural library name, database ID number, and file number where the application is located. For production statuses, these fields do not exist.

   Note: If no library, database, or file number are entered, the Library field displays the values set in the application library defaults. The database and file number fields display the values set when the status/application was defined. For production statuses, enter the database ID (DBID) and file number (Fnr) of the PAA system file.

3. Enter the Predict database ID number and file number where the cross-reference data is stored, in the Predict "DBnr" and "Fnr" columns, respectively.

   Note: If no Predict database or file number are entered, the Predict Data database (DBnr) and file number (Fnr) display the values set when the status/application was defined. You may override these values.

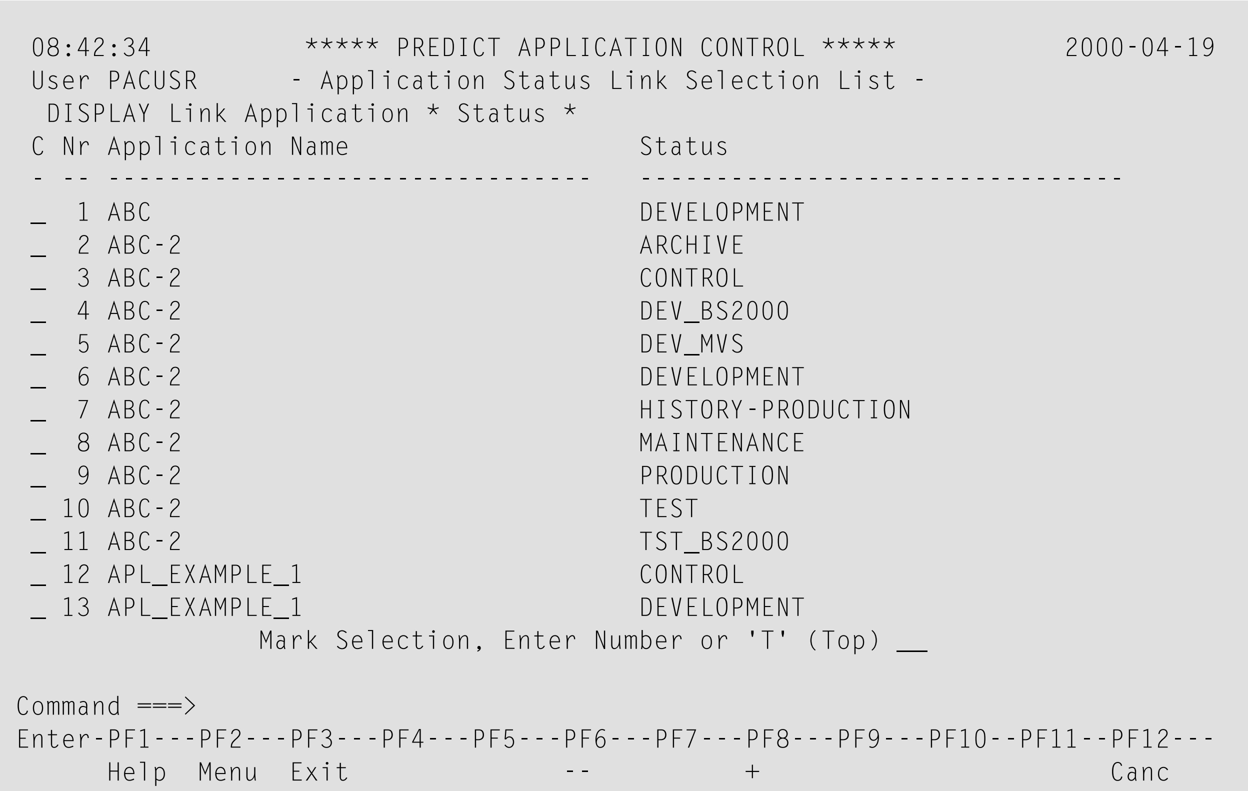
4. Enter cross-reference information in the "Xr" column (L for Local; R for Remote; B for both; N for none. The available options depend on the status type.
5. Press ENTER to link the status to the application.

   When the application link is successfully added, the "Message" column displays the message "Added".

Selecting an Application Status Link

You can access a list of links defined for a specified application,status or FTT by entering Code S (Select Application and/or Status or FTT) on the Application Status Menu along with the application or status or FTT name (or a range for either).Alternatively, you can enter the SELECT direct command on the command line. Refer to the PAC Reference documentation for the correct syntax.

The Application Status Link Selection List appears:

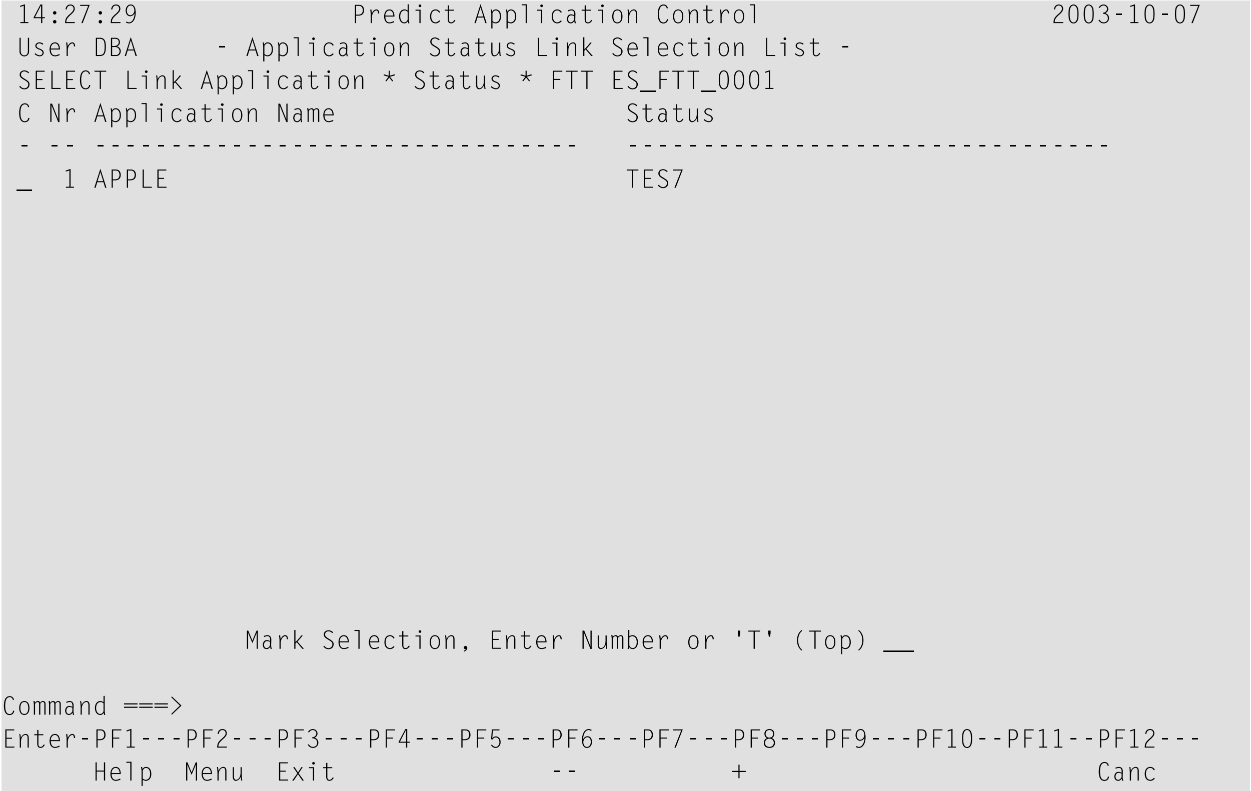


```
 08:42:34          ***** PREDICT APPLICATION CONTROL *****           2000-04-19
 User PACUSR      - Application Status Link Selection List -
  DISPLAY Link Application * Status *
 C Nr Application Name                   Status
 - -- --------------------------------   --------------------------------
 _  1 ABC                                DEVELOPMENT
 _  2 ABC-2                              ARCHIVE
 _  3 ABC-2                              CONTROL
 _  4 ABC-2                              DEV_BS2000
 _  5 ABC-2                              DEV_MVS
 _  6 ABC-2                              DEVELOPMENT
 _  7 ABC-2                              HISTORY-PRODUCTION
 _  8 ABC-2                              MAINTENANCE
 _  9 ABC-2                              PRODUCTION
 _ 10 ABC-2                              TEST
 _ 11 ABC-2                              TST_BS2000
 _ 12 APL_EXAMPLE_1                      CONTROL
 _ 13 APL_EXAMPLE_1                      DEVELOPMENT
                Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

If you accessed this screen using the S (Select Application Status Link) sub-function or the SELECT direct command, the following sub-functions can be processed directly for one or more of the listed application status links by entering the code for the sub-function in the "C" column: D (Display), M (Modify), O (Object versions), P (Purge), S (Select) and V (Object version audit history).

If you mark the application status with the cursor or enter an X or an S in the "C" column, or enter the application status link number (from the "Nr" column) in the Mark Selection... field, you are returned to the Application Status Menu; the specified application and status are displayed in the Application field and Status field, respectively.

If selection is by FTT then the following screen is displayed:



```
 14:27:29              Predict Application Control                   2003-10-07
 User DBA     - Application Status Link Selection List -
 SELECT Link Application * Status * FTT ES_FTT_0001
 C Nr Application Name                   Status
 - -- --------------------------------   --------------------------------
 _  1 APPLE                              TES7















                Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

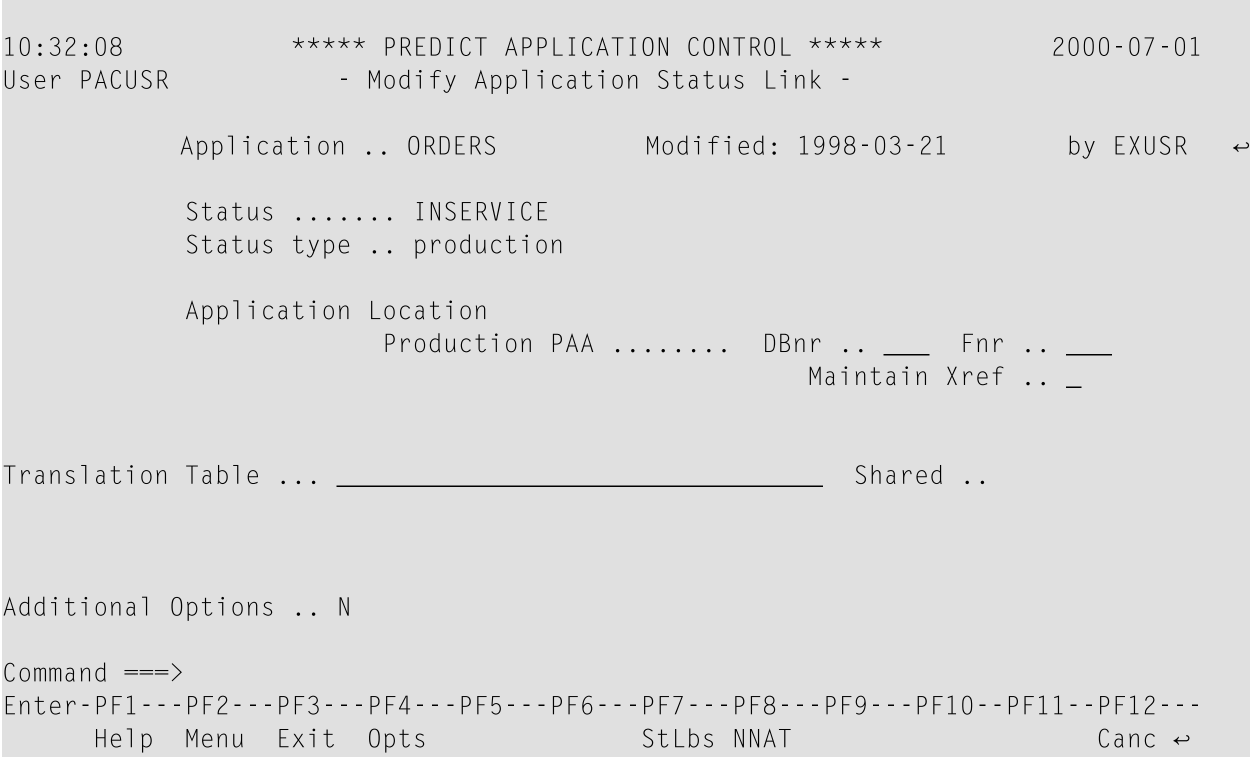
Modifying Application Status Links

PAC offers the ability to change application status links individually, to change all links for a single application, or to change all applications for a single status.

This section covers the following topics:

- Modifying a Single Application Status Link
- Modifying All Statuses for an Application
- Modifying All Applications for a Status

Modifying a Single Application Status Link



```
10:32:08           ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR           - Modify Application Status Link -

            Application .. ORDERS         Modified: 1998-03-21        by EXUSR   ↩

            Status ....... INSERVICE
            Status type .. production

            Application Location
                         Production PAA ........  DBnr .. ___  Fnr .. ___
                                                     Maintain Xref .. _


Translation Table ... ________________________________  Shared ..



Additional Options .. N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              StLbs NNAT                    Canc ↩
```

To modify an individual application status link, enter Code M (Modify Application Status Link) on the Application Status Menu.

The resulting Modify Application Status Link screen is similar to the Add Application Status Link screen, but instead contains parameters for the production status of the application.

Modifying All Statuses for an Application

To modify all statuses for an application at one time, enter Code A (Applications) on the PAC Main Menu; then Code L (Link Statuses to an Application) and the application name on the resulting Application Menu.

Modifying All Applications for a Status

To modify all applications for a specific status at one time, enter Code S (Statuses) on the PAC Main Menu; then Code L (Link Applications to a Status) and the status name on the resulting Status Menu.

The screen that appears is similar to the **Link Applications to a Status screen**.

Purging an Application Status Link

To purge a status link, enter Code P, the application name, and the status name on the Application Status Menu.

If objects exist in the application status link, the purge request is ignored and the following message is displayed:

"Objects exist in this Status. Purge cannot be performed until the objects have been deleted via the PAC Administrator Functions."

Otherwise, the Purge Confirmation window appears reminding you that the associated migration paths and fixed file translation tables will also be purged.

From the Purge Confirmation window, you have the following options:

- Type Confirm or press PF5 to purge the application status link.
- Type a period (.) or press PF3 to return to the Application Menu without purging the application status link.

Displaying an Application Status Link

To display application status link information, enter Code D (Display Application Status) together with the application name and status name on the Application Status Menu.

The Display Application Status Link screen appears; it is similar to the Add Application Status Link screen. You may not modify the Display information.

This section covers the following topics:

- Displaying Additional Options

Displaying Additional Options

When you access Additional Options from the Display Application Status Link screen, you can display a list of object versions, a list of the migration path destinations associated with the status link, and information about when and by whom the application status link was added/modified.

Option	**Displays a list of . . .**
Compile Steplibs	up to eight applications defined as steplibs on the Compile Steplibs window. These are displayed only for maintenance or development statuses.

Option	Displays a list of . . .
Object Versions	the application objects currently at this status. You can also display this list directly from the Application Status Menu by entering Code O (Objects for Application Status).
Foreign Datasets	Foreign support application status the foreign datasets currently defined to the application status link. You can also display this list directly by entering PF8 (NNAT) on the Display Application Status Link screen.
Migration Path	destination status names. You can also display this list directly from the Migration Path Menu.
Translation Table Usage	statuses that use the same FTT used by this application status link. If no translation table is in use by any statuses, a message to that effect is displayed. These are displayed only for non-maintenance or non-development statuses.

Displaying Objects for an Application Status

You can obtain information about an application's versioned objects by using the Objects for Application Status sub-function on the Application Status Menu.

This section covers the following topics:

- Displaying a Specific Object
- Displaying Objects from a List

Displaying a Specific Object

To display information about a specific object in a specific status, enter Code O (Objects for Application Status) on the Application Status Menu along with the application name, status name, and object name. The Display Object Version screen appears:

Natural Object Version

```
10:32:08           ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR             - Display Object Version -

Application ... BA_APL
Object ........ BPGMC1.0001 (Copycode)
Saved ......... 1998:12:20 14:33:45
Cataloged ..... 0000:01:02 00:00:00

Migration Event OS-NATURAL-MIGRATE
Created .......... 1997:04:01 14:31:59

               --- Development Source Directory Information ---
Library .... BADEV      User-ID ...... PACUSR      Saved .. 1997-11-08 18:52:07
Tp-System .. COMPLETE   Terminal-ID .. 8     10
Op-System .. MVS/XA     Transaction .. NAT27
NAT-Ver .... 2.1.7      Mode ......... Report
Size in ESIZE ........................ 58      Bytes

Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                           Canc      ↩
```

This screen displays information about the specified Natural, Predict, or user error message objects as follows.

Natural Objects

For a Natural object, as shown in the above example, the Display Object Version screen displays

- the application to which the object belongs;
- the name, version, and type of the specified object;
- the dates and times the object was saved and cataloged (if the date is zero (0), then either the saved or cataloged object does not exist);
- the name of the migration event that migrated the object into the specified status and the date the event was created;
- information about the development source directory;
- Additional Options:
  - the source code for the specified object.
  - a list of statuses in which the object resides.
  - a list of objects used by the specified object.

- a list of objects that use the specified object. If the object is in the steplib application and is used by more than one application, a list of the applications is displayed.
- additional (extended) user-defined information about the object version history, for example, application name and object name.
- a directory display of the specified object.

Refer to section **Creating and Validating an Object List** for detailed information about objects used by a specific object and the objects that use a specific object.

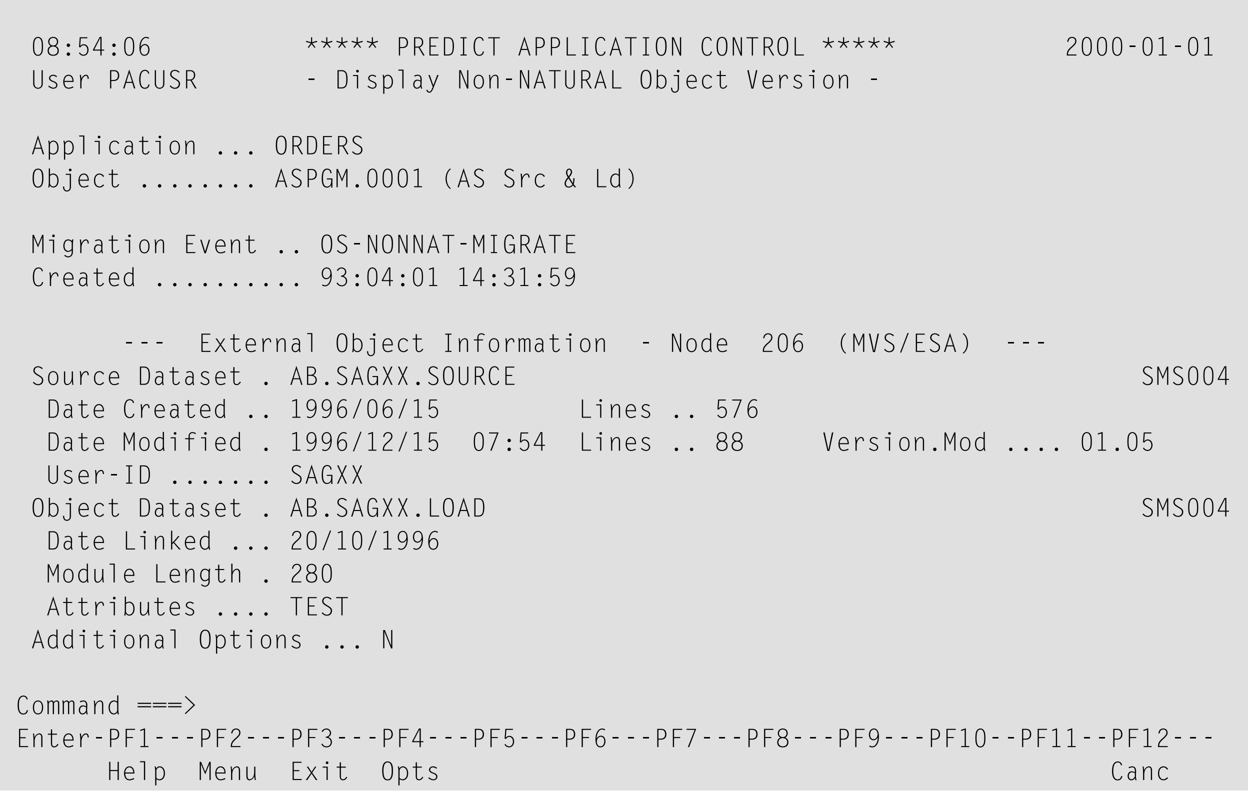
Predict Objects

For a Predict object, the Display Object Version screen displays the Predict event used to migrate the object and also Predict migration information. The Saved field is not displayed.

User Error Message Objects

For a user error message, the Display Object Version screen displays the event used to migrate the object along with the date and time the error message was incorporated. Information includes the number of short messages, extended messages, and languages.

Foreign Object Version (MVS/ESA, z/OS, BS2000)



```
 08:54:06           ***** PREDICT APPLICATION CONTROL *****           2000-01-01
 User PACUSR        - Display Non-NATURAL Object Version -

 Application ... ORDERS
 Object ........ ASPGM.0001 (AS Src & Ld)

 Migration Event .. OS-NONNAT-MIGRATE
 Created .......... 93:04:01 14:31:59

       ---  External Object Information  - Node  206  (MVS/ESA)  ---
 Source Dataset . AB.SAGXX.SOURCE                                         SMS004
  Date Created .. 1996/06/15         Lines .. 576
  Date Modified . 1996/12/15  07:54  Lines .. 88     Version.Mod .... 01.05
  User-ID ....... SAGXX
 Object Dataset . AB.SAGXX.LOAD                                           SMS004
  Date Linked ... 20/10/1996
  Module Length . 280
  Attributes .... TEST
 Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc
```

This screen displays information about the specified foreign object version. External object information includes the

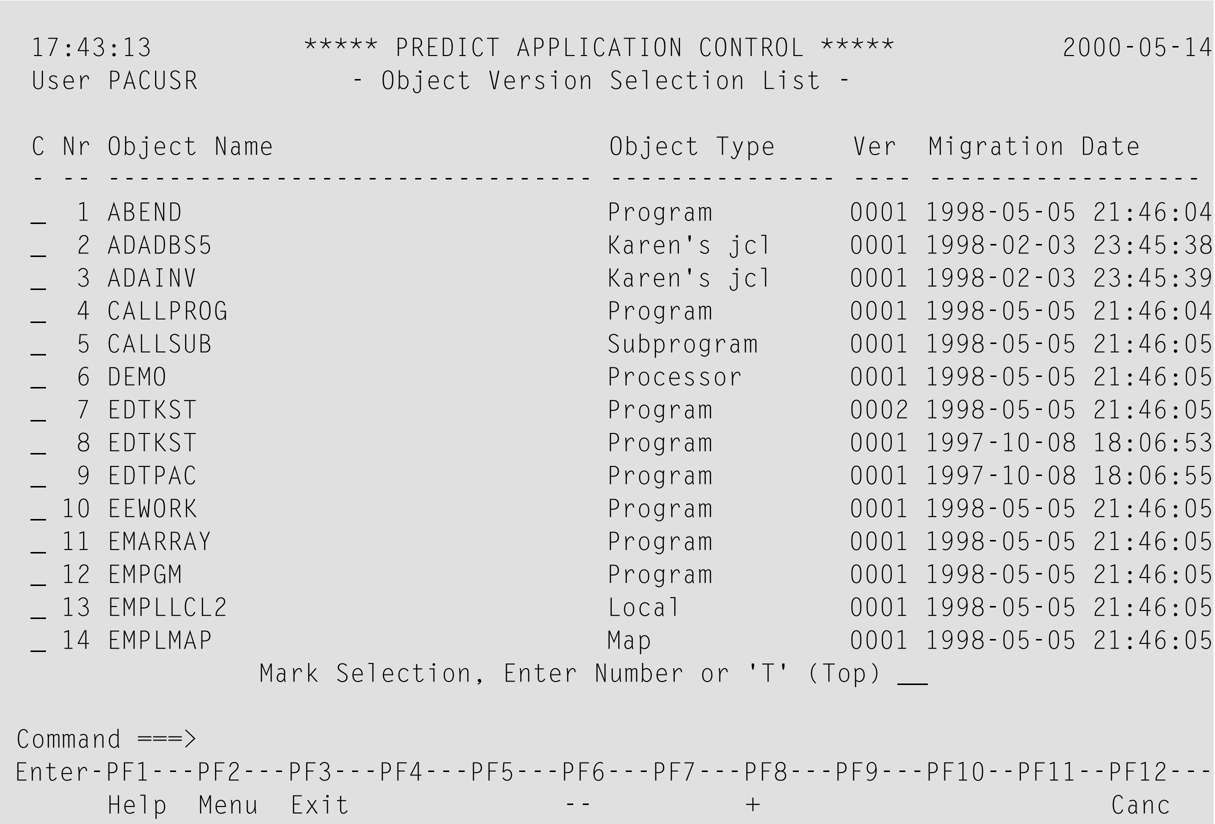
- node and system type where the dataset is located;
- name of the source/object datasets to which the object belongs and the Volser (SMS004 in this example);
- date the object was created;
- number of lines of code comprising the object when it was created;
- date and time the object was last modified, the number of lines after the most recent modification;
- version of the object that was modified and the number of lines that were modified;
- ID of the user who last modified the object;
- operating system attributes of the object (in the above example, a test environment).

Displaying Objects from a List

You can display a list of the objects of an application in a specific status from the Application Status Menu as follows:

1. To display a list of application objects in a specific status, enter Code O (Objects for Application Status) on the Application Status Menu along with the application name and status name.

   The Object Version Selection List appears:



```
 17:43:13          ***** PREDICT APPLICATION CONTROL *****          2000-05-14
 User PACUSR          - Object Version Selection List -

 C Nr Object Name                       Object Type     Ver  Migration Date
 - -- -------------------------------- --------------- ---- -----------------
 _  1 ABEND                             Program         0001 1998-05-05 21:46:04
 _  2 ADADBS5                           Karen's jcl     0001 1998-02-03 23:45:38
 _  3 ADAINV                            Karen's jcl     0001 1998-02-03 23:45:39
 _  4 CALLPROG                          Program         0001 1998-05-05 21:46:04
 _  5 CALLSUB                           Subprogram      0001 1998-05-05 21:46:05
 _  6 DEMO                              Processor       0001 1998-05-05 21:46:05
 _  7 EDTKST                            Program         0002 1998-05-05 21:46:05
 _  8 EDTKST                            Program         0001 1997-10-08 18:06:53
 _  9 EDTPAC                            Program         0001 1997-10-08 18:06:55
 _ 10 EEWORK                            Program         0001 1998-05-05 21:46:05
 _ 11 EMARRAY                           Program         0001 1998-05-05 21:46:05
 _ 12 EMPGM                             Program         0001 1998-05-05 21:46:05
 _ 13 EMPLLCL2                          Local           0001 1998-05-05 21:46:05
 _ 14 EMPLMAP                           Map             0001 1998-05-05 21:46:05
               Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                        Canc
```

This screen lists the type and version of each object; and the date and time that each object version was migrated into that status.

Note: Where no cataloged version exists, the object name is highlighted.

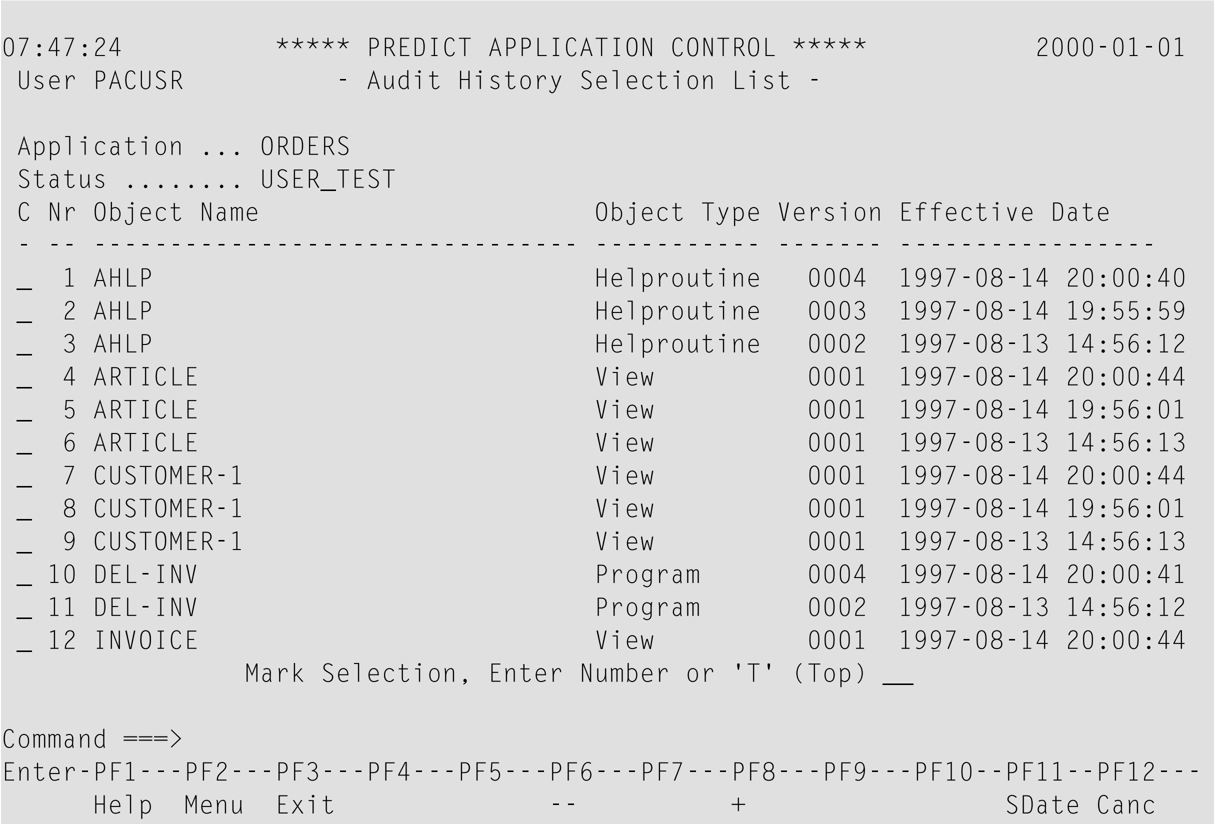
2. To display information about individual objects on the Display Object Version screen, mark the desired object with the cursor, or enter the number of the object (from the "Nr" column) in the Mark Selection... field.

Displaying an Object Version Audit History

1. To list the versions of application objects from the Application Status Menu, enter Code V (Object Version Audit History) and the application name and status name.

   You may limit the list of objects by specifying range notation in the Object Name field.

   The Audit History Selection List appears for statuses other than Control. The screen displayed for the Control status shows the date the objects were migrated. For statuses other than Control, the effective date and superseded date are displayed.

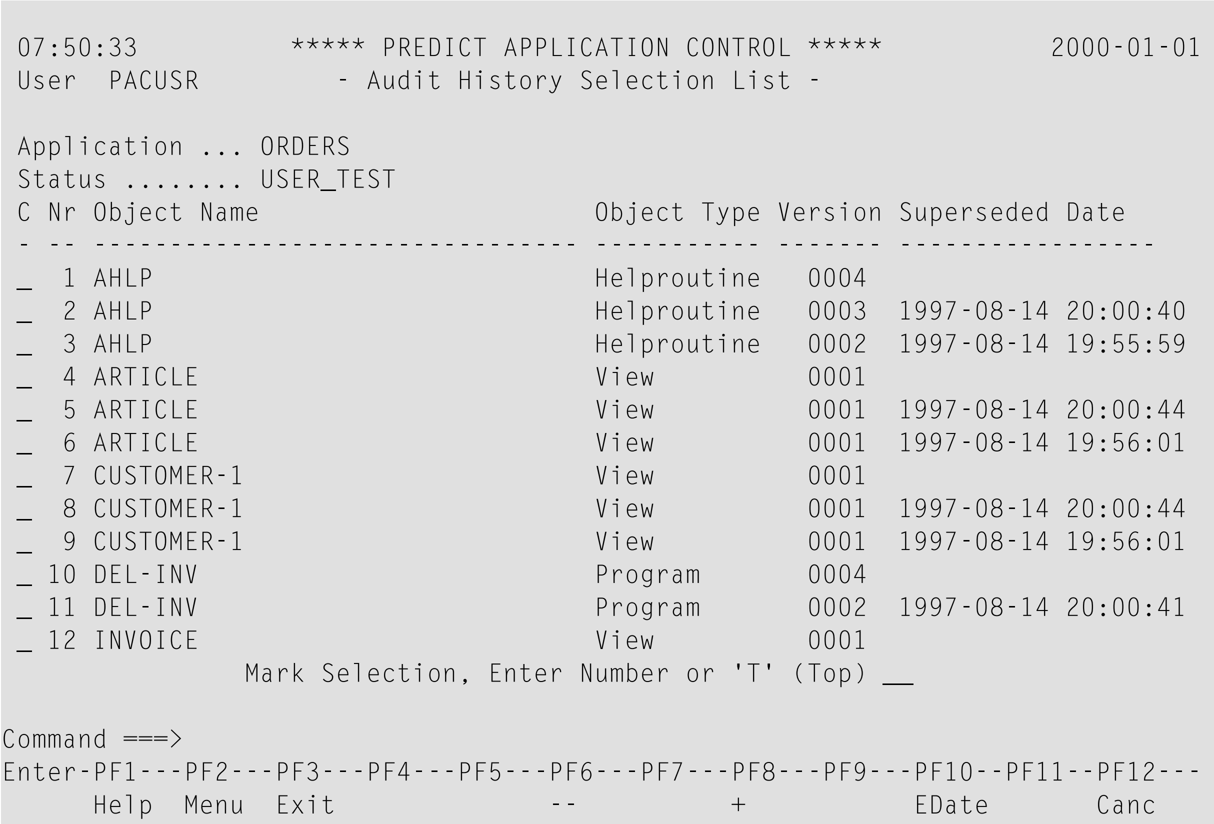


```
07:47:24          ***** PREDICT APPLICATION CONTROL *****           2000-01-01
 User PACUSR          - Audit History Selection List -

 Application ... ORDERS
 Status ........ USER_TEST
 C Nr Object Name                      Object Type Version Effective Date
 - -- -------------------------------- ----------- ------- -----------------
 _  1 AHLP                             Helproutine   0004  1997-08-14 20:00:40
 _  2 AHLP                             Helproutine   0003  1997-08-14 19:55:59
 _  3 AHLP                             Helproutine   0002  1997-08-13 14:56:12
 _  4 ARTICLE                          View          0001  1997-08-14 20:00:44
 _  5 ARTICLE                          View          0001  1997-08-14 19:56:01
 _  6 ARTICLE                          View          0001  1997-08-13 14:56:13
 _  7 CUSTOMER-1                       View          0001  1997-08-14 20:00:44
 _  8 CUSTOMER-1                       View          0001  1997-08-14 19:56:01
 _  9 CUSTOMER-1                       View          0001  1997-08-13 14:56:13
 _ 10 DEL-INV                          Program       0004  1997-08-14 20:00:41
 _ 11 DEL-INV                          Program       0002  1997-08-13 14:56:12
 _ 12 INVOICE                          View          0001  1997-08-14 20:00:44
                Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                 SDate Canc
```

The Audit History Selection List screen displays the specified application and status together with objects, object types and version numbers; and the effective date and time the objects were moved into the specified status.

2. Display the Superseded Date column by pressing PF11 (SDate).

   This column displays the date and time the object version was replaced by the object version displayed immediately above:



```
 07:50:33          ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User  PACUSR         - Audit History Selection List -

 Application ... ORDERS
 Status ........ USER_TEST
 C Nr Object Name                      Object Type Version Superseded Date
 - -- -------------------------------- ----------- ------- -----------------
 _  1 AHLP                             Helproutine   0004
 _  2 AHLP                             Helproutine   0003  1997-08-14 20:00:40
 _  3 AHLP                             Helproutine   0002  1997-08-14 19:55:59
 _  4 ARTICLE                          View          0001
 _  5 ARTICLE                          View          0001  1997-08-14 20:00:44
 _  6 ARTICLE                          View          0001  1997-08-14 19:56:01
 _  7 CUSTOMER-1                       View          0001
 _  8 CUSTOMER-1                       View          0001  1997-08-14 20:00:44
 _  9 CUSTOMER-1                       View          0001  1997-08-14 19:56:01
 _ 10 DEL-INV                          Program       0004
 _ 11 DEL-INV                          Program       0002  1997-08-14 20:00:41
 _ 12 INVOICE                          View          0001
               Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +           EDate       Canc
```

For example, on the above screen, Version 0002 of the help routine AHLP was replaced (superseded) by Version 0003 on 1997-08-14 at 20:00:40.

3. Press PF10 (Left) to return to the previous screen.
4. To display information about specific object versions listed on the Audit History Selection List, mark the desired object with the cursor, or enter the number of the desired object (from the "Nr" column) in the Mark Selection... field.

See the description of the resulting **Display Object Version screen**.

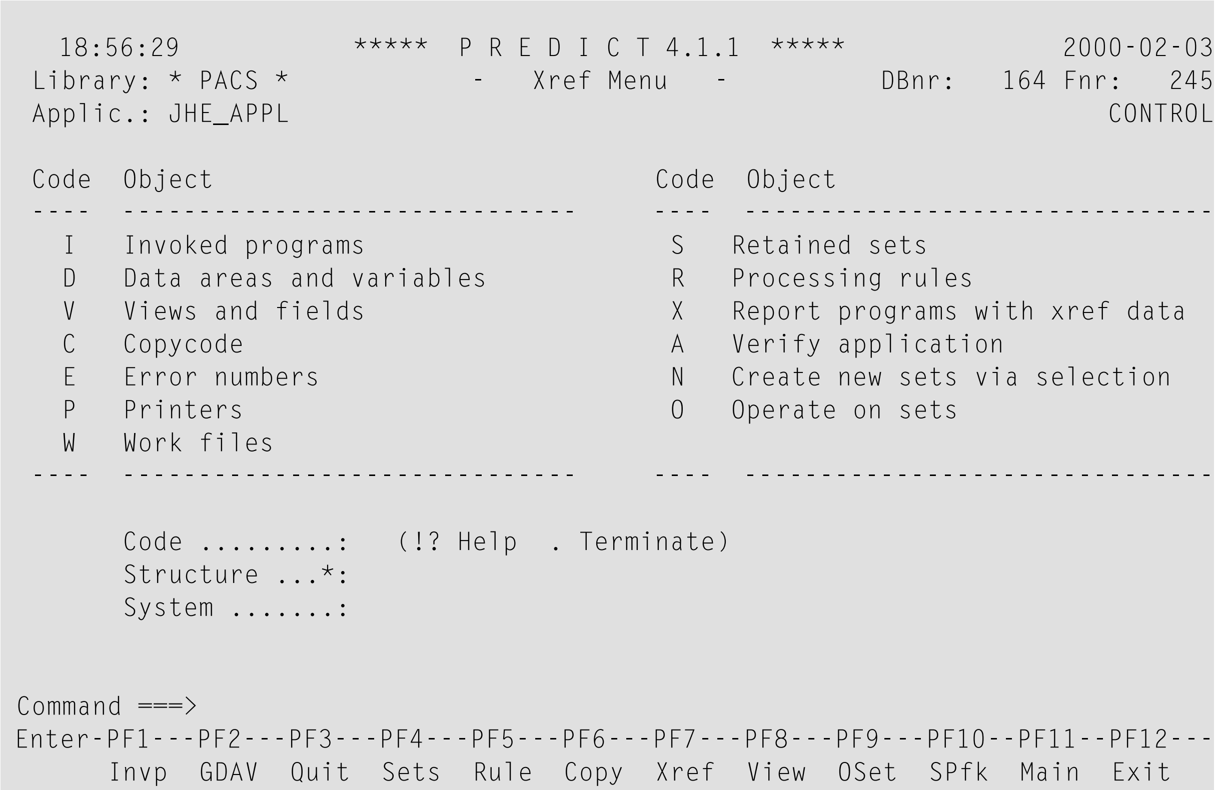
Displaying Predict Cross-Reference Data

The Predict cross-reference sub-functions allow you to obtain cross-reference information about an application. This information is available for statuses other than the Control status only if the Maintain Xref attribute for that status specifies one of the following:

Attr.	Location	Description
L	Local	Cross-reference data is stored within PAC. (Control status.)
R	Remote	Cross-reference data is copied to the Predict file specified by the application status link. (Development, incorporation, maintenance, test, and production statuses.)
B	Both	Cross-reference data is stored both locally and remotely. (Test or production statuses.)

1. To display the Xref Menu, enter Code X (Predict Cross-Reference Data) along with the application name and the status name on the Application Status Menu.
   - If you specify Control status, all versions are traced by Control. PAC allows you to display cross-reference information only for the most recent versions of the objects that are in Control status.
   - You may specify a status other than Control if either B (both local and remote) or R (remote) was specified for that status. In this case, the cross-reference data is displayed as it exists in the external Natural library.

   The Predict Xref Menu appears:



```
  18:56:29          *****  P R E D I C T 4.1.1  *****            2000-02-03
 Library: * PACS *           -   Xref Menu   -         DBnr:   164 Fnr:   245
 Applic.: JHE_APPL                                                    CONTROL

 Code  Object                             Code  Object
 ----  -----------------------------      ----  ------------------------------
   I   Invoked programs                    S   Retained sets
   D   Data areas and variables            R   Processing rules
   V   Views and fields                    X   Report programs with xref data
   C   Copycode                            A   Verify application
   E   Error numbers                       N   Create new sets via selection
   P   Printers                            O   Operate on sets
   W   Work files
 ----  -----------------------------      ----  ------------------------------

       Code .........:   (!? Help  . Terminate)
       Structure ...*:
       System .......:


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Invp  GDAV  Quit  Sets  Rule  Copy  Xref  View  OSet  SPfk  Main  Exit
```

   The Predict Xref Menu screen allows you to obtain information about Predict cross-reference objects that belong to a specific application including programs, data areas, userviews, copycode, and retained sets.

2. To access an object, enter the relevant Code on the Predict Xref Menu. Alternatively, you may enter a direct command.

For more information about the Predict cross-reference facility, refer to the Predict documentation. Also, refer to section **Migrating Predict Objects**.

10

File Translation Tables

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- Modifying a File Translation Table 162
- Copying a File Translation Table 163
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- Purging a File Translation Table 164

PAC file translation tables (FTTs) allow you to compile Natural objects with the set of user database/file numbers defined by the views/DDMs with which the objects are compiled, and execute them against another set of user database/file numbers.

Because the objects are compiled just once, the code that is tested is the same code that is executed in production. The FTT facility maintains application integrity and reduces the amount of work required to prepare an application for implementation.

Refer to **Configuring a PAC Environment** for additional information and examples of FTT use.

You may use an FTT with all applications if the target status is either Production or Test, or you may restrict its use to a specific application and/or status to provide security or effective use.

You may set up one or more base tables and then create or copy subsets for special requirements. For each table, the origin DBnr and Fnr always represent the DBnr and Fnr of the views/DDMs with which the objects were compiled.

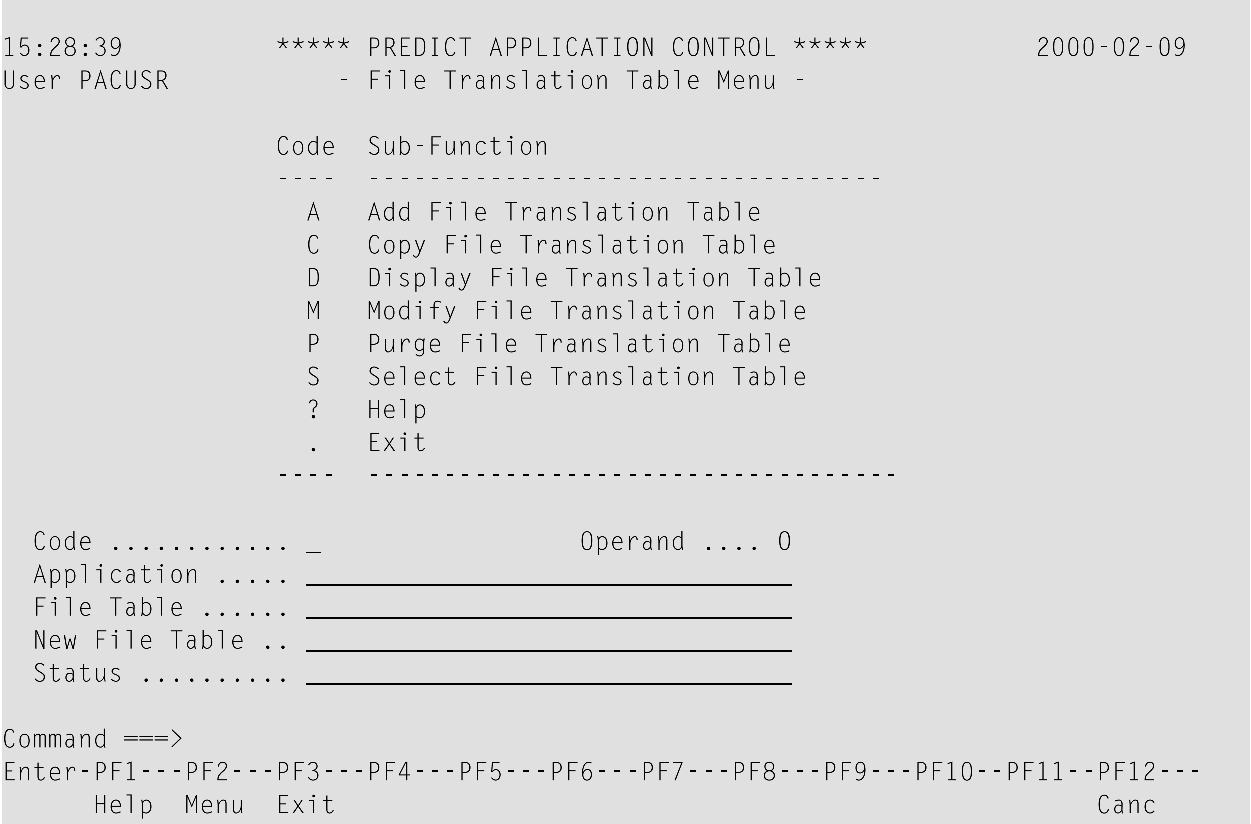
This chapter covers the following topics:

Displaying the FTT Main Menu

To access the PAC file translation table (FTT) maintenance and reporting sub-functions, enter Code F (File Translation Tables) on the PAC Main Menu.

Depending on your user profile, the File Translation Table Menu or the File Translation Table Reporting Menu appears. The File Translation Table Menu that combines the maintenance and reporting sub-functions is used throughout this section.

Note: The Modify Application Status screen can also be used to define file translation tables. In this case, a "dormant" file translation table is created for the application status. This table is activated once it is updated with a set of DBnr and/or Fnr entries.



```
15:28:39           ***** PREDICT APPLICATION CONTROL *****           2000-02-09
User PACUSR             - File Translation Table Menu -

                   Code  Sub-Function
                   ----  ----------------------------------
                     A   Add File Translation Table
                     C   Copy File Translation Table
                     D   Display File Translation Table
                     M   Modify File Translation Table
                     P   Purge File Translation Table
                     S   Select File Translation Table
                     ?   Help
                     .   Exit
                   ----  -----------------------------------

  Code ............ _                 Operand .... O
  Application ..... ________________________________
  File Table ...... ________________________________
  New File Table .. ________________________________
  Status .......... ________________________________

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                 Canc
```

Note: All of the sub-function on this menu, except Add and Copy, may be selected for processing directly from the File Table Selection list that is accessed using the Select FTT sub-function.

This section covers the following topics:

- Operand Field
- Application Field
- File Table and New File Table Fields
- Status Field

Operand Field

File Translation Tables can be type AND or OR. A one-character code is used to identify the type of table:

- A indicates the AND operand; the DBnr and Fnr translation are processed together as a pair. An AND operand table may be changed to an OR operand table until the first entry is entered into the table.
- O indicates the OR operand (the default); the DBnr and Fnr translation are processed independently of one another. You need specify only the database number, and not all of the file correlation is the same between origin and destination.

- I indicates the IF operand; The DBnr and Fnr translations are processed according to any specified conditional entries, including between values, greater than values, less than values or masked values.

Application Field

The name of the application to which the FTT is defined. Each FTT may belong to only one application or to no specific application; that is, the application name may be left blank. If an application is not specified, PAC considers the FTT to be valid for all applications. PAC uses the **All** notation.

You may enter an application name, an alias, range notation, or leave the field blank.

File Table and New File Table Fields

The File Table field is used for the name of the FTT. You may enter an FTT name or range notation.

Each FTT name must begin with an alphabetic character and may be from 1 to 32 characters in length. Embedded blanks are allowed, but are automatically changed to the underscore (_) character. If a duplicate FTT name is entered, an error message is displayed.

An existing FTT may be copied under a new name and optionally to another application and status. The New Table field is used to add a unique name for the new FTT.

Status Field

The status to which the application is linked. The FTT is applied when objects are migrated into this status (destination or "To" status). It may be a T status type; or it may be a blank, range notation, or an alias name.

The FTT may be defined as being either shared (the FTT may be used with any status) or not shared (the FTT may only be used with one specific status). If you enter the status name, the FTT will be defined as not shared. If you wish the FTT to be shared, leave this field blank (do not enter a status name). If both shared and not shared FTTs are to be selected, use asterisk "*" notation.

Note: The status definition is independent of the application definition.

Adding (Defining) a File Translation Table

Before an FTT can be used, it first must be defined. Then the defined FTT must be assigned to the application status; that is, the destination status where it is applied during an application migration.

An FTT can be defined as shared or not shared with other statuses of the same application, or with all applications.

Step 1. Accessing the FTT Allocation Screen

To access the FTT Allocation screen, enter Code A (Add File Translation Table) on the FTT Menu along with the following information and then press ENTER:

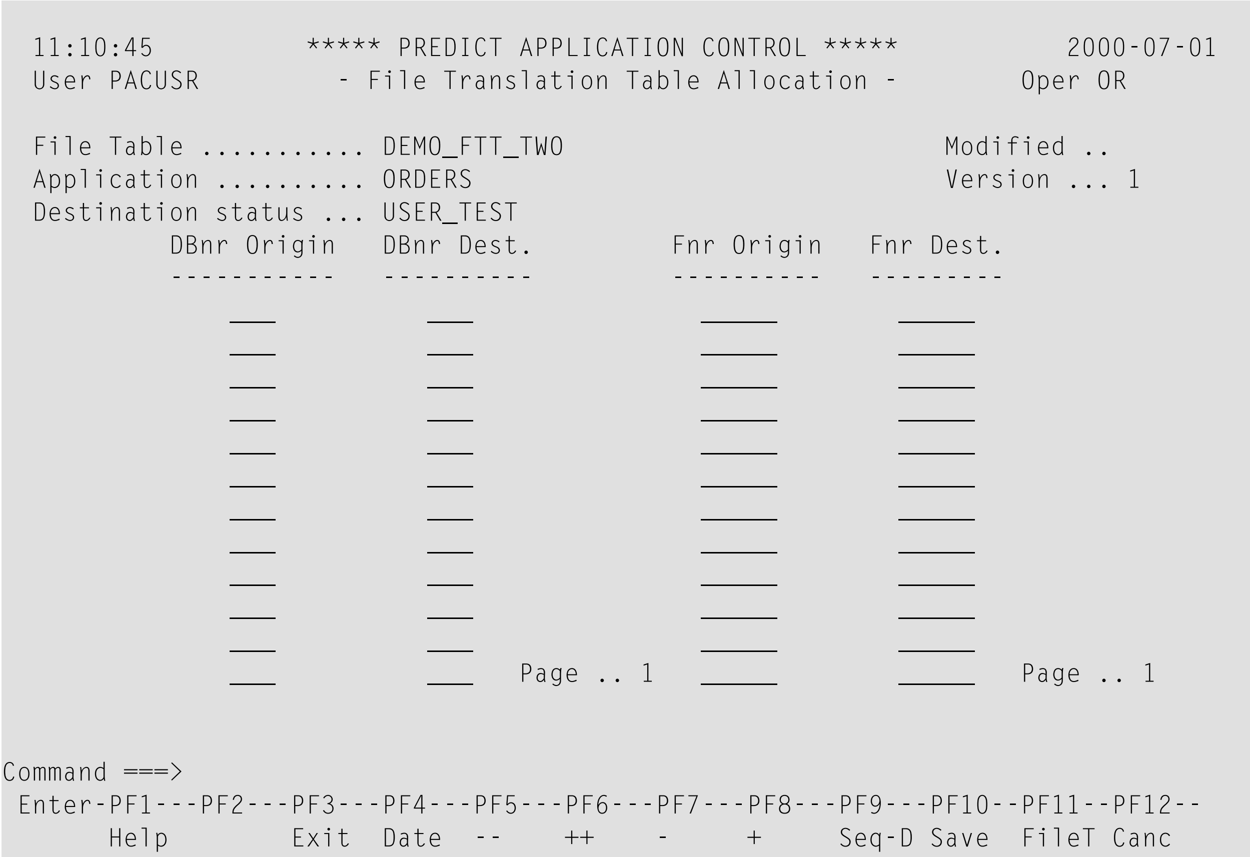
- an operand (A or O) to indicate the table type AND or OR.
- optionally, the name of the application to which the FTT is being defined. If you do not specify an application, the FTT can be used by all applications.
- a new, unique name for the FTT.
- optionally, the name of the status to which the FTT is being restricted (not shared). If you do not specify a status, the FTT can be used by all statuses (shared).

Operand OR Allocation Screen

When you specify the OR operand, the origin and destination database numbers (DBnr) are paired, and the origin and destination file numbers (Fnr) are paired.

Each origin DBnr may be uniquely defined and must correspond to another uniquely defined DBnr. Likewise, each origin Fnr may be uniquely defined and must correspond to another uniquely defined Fnr.

If you specify the OR operand, the following File Translation Table Allocation "or" screen appears:

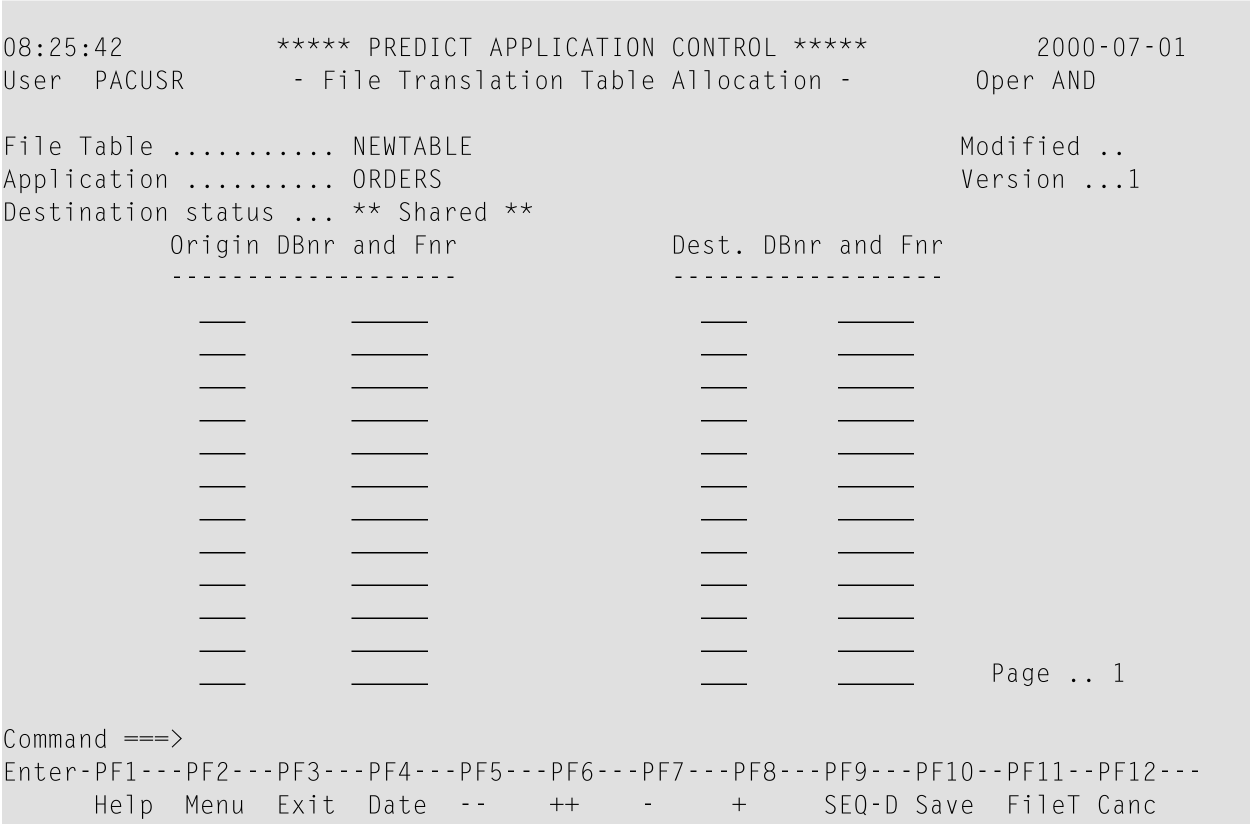


```
  11:10:45          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
  User PACUSR         - File Translation Table Allocation -        Oper OR

  File Table ........... DEMO_FTT_TWO                         Modified ..
  Application .......... ORDERS                               Version ... 1
  Destination status ... USER_TEST
           DBnr Origin   DBnr Dest.         Fnr Origin   Fnr Dest.
           -----------   ----------         ----------   ---------
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___               _____        _____
               ___          ___   Page .. 1   _____        _____   Page .. 1


Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--
       Help        Exit  Date  --    ++    -     +     Seq-D Save  FileT Canc
```

Operand AND Allocation Screen

When you specify the AND operand, the DBnr and Fnr attributes are paired by origin and destination. Only one combination of each DBnr and Fnr may be specified for the origin table. Likewise, only one combination of each DBnr and Fnr may be specified for the destination table.

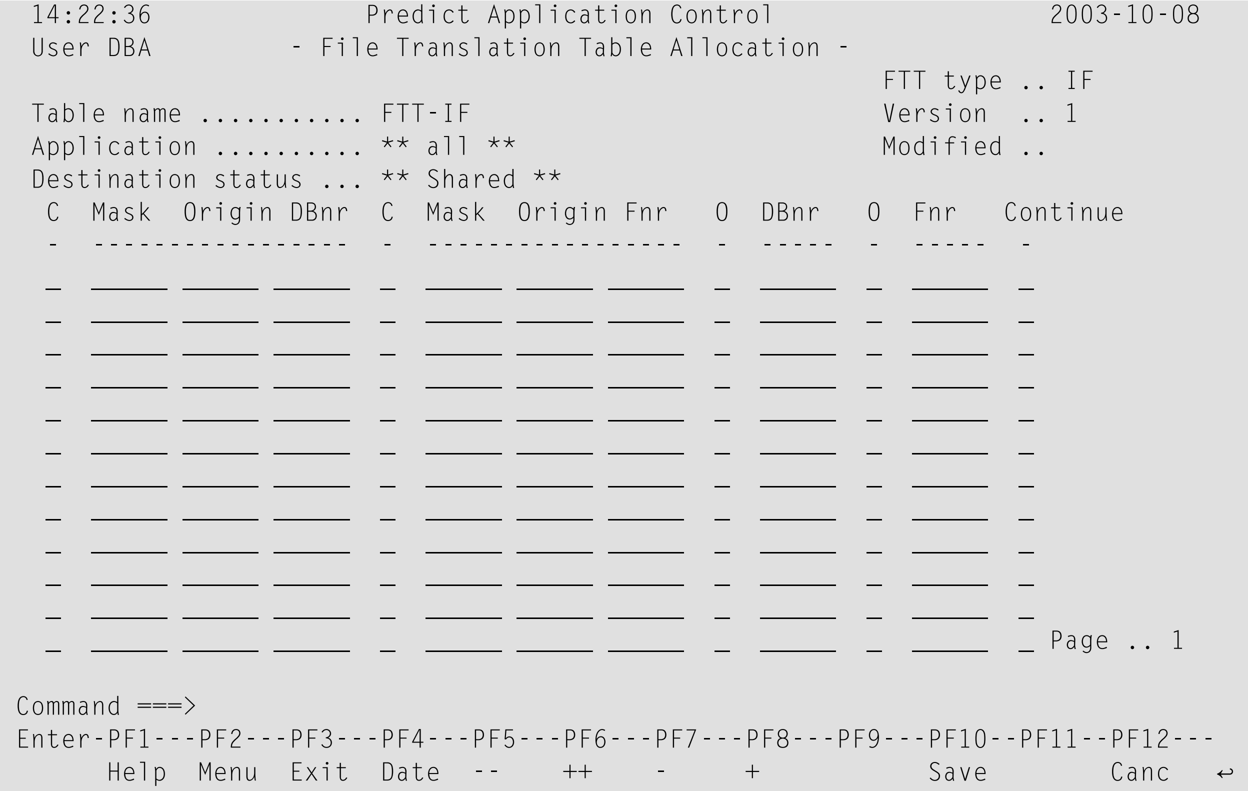
If you specified the AND operand, the following File Translation Table Allocation "and" screen appears:



```
08:25:42          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User  PACUSR       - File Translation Table Allocation -        Oper AND

File Table ........... NEWTABLE                                Modified ..
Application .......... ORDERS                                  Version ...1
Destination status ... ** Shared **
           Origin DBnr and Fnr            Dest. DBnr and Fnr
           -------------------            ------------------
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____
             ___       _____                ___      _____     Page .. 1

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Date  --    ++    -     +     SEQ-D Save  FileT Canc
```

Operand IF Allocation Screen

When you specify the IF operand, the DBnr and Fnr attributes, depending on conditional entries can be paired or not by origin and destination. If you specified the IF operand, the following File Translation Table Allocation "if" screen appears:



```
 14:22:36              Predict Application Control                   2003-10-08
 User DBA         - File Translation Table Allocation -
                                                         FTT type .. IF
 Table name ........... FTT-IF                           Version  .. 1
 Application .......... ** all **                        Modified ..
 Destination status ... ** Shared **
  C  Mask  Origin DBnr  C  Mask  Origin Fnr   O  DBnr   O  Fnr   Continue
  -  ----------------   -  ----------------   -  -----  -  -----  -
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _
  _  _____ _____ _____  _  _____ _____ _____  _  _____  _  _____  _ Page .. 1

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Date  --    ++    -     +           Save        Canc   ↩
```

Allocation Screen Fields

The attributes for both the OR and the AND FTT Allocation screens are the same.

Attribute	Description
DBnr Origin	A list (or range) of all possible databases corresponding to the views referenced by any object as an external subordinate object at compile time. A database number may be any value between 1 and 65,535. Each number may be specified only once.
DBnr Destination	A list (or range) of all possible databases that the objects access. Each database identifies the DBnr of the user data. Each database placed in this list must have a corresponding originating database number (DBnr Origin). A database number may be any value between 1 and 65,535. Each number may be specified only once.
Fnr Origin	A list (or range) of all possible files corresponding to the views referenced by any object as an external subordinate object during compile time. A file number may be any value between 1 and 65,535. Each number may be specified only once.
Fnr Destination	A list (or range) of all possible files that the objects access. Each file number identifies the Fnr of the user data. A file number may be any value between 1 and 65,535. Each number may be specified only once.
Page	Allows you to specify the page number (backwards or forwards) to be displayed for the DBnr and/or Fnr table. The page number may be any value between 1 and 22.
Version	As long as a version of an FTT has not been used in a migration, it can be modified. Once the FTT version has been used in a migration event, any attempt to modify it causes PAC to create a new version and assign a new version number to it. This version

Attribute	Description
	supersedes any previous versions as the current version. Previous versions remain but cannot be modified. The current version is used for any required migration events.
Condition	Condition for DBnr/Fnr B DBnr/Fnr must be BETWEEN specified values G DBnr/Fnr must be GREATER than specified value. L DBnr/Fnr must be LESS than specified value. M DBnr/Fnr must match the specified MASK. O DBnr/Fnr must be OUTSIDE the interval specified by values.
Mask	DBnr/Fnr Mask Positions corresponding to entered Mask will be checked. Unnecessary positions must be filled with '.'.
Operation on (O)	Operation on DBnr/Fnr values can be: A ADD specified value to DBnr/Fnr. M apply MASK to DBnr/Fnr. S SUBTRACT specified value from DBnr/Fnr.

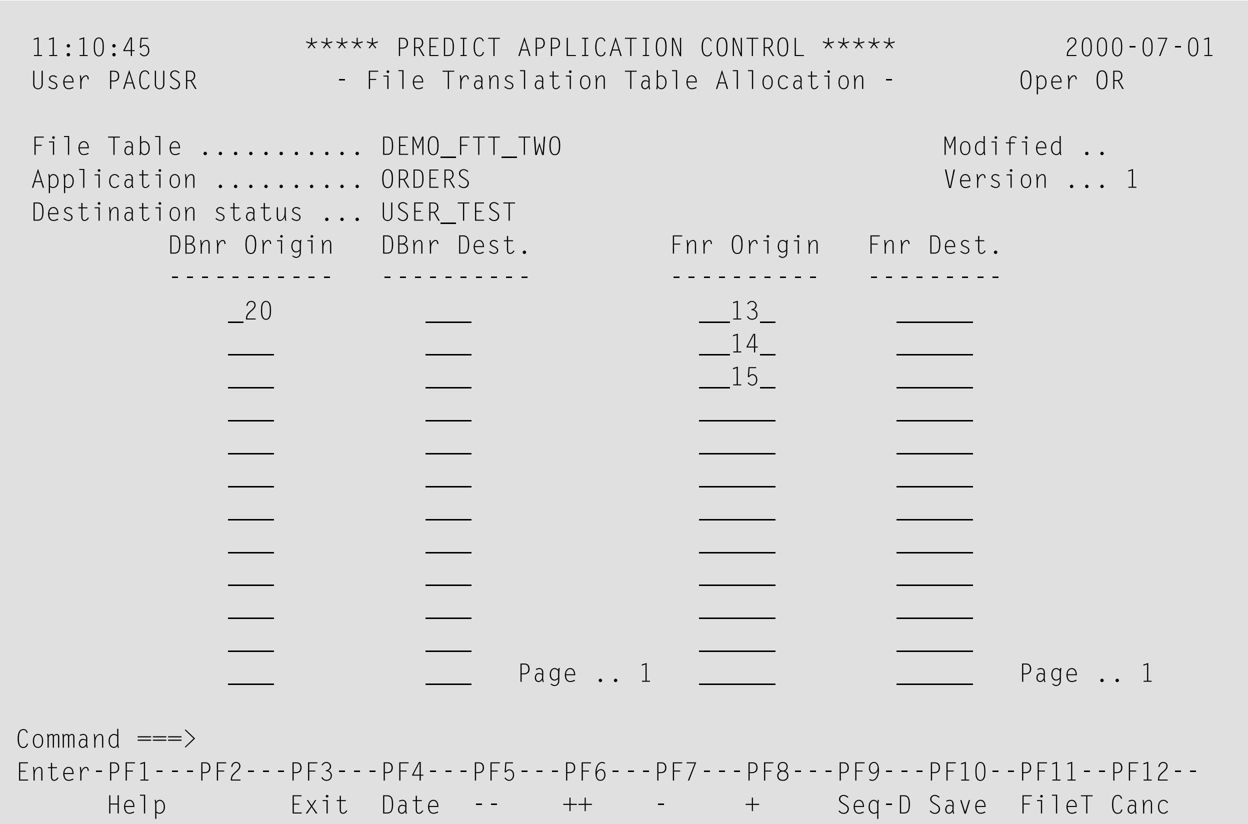
The following PF key functions are unique to the File Translation Table Allocation screen:

Function	Is Used to ...
Seq-D	(sequence destination) arrange the list of DBnr and Fnr in ascending sequence by destination DBnr and Fnr.
Seq-O	(sequence origin) arrange the list of DBnr and Fnr in ascending sequence by originating database.
Save	save the file translation table after all information has been entered.
File T	display a list of all views with their corresponding databases and file numbers currently used by the application. Views may be selected directly from this list.

Step 2. Entering the Originating Database/File Numbers

Enter the originating database numbers and file numbers accessed by the application in the DBnr Origin and Fnr Origin columns, respectively; that is, the DBnrs and Fnrs of the views/DDMs with which the objects were compiled.

For example, if the originating database number is 20 and the originating file numbers are 13, 14, and 15, enter "20" in the DBnr Origin column and "13, 14, and 15" in the Fnr Origin column as shown in the following screen:



```
 11:10:45          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
 User PACUSR         - File Translation Table Allocation -        Oper OR

 File Table ........... DEMO_FTT_TWO                         Modified ..
 Application .......... ORDERS                               Version ... 1
 Destination status ... USER_TEST
          DBnr Origin   DBnr Dest.         Fnr Origin   Fnr Dest.
          -----------   ----------         ----------   ---------
              _20          ___               __13_        _____
              ___          ___               __14_        _____
              ___          ___               __15_        _____
              ___          ___               _____        _____
              ___          ___               _____        _____
              ___          ___               _____        _____
              ___          ___               _____        _____
              ___          ___               _____        _____
              ___          ___               _____        _____
              ___          ___               _____        _____
              ___          ___               _____        _____
              ___          ___   Page .. 1   _____        _____   Page .. 1

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--
      Help        Exit  Date  --    ++    -     +     Seq-D Save  FileT Canc
```

Note: PAC resolves duplicates if the same entries are selected/entered more than once.

If you do not know the originating database/file numbers that the application accesses, you may select views from a list as follows:

1. Press PF11 (FileT) to display a list of views, database numbers, and file numbers.

   The View window appears:

```
 11:10:45          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
 User PACUSR         - File Translation Table Allocation -        Oper OR

 File Table ........... DEMO_FTT_TWO                         Modified ..
 Application .......... ORDERS                               Version ...1
 Destination status ...  +--------------------------------------------------+
          DBnr Origin    |                     - View -                     |
          -----------    |                                                  |
              ___        |   C View Name                        DBnr Fnr    |
              ___        |   - -------------------------------- ---- -----  |
              ___        |   _ ARTICLE                           20     13  |
              ___        |   _ CUSTOMER                          20     14  |
              ___        |   _ INVOICE                           20     15  |
              ___        |   _ INVOICE-LINE                      20     15  |
              ___        |                                                  |
              ___        |                                                  |
              ___        |                                                  |
              ___        |                                                  |
              ___        |                                                  |
              ___        |                                                  |
                         |                                                  |
Command ===>             +--------------------------------------------------+
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--
      Help  Menu  Exit  Date  --    ++    -     +     Seq-D Save  FileT Canc
```

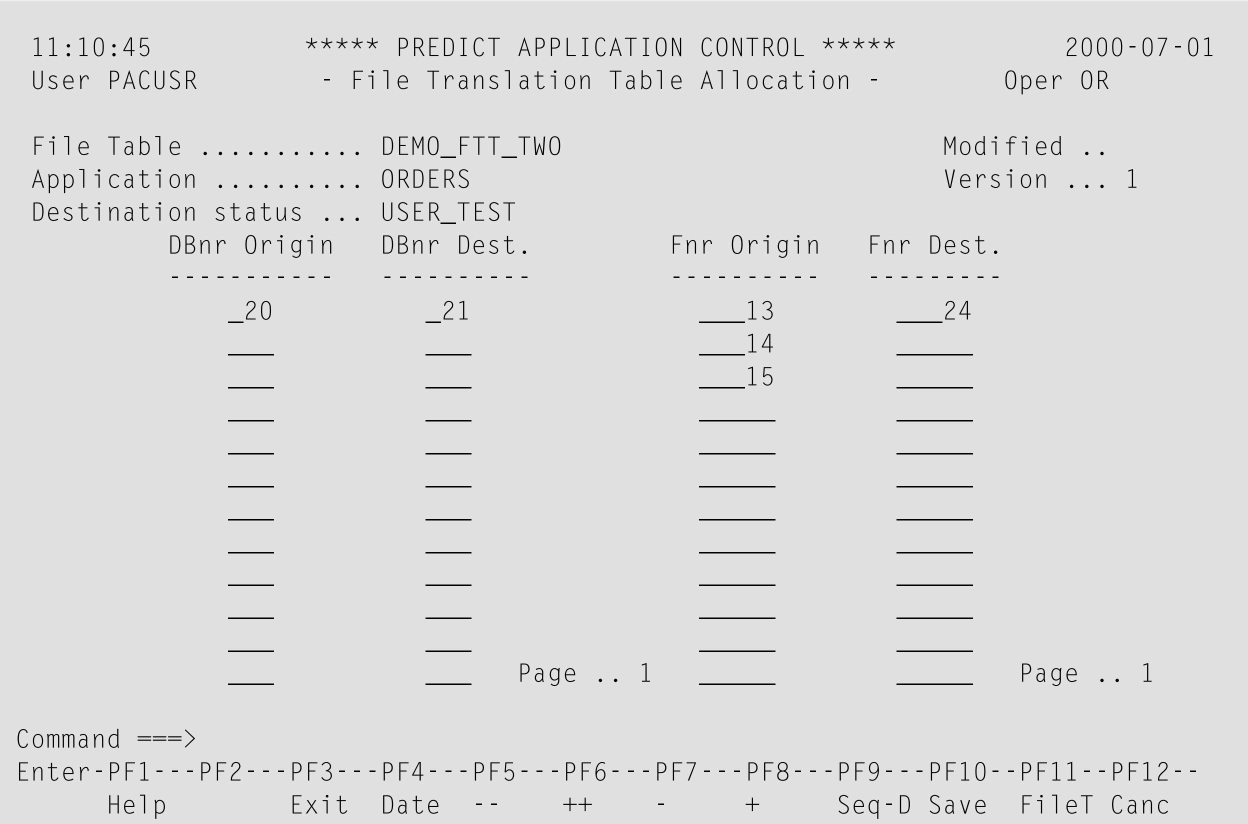
2. Select the desired views from this list by marking the view(s) with an X in the "C" column and pressing ENTER.

   The database numbers and file numbers of the selected views are then placed in the DBnr Origin and Fnr Origin columns of the File Translation Table Allocation screen.

Step 3. Entering the Destination Database/File Numbers

In the DBnr Dest. and Fnr Dest. columns, enter the destination database numbers and file numbers that the application accesses, respectively.

For example, if the originating database number is 20 and is to be translated to 21, enter "21" in the DBnr Dest. column directly across from the "20" designation in the DBnr Origin column. If the file number is 13 and is to be translated to destination file number 24, enter "24" in the Fnr Dest. column directly across from the "13" designation in the Fnr Origin column as shown in the following screen:



```
 11:10:45          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
 User PACUSR        - File Translation Table Allocation -        Oper OR

 File Table ........... DEMO_FTT_TWO                           Modified ..
 Application .......... ORDERS                                 Version ... 1
 Destination status ... USER_TEST
          DBnr Origin   DBnr Dest.         Fnr Origin   Fnr Dest.
          -----------   ----------         ----------   ---------
              _20          _21                ___13        ___24
              ___          ___                ___14        _____
              ___          ___                ___15        _____
              ___          ___                _____        _____
              ___          ___                _____        _____
              ___          ___                _____        _____
              ___          ___                _____        _____
              ___          ___                _____        _____
              ___          ___                _____        _____
              ___          ___                _____        _____
              ___          ___                _____        _____
              ___          ___   Page .. 1    _____        _____   Page .. 1

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--
      Help        Exit  Date  --    ++    -     +     Seq-D Save  FileT Canc
```

Note: PAC resolves duplicates if the same entries are selected/entered more than once.

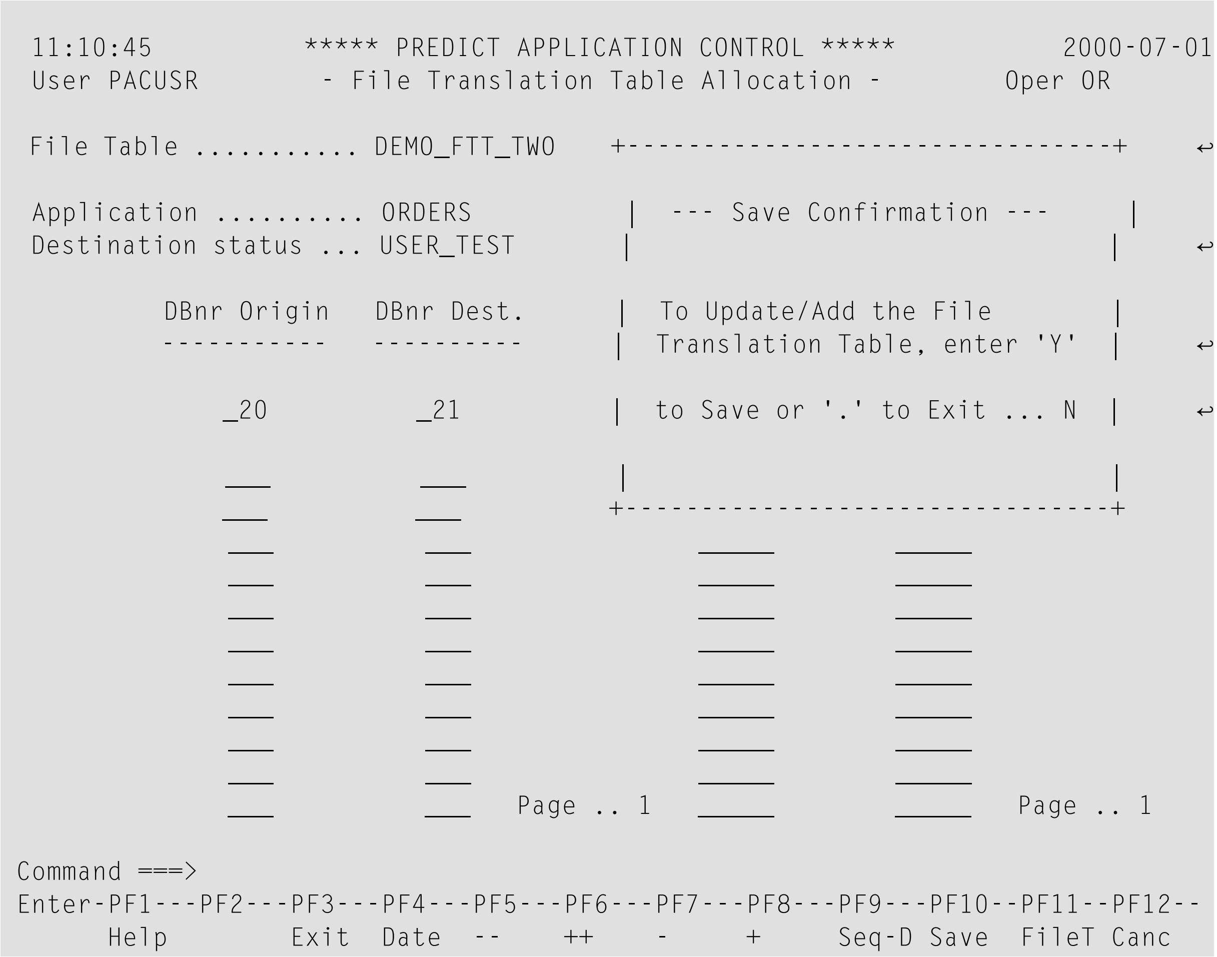
Step 4. (Optional) Changing the Sequence of the Table Entries

You may optionally change the sequence of the table as follows:

- Press PF9 (Seq-D) to arrange the list of DBnr and Fnr in ascending sequence by destination DBnr and Fnr; or
- Press PF9 (Seq-O) to arrange the list of DBnr and Fnr in ascending sequence by originating database.

Step 5. Confirming FTT Entries and Adding the FTT

1. Press PF10 (Save) when all of the information has been entered in the relevant columns. A Save Confirmation window is displayed on which you may either reject or accept the new definition:



```
11:10:45          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR        - File Translation Table Allocation -        Oper OR

File Table ........... DEMO_FTT_TWO    +---------------------------------+    ↩

Application .......... ORDERS          |  --- Save Confirmation ---      |
Destination status ... USER_TEST       |                                 |    ↩

         DBnr Origin   DBnr Dest.      |  To Update/Add the File         |
         -----------   ----------      |  Translation Table, enter 'Y'   |    ↩

             _20          _21          |  to Save or '.' to Exit ... N   |    ↩

             ___          ___          |                                 |
             ___          ___          +---------------------------------+
             ___          ___                _____        _____
             ___          ___                _____        _____
             ___          ___                _____        _____
             ___          ___                _____        _____
             ___          ___                _____        _____
             ___          ___                _____        _____
             ___          ___                _____        _____
             ___          ___                _____        _____
             ___          ___     Page .. 1  _____        _____     Page .. 1

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--
      Help        Exit  Date  --    ++    -     +     Seq-D Save  FileT Canc
```

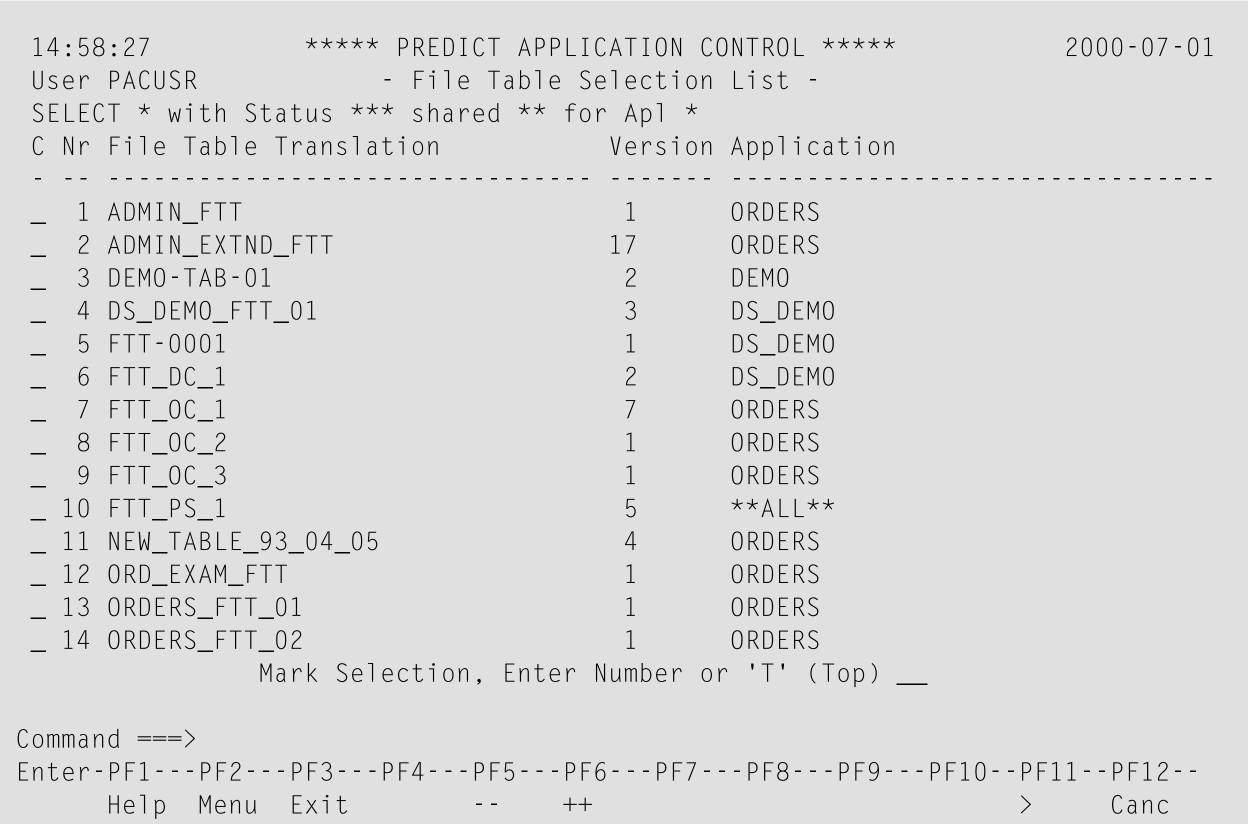
2. To confirm the FTT entries and add the FTT, overtype the default with Y (Yes) in the Save Confirmation window; to return to the previous screen without confirming the entries or adding the FTT, just press ENTER.

   When adding an FTT, the following occurs:

   - PAC scans the specified application for all known databases and file numbers accessed by the application objects. This is determined accordingly as all views/DDMs registered to the application.
   - PAC verifies that the most recent versions of views for the specified application are used, and all databases and file numbers used are placed on the DBnr and Fnr origin lists.

Selecting a File Translation Table

1. To display a list of FTTs, enter Code S (Select FTT) on the FTT Menu along with
   - range notation in the File Table field to limit the list; or enter an asterisk (*) to select all FTTs.
   - the type of list to be displayed:
     - For a list of all FTTs (shared and not shared), enter an asterisk (*) in the Status field.
     - For a list of only shared FTTs, leave the Status field blank.
     - For a list of not shared FTTs for a specific status, enter the status name in the Status field; or enter range notation to limit the list.
   - the desired application(s):
     - For a list of all applications, enter an asterisk (*) in the Application field.
     - For a list of only FTTs applicable to non-restricted or specific applications, leave the Application field blank.
     - For a specific application, enter the application name.
2. Press ENTER to display the File Table Selection List:



```
 14:58:27          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
 User PACUSR            - File Table Selection List -
 SELECT * with Status *** shared ** for Apl *
 C Nr File Table Translation           Version Application
 - -- -------------------------------- ------- --------------------------------
 _  1 ADMIN_FTT                         1      ORDERS
 _  2 ADMIN_EXTND_FTT                  17      ORDERS
 _  3 DEMO-TAB-01                       2      DEMO
 _  4 DS_DEMO_FTT_01                    3      DS_DEMO
 _  5 FTT-0001                          1      DS_DEMO
 _  6 FTT_DC_1                          2      DS_DEMO
 _  7 FTT_OC_1                          7      ORDERS
 _  8 FTT_OC_2                          1      ORDERS
 _  9 FTT_OC_3                          1      ORDERS
 _ 10 FTT_PS_1                          5      **ALL**
 _ 11 NEW_TABLE_93_04_05                4      ORDERS
 _ 12 ORD_EXAM_FTT                      1      ORDERS
 _ 13 ORDERS_FTT_01                     1      ORDERS
 _ 14 ORDERS_FTT_02                     1      ORDERS
                Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--
      Help  Menu  Exit        --    ++                            >     Canc
```

The above File Table Selection List example screen displays an alphabetical list of shared FTTs along with the maximum number of versions that exist for a particular FTT and the application to which each FTT belongs.

The sub-function ("SELECT" in the above example) displayed on the line directly under the User field indicates that you used one of the following methods to access this screen:

- Range notation or blank in the Status field along with the Display, Modify, Purge, or Select sub-function;
- The SELECT direct command (see the PAC Reference documentation).

If you accessed the screen with the S (Select FTT) sub-function or with the SELECT direct command for one or more of the listed FTTs, you can process the following sub-function by entering the corresponding Code in the "C" column: D (Display), M (Modify), P (Purge), S (Select). Enter a period (`.') to return to the FTT Menu.

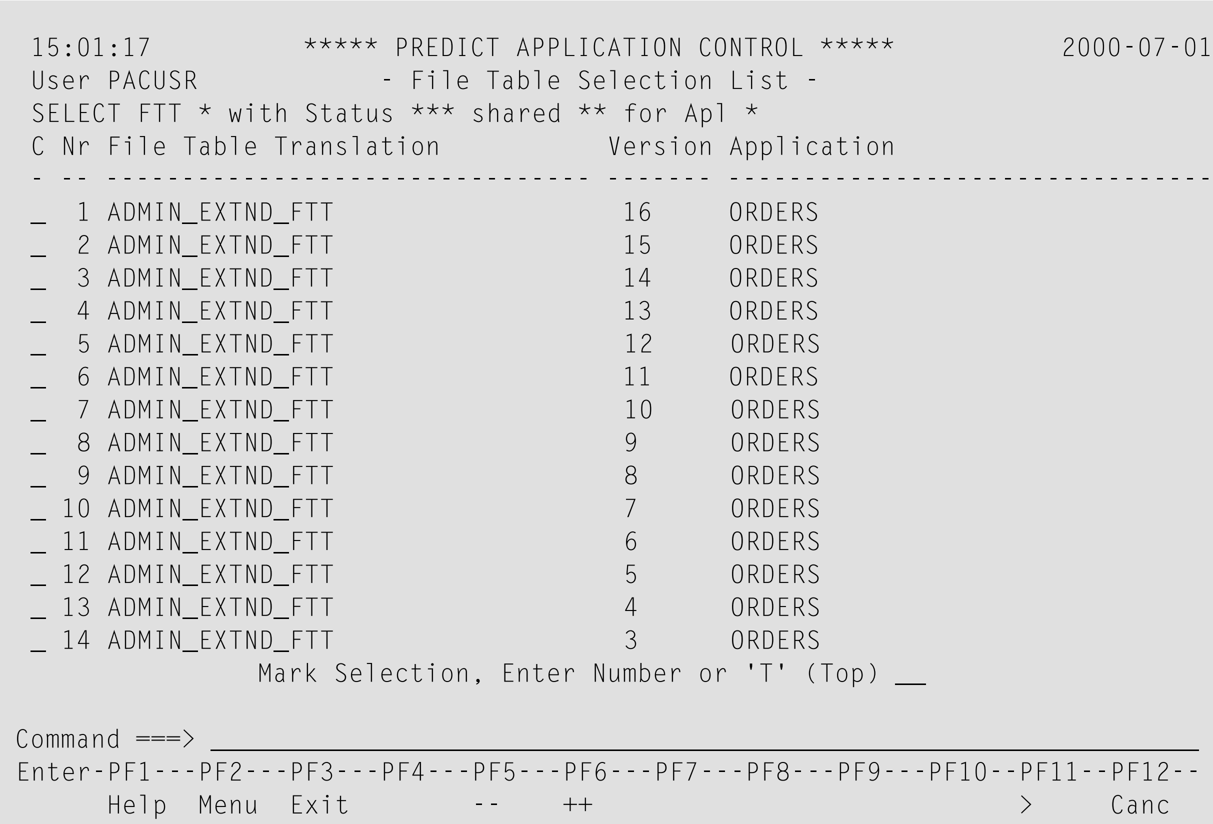
If you mark the FTT with the cursor or if you enter an X or an S in the "C" column; or if you enter the FTT number (From the "Nr" column) in the Mark Selection... field, and press ENTER, you are returned to the FTT Menu where the specified FTT is displayed in the File Table field.

Displaying FTT Creation Dates and Status

- Press PF11 (>) to display the creation dates of the FTTs listed on the File Table Selection List screen.
- Press PF11 (>) again to display the status (shared, not shared) of the FTT.
- Press PF10 (<) to return to the previous screen.

Displaying a File Translation Table

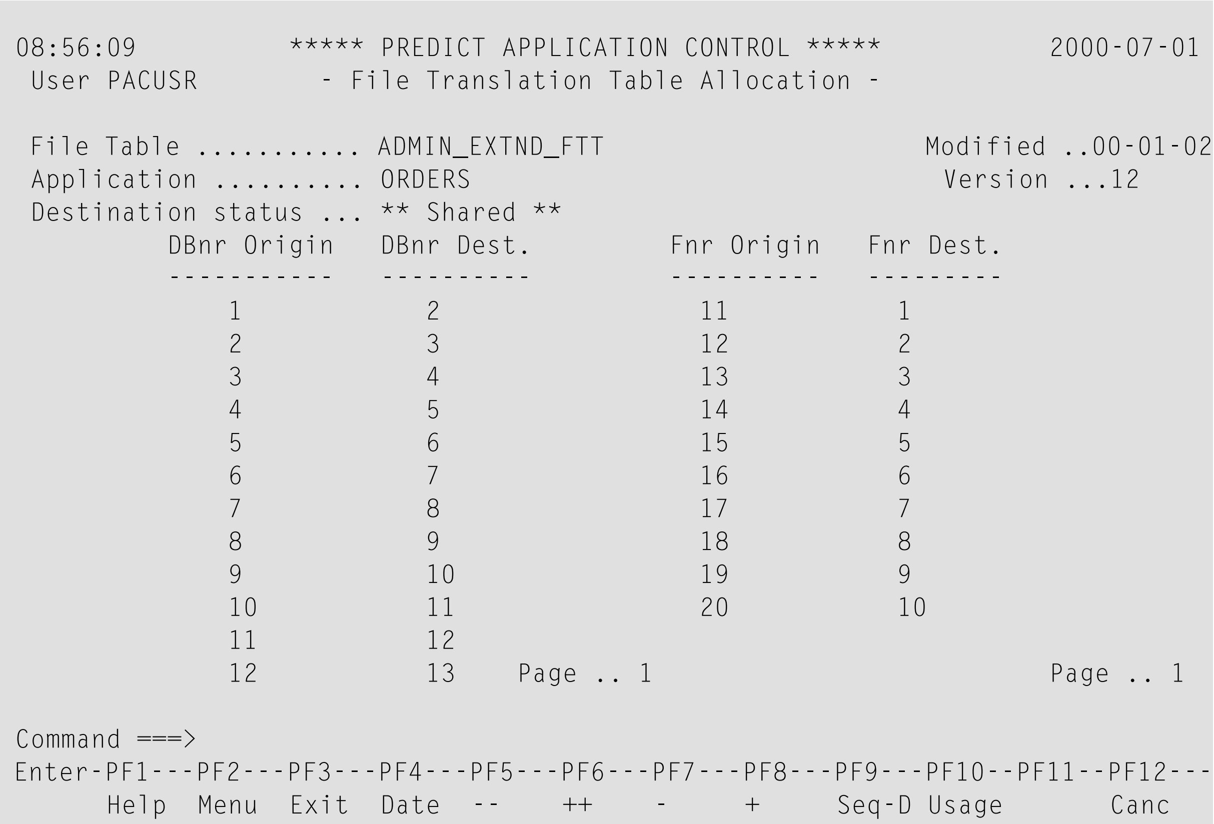
1. To display an FTT, enter Code D on the FTT Menu, the name of the FTT, and optionally the name of the application to which the FTT is assigned.
    - If only one version of the FTT exists, the File Translation Table Allocation screen is displayed.
    - If more than one version of the FTT exists, a list of the versions is displayed on the File Table Selection List:



```
 15:01:17          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
 User PACUSR            - File Table Selection List -
 SELECT FTT * with Status *** shared ** for Apl *
 C Nr File Table Translation           Version Application
 - -- -------------------------------- ------- --------------------------------
 _  1 ADMIN_EXTND_FTT                   16     ORDERS
 _  2 ADMIN_EXTND_FTT                   15     ORDERS
 _  3 ADMIN_EXTND_FTT                   14     ORDERS
 _  4 ADMIN_EXTND_FTT                   13     ORDERS
 _  5 ADMIN_EXTND_FTT                   12     ORDERS
 _  6 ADMIN_EXTND_FTT                   11     ORDERS
 _  7 ADMIN_EXTND_FTT                   10     ORDERS
 _  8 ADMIN_EXTND_FTT                   9      ORDERS
 _  9 ADMIN_EXTND_FTT                   8      ORDERS
 _ 10 ADMIN_EXTND_FTT                   7      ORDERS
 _ 11 ADMIN_EXTND_FTT                   6      ORDERS
 _ 12 ADMIN_EXTND_FTT                   5      ORDERS
 _ 13 ADMIN_EXTND_FTT                   4      ORDERS
 _ 14 ADMIN_EXTND_FTT                   3      ORDERS
                Mark Selection, Enter Number or 'T' (Top) __

Command ===> _________________________________________________________________
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--
      Help  Menu  Exit        --    ++                            >     Canc
```

The columns display the FTTs in alphabetical order, the version of each FTT, and the applications to which each FTT is assigned. Versions that have been used in a migration are highlighted.

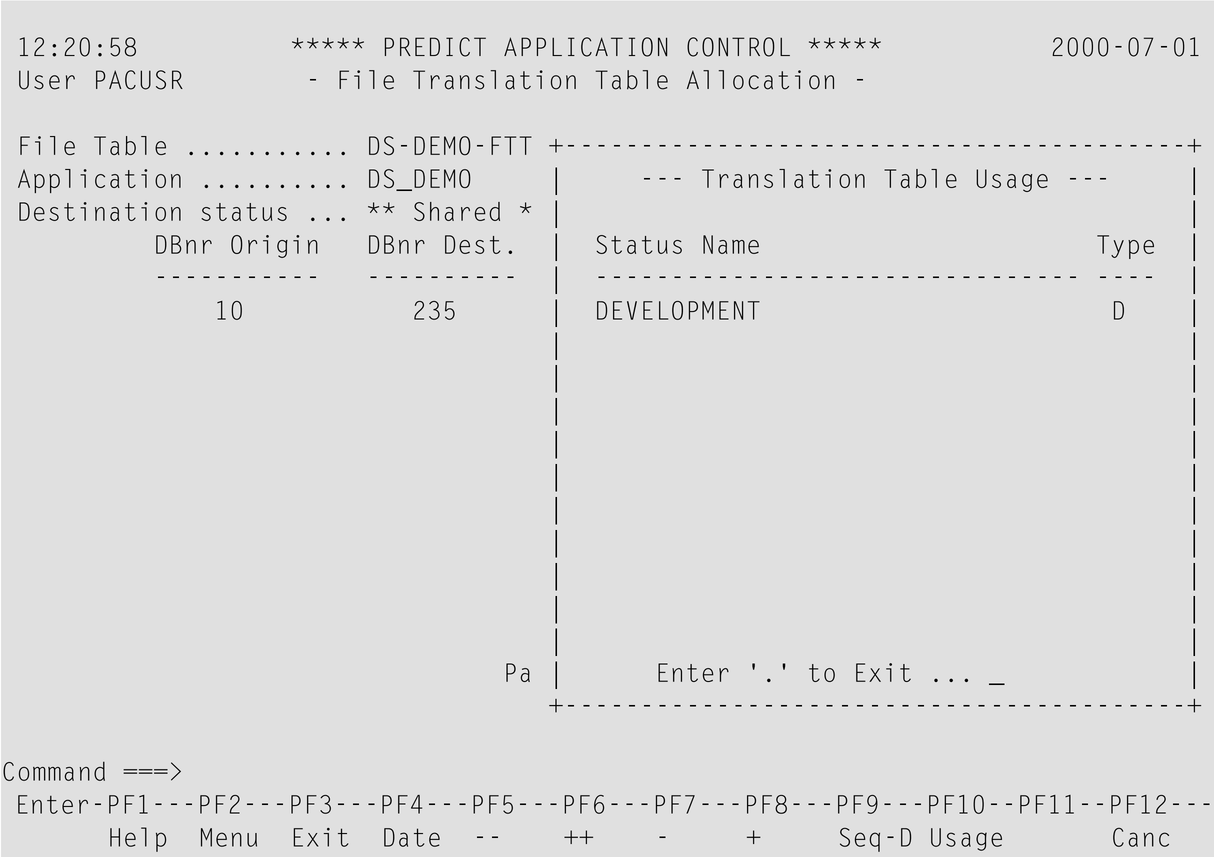
2. To display a specific version of an FTT on the File Translation Table Allocation screen, mark the desired FTT with the cursor in the "C" column or enter the number (from the "Nr" column) in the Mark Selection... field:



```
08:56:09          ***** PREDICT APPLICATION CONTROL *****            2000-07-01
 User PACUSR        - File Translation Table Allocation -

 File Table ........... ADMIN_EXTND_FTT                      Modified ..00-01-02
 Application .......... ORDERS                                Version ...12
 Destination status ... ** Shared **
          DBnr Origin   DBnr Dest.          Fnr Origin   Fnr Dest.
          -----------   ----------          ----------   ---------
              1            2                  11           1
              2            3                  12           2
              3            4                  13           3
              4            5                  14           4
              5            6                  15           5
              6            7                  16           6
              7            8                  17           7
              8            9                  18           8
              9            10                 19           9
              10           11                 20           10
              11           12
              12           13    Page .. 1                           Page .. 1

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Date  --    ++    -     +     Seq-D Usage       Canc
```

This screen is similar to the screen used to define the FTT. You may page forward or backward using the appropriate PF keys, or by entering the number of the page in the Page: field for the DBnr and/or Fnr.

3. To display a list of statuses that use the FTT, press PF10 (Usage).
    - If the FTT is not shared, only one Status Name entry is displayed.
    - If the FTT is shared with several statuses, the Translation Table Usage window displays a list of the names and types of all other statuses that use the FTT:



```
 12:20:58          ***** PREDICT APPLICATION CONTROL *****          2000-07-01
 User PACUSR        - File Translation Table Allocation -

 File Table .......... DS-DEMO-FTT +-----------------------------------------+
 Application ......... DS_DEMO     |     --- Translation Table Usage ---     |
 Destination status ... ** Shared * |                                        |
          DBnr Origin   DBnr Dest.  |  Status Name                     Type  |
          -----------   ----------  |  --------------------------------- ----  |
              10           235      |  DEVELOPMENT                      D    |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                    |                                         |
                                 Pa |      Enter '.' to Exit ... _            |
                                    +-----------------------------------------+

Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit  Date  --    ++    -     +     Seq-D Usage       Canc
```

If no statuses use the FTT version, a window appears displaying the following message:

"Translation Table is not used by any Statuses."

Modifying a File Translation Table

If the FTT has not been used in a migration, the existing information for the FTT may be modified.

If the FTT has been used in a migration, PAC assigns a new version number to the FTT when you attempt to modify it. This version supersedes any previous versions as the current version. The previous versions remain, and are not modifiable.

For example, if the current version (Version 3, for example) has been used in a migration event and you attempt to modify it, PAC creates a new version (Version 4) of the FTT and a "4" is displayed in the Version field on the FTT Allocation screen. Version 4 may be modified as often as necessary until it is used in a migration event. Version 3 remains as an audit trail for any migration event that used it. The DBnr and Fnr data from the previous version are provided as the base information for the new version.

Once the FTT is created, migration events that use it will use the current version until it is superseded when the FTT is modified.

To modify a file translation table

1. On the FTT Menu, enter Code M (Modify FTT), the name of the FTT to be modified, and optionally, the name of the application to which the FTT is assigned and/or the name of the status to which the FTT is assigned.

   The **FTT Allocation screen** appears .

2. Modify the FTT.

   You may use the PF keys or specify a page number in the Page: field to page forward or backwards in the list to modify DBnr and/or Fnr assignments. Refer to the section **Allocation Screen Fields** for more information.

3. Press PF10 (Save) or press ENTER to confirm your modifications and return to the FTT Menu.

Copying a File Translation Table

When copying an FTT, you may change the application and/or status on the FTT Menu so that the new FTT acquires that new application and/or status assignment.

To copy a file translation table

1. On the FTT Menu, enter Code C, the name of the FTT to be copied, and a name for the new FTT. If the new FTT is to be restricted (not shared), enter the status and/or application name as well.

   The Copy File Translation Table screen appears. The information assigned to the new FTT is identical to that of the old FTT unless you entered a status and/or application name on the FTT Menu.

2. Modify the information (adding and removing entries as required) and press PF10 (Save) to update.
3. To retrieve the list of views used by the specified application, press PF11 .
4. Press PF3 to exit.

Linking an FTT to an Application Status Link

Once an FTT has been created (defined), it must be assigned as an attribute of the To status (destination status) of an application status link before it can be used in a migration event. This is accomplished by modifying the specific application status link.

Even if an FTT is assigned a specific application and status, the FTT must still be defined to the application status link because there may be more than one FTT with the same application and status assignments.

When the migration event is created for the application, the FTT is then assigned automatically and may not be overridden.

Refer to the section **Adding an Individual Application Status Link** for detailed information.

Changing an FTT Assignment

To change the FTT assigned to a particular application status link, type over the FTT name displayed in the Translation Table field on the Modify Application Status Link screen.

If the FTT is specified as shared ("Y") in the Shared Table field, the entry is updated.

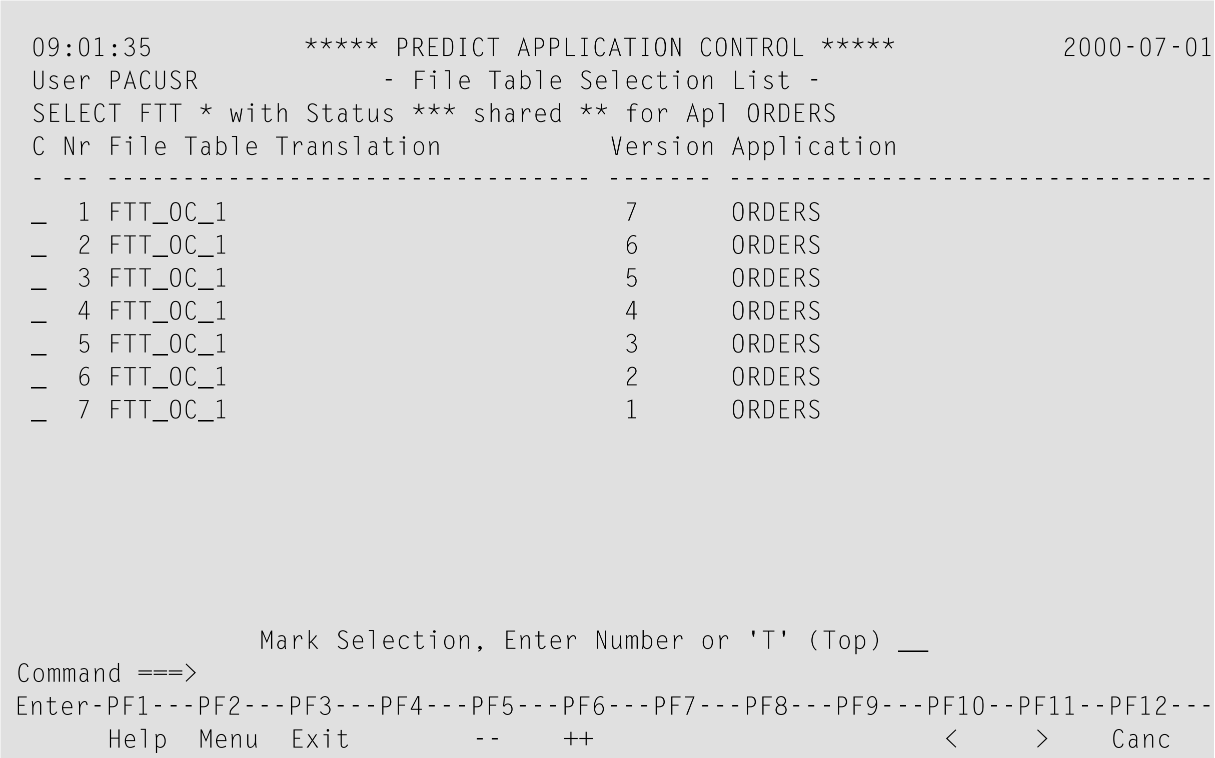
If the FTT is specified as not shared ("N") in the Shared Table field, it cannot be updated to be shared. You can only update an FTT to shared as a separate task when the FTT is defined. Updating results in the creation of a new version of the FTT.

If the FTT is dormant, PAC assumes that an error previously occurred and, if no other application status links use this table, the FTT entry is purged.

Purging a File Translation Table

1. To purge an FTT, enter Code P and the name of the FTT on the FTT Menu.

   If there is more than one version of the FTT, a list of all versions is displayed on the File Table Selection List:



```
 09:01:35         ***** PREDICT APPLICATION CONTROL *****          2000-07-01
 User PACUSR            - File Table Selection List -
 SELECT FTT * with Status *** shared ** for Apl ORDERS
 C Nr File Table Translation           Version Application
 - -- -------------------------------- ------- --------------------------------
 _  1 FTT_OC_1                          7      ORDERS
 _  2 FTT_OC_1                          6      ORDERS
 _  3 FTT_OC_1                          5      ORDERS
 _  4 FTT_OC_1                          4      ORDERS
 _  5 FTT_OC_1                          3      ORDERS
 _  6 FTT_OC_1                          2      ORDERS
 _  7 FTT_OC_1                          1      ORDERS








                Mark Selection, Enter Number or 'T' (Top) __
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit        --    ++                     <     >    Canc
```

FTTs that may not be purged are highlighted.

2. To select the appropriate version, enter P in the "C" column.

   PAC determines whether the FTT has been used by a migration event. If so, the purge request is rejected and the Purge Rejection window is displayed with the following message:

   "This version of the File Translation Table may not be purged because it was used by an event."

   If the FTT has not previously been used, the Purge Confirmation window appears.

3. To purge the FTT, type Confirm or press PF5.

   To return to the FTT Menu without purging the FTT, type a period (.) or press PF3.

11 Part II - PAC Migration Concepts

This part tells you how to set up, run, and monitor migration events and assign and maintain versions of migrated objects.

- Migration
- Migration Paths
- Migration Events
- Migration Path Defaults
- Archive Event Maintenance
- Authorizing and Submitting a Migration Event
- Migrations Into, Within, and Out of PAC
- Migrating Predict Objects
- Assigning and Maintaining Object Versions
- Object Version Maintenance

The overall migration steps are:

1. Define the migration event to migrate the application from one status to another along a defined migration path. Identify the activities that must take place during the migration of the objects of an application.

   Note: The event that migrates Predict objects must be run before the event that moves/copies the Natural and non-Natural application objects that use them.

2. Build the object list. The object list identifies the objects of an application to be migrated.

   The expand status option may be used to specify the status from which subordinate objects are to be compiled.

3. Validate the object list. PAC checks the list of objects to be migrated.
4. Authorize the event. Permission is given to execute the migration.
5. Submit the event; this activates the job that runs the migration event.
6. Monitor the processing of the migration event. The Audit Report and the Job Information screens show the progress of the migration.

After the migration steps are completed, a version can be assigned to an object to identify and control it in the PAC environment.

12 Migration

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- Defining Migration Events 171
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- Authorizing a Migration Event 179
- Submitting a Migration Event 181
- Monitoring a Migration Event 181
- Audit Report 183

Migration is the process of transferring applications or parts of applications (objects), either online or in batch, from one location (status) to another. Three PAC entities are used for the migration process:

- Migration event
- Object list
- Audit report

As an application moves through its test plan or life-cycle, PAC uses defined procedures and controls to migrate its objects from one linked status to another. These procedures and controls are defined in the migration path and migration event.

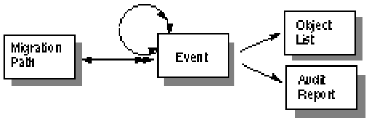
This chapter covers the following topics:

General Procedure

The procedure for migrations must be followed in sequence:

1. Define the migration event to migrate the application along an authorized migration path from one status to another.
2. Create the list of objects to be migrated.
3. Validate the object list. PAC checks the list of objects to be migrated.
4. Authorize the event; that is, grant permission to execute the migration.
5. Submit the event; this activates the job that performs the migration.
6. Monitor the processing of the migration event. The Audit Report and the Job Information screens show the progress of the migration.

Defining Migration Events



A migration event is used to execute a migration. An event can migrate any combination of Natural and foreign objects using the same event or separate events; Predict objects must use separate events. A migration event that loads Predict objects into PAC must be run before the event that migrates the application objects that use the Predict objects as subordinates. See **Migrating Predict Objects**.

An event can only be used for a single migration. Because all actions performed during a specific migration are logged in an audit report, a unique event definition is required to identify this historical information for retrieval at a later date.

It is possible to copy a used event definition to a new event; however, the audit report for the original (copied) event is not copied to the new event. It is also possible to refresh an existing event and reuse the same event definitions. If an event is refreshed, however, all audit information for the existing event is purged.

The migration event definition identifies the information needed to process and control a migration. It specifies

- the migration path (see **Defining Migration Paths**);
- the list of objects to be migrated (see **Creating the Object List**);
- the relationship of the event to be migrated with other events;
- the schedule for immediate or future processing.

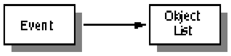
In addition, it may be possible to override some of the migration path specifications.

Scheduling the Migration

You may want to run the migration immediately, or schedule it for a later date/time after another task has been completed.

When migrating to a production status, scheduling allows you to prepare, submit, and process the event at your convenience. The objects for the migration are not implemented into the production environment until the migration is activated by the PAA administrator at the scheduled time. This minimizes outage time because part of the work will already have been completed.

Creating the Object List



The object list comprises objects selected for processing during a migration. The list may

- include one, all, or any number of the application's objects;
- contain the name of specific objects or identify ranges of objects;
- be manually created or automatically generated;

Types of Objects

PAC and PAA support both saved (source) and cataloged (compiled) objects. A saved object is a Natural, foreign or Predict object created and saved by an application programmer using a source code editor. A cataloged object is a saved object that has been compiled and contains executable code, either Natural or foreign.

Not all objects will exist in compiled form; for example, copycode, text, macros, and recordings exist only in source form. Programs also may exist in source form if the PAC dynamic source option is in use.

For foreign objects, the existence of source and compiled code is predefined by the PAC administrator for each class of object.

Object lists can include

- Predict objects only (see **Migrating Predict Objects**);
- Natural objects only;
- foreign objects only;
- both Natural and foreign objects.

Foreign Objects for the Object List

PAC provides a mechanism to migrate, version, and audit foreign objects. Predict Application Audit (PAA) tracks foreign objects that are loaded into production.

Before foreign objects can be migrated in PAC, the PAC administrator must define the foreign object datasets to PAC. Once the datasets are defined to PAC, specific datasets can be defined for an application. Thus, the objects that can be migrated are those that belong to the datasets defined for the specific application.

The supported datasets are two formats: source and load (compiled). The default dataset type is source if a dataset type is not specified. foreign objects are not compiled or recompiled when they enter the PAC environment.

The foreign objects that are supported by PAC are user-defined and can include, for example:

```
Assembler copy code
Assembler macro
C
COBOL copy code
COBOL program
JCL
```

Foreign objects are identified on the object list by the prefix 3 on the object type (for example, 3COB is a Cobol object type); this prefix is automatically assigned by PAC.

Although the Expand function is not valid for foreign objects, a Natural program can be expanded to include foreign objects that are used by that Natural program.

Refer to later sections of this documentation for detailed information about migrating foreign objects.

Objects Containing Dynamic Source Variables

Natural programs that contain dynamic source variables (that is, fields prefixed with a plus sign (+) or an ampersand (&)) are referred to as dynamic source. In most cases, programs that contain fields with an & variable must be run, not executed; that is, the program must exist in source form.

PAC requires that you add an extension S to the object type for objects that are to be designated as dynamic source when you create the object list for migrations from development or maintenance. This extension indicates to PAC that the specified object version is to be flagged and migrated as dynamic source for subsequent migrations to test or production statuses; the extension need not be specified for these migrations. Each time the object is migrated from development or maintenance, however, it must be newly flagged to ensure that the new version of the object will be migrated as dynamic source.

Since these objects may require subordinates when they are run, the subordinates (data areas, maps, copycode) must be included in the object list as well.

Note the following compile considerations for subordinates and the states that are required when objects that use these are migrated as dynamic source:

- Programs are not compiled; only the source is migrated;
- Maps are compiled and both source and cataloged forms are migrated;
- Copycode source is migrated;
- Data areas are compiled; only the cataloged form is migrated (Applymod 8 is required).

The following is an example list of objects, including subordinates, that would be supported in the source form for use with dynamic source variables:

```
MENU,PS
MAP1,MS
COPY1,CS
A*,PS
A*,MS
```

where S (the second byte of the second parameter indicating the object type) indicates that this object is to be flagged for migration as dynamic source.

Applymods

The following applymods are provided for use with dynamic source:

- Applymod 2
  Used for syntax table delivery.
- Applymod 8
  Allows all views/data areas to be unloaded during migration because data areas and views may be needed to run the dynamic source programs at execution time.

  Note: If programs are not compiled, PAC is unable to determine the subordinate usage of this object; therefore, the expand will not work.

- Applymod 19
  Forces source and cataloged objects to be migrated for all objects in the object list; however, the objects will not be treated as dynamic source and will be compiled normally.
- Applymod 31
  Used for migrating objects.

Options for Building an Object List

You can either generate or "manually" create a list of objects to be migrated.

- If you want to migrate only a few objects, you may enter the individual objects in the Object List Editor.
- If you want to migrate large numbers of objects, you may use the generation facilities. This method avoids the errors that could occur when you manually enter objects.

PAC provides different methods for generating object lists to accommodate different types of migrations or different site requirements. Applymods, user exits, and APIs are available to further customize object lists.

See **Creating and Validating a Migration List** for detailed information about building the object list for specific types of object migrations.

Manually Creating the Object List

When you create an object list "manually" in the Object List Editor, you may enter objects in different forms to accommodate the type of migration. For example, you may enter

- the specific object name (or range notation);
- the object type (or range notation);

  Note: Currently, range notation is not available for selecting foreign objects.

- an optional reference such as a status name or version number. The status name is effective because it uses the version of the object present in the particular execution environment represented by the status name.

Generating the Object List

Note: You can generate a list of foreign objects only where the origin (From) status is the Control status.

Automation of object grouping guarantees that the list of objects migrated from status to status is always a consistent, related set of objects.

You may automatically generate an object list either online or in batch:

- When you are adding a migration event online, you may generate the object list online by entering a valid value in the Generate List field of the Add Event screen.
- When you are adding a migration event in batch, you may specify a valid value for the GENTYPE option of the ADD EVENT command.

Either online or in batch, you may create the object list for an existing event by issuing the GENLIST command when you are modifying the event. GENLIST may also be used to replace or regenerate an object list for an existing migration event.

Selecting and Expanding Objects for the Object List

You may use the select options (SEL command) to add objects to the object list, either alone or in conjunction with the expand options (EXP command) to include subordinate objects that use or are used by the selected objects.

For foreign objects, only the "used by" expand option is valid. Only Natural objects can be expanded to include subordinate foreign objects that are used by that Natural object.

The SEL Command

The SEL command can be used to select

- Natural objects;
- foreign objects;
- Natural user error messages;
- rules and views to be used during the migration compile phase (of Natural objects).

If selection criteria is provided, the objects that meet the criteria are presented in a list. You may then select those objects to be included in the object list.

The EXP Command

The Expand Status option may be used to include additional objects that may be required during the compile phase.

The object list can be expanded using the Expand option, which can be invoked either manually or automatically.

The Expand option can be used to

- include subordinate objects used by the selected object at compile time;
- include referenced objects used by the selected objects at run time;
- include both subordinate and referenced objects that are used by the selected object;
- include objects that use the selected object:

Objects Used By. When the expand option (EXP command) is requested, PAC takes each entry in the object list in turn and retrieves its subcomponents (for example, views, copycode, data areas, and rules) and adds them to the object list. External referenced foreign objects that are called from a Natural program are also added to the object list.

Objects That Use. (Not valid for foreign objects) For example, if a particular copy code has been changed, you may need to recompile all objects that use the copy code to incorporate and synchronize these changes.

You may optionally reissue the EXP command so that these subcomponents are expanded in turn, the list sorted, and all duplicate objects eliminated. This recursive EXPAND can be used at execution time if Applymod 13 is active in your environment.

Note: The Expand option may also be used as an option in the migration path definition. This ensures that the subcomponents to be included in the object list are determined based on the overall PAC environment at the time the migration event is processed.

When migrating objects from development or maintenance status types, the Expand function is valid only if the cross-reference data exists for the object on the Predict file specified for the application status link. The EXP (Expand) command and special options of the SEL (Select) command use cross-reference (Xref) data from Predict for migrations from development, maintenance, and incorporation status types; for all other migrations, cross-reference data from PAC is used.

Customizing the Object List

When you have created the object list, you can use system applymods, user exits, and APIs to further customize the objects that are to be migrated.

Applymods

The PAC administrator can choose from a number of applymods to override object list defaults:

- You can suppress the auto expansion of the global data area (GDA) during migration to reduce the number of objects involved in the migration.
- You can instruct PAC to compare the versions of objects added during processing of the Expand option and update the object list with the highest version found. In cases when an object is referenced more than once, this clearly identifies the version to be migrated.
- You can expand the object list recursively. See the section The EXP Command earlier in this section.

User Exits

The PAC administrator can set up user exits to add options for building object lists:

- User Exit 10 can be used to limit the list of objects verified when PAC validates the objects to be processed for a migration event. It can also be used to perform some additional processing on the objects.
- User Exit 23 allows you to selectively suppress expansion or modify Expand option parameters for particular objects.
- User Exit 26 allows you to modify the application general default criteria for selecting objects to be archived.

Application Program Interface (APIs)

The PAC administrator can set up the Object List API in your environment so that you can directly add, purge, or display objects from the object list for a particular migration event.

Validating the Object List

Once created, an object list must be validated before a migration event can be authorized and processed.

You may choose to validate the list immediately, or later, before the event itself becomes authorized. PAC always validates the object list again at execution time to accommodate changes that may have occurred since the list was previously validated.

Depending on the type of migration, PAC performs different types of validation. The following types of questions require answers in any case:

- Does the object exist at the origin location?
- If a range of objects is specified, does at least one object in the range exist at the origin location?
- If an object type (for example, program) is specified to limit the objects in a range, does at least one object of that type in that range exist at the origin location?

If status is used as a reference, PAC verifies this at execution time, and the corresponding version number is substituted before processing continues. The status reference validation ensures that the correct version is used for event processing since the version number may have changed by that time.

How PAC Validates an Object List

PAC uses the following process to validate an object list:

- For objects being copied in from development or maintenance, PAC checks the specified Natural library (or dataset for foreign objects) to ensure that each named object exists and is the correct type.
- For objects being copied from Control, PAC checks against other objects in Control.
- For objects being copied to development or maintenance without replacement, PAC checks the destination library to ensure that the object does not already exist there.
- If a type code has not been provided for a Natural object, PAC updates the object list with the object type found on the system file (origin status).
- If the type code is not consistent with the object type, it is flagged and a warning message is returned.

Revalidation During Processing

Once the object list is validated, the event may be authorized and submitted for processing. During the initial step of the migration process, PAC again validates the object list to determine if all entries are valid.

Note: Between authorizing the event and processing the event, some time may elapse during which the status of an application and/or any of its objects may change.

Thereafter, if PAC finds an error during the processing of the event, it prints an audit message to the audit report, ignores the object, and then proceeds with processing.

Authorizing a Migration Event

An event must be authorized before it is submitted.

Event authorization is a restricted function that must be performed before an event is submitted. The list of authorizers is specified uniquely for each migration path defined to PAC and is maintained through the Modify Migration Path function.

Once authorized, a migration event is placed in a "frozen" state and cannot be modified. This helps to ensure that only the correct actions and activities take place during the migration.

A migration event, however, can be unauthorized, modified, and then authorized again. A migration event that is copied is automatically unauthorized.

Initiating the Authorization Process

If you have been designated as a migration event authorizer, you can authorize the event online, in batch, or by using the event authorization API provided by PAC if it has been set up in your environment.

- To authorize an event online, enter the AUTHORIZE command on the command line of the Migration Event Authorization screen or use the PF5 key.
- To authorize an event in batch, issue the AUTHORIZE EVENT batch command.

Only an event that is in the Pending or Validated state can be authorized. The authorization request will take a Pending event through the Validated state automatically.

If the event authorization API has been set up in your environment, ask your PAC administrator for information about invoking it.

Customizing the Migration Event Process

When authorizing a migration event, you can set system applymods, which override PAC default processing procedures.

You may override certain PAC defaults during the migration by invoking specific PAC system applymods, user exits, and APIs. See the PAC Reference documentation for detailed information.

Applymods

Applymods can be used to override certain PAC defaults during migrations. For example:

- To conserve space, you may suppress the creation of the audit report during migration (applymod 4). For example, you may only need the report listing from the batch job for verification. The disadvantage is that the suppressed report is not available for an audit review in the PAC system at a later time.
- When copying an event or performing a refresh, you can retain the job name specified in the source event rather than use the job name specified in the migration path. The information is rippled forward and the copied event is run using the same job (applymod 20).

User Exits

User exits can be used to

- generate and verify migration event names;
- add controls at the initialization of the event before migration processing;
- implement audits and security;
- prevent the termination of the migration event after the compile processing step, even if one or more objects do not compile successfully;
- permit the migration unload/load jobs to end normally in spite of certain error conditions being detected.

Application Program Interface (APIs)

The PAC Express APIs provide a useful base for creating a custom system to process migration events quickly and easily. The following APIs are available for migration events:

- The Migration Event API allows you to add, modify, submit, purge or display information about a particular migration event.
- The Object List API allows you to add, purge, or display (retrieve) object list objects for a particular migration event.
- The Text Objects API allows you to display the audit report for a particular migration event.

Submitting a Migration Event

Once a migration event has been defined, details of the event such as the object list must be validated (or optionally overridden). Before a migration event can be submitted, it must have been authorized by an authorizer designated on the migration path.

Based on the options specified at authorization time, the event is submitted for processing either in batch using the remote job entry (RJE) facility, or online in your current Natural session. If an event is submitted online and a job (JCL) has been specified for the migration path, the job is ignored.

You can submit migration events online by entering the SUBMIT direct command on the command line of the Migration Event Submission screen or by using the PF key assigned to confirm submission (PF10).

If the event submission API has been set up in your environment, ask your PAC administrator for information about invoking it. For more information, refer to the section Customizing Migration Processing later in this section.

Monitoring a Migration Event

Once a migration event has been started, the application is locked and no other event for this application can be processed until the first migration event has been completed and unlocked. This restriction ensures that multiple events do not run concurrently, which could cause inconsistent results.

If migration event processing ends abnormally, you have the option to either rerun the event immediately, or to back it out, modify it, and then restart it.

If you decide to back out the incomplete event, any changes made are reversed and the migration event itself is updated unless the event has reached a point of no return (Step 6).

Once processing of a migration event has been completed or backed out, the event may not be processed again or modified unless the REFRESH command is used.

The REFRESH command makes the event reusable by removing all audit information and resetting totals set during its processing.

Locking

The PAC locking mechanism has been enhanced for better data consistency within the migration event process. during migration events into PAC, either from a development or maintenance status it is possible only to execute one migration event at a time, regardless of whether the applications involved are using unique (PRD) applications.

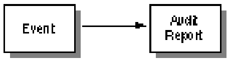
During migrations within or out of PAC it is possible to execute migration events in parallel regardless of whether they use a common (PRD) application or a unique (PRD) application.

This has been changed due to the new way that Predict objects are handled. All Predict objects are now handled within the PCF file and as there is only one PCF file per system this mechanism of locking is essential.

Customized Migration Processing

Migration event processing can be customized using PAC system applymods, user exits, and APIs.

Audit Report



An audit report is a log of the actions performed during a specific migration. It includes the audit, warning, and caution messages needed to verify the results of a migration. The audit report is typically used for problem determination if a migration should fail.

For both online and batch migration events, PAC tracks all migration activities and stores them in an audit report, which is available for review during or after the migration process. In addition, totals of objects processed may be viewed in the job totals.

During processing, PAC may issue a number of warnings and cautions. You therefore need to verify in the audit report that the correct actions have been performed.

13 Migration Paths

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- Selecting a Migration Path 193
- Displaying Migration Path Information 196
- Purging a Migration Path 198

This section explains the steps required to define migration paths.

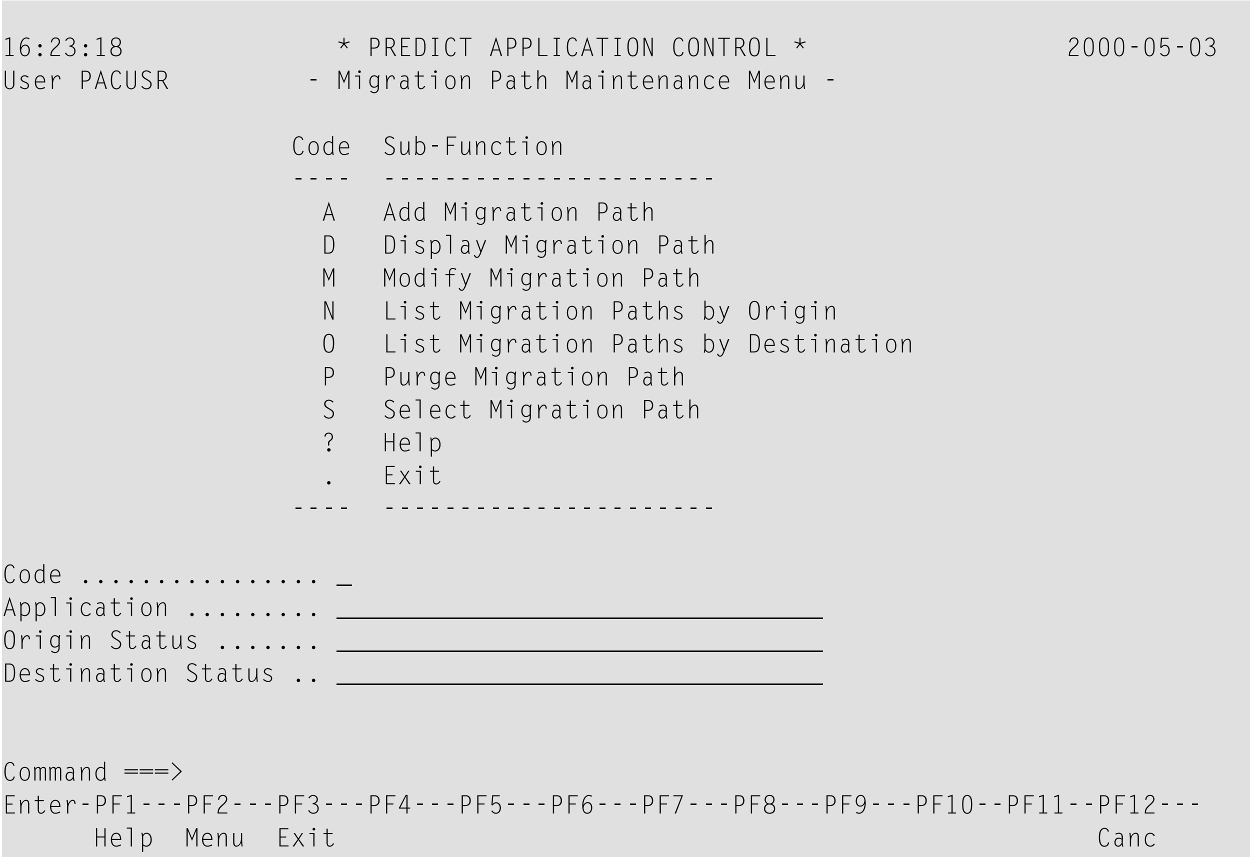
The migration path is the route between two statuses that an application is permitted to follow during its planned life-cycle. Each status specified in a migration path must have been previously defined to PAC and linked to the application. Migration events may be defined only for two statuses that have been paired in a migration path.

Migration paths specify the conditions of application object movement between statuses:

- the origin and destination application statuses;
- the person(s) or group(s) who may authorize the events that use the migration path;
- whether the event using the migration path is run online or in batch, and whether a work file is to be used during migration;
- the names of the jobs to be submitted by a batch event;
- whether the listed objects are to be moved or copied to the destination status when the event is processed; or, in the case of development, maintenance, and incorporation status types, whether the objects are to be included from a previously created work file;
- whether and how the listed objects are to be expanded before the migration (the Expand option to be used).

To access the PAC migration path maintenance and reporting sub-functions, enter Code T (Migration Paths) on the PAC Main Menu.

Depending on your user profile, either the Migration Path Maintenance Menu or the Migration Path Reporting Menu appears. The Migration Path Maintenance Menu, which combines the maintenance and reporting sub-functions, is used in discussions throughout this section.



```
16:23:18             * PREDICT APPLICATION CONTROL *                 2000-05-03
User PACUSR         - Migration Path Maintenance Menu -

                   Code  Sub-Function
                   ----  ---------------------
                     A   Add Migration Path
                     D   Display Migration Path
                     M   Modify Migration Path
                     N   List Migration Paths by Origin
                     O   List Migration Paths by Destination
                     P   Purge Migration Path
                     S   Select Migration Path
                     ?   Help
                     .   Exit
                   ----  ---------------------

Code ............... _
Application ........ ________________________________
Origin Status ...... ________________________________
Destination Status .. ________________________________


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

On this menu, you can enter the (existing) application for which the migration path is to be defined as well as existing statuses (origin and destination) that will be linked by the migration path. You may use the full name, an alias, or range notation.

- If the Origin Status is left blank or a range is specified, and the Destination Status is specified, the Migration Path Destination screen is displayed.
- If the Destination Status is left blank or a range is specified, and the Origin Status is specified, the Migration Path Origin screen is displayed.

Both of these screens display a list of the origin/destination status links that have already been defined for the status you specified.

Note: All of the sub-functions listed on this screen, except Add, may be selected for processing directly from the Migration Path Selection List that is accessed using the Select Migration Path sub-function.

This chapter covers the following topics:

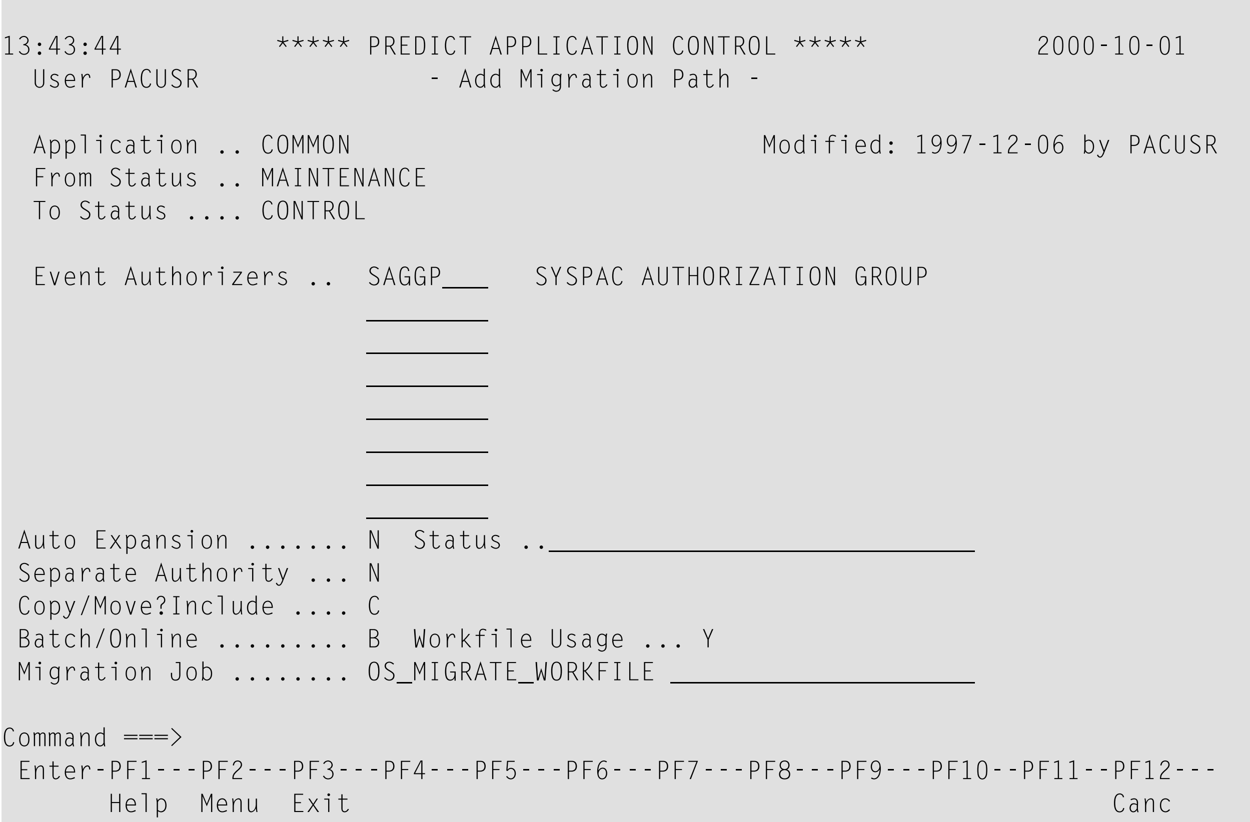
Adding (Defining) a Migration Path and Authorization

You may add a migration path from one of three screens:

- Add Migration Path
- Migration Path Destination
- Migration Path Origin

Methods for Adding a Migration Path

You can define a migration path using either the "Add Migration Path" (A) function on the migration path main menu, or using the Migration Path Destination/Origin functions.



```
13:43:44          ***** PREDICT APPLICATION CONTROL *****           2000-10-01
  User PACUSR               - Add Migration Path -

  Application .. COMMON                           Modified: 1997-12-06 by PACUSR
  From Status .. MAINTENANCE
  To Status .... CONTROL

  Event Authorizers ..  SAGGP___   SYSPAC AUTHORIZATION GROUP
                        ________
                        ________
                        ________
                        ________
                        ________
                        ________
                        ________
 Auto Expansion ....... N  Status ..____________________________
 Separate Authority ... N
 Copy/Move?Include .... C
 Batch/Online ......... B  Workfile Usage ... Y
 Migration Job ........ OS_MIGRATE_WORKFILE ____________________

Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                  Canc
```

Using the Add Migration Path Screen

1. To access the Add Migration Path screen, enter A (Add Migration Path), the application name, and the origin and destination statuses on the Migration Path Maintenance Menu.
2. To specify the migration event authorizers, enter in the Event Authorizers field the IDs of the users or groups who are allowed to authorize events for this migration path.

   The user names are filled in automatically from the PAC profile or Natural Security definition.

   You may use range notation to specify the user IDs as follows:

Notation	**Authorizers**
@*	Any user ID.
@user*	All user IDs beginning with "user".
@user>	All user IDs greater than or equal to "user".
@user<	All user IDs less than or equal to "user".

   Note: The @ character should be replaced by the current job substitution character defined in the PAC administrator profile defaults.

3. To specify automatic expansion for the object list, enter one of the following options in the Auto Expansion field:

Option	**Description**
N	(Default) No auto-expansion; PAC migrates only the objects listed.
C	Map auto expansion Rule auto expansion View/DDM auto expansion Copy code auto expansion Data area auto expansion Object auto expansion (Subordinate Objects⊚Compile Time) Include the objects listed and all subordinate objects (data areas, copycode, views, rules, or maps).
R	(Referenced Objects⊚Runtime) Include the objects listed and all referenced objects.
E	(Subordinate and Referenced Objects) Include the objects listed, all subordinate objects, and all referenced objects.
U	Natural object auto expansion (Used by Objects) Include the objects listed and all Natural objects that reference that (Natural or foreign) object.

   Refer to **Creating and Validating an Object List** for more information about expanding object lists.

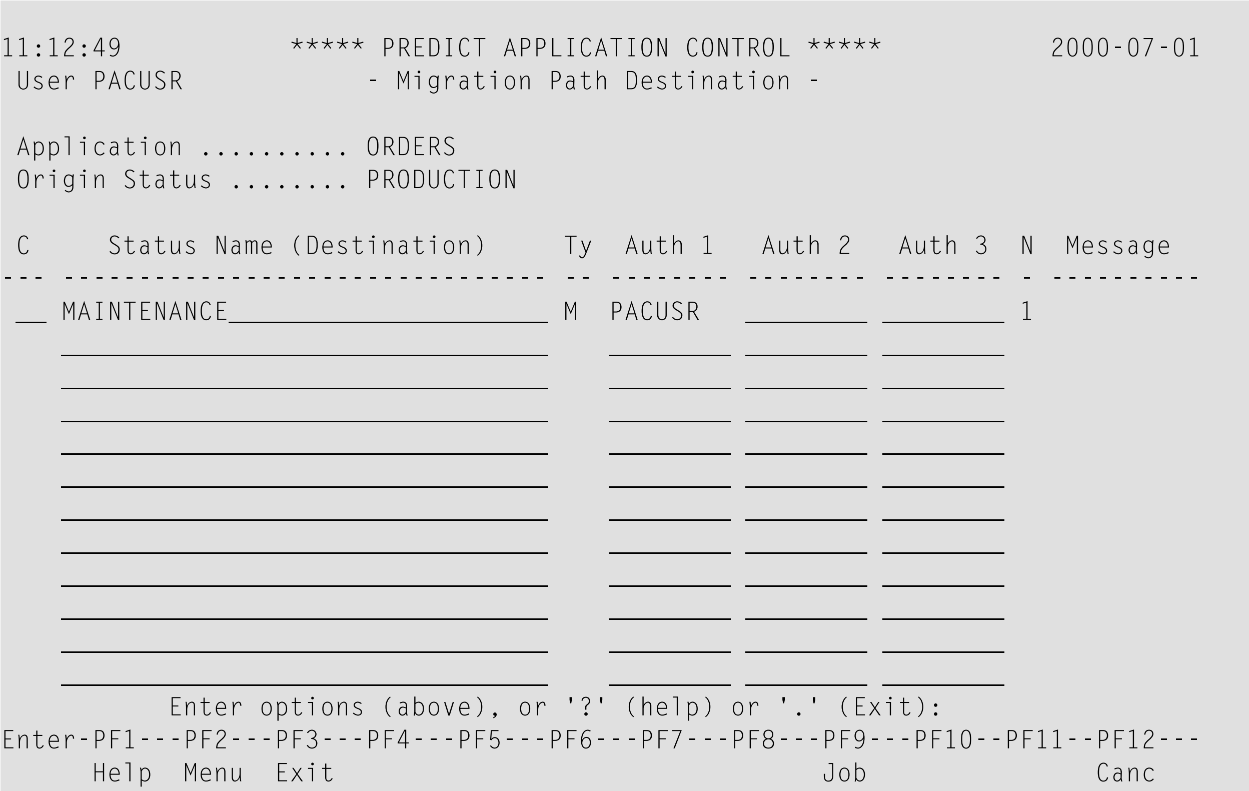
4. (Optional) To specify a location for the subordinate objects at compile time, specify a status (Expand status) in the Status field.
5. Indicate whether separate authority is required by accepting the default N (no) in the Separate Authority field if the user who creates a migration event may also authorize it, or overtype the default with Y (yes) if someone other than the creator of an event must authorize it.
6. In the Copy/Move/Include field, enter the following:

Option	Description
C	(Copy, the default) if objects are to be copied, but also remain in the source location.
M	(Move) if objects are to be moved from the source location with no copy remaining in the source location.
I	(Include) if objects from a previously created work file are to be included.

7. In the Batch/Online field, specify whether the events that use this migration path are to be run in batch (B, the default) or online (O).
8. Indicate whether a work file is to be used by accepting the default N (no) in the Workfile Usage field, or overriping it with Y (yes) if a work file is to be used during migrations that use this migration path.
9. In the Migration Job field, specify the job that is to be used to process migration events that use this migration path.
10. Press ENTER to add the migration path and return to the Migration Path Maintenance Menu.

Using the Migration Path Destination / Origin Screens

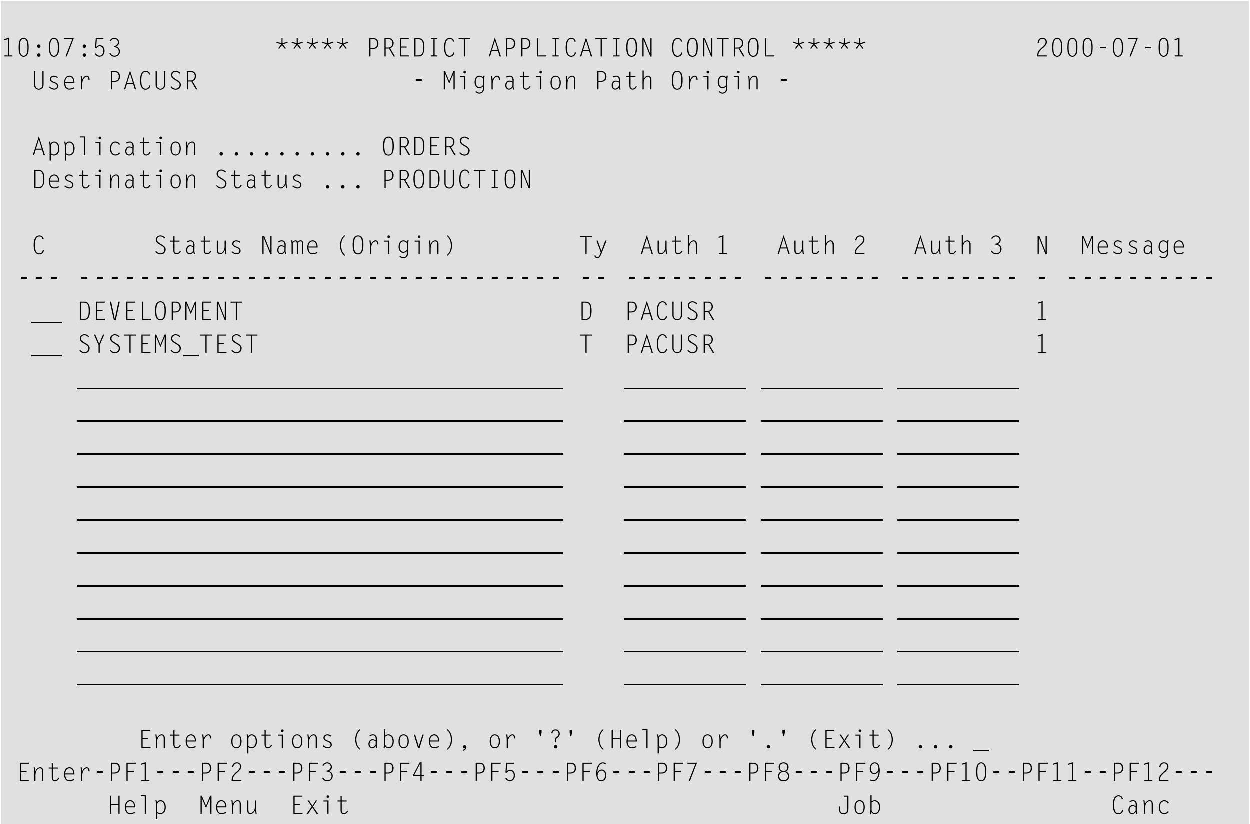
To add a migration path from the Migration Path Destination screen, either access the screen from the Add Application Status Link screen using Additional Options or from the Migration Path Maintenance Menu by leaving the Destination Status field blank.



```
11:12:49           ***** PREDICT APPLICATION CONTROL *****           2000-07-01
 User PACUSR            - Migration Path Destination -

 Application .......... ORDERS
 Origin Status ........ PRODUCTION

 C     Status Name (Destination)     Ty  Auth 1   Auth 2   Auth 3  N  Message
--- -------------------------------- -- -------- -------- -------- - ----------
 __ MAINTENANCE_____________________ M  PACUSR   ________ ________ 1
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
    ________________________________    ________ ________ ________
           Enter options (above), or '?' (help) or '.' (Exit):
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                              Job                 Canc
```

The Migration Path Destination screen identifies the existing paths defined for the specified application in the specified origin status. On this example screen, the only defined path for the application ORDERS is from production to maintenance.

To add a migration path from the Migration Path Origin screen, either access the screen from the Add Application Status Link screen using Additional Options or from the Migration Path Maintenance Menu by leaving the Origin Status field blank.



```
10:07:53          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
  User PACUSR              - Migration Path Origin -

  Application .......... ORDERS
  Destination Status ... PRODUCTION

  C       Status Name (Origin)        Ty  Auth 1   Auth 2   Auth 3  N  Message
 --- -------------------------------- -- -------- -------- -------- - ----------
  __ DEVELOPMENT                      D  PACUSR                     1
  __ SYSTEMS_TEST                     T  PACUSR                     1
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________
     ________________________________    ________ ________ ________

         Enter options (above), or '?' (Help) or '.' (Exit) ... _
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                Job               Canc
```

The Migration Path Origin screen identifies the existing paths defined for the specified application in the specified destination status. In the above example, the defined migration paths for the application ORDERS are development to production and systems test to production.

Previously defined migration paths displayed on the Migration Path Destination / Origin screens may be modified/displayed by entering the two-character code MO (Modify Path Definition) or DI (Display Link Definition), respectively, in the "C" column adjacent to the path. These codes invoke the Modify/Display Migration Path screen, which is similar to the Add Migration Path screen. Refer to **Add (Define) a Migration Path and Authorization** for more information.

Refer to **Access Additional Sub-functions for Existing Migration Paths** for information about sub-functions available for editing existing paths.

Step 1. Specify the Destination / Origin Status and Migration Event Authorizers

On the Migration Path Destination / Origin screen, enter the following information:

Field Name	**Enter the . . .**
Status Name (Destination)	destination status on a blank line.
Status Name (Origin)	origin status on a blank line.
Auth 1 / Auth 2 / Auth 3	user ID or group ID of those users who may authorize the migration event.

You may add additional authorizers on the Modify Migration Path screen. Refer to **Access Additional Sub-functions for Existing Migration Paths** for more information.

Step 2. Specify the Migration Job

1. Press PF9 (Job) to display the Job column.
2. Enter the name of the job that is to be submitted to process the event.
3. Press PF9 (Auth) to return to the previous screen.

Step 3. Add the Migration Path

Press ENTER to add the migration path and return to the previous screen.

The following attributes must be specified on the Modify Migration Path screen when you are defining a migration path on a screen other than the Add Migration Path screen:

- Auto Expansion
- Separate Authority
- Copy/Move/Include objects
- Batch/Online
- Workfile Usage

Modifying/Displaying a Migration Path

PAC allows you to update or display existing (defined) migration paths by modifying/displaying

- an individual migration path using the Modify sub-function on the Migration Path Maintenance Menu;
- several migration paths at a time using the SCANPATH utility.

Modifying/Displaying an Individual Migration Path

You may modify or display an individual migration path definition on the Modify Migration Path or Display Migration Path screens, which are accessed in the following ways:

- On the Migration Path Maintenance Menu, enter Code M (Modify Migration Path) or D (Display Migration Path), the application, and the origin and destination statuses of an existing path in the relevant fields.
- On the Migration Path Destination or Origin screen, select the path you wish to modify/display by entering the two-character code MO (Modify Path Definition) or DI (Display Link Definition) in the "C" column.

In both cases, the Modify/Display Migration Path screen appears. The screen is similar to the Add Migration Path screen. Refer to **Add (Define) a Migration Path and Authorization** for more information.

Updating Multiple Migration Paths

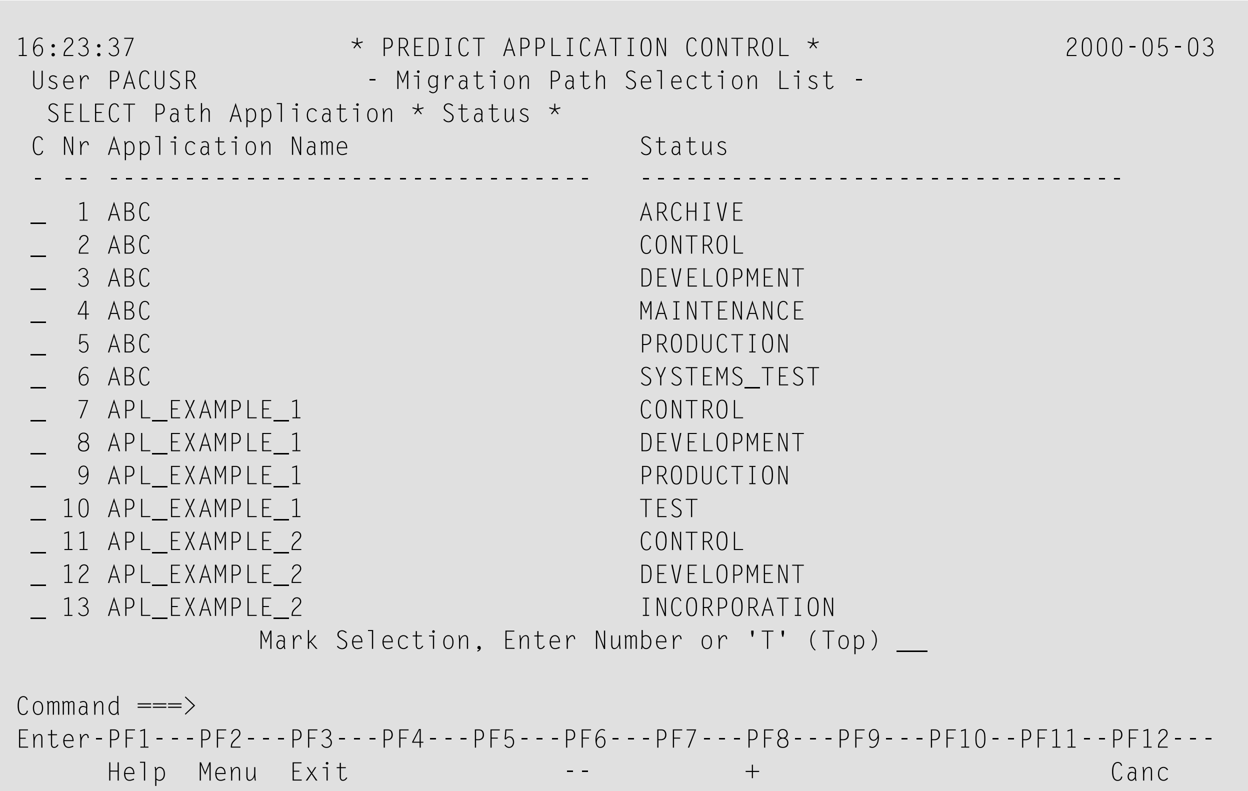
The SCANPATH utility allows you to modify (update) the defaults of several migration paths at a time. For migration paths that satisfy your selection criteria, you can

- modify the default values such as execution mode (batch/online), work file use, and copy/move/include objects;
- scan for paths that use a particular job to process migration events and (optionally) update/replace that job for all paths that use it.

Refer to the PAC Reference documentation for more information.

Selecting a Migration Path

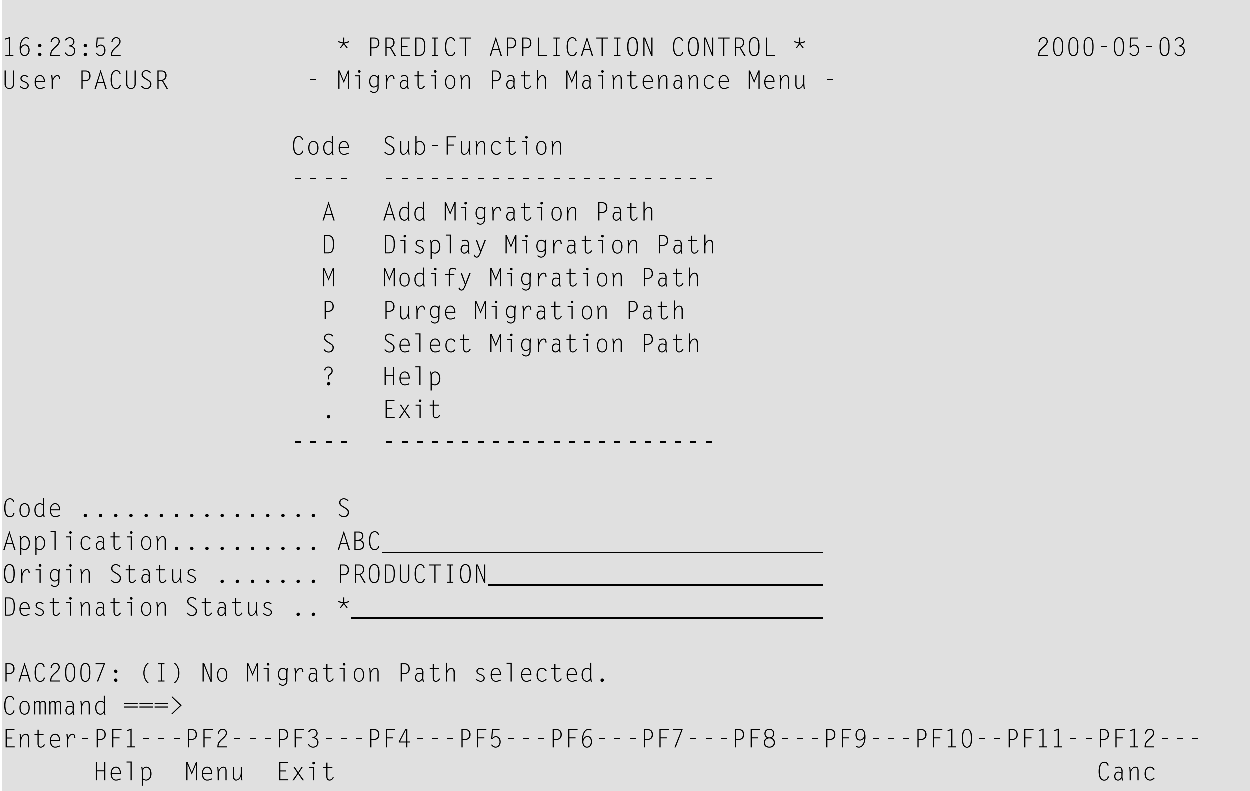
To access a selection list of existing migration paths, enter Code S (Select Migration Path) on the Migration Path Maintenance Menu.



```
16:23:37              * PREDICT APPLICATION CONTROL *                 2000-05-03
 User PACUSR           - Migration Path Selection List -
  SELECT Path Application * Status *
 C Nr Application Name                   Status
 - -- --------------------------------   --------------------------------
 _  1 ABC                                ARCHIVE
 _  2 ABC                                CONTROL
 _  3 ABC                                DEVELOPMENT
 _  4 ABC                                MAINTENANCE
 _  5 ABC                                PRODUCTION
 _  6 ABC                                SYSTEMS_TEST
 _  7 APL_EXAMPLE_1                      CONTROL
 _  8 APL_EXAMPLE_1                      DEVELOPMENT
 _  9 APL_EXAMPLE_1                      PRODUCTION
 _ 10 APL_EXAMPLE_1                      TEST
 _ 11 APL_EXAMPLE_2                      CONTROL
 _ 12 APL_EXAMPLE_2                      DEVELOPMENT
 _ 13 APL_EXAMPLE_2                      INCORPORATION
                Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

If you mark the listed application/status with the cursor or enter an X or an S in the "C" column, or if you enter the application/status number (from the "Nr" column) in the Mark Selection field..., you are returned to the Migration Path Maintenance Menu where the specified application and status are displayed in the Application and Origin Status fields, respectively.

Note: If you accessed the Migration Path Selection List screen using Code S (Select Migration Path) or the SELECT direct command, you may D (Display), M (Modify), P (Purge), or S (Select) one or more of the listed applications/status combinations directly by entering the sub-function code in the "C" column.



```
16:23:52              * PREDICT APPLICATION CONTROL *              2000-05-03
User PACUSR          - Migration Path Maintenance Menu -

                   Code  Sub-Function
                   ----  ----------------------
                     A   Add Migration Path
                     D   Display Migration Path
                     M   Modify Migration Path
                     P   Purge Migration Path
                     S   Select Migration Path
                     ?   Help
                     .   Exit
                   ----  ----------------------

Code ................ S
Application.......... ABC______________________________
Origin Status ....... PRODUCTION_______________________
Destination Status .. *________________________________

PAC2007: (I) No Migration Path selected.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

If you then press ENTER, the Migration Path Destination screen appears allowing you to complete your selection of an existing migration path by choosing the destination status.

Accessing Additional Sub-Functions for Existing Migration Paths

To display and edit an existing migration path displayed on the Migration Path Destination screen or the Migration Path Origin screen, mark the desired status in the "C" column with a valid two-character code.

A list of valid codes is available by accessing Help or by marking the desired status with an asterisk (*).

If you access the Migration Path Destination / Origin screens using the Display (D) sub-function, maintenance is not allowed and you may only display information about existing paths.

If you use the Modify (M) sub-function to access the Migration Path Destination / Origin screens, the following sub-functions are available:

Code	**Sub-Function**
MO	Modify Link Definition
PU	Purge Link Definition
AP	Display Application Definition
ST	Display Status Definition
LI	Display Link Definition

Code	Sub-Function
PO	Display Migration Path Origin
PD	Display Migration Path Destination

Displaying Migration Path Information

You may display information about the migration paths defined for an application on the Migration Path Destination / Origin screen by entering Code N (Migration Path Destination) or Code O (Migration Path Origin) and the application name on the Migration Path Maintenance Menu.

Using the Destination Screen

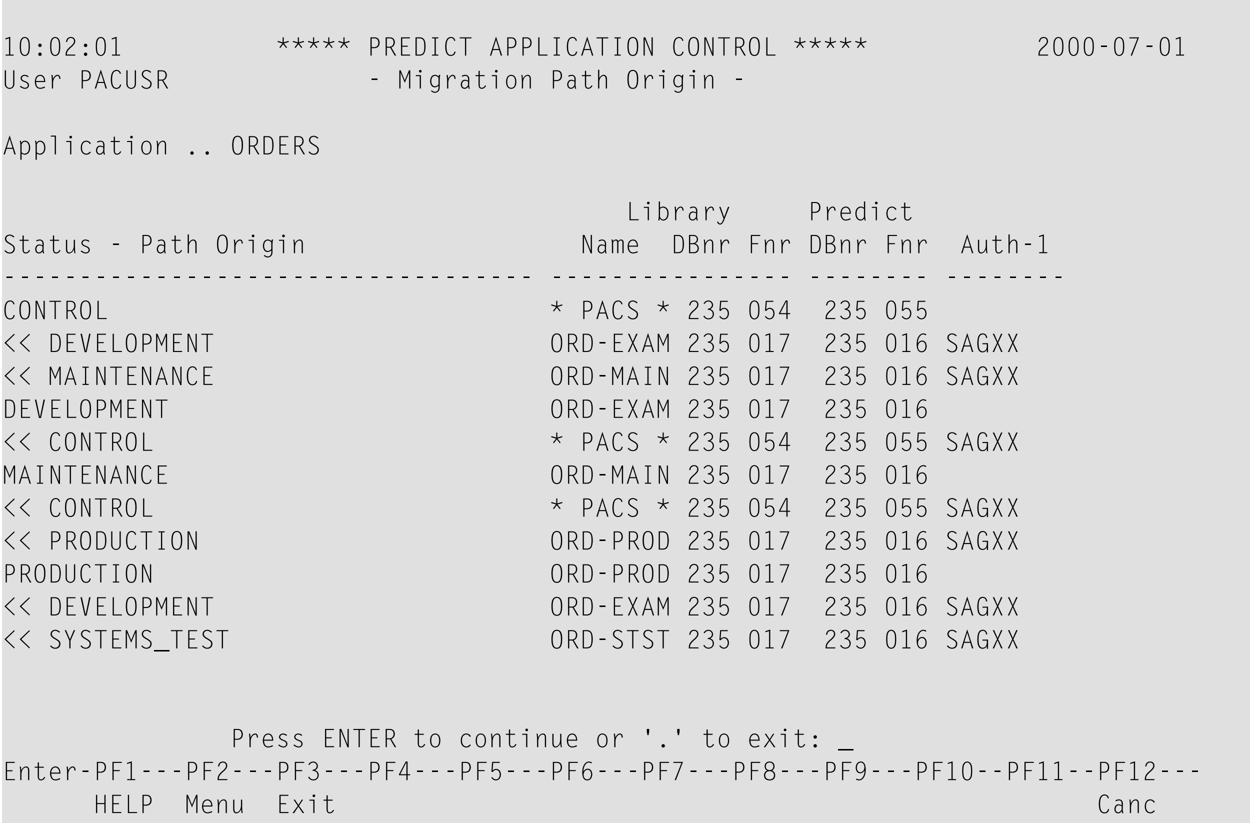
The Migration Path Destination screen appears if you entered Code N:

```
10:01:34          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR           - Migration Path Destination -

Application .. ORDERS
                                          Library     Predict
Status - Path Destination             Name  DBnr Fnr DBnr Fnr  Auth-1
----------------------------------- ---------------- -------- --------
CONTROL                             * PACS * 235 054  235 055
>> DEVELOPMENT                      ORD-EXAM 235 017  235 016 SAGXX
>> MAINTENANCE                      ORD-MAIN 235 017  235 016 SAGXX
>> USER_TEST                        ORD-UTST 235 017  235 016 SAGXX
DEVELOPMENT                         ORD-EXAM 235 017  235 016
>> CONTROL                          * PACS * 235 054  235 055 SAGXX
>> PRODUCTION                       ORD-PROD 235 017  235 016 SAGXX
>> USER_TEST                        ORD-UTST 235 017  235 016 SAGXX
MAINTENANCE                         ORD-MAIN 235 017  235 016
>> CONTROL                          * PACS * 235 054  235 055 SAGXX
PRODUCTION                          ORD-PROD 235 017  235 016
>> MAINTENANCE                      ORD-MAIN 235 017  235 016 SAGXX


                Press ENTER to continue or '.' to exit: _
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      HELP  Menu  Exit                                                  Canc
```

This screen provides a global view of the existing migration paths of the application. In essence, this screen answers the question "For each status defined, where may the objects be migrated?"

Using the Origin Screen

The Migration Path Origin screen appears if you entered Code O:



```
10:02:01          ***** PREDICT APPLICATION CONTROL *****          2000-07-01
User PACUSR             - Migration Path Origin -

Application .. ORDERS

                                         Library     Predict
Status - Path Origin                  Name  DBnr Fnr DBnr Fnr  Auth-1
----------------------------------- ---------------- -------- --------
CONTROL                             * PACS * 235 054  235 055
<< DEVELOPMENT                      ORD-EXAM 235 017  235 016 SAGXX
<< MAINTENANCE                      ORD-MAIN 235 017  235 016 SAGXX
DEVELOPMENT                         ORD-EXAM 235 017  235 016
<< CONTROL                          * PACS * 235 054  235 055 SAGXX
MAINTENANCE                         ORD-MAIN 235 017  235 016
<< CONTROL                          * PACS * 235 054  235 055 SAGXX
<< PRODUCTION                       ORD-PROD 235 017  235 016 SAGXX
PRODUCTION                          ORD-PROD 235 017  235 016
<< DEVELOPMENT                      ORD-EXAM 235 017  235 016 SAGXX
<< SYSTEMS_TEST                     ORD-STST 235 017  235 016 SAGXX


               Press ENTER to continue or '.' to exit: _
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      HELP  Menu  Exit                                                  Canc
```

This screen shows where an application in a particular status originated. In essence, this screen answers the question "For each status defined, from which status may the objects be migrated?"

Refreshing the Screen

To refresh the screen and display more information, press ENTER.

To return to the Migration Path Maintenance Menu, enter a period (.) on the command line, and press ENTER.

Interpreting the Displayed Information

The following table describes attributes of the Migration Path Origin and Destination screens:

Attribute	Description
Application	The application specified.
Status - Path Destination	The current statuses in which the application is held (for example, DEVELOPMENT), and the statuses to which the application may be migrated (for example, >>PRODUCTION).
Status - Path Origin	The current statuses in which the application is held (for example, MAINTENANCE), and the statuses from which the application may be migrated (<<PRODUCTION, for example).
Library Name / DBnr / Fnr	The library name, the database ID, and the file number where each application status is stored.
Predict DBnr / Fnr	The Predict database ID and file number where the Predict cross-reference data for each application status is stored.
Auth-1	The ID of the first user on a list of users who may authorize the migration of the application from one status to another. The complete list of authorizers may be viewed on the Migration Path definition screen that is accessed using the Display Migration Path sub-function.

Purging a Migration Path

To purge a migration path, enter Code P (Purge Migration Path), the application, and the origin and destination statuses that identify the migration path on the Migration Path Maintenance Menu.

The Purge Confirmation window appears displaying the migration path (From status / To status) that will be deleted for the specified application.

14 Migration Events

- Migration Path Prerequisite 200
- Accessing Migration Event Sub-Functions 200
- Direct Commands for Migration Events 203
- Adding (Defining) a Migration Event 204
- Selecting a Migration Event 219
- Displaying a Migration Event 220
- Modifying a Migration Event 223
- Copying a Migration Event 223
- Purging a Migration Event 225
- Trying a Migration Event 225

A migration event is first defined and then authorized and submitted. The migration event definition identifies the set of application objects (the migration list) that will be migrated from one status to another.

A migration event can be defined either online or in batch. It may also be defined using an Application Program Interface (API) call. Refer to the PAC Reference documentation for information about batch commands and APIs.

Migration Path Prerequisite

A migration event is valid for a specific migration path.

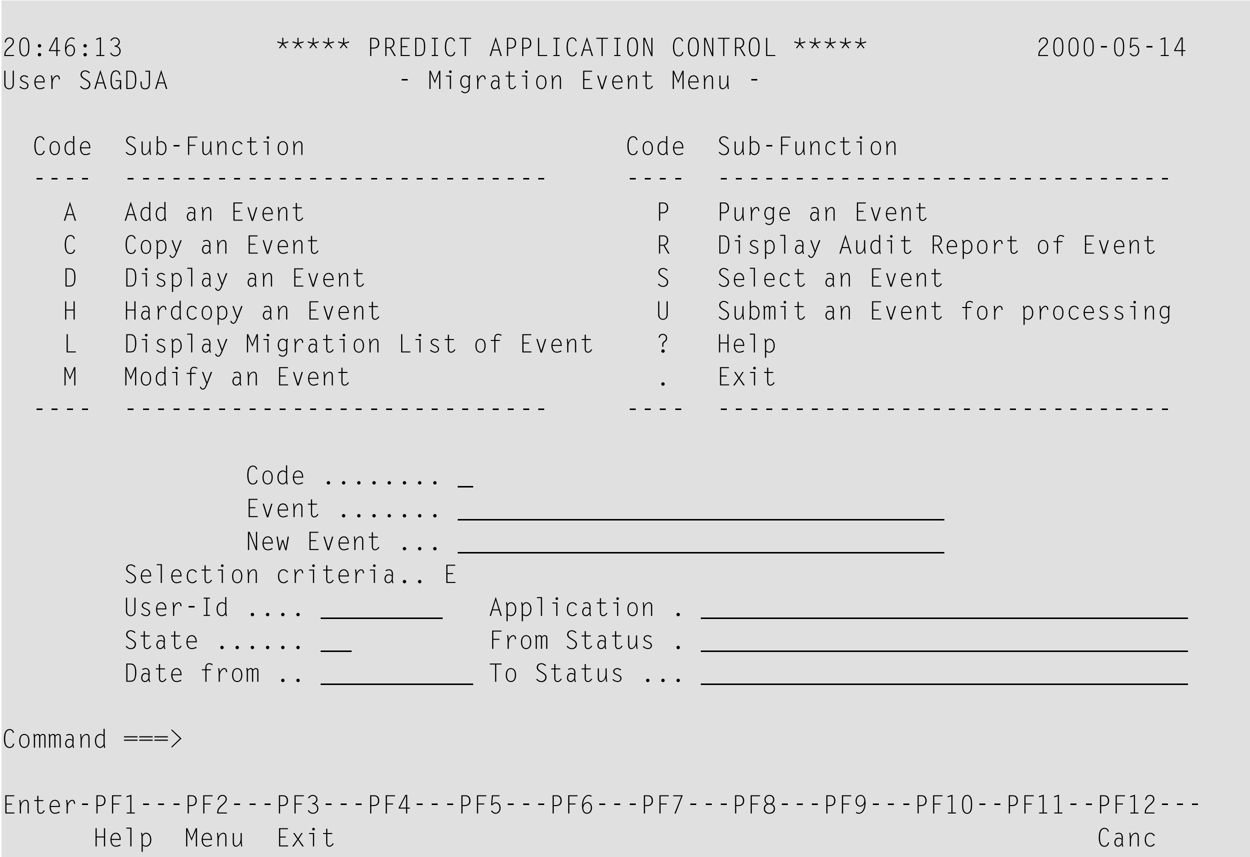
Before a migration event can be defined, the migration path for the application must be defined. The origin status and the destination status specified in the migration event definition are checked against the defined paths to verify that the migration is valid.

Software AG recommends that:

- The migration path definition should also specify the list of users permitted to authorize the event. Refer to **Migration Paths** for more information.
- The job control (JCL/JCS) used to process a batch migration event also be defined. Refer to **Appendix B** for more information on jobs included with PAC.

Accessing Migration Event Sub-Functions

If you are authorized to maintain migration events, you can access the Migration Event Menu directly (Code E, Migration Events) from the PAC Main Menu.



```
20:46:13          ***** PREDICT APPLICATION CONTROL *****           2000-05-14
User SAGDJA                   - Migration Event Menu -

  Code  Sub-Function                     Code  Sub-Function
  ----  ----------------------------     ----  ------------------------------
    A   Add an Event                       P   Purge an Event
    C   Copy an Event                      R   Display Audit Report of Event
    D   Display an Event                   S   Select an Event
    H   Hardcopy an Event                  U   Submit an Event for processing
    L   Display Migration List of Event    ?   Help
    M   Modify an Event                    .   Exit
  ----  ----------------------------     ----  ------------------------------

                Code ........ _
                Event ....... ________________________________
                New Event ... ________________________________
        Selection criteria.. E
        User-Id .... ________   Application . ________________________________
        State ...... __         From Status . ________________________________
        Date from .. __________ To Status ... ________________________________

Command ===>

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

Note: All sub-functions on this screen except Add an Event and Copy an Event may be invoked from the Selection List that is accessed using the S (Select an Event) sub-function.

Selection, Date From, and UserID Fields

The Selection field is used with the Select sub-function to identify the class of events to be selected. Valid classes include:

Code	Description
A	Event(s) for the specified application. Events are listed alphabetically by application name.
D	Event(s) that were created/modified on or after the specified `Date From'.
E	Specified Event (default). If no event is specified, a selection list displays all events alphabetically.
S	Event(s) in the specified state. If no state is specified, all events are displayed on the selection list in the processing sequence (see **State Field**).
U	Event(s) created by the specified user.

Also used with the Select sub-function

- the Date From field specifies the starting (Event creation) date for a list of events.
- the UserID field specifies the user (Event creator) whose events are to be listed.

Event and New Event Fields

The Event field names an existing migration event or an event being added. You may enter an event name or range notation. The New Event field names an existing migration event that is being copied to create a new event.

Refer to **Step 1 Specifying the Migration Event Name** for specific information about entering a value in these fields.

Application, From Status, and To Status Fields

You can optionally enter the name of an existing application to which the migration event applies and the names of origin and destination statuses to identify the previously defined migration path of the migration event. Refer to **Step 2 Specifying the Application to be migrated** and **Step 3 Specifying the Origin and Destination Status** for specific information about entering values in these fields.

State Field

The current processing state of a migration event. Valid states (listed in processing sequence) include:

State	Description
New	A new migration event is being created.
Pending	Migration list not created and / or validated.
Validated	Migration list successfully created and verified. The event is ready to be authorized and submitted.
Authorized	Event can no longer be updated and can be submitted for processing unless disallowed by the schedule date.
Submitted	Event submitted but processing has not yet started.
Started	Event submitted and processing started but not completed. The application is locked.
Completed	Event submitted and processed. The application is unlocked.
Unloaded	(Control to Archive only). Objects unloaded from PAC to archive file.
Backed Out	Event submitted and processing started but not completed. The application is released (unlocked); all processing is reversed.

Reporting Sub-Functions

The reporting sub-functions (D, L, R, S) retrieve information about migration events including

- the movement of object versions from one status to another status.
- an audit report of migration activities (Audit Report of Event). Audit reports provide information about the status of migration events and the validity (occurrences and actions performed) of PAC migrations.
- migration totals for classes of objects (Natural or foreign objects and errors).
- a hardcopy report of a migration event.

Direct Commands for Migration Events

The following direct commands can be used on the specified migration event screens:

Command	Screen	Description
AUTHORIZE	Add, Copy, Modify	To authorize the current event. Refer to **Authorizing and Submitting a Migration Event** for more information.
ARCHIVE	Display	Displays an archive event. Available only for events with Archive as the destination status.
GENLIST	Add, Copy, Modify	Generates a migration list. If this command is reissued, the generated list is automatically replaced with a newly generated list.
REFRESH	Display	To refresh the current event. The current event will be set to a Pending state; the following information will be removed: audit report, authorization, job information, and scheduled date. The event can be reused.
REQUEST	Display	Displays a list of all migration events using the maintenance request assigned to the current event.
SUBMIT	Submit	To submit the current event for processing. This can be used where (Sub) is not available. Refer to **Authorizing and Submitting a Migration Event** for more information.

Refer to the PAC Reference documentation for more information about commands.

Adding (Defining) a Migration Event

Information required for processing a migration event includes the

- environment in which the objects currently exist, and the new environment into which they are to be migrated;
- list of objects to be migrated;
- externally created work file from which objects are to be included;
- date and time when the migration is to take place; whether or not there is a schedule if the destination status is a production status type;
- (optional) maintenance request assigned for the processing of the migration event.

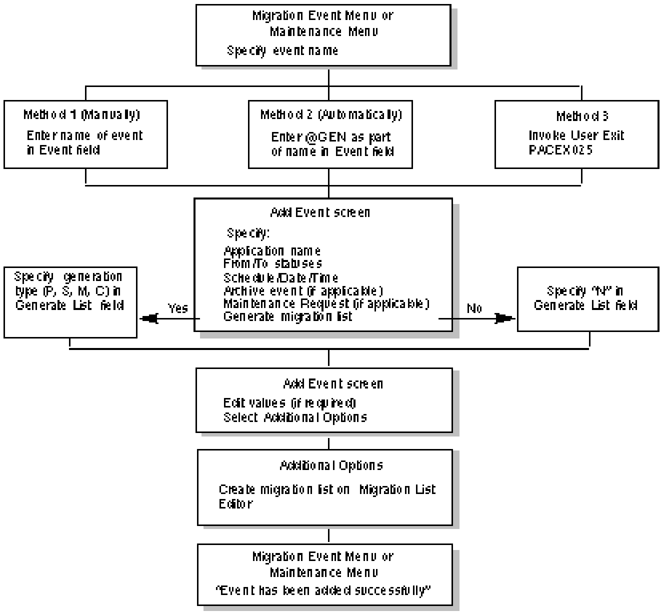
Once a migration event has been processed, it may not be processed again, or modified. However, the current migration event may be refreshed (REFRESH command), in which case it is set to the Pending state and can be used again.

You may add (define) a migration event online by performing the steps outlined in the following overview and diagram; or you may add a migration event in batch. For detailed information about adding an event in batch, refer to the PAC Reference documentation.

Overview of Steps for Adding a Migration Event

1. Specify the migration event name.
2. Specify the application to be migrated.
3. Specify the origin and destination status.
4. Specify the schedule (To status of production); and date/time for the migration (optional).
5. Optionally include notes concerning the migration event.
6. Specify an archive event, if applicable.
7. Specify a maintenance request, if applicable.
8. Indicate how the migration list is to be created.
9. Edit the Add Event screen, if applicable.
10. Indicate when to validate the migration list.
11. Access the migration list editor.
12. Add the migration event.
13. Authorize the successfully created migration event (optional at this time).

The following diagram shows the process for adding a migration event:


Migration Event Menu or
Maintenance Menu
Specify event name
Method 1 (Manually)
Enter name of event in Event field
Method 2 (Automatically)
Enter @GEN as part of name in Event field
Method 3
Invoke User Exit PACEX025
Add Event screen
Specify:
Application name
From/To statuses
Schedule/Date/Time
Archive event (if applicable)
Maintenance Request (if applicable)
Generate migration list
Yes
Specify generation type (P, S, M, C) in Generate List field
No
Specify "N" in Generate List field
Add Event screen
Edit values (if required)
Select Additional Options
Additional Options
Create migration list on Migration List Editor
Migration Event Menu or
Maintenance Menu
"Event has been added successfully"

Step 1. Specifying the Migration Event Name

On the Migration Event Menu, enter Code A (Add Event) and specify the migration event name using one of the following methods:

Method	**Description**
1	"Manually" enter a unique name; or
2	@GEN migration event "Automatically" generate the event name by entering a name that includes the string "@GEN"; or
3	PACEX013 user exit migration event User Exit 25 migration event User Exit 13 migration event PACEX025 user exit migration event Invoke User Exit PACEX025 or PACEX013 to assign a unique event name dynamically; or
4	Use Method 2 and Method 3 in combination.

These methods are discussed in more detail in the following paragraphs.

Alternatively, enter the ADD EVENT command on the command line. Refer to the PAC Reference documentation for the correct syntax.

Method 1 : Entering a Name Manually

Enter a unique migration event name on the Migration Event Menu.

The name must begin with an alphabetic character and may be up to 32 characters in length. Embedded blanks are allowed, but will be translated automatically to the underscore ( ) character. If a duplicate event name is entered, an error message is displayed.

Method 2 : Generating a Name Automatically

Enter a name that includes the "@GEN" string on the Migration Event Menu.

The name must begin with an alphabetic character and may be up to 32 characters in length including the resolution of the @GEN string; or up to 24 characters if a prefix (1-3 characters) is included. Embedded blanks are allowed, but will be translated automatically to the underscore ( ) character.

PAC scans for the @GEN string and replaces the string with a prefix and a suffix as follows:

- If a prefix was defined when the application was added/modified, this is the prefix of the generated number. Otherwise, the generated string will not have a prefix.
- PAC uses the incremented application Gen No (defined when the application was added/modified) as the suffix for the generated number. The generated number is a 5-digit numeric value ranging from 00000-99999.

The Gen No may be reset or changed at any time. If, however, a duplicate number is encountered, PAC issues an error and asks the user to enter a unique value for the event name.

The uniqueness of the event name can be ensured by using standard naming conventions; that is, meaningful string prefixes and suffixes for the @GEN value.

Example 1:

```
USERID-YYMMDD-@GEN
```

where PAC replaces the @GEN suffix with the prefix for the application (if one has been defined) and the 5-digit number; for example, -APL01234.

Example 2:

```
@GEN-YYMMDD-DEV-TO-TEST
```

where PAC replaces the @GEN prefix as follows:

- Where there is a prefix defined for the application, @GEN is replaced by the application prefix followed by the 5-digit numeric value, for example, APL01234-.

- If no prefix is defined for the application, this example is invalid because an event name cannot begin with a numeric value.

Method 3 : Setting Up a User Exit to Generate a Name

Invoke User Exit 25 before the migration list is validated, or User Exit 13 after the migration list is validated; and enter the desired variables for the event name.

Refer to the PAC Reference documentation section User Exits for detailed information.

Method 4 : Using Methods 2 and 3 Together

This method combines Methods 2 and 3 described above.

Invoke User Exit 25 or User Exit 13 and enter the desired variables for the event name using the @GEN string.

Example:

```
APL-@DATE-@GEN
```

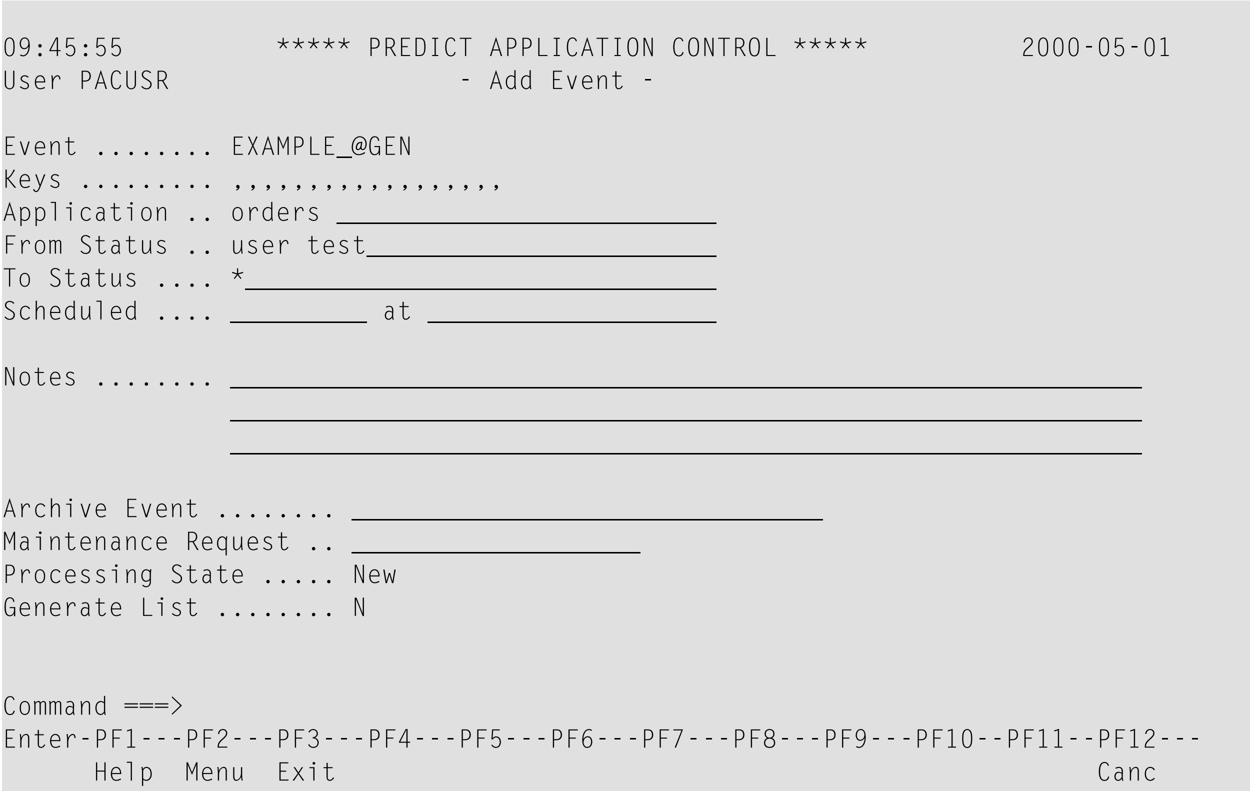
where:

- PAC replaces @GEN with the prefix for the application and the 5-digit number.
- the user exit replaces @DATE.

Note: Since User Exit 25 is called before the migration list is validated, the Event field may optionally be left blank allowing the exit to generate an event name.

Accessing the Add Event Screen

When you press ENTER after specifying the migration event name, the Add Event screen appears:



```
09:45:55          ***** PREDICT APPLICATION CONTROL *****          2000-05-01
User PACUSR                   - Add Event -

Event ........ EXAMPLE_@GEN
Keys ......... ,,,,,,,,,,,,,,,,,,
Application .. orders _________________________
From Status .. user test_______________________
To Status .... *_______________________________
Scheduled .... _________ at ___________________

Notes ........ ____________________________________________________________
               ____________________________________________________________
               ____________________________________________________________

Archive Event ........ _______________________________
Maintenance Request .. ___________________
Processing State ..... New
Generate List ........ N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

Note: If you want to generate the migration list automatically, select the type of list in the Generate List field before you press ENTER. Otherwise, the Add Event screen shown in Step 9 is displayed. Refer to **Step 8 Indicating How to Create the Migration List** for information about values for the Generate List field.

The Event field on this screen displays either

- the name of the migration event you specified if you used Method 1; or
- the @GEN string if you used Method 2. PAC replaces the @GEN string once the migration list has been added. The @GEN value is interpreted only when the application name is specified.

Step 2. Specifying the Application to be Migrated

Enter the name of the application you wish to migrate on the Add Event screen. To display a list of all applications defined to PAC, enter an asterisk (*). To limit the list, use range notation.

Step 3. Specifying the Origin and Destination Status

This step specifies the application status link (migration path) for the event.

1. Enter the name (or alias) of the status to which (To Status) or from which (From Status) the application is to be migrated (destination/origin status, respectively).

   To display a list of possible status destinations/origins, enter an asterisk (*) or range notation and optionally specify an origin/destination status (From/To Status, respectively) and press ENTER.

   If the destination status name is given, the list displayed is a subset showing just origin statuses valid for the specified destination. If the origin status name is given, then the list is a subset showing just destination statuses valid for the specified origin status.

   To display a list of all defined migration paths, leave the From Status and To Status fields blank.
2. From the resulting list, mark the desired destination/origin status (or the migration path) with X in the "C" column.

   The Add Event screen reappears displaying the names of the origin and destination statuses, and the previously defined batch/online and copy/move/include options.

   If only one migration path is defined for the origin/destination status specified, PAC automatically enters that status in the corresponding From/To Status field. If you select a migration path, PAC automatically enters the statuses in the corresponding From/To Status fields.

Step 4. Specifying the Schedule Date / Time for the Migration Event

For all events, indicate the date and time the event is scheduled to be processed in the format `yyyy-mm-dd hh:min:ss`.

- If no date and time are entered, the default is the current date and time.
- If the destination status is production, the migration event may be submitted prior to the date and time indicated; however, the objects in the migration list cannot be activated in PAA before the specified date and time.
- If the destination status is not production, the event cannot be submitted before the specified date and time.

Step 5. Optionally Include Notes

You can enter comments relevant to the migration event in the Notes field.

Step 6. Specifying the Archive Event

The Archive Event field is used if the migration event will restore to PAC objects that were previously archived. Such an event migrates objects from the origin status of Archive to the destination status of Control.

Enter the name of the event initially used to archive the objects.

Step 7. Specifying a Maintenance Request

The Maintenance Request field is used if the migration event will be linked to a maintenance request. The maintenance request must have been previously defined. Using this field enables PAC to keep track of objects processed to or from maintenance status types.

In the Maintenance Request field, enter an existing maintenance request ID.

Refer to **Maintenance Requests** for more information.

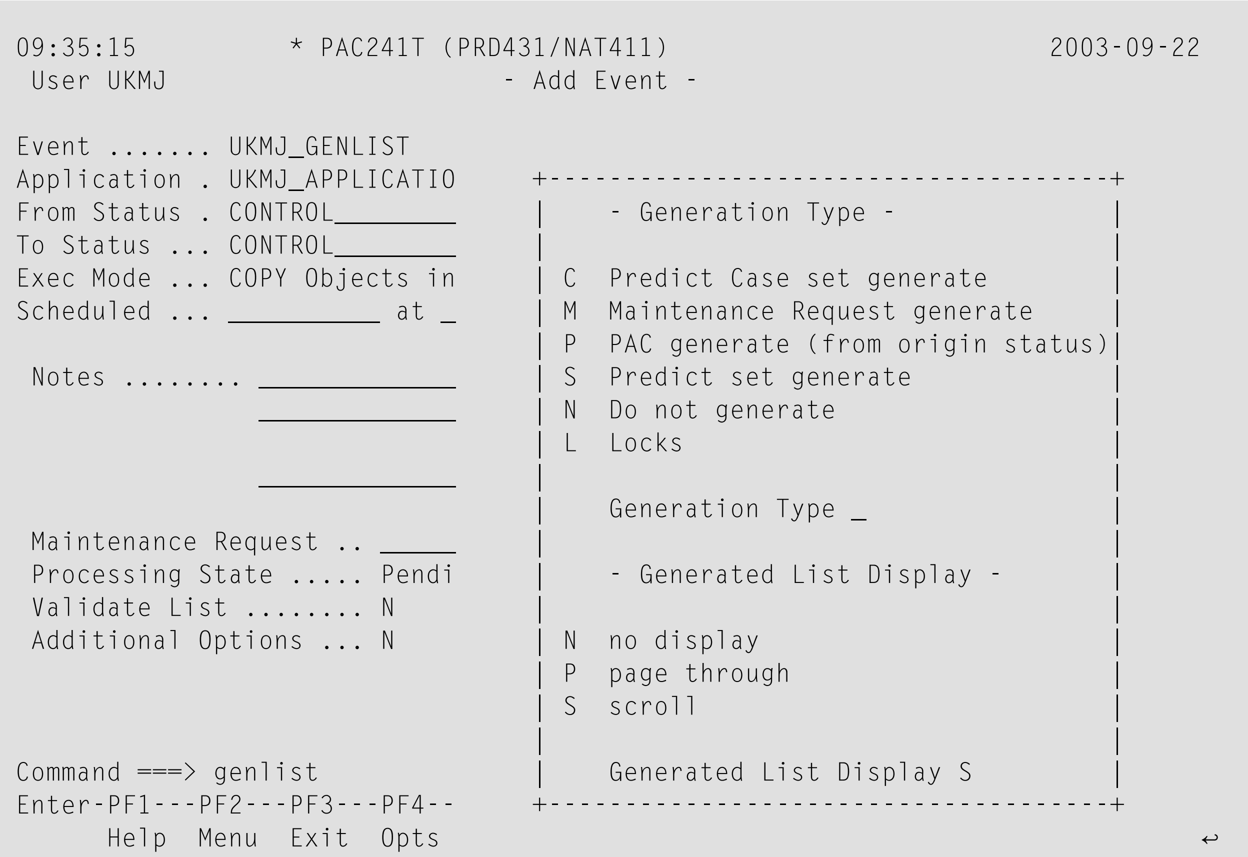
Step 8. Indicating How to Create the Migration List

You can create a migration list for the migration event "automatically" by generating it, or "manually" by entering objects on the Migration List Editor.

Refer to **Step 11 Accessing the Migration List Editor** and **Creating and Validating a Migration List** for information about creating migration lists manually. Refer to the PAC Reference documentation for information about generating migration lists in batch mode. This section tells you how to generate lists online.

Note: A list of foreign objects can be generated only when the destination status is Control.

To specify that a migration list should be automatically generated and what objects should be included in that generation, enter one of the following values in the Generate List field by overtyping the default N (do not generate a list) or by typing the direct command GENLIST on the command line and selecting an option from the resulting window:



```
09:35:15          * PAC241T (PRD431/NAT411)                         2003-09-22
 User UKMJ                      - Add Event -

Event ....... UKMJ_GENLIST
Application . UKMJ_APPLICATIO     +-------------------------------------+
From Status . CONTROL________     |    - Generation Type -              |
To Status ... CONTROL________     |                                     |
Exec Mode ... COPY Objects in     | C  Predict Case set generate        |
Scheduled ... __________ at _     | M  Maintenance Request generate     |
                                  | P  PAC generate (from origin status)|
 Notes ........ _____________     | S  Predict set generate             |
                _____________     | N  Do not generate                  |
                                  | L  Locks                            |
                _____________     |                                     |
                                  |    Generation Type _                |
 Maintenance Request .. _____     |                                     |
 Processing State ..... Pendi     |    - Generated List Display -       |
 Validate List ........ N         |                                     |
 Additional Options ... N         | N  no display                       |
                                  | P  page through                     |
                                  | S  scroll                           |
                                  |                                     |
Command ===> genlist              |    Generated List Display S         |
Enter-PF1---PF2---PF3---PF4--     +-------------------------------------+
      Help  Menu  Exit  Opts                                                  ↩
```

For events with From Status External, the Generation Type window is different:

```
 16:48:25          ***   PREDICT APPLICATION CONTROL   ***          2008-10-24
 User HNO                       - Add Event -

Event ....... HNO_TEST1                        Modified: 2008-10-24 by HNO
Application . HEB_TEST________________________
From Status . HEB_EXT________
To Status ... CONTROL________     +-----------------------------------+        ↩

Exec Mode ... COPY Objects On     !    - Generation Type -            !
Scheduled ... __________ at _     !                                   !
                                  ! L  Locked objects generate        !
 Notes ........ _____________     ! U  PAC generate (from origin status)!
                _____________     ! N  do not generate                !
                _____________     !                                   !
                                  !    Generation Type _              !
 Maintenance Request .. _____     !                                   !
 Processing State ..... Pendi     !    - Generated List Display -     !
 Validate List ........ N         !                                   !
 Additional Options ... N         ! N  no display                     !
                                  ! P  page through                   !
                                  ! S  scroll                         !
PAC7140: (I) All options succ     !                                   !
Command ===>           genli      !    Generated List Display S       !
Enter-PF1---PF2---PF3---PF4--     +-----------------------------------+        ↩

      Help  Menu  Exit  Opts                                                  ↩
```

The following table lists all options that can be used.

Option	To build a migration list . . .
P	Object list origin status based on the objects currently in the origin status compared to the objects in the destination status. On the resulting PAC Generate window, enter selection criteria for the objects (object name or type(s), user ID, range of compile dates / times).
M	Maintenance request object list based on the objects specified in a maintenance request. Displays a selection list from which to select objects. A valid existing request ID must be entered in the Maintenance Request field.
S	Predict set generate from a Predict set. Predict set identifier Predict set user Predict set number Predict set location On the resulting Predict SET Generate window, enter the set identifier: set user (up to eight characters), set number (two bytes), and Xref location (Local or Remote).
C	Predict Case object list from set based on a Predict Case set. Set user and set name are required. On the resulting Generate List from PCA Set window, enter the set identifier: set user (up to eight characters) and set name (up to twenty characters). Predict Case library The PCA library assigned to the application status link is displayed in this window. (The PCA library must be defined on the application status link with an origin status of maintenance or development; it must be valid for the current NTFILE definition for PCA in the Natural parameter modules.)
U	Object list based on the objects found in an external version control software repository specified with the given URL(s).

Option	To build a migration list . . .
L	This migration list generation option would normally be used to help setting up one or several events following an unexpected outcome of a previous event. For this to work, the previous event must remain locked. For example, if an emigration from CONTROL to a test deployment is aborted because it is discovered (with PACEX029) that the FTT being applied is wrong, then, as long as the aborted emigration event remains locked, GENLIST L can help obtain various lists of objects involved in the aborted migration. The following lock types are available: **O - object records** At immigration an object record is created and locked for each object which is being immigrated. If rolling results from the migration list of the event, then the record of an object rolled out is locked as well. The record of the object rolled in is locked if and only if the rolled-in object is of the same application as the migration event. The object records are unlocked in the following unlocking step. At emigration the records of the objects referred to in the migration list are locked. These are the objects actually emigrated as well as those which are considered for emigration but not emigrated for some reason, for example, because they are copycodes and applymod 19 is off. The object records are unlocked in the following unlocking step. A transmigration locks an object record if and only if it would be locked by the immigration or the emigration part of this transmigration. The object records are unlocked in the following unlocking step. A migration from a neighbour compartment locks object records like an immigration does; the records of the objects in the origin compartment are not locked. The object records are unlocked in the following unlocking step. A retirement from a maintenance, test, or production deployment locks the records of the objects referred to in the migration list of the retirement event. The object records are unlocked in the following unlocking step. An archiving event locks the records of the objects referred to in the migration list. The object records are unlocked in the following unlocking step. The finalisation of an archiving event locks the records of the archived objects. There is no separate unlocking step, and the object records normally turn into tokens and are unlocked later in the finalisation. A retirement from CONTROL locks the records of the objects referred to in the migration list. The records of the objects which are retired are deleted in the same step. The records of the objects referred to in the migration list but not retired are unlocked in the following unlocking step. A retirement from ARCHIVE locks the tokens of objects referred to in the migration list. Tokens are deleted in the same step. The tokens referred to in the migration list but not deleted are unlocked in the following unlocking step. A restoration (from ARCHIVE) event locks the tokens of the objects being restored and turns them back into object records. The object records are unlocked in the following unlocking step.

Option	To build a migration list . . .
	N - new object - status links A COPY immigration from a maintenance deployment creates new object - origin status links. They are created locked; they are unlocked in the following unlocking step. An emigration to a maintenance, test, or production deployment creates new object - destination status links. They are created locked; they are unlocked in the following unlocking step. A finalisation of an archiving event creates object - ARCHIVE links. They are created locked; they are unlocked later in the same step after the unlocking of the tokens. **H - historical object - status links corresponding to objects just superseded** An emigration to a maintenance, test, or production deployment may render some object - destination status links historical. Links thus made historical are locked. They are unlocked in the following unlocking step; they remain historical, if the event is RELEASEd; they revert to a current state, if the event is UNDOne. A finalisation of an archiving event run with applymod 23 on renders the non-ARCHIVE links of the archived objects historical. Links thus made historical are locked; they are unlocked later in the same step after the unlocking of the tokens. **R - historical object - status links corresponding to objects just retired from non-ACF locations** An immigration from a maintenance deployment may render some object - origin status links historical. Links thus made historical are locked. They are unlocked in the following unlocking step. A false MOVE migration from a test status renders the object - origin status links historical. Links thus made historical are locked. They are unlocked in the following unlocking step. A retirement from a maintenance, test, or production deployment renders the object - origin status links historical. Links thus made historical are locked. They are unlocked in the following unlocking step. **S - all object - status links** This designates all locks of types N, H, or R.

The genlist display option enables the user to control the generated migration list displayed.

N	No list. Pac will not display the generated list.
P	Page. This allows the user to page through the generated list using the <Enter> key.
S	Scroll (default). This scrolls the generated list.

The migration path determines the way the migration list is generated. To manually add dynamic source variables or foreign objects to the generated list, see **Step 9 Editing the Add Event screen**.

When an application is migrated from development into the PAC controlled environment, PAC reads the development library. The name of each saved object is compared with the most recent objects already under PAC control for that application. If an object found in the development library

- is not currently under PAC control, it is added to the migration list.

- is also found under PAC control, then the saved dates are compared. (PAC retains the date that the object was last saved in the development library when it is migrated into PAC control.)
- has a saved date different from the saved date of the duplicate object retained by PAC, it is added to the migration list; otherwise it is ignored.

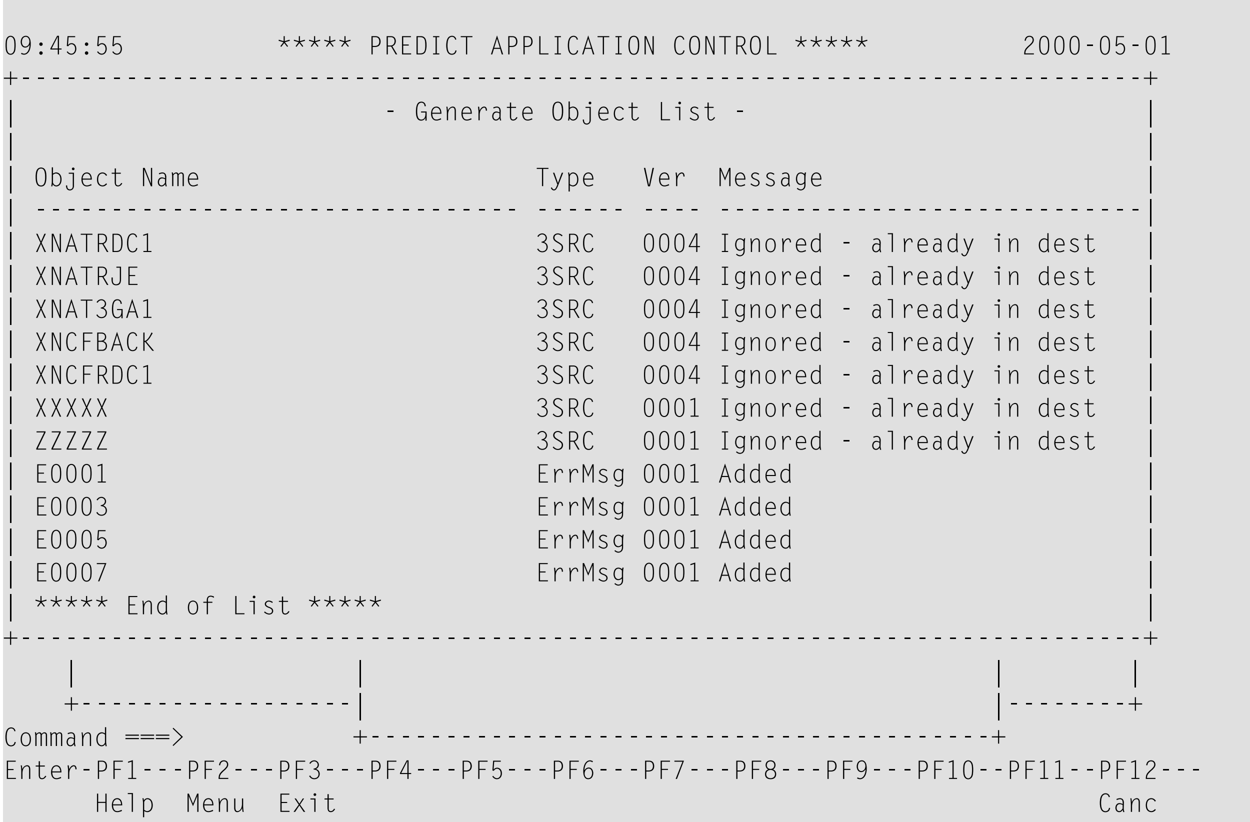
When generating an event that migrates an application from Control to Control (Alignment), the most recent version of every object in Control status is included in the migration list unless overridden by another specific entry.

Otherwise, when migrating objects to or from Control or a test or production status, all object versions found in the origin status are eligible for migration to the destination status.

- PAC does not check whether the objects already exist in the destination status.
- If the same object version is in both the origin status and destination status, it is ignored.

An Example of Displayed List Generation

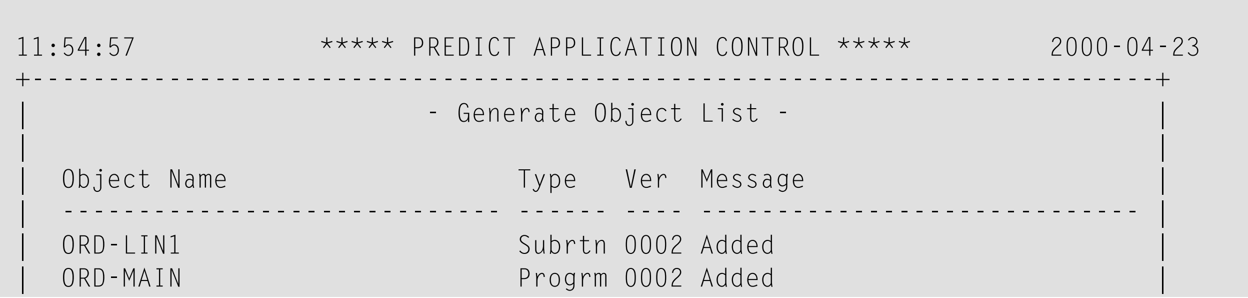
If the default display option (S) is selected then the following screen is displayed.



```
09:45:55          ***** PREDICT APPLICATION CONTROL *****          2000-05-01
+--------------------------------------------------------------------------+
|                        - Generate Object List -                          |
|                                                                          |
| Object Name                      Type   Ver  Message                     |
| -------------------------------- ------ ---- ----------------------------|
| XNATRDC1                         3SRC   0004 Ignored - already in dest   |
| XNATRJE                          3SRC   0004 Ignored - already in dest   |
| XNAT3GA1                         3SRC   0004 Ignored - already in dest   |
| XNCFBACK                         3SRC   0004 Ignored - already in dest   |
| XNCFRDC1                         3SRC   0004 Ignored - already in dest   |
| XXXXX                            3SRC   0001 Ignored - already in dest   |
| ZZZZZ                            3SRC   0001 Ignored - already in dest   |
| E0001                            ErrMsg 0001 Added                       |
| E0003                            ErrMsg 0001 Added                       |
| E0005                            ErrMsg 0001 Added                       |
| E0007                            ErrMsg 0001 Added                       |
| ***** End of List *****                                                  |
+--------------------------------------------------------------------------+
    |                  |                                         |        |
    +------------------|                                         |--------+
Command ===>           +-----------------------------------------+
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

The window above shows objects being added to the PAC controlled environment. In either case, when the list is complete, the "End of List" message appears.

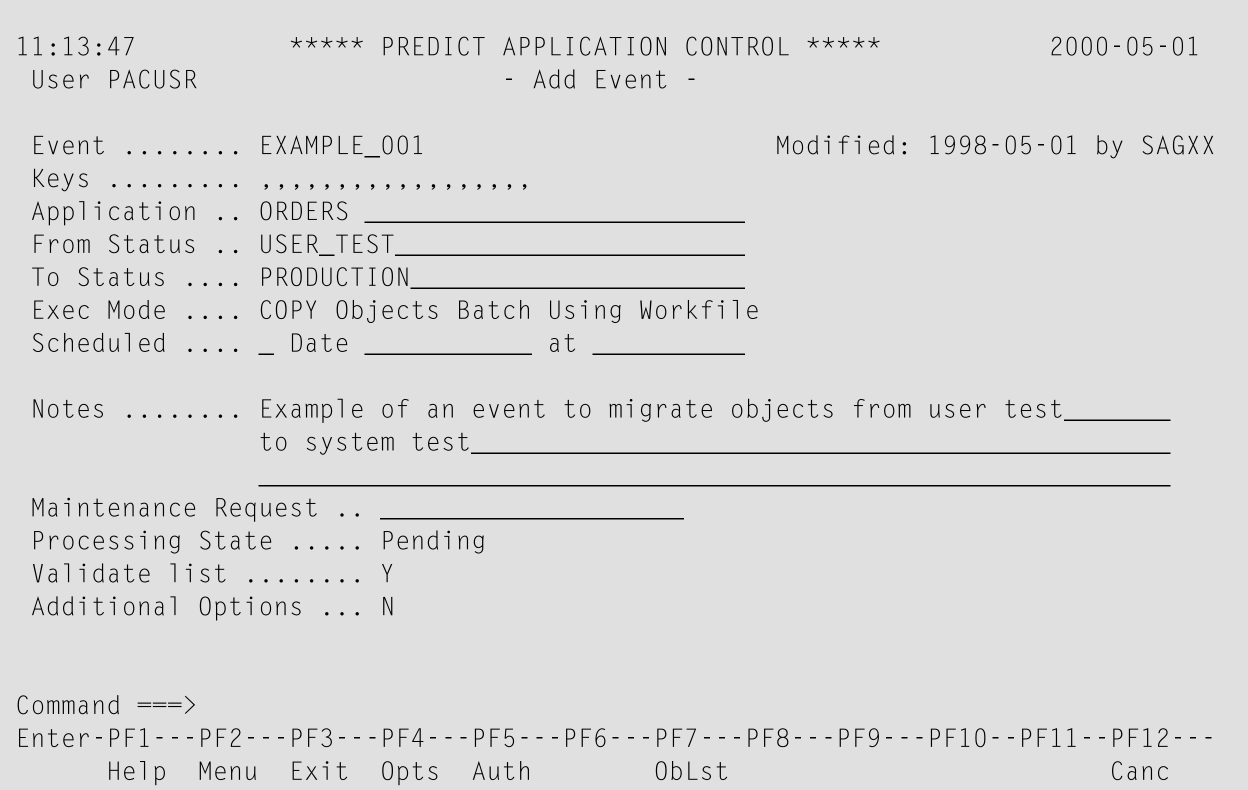
When generating a migration list for an archive event (option P), the Generate Object List window appears, displaying the objects as they are selected for the event. The Application Defaults for minimum current versions and the current retention period determine which objects are added or ignored.



```
11:54:57            ***** PREDICT APPLICATION CONTROL *****         2000-04-23
+---------------------------------------------------------------------------+
|                          - Generate Object List -                          |
|                                                                           |
|  Object Name                  Type   Ver  Message                          |
|  ---------------------------- ------ ---- ---------------------------- |
|  ORD-LIN1                     Subrtn 0002 Added                            |
|  ORD-MAIN                     Progrm 0002 Added                            |
```

Step 9. Editing the Add Event Screen

When you press ENTER after identifying the application, the migration path, the schedule, and the Generate List option, the Add Event screen displays the field values you have specified as shown in the following example:



```
11:13:47          ***** PREDICT APPLICATION CONTROL *****           2000-05-01
 User PACUSR                    - Add Event -

 Event ........ EXAMPLE_001                       Modified: 1998-05-01 by SAGXX
 Keys ......... ,,,,,,,,,,,,,,,,,,
 Application .. ORDERS _________________________
 From Status .. USER_TEST_______________________
 To Status .... PRODUCTION______________________
 Exec Mode .... COPY Objects Batch Using Workfile
 Scheduled .... _ Date ___________ at __________

 Notes ........ Example of an event to migrate objects from user test_______
                to system test______________________________________________
                ____________________________________________________________
 Maintenance Request .. ____________________
 Processing State ..... Pending
 Validate list ........ Y
 Additional Options ... N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts  Auth        ObLst                         Canc
```

If you entered the @GEN string to generate the migration event name, the generated name appears on this screen as well if the migration list has already been created.

Highlighted fields on this screen may be edited. Additionally, new fields may appear on this screen, some dependent on the particular migration path specified.

To manually add dynamic source variables or foreign objects to a generated list, you can access the Migration List Editor through Additional Options or directly by pressing PF7 (ObLst). See **Creating and Validating a Migration List** for more information.

Exec Mode Field

This field shows information retrieved from the migration path specified. It indicates whether the objects associated with the event are to be copied or moved and whether the event is to be processed online or in batch; and if in batch, whether or not the objects are to be included from a work file.

You may be allowed to edit the following three values.

Scheduled Field

If the specified migration path has a destination status of production, the Scheduled field appears on this screen.

Indicate in the Scheduled field whether the event will be scheduled (enter Y) or not (leave the field blank - the default).

You may also be able to edit the schedule date and time for the event.

Replace Field

In PAC, objects are automatically replaced in the destination status except when that status is development or maintenance. In those cases, the Replace field appears on the Add Event screen.

Indicate in the Replace field whether to replace (overwrite) an object already existing in the destination status with the version that is being migrated (enter Y); or not (enter N).

If you enter N, an object already existing in the destination status will be flagged as an error during validation and must be manually "commented out" or deleted from the migration list.

Archive Event Field

If the specified migration path has an origin status of Archive and a destination status of Control (that is, the event will restore archived objects to PAC) and you have not yet specified the name of the event that initially archived the objects, the Archive Event field reappears on this screen.

Specify the name of the event that initially archived the objects you now wish to restore to PAC.

Step 10. Indicating When to Validate the Migration List

Once the migration list has been created, you may validate the list immediately or wait to validate it at a later time; however, the migration list must be validated before the migration event can be authorized or at the time it is authorized..

Note: When the migration list is created and/or modified, the validation flag is automatically set to Y. If the validation flag is left as Y, validation ("revalidation" if the migration list was modified) will be performed when the event is saved.

If the Validate List field contains the value N (no), the migration list you create (or have generated) is saved, but not validated. This choice allows you to include other objects in the list. This is a possibility if the event is scheduled to run at some time in the future.

The value Y (yes) in the Validate List field directs PAC to validate your migration list immediately. The objects in your list are compared with those held in the origin status for consistency of object name, type, and version number.

Enter the appropriate value in the Validate List field.

Refer to **Validating a Migration List** for information about how PAC validates the migration list and suggestions for troubleshooting validation problems.

Step 11. Accessing the Migration List Editor

This step is only necessary if you are creating your migration list manually.

To create the migration list using the Migration List Editor

1. From the current Add Event screen, access the Migration List Editor through Additional Options (migration list) or directly by pressing PF7 (ObLst).
2. Use the migration list Editor to create the list according to the instructions in the section **Creating and Validating a Migration List**.
3. Enter SAVE on the editor command line to save the migration list; then a period (.) to exit from the editor.

Step 12. Adding the Migration Event

1. When you have completed all of the preceding steps, press PF3 to return to the Add Event screen.
2. Press ENTER to add the event and return to the Migration Event Menu screen.

The message "Event has been added successfully" is displayed.

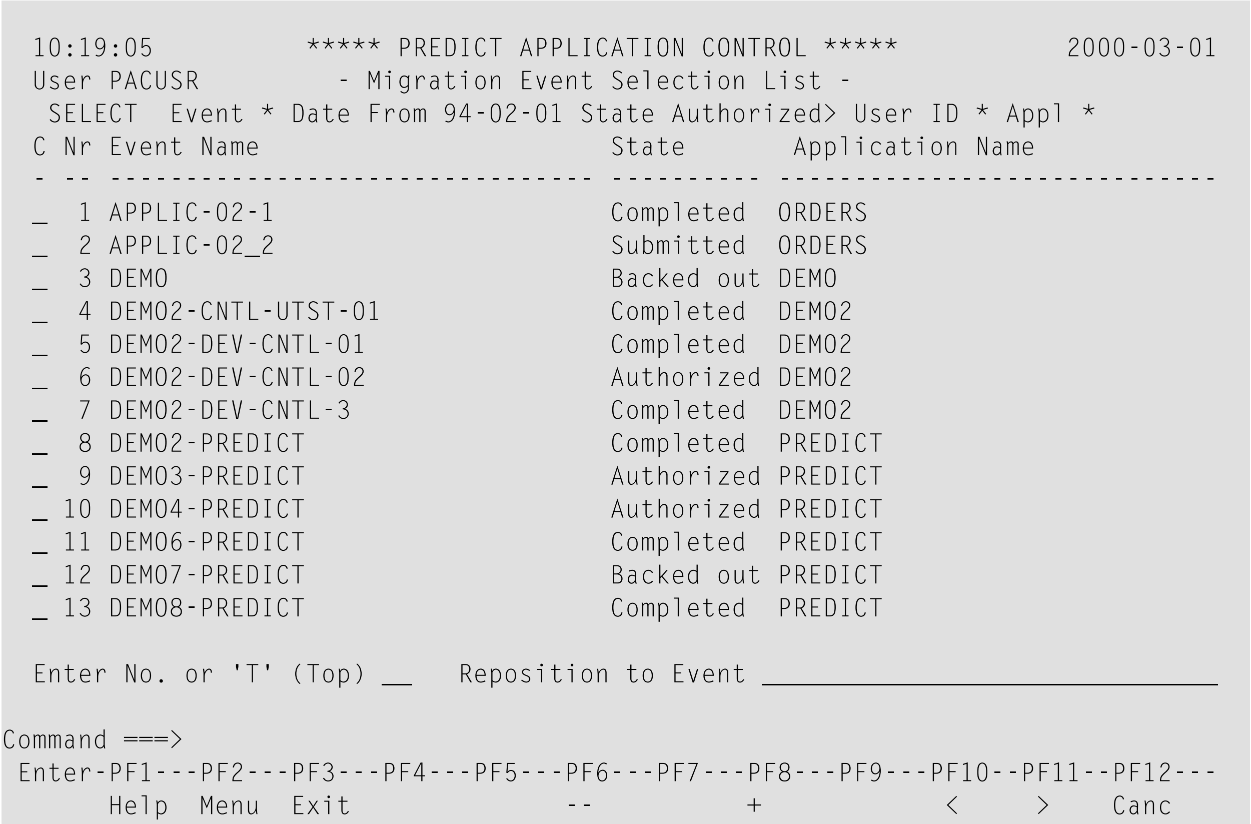
Step 13. Authorizing the Migration Event

When all of the steps for creating the migration event have been successfully completed, you may authorize the event on the Add Event screen using PF5 (Auth). Refer to **Authorizing and Submitting a Migration Event** for detailed information.

Selecting a Migration Event

To select a migration event from a list, enter Code S (Select a Migration Event) on the Migration Event Menu. Use range notation to limit the list.

The Migration Event Selection List appears:



```
  10:19:05          ***** PREDICT APPLICATION CONTROL *****           2000-03-01
  User PACUSR         - Migration Event Selection List -
   SELECT  Event * Date From 94-02-01 State Authorized> User ID * Appl *
  C Nr Event Name                       State       Application Name
  - -- -------------------------------- ---------- -----------------------------
  _  1 APPLIC-02-1                      Completed  ORDERS
  _  2 APPLIC-02_2                      Submitted  ORDERS
  _  3 DEMO                             Backed out DEMO
  _  4 DEMO2-CNTL-UTST-01               Completed  DEMO2
  _  5 DEMO2-DEV-CNTL-01                Completed  DEMO2
  _  6 DEMO2-DEV-CNTL-02                Authorized DEMO2
  _  7 DEMO2-DEV-CNTL-3                 Completed  DEMO2
  _  8 DEMO2-PREDICT                    Completed  PREDICT
  _  9 DEMO3-PREDICT                    Authorized PREDICT
  _ 10 DEMO4-PREDICT                    Authorized PREDICT
  _ 11 DEMO6-PREDICT                    Completed  PREDICT
  _ 12 DEMO7-PREDICT                    Backed out PREDICT
  _ 13 DEMO8-PREDICT                    Completed  PREDICT

  Enter No. or 'T' (Top) __   Reposition to Event ______________________________

Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit              --          +             <     >    Canc
```

On this screen, the status line directly under the User field indicates the selection criteria you used to access the screen. In the example shown above, events created on or after 94-02-01 in the processing state "Authorized" or after (Submitted, Started, Completed, Backed Out) were selected.

The sub-function ("SELECT..." in the above example) displayed on the status line directly under the User field indicates that you used one of the following methods to access this screen:

- Range notation or blank in the Event field along with the Display, Modify, Purge, Submit, or Select sub-function;
- The SELECT direct command.

If you accessed the screen with the S (Select a Migration Event) sub-function or with the SELECT direct command for one or more of the listed migration events, the following sub-functions may be invoked on this screen by entering the corresponding function code in the "C" column: D (Display), H (Hardcopy), L (Display object list), M (Modify), P (Purge), R (Display event audit report), S or X (Select), or U (Submit).

If you mark the event with the cursor or enter an X or an S in the "C" column, or the migration event number (from the "Nr" column) in the Enter No. or `T' (Top) field, the Migration Event Menu appears with the specified event displayed in the Event field.

For an explanation of values in the "State" column, see **State Field**.

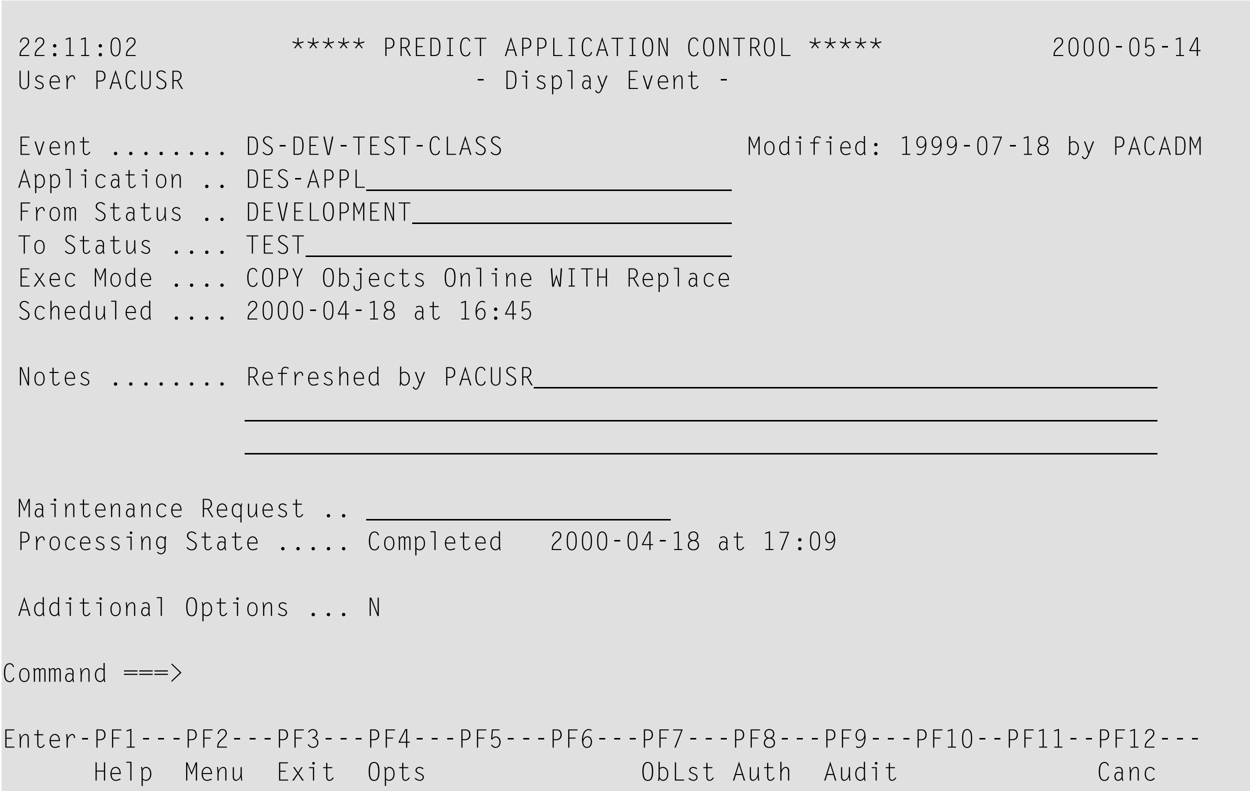
The following navigation aids are available to position the table both vertically and horizontally:

Aid	**Action**
T or PF6 (--)	Repositions the table back (vertically) to the top.
PF8 (+)	Scrolls the table forward (vertically) one screen.
PF10 (<)	Scrolls the table to the left (horizontally) to display the To Status, From Status, and Notes of the migration event.
PF11 (>)	Scrolls the table to the right (horizontally) to display the From Status of the migration event.
Reposition to ...	Allows you to specify a starting value for the selection list for the type of selection (application name, modification date, event name, event state, and user ID).

Displaying a Migration Event

To display a migration event, enter Code D (Display Event) and the event name or a range on the Migration Event Menu.

The Display Event screen appears:



```
 22:11:02          ***** PREDICT APPLICATION CONTROL *****          2000-05-14
 User PACUSR                    - Display Event -

 Event ........ DS-DEV-TEST-CLASS               Modified: 1999-07-18 by PACADM
 Application .. DES-APPL________________________
 From Status .. DEVELOPMENT_____________________
 To Status .... TEST____________________________
 Exec Mode .... COPY Objects Online WITH Replace
 Scheduled .... 2000-04-18 at 16:45

 Notes ........ Refreshed by PACUSR_________________________________________
                ____________________________________________________________
                ____________________________________________________________

 Maintenance Request .. ____________________
 Processing State ..... Completed   2000-04-18 at 17:09

 Additional Options ... N

Command ===>

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              ObLst Auth  Audit             Canc
```

This Display Event screen is an example for a group member event ("Member" in the line under the date). Because this event has been completed, the PF9 (Audit) key is displayed so that audit information can be accessed.

For information about the fields on this screen, refer to **Add (Define) Migration Event**.

Additional Options for this screen provide access to:

- The migration list for the migration event. This list may be accessed directly from the Display Event screen with the PF7 (ObLst) key or from the Migration Event Menu by selecting the "Display Migration List of Event" sub-function. Refer to **Creating and Validating the Migration List** for more information.
- Description of the event.
- Job information (described in this section).
- Authorization information. This information may be accessed directly from the Display Event screen with the PF8 (Auth) key. Refer to **Displaying Migration Event Authorization Information** for information about displaying authorization information for migration events.
- The audit report of the migration event. Audit information is available only for migration events that are completed, backed out, or purged. This report may be accessed directly from the Display Event screen with the PF9 (Audit) key or from the Migration Event Menu by selecting the Display Audit Report of Event sub-function. Refer to **Displaying the Audit Report** for more information.
- Dates and times the event was added/modified, and by whom.

Displaying Migration Event Job Information

Information about the migration event job is displayed on the Migration Event Job Information window:

```
    --- Migration Event Job Information ---

Job ............... BATCH MIGRATION

Submitted ......... 2000-05-11 at 15:02:05 by
Started ........... 0000-01-02 at 00:00:00
Ended ............. 0000-01-02 at 00:00:00
Step number ....... 0

Migration Totals
  NATURAL Objects ....... 0
  FOREIGN Objects ....... 0
  ErrMsg Objects ........ 0
  PREDICT Objects ....... 0

  Error Count ........... 0

Refresh ........... N
```

This window displays the name of the job used for a batch migration event, and the date and time the job was submitted and by whom. The actual start and end dates and times for the job are also indicated.

The Step Number field indicates the processing step and state of the event as it is being processed. If the event has ended, the field indicates the point reached when processing ended. The section **State Field** describes the processing states.

Migration Totals include the number of Natural objects, foreign objects, user error messages, and Predict objects migrated, and the number of errors detected during processing.

To observe the progress of the job as it is running, overtype the default N in the Refresh field with Y. The totals for Natural and Predict objects, error messages, and the step number change as the job proceeds.

A message displayed at the bottom of the window provides additional information about the progress of the actions between steps, or about the job that PAC terminates during processing.

Modifying a Migration Event

You can modify events that have the processing state Pending, Validated, or Authorized. For Authorized events, a Warning window displays the message "This event has been authorized. If modified, the Event must be reauthorized." You have the option to continue and modify.

If you attempt to modify a

- Completed or Backed Out event, a Warning window tells you that an event can be copied but not modified once it is processed.
- Started event, the Locked Data Warning window tells you that the event is locked and cannot be modified.

1. To modify a migration event, enter Code M (Modify an Event) and the name of the event or a range on the Migration Event Menu.

   The Modify Event screen appears. This screen is similar to the **Add Event screen**.

   The Archive Event field appears only for migrations from Archive to Control; it allows you to identify the event that initially archived the objects. The Replace field appears only for migrations to development or maintenance statuses.
2. You may modify the migration event by overtyping the existing values.
3. Press ENTER to confirm your modifications.

The Migration Event Menu displays the message "Event . . . has been modified".

Copying a Migration Event

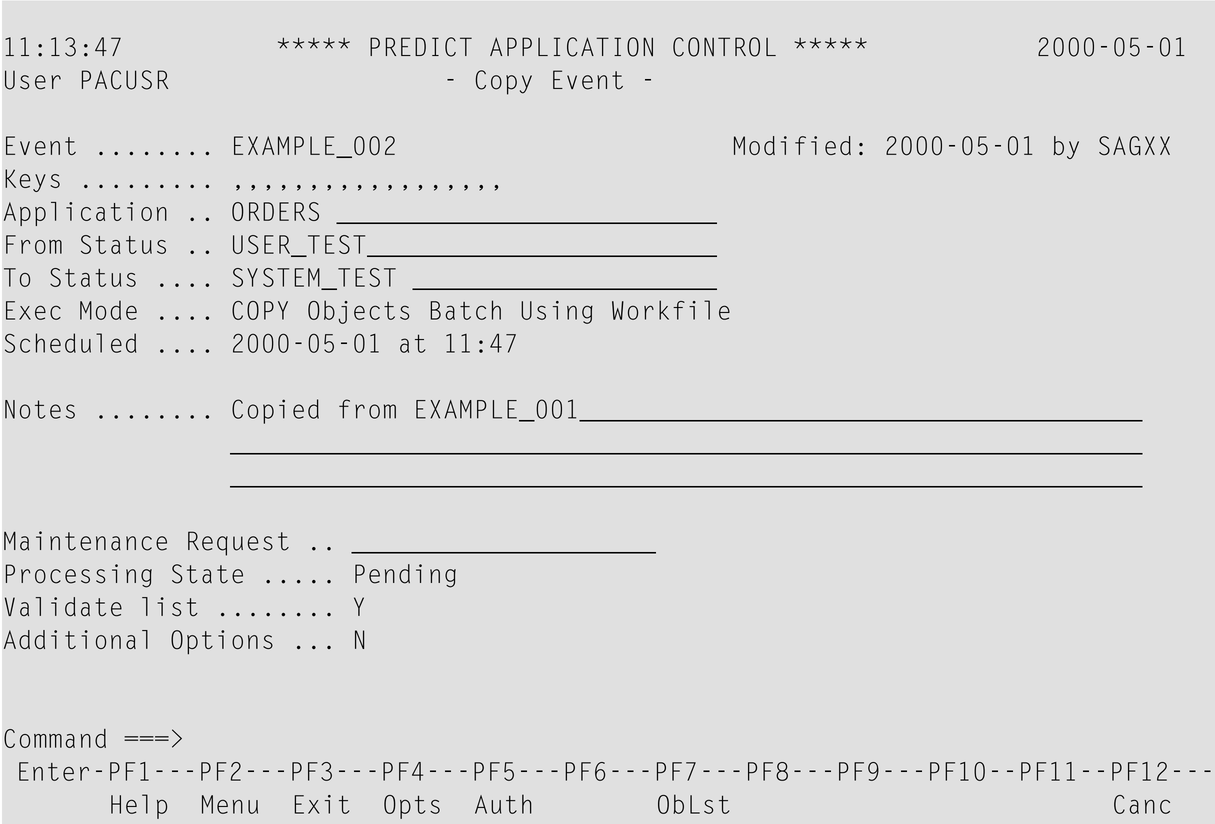
You may copy an existing migration event and then modify the attributes of the copied event.

1. To copy an event, enter Code C (Copy Event), the name of an existing migration event, and a unique name for the new event using one of the four methods described in the section **Add (Define) a Migration Event**.

   If you generate the new name automatically using the "@GEN" string in the new name, the generated migration event name (resolution of the @GEN string) is based on the application from which the event was copied.

   Alternatively, enter the COPY EVENT command on the command line. Refer to the PAC Reference documentation for the correct syntax.

   The Copy Event screen appears:



```
11:13:47          ***** PREDICT APPLICATION CONTROL *****           2000-05-01
User PACUSR                  - Copy Event -

Event ........ EXAMPLE_002                      Modified: 2000-05-01 by SAGXX
Keys ......... ,,,,,,,,,,,,,,,,,,
Application .. ORDERS _________________________
From Status .. USER_TEST_______________________
To Status .... SYSTEM_TEST ____________________
Exec Mode .... COPY Objects Batch Using Workfile
Scheduled .... 2000-05-01 at 11:47

Notes ........ Copied from EXAMPLE_001_____________________________________
               ____________________________________________________________
               ____________________________________________________________

Maintenance Request .. ____________________
Processing State ..... Pending
Validate list ........ Y
Additional Options ... N


Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit  Opts  Auth        ObLst                         Canc
```

This screen is similar to the **Add Event screen**.

All field values are copied except the event authorizer and the audit report. These values are retained in the original event, however. The audit report is "refreshed" for the new event.

A comment is automatically entered in the Notes field of the new event telling you the name of the event that was copied.

The Archive Event field appears only for migrations from Archive to Control; it allows you to identify the event that initially archived the objects. The Replace field appears only for migrations to development or maintenance statuses.

2. You may edit the Copy Event screen by typing over the existing values.
3. Press ENTER to copy the event.

The Migrate Event Menu displays the message "Event . . . has been copied".

Purging a Migration Event

A migration event that has been started cannot be purged.

To purge a migration event, enter Code P (Purge an Event) and the name of the event on the Migration Event Menu. Alternatively, mark the migration event with P in the "C" column of the Migration Event Selection List.

The Purge Confirmation window appears.

- Type Confirm or press PF5 to purge the migration event.
- Type a period (.) or press PF3 to return to the Migration Event Menu without purging the migration event.

Trying a Migration Event

The TRY EVENT direct command lists the objects whose retirement or the finalisation of whose archiving would be refused if the retirement were to be submitted or the archiving finalised at the time when the command is issued.

There can be five reasons for such refusals: four application defaults' settings and the setting (OFF) of applymod 23.

The objects get messages, but the retirement or finalisation of archiving goes on. This provides a way of knowing before the submission of the retirement or archiving event whether he was likely to run into any such refusal.

15 Migration Path Defaults

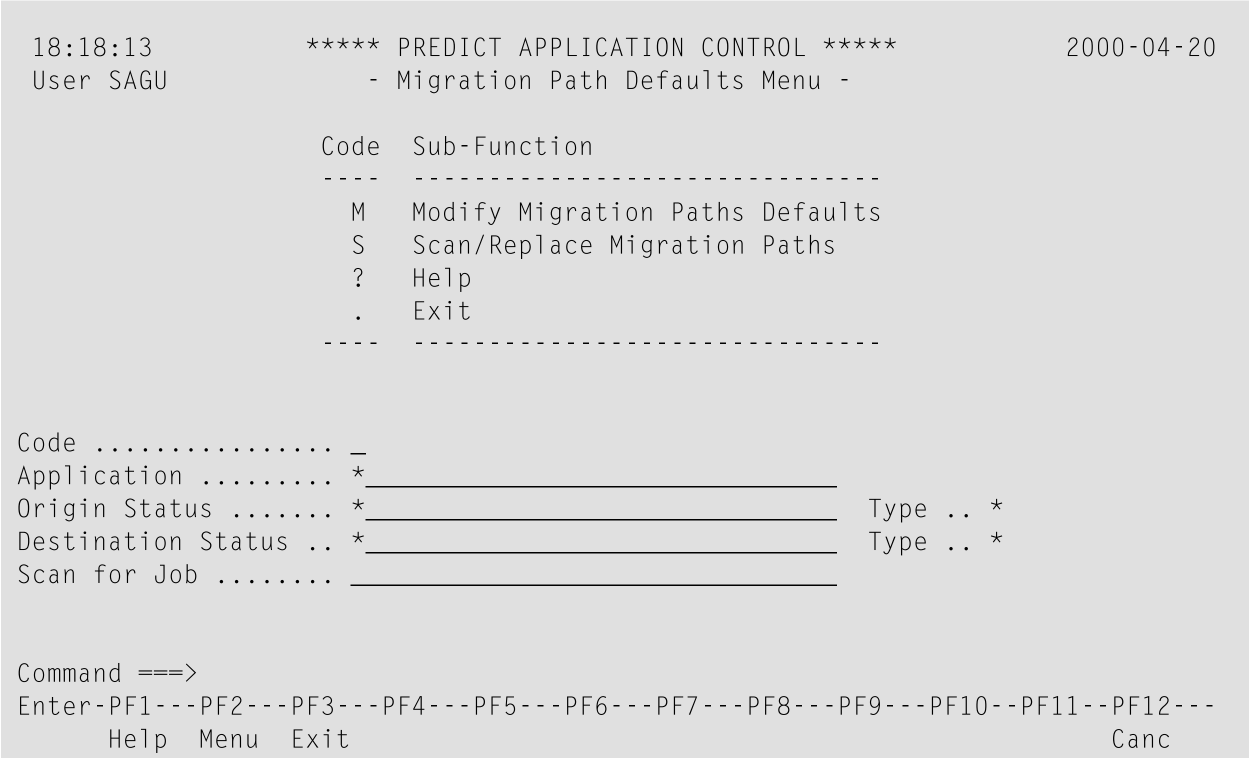
Using the maintenance functions in the Administration subsystem of PAC available in the Migration Path Defaults Menu allow you to see and modify the values of the job, batch/online, workfile usage, and copy (C)/move (M)/include (I) fields of the migration paths. Perform the modification in either of the following ways:

- manually on screens listing migration paths (one per line);
- automatically for all paths satisfying the selection criteria.

The facilities described in this section are also available via the SCANPATH utility. For details, see the PAC Reference documentation.

To access the defaults maintenance functions for migration paths, enter Code P on the General Defaults menu.

The Migration Path Defaults Menu appears:



```
 18:18:13          ***** PREDICT APPLICATION CONTROL *****          2000-04-20
 User SAGU             - Migration Path Defaults Menu -

                   Code  Sub-Function
                   ----  ------------------------------
                     M   Modify Migration Paths Defaults
                     S   Scan/Replace Migration Paths
                     ?   Help
                     .   Exit
                   ----  ------------------------------


Code ............... _
Application ......... *________________________________
Origin Status ....... *________________________________  Type .. *
Destination Status .. *________________________________  Type .. *
Scan for Job ........ ________________________________


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                 Canc
```

Enter Code M to get a list of migration paths and for modifying manually the values of their job, batch/online, workfile usage, and copy/move/include fields.

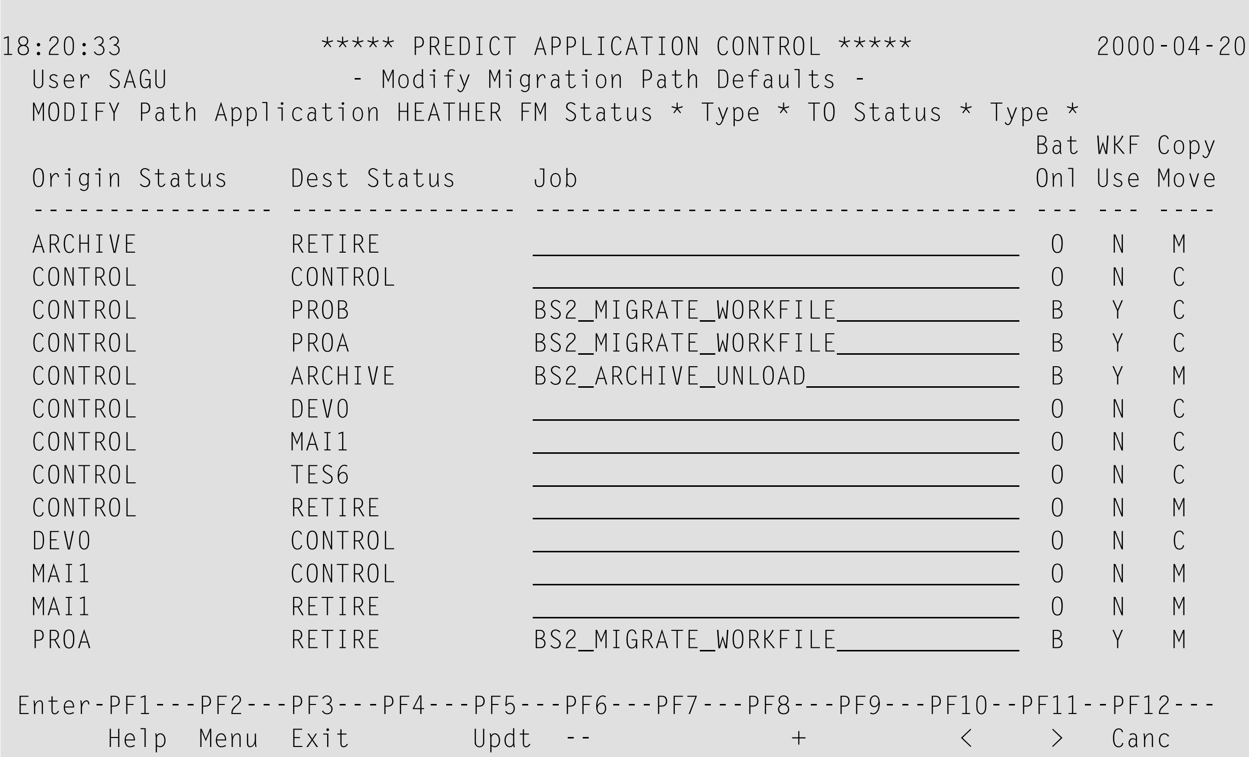
Enter Code S for PAC to automatically modify the values of the job, batch/online, workfile usage, or copy/move/include fields of all paths which satisfy the selection criteria.

In either case, specify the migration path selection criteria. Six fields are provided:

Input Field	Description
Application	For the specification of a range of application names to restrict the choice of paths to those whose application names are in the range.
Origin Status	For the specification of a range of status names to restrict the choice of paths to those whose origin status names are within the range.
(origin status) Type	For the optional specification of a status type to restrict the choice of paths to those whose origin statuses are of the specified type.
Destination Status	For the specification of a range of status names to restrict the choice of paths to those whose destination status names are within the range.
(destination status) Type	For the optional specification of a status type to restrict the choice of paths to those whose destination statuses are of the specified type.
Scan for Job	For the optional full (i.e., no range notation) specification of a JCL text name to restrict the choice of paths to those whose Migration Job fields contain the specified name.

The Type fields - except for synonymous "*" and " " - can take the following values: A(RCHIVE), C(ONTROL), D(evelopment), I(ncorporation), M(aintenance), R(ETIRE), and T(est).

If Code M has been entered on the Migration Path Defaults Menu and there is a migration path which satisfies the selection criteria, a Modify Migration Path Defaults screen appears:



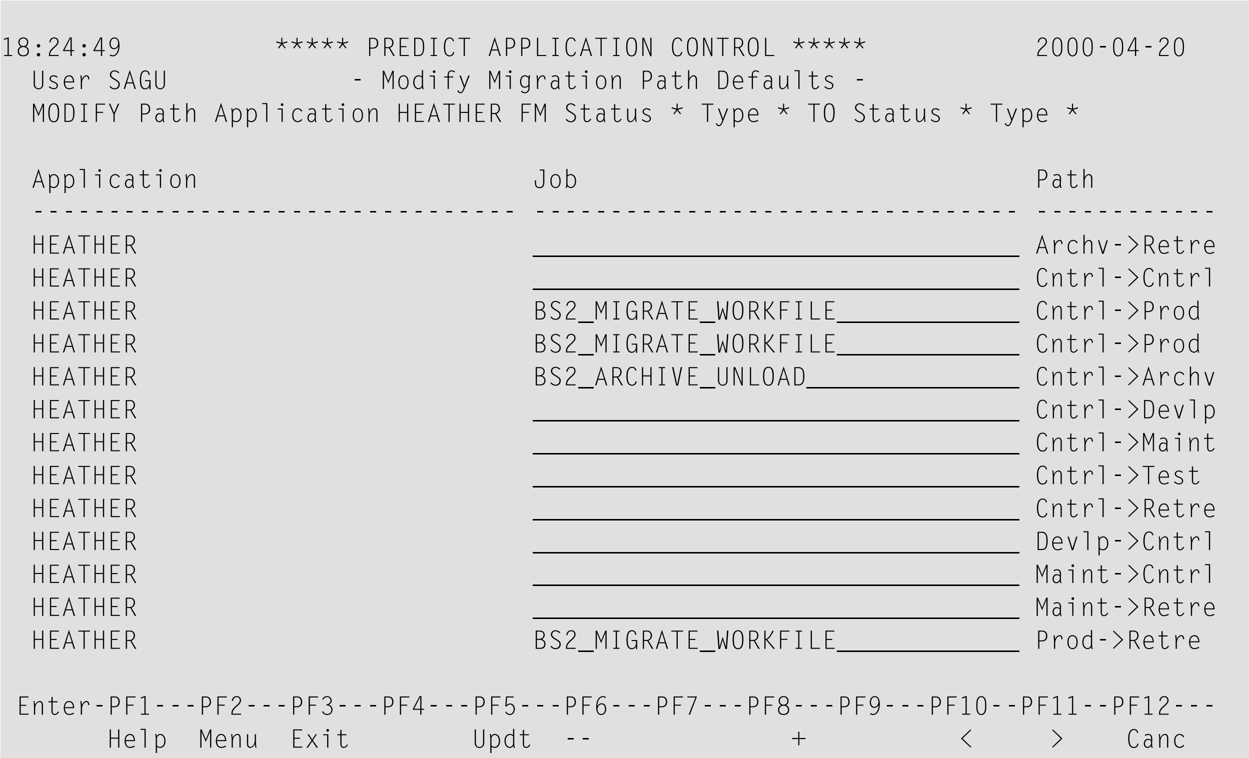
```
18:20:33             ***** PREDICT APPLICATION CONTROL *****            2000-04-20
  User SAGU            - Modify Migration Path Defaults -
  MODIFY Path Application HEATHER FM Status * Type * TO Status * Type *
                                                                    Bat WKF Copy
  Origin Status    Dest Status     Job                              Onl Use Move
  ---------------- --------------- -------------------------------- --- --- ----
  ARCHIVE          RETIRE          ________________________________  O   N   M
  CONTROL          CONTROL         ________________________________  O   N   C
  CONTROL          PROB            BS2_MIGRATE_WORKFILE____________  B   Y   C
  CONTROL          PROA            BS2_MIGRATE_WORKFILE____________  B   Y   C
  CONTROL          ARCHIVE         BS2_ARCHIVE_UNLOAD______________  B   Y   M
  CONTROL          DEVO            ________________________________  O   N   C
  CONTROL          MAI1            ________________________________  O   N   C
  CONTROL          TES6            ________________________________  O   N   C
  CONTROL          RETIRE          ________________________________  O   N   M
  DEVO             CONTROL         ________________________________  O   N   C
  MAI1             CONTROL         ________________________________  O   N   M
  MAI1             RETIRE          ________________________________  O   N   M
  PROA             RETIRE          BS2_MIGRATE_WORKFILE____________  B   Y   M

 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit        Updt  --             +          <     >   Canc
```

If there is no migration path satisfying the selection criteria, a message appears on the Migration Path Defaults Menu.

Modify the values of the Job, Batch/Online, Workfile Usage, or Copy (C), Move (M), Include (I) fields as needed and press PF5 to update the corresponding fields in the migration event records. Press PF8 to go to the next screen of the list without applying the yet unapplied current screen modifications. Press PF3 to return to the Migration Path Defaults Menu without applying the current screen modifications which have not yet been applied.

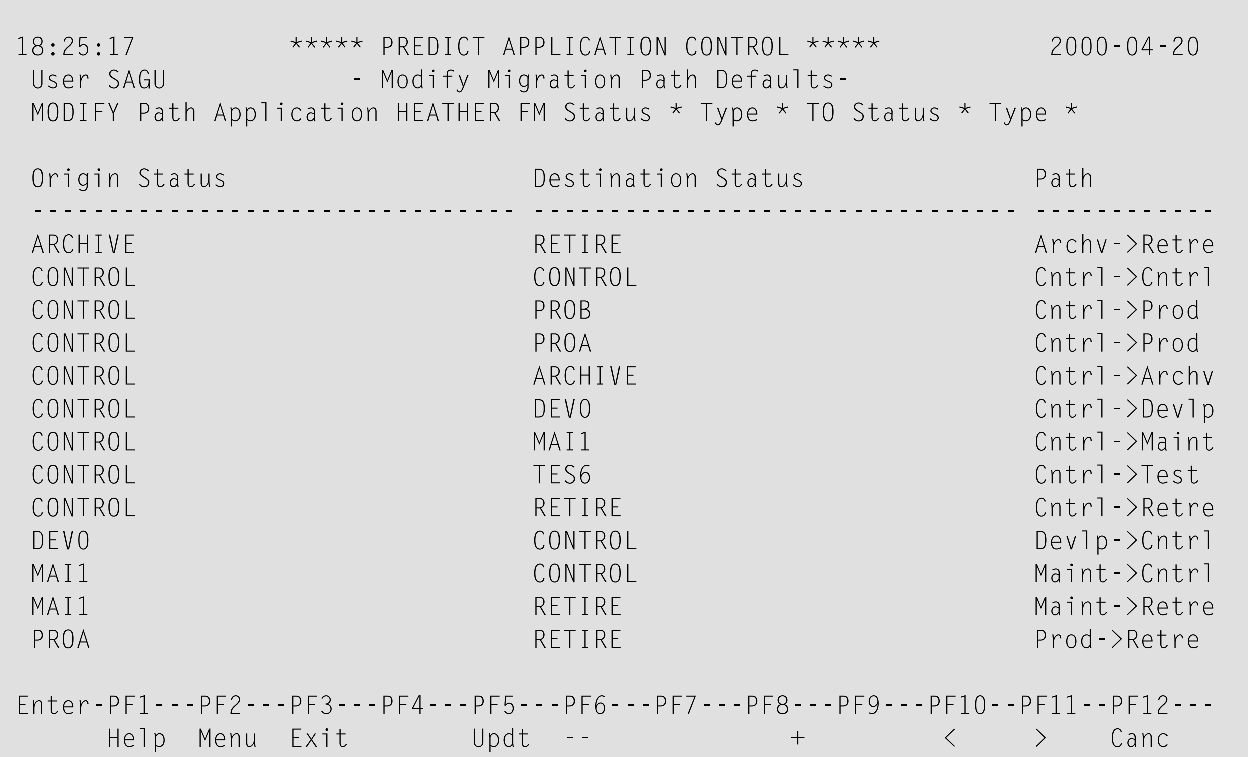
Note: The Include option is batch for the event from an externally created work file (CM-WK01) and is valid for paths with an origin status of incorporation only.

Use PF10 and PF11 to list other attributes of the paths:



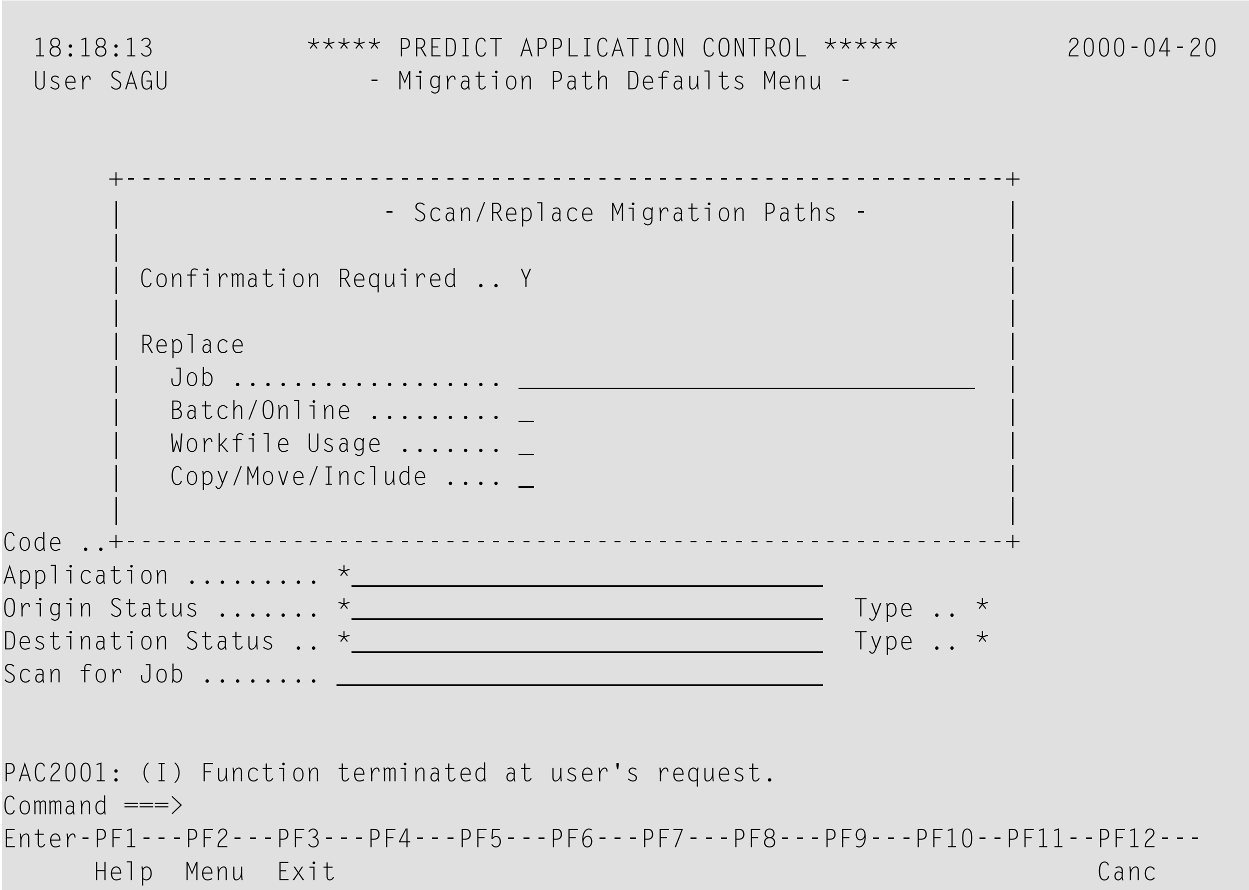
```
18:24:49          ***** PREDICT APPLICATION CONTROL *****          2000-04-20
  User SAGU            - Modify Migration Path Defaults -
  MODIFY Path Application HEATHER FM Status * Type * TO Status * Type *

  Application                      Job                              Path
  -------------------------------- -------------------------------- ------------
  HEATHER                          ________________________________ Archv->Retre
  HEATHER                          ________________________________ Cntrl->Cntrl
  HEATHER                          BS2_MIGRATE_WORKFILE____________ Cntrl->Prod
  HEATHER                          BS2_MIGRATE_WORKFILE____________ Cntrl->Prod
  HEATHER                          BS2_ARCHIVE_UNLOAD______________ Cntrl->Archv
  HEATHER                          ________________________________ Cntrl->Devlp
  HEATHER                          ________________________________ Cntrl->Maint
  HEATHER                          ________________________________ Cntrl->Test
  HEATHER                          ________________________________ Cntrl->Retre
  HEATHER                          ________________________________ Devlp->Cntrl
  HEATHER                          ________________________________ Maint->Cntrl
  HEATHER                          ________________________________ Maint->Retre
  HEATHER                          BS2_MIGRATE_WORKFILE____________ Prod->Retre

 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit        Updt  --             +          <     >    Canc
```

Use PF10 and PF11 to list the following information:



```
 18:25:17          ***** PREDICT APPLICATION CONTROL *****          2000-04-20
  User SAGU            - Modify Migration Path Defaults-
  MODIFY Path Application HEATHER FM Status * Type * TO Status * Type *

  Origin Status                    Destination Status               Path
  -------------------------------- -------------------------------- ------------
  ARCHIVE                          RETIRE                           Archv->Retre
  CONTROL                          CONTROL                          Cntrl->Cntrl
  CONTROL                          PROB                             Cntrl->Prod
  CONTROL                          PROA                             Cntrl->Prod
  CONTROL                          ARCHIVE                          Cntrl->Archv
  CONTROL                          DEVO                             Cntrl->Devlp
  CONTROL                          MAI1                             Cntrl->Maint
  CONTROL                          TES6                             Cntrl->Test
  CONTROL                          RETIRE                           Cntrl->Retre
  DEVO                             CONTROL                          Devlp->Cntrl
  MAI1                             CONTROL                          Maint->Cntrl
  MAI1                             RETIRE                           Maint->Retre
  PROA                             RETIRE                           Prod->Retre

 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit        Updt  --             +         <     >    Canc
```

If Code S has been entered on the Migration Path Defaults Menu, a Scan/Replace Migration Paths window appears:

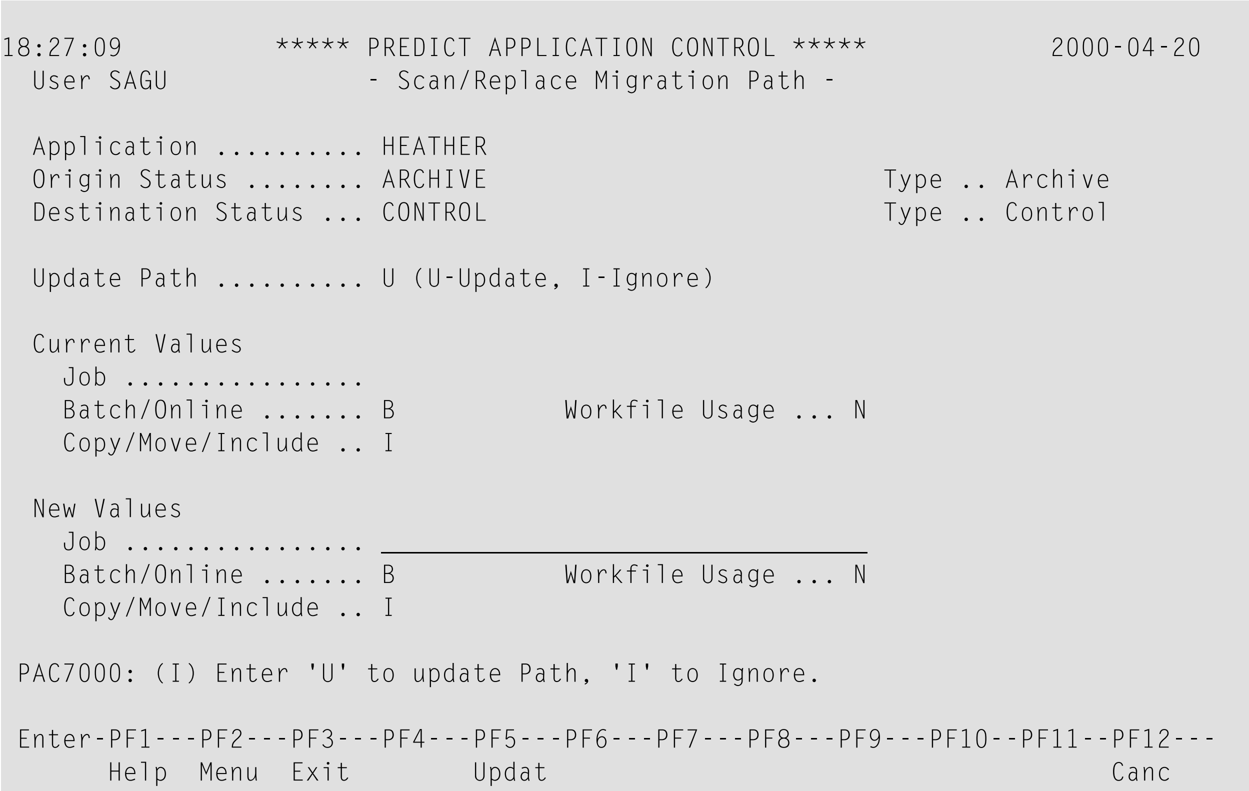


```
  18:18:13          ***** PREDICT APPLICATION CONTROL *****           2000-04-20
  User SAGU             - Migration Path Defaults Menu -


       +-----------------------------------------------------------+
       |                 - Scan/Replace Migration Paths -          |
       |                                                           |
       | Confirmation Required .. Y                                |
       |                                                           |
       | Replace                                                   |
       |   Job .................. ______________________________   |
       |   Batch/Online ......... _                                |
       |   Workfile Usage ....... _                                |
       |   Copy/Move/Include .... _                                |
       |                                                           |
Code ..+-----------------------------------------------------------+
Application ......... *________________________________
Origin Status ....... *________________________________  Type .. *
Destination Status .. *________________________________  Type .. *
Scan for Job ........ ________________________________


PAC2001: (I) Function terminated at user's request.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

Specify a replacement JCL text name in the Job field to write it into the Migration Job fields of selected paths. Leave the Job field of the window blank if the Migration Job fields of the selected paths are not to be automatically updated. Also specify a value for the Batch/Online fields of selected paths if a replacement is needed. Treat the Workfile Usage and the Copy/Move/Include fields of the window similarly.

Set the Confirmation Required field to NO (N) for the replacements to go ahead for all selected paths without further confirmations.

Set the Confirmation Required field to Yes (Y) to invoke a Scan/Replace Migration Path screen for every selected path:



```
18:27:09          ***** PREDICT APPLICATION CONTROL *****            2000-04-20
  User SAGU             - Scan/Replace Migration Path -

  Application .......... HEATHER
  Origin Status ........ ARCHIVE                          Type .. Archive
  Destination Status ... CONTROL                          Type .. Control

  Update Path .......... U (U-Update, I-Ignore)

  Current Values
    Job ................
    Batch/Online ....... B           Workfile Usage ... N
    Copy/Move/Include .. I

  New Values
    Job ................ ________________________________
    Batch/Online ....... B           Workfile Usage ... N
    Copy/Move/Include .. I

 PAC7000: (I) Enter 'U' to update Path, 'I' to Ignore.

 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit        Updat                                     Canc
```

Five fields are unprotected on this screen: the Update Path and the four New Values fields.

You can

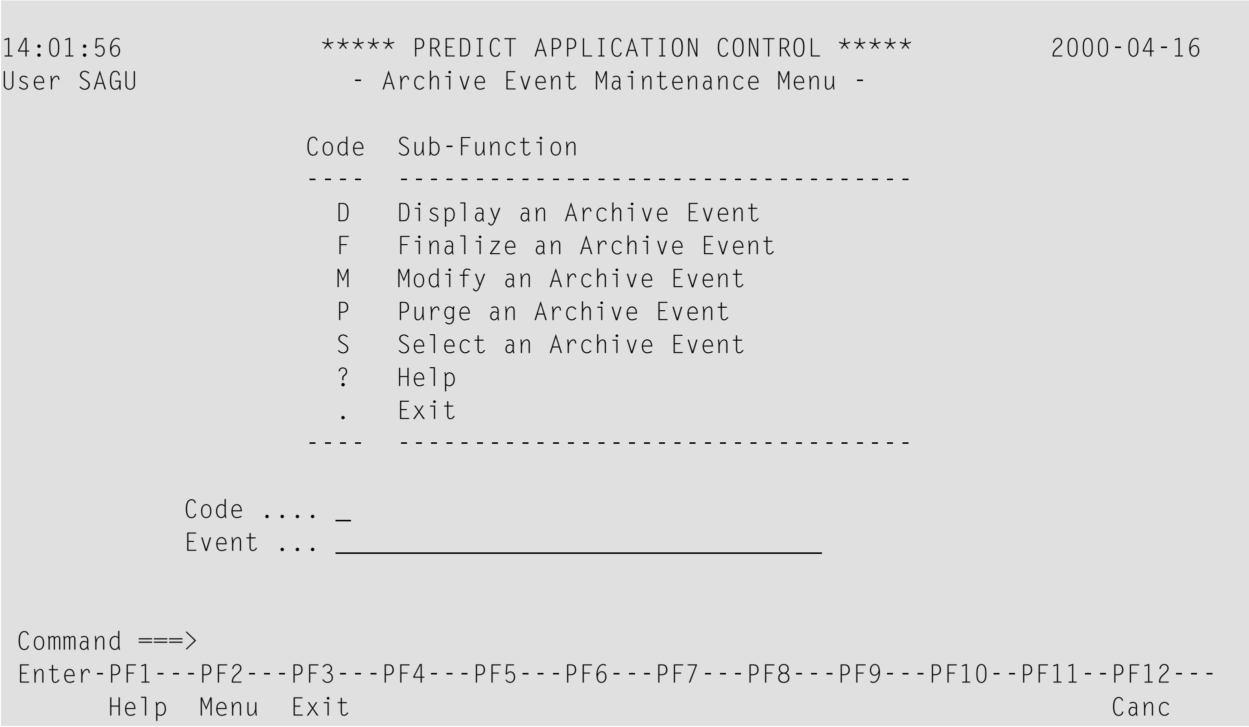
- keep or enter Update (U) in the Update Path field and press ENTER or press PF5 to apply the specified replacements to the particular path;
- modify the New Values for the particular path and then update the four fields of the particular path record by entering U in the Update Path field or pressing PF5;
- keep or enter Ignore (I) in the Update Path field and press ENTER or just press PF3 to avoid updating the particular path and to pass on to the next selected path (or the Migration Path Defaults Menu after dealing with the last selected path);
- press PF12 to immediately return to the Migration Path Defaults Menu.

16 Archive Event Maintenance

- Select an Archive Event 234
- Display Archive Event 236
- Modify Archive Event 237
- Finalize Archive Event 238
- Purge Archive Event 239

Archiving is a migration with origin CONTROL and destination ARCHIVE. It consists of copying objects from a CONTROL status to a work file and subsequently deleting the objects from the ACF system file. The running of an archiving event covers only the copying; immediately after the copying, the objects are still in their compartment and are reported as "unloaded". The deleting is performed by the PAC administrator when he finalizes the completed archiving event, using the facility described in this section.

To access the archiving event maintenance functions, enter Code E (Migration Events) on the PAC Main Menu. Then enter Code W to access the Archive Event Maintenance Menu.



```
14:01:56             ***** PREDICT APPLICATION CONTROL *****         2000-04-16
User SAGU              - Archive Event Maintenance Menu -

                    Code  Sub-Function
                    ----  ----------------------------------
                      D   Display an Archive Event
                      F   Finalize an Archive Event
                      M   Modify an Archive Event
                      P   Purge an Archive Event
                      S   Select an Archive Event
                      ?   Help
                      .   Exit
                    ----  ----------------------------------

            Code .... _
            Event ... ________________________________


 Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                    Canc
```

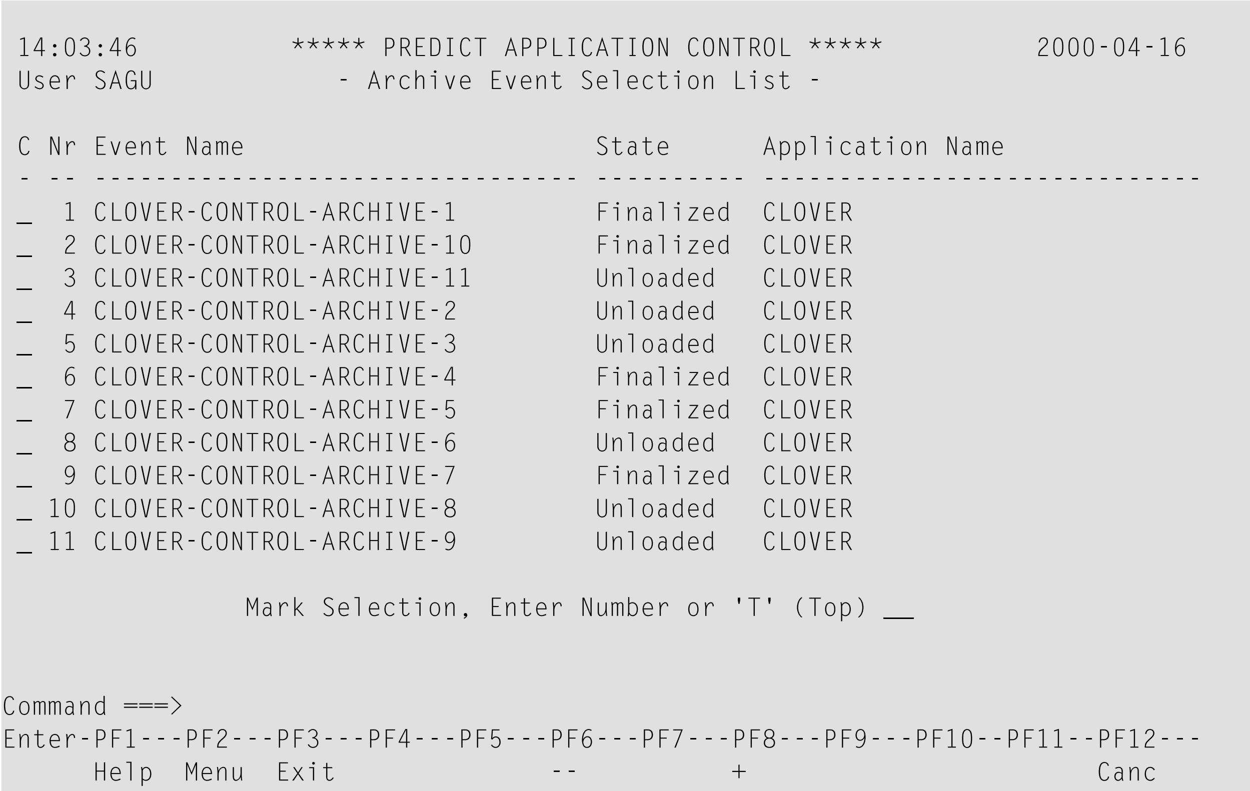
This chapter covers the following topics:

Select an Archive Event

To select archiving events on the Archive Event Maintenance Menu, enter the following:

- Code S
- a range of event names - assuming that "*" is left blank.

If there is a completed (unloaded, locking, finalizing, or finalized) archive event whose name is in the specified range, an Archive Event Selection List appears:



```
 14:03:46          ***** PREDICT APPLICATION CONTROL *****          2000-04-16
 User SAGU            - Archive Event Selection List -

 C Nr Event Name                       State      Application Name
 - -- -------------------------------- ---------- -----------------------------
 _  1 CLOVER-CONTROL-ARCHIVE-1         Finalized  CLOVER
 _  2 CLOVER-CONTROL-ARCHIVE-10        Finalized  CLOVER
 _  3 CLOVER-CONTROL-ARCHIVE-11        Unloaded   CLOVER
 _  4 CLOVER-CONTROL-ARCHIVE-2         Unloaded   CLOVER
 _  5 CLOVER-CONTROL-ARCHIVE-3         Unloaded   CLOVER
 _  6 CLOVER-CONTROL-ARCHIVE-4         Finalized  CLOVER
 _  7 CLOVER-CONTROL-ARCHIVE-5         Finalized  CLOVER
 _  8 CLOVER-CONTROL-ARCHIVE-6         Unloaded   CLOVER
 _  9 CLOVER-CONTROL-ARCHIVE-7         Finalized  CLOVER
 _ 10 CLOVER-CONTROL-ARCHIVE-8         Unloaded   CLOVER
 _ 11 CLOVER-CONTROL-ARCHIVE-9         Unloaded   CLOVER

                Mark Selection, Enter Number or 'T' (Top) __


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

If there is no completed archive event whose name is in the specified range, a message appears on the original screen.

The "State" fields can have the values "Unloaded", "Locking", "Finalizing" and "Finalized".

"Unloaded" marks the archiving events which have been completed but whose finalization has not been started. The objects on the migration list of an unloaded archiving event have been written to a work file; their condition has not changed otherwise.

"Locking" and "Finalizing" mark the archiving events which have been completed and whose finalization has been started but not yet completed.

None of the objects on the migration list of a locking archiving event has been archived - i.e., deleted - from the ACF system file. Some objects on the migration list of a finalizing archiving event may have been archived while others remain only unloaded.

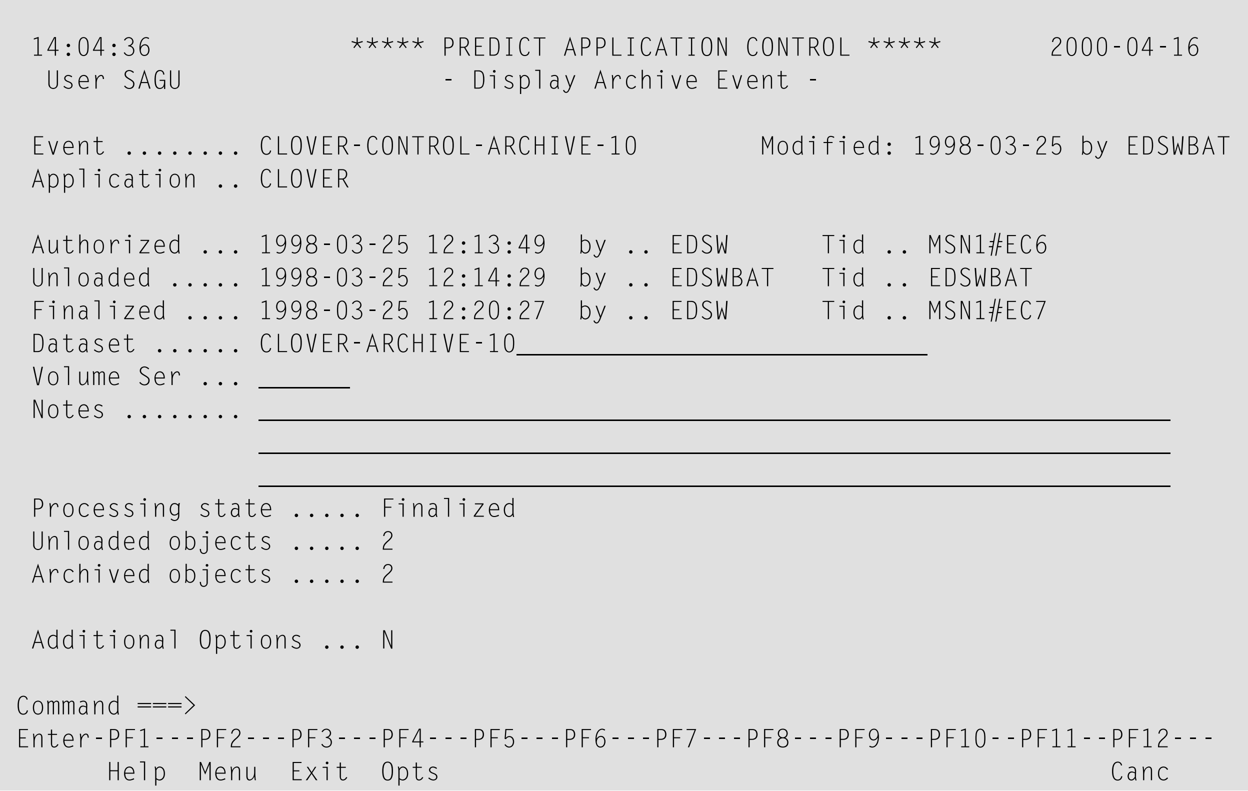
"Finalized" marks the archiving events which have been completed and whose finalization has also been completed. In some cases even an object on the migration list of a finalized archiving event may be unloaded but not archived.

The C fields of an Archive Event Selection List screen can take as values - in addition to "?" and "." - S(elect), D(isplay), M(odify), F(inalize), and P(urge). Only an archiving event in the state "Unloaded", "Locking" or "Finalizing" can be finalized.

The command S(elect) returns the Archive Event Maintenance Menu with its "Event" field filled with the name of the selected event.

Display Archive Event

Choose D from the Archive Event Maintenence Menu. D(isplay) produces a Display Archive Event screen:



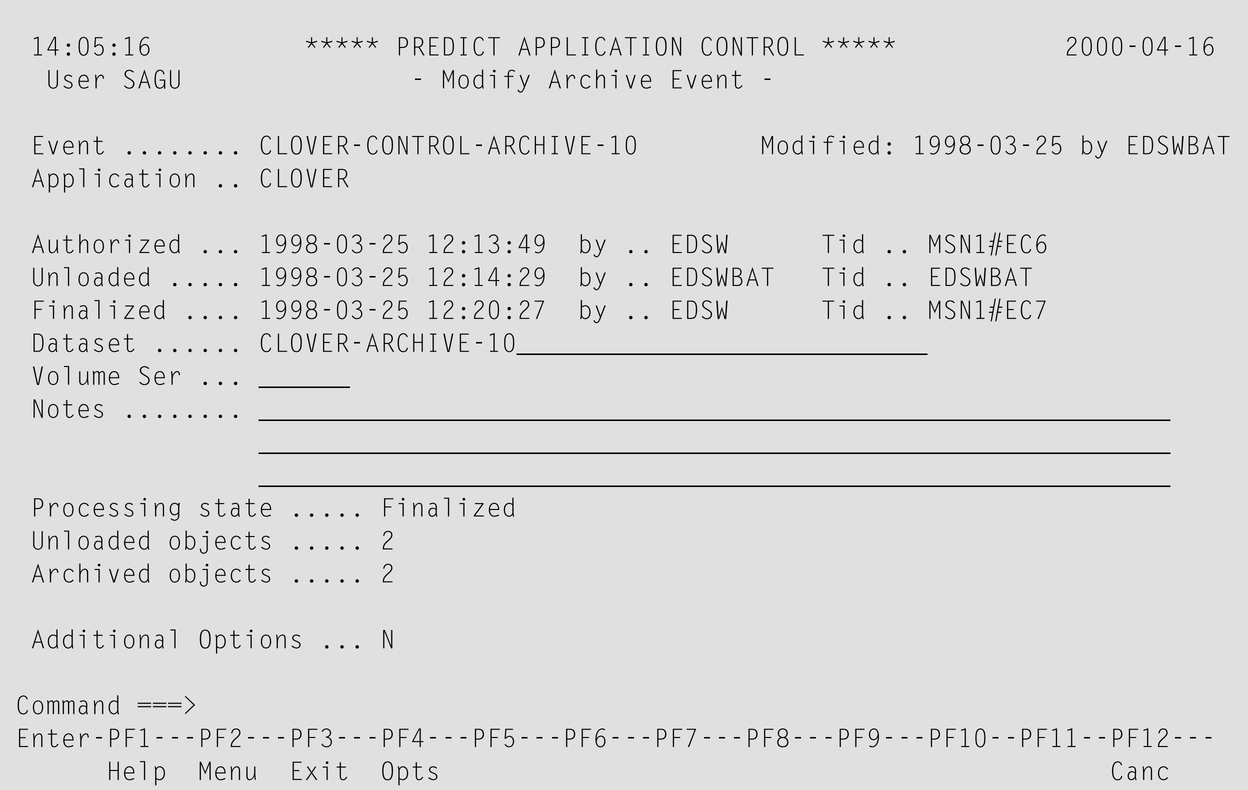
```
 14:04:36             ***** PREDICT APPLICATION CONTROL *****       2000-04-16
  User SAGU                 - Display Archive Event -

 Event ........ CLOVER-CONTROL-ARCHIVE-10        Modified: 1998-03-25 by EDSWBAT
 Application .. CLOVER

 Authorized ... 1998-03-25 12:13:49  by .. EDSW      Tid .. MSN1#EC6
 Unloaded ..... 1998-03-25 12:14:29  by .. EDSWBAT   Tid .. EDSWBAT
 Finalized .... 1998-03-25 12:20:27  by .. EDSW      Tid .. MSN1#EC7
 Dataset ...... CLOVER-ARCHIVE-10___________________________
 Volume Ser ... ______
 Notes ........ ____________________________________________________________
                ____________________________________________________________
                ____________________________________________________________
 Processing state ..... Finalized
 Unloaded objects ..... 2
 Archived objects ..... 2

 Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc
```

The default setting for additional options is N. If you set it to Y, a window is displayed with the following three additional options you can choose from:

- Archive migration list - i.e., the migration list of the archiving event with entries on resolved ranges;
- Audit report - i.e., the report of finalization which is present only if the archiving event is finalizing or finalized;
- Date.

Modify Archive Event

Choose M from the Archive Event Maintenence Menu.M(odify) produces a Modify Archive Event screen:



```
 14:05:16          ***** PREDICT APPLICATION CONTROL *****          2000-04-16
  User SAGU                - Modify Archive Event -

 Event ........ CLOVER-CONTROL-ARCHIVE-10        Modified: 1998-03-25 by EDSWBAT
 Application .. CLOVER

 Authorized ... 1998-03-25 12:13:49  by .. EDSW      Tid .. MSN1#EC6
 Unloaded ..... 1998-03-25 12:14:29  by .. EDSWBAT   Tid .. EDSWBAT
 Finalized .... 1998-03-25 12:20:27  by .. EDSW      Tid .. MSN1#EC7
 Dataset ...... CLOVER-ARCHIVE-10___________________________
 Volume Ser ... ______
 Notes ........ ____________________________________________________________
                ____________________________________________________________
                ____________________________________________________________
 Processing state ..... Finalized
 Unloaded objects ..... 2
 Archived objects ..... 2

 Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                              Canc
```

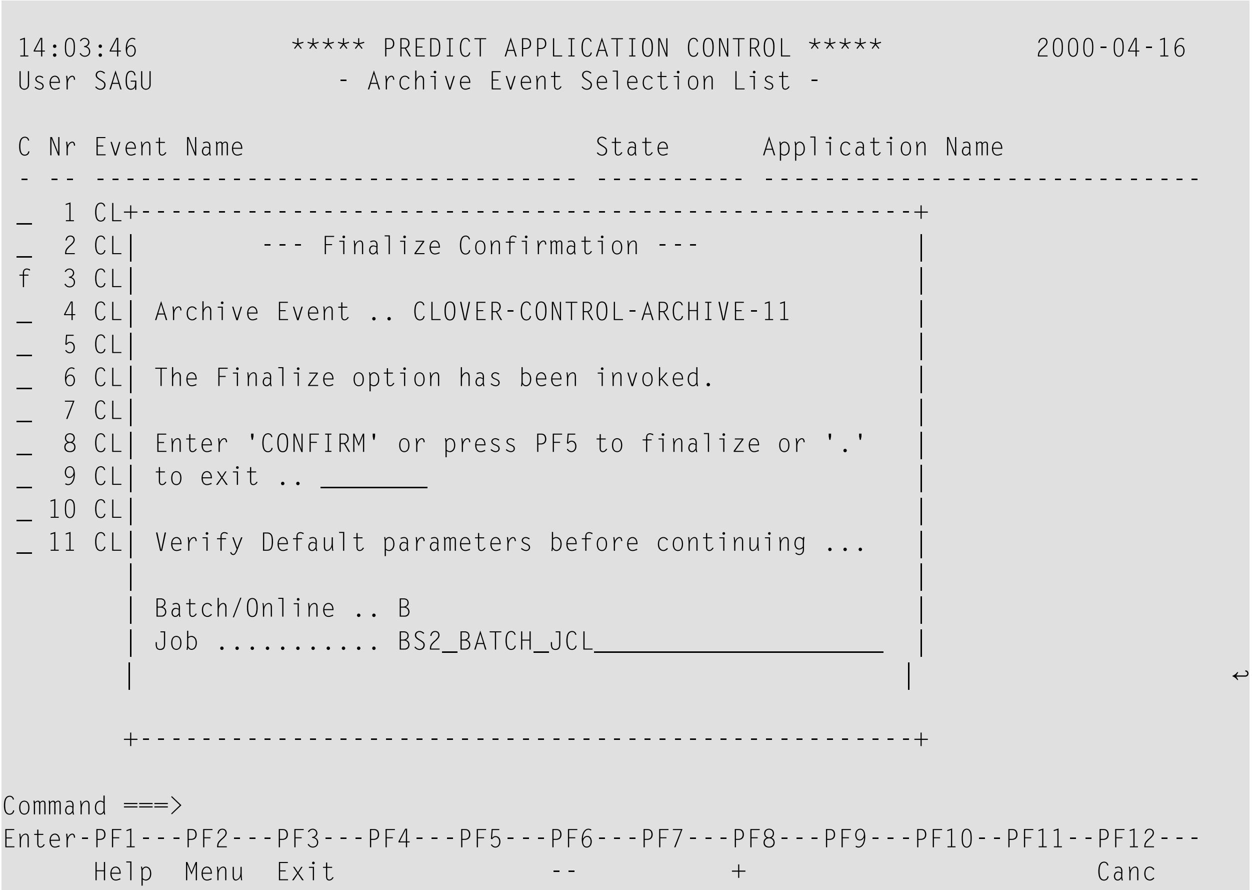
A Modify Archive Event screen differs from the Display Archive Event in the following areas:

- Dataset;
- Volume Ser;
- Notes

Fields are unprotected, and their contents can be changed on the screen and in the corresponding archiving event record fields in the ACF system file.

Finalize Archive Event

Choose F from the Archive Event Maintenence Menu. F(inalize) is applicable only to unloaded, locking, and finalizing archiving events. When applied, it produces a Finalize Confirmation window:



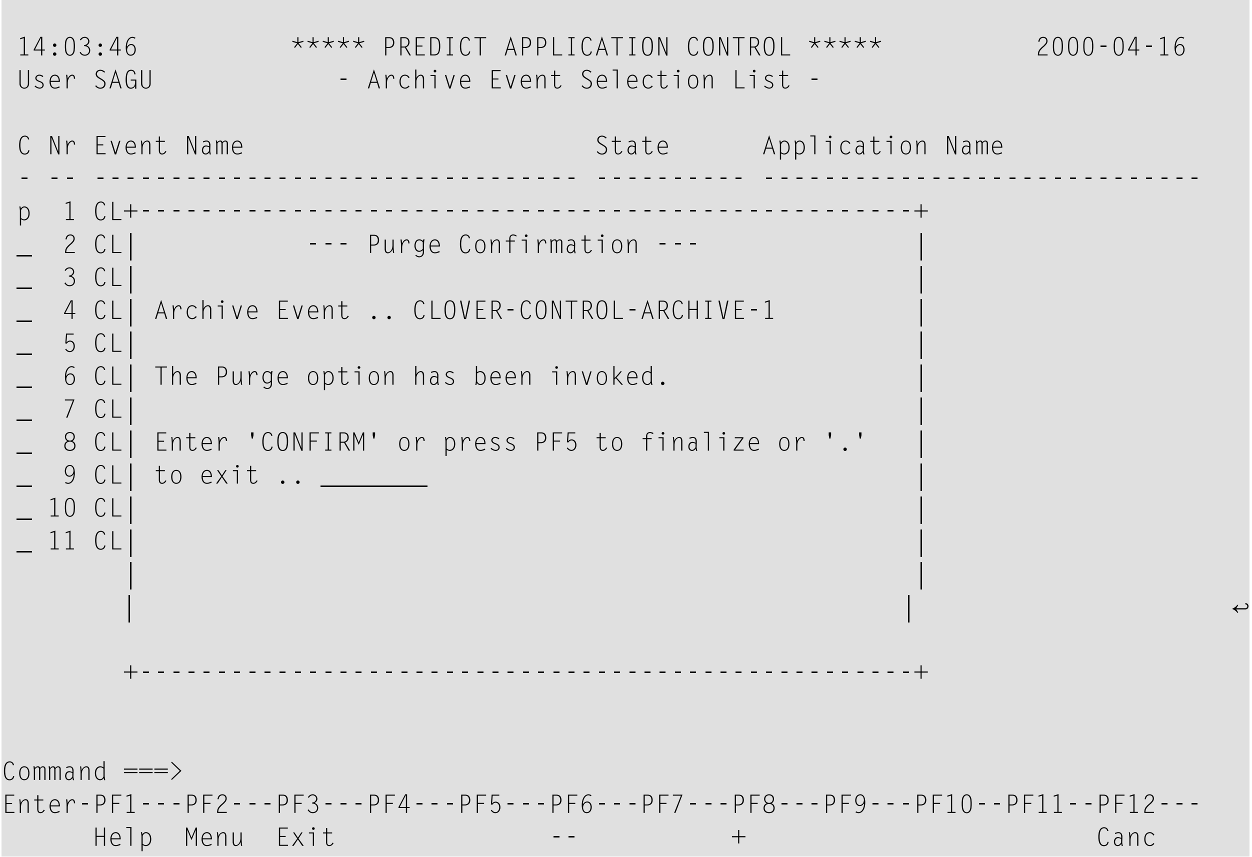
```
 14:03:46          ***** PREDICT APPLICATION CONTROL *****          2000-04-16
 User SAGU            - Archive Event Selection List -

 C Nr Event Name                       State      Application Name
 - -- -------------------------------- ---------- -----------------------------
 _  1 CL+---------------------------------------------------+
 _  2 CL|        --- Finalize Confirmation ---              |
 f  3 CL|                                                   |
 _  4 CL| Archive Event .. CLOVER-CONTROL-ARCHIVE-11        |
 _  5 CL|                                                   |
 _  6 CL| The Finalize option has been invoked.             |
 _  7 CL|                                                   |
 _  8 CL| Enter 'CONFIRM' or press PF5 to finalize or '.'   |
 _  9 CL| to exit .. _______                                |
 _ 10 CL|                                                   |
 _ 11 CL| Verify Default parameters before continuing ...   |
        |                                                   |
        | Batch/Online .. B                                 |
        | Job ........... BS2_BATCH_JCL___________________  |
        |                                                  |                     ↩

        +---------------------------------------------------+

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Finalization can be performed online or in batch. Specify O(nline) or B(atch) in the Batch/Online field of the window. If you select B(atch), the name of a JCL text in the ACF system file must be specified in the "Job" field. The sample JCL texts provided by Software AG are called ..._BATCH_JCL. The @PAC-REQUEST parameter receives the value "ARCFINAL <event name>".

Enter CONFIRM or press PF5 to finalize an event. To exit the window without finalizing the archive event, enter a period (.) or press PF3 (Exit) or PF12 (Cancel)

Purge Archive Event

Choose P from the Archive Event Maintenence Menu. P(urge) produces a Purge Confirmation window:



```
 14:03:46          ***** PREDICT APPLICATION CONTROL *****          2000-04-16
 User SAGU            - Archive Event Selection List -

 C Nr Event Name                        State      Application Name
 - -- -------------------------------- ---------- ----------------------------
 p  1 CL+----------------------------------------------------+
 _  2 CL|           --- Purge Confirmation ---               |
 _  3 CL|                                                    |
 _  4 CL| Archive Event .. CLOVER-CONTROL-ARCHIVE-1          |
 _  5 CL|                                                    |
 _  6 CL| The Purge option has been invoked.                 |
 _  7 CL|                                                    |
 _  8 CL| Enter 'CONFIRM' or press PF5 to finalize or '.'    |
 _  9 CL| to exit .. _______                                 |
 _ 10 CL|                                                    |
 _ 11 CL|                                                    |
        |                                                    |
        |                                                   |                     ↩

        +----------------------------------------------------+


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Enter CONFIRM or press PF5 to purge an event whose entry is marked with a P in the Archive Event Selection List. Press PF3 to return to the Archive Event Selection List screen or to apply the next function specified in a C field of the Archive Event Selection List screen without purging the event.

After a completed archiving event has been purged, the work file it produced cannot be used by any restoration event.

To finalize or purge an event

- use option F or P on the Archive Event Maintenance Menu or
- use option S and, in column "C", select F or P.

17

Authorizing and Submitting a Migration Event

- Authorizing a Migration Event 242
- Submitting a Migration Event 249
- Backing Out an Incomplete Migration Event 256
- Migration Event Audit Report 256
- Migration Processing and Monitoring 260

After a migration event is defined, it may be authorized and then submitted as described in the following sections.

This chapter covers the following topics:

Authorizing a Migration Event

Before a migration event can be submitted, it must be authorized by the authorizer(s) assigned on the migration path. Refer to **Migration Paths** for information about designating authorizers.

Only a migration event with a processing state of Pending or Validated can be authorized. The authorization request takes a Pending event through the Validated state automatically.

Migration events may be authorized

- online from the Modify Event screen;
- in batch mode using commands; or
- by using Application Program Interface (API) calls.

Refer to the PAC Reference documentation for more information about APIs.

Removing an Authorization

If an attempt is made to update a migration event that has been authorized, a warning message is issued and the update is interrupted until the authorization(s) has been removed.

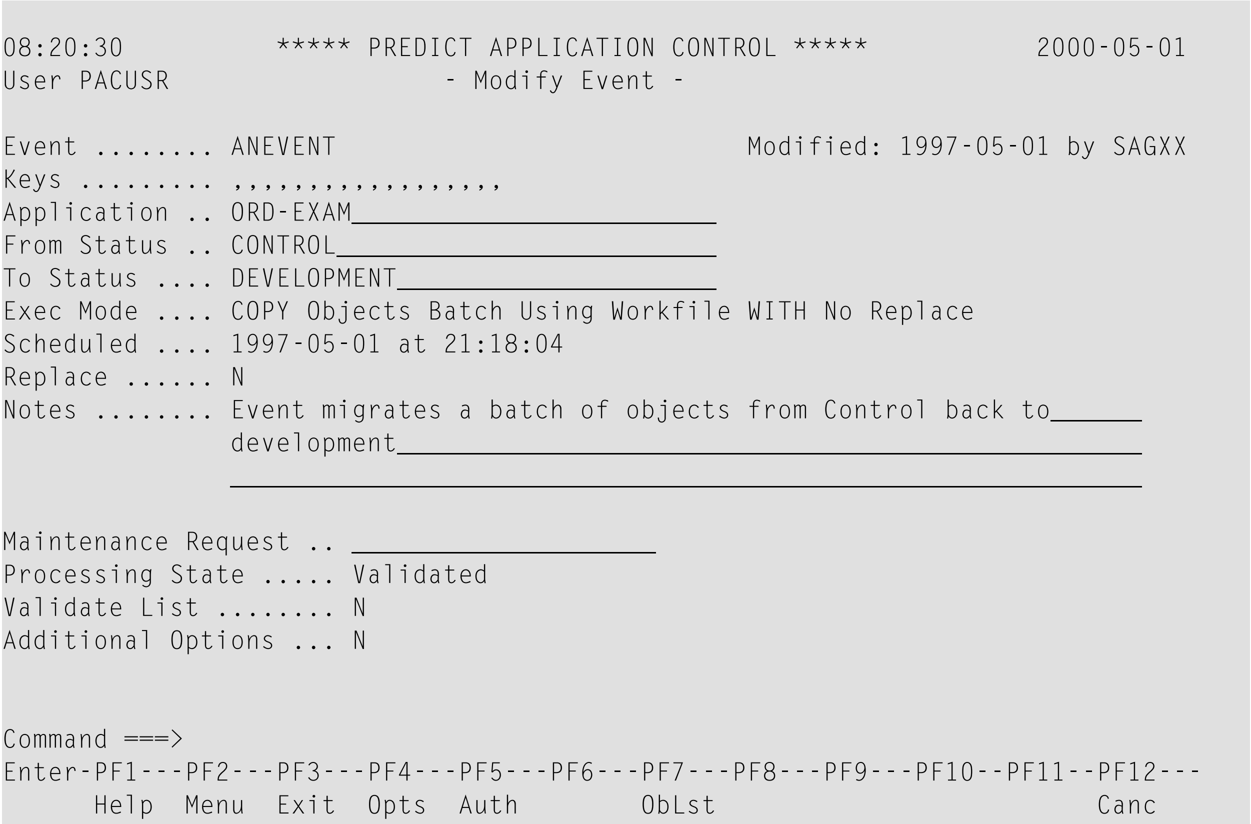
To remove an authorization, type Y (Yes) in the window that contains the error message.

Authorizing a Migration Event

Step 1. Accessing the Modify Event Screen

On the Migration Event Menu, enter Code M (Modify an Event) and the name of the migration event you wish to modify.

The Modify Event screen appears:



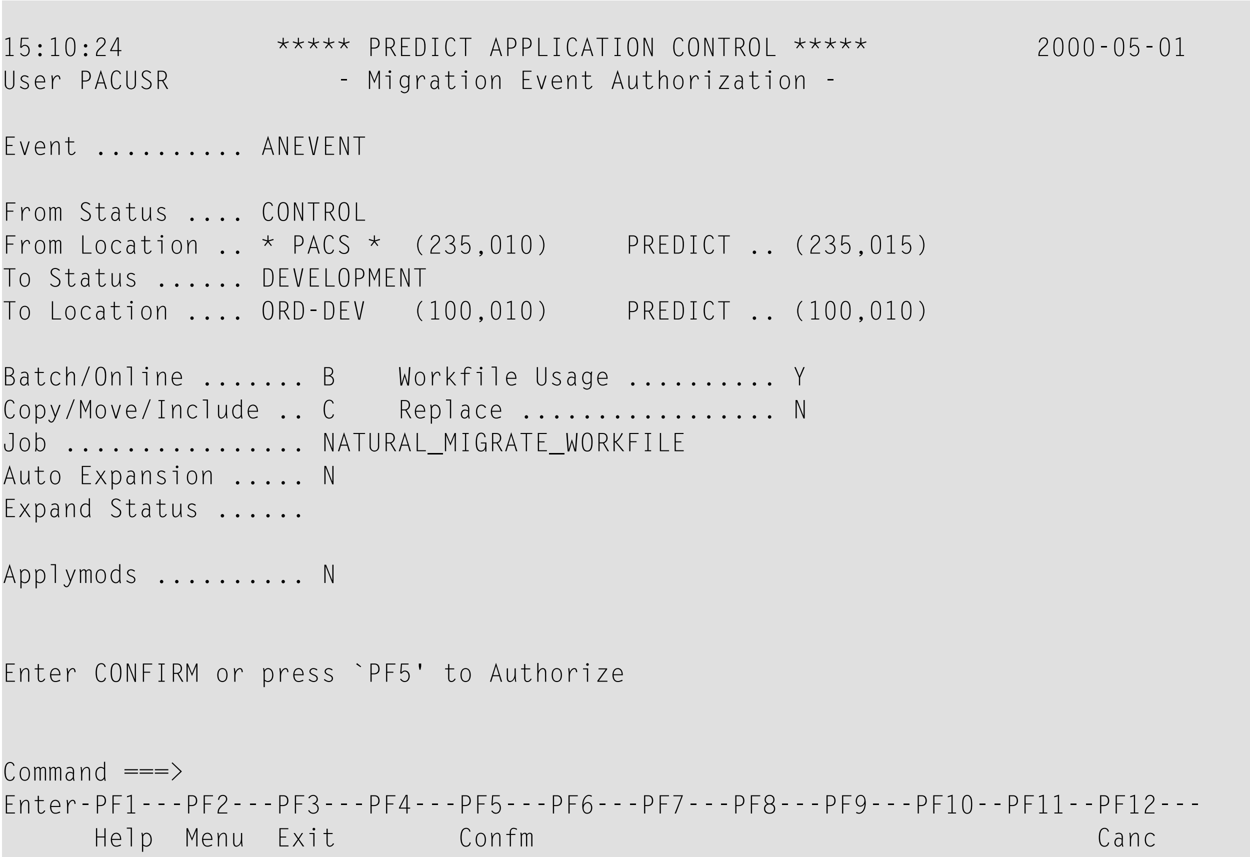
```
08:20:30         ***** PREDICT APPLICATION CONTROL *****          2000-05-01
User PACUSR                  - Modify Event -

Event ........ ANEVENT                          Modified: 1997-05-01 by SAGXX
Keys ......... ,,,,,,,,,,,,,,,,,,
Application .. ORD-EXAM_________________________
From Status .. CONTROL__________________________
To Status .... DEVELOPMENT______________________
Exec Mode .... COPY Objects Batch Using Workfile WITH No Replace
Scheduled .... 1997-05-01 at 21:18:04
Replace ...... N
Notes ........ Event migrates a batch of objects from Control back to______
               development_________________________________________________
               ____________________________________________________________

Maintenance Request .. ____________________
Processing State ..... Validated
Validate List ........ N
Additional Options ... N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts  Auth        ObLst                         Canc
```

Note: The PF5 (Auth) key does not appear on the Modify Event screen if you are not allowed to authorize the event. Possible reasons can be that permission is not granted, or the Separate Authority option is in effect.

Step 2. Accessing the Migration Event Authorization Screen

On the Modify Event screen, press PF5 (Auth), or enter AUTH on the command line.

The Migration Event Authorization screen appears:



```
15:10:24          ***** PREDICT APPLICATION CONTROL *****           2000-05-01
User PACUSR            - Migration Event Authorization -

Event .......... ANEVENT

From Status .... CONTROL
From Location .. * PACS *  (235,010)     PREDICT .. (235,015)
To Status ...... DEVELOPMENT
To Location .... ORD-DEV   (100,010)     PREDICT .. (100,010)

Batch/Online ....... B    Workfile Usage .......... Y
Copy/Move/Include .. C    Replace ................. N
Job ................ NATURAL_MIGRATE_WORKFILE
Auto Expansion ..... N
Expand Status ......

Applymods .......... N


Enter CONFIRM or press `PF5' to Authorize


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit        Confm                                     Canc
```

The values for the attributes on the Migration Event Authorization screen were set when the migration path was defined.

The following attributes cannot be modified on this screen:

- name of the migration event to be authorized;
- origin and destination statuses and their locations;
- origin and destination locations of the Predict objects.
- physical location of foreign datasets.

The attributes described in the following table are modifiable depending on the migration path (From/To statuses):

Attribute	Description
Applymods	Applymods in effect for the current migration event.
Auto Expansion	The type of object expansion to be performed.
Batch/Online	Whether the job is to be run in batch or online. The execution mode (batch/online) options were specified when the migration path was defined.
Copy/Move/ Include	Copy/move/include options.

Attribute	Description
Expand Status	(Optional) The name of the Expand status.
Job	The job name for a batch migration.
Replace	Y indicates that objects that exist in the destination status are to be overridden (replaced) with the object being migrated. N indicates that objects are not to be replaced.
Workfile Usage	Y indicates that objects are to be unloaded to an intermediate work file during event processing. N indicates that objects are to be migrated directly without using an intermediate work file. This is not valid for Predict objects. For Predict migrations, Workfile Usage is not applicable/displayed. This attribute is protected in some cases, for example, for migration paths Control to Archive, or Archive to Control.
Translation Table	(If applicable) The translation table (FTT) to be used when objects are migrated into the application status.

Switch for Authorization

Alignment events (from CONTROL to CONTROL) and events of migrations from neighbour statuses to CONTROL provide a new tripositional switch - Catalogue - to be set at authorisation time:

D	default value Natural objects will be catalogued only if they have been previously catalogued
N	Natural objects will not be catalogued
Y	Natural objects will be cataloqued regardless of how they have been immigrated into PAC

Step 3. Specifying Online or Batch

Specify whether the migration event is to be run online (O) or in batch (B).

If batch is specified, a job name must be supplied in the Migration Job field.

Note: Predict application migrations and Archive events must always run in batch.

Step 4. Specifying a Work File for a Batch Migration

For batch migration, specify Y if a work file is to be used during migration; if not, specify N.

Note: For Archive migrations, Y must be specified.

Step 5. Specifying a Job

A job name must be provided for batch migration; otherwise, the event cannot be authorized. You may override the job name, if necessary. For more information on jobs, see **Appendix B**.

Step 6. Specifying Copy, Move, or Include

In the Copy/Move/Include field, enter the following:

Enter...	If...
C	objects are to be copied from the origin status. When input is from a work file, C is always used for origin statuses of Archive, Control, Incorporation, production and development status types.
M	objects are to be moved from the origin status. For Archive and Retire status types, M is always specified and the field protected.
I	the origin status input is to be included from a previously created work file. This is valid only for batch events with an origin status type of development or incorporation.

Step 7. (Optional) Specifying Auto Expansion and Expand Status

Enter a valid auto-expansion type in the Auto Expansion field as follows:

Code	Type of Expansion
C	Include all subordinates (compile time objects: data areas, copy code, maps, and views).
E	Include all subordinate and referenced objects (combination of R and C).
R	Include referenced objects (programs, maps, subprograms, subroutines, help routines, GDAs).
U	Include Used By objects (objects that use or reference the object).
N	Do not auto-expand.

For detailed information about valid auto-expansion types, refer to **Creating and Validating an Object List**.

If you entered an auto-expansion type, enter the Expand status in the Expand Status field.

Step 8. (Optional) Specifying a File Translation Table (FTT)

In the Translation Table field, enter the name of the FTT to be used when the objects are migrated.

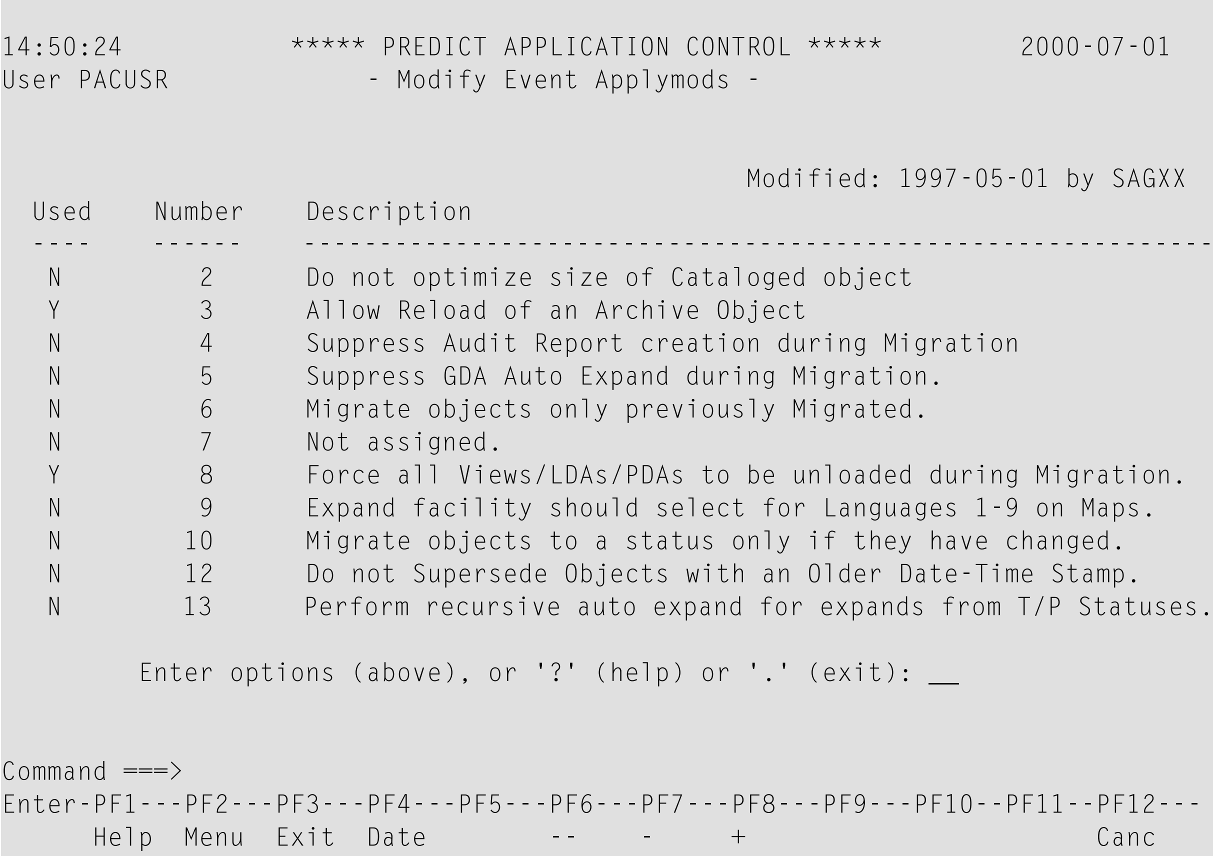
The database and file numbers will be changed in the Natural object to conform with the physical environment.

Step 9. (Optional) Switching On Applymods

Applymods for a migration event are determined at the time the migration event is created.

1. In the Applymods field, enter Y (Yes) to access a list of applymods.

   The Modify Event Applymods screen appears as shown in the following example:



```
14:50:24           ***** PREDICT APPLICATION CONTROL *****         2000-07-01
User PACUSR             - Modify Event Applymods -


                                                 Modified: 1997-05-01 by SAGXX
  Used    Number    Description
  ----    ------    ------------------------------------------------------------
   N         2      Do not optimize size of Cataloged object
   Y         3      Allow Reload of an Archive Object
   N         4      Suppress Audit Report creation during Migration
   N         5      Suppress GDA Auto Expand during Migration.
   N         6      Migrate objects only previously Migrated.
   N         7      Not assigned.
   Y         8      Force all Views/LDAs/PDAs to be unloaded during Migration.
   N         9      Expand facility should select for Languages 1-9 on Maps.
   N        10      Migrate objects to a status only if they have changed.
   N        12      Do not Supersede Objects with an Older Date-Time Stamp.
   N        13      Perform recursive auto expand for expands from T/P Statuses.

         Enter options (above), or '?' (help) or '.' (exit): __


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Date        --    -     +                       Canc
```

The Used column on the Modify Event Applymods screen is described as follows:

Code	Explanation
Y (A)	The applymod is active for the event. This field is protected because he PAC administrator has set this applymod to A (activated), therefore, Y cannot be overridden.
N	No, but can be overridden.
Y	Yes, but can be overridden.

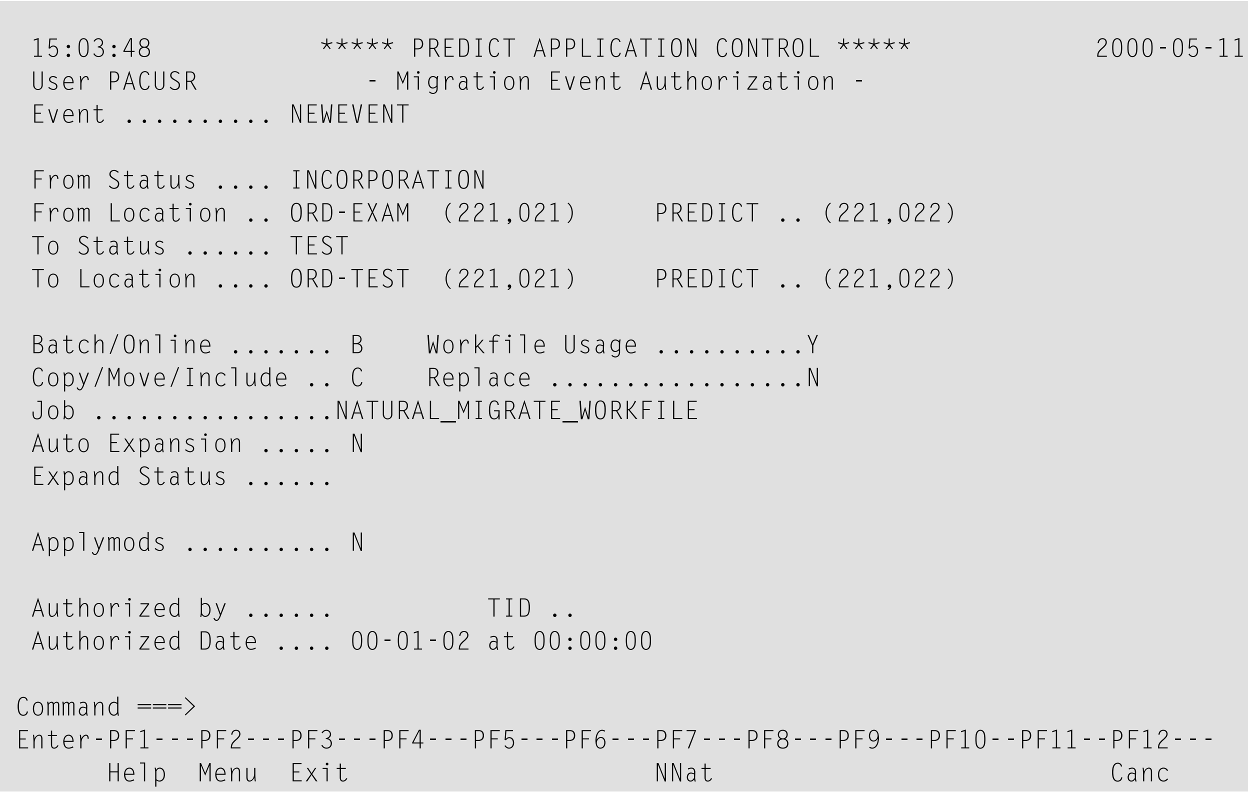
Code	Explanation
N (D)	The applymod is not active for the event. (This field is protected because the PAC administrator has set this applymod to D (deactivated), therefore, N cannot be overridden.

2. Type Y (Yes) over the default in the Used column for each applymod to be switched on during processing of this migration event; then press ENTER to confirm.
3. Press PF3 to return to the Migration Event Authorization screen.

Step 10. Authorizing the Event

On the Migration Event Authorization screen, enter Confirm and press ENTER, or press PF5, to authorize the migration event. The message "Migration event has been authorized" appears on the Migration Event Menu screen.

Displaying Migration Event Authorization Information



```
 15:03:48           ***** PREDICT APPLICATION CONTROL *****            2000-05-11
 User PACUSR           - Migration Event Authorization -
 Event .......... NEWEVENT

 From Status .... INCORPORATION
 From Location .. ORD-EXAM  (221,021)     PREDICT .. (221,022)
 To Status ...... TEST
 To Location .... ORD-TEST  (221,021)     PREDICT .. (221,022)

 Batch/Online ....... B    Workfile Usage ..........Y
 Copy/Move/Include .. C    Replace .................N
 Job ................NATURAL_MIGRATE_WORKFILE
 Auto Expansion ..... N
 Expand Status ......

 Applymods .......... N

 Authorized by ......          TID ..
 Authorized Date .... 00-01-02 at 00:00:00

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                    NNat                          Canc
```

Information about the migration event authorization is displayed on the Migration Event Authorization screen above. The Migration Event Authorization screen displays the following:

Field	Description
Workfile Usage	Work file usage option Whether the objects in the object list are to be unloaded to a work file.
Job	Batch migration event job name.

Field	Description
Auto Expansion	Whether the auto expansion facility was selected for the object list.
Expand Status	The name of the Expand status (if specified).
Applymods	Applymods migration event authorization Applymods used. Type Y over the N default to display the applymods for this migration event.
Authorized By	User ID and terminal ID number of the user who authorized the job.
Authorized Date	Date and time the event was authorized.

Submitting a Migration Event

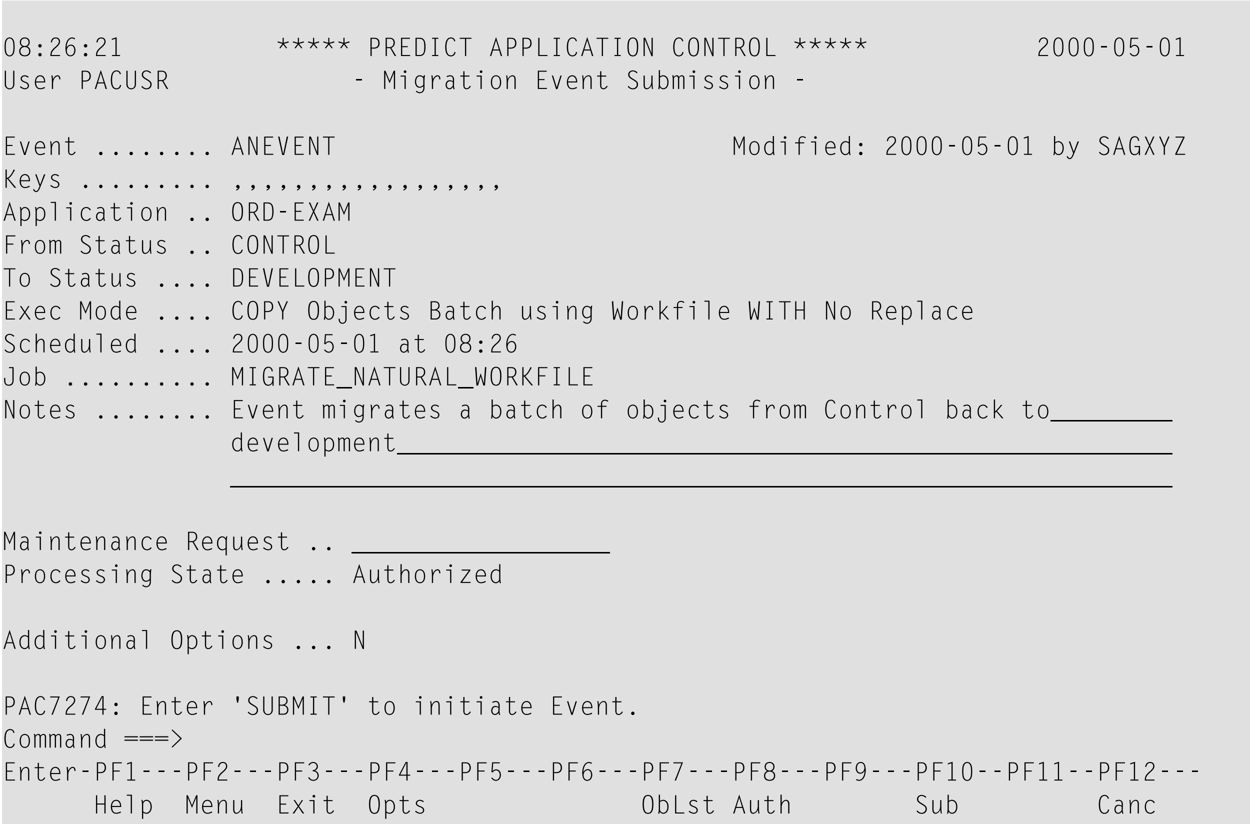
Migration events may be submitted in batch or online from the Migration Event Submission screen; or in batch using direct commands (in an MVS environment only). PAC supplies an applymod for submitting migration events. You may also use an API to submit an event.

Using the Migration Event Submission Screen

Step 1. Accessing the Migration Event Submission Screen

Enter Code U (Submit a Migration Event for Processing) and the appropriate migration event name on the Migration Event Menu.

The Migration Event Submission screen appears:



```
08:26:21          ***** PREDICT APPLICATION CONTROL *****          2000-05-01
User PACUSR            - Migration Event Submission -

Event ........ ANEVENT                          Modified: 2000-05-01 by SAGXYZ
Keys ......... ,,,,,,,,,,,,,,,,,,
Application .. ORD-EXAM
From Status .. CONTROL
To Status .... DEVELOPMENT
Exec Mode .... COPY Objects Batch using Workfile WITH No Replace
Scheduled .... 2000-05-01 at 08:26
Job .......... MIGRATE_NATURAL_WORKFILE
Notes ........ Event migrates a batch of objects from Control back to________
               development___________________________________________________
               ______________________________________________________________

Maintenance Request .. _________________
Processing State ..... Authorized

Additional Options ... N

PAC7274: Enter 'SUBMIT' to initiate Event.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              ObLst Auth        Sub         Canc
```

The Migration Event Submission screen example above indicates a batch submission: The Exec Mode field specifies "COPY Objects Batch Using Workfile...", and the job for the batch migration is also displayed.

For online events, the Exec Mode field would indicate the type of online migration (for example, Copy Objects Online WITH Replace), and the Job field would not be displayed.

You may not modify the fields on this screen, but you may access the Additional Options to review information about the event before submitting it, including the object list, authorization information, job information.

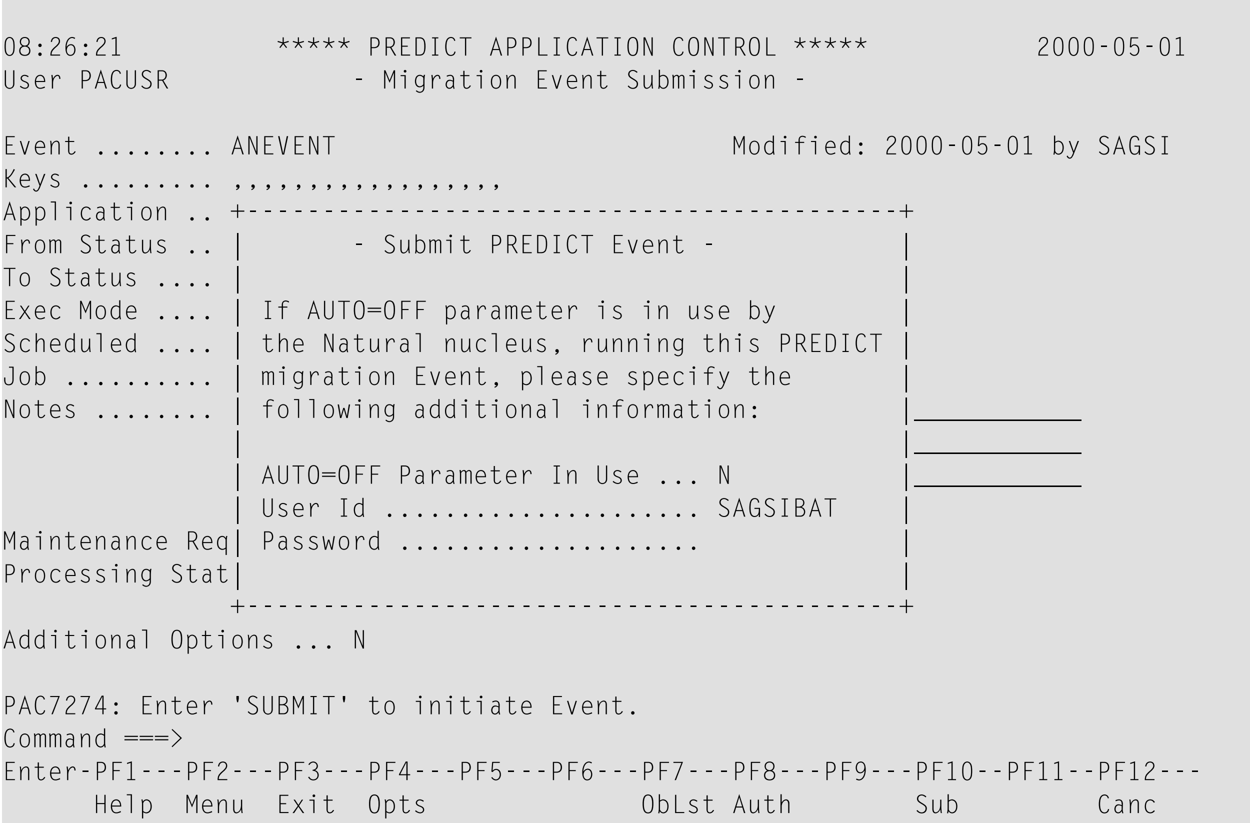
The PF7 (ObLst) key allows you to display the object list directly. The PF8 (Auth) key displays the Migration Event Authorization screen where you can review/modify applymods associated with the migration event.

Note: For a nonproduction event, if the schedule date is set for a future time, the event will not be submitted. The message "Submit not possible - check schedule date" is displayed on the Migration Event screen.

Step 2. Submitting the Event

Batch Mode

When submitting a Predict event, the Submit Predict Event window appears:

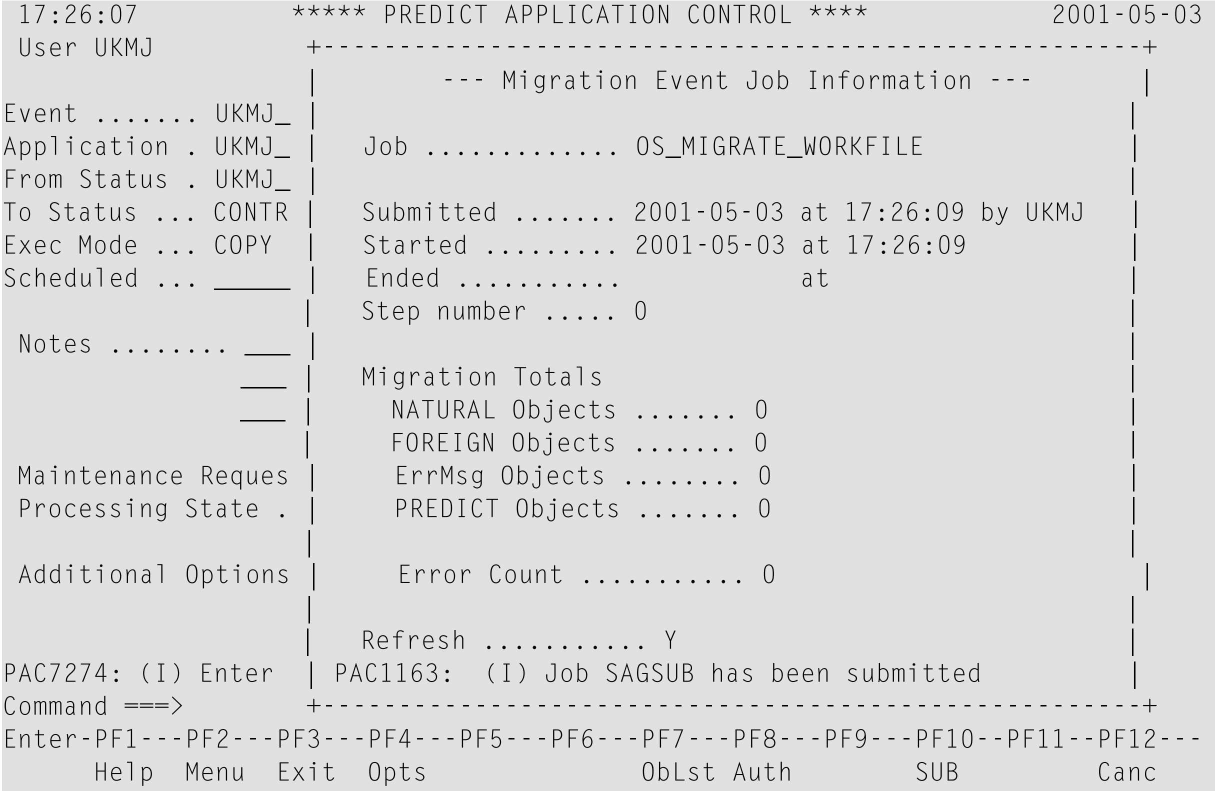


```
08:26:21          ***** PREDICT APPLICATION CONTROL *****           2000-05-01
User PACUSR            - Migration Event Submission -

Event ........ ANEVENT                          Modified: 2000-05-01 by SAGSI
Keys ......... ,,,,,,,,,,,,,,,,,,
Application .. +-------------------------------------------+
From Status .. |       - Submit PREDICT Event -            |
To Status .... |                                           |
Exec Mode .... | If AUTO=OFF parameter is in use by        |
Scheduled .... | the Natural nucleus, running this PREDICT |
Job .......... | migration Event, please specify the       |
Notes ........ | following additional information:         |___________
               |                                           |___________
               | AUTO=OFF Parameter In Use ... N           |___________
               | User Id ..................... SAGSIBAT    |
Maintenance Req| Password ....................             |
Processing Stat|                                           |
               +-------------------------------------------+
Additional Options ... N

PAC7274: Enter 'SUBMIT' to initiate Event.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              ObLst Auth        Sub         Canc
```

If running in a Natural Security environment, you may specify required security options. The AUTO=OFF parameter can be set for all steps of the migration. If AUTO=OFF is specified, all steps must be performed in a security environment; also, the user ID and password must be specified.

1. Enter SUBMIT on the command line, or press PF10 (Sub).

   When the job is accepted for processing, the Migration Event Job Information window appears:



```
 17:26:07          ***** PREDICT APPLICATION CONTROL ****          2001-05-03
 User UKMJ          +-------------------------------------------------------+
                    |        --- Migration Event Job Information ---        |
Event ....... UKMJ_ |                                                       |
Application . UKMJ_ |   Job ............. OS_MIGRATE_WORKFILE               |
From Status . UKMJ_ |                                                       |
To Status ... CONTR |   Submitted ....... 2001-05-03 at 17:26:09 by UKMJ    |
Exec Mode ... COPY  |   Started ......... 2001-05-03 at 17:26:09            |
Scheduled ... _____ |   Ended ...........            at                     |
                    |   Step number ..... 0                                 |
 Notes ........ ___ |                                                       |
                ___ |   Migration Totals                                    |
                ___ |     NATURAL Objects ....... 0                         |
                    |     FOREIGN Objects ....... 0                         |
 Maintenance Reques |     ErrMsg Objects ........ 0                         |
 Processing State . |     PREDICT Objects ....... 0                         |
                    |                                                       |
 Additional Options |     Error Count ........... 0                         |
                    |                                                       |
                    |   Refresh ........... Y                               |
PAC7274: (I) Enter  | PAC1163:  (I) Job SAGSUB has been submitted           |
Command ===>        +-------------------------------------------------------+
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              ObLst Auth        SUB         Canc
```

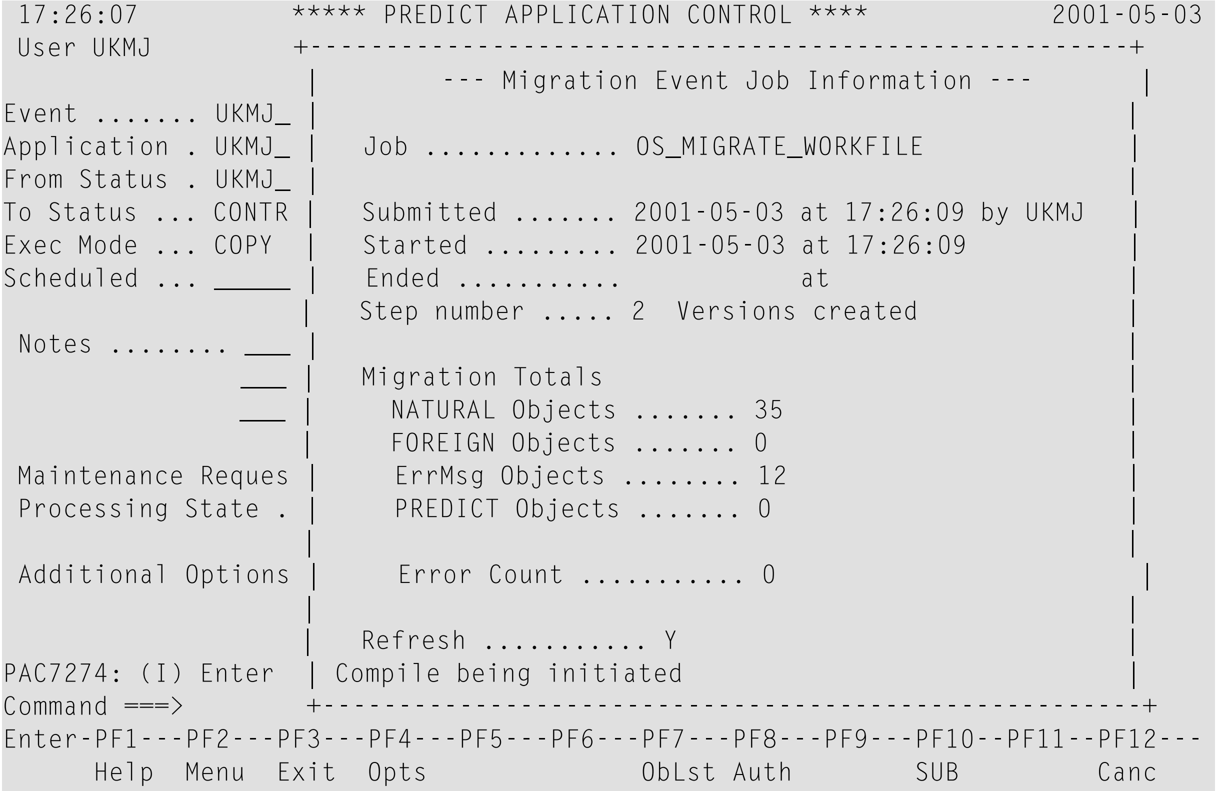
The information on the screen indicates that a batch job has been submitted to migrate objects using a work file.

The Migration Event Job Information windows displays the following information:

- The name of the job used to process the migration event.
- The date and time the job started and ended; incomplete information in the Ended field indicates that the job is in process.
- The Step Number field displays each step number completed as the job progresses.
- In the Migration Totals fields, the totals for Natural, Predict and user error message objects; and the number of errors detected; incomplete information in these fields indicates that the job is in process.

2. To follow the progress of the batch migration event job, enter Y (Yes) in the Refresh field.

   An updated Migration Event Job Information window is displayed:



```
 17:26:07          ***** PREDICT APPLICATION CONTROL ****          2001-05-03
 User UKMJ        +-------------------------------------------------------+
                   |        --- Migration Event Job Information ---       |
Event ....... UKMJ_ |                                                      |
Application . UKMJ_ |   Job ............ OS_MIGRATE_WORKFILE               |
From Status . UKMJ_ |                                                      |
To Status ... CONTR |   Submitted ....... 2001-05-03 at 17:26:09 by UKMJ   |
Exec Mode ... COPY  |   Started ......... 2001-05-03 at 17:26:09           |
Scheduled ... _____ |   Ended ...........            at                    |
                    |   Step number ..... 2  Versions created              |
 Notes ........ ___ |                                                      |
                ___ |   Migration Totals                                   |
                ___ |     NATURAL Objects ....... 35                       |
                    |     FOREIGN Objects ....... 0                        |
 Maintenance Reques |     ErrMsg Objects ........ 12                       |
 Processing State . |     PREDICT Objects ....... 0                        |
                    |                                                      |
 Additional Options |     Error Count ........... 0                        |
                    |                                                      |
                    |   Refresh ........... Y                              |
PAC7274: (I) Enter  | Compile being initiated                              |
Command ===>        +------------------------------------------------------+
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              ObLst Auth        SUB         Canc
```

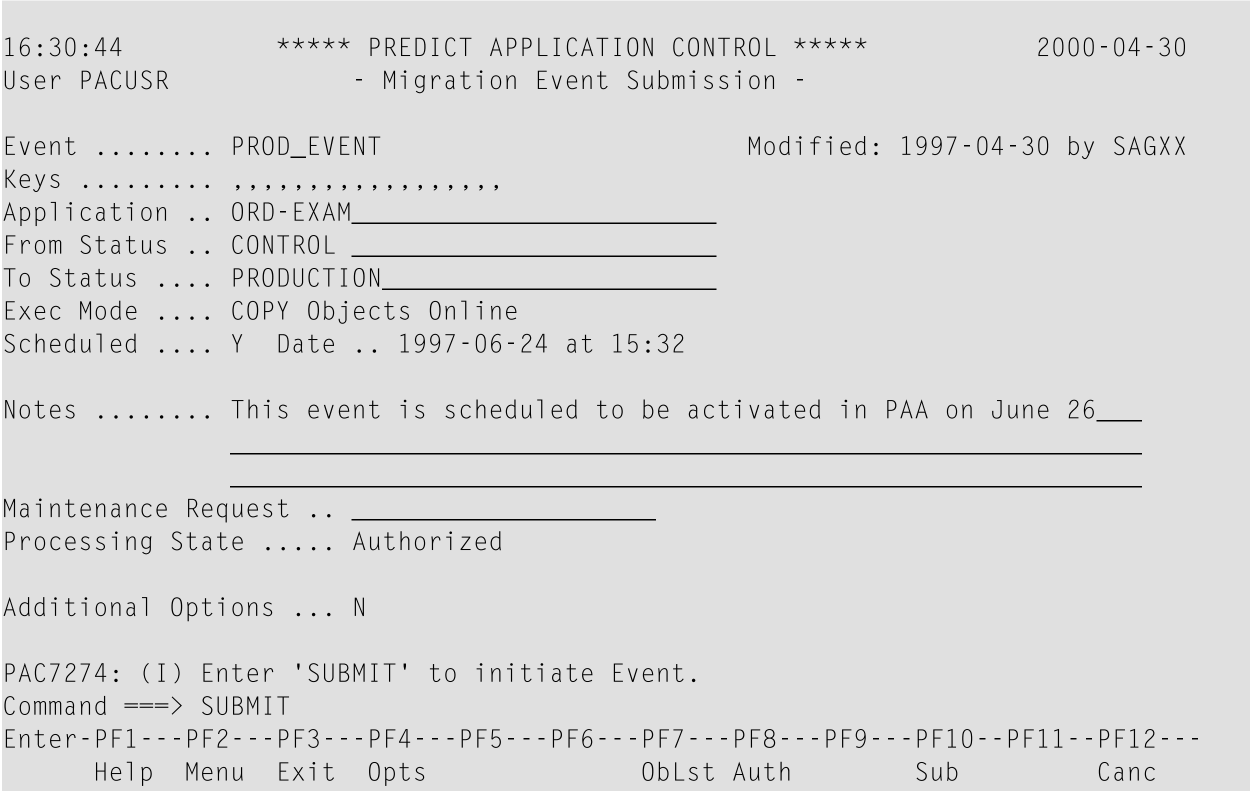
The Step Number field and the totals in the Migration Totals fields are updated as each step is completed. The audit message at the bottom of the screen (in this example, "Compile being initiated") is also refreshed.

3. Continue to press ENTER to refresh the information until the job ends. The end of the job is indicated by information in the Ended field and "7 Completed" in the Step Number field.
4. Type N over the Y in the Refresh field, then press ENTER to return to the Migration Event Submission Menu screen where the message "Migration event successfully submitted" is displayed.

If a job ABENDs or does not complete successfully, review the audit report of the job, correct the error, and restart the job. PAC determines the point of restart and continues processing at this point.

Online Submission

The following Migration Event Submission screen is an example of the screen on which online migration events are submitted:



```
16:30:44          ***** PREDICT APPLICATION CONTROL *****           2000-04-30
User PACUSR            - Migration Event Submission -

Event ........ PROD_EVENT                        Modified: 1997-04-30 by SAGXX
Keys ......... ,,,,,,,,,,,,,,,,,,
Application .. ORD-EXAM________________________
From Status .. CONTROL ________________________
To Status .... PRODUCTION______________________
Exec Mode .... COPY Objects Online
Scheduled .... Y  Date .. 1997-06-24 at 15:32

Notes ........ This event is scheduled to be activated in PAA on June 26___
               ____________________________________________________________
               ____________________________________________________________
Maintenance Request .. ____________________
Processing State ..... Authorized

Additional Options ... N

PAC7274: (I) Enter 'SUBMIT' to initiate Event.
Command ===> SUBMIT
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts              ObLst Auth        Sub         Canc
```

Note that the Exec Mode field specifies "COPY Objects Online".

1. Enter SUBMIT on the command line, or press PF10 (Sub).

   The Migration Event Processing screens, as seen in the following two examples, show the progress of the online migration.

```
15:11:31           ***** PREDICT APPLICATION CONTROL *****                ↩
2000-07-23
User PACUSR              - Event Migrate Processing -

Event Name ... JRBW_TST_TO_PRD_01
Application .. JRBW_EAS
From Status .. TEST                          Lib .. JRBW-TST (238,028)
To Status .... PRODUCTION                    Lib .. JRBW-PRD (238,028)
PAC6902: (A) Migration initiated at 1997-07-23 15:11 by SAGSI
PAC6905: (A) ACF system file assignment .. (238,083)
PAC6905: (A) PCF system file assignment .. (238,084)
PAC6920: (A) COPY Objects Online
PAC6904: (A) Applymods in effect for Migration .... (2,3,8,14,16)
*
PAC7020: (W) Application Lock applied at 1997-07-23 15:11.
PAC6903: (A) StepNo 1  completed at 1997-07-23 15:11:31
PAC7497: (A) GDA AutoExpand active for this Event.
PAC7498: (W) GDA AutoExpand has not added objects to List.
PAC6902: (A) Ver Lock  initiated at 1997-07-23 15:11:32
PAC7080: (A) EAS-PROC.0002 (Proc) -- Locked
PAC7080: (A) EASFRAME.0002 (Map) -- Locked
PAC7080: (A) EASGDA.0002 (Global) -- Locked
PAC7080: (A) EASINCC.0002 (Map) -- Locked
PAC7080: (A) EASINCCI.0002 (Map) -- Locked
MORE
```

```
MORE 15:19:33       ***** PREDICT APPLICATION CONTROL *****         2000-07-23
User PACUSR              - Event Migrate Processing -

Event Name ... JRBW_DEV_TO_PRD_01
Application .. JRBW_EAS
From Status .. DEVELOPMENT                   Lib .. JRBW-DEV (238,028)
To Status .... PRODUCTION                    Lib .. * PACS * (238,084)

PAC6902: (A) Create Version initiated at 1997-07-23 15:19
PAC7051: (W) New version NOT required for EASGDA (Global).
PAC7057: (A) EASINPGM.0003 (Progrm) -- created.
PAC7057: (A) EASMNMEN.0003 (Map) -- created.
PAC7057: (A) EASMNPGM.0003 (Progrm) -- created.
PAC7057: (A) EASMTPGM.0003 (Progrm) -- created.
PAC7053: (A) 5 Natural objects processed.
PAC6903: (A) Create Version completed at 1997-07-23 15:19
PAC6902: (A) Precomple initiated at 1997-07-23 15:19:40
PAC6906: (A) Compile List deleted at 1997-07-23 15:19:40
PAC7054: (A) 4 Natural objects to be Compiled.
PAC6903: (A) Precomple completed at 1997-07-23 15:19:40

MORE
```

2. When the migration event has completed processing, press ENTER to return to the Display Event screen.

   If a job ABENDs or does not complete successfully, review the audit report of the job, correct the error, and restart the job. It is possible to restart a job (PAC determines the point of restart and continues processing at this point); or rerun the job from the beginning after the job has been backed out and then refreshed.

Backing Out an Incomplete Migration Event

Once a migration event has been started, the application is locked and no other event for this application can proceed until the first migration event has been completed and unlocked.

If a migration event cannot be completed (for example, the database from which it is reading becomes inactive), then it may be backed out (aborted). This action will reverse any changes made, and will update the migration event itself with a step of "8" (migration event backed out).

The following methods can be used to access locked data:

- The UNLOCK command accesses a list of migration events that a user is authorized (in the user profile) to unlock;
- The PAC administrator may invoke the "Release Locked Data" function.

Note that at Step 6, no backout/release is possible.

Migration Event Audit Report

An audit report is created when a migration event is being processed. The report gives a detailed listing of all actions that take place and any errors that occur in the form of PAC messages.

The audit report allows you to view information about a migration event from the time processing starts to the time it is completed/backed out/purged. Audit reports provide information about the status of migration events and the validity (occurrences and actions performed) of PAC migrations.

When the event is submitted, the resulting audit report may also be viewed as part of a batch report. The information in the audit report for the batch job may contain additional statistics or other audit information.

For example, during the compile process, the batch report provides a complete listing of all objects included in the compile; the audit report, on the other hand, retains information only about those objects that did not compile successfully.

Displaying the Audit Report

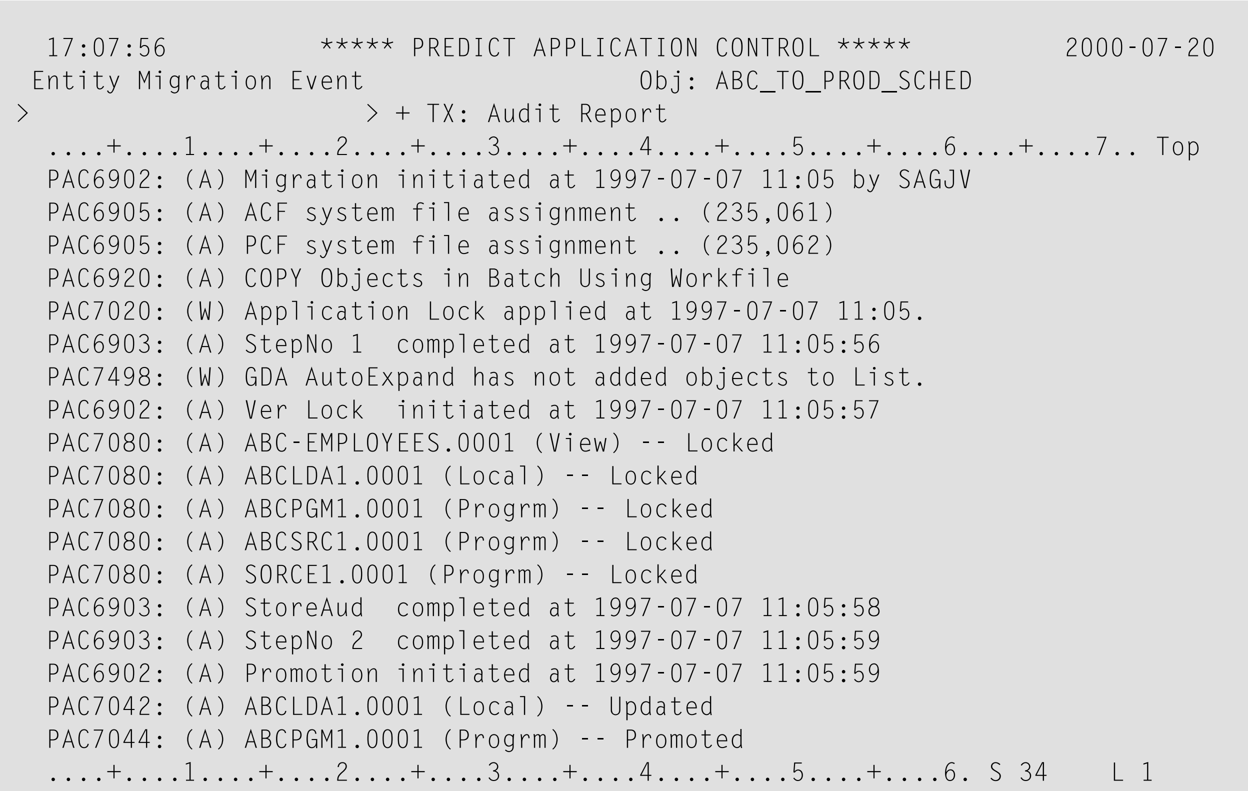
Audit reports are available only for events which have been completed, backed out or purged.

To access the Audit Report, use Code R (Display Audit Report of Event) on the Migration Event Menu.

You may also access the Audit Report directly with the PF9 (Audit) key on the Display Migration Event screen, or in the Additional Options of the Display Migration Event screen.

The audit report is displayed on the Natural editor screen as shown in the following two examples.

Screen 1:



```
  17:07:56          ***** PREDICT APPLICATION CONTROL *****         2000-07-20
 Entity Migration Event                  Obj: ABC_TO_PROD_SCHED
>                     > + TX: Audit Report
  ....+....1....+....2....+....3....+....4....+....5....+....6....+....7.. Top
  PAC6902: (A) Migration initiated at 1997-07-07 11:05 by SAGJV
  PAC6905: (A) ACF system file assignment .. (235,061)
  PAC6905: (A) PCF system file assignment .. (235,062)
  PAC6920: (A) COPY Objects in Batch Using Workfile
  PAC7020: (W) Application Lock applied at 1997-07-07 11:05.
  PAC6903: (A) StepNo 1  completed at 1997-07-07 11:05:56
  PAC7498: (W) GDA AutoExpand has not added objects to List.
  PAC6902: (A) Ver Lock  initiated at 1997-07-07 11:05:57
  PAC7080: (A) ABC-EMPLOYEES.0001 (View) -- Locked
  PAC7080: (A) ABCLDA1.0001 (Local) -- Locked
  PAC7080: (A) ABCPGM1.0001 (Progrm) -- Locked
  PAC7080: (A) ABCSRC1.0001 (Progrm) -- Locked
  PAC7080: (A) SORCE1.0001 (Progrm) -- Locked
  PAC6903: (A) StoreAud  completed at 1997-07-07 11:05:58
  PAC6903: (A) StepNo 2  completed at 1997-07-07 11:05:59
  PAC6902: (A) Promotion initiated at 1997-07-07 11:05:59
  PAC7042: (A) ABCLDA1.0001 (Local) -- Updated
  PAC7044: (A) ABCPGM1.0001 (Progrm) -- Promoted
  ....+....1....+....2....+....3....+....4....+....5....+....6. S 34    L 1
```

Screen 2:

```
 17:11:46          ***** PREDICT APPLICATION CONTROL *****          2000-07-20
 Entity Migration Event                  Obj: ABC_TO_PROD_SCHED
>                      > + TX: Audit Report
  ....+....1....+....2....+....3....+....4....+....5....+....6....+....7.. Bot
  PAC7042: (A) ABCLDA1.0001 (Local) -- Updated
  PAC7044: (A) ABCPGM1.0001 (Progrm) -- Promoted
  PAC7545: (C) ABCPGM1.0004 (Progrm) -- Superceded by ver 0001
  PAC7044: (A) ABCSRC1.0001 (Progrm) -- Promoted
  PAC7545: (C) ABCSRC1.0004 (Progrm) -- Superceded by ver 0001
  PAC7044: (A) SORCE1.0001 (Progrm) -- Promoted
  PAC7545: (C) SORCE1.0002 (Progrm) -- Superceded by ver 0001
  PAC7044: (A) ABC-EMPLOYEES.0001 (View) -- Promoted
  PAC7545: (C) ABC-EMPLOYEES.0003 (View) -- Superceded by ver 0001
  PAC7053: (A) 00000004 NATURAL objects processed.
  PAC7053: (A) 00000001 PREDICT objects processed.
  PAC6903: (A) StepNo 5  completed at 1997-07-07 11:06:07
  PAC6903: (A) StoreAud  completed at 1997-07-07 11:06:07
  PAC6902: (A) Migrate was invoked at 1997-07-07 11:06:08
  PAC6903: (A) Pre-Unld  completed at 1997-07-07 11:06:08
  PAC6902: (A) Unlock    initiated at 1997-07-07 11:08:23
  PAC6914: (W) Application Lock was removed at 1997-07-07 11:08:25
  PAC6903: (A) Unlock    completed at 1997-07-07 11:08:26
  ....+....1....+....2....+....3....+....4....+....5....+....6. S 34    L 17
```

The name of the migration event is displayed at the top of the screen. Every activity of the specified migration event is listed on the screens. The format of the audit report message is explained in a table following the audit report screens.

Note: If asterisk (*) notation was used in the object list for object type, the audit report interprets this as "GENERIC" because PAC does not know the object type at that point in the migration.

Press ENTER or use the Natural editor screen positioning commands to scroll through the audit report information. Refer to the PAC Reference documentation for the Natural editor commands.

To exit the Audit Report screen, enter a period (.) at the cursor position at the top of the screen and press ENTER.

Audit Report Message Format

Audit report information is displayed in the following format:

```
PPPnnnn (type) text
```

where:

PPP	is the product code. Valid values are as follows:
	NAT = Natural
	ESY = Entire System Server
	DIC = Predict
	PAC = Predict Application Control
	PAA = Predict Application Audit

nnnn	is the four-digit error or message number;
text	is the actual text of the audit report message;
type	is the audit report message type.

Valid audit report message types are described in the following table:

Code	Type	Explanation
(E)	Error	An error occurred and it must be reviewed by the user. Normally, PAC will terminate after this type.
(C)	Caution	An error may have occurred, but, depending on the circumstances, it may be ignored. The user should review all such errors.
(W)	Warning	The message is displayed to inform the user of an error or action that may be relevant for the results or subsequent actions that may take place for the request; for example, the consequences of actions.
(A)	Audit	The message is displayed for documentation reasons and enables the user to review all actions that occurred during the processing of the migration.
(I)	Information	This message is displayed to inform the user that a particular action has been completed or not completed.

Audit Report Message Information

The audit report of a migration event includes the following information:

- Date and time, and by whom the job processing was initiated.
- Location of the application being migrated, and its Predict information.
- Date and time the information was recorded.
- List of objects that have been migrated including their version numbers, and object types, for example, "P" (Program).
- Steps or phases started/completed indicated by checkpoint messages; for example, "PAC6903 StepNo5 completed . . .".
- Restart information.
- Errors encountered.
- Expand options and the number of objects added as a result of the expansion.

You can use User Exit 28 (PACEX028) to "customize" the audit report by specifying the type of information to be written to the report.

Migration Processing and Monitoring

As each job step of the migration is completed, audit messages are written to an audit report. This report may be viewed as each step is completed. You may access the audit report by invoking the Display Audit Report of Event (function code R) from the Migration Event Menu.

The RESET function backs out all actions that have occurred since the start of processing so that the migration event can be restarted from the beginning. The object list will be recreated and re-validated as well. The audit report is refreshed if the migration is reset before it reaches Step 6. If the migration is already at Step 6, the RESET command is ignored.

The RESET function can be used to correct migration processing information; for example, Natural parameter modules, steplibs, work files, Natural library status, user exits, or applymods. Reset ensures that the current event is not preceded by another event; thus, the event is run from the start when submitted for processing and no other event is run for this application until the reset event has been completed or backed out.

Natural Application Processing Steps

The job steps are described as follows. Step numbers that are not listed are not used.

Note: Job steps are not the JCL/JCS steps.

From Maintenance or Development

Step	Description
0	Job initialization - Interrogates the migration event request. - Locks the application for which the event is being run.
1	Job started - Deletes new object versions in the case of restart. - Expands the migration list as required. - Creates new object versions for each specified object. - Performs any rolling. - Copies all object versions from development/maintenance to the PCF system file (PAC work area). - Versions created.
2	Object compilation - Prepares and prioritizes the objects in a specific list for compiling. - Compiles the new objects on the PCF system file (PAC work area). - Processes and audits the compilation results.

Step	Description
4	Compile check point - Captures Natural CATALL report and audit results. - Promotes the object to the new status, unless the new status is Control or Retire.
5	Versions copied Versions all objects as cross-reference data by copying them to the ACF system file.
6	Object unload/load - Unloads the objects to be migrated. - Loads the objects into the destination location (To Status).
7	Application unlocked - Unlocks the application and any of the "held" objects. - Job completed. Prints an audit report.

If the Move option is in effect, the saved objects are removed/deleted from the origin status.

Note: If the job is backed out before Step 6, the object versions are deleted. The objects themselves are left intact regardless of the Move or Copy options.

To Maintenance or Development

Step	Description
0	Job initialization - Interrogates the migration event request. - Locks the application for which the event is being run.
1	Expands the object list as required. If maintenance or development, verifies the Replace option for each object.
2	Copies each specific object version to the target location.
3	Creates a notification checkpoint if the destination status (To Status) is maintenance.
5	Promotes the objects to the new status.
7	Unlocks the application and any of the "held" objects. Job completed. Prints an audit report.

From Control, To or From Test or Production

Step	Description
0	Job initialization - Interrogates the migration event request. - Locks the application for which the event is being run.
1	Expands the object list as required.
2	Determines the correct object versions to be processed.
4	Promotes the object to the new status, unless the new status is Control or development.
6	Unloads the object to be migrated. Loads the objects into the destination status (To Status).
7	Unlocks the application and any of the "held" objects. Job completed. Prints an audit report.

Predict Application Processing Steps

Job steps are described as follows. Step numbers that are not listed are not used.

Note: For additional information about Predict, refer to the Predict documentation.

From Development or Maintenance

Step	Description
0	Job initialization - Interrogates the migration event request.
1	Locks the Predict application - Expands the object list as required. - Deletes new object versions in the case of restart. - Creates the unload commands for the migration utility.
2	Unloads the Predict data from the origin location - Creates new object version for each specified object. - Stores the versioned Predict objects on the ACF system file.
3	Loads all userviews and verification rules to the PCF system file.
4	Generates views and rules.
5	Stores the versioned generated objects on the ACF system file.
6	Unlocks the application and any of the "held" objects.
7	Job completed. Prints an audit report.

To or From Control, Test, or Production

Step	Description
0	Job initialization - Interrogates the migration event request.
1	Locks the Predict application - Expands the object list as required. - Creates the unload commands for the migration utility.
2	Unloads the Predict data from the origin location.
3	Loads all unloaded data to the specified Predict file.
5	Unlocks the application and any of the "held" objects.
7	Job completed. Prints an audit report.

18 Migrations Into, Within, and Out of PAC

Once the required Predict objects have been migrated into PAC, you can load the Natural application and its subordinates including foreign subordinates, if any.

- Incorporating Existing Applications
- Migrations from Development or Maintenance
- Migrations to Development or Maintenance
- Migrations from External
- Migrations from Neighbour
- Migrations from Control to Control : Alignment
- Migrations Between Control, Test, and Production
- Migrations to and from the Archive
- Migrations to Retire Status
- Open Systems Support and Migrations

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Incorporating Existing Applications

- Incorporation Options 267
- Incorporation Paths 267
- Incorporation Object List 268
- Authorizing and Submitting an Incorporation Event 268

Applications and objects may be incorporated into PAC without being compiled or recompiled. Incorporation allows you to place under PAC control applications or objects that exist in catalog form only.

The PAC incorporation facility is used for migrations from environments where development or maintenance is performed to Control, or to a test or production status type.

Once an application has been linked to an incorporate status type, the entire application or just selected objects can be incorporated into PAC. PAA treats objects incorporated into a production status type like any other objects.

Saved, cataloged, and cross-reference (Xref) objects can be incorporated in the following combinations:

```
Saved
Cataloged
Saved/cataloged
Cataloged + Xref
Saved/cataloged + Xref
```

Xref data is optional, but must be accompanied by the corresponding cataloged object; otherwise, it will be rejected.

An object may be incorporated only if a previous version of the object was not compiled in PAC. PAC does not allow an object previously migrated into PAC from a development or maintenance status type to be incorporated, because incorporation could affect the integrity of not only the object itself, but related objects and even the entire application. Since objects are not compiled when they are incorporated into PAC, PAC has no way of synchronizing and controlling subordinate and other objects that may be used by the incorporated object.

There is no restriction on the number of times an object can be incorporated into PAC; however, PAC always considers the cataloged object as "alien" because it was compiled outside the control of PAC and its used and used-by objects and/or Xref data may be inconsistent.

With incorporated objects, certain interrelationships may be lost; for example, object usage information established from the Xref data derived from the compile.

This chapter covers the following topics:

- **Incorporation Options**
- **Incorporation Paths**
- **Incorporation Object List**
- **Authorizing and Submitting an Incorporation Event**

Incorporation Options

Objects may be incorporated online or in batch; they may be incorporated from an externally created work file or not:

- If the Include option is specified, objects are by definition incorporated in batch from an externally created work file. The work file must have been created using the Natural NATUNLD utility.

  Note: Do not use a work file created by the Natural Transfer Utility, except when incorporating Natural Open System objects.

- Without a work file as input, object are incorporated directly. The process is the same as a migration from development, including setting up the object list; however, objects are not compiled.

If the Include option is specified, the INCORPORATE batch sample job is used. Step 1 of this job should assign Work File 1 (CMWKF01) to the external work file. The Include flag must be set in the migration path definition or at the time the event is authorized.

If the incorporated objects are then to be migrated to another status and this migration uses an output work file (the work file option is set), an extra step, the TRNUNLD command, is needed to unload the necessary objects. Refer to **Job Steps: Batch With Work File Option** for more information.

If only an input and not an output work file is required (the Include option is specified but the work file option is not set), the JCL should be modified appropriately to exclude the TRNUNLD and the migration load step. Refer to **Job Steps: Online or Batch Without Work File Option, Using Include Option** for more information.

Incorporation Paths

Objects and applications may be incorporated into PAC using previously defined migration paths from an incorporate status type to Control, a test status type, or a production status type.

If the origin and destination statuses have the same library, database and file number in their application status links, PAC treats the migration as a logical one and does not unload the objects. To ensure that the objects to be incorporated are unloaded, use a different Natural library name or a different database or file number for the destination status.

If objects are incorporated from an external work file (the Include option is specified), the library selection is determined by the library name on the application status link. For example, if the destination library is LIB01, then the library on the incorporation application status link should also be LIB01.

Incorporation Object List

Natural views/DDMs that exist in catalog form external to PAC can be incorporated into PAC without being regenerated, but only for the initial setup of Predict information in PAC. Because views/DDMs are considered Natural objects, this is a Natural migration. For information about incorporating views/DDMs, refer to **Migrating Predict Objects**.

If objects are to be incorporated directly (that is, the Copy/Move option is specified indicating that a work file is not to be used as an input), then the object list for incorporation may be set up as for migrations from development, except that no views/DDMs or rules may be specified.

The EXP (Expand) command and special options of the SEL (Select) command use cross-reference (Xref) data from Predict for incorporations.

If objects are to be incorporated from an external work file (that is, the Include option is specified), then the object list must consist of a single entry only which indicates which objects of which type are to be loaded. For example:

*,P	loads all program type objects.
S>,M	loads all maps with a name greater than "S".

Authorizing and Submitting an Incorporation Event

When the incorporation event is authorized and submitted:

1. PAC selects all objects identified by the object list entry from the library on the application status link.
2. Objects satisfying the selection criteria are assigned a unique version number and added to the PCF system file. The object may exist in saved and/or cataloged form.
3. Once loaded, PAC bypasses the compile stage and processes the object like any other new object from a development status type.
4. The versioned object is stored on the ACF system file.

20 Migrations from Development or Maintenance

- Compiling Natural Objects in PAC 271
- Using the Rolling Facility 272

Applications or objects can be migrated into PAC from a development or maintenance status to Control, or to a test or production status. Migrations from development or maintenance may be processed in batch or online.

Saved Natural objects are compiled unless the dynamic source option is specified. Natural command processors are migrated "as is"; that is, they are not compiled during migration processing. The same applies to foreign datasets.

Not all objects will exist in catalog form; for example, copycode, text, macros, and recordings exist only in source form. Programs also may exist in source form if the PAC dynamic source option is in use.

For foreign objects, the existence of source and object code is predefined by the PAC administrator for each class of object.

Views/DDMs and rules which are required during the compile of Natural objects must already have been defined to PAC in a previous Predict migration event. Only then are they used for the compilation. They are treated as Natural objects and are identified with Natural object lists.

When migrating objects from development or maintenance status types, the Expand function is valid only if the cross-reference data exists for the object on the Predict file specified for the application status link. The EXP (Expand) command and special options of the SEL (Select) command use cross-reference (Xref) data from Predict for migrations from development or maintenance.

If the Copy option is specified for the migration, a copy of the objects remains in development or maintenance. If the Move option is specified, the objects are purged from the development or maintenance status.

Batch migrations from development (but not maintenance) can include input from an externally created work file by setting the Include option (instead of Copy or Move) in the migration path definition, or when the event is authorized. The work file can also be specified for CMWKF01 in the TRNEVENT step of the migration job. Only saved objects are processed and all objects are compiled as usual.

This chapter covers the following topics:

- **Compiling Natural Objects in PAC**
- **Using the Rolling Facility**

Compiling Natural Objects in PAC

PAC invokes the standard Natural CATALL utility to compile objects; thus, the compile process is the same when using PAC as when using the CATALL utility alone. The CATALL utility resides in library SYSLIB on the Natural system file FNAT.

All or None Compile

PAC considers a migration event to be a "unit of work" requiring that all or none of the objects in that unit be migrated. By default, then, PAC terminates a migration event if even one of the objects in the object list does not compile successfully. You can then correct the error and restart the migration. A restart causes all objects to be recompiled. Parameters, views/DDMs, and rules may also be reestablished.

User Exit 6 and Applymod 14 are available to customize the compile process.

User Exit 6

User Exit 6 can be used to override the "unit of work" default. It is invoked when a compile error occurs but before the migration event is terminated. It provides information about the total number of objects to be compiled and the total number of objects that did and did not compile. You can then decide whether to

- terminate the migration; then correct the error and restart the migration (the default); or
- migrate objects that compile now and then migrate other objects later after they have been corrected.

If you choose to migrate compiled objects now and uncompiled objects later, the source of the object(s) that did not compile is stored in PAC (Control status) under a new object version. If the Move option is specified, the object is purged from the origin status.

You can then migrate the uncompiled source to development or maintenance, correct the error, and migrate it back into PAC as another new version.

Applymod 14

If you use User Exit 6, you can then use Applymod 14 to ensure that an object that does not compile is not stored in PAC and a new version of the object is not created. Applymod 14 also ensures that the object will not be purged from the origin status, even if the Move option has been specified.

Natural Optimizer Compiler Error

If the MCG option is in effect, and the Natural Optimizer Compiler has not been linked to the Natural nucleus under which the migration is being processed, the object will still be compiled, but without the Natural Optimizer Compiler.

This error does not invoke User Exit 6 because the object does compile; however, the compiled code is not optimized.

Even though the object is processed normally, a NAT0893 error is returned and a warning message appears in the audit report of the event.

The MCG option can be overridden within the program itself; otherwise, the defaults specified on the PAC application definition are used.

View Security Restrictions Error

Compilation errors may occur due to violations of view security restrictions (for example, an attempt to update an "access only" file; or an attempt to read and/or update a "disallowed" file).

Using the Rolling Facility

Subordinate objects are those objects "used" when compiling another object. Subordinate objects include maps, copycode, data areas, rules, and views. By default, PAC uses the current versions of subordinate objects to compile new objects. However, because PAC represents applications in different phases of their life-cycles, it may be necessary to compile objects with specific earlier versions of subordinate objects.

The PAC rolling facility allows new versions of objects to be compiled with specific earlier versions of subordinate objects. Rolling can occur only when objects are migrated into PAC from a development or maintenance status since only these migrations result in the compilation of migrated objects.

The following subordinate objects may be rolled:

- The source form of copycode and maps.
- The cataloged form of data areas (local, parameter, and global).
- Views and rules.

If other types of objects are specified for rolling, PAC ignores them.

Specifying Objects to be Rolled

You can specify a subordinate object for rolling by attaching a reference to the object list entry. This reference instructs PAC to temporarily roll out the current version of the subordinate object and then roll in the older version of that same subordinate object.

When the migration is completed, the current version of the subordinate object is restored so that it may be used again as the default subordinate for any new compiles.

The reference you attach to an object list entry must indicate either a specific version number or a specific status:

- A specific version reference ensures that the correct object is rolled in, even if the object has been superseded. For example:

  ```
  MAINGDA,G,0001
  ```

  where the reference is a specific version number (0001).
- A status reference allows rolling to proceed without an exact version number. For example:

  ```
  MAINCOPY,C,PRODUCTION
  ```

  where the reference is to whatever version exists in a particular status (PRODUCTION).

While the version number method is a fixed definition and guarantees that the same version is always used, the status reference is dynamic; that is, PAC determines at processing time which version is at the specified status and then rolls in that version.

Since migration events are serialized for this purpose, the references are always guaranteed; this is important when versions of objects currently in a specific status are superseded. The reference method allows the same object list to be reused with subsequent migrations without the potential for loss of integrity.

Rolling Example

A typical example of the rolling procedure is presented below to demonstrate the need for and to further clarify the use of rolling.

1. The programmer develops Phase 1 of an application and migrates the objects into the PAC controlled environment. One of the objects is a global data area (GDA).
2. The application (including Version 0001 of the GDA) is implemented into production as required for use by the end user.

3. The programmer at a later point develops Phase 2 of an application and migrates the objects into the System-Test status in the PAC controlled environment where the project leader tests the new phase. At this point, the GDA has been changed and recompiled; that is, Version 0002 of the GDA is in the System-Test status, while Version 0001 of the GDA is in production.
4. The end user then encounters a bug in Phase 1 of the application in production and the programmer subsequently discovers that a program that uses the GDA must be changed.
5. The programmer changes the program and when he creates the object list, he ensures that the GDA is also included, except that the GDA entry in the object list specifies a reference (Production or 1 for Version 0001 of the GDA).

   If the GDA reference is not specified in the object list, PAC recompiles the program with the current version of the GDA (Version 0002 in this case) and a NAT0933 error is received when the program is migrated into production.
6. PAC processes the object list as follows:
   - PAC recognizes the referenced GDA in the object list and rolls in that version of the GDA to the PCF system file (the work area for compiling).
   - The compile is performed; PAC recognizes that the production version (in this case, Version 0001) is to be used.
   - After the compile, the program is migrated into production once again and the NAT0933 error is not incurred because the program was compiled with the correct version of the GDA.
   - During the unlock step of the migration, the latest version of the GDA is then rolled back to the PCF system file, ready for the next compile that may use the latest version of the GDA by default.

21 Migrations to Development or Maintenance

Saved and/or cataloged objects can be migrated out of PAC to development or maintenance from Control, or a test or production status for the purpose of maintenance, ongoing development, or to access source code for the object outside the confines of PAC. Migrations to development or maintenance may be processed in batch or online.

Only the Copy option is possible for migrations to development or maintenance from production or Control; a copy of the objects must remain in Control and production. Both the Copy and Move options are possible for migrations from a test status.

For migrations out of PAC, views/DDMs can be included on a list that comprises only Natural or both Natural and foreign objects. If views are placed in the object list, these will be migrated to the Predict file identified by the development or maintenance application status link definition.

An object status entry is created to audit the fact that the object is being migrated to a maintenance status; a change control log is created and updated with the check-out information, and optionally verified by User Exit 7. See **Maintaining Natural Objects in PAC** for more information. No such entry is created for a migration to a development status: PAC does not maintain change control information for objects migrated to a development status.

Note: Currently, check-out to maintenance is not available for foreign objects.

If a maintenance request is defined for the migration event, then the objects are also added to the maintenance request Related Object Versions list.

22 Migrations from Neighbour

This type of migration facilitates the copying of objects between two PAC-defined Applications.

Migrations from this status type can only be to CONTROL and no other status type. During migrations in this category all connected objects are migarted, Source, Object and Xref if present. If only source code or object code are present, then only they will be migrated. No compilation (CATALL) takes place during this type of migration. The objects are merely copied from one Applications compartment to another one. As no compile takes place, PAC cannot build 'used' or 'used-by' lists for these migrated objects.

Versioning does take place during these types of migrations, however, if during a migration PAC encounters a like named object then the in-coming object will receive the next highest available version number for that object. For exapmle, if we were to migrate an object called 'PDA001' from application_1 to application_2 and application_2 already had an object called 'PDA001' version number (7), then the in-coming object would obtain a version number (8).

23 Migrations from External

Applications or objects can be migrated into PAC from an External status (i. e. the sources reside in a repository under the control of an external version control software) to Control, or to a test or production status. Migrations from External may be processed in batch or online.

When new or changed Natural sources are transferred into a PAC controlled environment, a transfer event from External to Control status (or any other target status) must be created. This can be done by specifying the fully qualified URL. When the transfer event is executed, the handling is the same as with other migrations from a development status into a PAC controlled environment. PAC gets the source by means of a `REQUEST DOCUMENT` statement and writes it into the PCF, compiles the sources in the PCF and creates a new version of the cataloged object in the ACF. DDMs are written into the PCF. But instead of the source text the used URL is stored in the ACF.

Before storing the source into the PCF, the line numbers and line number references will be recreated.

The Natural member name, the programming mode, the save date, the user and the code page information will be extracted from the source text. This information is either inserted into the source text by the Local Versioning plug-in or by Natural for Eclipse. If that information does not exist, default values will be used. The member type of the source file can only be derived from its extension. Those URLs that do not allow to determine the member type will be rejected.

24 Migrations from Control to Control - Alignment

- Creating the Object List 282

Alignment is a special migration that forces Natural objects already under the control of PAC to be recompiled in the Control status with the current version or a specific version of all referenced subordinate objects. Alignment is used to ensure that all objects use the same version of a subordinate object at compile time. Alignment occurs when the Control status is specified as both the origin status and the destination status; that is, Control to Control.

Subordinate objects are those objects "used" during the compile of another object. Subordinate objects include maps, copycode, data areas, rules, and views.

By default, PAC uses the current versions of subordinate objects to compile new objects. However, because PAC represents applications in different phases of their life-cycles, it may be necessary to recompile objects already under PAC control with current versions of subordinate objects.

For example, if a global data area (GDA) is changed and migrated into PAC, all objects that use the GDA will need to be recompiled. If you use the alignment facility, there is no need to check the objects out to maintenance first.

At compile time, PAC recatalogs each object in the object list with the most recent version of Control's subordinate object, or with the version specified by the version number or status referenced in the object list (see the information about **"rolling"**). The newly compiled object versions become the current versions.

If a steplib is needed for the compile, this should be specified on the Control application status link.

Alignment migrations can be run online or in batch; a work file is not required.

The MIGRATE job is used to perform the alignment of object versions.

This chapter covers the following topic:

- **Creating the Object List**

Creating the Object List

When creating the object list for an alignment migration event, subordinates that are not to be recompiled must have a "reference" (version or status) attached to their object list entries. If a subordinate has a reference, then rolling occurs:

- the object is not recompiled with the current version of the subordinate objects; and
- a new version is not created for it.

If the subordinate has no reference, then it is recompiled.

The Expand option can be used to help ensure that all necessary objects are included in the object list.

Note: If status or version references are not specified, the current versions for all objects in the list are used, including any objects added as a result of expand processing.

25

Migrations Between Control, Test, and Production

- Migrations to Test or Production 286
- Migrations to Production 286
- Migrations to Test 286

This chapter covers the following topics:

Migrations to Test or Production

Cataloged objects can be migrated to a test or production status from Control status, a test status, or a production status. If support for dynamic source variables is required in the execution environment, saved copy code, programs and maps are migrated as well. Foreign objects, whether saved or cataloged, can also be migrated as part of the object list.

Rules, views/DDMs (except VSAM views which are required at execution time), local data areas, and parameter data areas are ignored unless Applymod 8 is active in your environment to force the migration of views and data areas during migration processing.

Migrations to test or production result in an object status entry being created for each object migrated. The migration may be processed in batch or online.

Migrations to Production

The production status is controlled by PAA; thus, there is more processing required for verification and consistency checking of the migration because PAA audit information and superseded backups will also be created.

Migrations to Test

Only the Copy option is possible for migrations to test from production or Control; a copy of the objects must remain in Control and production. Both the Copy and Move options are possible for migrations to a test status from another test status.

26 Migrations to and from the Archive

- Archiving Process 288
- Phase 1 289
- Restoring Objects Before Phase 2 294
- Phase 2 : Removing the Object Versions from the PAC Environment 295
- Restoring Archived Objects to the PAC Environment 296

Natural objects (source and cataloged form as well as Xref data), as well as foreign objects can be migrated from the Control status to the Archive status, where they are stored off-line as a sequential file on a medium such as tape, cassette, or DASD.

Archiving allows you to manage your available storage space more effectively by removing redundant or historical objects from the PAC environment in a timely manner leaving only the current and active object versions online in PAC.

Note: Objects in a production status type are current and cannot be archived because they must be synchronized with PAA.

Archived objects are still under PAC control and can subsequently be restored to a Control, test, or production status using the archive reload facility.

The maintenance of archive events is a PAC administrator function. Refer to the PAC Administration documentation for more information.

Archived objects are not retired objects. A retired object has been physically removed either from a status or from PAC itself. An archived object can subsequently be retired. Refer to the section Migrations to Retire Status for more information.

Note: It is not yet possible to archive Predict objects.

This chapter covers the following topics:

Archiving Process

To preserve the integrity of the objects, the archiving process unloads objects into an archive file in two phases:

Phase	**Action**
1	The archive file (dataset) is created. The archive event for Phase 2 is created and placed in an unloaded state. Since the objects are still physically in PAC until Phase 2 is performed, the objects' status is not updated; their status is still what it was before Phase 1.
2	Finalizes the archive event: The objects on the archive (output) file are verified and then removed from the PAC environment (ACF system file).

Note: Phase 2 can only be done by the PAC administrator.

Phase 1

This section covers the following topics:

- Creating the Archive File
- Setting Up the Job
- Defining the Archive File
- Defining the Unload Migration Event
- Creating the Object List
- Archiving Objects in a Status Other Than Control
- Unload Migration Event Processing
- Unlocking the Migration Event
- Archive Event

Creating the Archive File

Phase 1 unloads the object version to the archive file as represented in the diagram below. The steps indicated in the diagram are described below:

Step	**Action**
1	Define the migration event from Control to Archive.
2	PACEX026 user exit archiving User Exit 26 archiving Select objects for the migration event object list. The list can be generated automatically or created manually. User Exit 26 can be set up in your environment to provide the criteria for automatically selecting the objects to be archived.
3	Verify the object version selection. Specified statuses are checked and objects found are checked first against the minimum current version, then against the minimum retention period defined in the application defaults, and finally, against the status.
4	Authorize and submit the event. The archiving process unloads the objects to the archive file and creates the archive event for Phase 2.
5	Unlock the migration event to complete Phase 1.

Setting Up the Job

The archive migration event can be run only in batch with a work file. The JCL (ARCHIVE_UNLOAD) is similar to the JCL for a Natural migration with a work file; however, the processing control statements are different.

Defining the Archive File

You need to define the archive file where the application objects are to be stored.

When the job for the migration is set up, Work File 1 (CMWKF01) should be assigned to the archive file or to an @ variable.

PAC provides the @ARC-DSN and @ARC-VOLSER substitution parameters for this purpose. If you use these substitution parameters, you are prompted for the archive file name and any other variables (for example, DISP) when the migration event is submitted. This information is stored in the archive event (Phase 2).

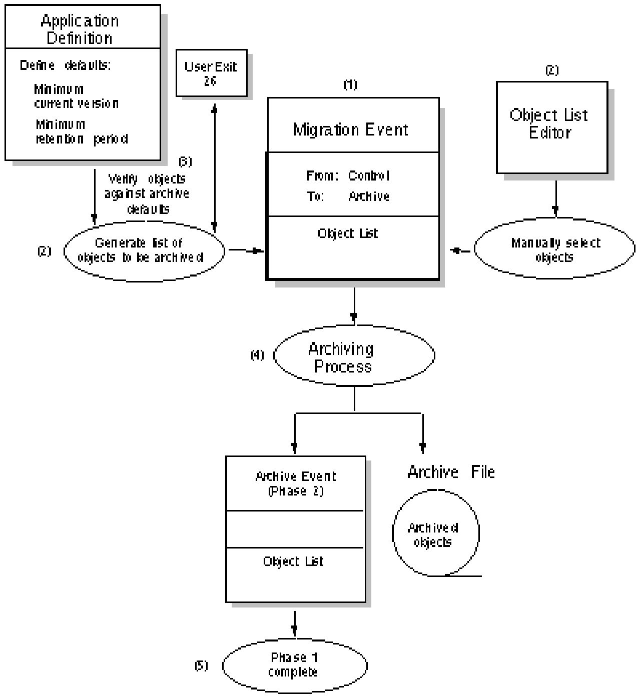
You may use use other substitution parameters; however, the migration event is automatically updated only if you use the @ARC-DSN and @ARC-VOLSER parameters.

Do not use the MVS JCL or the CMS filedef option DISP=MOD for the disposition of the archive dataset; PAC has no facility for tracking datasets that have been concatenated using this parameter; thus, each archive file should be unique and independent of the others.

Note: For VM/CMS, the substitution parameters are @ARC-VMUSERID, @ARC-VADDR1, @ARC-FN, and @ARC-FT.

Defining the Unload Migration Event

Once the status Archive has been linked to the application whose objects are to be archived and a migration path between Control and Archive has been defined for the application, the migration event can be defined. The origin status of a migration event is Control; the destination status is Archive.



Creating the Object List

Saved, cataloged, and Xref objects that exist only in Control (that is, have been removed from all other statuses), can normally be migrated to the Archive status. These objects may be selected for unloading in the following combinations:

```
Saved
Cataloged
Saved/cataloged
Cataloged + Xref
Saved/cataloged + Xref
```

PAC provides several options for creating the object list: you can generate the object list or create it by "manually" entering the objects in the Object List Editor.

You can use the PAC Object List API (APINOBLS) to create or update an object list without logging on to PAC.

Creating the List Manually

If you manually specify objects to be archived

- a version number reference must be used to specify multiple versions of the same object.
- by default, the object version selected will be the oldest version for the object or the lowest available object version number.
- range notation can be used. To select the oldest version of all the objects, enter *,*. (Note that *,* will not select all of the objects).

The SEL (Select) and EXP (Expand) command options can be used in the normal way to select objects for archiving.

Note: Because objects are validated after expansion, those objects added as a result of the expansion may be rejected based on the application defaults for minimum current version and minimum retention period, and status roles.

Creating the List Automatically

You can generate an object list automatically for a new migration event by

- specifying a value P for the Generate List option when defining a migration event online; or
- issuing the ADD EVENT command either online or in batch, and specifying the value P in the GENTYPE field.

For an existing migration event, you can generate an object list automatically by issuing the GENLIST command with the value P for the GENTYPE keyword to generate a new or replace an existing object list.

Retention Defaults

When generating a list of objects for archiving, the objects selected can be restricted by using the retention defaults defined in the application:

- The minimum current versions specifies the minimum number of object versions to be retained in PAC.
- The minimum retention period specifies the number of days the object must have existed in PAC before it is eligible to be archived.

The minimum retention period is verified only after PAC establishes the minimum current versions for each object to be archived.

Once the objects have been validated against the minimum current versions and the current retention period, PAC selects the object for archiving. The values are checked again during Phase 2 of the archiving process (finalization).

Example:

```
Current date:......................17 May 1993
Minimum current versions.......... 3 (Versions 8, 9, and 10)
Minimum retention period.......... 90 days
```

Object in a Status	Version	Date Compiled/Incorp.	Archive Selectability
ORD-MAIN	0001	04 Dec 1992	**already archived**
ORD-MAIN	0002	16 Dec 1992	Objects will be selected for archiving.
ORD-MAIN	0003	27 Dec 1992	
ORD-MAIN	0004	07 Jan 1993	
ORD-MAIN	0005	28 Jan 1993	
ORD-MAIN	0006	26 Feb 1993	Not archived. Objects are within the current retention period.
ORD-MAIN	0007	05 Apr 1993	
ORD-MAIN	0008	11 Apr 1993	Not archived. Objects are the current versions.
ORD-MAIN	0009	01 May 1993	
ORD-MAIN	0010	17 May 1993	

Archiving Objects in a Status Other Than Control

To archive objects in a status other than Control (except production):

- Applymod 23 must be active in your environment to allow objects in any status to be selected for archiving. Objects will be removed from the status and placed in the Archive status.
- User exit 26 can be set up in your environment to select objects in a particular status. This exit, invoked when generating an object list, can be programmed to set up and/or verify the criteria (retention defaults) used to select the objects for archiving.

Note: The actual physical purging of objects from the physical environments identified by the statuses is optional.

If an object is to be purged, you can issue delete commands using either the SYSMAIN utility or the PAC migration utility (MIGRATE). MIGRATE will write the delete commands to the migrate work file, which is then processed by the MIGRATE LOAD utility.

Unload Migration Event Processing

When the migration event has been defined and the object list has been selected and validated, the event can be authorized and submitted.

If for any reason there is an abnormal termination during the unload, or a new or another copy of the archive file is required, you must run the unload step again. The unload step can be run as many times as necessary before the event is finalized.

Unlocking the Migration Event

Phase 1 of the archiving process is complete when the migration event is unlocked. At this point, all objects have been migrated to the Archive status and unloaded to the archive dataset.

The resulting unloaded archive file can only be used as input to the PAC MIGLOAD utility. The migration must be from Archive to Control, a test, or a production status. The dataset is in a special format that can only be handled by PAC during an archive reload migration.

You can verify the successful completion of the archiving process by:

- Reviewing the audit report for inconsistencies, cautions, or possible errors;
- Verifying the archive event and object list and updating it if necessary.

Archive Event

The archive event for use in Phase 2 is created using the information from the migration event (for example, object list and name of the archive file). The name of the archive event is taken from the migration event that created it.

The information contained in the archive event is used to audit the results of the archive. This information is also used as input during the optional reloading of any or all of the archived objects.

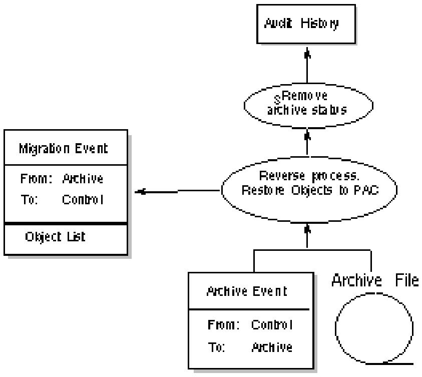
The archive list (that is, an itemized list of every object, including type and version) corresponds to the objects unloaded to the archive file.

Restoring Objects Before Phase 2

It is possible to restore objects to the PAC environment once Phase 1 is completed and before Phase 2 of the archiving process is started; that is, before the cataloged/saved object versions and cross-reference information of the object version(s) are removed from the PAC environment (ACF system file). You may restore the entire archive file or you may restore selected objects from the file.

A migration event with an Archive to Control migration path is set up and submitted. As a result, the objects specified on the object list are removed from the Archive status; that is, the object status link is removed and all activities are written to the audit history.

Any objects restored to PAC after Phase 1 is complete and before Phase 2 begins will not be purged when Phase 2 (the finalize phase) is processed. The following diagram shows this process:



Phase 2 : Removing the Object Versions from the PAC Environment

The second phase of archiving is the actual removal of object versions from PAC. Saved/cataloged object versions and the cross-reference information of each object version are physically removed from the PAC ACF system file.

This is accomplished by the PAC administrator using the finalize option either online or as a batch request. Refer to the PAC Administration documentation for more information about the finalizing procedure.

At this point, the objects are tagged as "archived". You can see the objects' status using the Versioned Objects Reporting sub-function (section **Assigning and Maintaining Object Versions**).

Selecting the Archive Event

The archive event name corresponds to the migration event that created the archive file in Phase 1.

Finalizing the Archive Event

The finalize step can be run either in batch or online. PAC systematically deletes the saved, cataloged, and cross-reference data for each object version in the archive object list.

The PAC references to the archived objects remain. The reference information retains the object version, date-time saved and cataloged (as applicable), original development directory, and any "Uses" information.

Once the actual deletion has started, deleted objects can be retrieved only by reloading the object from the archive file; however, the archive event may be terminated to prevent any further deletions of the objects.

If the archive event terminates abnormally, it can be restarted. The deletion process will restart at the point where the event terminated.

The archive event is unlocked to complete the archiving of the specified objects.

Restoring Archived Objects to the PAC Environment

Archived objects can be restored (reloaded) to the PAC environment. Once an object has been restored to PAC, it can be used as if it had never been archived.

Reloading is accomplished by running a migration event where the origin (From) status is Archive and the destination (To) status is the Control status.

When objects are reloaded into PAC, the saved and/or cataloged object and cross-reference (Xref) information are restored in the Control status. These objects may then be immediately or subsequently migrated to test or production status types.

Reloading the Migration Event Definition

Only objects from a single archive file may be restored. The archive file created during the actual archiving of the objects must be referenced by the migration event for reloading the archived objects to PAC.

The archive event created when the objects were unloaded to the Archive status supplies the information necessary to identify the archive file. If the archive event for an archived object has been purged from the system, it is not possible to restore any of the objects on the archive file.

The archive file information should be verified. If, for some reason, the file information has changed (for example, the dataset name has been changed or moved to a different volume), the archive file name, the volume serial number of the dataset, and notes may be updated.

The object list will be consistent with the objects unloaded. If the @ARC-DSN and @ARC-VOLSER substitution parameters were used in the job for the migration event that unloaded the objects, the file name and volume serial number will be updated automatically by PAC for the reload migration event.

Note: For VM/CMS, the substitution parameters are @ARC-VMUSERID, @ARC-VADDR1, @ARC-FN, and @ARC-FT.

Archived objects which have been retired from the Archive status cannot be reloaded.

The object list for the reload migration event should specify only those objects to be restored:

- The *,* notation can be used if all objects on the archive file are to be restored.
- The Generate List option can be used to create a list from the archive event; the list can be modified. Objects can be deleted from the list but not added to it unless they were originally archived by the referenced event.

Reloading Migration Event Processing

The reload migration must be run in batch and must use a work file. The JCL is ARCHIVE_RELOAD.

When the job is submitted, the referenced archive event is determined or verified:

- If the archive event was known (specified): PAC verifies that the archive event name specified on the event is the correct one for reload (that is, that it corresponds with the file specified in the JCL).

  Since it is possible to archive and reload an archived object many times, PAC does not require that the user always use the last archive file (with a specific object version) to restore the object.
- If the archive event was not known (not specified), but the archive file is known: PAC determines the correct archive event used to create the archive file during the initiation of the reload.

All objects on the object list for the reload migration event are loaded from the archive file into PAC.

- Any object on the object list that was not archived by the migration event that created the archive file is ignored.
- Any object that is no longer in a status of Archive is ignored, unless Applymod 3 is active.
- If the archive file was created using another PAC system, then all objects are rejected.

  As a result of the reload migration, the saved, cataloged and cross-reference data are stored back on to the ACF system file.
- The object status of "ARCHIVE" is removed; and
- The ARCHIVED flag on the object version is removed.

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Migrations to Retire Status

- Reserved Status Retire: Objects are purged from the Control or Archive statuses. 300
- User Status Retire: Objects are purged from test, production or maintenance status types. 300
- Retire Facility Overview 300
- User Status Retire 301
- Reserved Status Retire 303
- Retire Event Processing 304

The Retire facility is used to remove objects from an origin status identified by a migration path: either a PAC reserved status (Control or Archive) or a user-defined status.

This chapter covers the following topics:

Reserved Status Retire: Objects are purged from the Control or Archive statuses.

When objects have been removed from all other statuses and exist only in Control or Archive status, they can be retired (purged) from PAC.

Retiring objects from the Control or Archive statuses results in the permanent physical removal of objects from PAC, including all information stored about the objects such as audit history.

- Retiring objects from Archive purges the object and removes the object status definition.
- Retiring objects from Control purges both the objects and the object links to any other status.

User Status Retire: Objects are purged from test, production or maintenance status types.

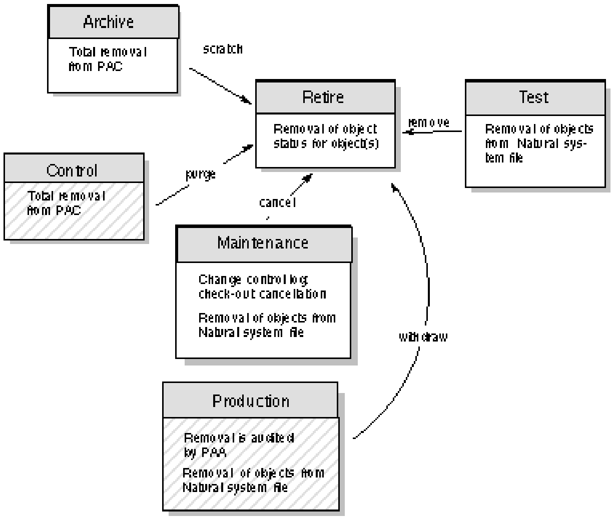
Performing a "retire" from one of these user-defined statuses removes the saved and/or cataloged object(s) from the physical location of the user. The object status reference of the specific object version in PAC is also removed, but the object(s) are not removed from PAC itself. The objects still exist in Control and in any other status to which they have been migrated.

Retiring objects from a maintenance status results in the cancellation of the corresponding change control logs in addition to the removal of the object from the maintenance status. The change control log is updated to indicate that maintenance has been "cancelled".

The Retire status type is a logical status.

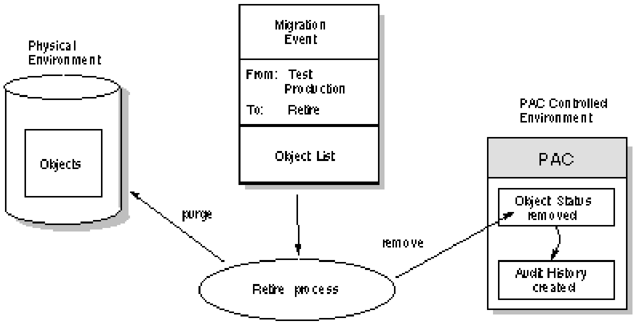
Retire Facility Overview

The following diagram represents an overview of the Retire facility:


Archive
Total removal from PAC
scratch
Retire
Removal of object status for object(s)
remove
Test
Removal of objects from Natural system file
Control
Total removal from PAC
purge
cancel
Maintenance
Change control log check-out cancellation
Removal of objects from Natural system file
withdraw
Production
Removal is audited by PAA
Removal of objects from Natural system file

User Status Retire

Objects are purged from test, production or maintenance status types as shown in the following two diagrams:



This section covers the following topics:

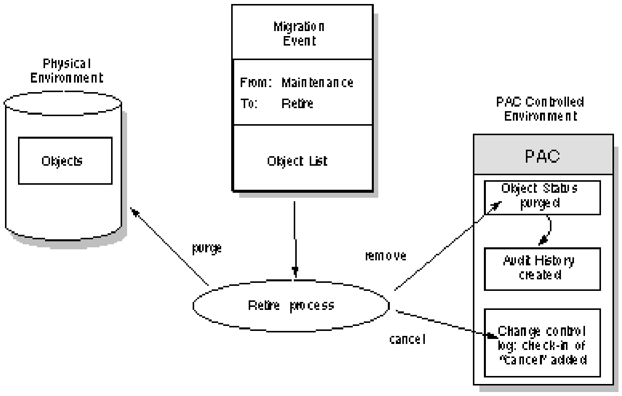
- From Test or Production

- From Maintenance

From Test or Production

When objects are retired from test or production statuses, the following occurs:

- The object status is removed.
- The audit history is created.
- The objects in the physical location are purged.
- The objects remain in Control status at least; if only in Control, they are eligible to be archived or permanently retired from the PAC environment.
- Objects are not restricted by the defaults (minimum current versions, minimum retention period) defined in the application defaults.



From Maintenance

When objects are retired from maintenance, the following occurs:

- The object status is removed.
- The audit history is created.
- The objects in the physical location are purged.
- The objects remain in Control status at least; if only in Control, they are eligible to be archived or permanently retired from the PAC environment.
- Objects are not restricted by the defaults (minimum current Archive versions, minimum archive retention period) defined in the application defaults.
- The change control logs are cancelled; that is, the corresponding change control log is updated with the check-in information of "cancel" indicating that the object has been removed from maintenance.

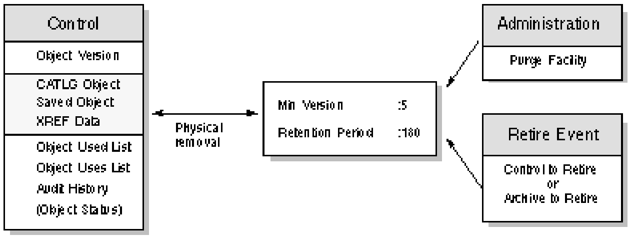
Reserved Status Retire

Object versions in Control and object versions (saved, cataloged, and cross-reference data) in the Archive status that were purged by the PAC administrator in Phase 2 of archiving can be retired.

Retiring objects that exist only in the Control status or in the Archive status results in the total removal of all components of the objects from PAC.

- For objects retired from Archive, this means that the object status is removed.
- For objects retired from Control, saved, cataloged, and cross-reference data, as well as all audit history information, is purged as part of the retire process.

Objects are purged from Control or Archive statuses as shown in the following diagram:



This section covers the following topics:

- Object Selection
- Retention Defaults Example

Object Selection

Objects to be retired are selected based on the retention defaults defined in the specified application.

From Control, the retention defaults defined in the application restrict object selection by specifying minimum current versions (the number of objects to be retained in PAC before the object is eligible for "automatic" purging) and a minimum retention period (the number of days the object must have existed in PAC before it is eligible to be purged). The minimum retention period is verified only after PAC establishes the minimum current versions for each object to be retired.

The PAC administrator can override the retention defaults by establishing and activating user exit 26.

From Archive, the retention defaults defined in the application restrict the object selection by specifying minimum archive versions (the number of versions of archived objects to be retained in PAC before the versions are eligible for "automatic" purging) and by specifying the archive retention period (the number of days the archived object version must have existed in PAC before it is eligible for "automatic" purging). This period is verified only after PAC establishes the minimum archive versions for each object to be retired.

Retention Defaults Example

Current Date:..................................17 May 1997
Minimum archive versions.............. 3
Minimum archive retention period...90 days

Object	Version	Date Archived	Retire Selectability
ORD-MAIN	0001	04 Dec 1992	**Archived** - will be selected.
ORD-MAIN	0002	16 Dec 1992	Objects will be selected for retiring.
ORD-MAIN	0003	27 Dec 1992	
ORD-MAIN	0004	07 Jan 1993	
ORD-MAIN	0005	28 Jan 1993	
ORD-MAIN	0006	26 Feb 1993	Not retired. Objects are not within the archive retention period.
ORD-MAIN	0007	05 Apr 1993	
ORD-MAIN	0008	11 Apr 1993	Not retired. Objects are the "minimum" archived versions.
ORD-MAIN	0009	01 May 1993	
ORD-MAIN	0010	17 May 1993	

Retire Event Processing

Because a migration to a retire status is a logical migration, a work file is not usually required. The sample JCL for batch processing is MIGRATE.

However, if a work file is used, it will contain instructions to the Migrate utility (MIGLOAD) to purge objects from the Natural system file where it is run. For example, for a production environment that is remote and not accessible to the PAC system, the MIGLOAD file can be used to purge the retired objects at the remote location as part of a status retire from the production status.

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Open Systems Support and Migrations

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PAC is able to support the migration and versioning of objects that are developed under Natural on the Open System platform. PAC uses the Natural Utility SYSTRANS to partially facilitate this process.

This process is only able to accommodate source code coming from the Open System platform, Natural sources may contain Operating Systems specific code, that would be impossible to compile, thus the PAC compile process is ignored for these objects within the PAC mainframe environment. The majority of the migration process for these objects is similar to the Incorporation process used for other PAC recognized objects. The process is delivered as semi-automatic, with the need for a SYSTRANS created formatted workfile to be loaded onto the mainframe platform, in order for the PAC migration event process to be executed.

This chapter covers the following topics:

Application Definition

An application to be used for this process would be defined as any other normal application of type (NAT). This is fully documented in section 5 of this documentation.

Status Definition

Statuses to be used for this process need to be defined in a similar way as statuses for other applications, with only a few exceptions. The status of type I (incorporation) has to be defined for the base status, that of the initial entry status of the incoming objects. This status has to have a defined Natural library. All other statuses for use with this application can be as normal of types of T (test), M (maintenance) and P (production).

Application Status Links

Defined statuses for the application should be linked in the normal way. This is fully documented in section 6 of this documentation.

Migration Process In

This process details the process of migrating Natural Open System objects into PAC.

Step 1: Create workfile

Create a SYSTRANS format workfile from the Open System platform where the application sources reside.

Step 2: Transfer workfile to mainframe

Use a recognized transport mechanism (FTP) to transfer the workfile from the Open System platform to the mainframe.

Step 3: Create / Authorize the PAC migration event

Add a PAC migration event for the Open Systems application with the Incorporation status as the From-Status. The migration list must contain the wildcard selection of (*,*) , in order for the event to migrate-in the whole contents of the workfile (please see Natural Systrans documentation for more details). Authorize the PAC event in the normal way.

Ensure that the event has run-mode set to B (Batch) and that it uses the supplied PAC Job <prefix&gt;_SYSTRANS_MIGRATE_IN.

Step 4: Submit the PAC migration event

The defined PAC migration event through the PAC Job uses a number of variable parameters. These will be called for when the PAC migration event is submitted.

The parameters are:

@FUSER-FROM	FUSER value for incorporation library
@LIBRARY-FROM	Incorporation library
@SYSTRANS_DSN	Name of SYSTRANS workfile
@VOLSER	Volume Serial of workfile
@DISP	Disposition of workfile

Step 5: Execution of the PAC migration event

The PAC migration event will now perform the various steps contained within the PAC Job. Please see Job details for more information on this.

The migration event will produce an audit trail as normal for migration events. Upon successful completion of the migration event the Natural Open Systems objects will now be fully versioned within PAC and stored in the PAC ACF file.

Migration Process Out

This process details the process of migrating Natural Open System objects out of PAC.

Step 1: Create / Authorize the PAC migration event

Add a PAC migration event for the Open Systems application with the Incorporation status as the To-Status. The migration list objects can now be selected and saved. Authorize the PAC event in the normal way.

Ensure that the event has run-mode set to B (Batch) and that it uses the supplied PAC Job <prefix&gt;_SYSTRANS_MIGRATE_OUT. Applymods 8, 19 and 31 should be used when migrating these objects out of PAC.

Step 2: Submit the PAC migration event

The defined PAC migration event through the PAC Job uses a number of variable parameters. These will be called for when the PAC migration event is submitted.

The parameters are:

@FUSER-FROM	FUSER value for incorporation library
@LIBRARY-FROM	Incorporation library
@SYSTRANS_DSN	Name of SYSTRANS workfile
@DISP	Disposition of workfile
@VOLSER	Volume Serial of workfile

Step 3: Execution of the PAC migration event

The PAC migration event will now perform the various steps contained within the PAC Job. Please see Job details for more information on this.

The migration event will produce an audit trail as normal for migration events. Upon successful completion of the migration event the objects will now be contained in the defined workfile.

Step 4: Transfer workfile to Open System Platform

Use a recognized transport mechanism (FTP) to transfer the workfile from the Mainframe to the Open Systems Platform.

Step 5: Load objects from Workfile

Perform a SYSTRANS load from the workfile into your Natural system on the Open Systems platform.

Object Handling

Once the Natural Open Systems objects are migrated into PAC, they can then be handled as per any other PAC controlled object. They can be Archived, Retired, Purged and viewed in the Versioned Objects function.

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Migrating Predict Objects

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- Reports About Versioned Predict Objects 323

Software AG's active data dictionary system Predict is used to supply information needed by applications defined to PAC:

- Natural views/DDMs and rules are generated from Predict files, userviews, and verifications to supply the subordinates needed to compile Natural objects.
- Predict cross-reference (Xref) data is created for Natural objects when they are compiled and is used for building and documenting interrelationships among objects.

When migrating objects from development or maintenance status types, the Expand function is valid only if the cross-reference data exists for the object on the Predict file specified for the application status link. The EXP (Expand) command and special options of the SEL (Select) command use cross-reference (Xref) data from Predict for migrations from development, maintenance, and incorporation status types; for all other migrations, cross-reference data from PAC is used.

This chapter covers the following topics:

Migrating Predict Data Into and Out of PAC

Predict objects are migrated or copied into the PAC controlled environment. Predict objects can subsequently be unloaded from PAC into an external Predict file. A PAC administrator can remove Predict objects from PAC when they are no longer needed.

The migration event that loads Predict objects into PAC must be run separately and before the event that migrates the Natural application objects that use the Predict objects.

Notes:

1. To bypass this step, views/DDMs that exist in catalog form external to PAC can be incorporated into PAC without being regenerated. Because views/DDMs are considered Natural objects, this is a Natural migration.
2. You can also bypass this step for views/DDMs that exist in an external versioning tool. These can be incorporated into PAC without being regenerated. This requires an event for a Predict application from External to Control status. The value for SYSDDM utility in the Protection option of the System Defaults must be set to A (Allowed) for this alternative to work. See *Protection* in the *General Defaults* section of the *Predict Defaults* part of the *Predict Administration* documentation for further details.

The following example PAC jobs migrate only Predict objects:

- Predict_MIGRATE_IN JCL/JCS migrates Predict objects from an external Predict system file (FDIC) into PAC;
- Predict_MIGRATE_OUT JCL/JCS migrates Predict objects from PAC to an external FDIC file.

For Predict migrations into PAC, any objects that require it are generated or regenerated automatically in PAC as part of the migration.

For Predict migrations from PAC to an external FDIC file, such objects are migrated but not automatically generated or regenerated. The objects must be manually generated or regenerated in the external FDIC file after the successful completion of the migration event.

Origin of Predict Objects

For the reserved Predict application (see **Predict Application**), PAC acquires the Predict data dictionary information for each status defined to PAC from the Predict system file (FDIC). The FDIC file is identified by a database number (DBnr) and file number (Fnr).

PAC can be populated with any data dictionary information except user-defined entity objects (UDEs).

Certain data dictionary information must be migrated into the PAC controlled environment using the Predict migration utility SYSDICBE (userviews, files, verifications, keywords, help text), while other information is copied into the PAC environment as needed (generation default sets and linked databases).

Sets of generation defaults are used when generating PAC views/DDMs and rules from Predict files, userviews, and verifications. You must log on to Predict to create or maintain the sets of generation defaults, which are then copied into the PAC controlled environment where the actual generation occurs.

You must also log on to Predict to maintain the Predict keyword subsystem. Refer to the Predict documentation for more information. Keywords created in Predict can be migrated to PAC because the PAC keyword system is sufficiently similar. However, keywords defined within PAC for use as selection criteria within the PAC reporting subsystem are maintained separate from the Predict keywords.

Predict help is documented in Predict and stored on the FDIC file; certain applications may require access to this information at execution time.

Interaction With the PAC System Files

The PAC PCF system file is a work area with the same file structure as a Predict FDIC file. Any Predict files, userviews, and verifications used to generate PAC views/DDMs and rules are migrated to the PCF file from the Predict FDIC file using the Predict migration utility SYSDICBE.

Sets of generation defaults and any linked database information that may be specified for the sets is copied from the Predict FDIC file to the PCF system file by the PAC administrator.

A specific set of generation defaults may be specified for use during the generation phase of a Predict migration, based on the Predict objects being migrated. If no specific set is specified, the generation defaults set named DEFAULTS is used.

PAC views/DDMs and rules are actually generated in the PCF system file. The new versions of the Predict objects that are required during the compilation of Natural objects are stored in the PCF system file.

After the executable code has been generated for the PAC views/DDMs and rules, the versioned source used to generate them is copied to the ACF system file for documentation and reporting purposes.

Using the Predict Migration Utility SYSDICBE

Predict files, userviews, and verifications are loaded into the PAC controlled environment using the the Predict migration utility SYSDICBE, rather than the PAC migration utilities (MIGUNLD, MIGLOAD).

Caution: Do not use SYSMAIN, INPL, NATLOAD, or MIGLOAD directly to load views into the PAC environment (PCF file); this will cause a loss of data integrity in PAC.

- When initially invoked from PAC, the Predict SYSDICBE utility unloads Predict objects to a work file from the FDIC file specified on the application status link definition.
- When restarted, it loads
  - those Predict objects used for generation (files, userviews, verifications, databases) from the work file to the PCF system file.
  - all other Predict objects from the work file to the ACF system file where they are labeled as versioned Predict objects.

A defined interface allows PAC to communicate with the Predict migration utilities and vice versa. Using this mechanism, the different requirements for migrating the Predict objects are handled as effectively and consistently as with any Predict migration without PAC.

When using the Predict migration utility to migrate Predict data from the PAC controlled environment, the migration unload from PAC is processed in the same way as the migration load, ensuring consistency with the Predict data whenever the data are migrated from status to status.

During the unloading and loading of Predict objects, control can be given to PAC at specific points to verify the state of the migration and to issue checkpoints. These checkpoints are useful for restarting Predict events because PAC will ensure that each event process restarts from the step that was active during the previous termination.

If Predict incurs any errors while processing the Predict migration load step, it calls PAC to record the information about the error in the event audit report. This information is written at the bottom of the report at the time of termination and can normally be used to help identify problems with Predict migrations.

Note: For the *os*_PREDICT_MIGRATE_OUT job (where *os* must be replaced by the corresponding operating system notation, for example MVS_PREDICT_MIGRATE_OUT for the

MVS job), workfile 6 is mandatory, if the transfer list contains Predict objects from Predict Version 3.4 or below. If the transfer list contains only Predict objects from Predict Version 4.1 or above, workfile 6 is not required.

Generating Views/DDMs and Rules

Rules and views/DDMS are the means by which Predict files, userviews, and verifications are linked with Natural objects. Predict objects are the source; rules and views/DDMs are the cataloged objects used as subordinates by the Natural objects.

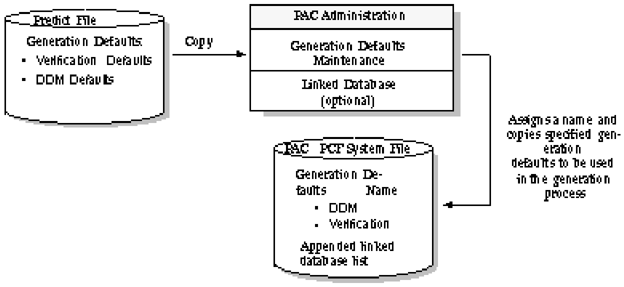
Although handled as Natural objects, these rules and views/DDMs are still linked to their origin in Predict. They are stored on the FDIC file.

During generation, the information about generations is recorded in the event audit report.

Setting Up the Predict Generation Defaults

Defaults for generating views/DDMs and rules are defined and maintained in Predict. Sets of generation defaults (verification and DDM) can be copied to PAC; however, the values for these defaults are not modifiable in PAC and therefore must be changed in Predict before being copied into PAC.

The PAC administrator may copy different sets of Predict generation defaults into PAC. Sets of defaults are assigned specific names for use with migrations of Predict data into PAC. They are saved and stored on the PCF system file. If a list of linked databases has been specified for a specific set of generation defaults, these linked databases will also be included with the defaults as shown in the following diagram:


Predict File
Generation Defaults
• Verification Defaults
• DDM Defaults
Copy
PAC Administration
Generation Defaults Maintenance
Linked Database (optional)
Assigns a name and copies specified generation defaults to be used in the generation process
PAC PCF System File
Generation Defaults Name
• DDM
• Verification
Appended linked database list

Sets of Generation Defaults

When PAC is initialized, a set of Predict generation defaults called DEFAULTS is automatically defined for use with migrations of Predict data into PAC. The generation defaults copied are those defined in Predict at the time PAC is initialized.

The defaults to be used with a Predict migration event to generate views/DDMs and rules can be specified during authorization by entering the name of a set of defaults previously copied and stored on the PCF system file. If a specific set is not specified for a migration of Predict data into PAC, the default set DEFAULTS is used.

If the specified set or the DEFAULTS set itself cannot be found (that is, has been removed or does not exist) at the time the migration is processed, an error will occur indicating the name of the set that was specified and that it does not exist.

Linked Databases

Predict generation defaults for Adabas files may have up to ten (10) databases to which files may be linked. The Adabas Subsystem Specification DB-ID parameter in the stored generation defaults determines whether a linked database is required; if so, a database number (DBnr) is assigned to the generated view/DDM .

Predict determines if a specific database is required for the generation of views/DDMs based on the value of the Specification DB-ID parameter and on the names of databases linked to the specified generation defaults set. Adabas files can be linked to one database, to several databases, or to no database.

The action taken by PAC depends on whether the value of the Specification DB-ID parameter in the stored generation defaults is N or Y:

N(o)	PAC generates a DDM with DBnr=0, even if the file is linked to several databases.
Y(es)	Before the files can be generated, Adabas files must be linked to one or several databases that were previously migrated into PAC (although the required databases may be migrated at the same time as the files as part of the same migration event). PAC generates the views/DDM based on the number of the appropriate linked databases by scanning the linked database list. If the databases required for specific file generations have not been migrated into PAC, Predict terminates the migration.

If the user exit PACEX037 is active, PAC invokes the exit before the generation command is built to determine the linked database to be used for the view/DDM generation. If no linked database is found or the Specification DB-ID=N, a blank is passed to the exit. Depending on the value of Specification DB-ID, the user exit may then verify, override, or reset the appropriate linked database name by scanning the linked database list.

Predict Object List

The Predict migration event migrates only Predict objects; that is, the object list may contain only Predict objects. Natural objects may not be included in a Predict object list.

Views/DDMs and rules are required during the compile of Natural objects; they are treated as Natural objects and occur on Natural object lists. They may be identified in the Predict object list in terms of files, userviews, and verifications; that is, in terms of the Predict objects used to generate them.

PAC provides specific applymods and user exits for additional customization of the list.

Building Object Lists

There are several options for building a list of Predict object types. If you want to migrate only a few objects, it may be more useful to enter the individual objects "manually" in the Object List Editor; however, if you want to migrate large numbers of objects, the generation facilities can be used to avoid the errors that could occur when manually entering objects.

Because of the nature of the Predict migration utility, a single entry in the Predict object list may result in numerous Predict objects being processed. For example, if the Predict type FILE (F or C) is specified for an object in the object list, Predict automatically unloads the file together with all of the verifications and userviews linked to the file, and generates new automatic rules and DDMs for each object.

Note: The conditions required for successful generation of Predict objects and the object types that do or do not require generation are determined by Predict. Refer to the appropriate Predict documentation for more information.

If only userviews and/or verifications are required for the object list, they should be individually placed in the list and the file itself should be omitted. The parent file (F or C) must have been previously migrated into PAC; otherwise, Predict will terminate the generation with an error.

Manually Creating the Object List

An object list may be created "manually' by entering each object on the Object List Editor.

To prevent ambiguities, the object name and type must be explicitly specified. The name of an object or a range of objects may be specified. An asterisk (*) or range notation may be used to specify a prefix or range of objects.

Selecting and Expanding Objects for the Object List

The Select option (SEL command) and the Expand option (EXP command) can be used on the Object List Editor to build the object list for Predict objects to be migrated into PAC.

You may use the SEL command to add Predict objects to the object list, either alone or when you are specifying objects manually on the Object List Editor. The objects presented for selection will be read directly from the Predict FDIC file specified in the development or maintenance status link definition. Selection is based on the specified object name, type, and range date or the date modified. Range notation or an asterisk (*) may be used to limit the list of objects returned.

The EXP command can be used to include in the object list all files linked to a database. A database can be expanded to include its files using the EXP command. However, files will be expanded to include the userviews and automatic verifications during migration. EXP is valid for databases when they are entering PAC from development or maintenance status types.

Generating the Object List

The list of Predict objects may be generated "automatically" using the PAC object list generation facilities either online or in batch. Automatic generation is only possible when the origin is Control, a test, or a production status.

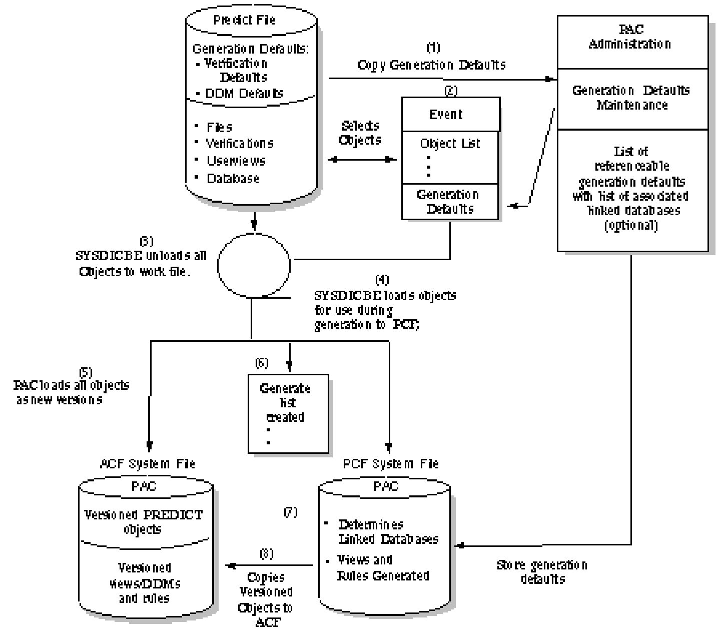
When you are adding a migration event, you may specify a generation option online by providing a GENTYPE value of P in the Generate List field of the Add Event screen.

When you want to generate the object list for an existing migration event or regenerate the object list, use the GENLIST command while modifying the event and specify the desired generation option.

The PACEX037 user exit can be invoked to control the views/DDMs and rules that are to be generated. For example, you may not wish to have an actual view/DDM generated for a file because only the views/DDMs of userviews are to be used by programming objects.

Overview of Generating and Versioning Predict Objects

The process of generating and versioning Predict objects in PAC is outlined in the following diagram:


Predict File
Generation Defaults:
• Verification Defaults
• DDM Defaults
• Files
• Verifications
• Userviews
• Database
(1)
Copy Generation Defaults
PAC Administration
Generation Defaults Maintenance
List of referenceable generation defaults with list of associated linked databases (optional)
(2)
Event
Object List
Generation Defaults
Selects Objects
(3)
SYSDICBE unloads all Objects to work file.
(4)
SYSDICBE loads objects for use during generation to PCF;
(5)
PAC loads all objects as new versions
(6)
Generate list created
ACF System File
PAC
Versioned PREDICT objects
Versioned views/DDMs and rules
PCF System File
PAC
• Determines Linked Databases
• Views and Rules Generated
(7)
(8)
Copies Versioned Objects to ACF
Store generation defaults

Explanation of Steps in the Diagram

Step	**Action**
1	Generation defaults Predict Predict generation defaults Generation defaults are copied from the Predict FDIC file to the PCF system file; if applicable, the PAC administrator specifies linked databases for some or all sets of generation defaults copied.
2	SYSDICBE utility The migration event is created; PAC validates the object list and creates unload commands to be processed by the Predict migration utility SYSDICBE. The generation defaults to be used are identified in the migration event; the event is submitted.
3	The SYSDICBE utility is invoked with the unload commands to create the migrate dataset (work file). With the SYSDICBE utility, one unload command normally results in the unload of several Predict objects (the parent object will be unloaded as well as all of its linked children).
4	The SYSDICBE utility is restarted to load from the work file to the PCF system file any objects required for the generation of views/DDMs and rules (that is, Predict userviews, files, databases, and verifications).
5	PAC loads all objects from the work file to the ACF system file as new versions.
6	For all objects that will require generation, the appropriate Predict SYSDIC generate commands are created and entries are made in the generate list.
7	Using the specified generation defaults, the generate commands are processed and the views/DDMs and rules are generated in the PCF system file; linked databases are determined. PACEX037 user exit Predict generation exit Predict generation user exit The PACEX037 user exit can be invoked to control the views/DDMs and rules that are to be generated. For example, if programming objects only use the views/DDMs of userviews, the generation of views/DDMs of files can be suppressed.

Step	Action
8	The generated objects (views/DDms and rules) are copied from the PCF system file to the ACF system file where they are versioned. In versioning the Predict application objects, PAC inherently tracks the state of these objects; that is, whether they have been migrated to other statuses.

Migrating Predict Data Within PAC

Once Predict data has entered the PAC controlled environment as versioned Predict objects or as Natural objects (views/DDMs and rules), it can be migrated throughout the PAC environment as part of a Natural migration.

Statuses/Application Status Links

PAC is able to retain an interrelationship between Predict files, userviews, and verifications and the applications that use them.

The origin status of each application status link defined in PAC identifies the physical location of the Predict FDIC file where the Predict objects, cross-reference data, and generated Natural views/DDMs and rules are stored. You can override the location (DBnr/Fnr) specified in the status definition when you define the application status link.

Locating Predict in Your Environment

You may use a single Predict FDIC system file for all environments or you may have different FDIC files in different environments.

You may locate FDIC files in the development, maintenance, test, and production environments. If you use different FDIC files in different environments and you make changes to the Predict data in any one of these environments, those changes will not be reflected in the other environments.

For example, suppose you have FDIC files in development, maintenance, and test. If you migrate Predict data through PAC, you could override more recent changes made in test or production with earlier data migrated from development or maintenance.

To maintain consistency across environments, it is strongly recommended that you make changes to the Predict data in a centralized location; that is, changes should be made in development or maintenance as required and then distributed to other locations throughout PAC.

Because this may not be possible for some sites, PAC does support a distributed Predict environment; however, PAC itself centralizes all Predict data.

Locating Predict in Development and Maintenance

The most likely locations for Predict are development (where the data is initially defined) and maintenance (where the data is maintained).

For instance, maintenance changes to PAC objects may require changes to the Predict userviews, files, and/or verifications needed to generate the views/DDMs and/or rules that must be used to recompile the PAC objects when they are returned from maintenance.

Locating Predict in Other Environments

Reasons for locating Predict in other environments are as follows:

- You may need Predict help at execution time for certain applications; this information needs to be readily available to the programs that use it.
- You may need to migrate VSAM DDMs for use at execution time.
- You may want to use Predict directly to generate files, for instance. Once files are defined in Predict, the actual files (FDT) can be generated for loading to the database.
- You may want to use Predict to maintain files using certain Adabas Basic Services functionality.
- You may want to locate Predict in an environment so that it reflects the state of all objects current for that environment; for example, you may locate it in production so that you can determine what the production versions of databases and files look like.
- You may need to have the cross-reference data of all objects in a particular status for deriving various statistical information.

Note: It is no longer possible to migrate Predict objects to a status of type (P). You can now attain the same functionality if you define a status of type (T) to a Predict application specifying the production FDIC as its location.
Creating a migration event for this migration path will ensure that objects of type Predict will be migrated to your production FDIC.

Migration Path/Event

Predict application objects from development, incorporation, or maintenance must have a destination status of Control. Once the Predict data is in the Control status, it can be migrated directly to other allowed statuses.

Cross-Reference Data

Cross-reference (Xref) data is available only with Predict Version 3.1 or above when the Predict Active References feature is installed.

The PAC Predict cross-reference sub-function allows you to obtain cross-reference information about application-linked Predict cross-reference objects such as the following:

- Programs
- Data areas
- Userviews
- Copy code
- Retained sets

Predict cross-referencing of Natural objects occurs only in the PAC Control status as part of a Natural migration. Xref information for Natural objects is created at compile time; it may optionally be migrated with Natural objects and stored at the destination as defined in the application status link.

Maintaining Cross-Reference Data

A migration event definition specifies whether

- cross-reference data is to be stored within PAC (Local);
- cross-reference data is to be copied to the Predict file specified by the application status link (Remote);
- cross-reference data is to be stored both locally and remotely;
- no cross-reference data is maintained.

The Predict Xref Menu is accessible from the Application Status Reporting Menu. Refer to the Predict User's Guide for more information.

Enhanced Predict Object Handling

It is necessary with the handling of Predict objects to correctly separate Predict files and DDMs. This change has resulted in some minor display and storage enhancements now being seen in PAC.

During a migration event of Predict objects, the audit report will show 'double' objects as follows:

```
PAC6997: (A) Unload requested for DEMO_FUSER_31_VIEW (ADABAS View)
PAC6997: (A) Unload requested for DEMO_FUSER_31 (ADABAS File)
PAC6997: (A) Unload requested for DEMO_DA_164 (Database)
PAC7057: (A) DEMO_FUSER_31_VIEW.0001 (ADABAS View) created
PAC7057: (A) DEMO_FUSER_31_VIEW.0001 (User View) created
PAC7057: (A) DEMO_FUSER_31.0001 (ADABAS File) created
PAC7057: (A) DEMO_FUSER_31.0001 (User View) created
PAC7057: (A) DEMO_DA_164.0001 (Database) created
```

Note that two of the original three objects (DEMO_FUSER_31_VIEW and DEMO_FUSER_31) in the migration list, have had 'double' entries created. This will also be seen when viewing the Predict objects in any of the 'View Objects' sub-functions.

Reports About Versioned Predict Objects

The Versioned Objects sub-function in PAC allows you to display information about versioned Predict objects.

Specific information about the Predict migration unload invoked to create the Predict object version is available, including the location of the FDIC file from which the object was unloaded and the version of Predict used.

You can review the use of particular Predict objects. For example, you can identify all objects for all applications that actually use the view/DDM of a file as a subordinate at compile time.

PAC allows you to display details about the object in a form similar to those available using the Predict retrieval functions. For example, you can display the following details about a file: file attributes, file elements, and even sub/superdescriptor information in the case of Adabas files. The actual generated view/DDM with the specified database and file may also be displayed.

30 Assigning and Maintaining Object Versions

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Each time a new or changed object is migrated or incorporated into the PAC controlled environment from a development, maintenance, or incorporation status, it is assigned a version number. The object name, object type, and version number assigned by PAC are used together to uniquely identify each instance of an object belonging to a specific application.

The PAC and PAA systems each assign an independent version number to an object:

- PAC assigns the control version when the object enters the PAC controlled environment; and
- PAA assigns the production version when the object enters the PAA-controlled production environment.

The two different versions are maintained for purposes of consistency and ease of understanding. The Natural List Directory function lists the PAC control version. The PAA system tracks the correlation between version numbers in different environments. Refer to the PAA documentation for information about identifying the object version that is executing in production.

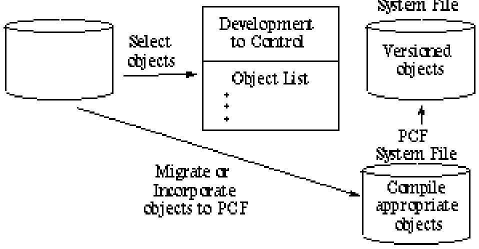
Objects that have been incorporated or migrated into the PAC controlled environment and have been assigned a version number are called versioned objects. A versioned object is not necessarily a compiled object. Each instance of a versioned object is called an object version. Migration events populate PAC with object versions.

For a specific version of an object in a specific status, you can view the date and time it was saved and cataloged, the event that migrated it to the status, other statuses in which the version exists, and related objects.

The object audit history shows every version of the object, the statuses to which each version has been migrated, and the dates and times of the migrations. You can view the source code for an object version.

You can use a PAC utility to compare the source code for two versions of an object or compare a PAC version with an object on a Natural system file outside the PAC-controlled environment. PAC indicates when objects are identical or displays the differences between them.

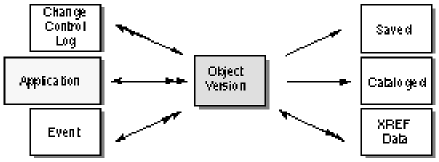
The following diagram shows how Natural objects being loaded into PAC are processed to create versioned objects:



A migration event from a development or incorporate status to Control status is created and objects are selected for the object list from the physical location. The objects are migrated to the PCF system file where the appropriate objects are compiled. The object versions are stored in the ACF system file.

This chapter covers the following topics:

Object Version



An object version is an application-specific instance of an object within PAC that can be uniquely identified by a version number.

A specific object version consists of a specific set of Natural (or foreign) statements. A compiled object optionally includes a specific set of subordinate objects.

An object version either performs the designated function or it does not. If it does not, it will probably be superseded by another version. Because of its interrelationships with other objects, the object itself must be a fixed definition; it may not change.

Removing Object Versions

Only the PAC administrator may remove objects from the PCF system file (PAC work area). Contact your administrator for more information.

The following examples illustrate situations where objects need to be removed from the PCF system file.

- If you rename a Natural subroutine and migrate it to PAC where the original version still exists, then try to compile the renamed subroutine, you will receive a NAT924 "Invalid subroutine name" message. The old subroutine name (that is, the one already existing in PAC) must be removed.
- When switching objects from one application to another application that is to be used as a steplib, the object must be removed from the original application or from the PCF system file so that PAC can use the object in the steplib application during compile.

Retrieving Information About Versioned Objects

You may check the integrity of application object versions with the Versioned Objects sub-function of PAC or by using the supplied PAC Application Program Interface (APIs).

Versioned Objects Sub-Function

The Versioned Objects sub-function of PAC allows you to retrieve information about all versions of an object in the PAC environment, including the current version. You may retrieve information about Natural, foreign, Predict, and Predict Case objects.

Along with the application name, object name, type, and version, you may display the following information about versioned objects:

- Development source directory information to identify the particulars about the person who changed the object before it was loaded into PAC:
  - the save library name;
  - the date it was saved in the development library;
  - the user ID;
  - the TP monitor and operating system;
  - the Natural version and system maintenance level;
  - the programming mode.
- The type of user error message (short or extended) and languages used; this information can be used for verification and also audit information.
- Subordinate objects that the versioned object uses; and the objects that use the versioned object; this information is useful for impact analysis and the expand facilities.
- Information about the statuses in which the object version exists for object list verification and possible problem resolution and state of the application.
- The "history" of an object version, for example the dates an object was migrated into a particular status; this information is used primarily for problem tracking; that is, to determine the state of an application at a specific previous date.
- Object versions that do not exist in any status; that is,
  - objects that have been superseded and no longer exist in any status other than Control;
  - objects that have been archived;
  - objects that have never been migrated to any status other than Control; that is, have never been used.

This information may be used to identify objects that should be purged from the PAC environment.

- Extended information from user-modifiable reporting front-ends supplied with PAC provide extended user facilities similar to user exit processing. These reporting front-ends are invoked by selecting the Extended User Info option from Additional Options.
- The date the object was saved and cataloged when it was brought into PAC.
- The maintenance version used: the version number of the object when it was checked out for maintenance; this information can be used for back-tracking the origin of the object that was changed◎a compare of these two versions will identify the exact changes.
- The migration event that brought this object version into PAC and the date the event was created ◎to determine the actions associated with the loading of this object, for example, other objects also migrated.

Application Program Interface (APIs)

PAC object version reporting has fixed definitions for the actual reports. You can tailor the reports to your specific needs using the APIs or even the supplied PAC Express.

The following PAC APIs can be used to retrieve information about versioned objects. A list of current APIs is provided in the PAC Reference documentation.

- The Display Object Version Natural Source API (APINNSRC) allows you to display the Natural source code for a particular object version in the Natural source area.
- The Load Object Version Natural Source API (APINLSRC) allows you to load the Natural source code for a particular object version into the Natural source area and edit it. Any changes made to the object version will not be reflected in PAC.
- The Object Version API (APINOBJV) allows you to display information about a particular object version; this information is the basic information about the object.

Versioned Objects

When an object is moved into the PAC controlled environment, it is assigned a version number and is called a versioned object. You can use the Versioned Objects function to retrieve information about all versions of an object in the PAC environment and the Compare function to compare object versions.

You can display version information about Natural programming objects and user error messages; foreign, Predict, and Predict Case objects. Available information about versioned objects includes

- migration information;
- development source directory information (Natural objects);
- type of user error message (short or extended) and languages used;
- subordinate objects that the versioned object uses;

- objects that use the versioned object;
- statuses in which the object version exists;
- history information such as the dates an object was migrated into a particular status;
- object versions that do not exist in any status;

You may print information about versioned objects using the Hardcopy sub-function.

You may use direct commands to display

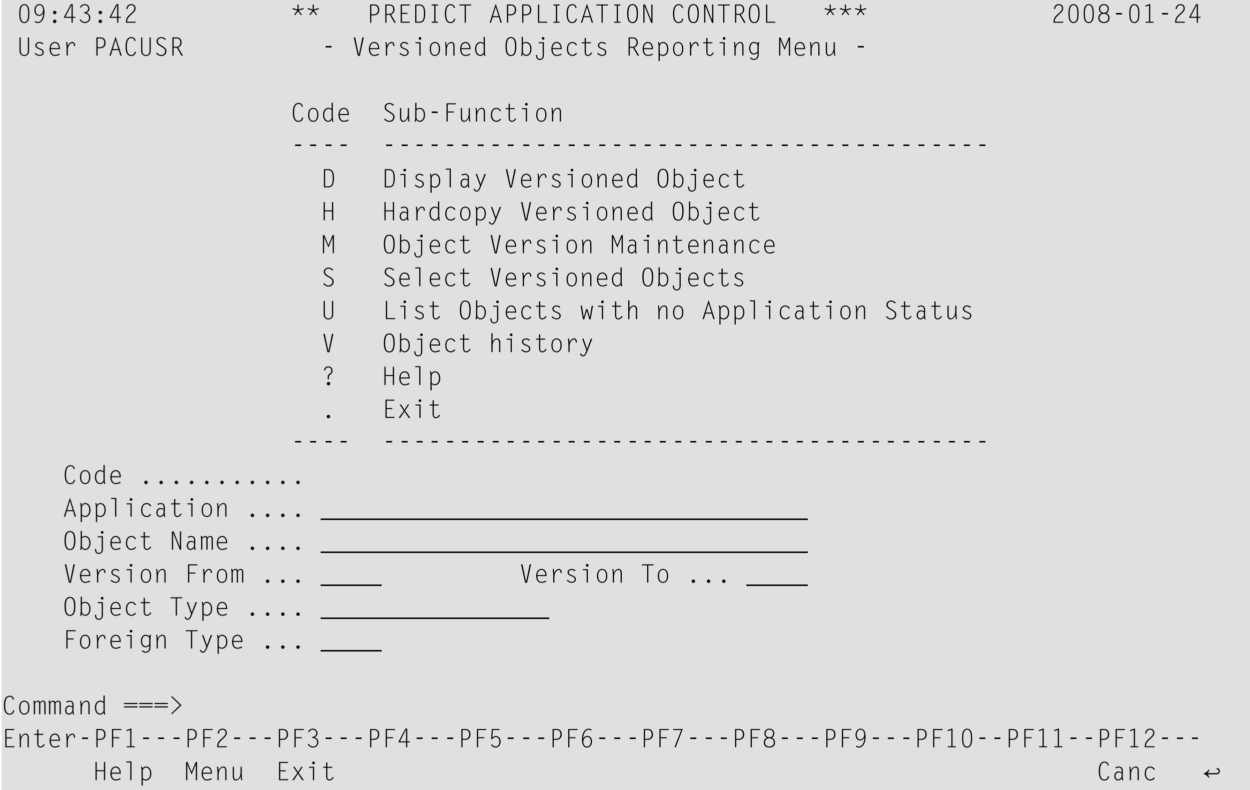
- a specific version of an object;
- an object in a specific status;
- the most current version of an object, or
- a specific version of an object previous to the most current version.

For detailed information about direct commands, refer to the PAC Reference documentation.

Accessing Versioned Objects Information

To access information about versioned objects, enter Code V on the PAC Main Menu.

The Versioned Objects Reporting Menu appears:



```
 09:43:42          **   PREDICT APPLICATION CONTROL   ***           2008-01-24
 User PACUSR         - Versioned Objects Reporting Menu -

                   Code  Sub-Function
                   ----  ----------------------------------------
                     D   Display Versioned Object
                     H   Hardcopy Versioned Object
                     M   Object Version Maintenance
                     S   Select Versioned Objects
                     U   List Objects with no Application Status
                     V   Object history
                     ?   Help
                     .   Exit
                   ----  ----------------------------------------
    Code ...........
    Application .... ________________________________
    Object Name .... ________________________________
    Version From ... ____         Version To ... ____
    Object Type .... _______________
    Foreign Type ... ____

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc   ↩
```

This menu provides the following fields for entering selection criteria:

Field	**Description**
Application	Name of the application to which the versioned objects belong. If you leave this field blank or enter range notation, a selection list of available applications is displayed.
Object Name	Name of the object to be processed. A range may be specified.
Version From	Version number of the object to be processed. If a range is specified, this field is used along with the Version To field. Version numbers are always equal to or less than the version number specified in the Version To field. Valid values are 1-9999. If a range is specified only for the Version From field, this value is used as the starting value of the versions selected.
Version To	Used along with the Version From field to specify a range. Version numbers are always greater than or equal to the version number specified in the Version From field. If specified, this value will be used for the ending value of the requested range. Valid values are 1-9999.
Object Type	Versioned object user error message Versioned object Natural Versioned object Predict Versioned object Predict Case The type of object to be processed (Natural, foreign, Predict, Predict Case, user error message). A question mark (?) in this field produces a list of Natural object types with the option to also list Predict object types.
Foreign Type	Foreign object to be processed, specified as 3nnn. A question mark (?) in this field produces a list of foreign datasets supported by the specified application.

You may also select the D, H, and S sub-functions directly from the Versioned Objects Selection List that is accessed using Code S (Select Versioned Object).

Selecting a Versioned Object from a List

1. To display a list of versioned objects for a specified application, enter Code S (Select Versioned Object) and the application name on the Versioned Objects Reporting Menu.

   If the application name is not specified, a selection window of available applications is displayed on which you may make your selection.

   You may limit the list of object versions retrieved by specifying the version numbers in the Version From.../Version To... fields; and/or object types to be displayed in the Object Type field.

   The Object Version Selection List appears displaying the selected list of object versions:

```
11:20:09          ***** PREDICT APPLICATION CONTROL *****         2000-06-07
User PACUSR          - Object Version Selection List -

C Nr Object Name                      Object Type     Ver  Migration Date
- -- -------------------------------- --------------- ---- ------------------
_  1 AAA-GDA                          Global          0002 1997-04-28 11:25:09
_  2 AAA-GDA                          Global          0001 1997-04-24 16:45:32
_  3 AAACOPY1                         Copycode        0001 1997-04-24 16:45:32
_  4 AAAPGM1                          Program         0003 1997-04-28 11:25:09
_  5 AAAPGM1                          Program         0002 1997-04-24 17:01:39
_  6 AAATEXT1                         Text            0001 1997-04-24 16:45:33
_  7 ADAMPM                           Cobol Source    0002 1997-04-24 17:01:57
_  8 AVB00001                         Cobol Source    0002 1997-04-24 17:01:57
_  9 AVB00002                         Cobol Source    0002 1997-04-24 17:01:58
_ 10 A1                               Program         0003 1997-04-28 11:25:10
_ 11 A1                               Program         0002 1997-04-24 17:01:39
_ 12 A10                              Program         0003 1997-04-28 11:25:10
_ 13 A10                              Program         0002 1997-04-24 17:01:39
               Mark Selection, Enter Number or 'T' (Top) __


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

This screen lists the objects of the application; the type and version of each object; and the date and time that each object version was migrated into PAC.

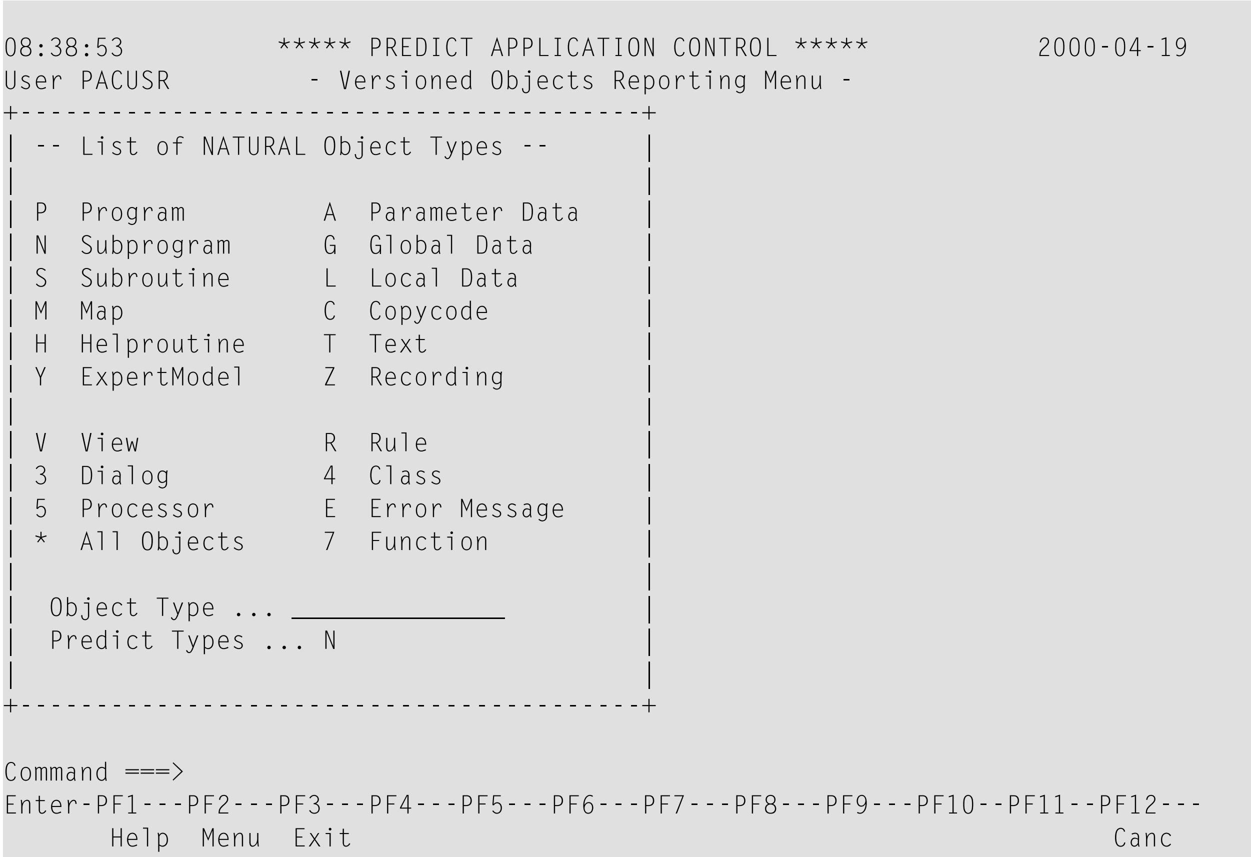
Note: Where no cataloged version exists, the object name is highlighted.

2. To display information about individual objects, mark the desired object with the cursor, enter the D, H, or S sub-function ins the "C" column, or enter the number of the object (from the "Nr" column) in the Mark Selection... field. A Display Object Version screen appears.

Selecting an Object Type from a List

You can select a Natural or Predict object type to limit your list of object versions by entering a question mark (?) in the Object Type field on the Versioned Objects Reporting Menu.

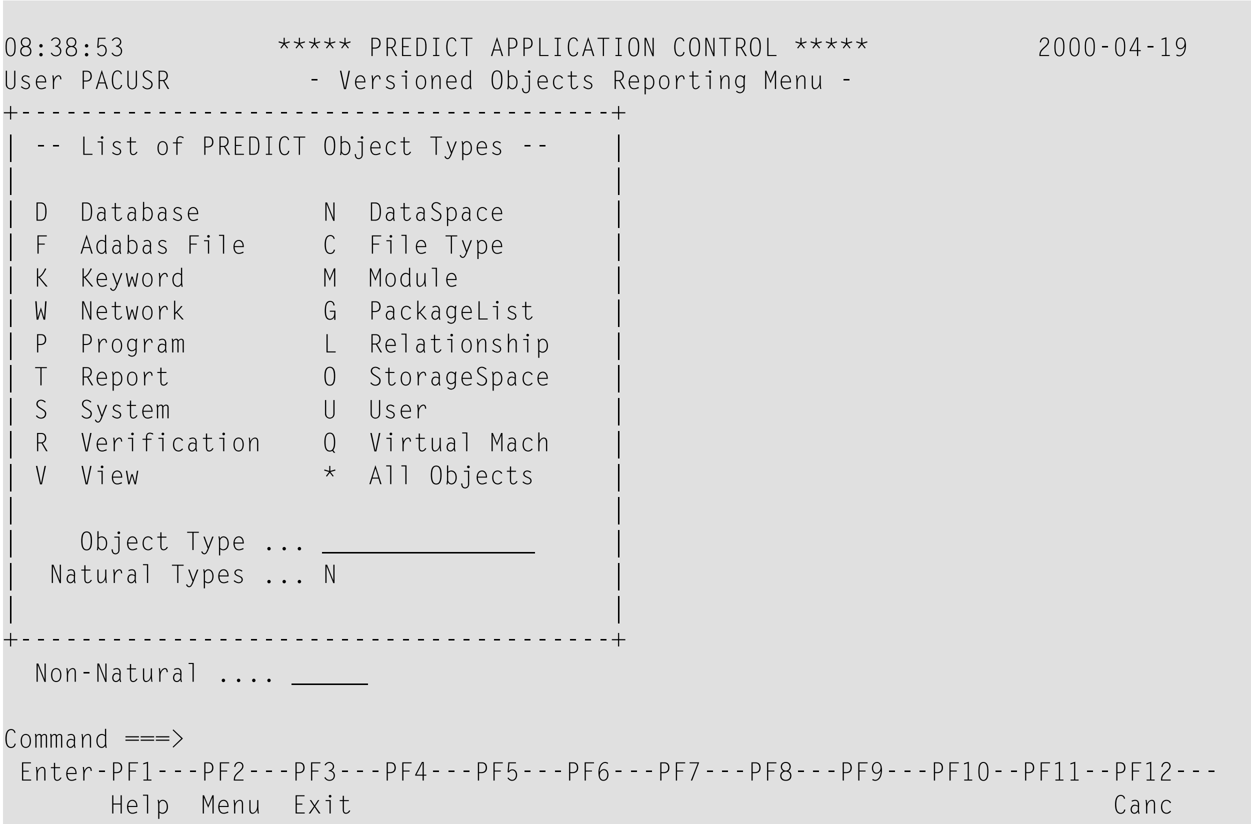
The List of Natural Object Types window appears:



```
08:38:53          ***** PREDICT APPLICATION CONTROL *****           2000-04-19
User PACUSR         - Versioned Objects Reporting Menu -
+-----------------------------------------+
| -- List of NATURAL Object Types --      |
|                                         |
| P  Program          A  Parameter Data   |
| N  Subprogram       G  Global Data      |
| S  Subroutine       L  Local Data       |
| M  Map              C  Copycode         |
| H  Helproutine      T  Text             |
| Y  ExpertModel      Z  Recording        |
|                                         |
| V  View             R  Rule             |
| 3  Dialog           4  Class            |
| 5  Processor        E  Error Message    |
| *  All Objects      7  Function         |
|                                         |
|  Object Type ... ______________         |
|  Predict Types ... N                    |
|                                         |
+-----------------------------------------+

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                     Canc
```

To select one or more Natural object types, enter the corresponding one-character code(s) in the Object Type field in this window; for example, "PMC" to select programs, maps, and copycode. To request all objects of the application, enter an asterisk (*). Press ENTER.

To select one or more Predict object types, change the default N in the Predict Types field to Y(es) to display a List of Predict Object Types:



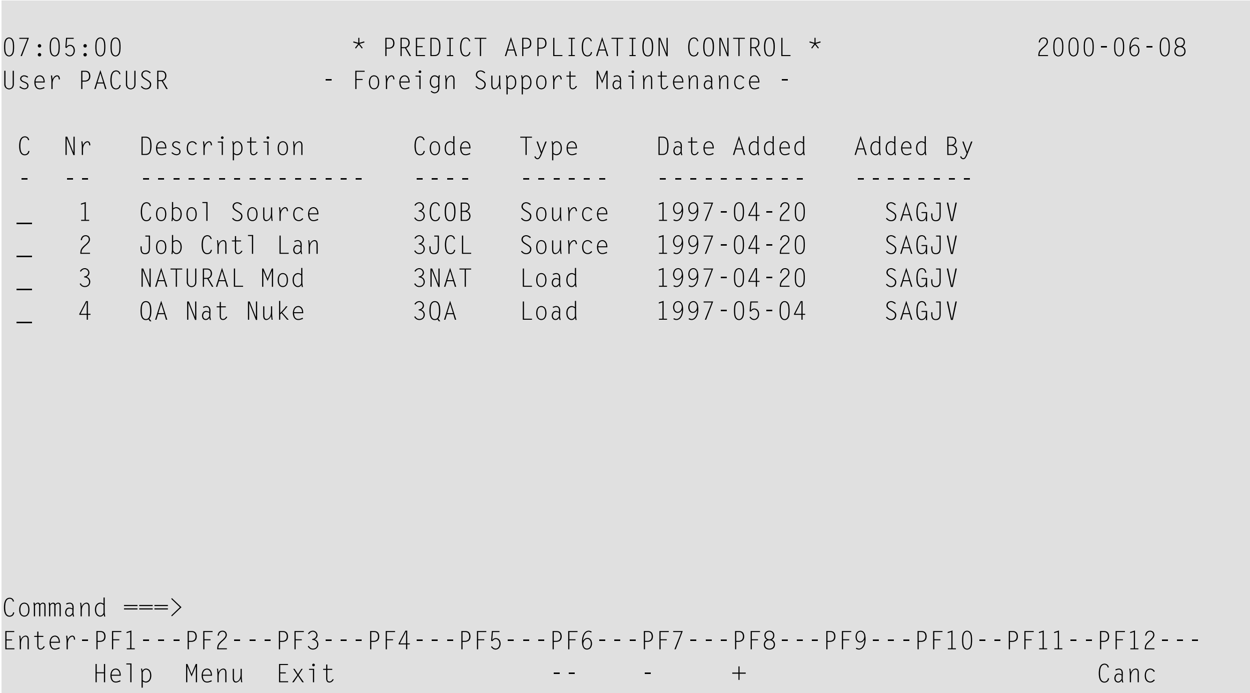
```
08:38:53          ***** PREDICT APPLICATION CONTROL *****           2000-04-19
User PACUSR         - Versioned Objects Reporting Menu -
+---------------------------------------+
| -- List of PREDICT Object Types --    |
|                                       |
| D  Database         N  DataSpace      |
| F  Adabas File      C  File Type      |
| K  Keyword          M  Module         |
| W  Network          G  PackageList    |
| P  Program          L  Relationship   |
| T  Report           O  StorageSpace   |
| S  System           U  User           |
| R  Verification     Q  Virtual Mach   |
| V  View             *  All Objects    |
|                                       |
|    Object Type ... ______________     |
|  Natural Types ... N                  |
|                                       |
+---------------------------------------+
  Non-Natural .... _____

Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                     Canc
```

Enter the corresponding one-character code(s) in the Object Type field in this window; for example, "DFV" to select programs, modules, and file types. To request all objects of the Predict application, enter an asterisk (*). Press ENTER.

In either case, an Object Version Selection List screen appears.

Selecting Foreign Datasets from a List

When you enter a question mark (?) in the Non-Natural field on the Versioned Objects Reporting Menu, the Foreign Support Maintenance screen appears:



```
07:05:00               * PREDICT APPLICATION CONTROL *              2000-06-08
User PACUSR          - Foreign Support Maintenance -

 C  Nr   Description       Code   Type     Date Added   Added By
 -  --   ---------------   ----   ------   ----------   --------
 _   1   Cobol Source      3COB   Source   1997-04-20     SAGJV
 _   2   Job Cntl Lan      3JCL   Source   1997-04-20     SAGJV
 _   3   NATURAL Mod       3NAT   Load     1997-04-20     SAGJV
 _   4   QA Nat Nuke       3QA    Load     1997-05-04     SAGJV











Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --    -     +                       Canc
```

This screen lists the foreign datasets supported for the specified application, the identifying code, the type of dataset (source, load/compiled, or both), the date the dataset entered the PAC controlled environment, and the user who added it.

To list the object versions in a particular foreign dataset, mark the dataset with any non-blank character the "C" column. An Object Version Selection List screen appears.

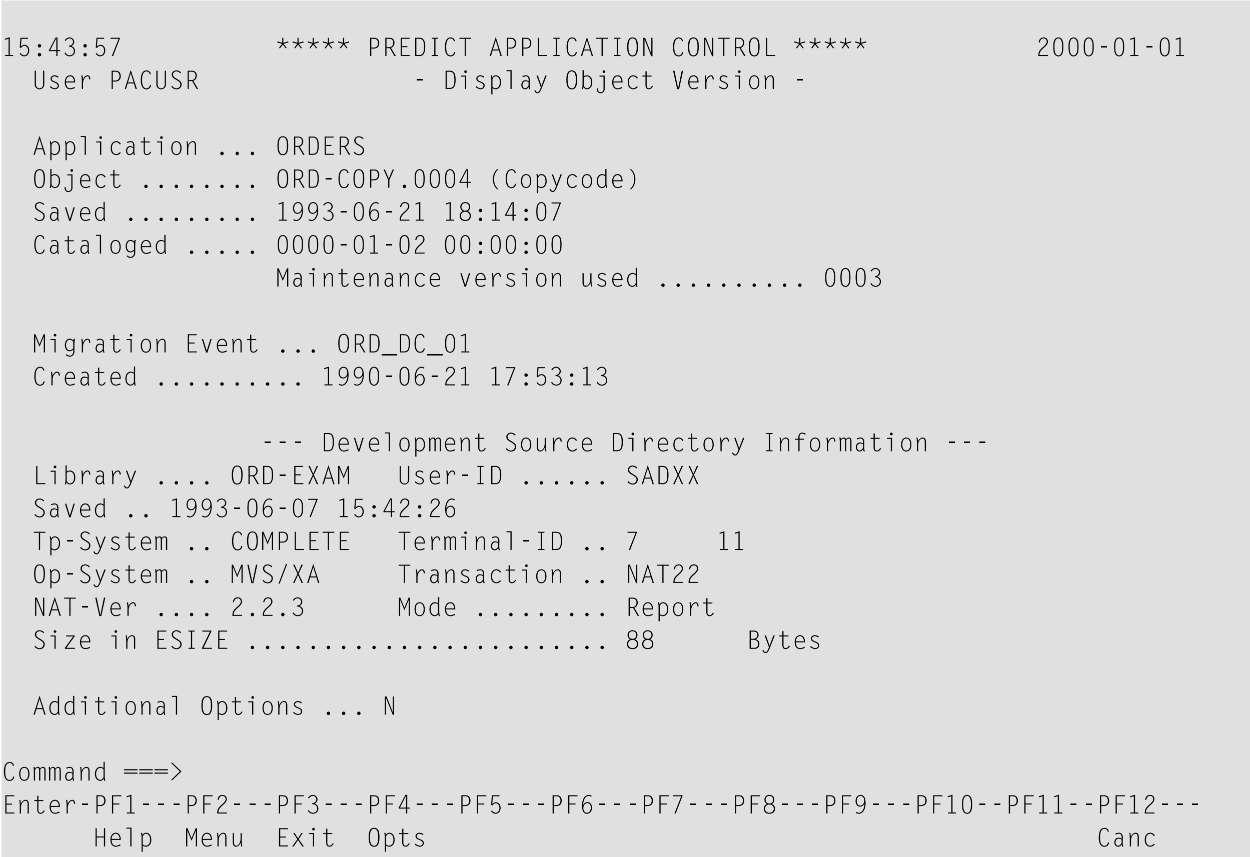
Displaying a Natural Object

1. To display version information for a Natural object, enter Code D (Display Versioned Object), the application, and optionally the Natural object name, version, and type (or ranges of these) on the Versioned Objects Reporting Menu.

   If the application name is not specified, a selection window of available applications is displayed on which you may make your selection.

   Unless you have uniquely specified the object version to be displayed, an Object Version Selection List screen appears.
2. On the Object Version Selection List, select the object version to display.

The Display Object Version screen appears:



```
15:43:57          ***** PREDICT APPLICATION CONTROL *****           2000-01-01
  User PACUSR              - Display Object Version -

  Application ... ORDERS
  Object ........ ORD-COPY.0004 (Copycode)
  Saved ......... 1993-06-21 18:14:07
  Cataloged ..... 0000-01-02 00:00:00
                  Maintenance version used .......... 0003

  Migration Event ... ORD_DC_01
  Created .......... 1990-06-21 17:53:13

                 --- Development Source Directory Information ---
  Library .... ORD-EXAM   User-ID ...... SADXX
  Saved .. 1993-06-07 15:42:26
  Tp-System .. COMPLETE   Terminal-ID .. 7     11
  Op-System .. MVS/XA     Transaction .. NAT22
  NAT-Ver .... 2.2.3      Mode ......... Report
  Size in ESIZE ....................... 88      Bytes

  Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                                Canc
```

This screen identifies the name, version, and type of the object along with the application to which it belongs.

It displays the date and time the object was saved and cataloged when it was brought into PAC (note the default values for Cataloged date and time in the example because the object type copycode is not cataloged in PAC).

If the object has been maintained, it displays the maintenance version used; that is, the version number of the object when it was checked out for maintenance.

It identifies the migration event that brought this object version into PAC and the date the event was created. If the object version was incorporated, the Incorporated field appears displaying the date and time of incorporation.

Development Source Directory Information

Development source directory information reproduces the Natural directory of the object as it was when the object was migrated into PAC. It includes

- the name of the development library;
- the date and time the object was saved in the development library and the user who saved it;
- the TP monitor and operating system under which Natural was running in the development environment, along with the version of Natural used;
- the terminal ID and the name of the transaction under which the object was saved.
- the programming mode of Natural used: Report or Structure; and
- the size of the object in bytes.

Additional Options

Type over the default N in the Additional Options field with Y or press PF4 to access the following additional information about the versioned object:

Option	Action
Date	Date and time and by whom the object version was migrated.
Source	Screens Object Version Source Object source code The Object Version Source screen appears displaying the Natural editor with a source listing for the object version. The source is not modifiable. However, certain editor commands are available for viewing the object.
Status Values	Screens Object Version Status Values Screens Display Object Status Versioned object status The Object Version Status Values window displays the statuses in which the object version exists. You can access information about the object version in the status by entering D in the "C" column. The Display Object Status screen appears displaying the date and time the object version was migrated into the status and the migration event that was used. The additional option on the Display Object Status screen displays the user who created/modified the event that migrated the object version to the status and the date and time of the creation/modification.
Used by Objects	Screens Used By Objects Subordinate object used by versioned object The Used by Objects window appears displaying the Natural program editor with information about objects that use (that is, invoke using the Natural statements FETCH, CALLNAT, or PERFORM) the specified object version during execution.
Objects Used	Screens Objects Used Subordinate object object used The Objects Used window appears displaying the Natural program editor with information about the subordinate objects (and their versions) that the specified object version uses. Subordinate objects are objects needed to compile another object, or invoked during the execution of that object.

Option	**Action**
PCA Objects Used	Predict Case objects used (If applicable) Lists Predict Case objects that the specified object version uses.
Extended User Information	HISTORY command Invokes a user-modifiable routine to display user-defined information.
List Directory	Screens Directory Display The Directory Display screen appears displaying saved or catalog directory information for the object version in PAC. See **Development Source Directory Information** for a listing of the types of system information displayed.

Displaying Database Calls for a Natural Object

You may review the use of database calls for Natural programs, subprograms, subroutines, and help routines.

To display database calls, enter the SHOW CALL direct command on the Display Object Version screen command line as shown below:

```
10:26:21          ***** PREDICT APPLICATION CONTROL ****            2001-04-10
  User UKMJ                - Display Object Version -

  Application ... HAIFI
  Object ........ APA.0001 (Program)
  Saved ......... 2001-03-28 11:04:08
  Cataloged ..... 2001-03-28 11:04:08


  Migration Event .. HINCCON
  Incorporated ..... 2001-03-28 15:02:58

               --- Development Source Directory Information ---
  Library .... FIS        User-ID ...... XSETGP     Saved .. 2001-03-28 11:04:08
  Tp-System .. COMPLETE   Terminal-ID .. DAEFTCJ8
  Op-System .. MVS/ESA    Transaction .. NAT31
  NAT-Ver .... 3.1.4      Mode ......... Structured
  Size in ESIZE ........................ 291     Bytes

  Additional Options ... N

 Command ===> SHOW CALL
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit  Opts                                          Canc   ↩
```

For the particular object, its field information shows:

- object and application name
- Natural version of that object

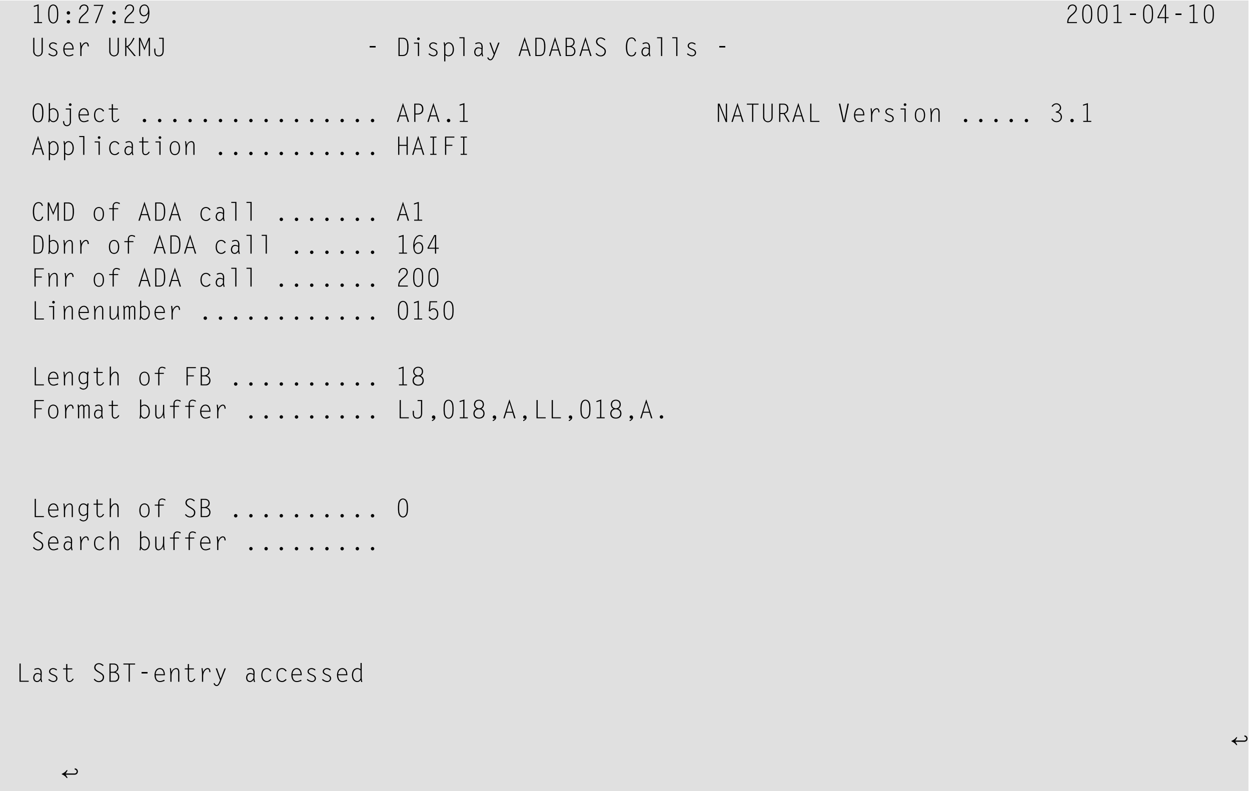
- database calls (commands: L6, L1, E1, S4)
- database and file numbers to which each call is issued
- line numbers within the Natural object that issued each call
- length and content of the search buffer
- length and content of the format buffer.

The following screen displays an example of the database call information:

```
10:27:05                                                                     2001-04-10
User UKMJ             - Display ADABAS Calls -

Object ................. APA.1                NATURAL Version ..... 3.1
Application ........... HAIFI

CMD of ADA call ....... L6
Dbnr of ADA call ...... 164
Fnr of ADA call ....... 200
Linenumber ............ 0080

Length of FB .......... 18
Format buffer ......... LJ,018,A,LL,018,A.


Length of SB .......... 8
Search buffer ......... LJ,18,A.



                                                                                      ↩
```

By pressing ENTER the individual commands will be displayed on a seperate screen. When the last screen is reached then a message: "Last SBT-entry accessed" will be displayed at the bottom of the screen.

On pressing ENTER again the user will be returned to the display object screen. The following screen shows an example of the database call information for the last displayed call:



```
 10:27:29                                                        2001-04-10
 User UKMJ             - Display ADABAS Calls -

 Object ................ APA.1               NATURAL Version ..... 3.1
 Application ........... HAIFI

 CMD of ADA call ....... A1
 Dbnr of ADA call ...... 164
 Fnr of ADA call ....... 200
 Linenumber ............ 0150

 Length of FB .......... 18
 Format buffer ......... LJ,018,A,LL,018,A.


 Length of SB .......... 0
 Search buffer .........



Last SBT-entry accessed

                                                                           ↩
   ↩
```

The Show Call function uses two messages:

- 'No Adabas calls have been found'

  This will be displayed when the object in question is suitable for the function but physically has no Adabas Calls to be displayed.

- 'Command SHOW CALL is not applicable to this object'

  This will be displayed when the object is not suitable for the function, for one of the following reasons.

  - The object has no compiled code.
  - The object has been Archived.
  - The object type is not suitable.
  - The object is not a Natural one.

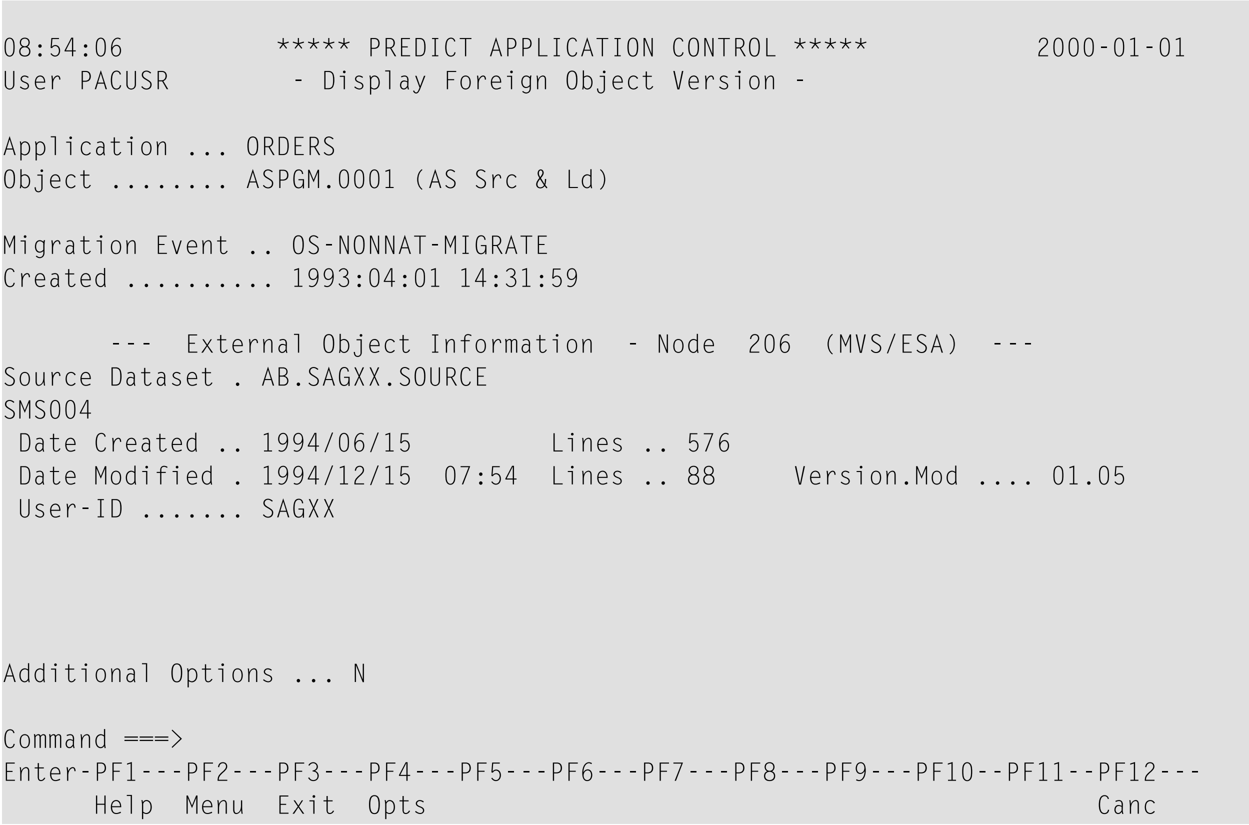
Displaying a Foreign Object

To display a foreign object version, enter Code D (Display Versioned Object), the application name, and optionally the foreign object name in the format 3nnn and version (or name/version ranges) on the Versioned Objects Reporting Menu.

If the application name is not specified, a selection window of available applications is displayed on which you may make your selection.

If you enter a question mark (?) in the foreign field, the Foreign Support Maintenance screen appears. If you otherwise do not uniquely specify the object version, an Object Version Selection List screen appears. From this list you can select a specific object version.

Once a foreign object version is uniquely specified, the Display Foreign Object Version screen appears:



```
08:54:06          ***** PREDICT APPLICATION CONTROL *****          2000-01-01
User PACUSR        - Display Foreign Object Version -

Application ... ORDERS
Object ........ ASPGM.0001 (AS Src & Ld)

Migration Event .. OS-NONNAT-MIGRATE
Created .......... 1993:04:01 14:31:59

       ---  External Object Information  - Node  206  (MVS/ESA)  ---
Source Dataset . AB.SAGXX.SOURCE
SMS004
 Date Created .. 1994/06/15         Lines .. 576
 Date Modified . 1994/12/15  07:54  Lines .. 88     Version.Mod .... 01.05
 User-ID ....... SAGXX




Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                             Canc
```

The Display Foreign Object Version screen identifies the name, version, and type (in parentheses) of the object along with the application to which it belongs. No directory information exists for foreign object versions.

It identifies the migration event that brought this object version into PAC and the date the event was created. If the object version was incorporated, the Incorporated field appears displaying the date and time of incorporation.

External Object Information

External object information for a foreign object version includes the

- node ID and operating system type where the object version is located;
- name of the source dataset to which the object belongs and the volume on which it resides;
- date the object was created and its initial size (number of lines of code);
- date and time the object was last modified, the number of lines modified, the modification level, and the user who modified it.
- name of the object (load) dataset to which the object belongs and the volume on which it resides;
- the date the object (load) module was linked to the application and the module's size.

Additional Options

The **Additional Options** available for Natural objects are the same ones available for foreign objects.

Displaying a Predict Object

On the Versioned Objects Reporting Menu, enter function code D (Display Versioned Object); the application name PREDICT, and optionally, the Predict object name, version, type (or ranges of these).

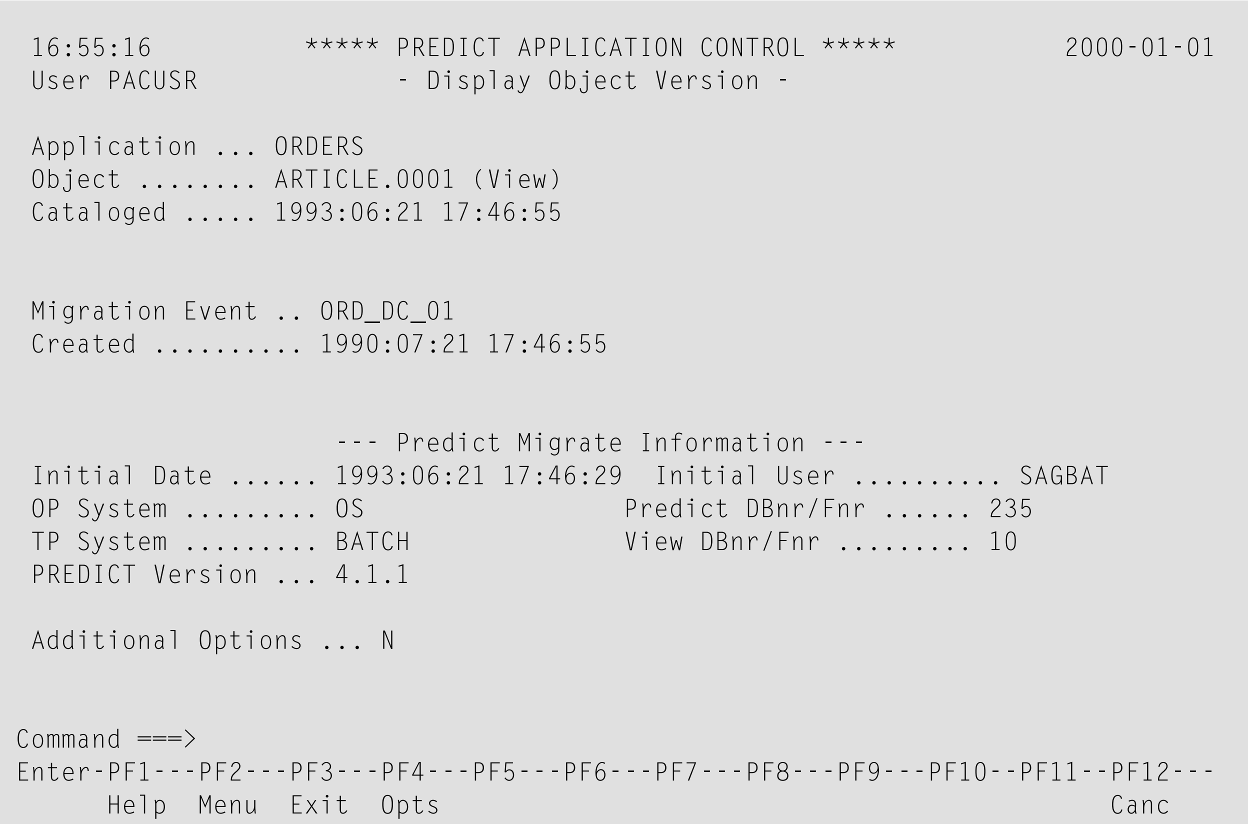
Press ENTER to display the Display Object Version screen.

Alternatively, select the object type from a list as follows

1. On the Versioned Objects Reporting Menu, enter function code D (Display Versioned Object) in the Code field; the application name (or leave blank to display a selection list) in the Application field; and optionally, the Predict object name, and object versions. Enter a ? in the Object Type field and press ENTER.

   The Object Version Selection List screen appears.
2. On the Object Version Selection List, enter D in the "C" column and press ENTER.

In both cases, the Display Object Version screen appears:



```
 16:55:16          ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User PACUSR             - Display Object Version -

 Application ... ORDERS
 Object ........ ARTICLE.0001 (View)
 Cataloged ..... 1993:06:21 17:46:55


 Migration Event .. ORD_DC_01
 Created ......... 1990:07:21 17:46:55



                    --- Predict Migrate Information ---
 Initial Date ...... 1993:06:21 17:46:29  Initial User .......... SAGBAT
 OP System ......... OS                 Predict DBnr/Fnr ...... 235
 TP System ......... BATCH              View DBnr/Fnr ......... 10
 PREDICT Version ... 4.1.1

 Additional Options ... N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                             Canc
```

The Display Object Version screen displays the following Predict information for the selected object version:

- The application name; the object name, version, and type; and the date the object was saved and cataloged when it was brought into PAC.
- The migration event that brought this object version into PAC and the date the event was created.
- The Predict event that brought the Predict objects into PAC.
- If the object version is a Predict object (for example, a view) the Predict Event field is displayed along with the name of the Predict event that brought the object version into PAC. This field does not apply if the application is Predict.
- Predict migration information, including initial user, TP and operating system, the Predict version with which the object was generated, the database/file number from which the object was migrated.
- For DB2 tables/views, the Truncate Creator field is displayed indicating whether or not (Y or N) the object was generated with the truncate creator option specified .

Additional Options

Refer to the Predict documentation for detailed information about Predict objects.

1. On the Display Object Version screen, press PF4 (Opts), or type Y (Yes) over the default and press ENTER to access the Additional Options.

   The Additional Options window appears listing options which provide additional information about the versioned object; the following are discussed:

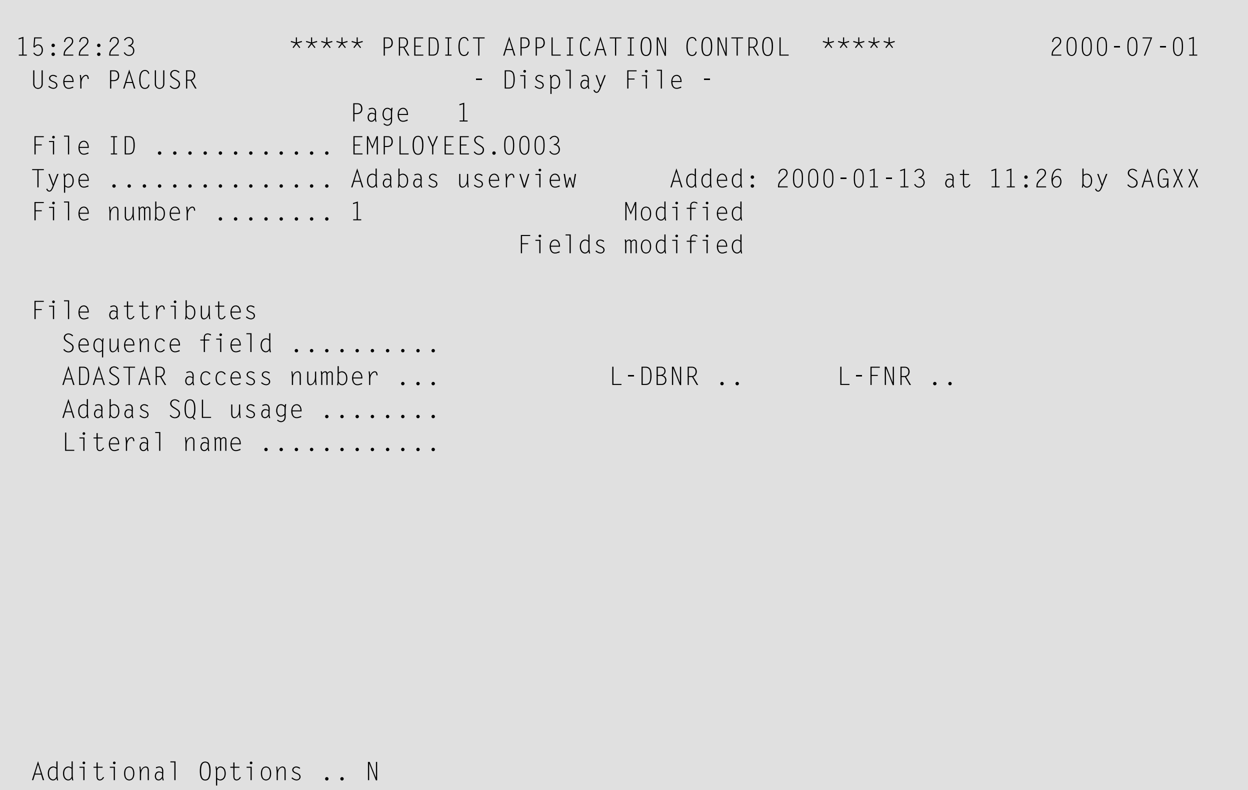
   - Source
   - Status Values
   - Used by Objects
   - Objects Used
   - Extended User Information

2. Press ENTER to move from one screen to the next.

The following screens are examples of the information typically displayed for a Predict object for these additional options.

Source

Source information about the specified Predict object is displayed on the Display File screen:



```
15:22:23          ***** PREDICT APPLICATION CONTROL  *****          2000-07-01
 User PACUSR                  - Display File -
                      Page   1
 File ID ............ EMPLOYEES.0003
 Type ............... Adabas userview      Added: 2000-01-13 at 11:26 by SAGXX
 File number ........ 1                 Modified
                                 Fields modified

 File attributes
   Sequence field ..........
   ADASTAR access number ...           L-DBNR ..      L-FNR ..
   Adabas SQL usage ........
   Literal name ............










 Additional Options .. N
```

This screen includes the file name (specified object), object type, version number, and Natural attributes such as the primary sequence field and view type.

The following additional options are available from the Display File screen:

- Comments
- Long description
- Keywords
- Owners
- File attributes
- Elements
- Element attributes

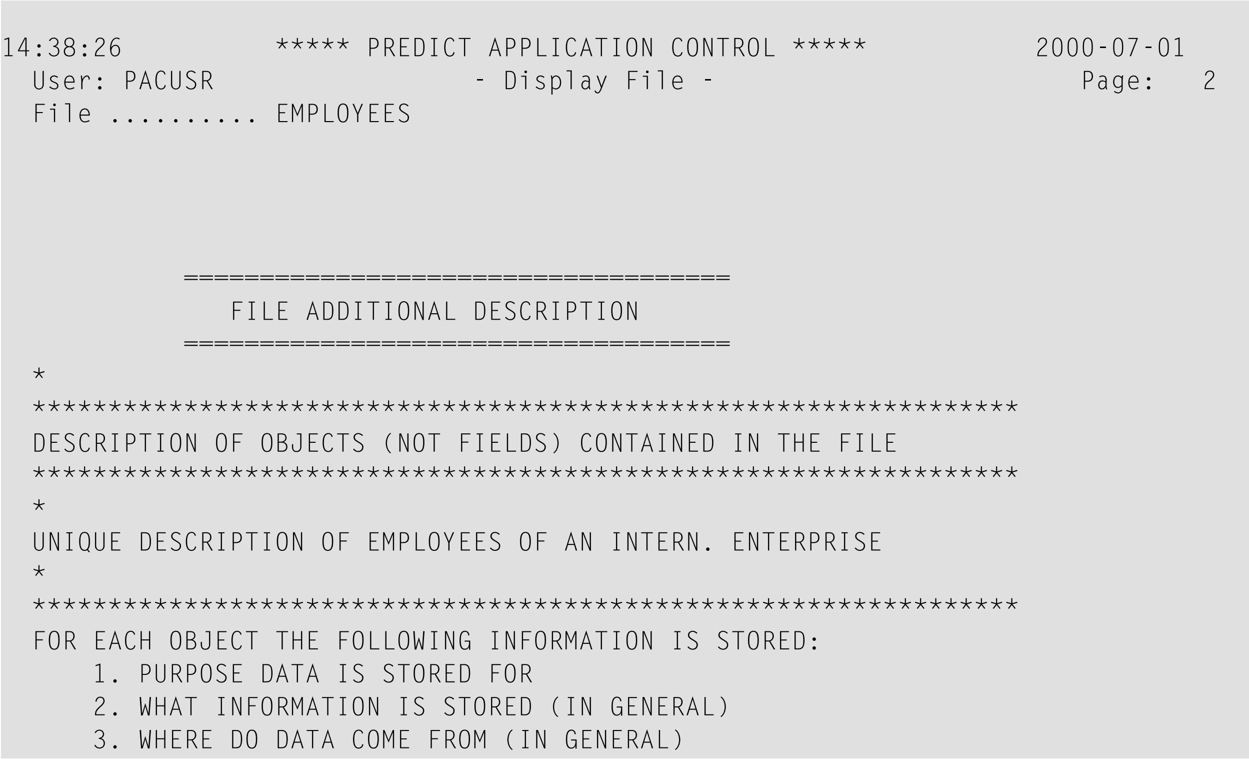
The following screens are examples of these additional options:

Comments

```
14:36:50          ***** PREDICT APPLICATION CONTROL *****          2000-07-01
  User: PACUSR                 - Display File -                       Page:   2
  File .......... EMPLOYEES
  ----------  Comments  ----------
  CONTAINS UNIQUE DESCRIPTIONS
  OF EMPLOYEES OF AN INTERN.
  ENTERPRISE (COMPAR. TO SAG)
  ***** End of Report *****
```

The Comments screen displays comments about the file (in this example, EMPLOYEES).

Long Description



```
14:38:26          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
  User: PACUSR                 - Display File -                        Page:   2
  File .......... EMPLOYEES




            ====================================
               FILE ADDITIONAL DESCRIPTION
            ====================================
  *
  *****************************************************************
  DESCRIPTION OF OBJECTS (NOT FIELDS) CONTAINED IN THE FILE
  *****************************************************************
  *
  UNIQUE DESCRIPTION OF EMPLOYEES OF AN INTERN. ENTERPRISE
  *
  *****************************************************************
  FOR EACH OBJECT THE FOLLOWING INFORMATION IS STORED:
      1. PURPOSE DATA IS STORED FOR
      2. WHAT INFORMATION IS STORED (IN GENERAL)
      3. WHERE DO DATA COME FROM (IN GENERAL)
```

The Long Description screen displays an additional description of objects contained in the file.

Keywords

If keywords exist for the specified object, this information will be displayed.

Owners

If owners exist for the specified object, this information will be displayed.

File Attributes

File attributes are displayed only for an Adabas file. Several screens in sequence display the complete set of attributes.

```
15:25:50       ***** PREDICT APPLICATION CONTROL  *****             2000-07-27
User PACUSR                  - Display File -                          Page   2

File ID ............ EMPLOYEES-FILE
Type ............... Adabas, Simple file
In database ........

ADABAS attributes
  Required attributes
    Phys. file number ..... 80
    Min ISN ............... 1
    Max ISN ...............

  Loading attributes                             Loading attributes
    Max recl ..............                        One AC extent ....
    ISN reusage ........... Y                      DS reusage ....... Y
    User ISN .............. N                      Mixed DS device .. N
    Ciphered .............. N                      Mirror ........... N
    LOWNERID ..............
    Refresh from program .. N
    Automatic allocation .. Y
    PLOG .................. N
    ISN size .............. 0 Adabas decides
MORE
```

Elements

```
15:29:59       *****  PREDICT APPLICATION CONTROL  *****            2000-07-27
  User PACUSR                - Display File -                            Page 2

  File ID ............ EMPLOYEES
  Cnt  Ty L Field name                       F    Length   Occ   D U DB S
     1    1 PERSONNEL-ID                     A      8.0          D U AA
     2 GR 1 FULL-NAME                                                AB
     3    2 FIRST-NAME                       A     20.0              AC N
     4    2 MIDDLE-I                         A      1.0              AD N
     5    2 NAME                             A     20.0          D   AE
     6    1 MIDDLE-NAME                      A     20.0              AD N
     7    1 MAR-STAT                         A      1.0              AF F
     8    1 SEX                              A      1.0              AG F
     9    1 BIRTH                            U      6.0          D   AH
    10 GR 1 FULL-ADDRESS                                             A1
    11 MU 2 ADDRESS-LINE                     A     20.0    8         AI N
    12    2 CITY                             A     20.0          D   AJ N
    13    2 ZIP                              A     10.0              AK N
    14    2 POST-CODE                        A     10.0              AK N
    15    2 COUNTRY                          A      3.0              AL N
    16 GR 1 TELEPHONE                                                A2
```

The Elements screen displays a description format of the file (in this example, EMPLOYEES).

Element Attributes

The Elements Attributes screen displays information about the file ID. (in this example, EMPLOYEES).

Displaying a Predict Case Object

On the Versioned Objects Reporting Menu, enter Code D (Display Versioned Object); PREDICT CASE in the Application field; and C in the Object Type field.

The Display Object Version screen for Predict Case objects appears:

```
15:00:31          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR              - Display Object Version -

Application ... Predict_case
Object ........ IR-A-INCODE-FOR-SF-PROG-1.0001 (Integrity Rule)
Saved ......... 2000-04-15 07:46:57`


Migration Event .. BENS-PCA-D-C-01
Created .......... 2000-04-15 07:46:57

                      --- Predict Case Information ---
Create Date ....... 1998-07-13 15:13:38  Create User ........... KRW
Maintenance Date .. 1998-07-16 09:17:07  Maintenance User ...... KRW
Status ............ in process


Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                             Canc
```

The Display Object Version screen displays the application name (Predict_Case), the object name and type, the associated migration event, the object status, the users associated with the creation and maintenance of the object, and relevant dates.

Additional Options

On the Display Object Version screen, press PF4 (Opts), or type Y (Yes) over the default and press ENTER to access the Additional Options.

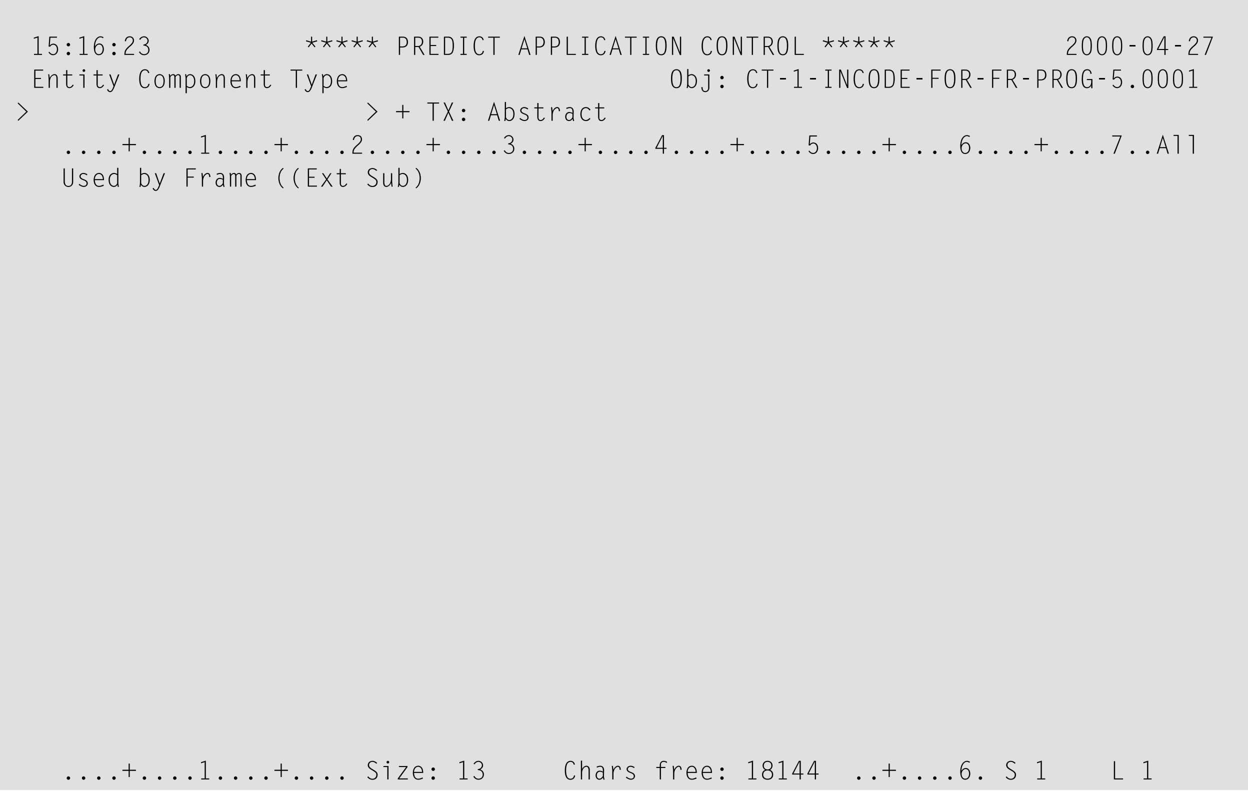
The Additional Options window appears listing options which provide additional information about the versioned object:

- Source
- Abstract
- Used by Objects
- Extended User Information

The following screens are examples of the information typically displayed for a Predict Case object for these additional options.

Abstract

The Natural editor screen displays the abstract of the Predict Case object.

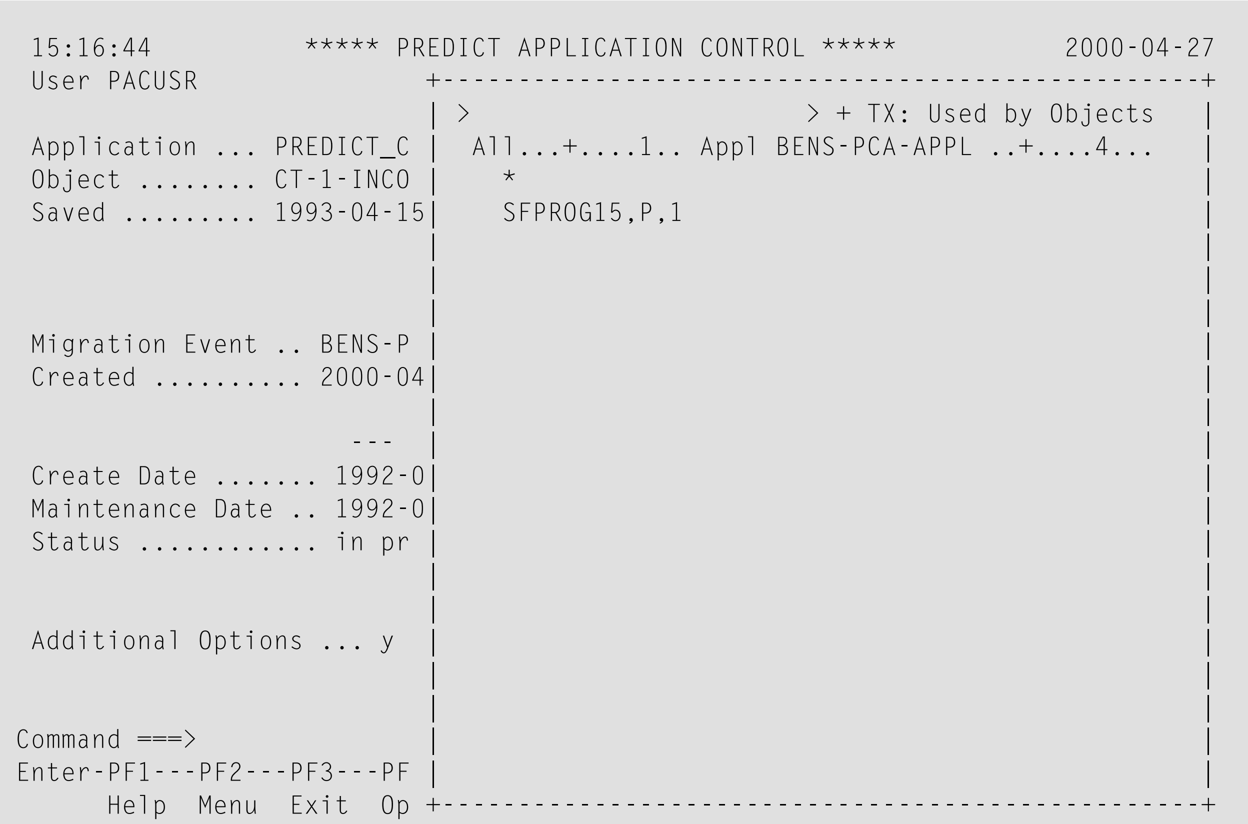


```
 15:16:23          ***** PREDICT APPLICATION CONTROL *****           2000-04-27
 Entity Component Type                     Obj: CT-1-INCODE-FOR-FR-PROG-5.0001
>                      > + TX: Abstract
   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7..All
   Used by Frame ((Ext Sub)


















   ....+....1....+.... Size: 13     Chars free: 18144  ..+....6. S 1    L 1
```

To exit this screen and return to the previous screen, type a period (.) and press ENTER.

Used by Objects/Objects Used

The Natural program editor displays information about objects that use the specified object as shown in the following Used by Objects window:



```
 15:16:44          ***** PREDICT APPLICATION CONTROL *****          2000-04-27
 User PACUSR             +----------------------------------------------------+
                         | >                      > + TX: Used by Objects   |
 Application ... PREDICT_C |  All...+....1.. Appl BENS-PCA-APPL ..+....4...   |
 Object ........ CT-1-INCO |    *                                             |
 Saved ......... 1993-04-15|    SFPROG15,P,1                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
 Migration Event .. BENS-P |                                                  |
 Created .......... 2000-04|                                                  |
                           |                                                  |
                       --- |                                                  |
 Create Date ....... 1992-0|                                                  |
 Maintenance Date .. 1992-0|                                                  |
 Status ............ in pr |                                                  |
                           |                                                  |
                           |                                                  |
 Additional Options ... y  |                                                  |
                           |                                                  |
                           |                                                  |
Command ===>               |                                                  |
Enter-PF1---PF2---PF3---PF |                                                  |
      Help  Menu  Exit  Op +--------------------------------------------------+
```

The Objects Used window is similar to this window and lists the objects that the specified objects uses.

To exit the Used by Objects window and return to the previous screen, type a period (.) and press ENTER.

Extended User Information

This additional option invokes a user-modifiable routine to display user-defined information.

Displaying a User Error Message

You may view information about individual user error messages. Error message text can be viewed the same way a Natural saved object is viewed.

Since no directory information is associated with user error messages, PAC tracks information obtained from the migration event used to incorporate the particular error message into the PAC system.

On the Versioned Objects Reporting Menu, enter Code D (Display Versioned Object), the application name, the user error message number or a range (for example, E1-E300) in the Object Name field, E in the Object Type field, and press ENTER.

The Display Object Version screen for error messages appears:

```
13:59:56          ***** PREDICT APPLICATION CONTROL *****           2000-01-01
User PACUSR           - Display Object Version -


Application ... ORDERS
Object ........ E7009.0001 (Error Message)
Loaded ........ 2000:01:05 17:42:31

Migration Event ... INC_ERR_01
Created .......... 2000:01:05 17:42:31


                       --- Error Message Information ---
Error message contains 2  short error texts and 2  extended texts
Languages (first 9).......... English
                                German



Additional Options ... N

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                              Canc
```

In addition to the application name and the user error message number and version, the information displayed on this screen includes the following:

- The date and time the error message was loaded into PAC;
- The name of the migration event used to incorporate the error message;
- Information for the specified error message as follows:
  - Number of short messages;

- Number of extended messages;
- Languages in which the message has been defined (up to nine in this screen example).

Displaying Additional Options for a User Error Message

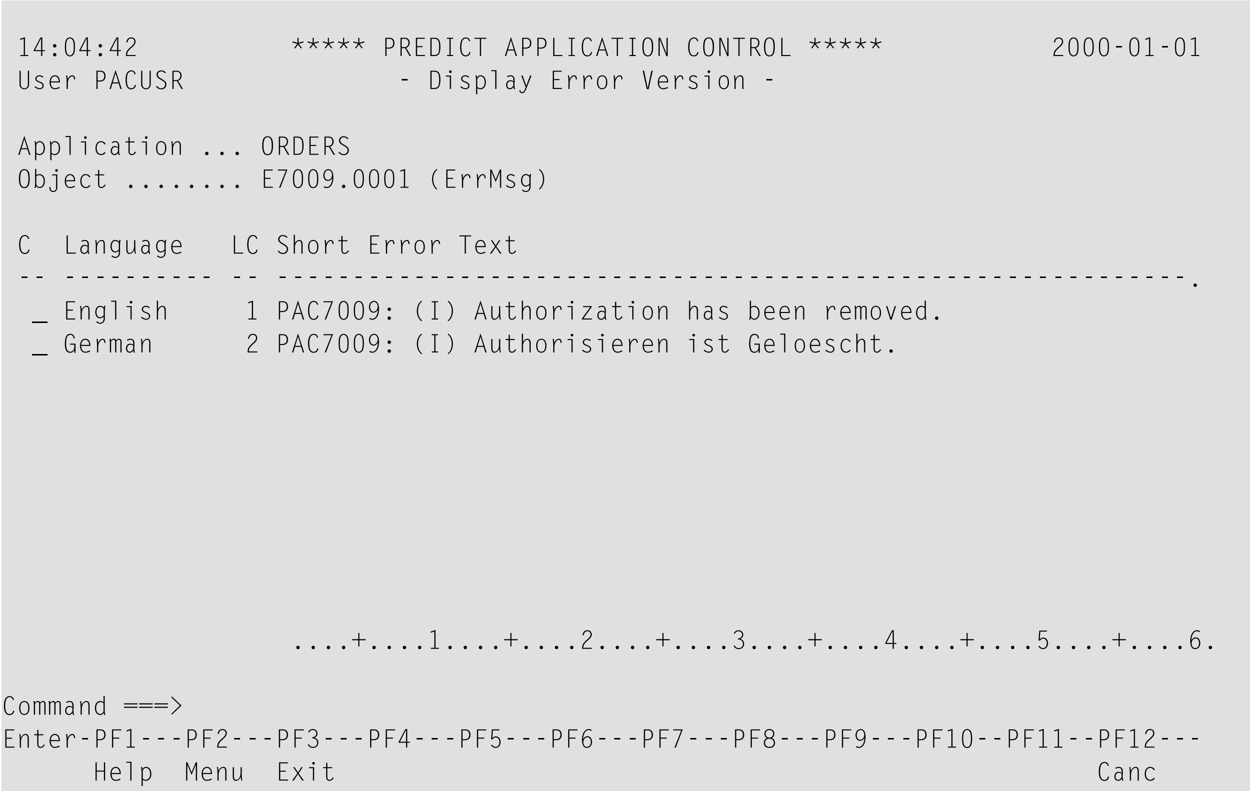
On the Display Object Version screen, press PF4 (Opts), or type Y (Yes) over the default and press ENTER to access the Additional Options.

The Additional Options window appears listing options which provide additional information about the error message.

- Source
- Status Values
- Objects Used
- Used by Objects
- Extended User Information
- List Directory
  (If applicable) Displays the saved/cataloged directory information for the object. (Not available for user error message objects.)

Source

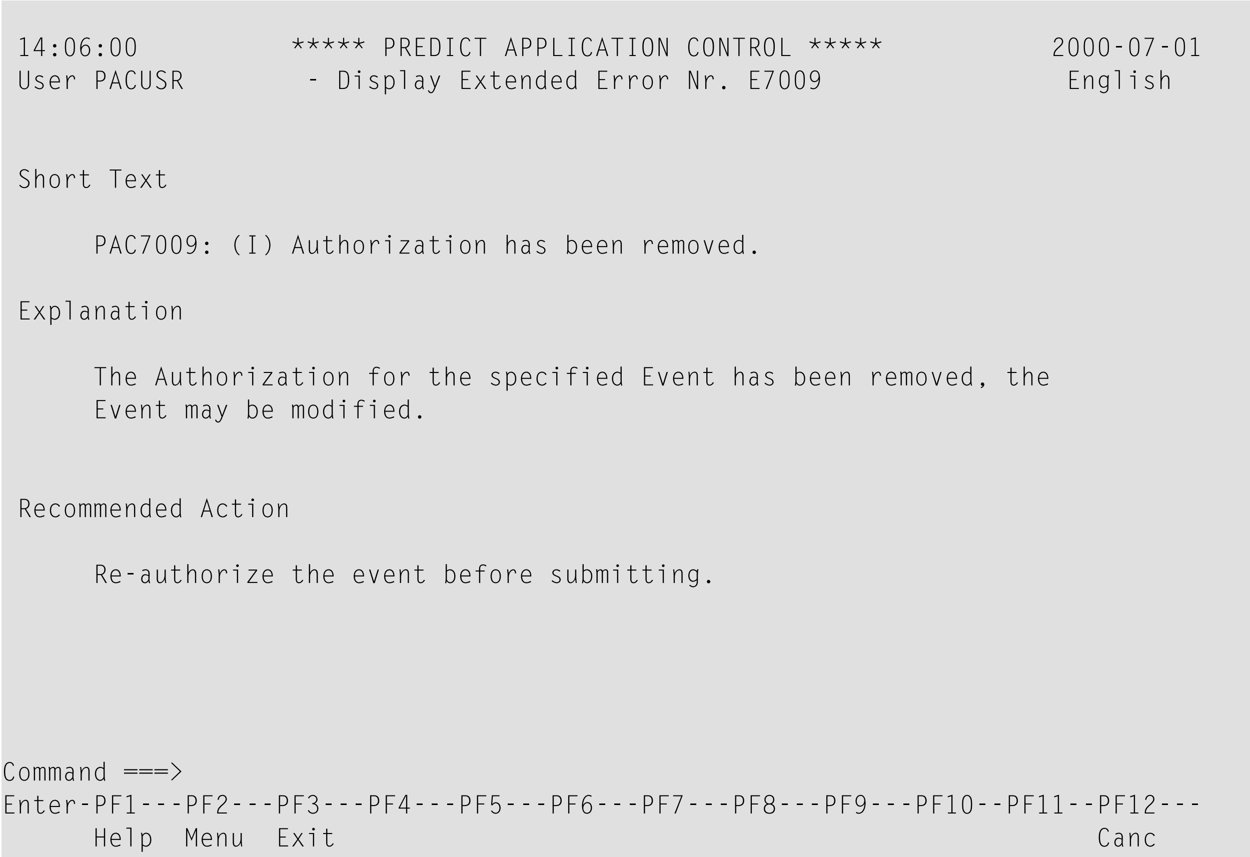
The Display Error Version screen shown in the following example displays source information about the specified user error message, including the name of the application, the name (number) of the error message object, and the languages in which the error message exists:



```
 14:04:42          ***** PREDICT APPLICATION CONTROL *****           2000-01-01
 User PACUSR              - Display Error Version -

 Application ... ORDERS
 Object ........ E7009.0001 (ErrMsg)

 C  Language   LC Short Error Text
 -- ---------- -- ------------------------------------------------------------.
  _ English     1 PAC7009: (I) Authorization has been removed.
  _ German      2 PAC7009: (I) Authorisieren ist Geloescht.









                   ....+....1....+....2....+....3....+....4....+....5....+....6.

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

To display more detailed information about a user error message language, mark the language with an X in the "C" column.

The screen accessed from the Display Error Version screen is similar to the Display Extended Error screen displayed when the Extended Information additional option is selected:

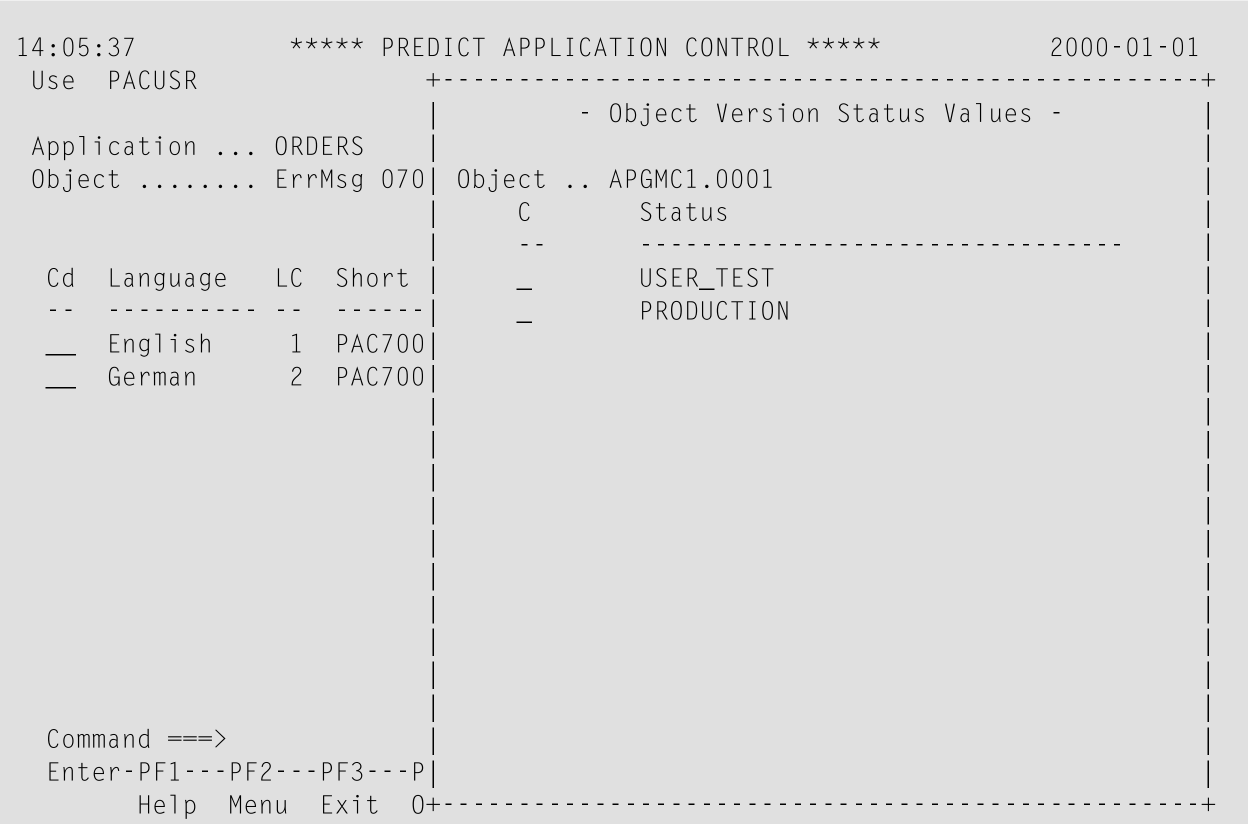


```
 14:06:00          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
 User PACUSR        - Display Extended Error Nr. E7009                English


 Short Text

      PAC7009: (I) Authorization has been removed.

 Explanation

      The Authorization for the specified Event has been removed, the
      Event may be modified.


 Recommended Action

      Re-authorize the event before submitting.





Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

The Display Extended Error screen displays the short text, explanation of the message, and recommended action, of the specified user error message.

Status Values

The Object Version Status Values window is accessed from the Display Object Version screen when the Status Values additional option is selected:



```
14:05:37          ***** PREDICT APPLICATION CONTROL *****           2000-01-01
 Use  PACUSR               +--------------------------------------------------+
                           |         - Object Version Status Values -         |
 Application ... ORDERS    |                                                  |
 Object ........ ErrMsg 070| Object .. APGMC1.0001                            |
                           |     C       Status                               |
                           |     --      --------------------------------     |
  Cd  Language   LC  Short |     _       USER_TEST                            |
  --  ---------- --  ------|     _       PRODUCTION                           |
  __  English     1  PAC700|                                                  |
  __  German      2  PAC700|                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
                           |                                                  |
  Command ===>             |                                                  |
  Enter-PF1---PF2---PF3---P|                                                  |
        Help  Menu  Exit  O+--------------------------------------------------+
```

The Object Version Status Values window displays a list of the statuses in which the specified user error message version currently exists.

From the Object Version Status Values window, enter D in the "C" column to display additional information about a status.

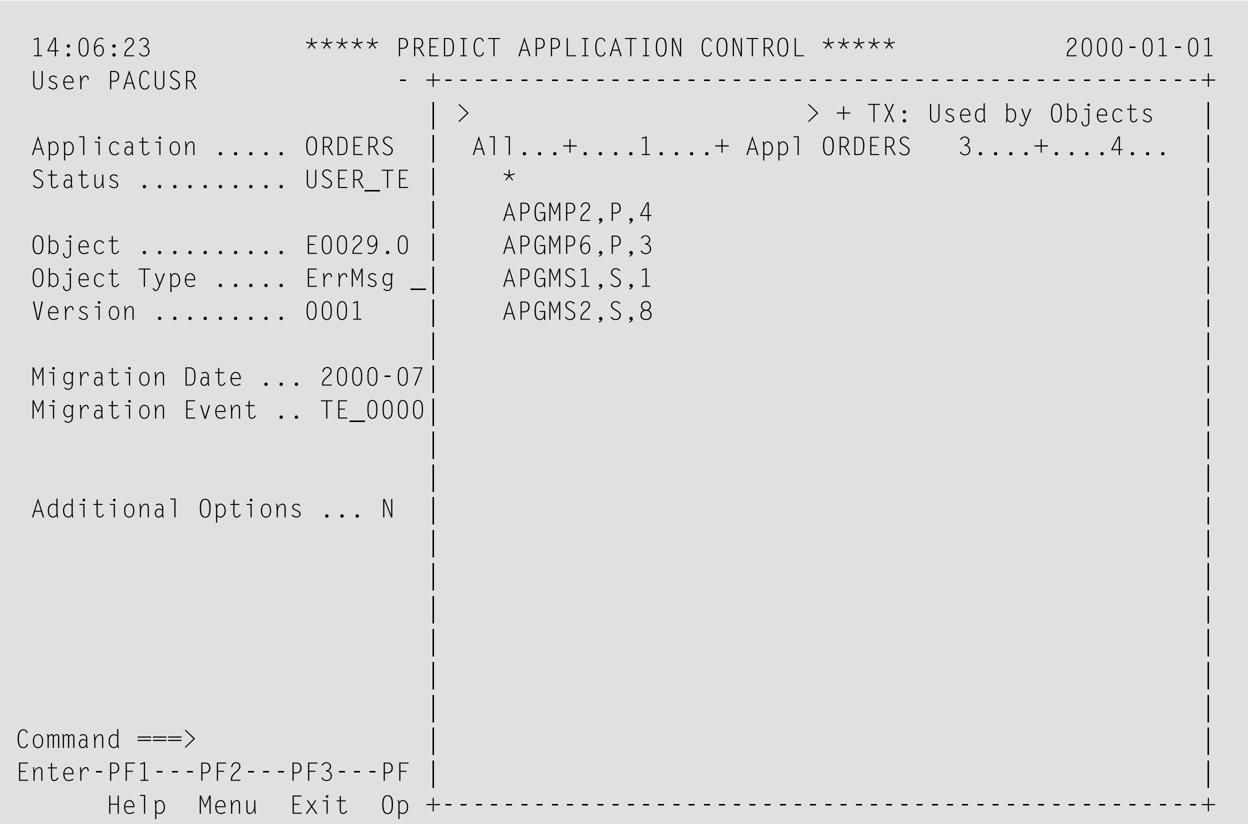
The Display Object Status screen appears.

The information displayed on the Display Object Status screen includes the name of the application, object name, type, version number; the date the object was migrated, and the migration event that was used for the migration.

To exit the Object Version Status Values window and return to the previous screen, type a period (.) and press ENTER, or press PF3 (Exit).

Used By Objects/Objects Used

The Natural program editor displays information about objects that use the specified object as shown in the following Used by Objects window:



```
 14:06:23          ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User PACUSR             - +---------------------------------------------------+
                           | >                       > + TX: Used by Objects   |
 Application ..... ORDERS  |  All...+....1....+ Appl ORDERS   3....+....4...  |
 Status .......... USER_TE |    *                                              |
                           |    APGMP2,P,4                                     |
 Object .......... E0029.0 |    APGMP6,P,3                                     |
 Object Type ..... ErrMsg _|    APGMS1,S,1                                     |
 Version ......... 0001    |    APGMS2,S,8                                     |
                           |                                                   |
 Migration Date ... 2000-07|                                                   |
 Migration Event .. TE_0000|                                                   |
                           |                                                   |
                           |                                                   |
 Additional Options ... N  |                                                   |
                           |                                                   |
                           |                                                   |
                           |                                                   |
                           |                                                   |
                           |                                                   |
                           |                                                   |
Command ===>               |                                                   |
Enter-PF1---PF2---PF3---PF |                                                   |
      Help  Menu  Exit  Op +---------------------------------------------------+
```

This window lists the objects which use the specified error message (in this example, E0029).

To exit the Used by Objects window and return to the previous screen, type a period (.) and press ENTER.

Extended User Information

This additional option invokes a user-modifiable routine to display user-defined information.

Listing Objects with No Application Status

You may list the object versions of an application that have never been migrated to any status.

This information is useful when, for example, you are creating a list of objects to be archived or retired.

On the Versioned Objects Reporting Menu, enter function code U (List Objects with No Application Status), leave the object field blank, and press ENTER.

The Object Versions with No Status screen appears displaying the following information:

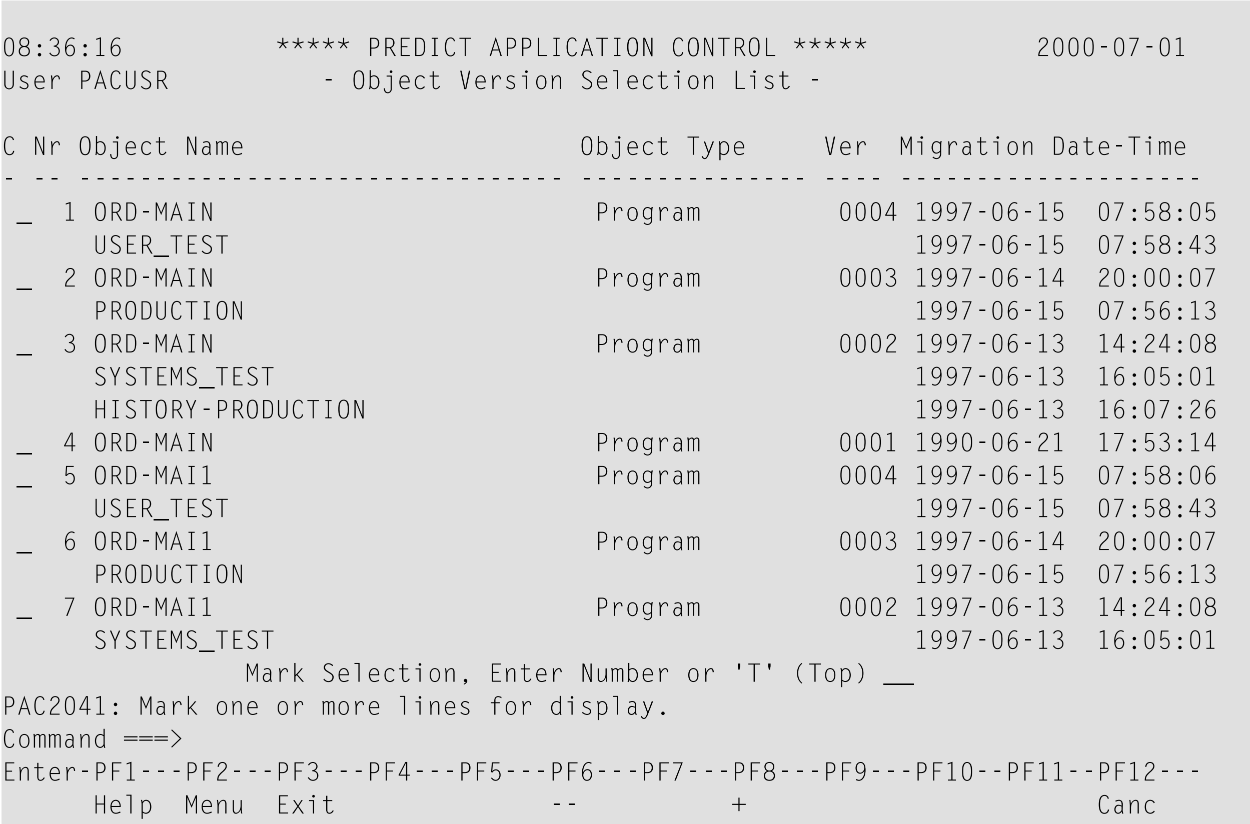
- The object name and version;
- The date and time the object version was created;
- The object type (for example, program, subroutine).

Object History

You may display information about an object's history in PAC.

On the Versioned Objects Reporting Menu, enter function code V (Object History) in the Code field; the desired application name; optionally, the object name, type, and version, or range notation; then press ENTER.

The Object Version Selection List screen appears as shown in the following example:



```
08:36:16          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR          - Object Version Selection List -

C Nr Object Name                      Object Type     Ver  Migration Date-Time
- -- -------------------------------- --------------- ---- --------------------
 _  1 ORD-MAIN                         Program         0004 1997-06-15  07:58:05
      USER_TEST                                             1997-06-15  07:58:43
 _  2 ORD-MAIN                         Program         0003 1997-06-14  20:00:07
      PRODUCTION                                            1997-06-15  07:56:13
 _  3 ORD-MAIN                         Program         0002 1997-06-13  14:24:08
      SYSTEMS_TEST                                          1997-06-13  16:05:01
      HISTORY-PRODUCTION                                    1997-06-13  16:07:26
 _  4 ORD-MAIN                         Program         0001 1990-06-21  17:53:14
 _  5 ORD-MAI1                         Program         0004 1997-06-15  07:58:06
      USER_TEST                                             1997-06-15  07:58:43
 _  6 ORD-MAI1                         Program         0003 1997-06-14  20:00:07
      PRODUCTION                                            1997-06-15  07:56:13
 _  7 ORD-MAI1                         Program         0002 1997-06-13  14:24:08
      SYSTEMS_TEST                                          1997-06-13  16:05:01
                Mark Selection, Enter Number or 'T' (Top) __
PAC2041: Mark one or more lines for display.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

The Object Version Selection List screen displays the following information:

- List of objects in the Object Name column.
- The statuses in which each object version exists (listed below each object name).
- The type of each object in the Object Type column.
- The object version in the "Ver" column.
- The date and time that each object version was created and moved to a specific status in the Migration Date-Time column.
- An object is highlighted to indicate that it did not compile; that is, it exists in saved form only.

For example, this screen shows that Version 0002 of the program ORD-MAIN was moved into Control status on 1997/06/13 at 14:24:08, into Systems Test status on 1997/06/13 at 16:05:01; and into History and Production status on 1997/06/13 at 16:07:26.

To access the following sub-functions directly from the Object Version Selection List, enter the code for the desired sub-function in the "C" column:

Code	**Function**
D	Display a versioned object.
H	Hard copy a versioned object.
S	Select a versioned object and return to the Versioned Objects Reporting Menu.

If you enter S in the "C" column or you enter the object number (from the "Nr" column) in the Mark Selection... field, the Versioned Objects Reporting Menu is displayed on which you may select a sub-function.

31

Object Version Maintenance

- Change Control Logs 363
- Select Closed Change Log from List 364
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- Versioned Object Logs 373
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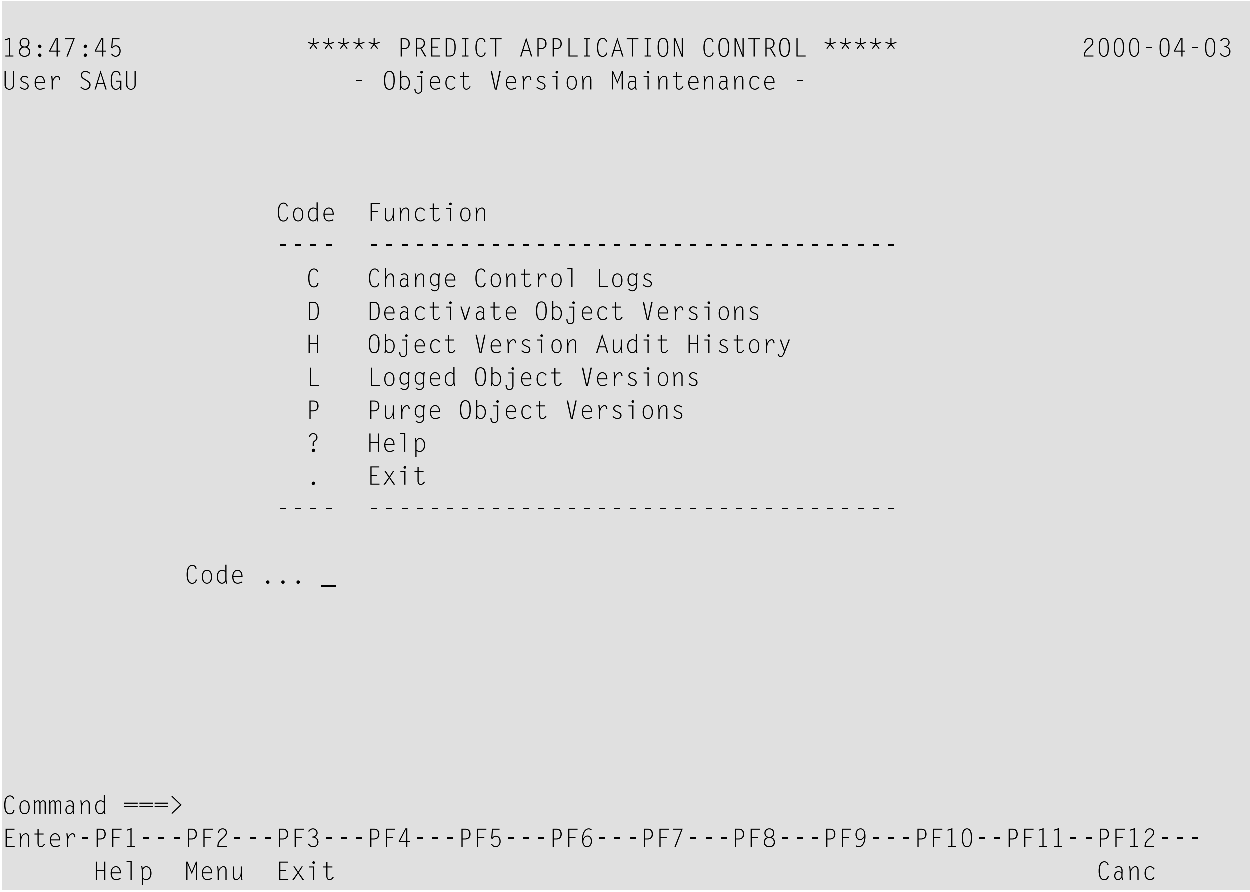
- Purge Object Version 378

The object maintenance facilities allow PAC administrators to

- view and purge change control logs - i.e., the records of migrations of individual objects to and from A (M) status;
- view which parts of Natural objects are in the PCF system file and deactivate the objects - i.e. delete their copies from the PCF;
- view and purge object audit history - i.e., the records of the individual objects in migrations;
- view and purge logged object versions - i.e., the records of individual object removals (retirement or purging from CONTROL or retirement or purging from ARCHIVE);
- view and purge objects in CONTROL or ARCHIVE.

To access the object maintenance functions, enter Code V on the main menu to access the Versioned Objects menu. Enter Code M on the Versioned Objects menu.

The Object Version Maintenance menu appears:



```
18:47:45          ***** PREDICT APPLICATION CONTROL *****          2000-04-03
User SAGU            - Object Version Maintenance -



                  Code  Function
                  ----  -----------------------------------
                    C   Change Control Logs
                    D   Deactivate Object Versions
                    H   Object Version Audit History
                    L   Logged Object Versions
                    P   Purge Object Versions
                    ?   Help
                    .   Exit
                  ----  -----------------------------------

            Code ... _







Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                    Canc
```

This chapter covers the following topics:

Change Control Logs

Change control logs are records of individual objects to be migrated to and from a (M) status. A change control log refers either to a versioned object migrated to a (M) status or to a versioned object from a (M) status or to several like named objects, the first of which was migrated to, and the second migrated from a (M) status.

A change control log contains

- the name of an application;
- the name of a maintenance status;
- the name of a Natural object or the number of an error message;
- a designation of the object's type.

It may contain

- the identifier of a maintenance request.

The check-out / check-in information contains

- either an object's check-out data
- or an object's check-in data.

An object's check-out data includes

- the number of the version (migrated to maintenance);
- the library name and the database and file numbers of the Natural location of the migration;
- the time of the migration;
- the user ID of the initiator of the migration;
- the terminal ID of the terminal from which the migration was initiated.

An object's check-in data includes

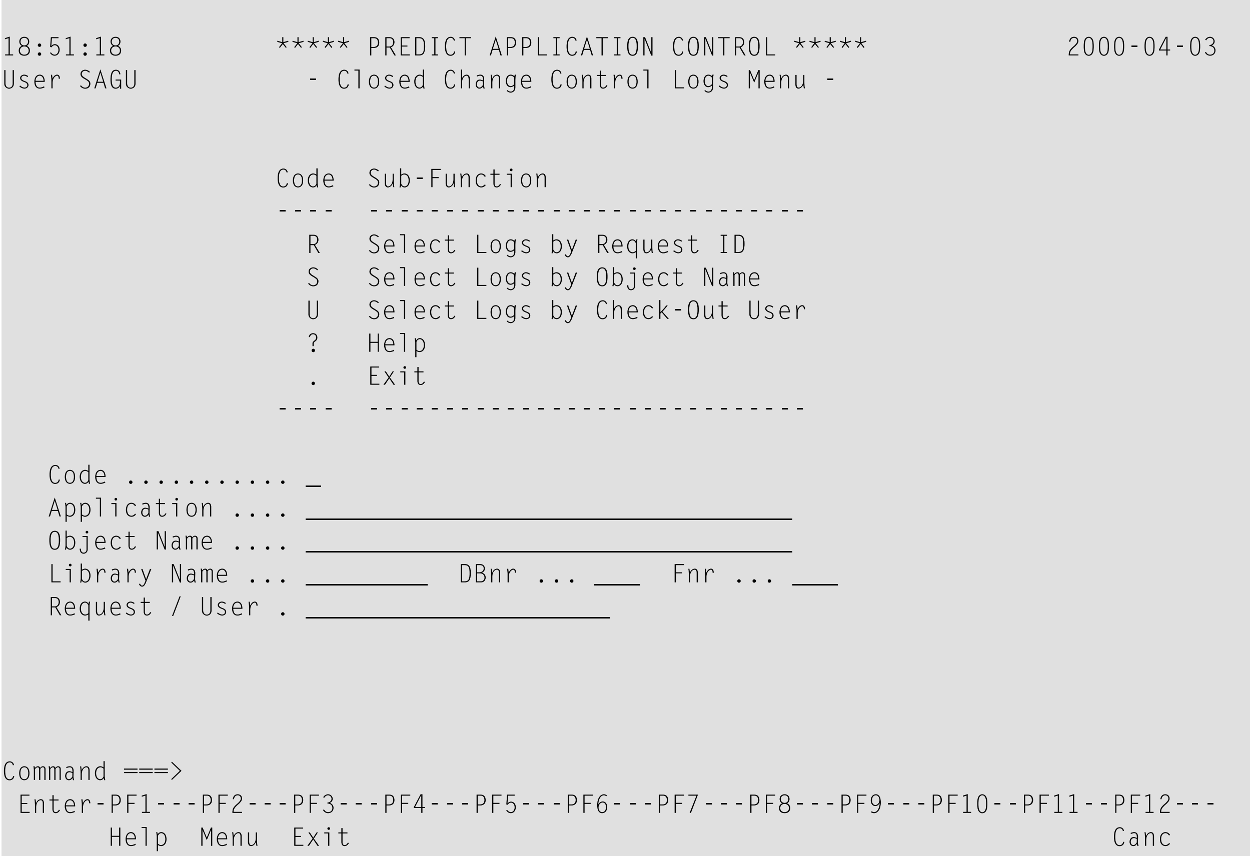
- the number of the version (migrated from maintenance or retired to maintenance;
- the library name and the database and file numbers of the Natural location of the migration, whereby the string ">Cancel<" takes the place of the library name, if the object was retired from the maintenance migration;
- the time of the migration or retirement;
- the user ID of the initiator of the migration or retirement;
- the terminal ID of the terminal from which the migration or retirement was initiated.

A change control log is defined as closed if it contains the check-in data of an object. It is defined as open if it is not closed. Only closed change control logs can be viewed or purged in the Administration Functions subsystem of PAC. Both the open and the closed change control logs can be viewed; neither can be purged in the Reporting and Maintenance subfunctions subsystem of PAC.

To access the change control logs maintenance functions, enter Code C on the Object Version Maintenance screen.

Select Closed Change Log from List

The Closed Change Control Logs Menu appears:



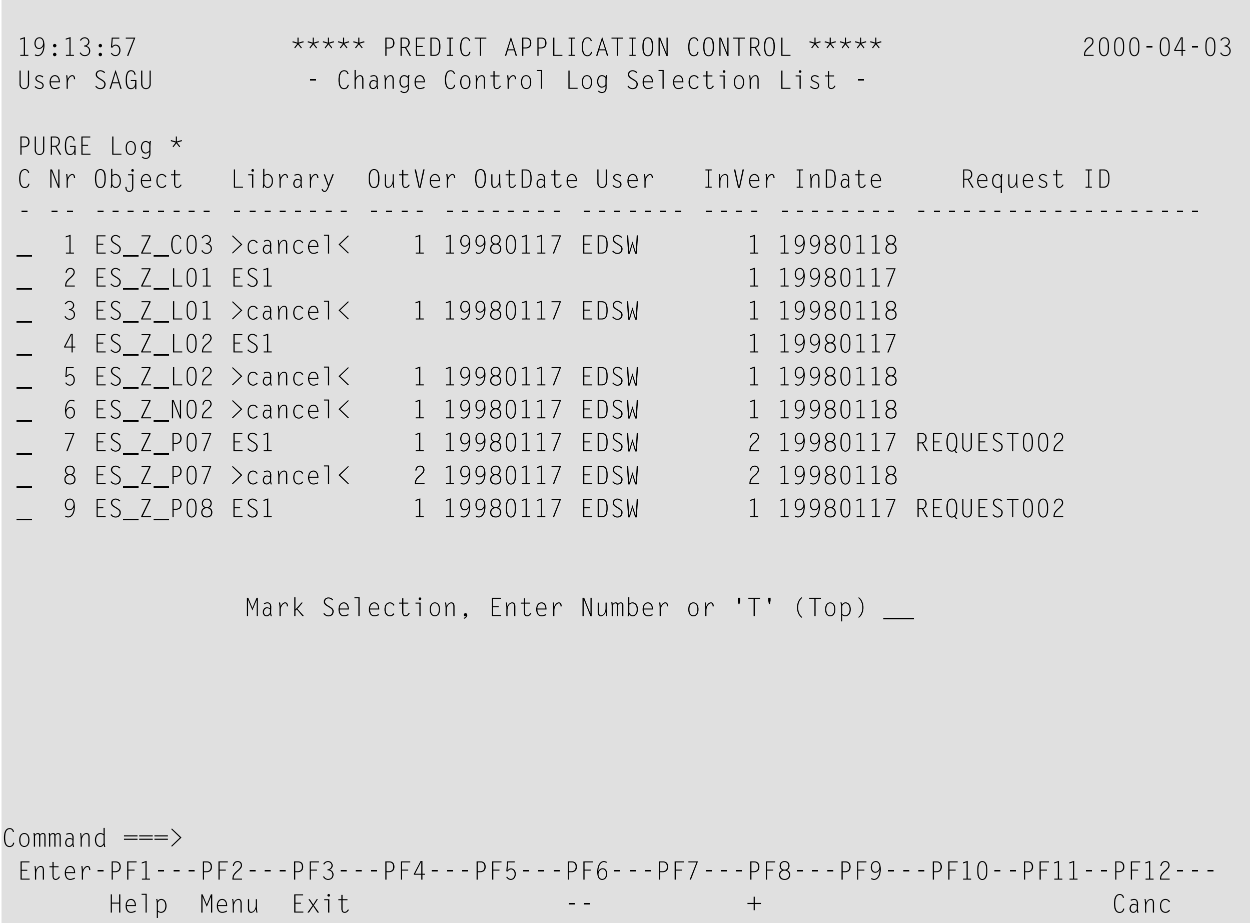
```
18:51:18          ***** PREDICT APPLICATION CONTROL *****             2000-04-03
User SAGU           - Closed Change Control Logs Menu -


                  Code  Sub-Function
                  ----  -----------------------------
                    R   Select Logs by Request ID
                    S   Select Logs by Object Name
                    U   Select Logs by Check-Out User
                    ?   Help
                    .   Exit
                  ----  -----------------------------

   Code ........... _
   Application .... ________________________________
   Object Name .... ________________________________
   Library Name ... ________  DBnr ... ___  Fnr ... ___
   Request / User . ____________________




Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                  Canc
```

To select change control logs for viewing or purging, enter

- one the following codes:
  - Code R to obtain a list of logs referring to specified maintenance requests and primarily sorted by the IDs of the requests referred to;
  - Code S to obtain a list of logs referring to specified maintenance requests and primarily sorted by the IDs of the requests referred to;

  - Code U to obtain a list of logs created at migrations initiated by specified users and primarily sorted by the check-out user IDs.
- the name of an application - optional with Code R, required with Code S;
- a range of object names - assumed "*" if left blank;
- optionally the library name and the database and file numbers of a Natural location to be matched by those in the check-in data of the selected logs;
- a range of request IDs with Code R or S, a range of user IDs with Code U - either assumed "*" if the "Request/User" field is left blank.

If there is a change control log which satisfies the selection criteria, a Change Control Log Selection List appears:



```
 19:13:57          ***** PREDICT APPLICATION CONTROL *****             2000-04-03
 User SAGU          - Change Control Log Selection List -

 PURGE Log *
 C Nr Object   Library  OutVer OutDate User   InVer InDate     Request ID
 - -- -------- -------- ---- -------- ------- ---- -------- -------------------
 _  1 ES_Z_C03 >cancel<    1 19980117 EDSW       1 19980118
 _  2 ES_Z_L01 ES1                               1 19980117
 _  3 ES_Z_L01 >cancel<    1 19980117 EDSW       1 19980118
 _  4 ES_Z_L02 ES1                               1 19980117
 _  5 ES_Z_L02 >cancel<    1 19980117 EDSW       1 19980118
 _  6 ES_Z_N02 >cancel<    1 19980117 EDSW       1 19980118
 _  7 ES_Z_P07 ES1         1 19980117 EDSW       2 19980117 REQUEST002
 _  8 ES_Z_P07 >cancel<    2 19980117 EDSW       2 19980118
 _  9 ES_Z_P08 ES1         1 19980117 EDSW       1 19980117 REQUEST002


                Mark Selection, Enter Number or 'T' (Top) __






Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit              --          +                       Canc
```

If no change control log satisfies the selection criteria, a message appears on the original screen.

If no application name is specified or "*", "<", or ">" occurs in the Application field, an application selection list is displayed, allowing you to to select an application.

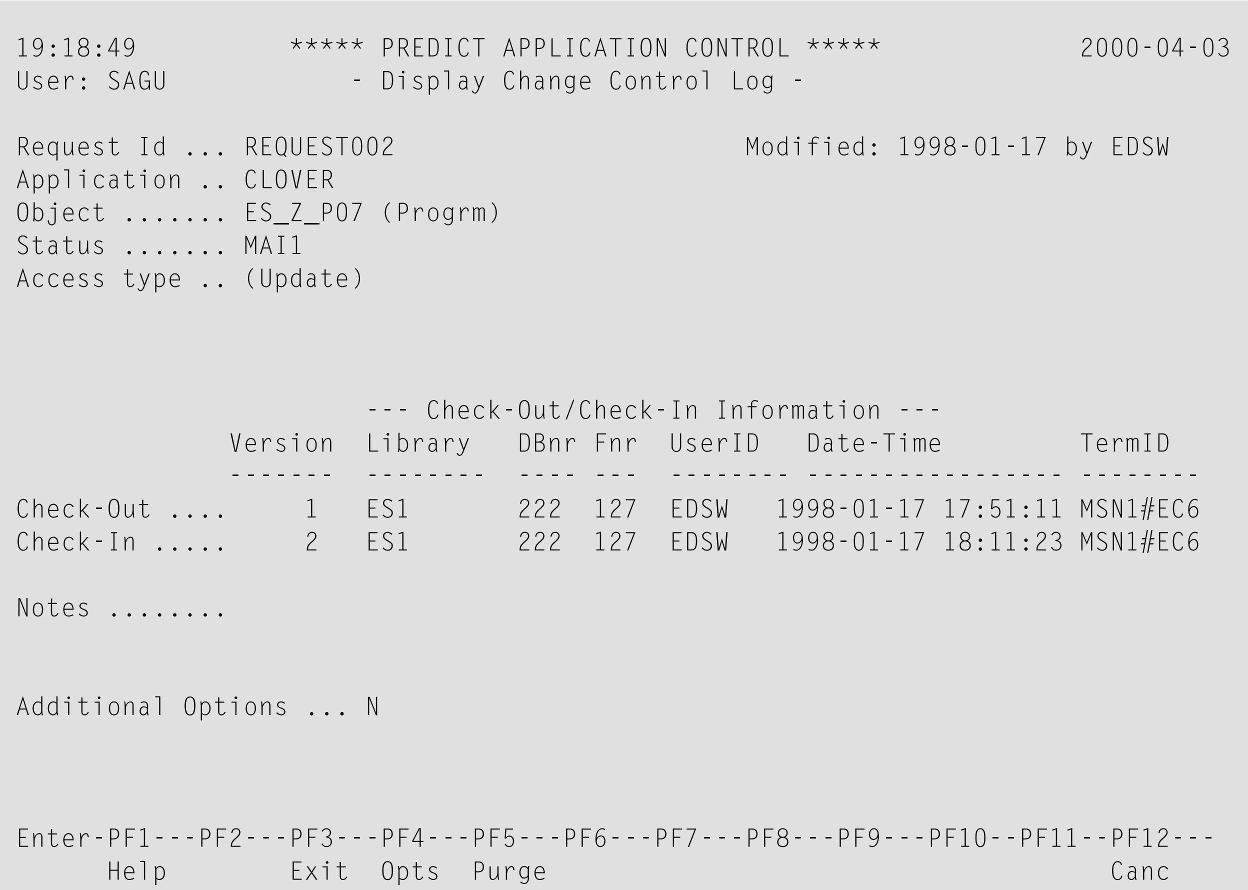
If no request ID is specified with Code R, all logs satisfying the other selection criteria and each referring to some maintenance request are listed. If no request ID is specified with Code S, the selection is not restricted on the account of the Request/User field and logs which do not refer to any maintenance request may also be listed.

If no user ID is specified with Code U, all logs containing check-out data are listed.

The C fields of the Change Control Log Selection List screen can take as values - in addition to " ", "?" and "." - S(elect), D(isplay), and P(urge).

S(elect) returns the Closed Change Control Logs Menu with its fields filled with the data of the selected log.

D(isplay) produces a Display Change Control Log screen:

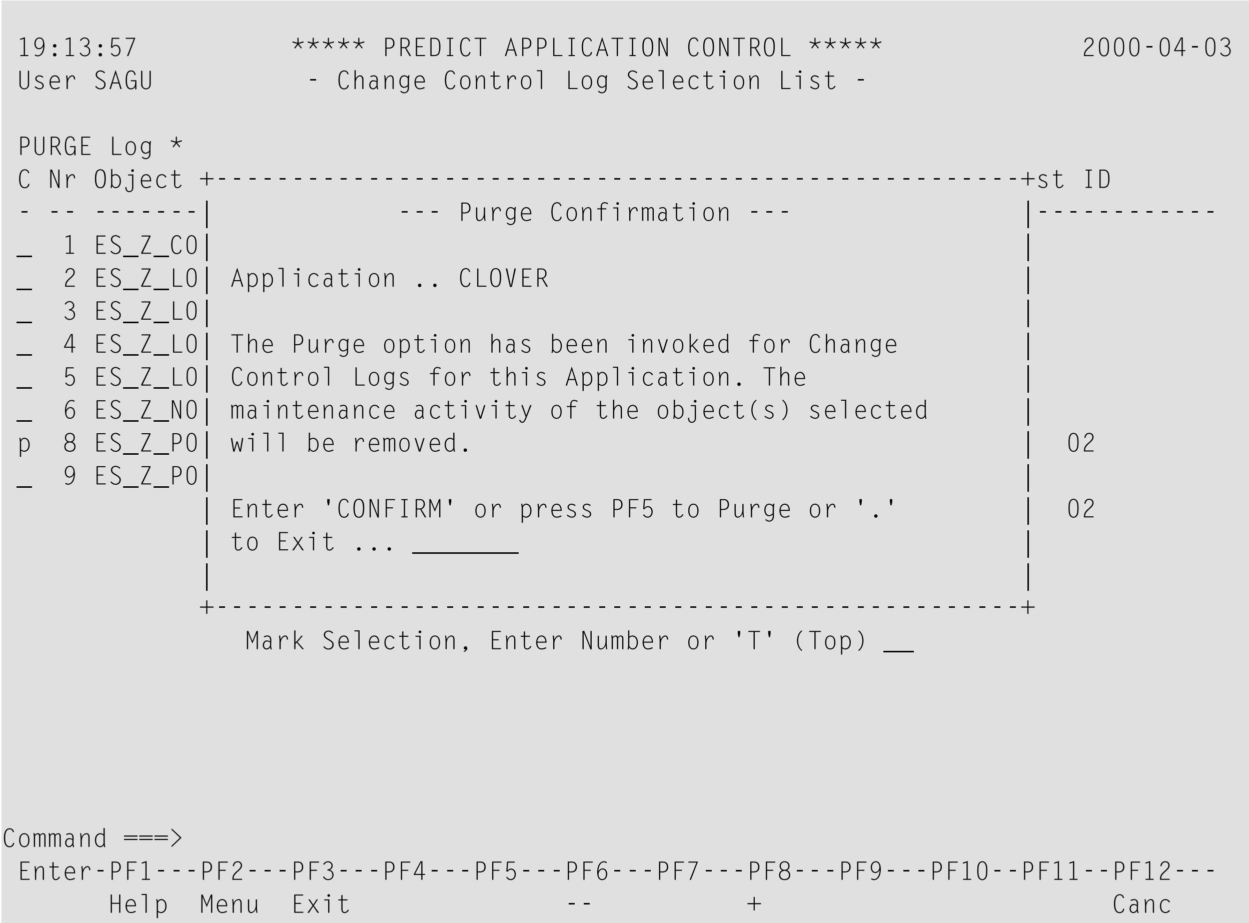


```
19:18:49          ***** PREDICT APPLICATION CONTROL *****          2000-04-03
User: SAGU            - Display Change Control Log -

Request Id ... REQUEST002                       Modified: 1998-01-17 by EDSW
Application .. CLOVER
Object ....... ES_Z_P07 (Progrm)
Status ....... MAI1
Access type .. (Update)



                       --- Check-Out/Check-In Information ---
              Version  Library   DBnr Fnr  UserID   Date-Time         TermID
              -------  --------  ---- ---  -------- ----------------- --------
Check-Out ....     1   ES1       222  127  EDSW   1998-01-17 17:51:11 MSN1#EC6
Check-In .....     2   ES1       222  127  EDSW   1998-01-17 18:11:23 MSN1#EC6

Notes ........


Additional Options ... N



Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit  Opts  Purge                                     Canc
```

The type designation in parentheses in the Object field belongs to the migrated object if the log was closed by a retirement; it belongs to the migrated object if the log was closed by a migration.

The Access type field can have as values "(Open)", "(Update)" and "(Access)". Only "(Open)" can occur in an open log, only "(Update)" or "(Access)" in a closed one. "(Update)" indicates that the log was closed by a migration and the migrated object is distinct from the migrated; in other closed logs the value is "(Access)".

P(urge) produces a Purge Confirmation window:



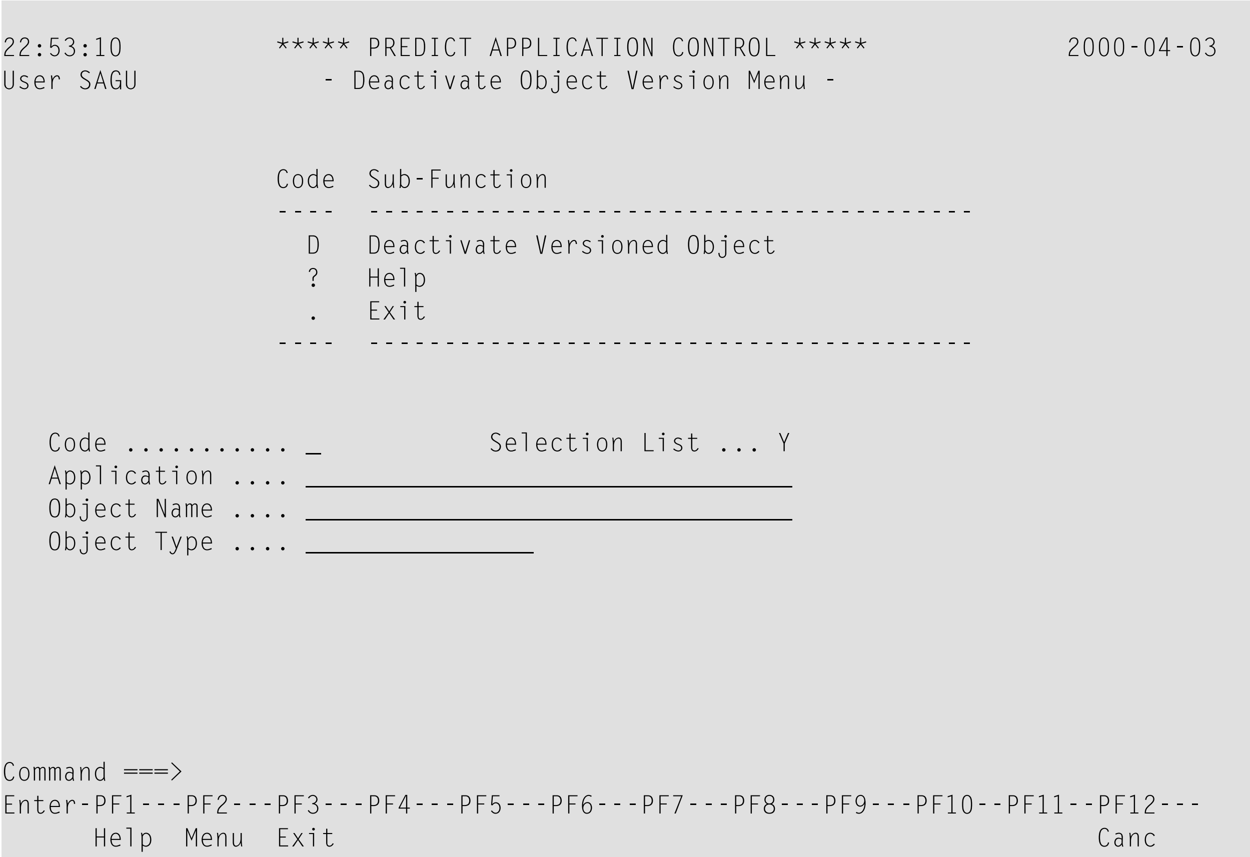
```
 19:13:57          ***** PREDICT APPLICATION CONTROL *****             2000-04-03
 User SAGU          - Change Control Log Selection List -

 PURGE Log *
 C Nr Object +-----------------------------------------------------+st ID
 - -- -------|            --- Purge Confirmation ---               |------------
 _  1 ES_Z_CO|                                                     |
 _  2 ES_Z_LO| Application .. CLOVER                               |
 _  3 ES_Z_LO|                                                     |
 _  4 ES_Z_LO| The Purge option has been invoked for Change        |
 _  5 ES_Z_LO| Control Logs for this Application. The              |
 _  6 ES_Z_NO| maintenance activity of the object(s) selected      |
 p  8 ES_Z_PO| will be removed.                                    |  02
 _  9 ES_Z_PO|                                                     |
             | Enter 'CONFIRM' or press PF5 to Purge or '.'        |  02
             | to Exit ... _______                                 |
             |                                                     |
             +-----------------------------------------------------+
                Mark Selection, Enter Number or 'T' (Top) __





Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit              --          +                       Canc
```

Enter CONFIRM or press PF5 to purge the change control logs marked with "P"s in the Change Control Log Selection List. Press PF3 to return to the Closed Change Control Logs Menu without purging the logs.

Deactivate Object Versions

To access the object deactivation functions, enter Code D on the Object Version Maintenance screen.

The Deactivate Object Version Menu appears:



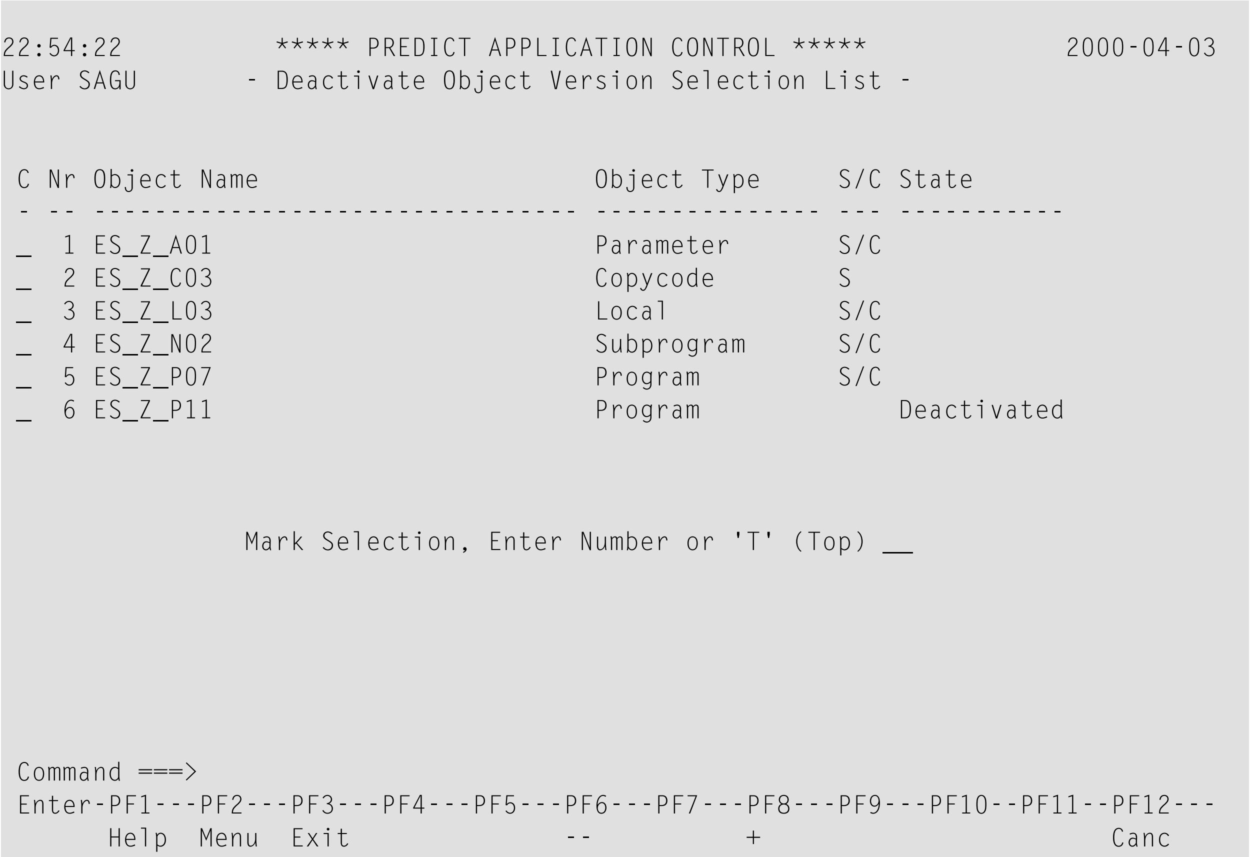
```
22:53:10          ***** PREDICT APPLICATION CONTROL *****          2000-04-03
User SAGU            - Deactivate Object Version Menu -


                  Code  Sub-Function
                  ----  ----------------------------------------
                    D   Deactivate Versioned Object
                    ?   Help
                    .   Exit
                  ----  ----------------------------------------


   Code ........... _           Selection List ... Y
   Application .... ________________________________
   Object Name .... ________________________________
   Object Type .... _______________






Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                    Canc
```

To select objects for viewing or deactivation, enter

- Code D;
- Selection List Y;
- the name of an application;
- a range of object names - assumed "*" if left blank;
- a (possibly empty) string of Natural object type designations consisting of one letter.

Deactivate Objects from Selection List

If there is an object which satisfies the selection criteria, a Deactivate Object Version Selection List appears:



```
22:54:22          ***** PREDICT APPLICATION CONTROL *****            2000-04-03
User SAGU       - Deactivate Object Version Selection List -


 C Nr Object Name                      Object Type     S/C State
 - -- -------------------------------- --------------- --- -----------
 _  1 ES_Z_A01                         Parameter       S/C
 _  2 ES_Z_C03                         Copycode        S
 _  3 ES_Z_L03                         Local           S/C
 _  4 ES_Z_N02                         Subprogram      S/C
 _  5 ES_Z_P07                         Program         S/C
 _  6 ES_Z_P11                         Program             Deactivated




                Mark Selection, Enter Number or 'T' (Top) __






 Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit              --          +                        Canc
```

This is a list of Natural object names, accompanied by type designations rather than a list of versioned objects. For each entry, there can be many like named versioned objects. The entry stands for the one with the highest number, the only one which can normally be in the PCF system file.

If no object satisfies the selection criteria, a message appears on the original screen.

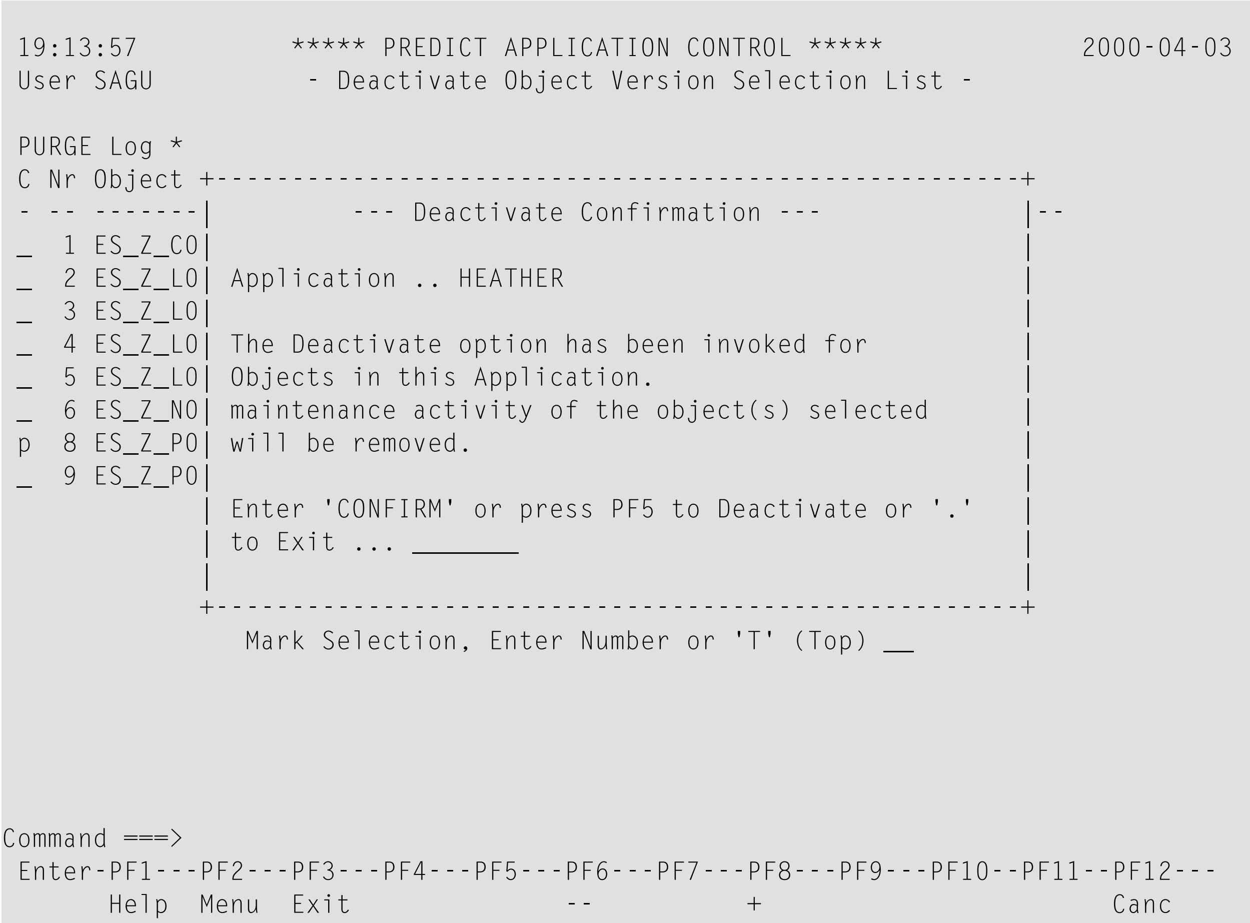
If no application name is specified or if "*", "<", or ">" occurs in the Application field, an application selection list is displayed letting one choose an application.

"S/C", "S", "C", or blank in an S/C field of a Deactivate Object Version Selection List screen indicates that copies of both the source of the object and its loadable part, only that of its source, only that of its loadable part, or neither of these is in the PCF system file.

"Deactivated" in a State field of a Deactivate Object Version Selection List screen indicates that no copy of the highest numbered version of an object referred to in the entry is present in the PCF system file.

The C fields of a Deactivate Object Version Selection List screen can take the value - in addition to " ", "?" and "." - D(eactivate).

D(eactivate) produces a Deactivate Confirmation window:



```
 19:13:57          ***** PREDICT APPLICATION CONTROL *****          2000-04-03
 User SAGU          - Deactivate Object Version Selection List -

 PURGE Log *
 C Nr Object +---------------------------------------------------+
 - -- -------|        --- Deactivate Confirmation ---            |--
 _  1 ES_Z_CO|                                                   |
 _  2 ES_Z_LO| Application .. HEATHER                            |
 _  3 ES_Z_LO|                                                   |
 _  4 ES_Z_LO| The Deactivate option has been invoked for        |
 _  5 ES_Z_LO| Objects in this Application.                      |
 _  6 ES_Z_NO| maintenance activity of the object(s) selected    |
 p  8 ES_Z_PO| will be removed.                                  |
 _  9 ES_Z_PO|                                                   |
             | Enter 'CONFIRM' or press PF5 to Deactivate or '.' |
             | to Exit ... _______                               |
             |                                                   |
             +---------------------------------------------------+
               Mark Selection, Enter Number or 'T' (Top) __




Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit              --          +                      Canc
```

Enter CONFIRM or press PF5 to deactivate the objects marked with D's in the Deactivate Object Version Selection List. Press PF3 to return to the Deactivate Object Version Menu without deactivating the objects.

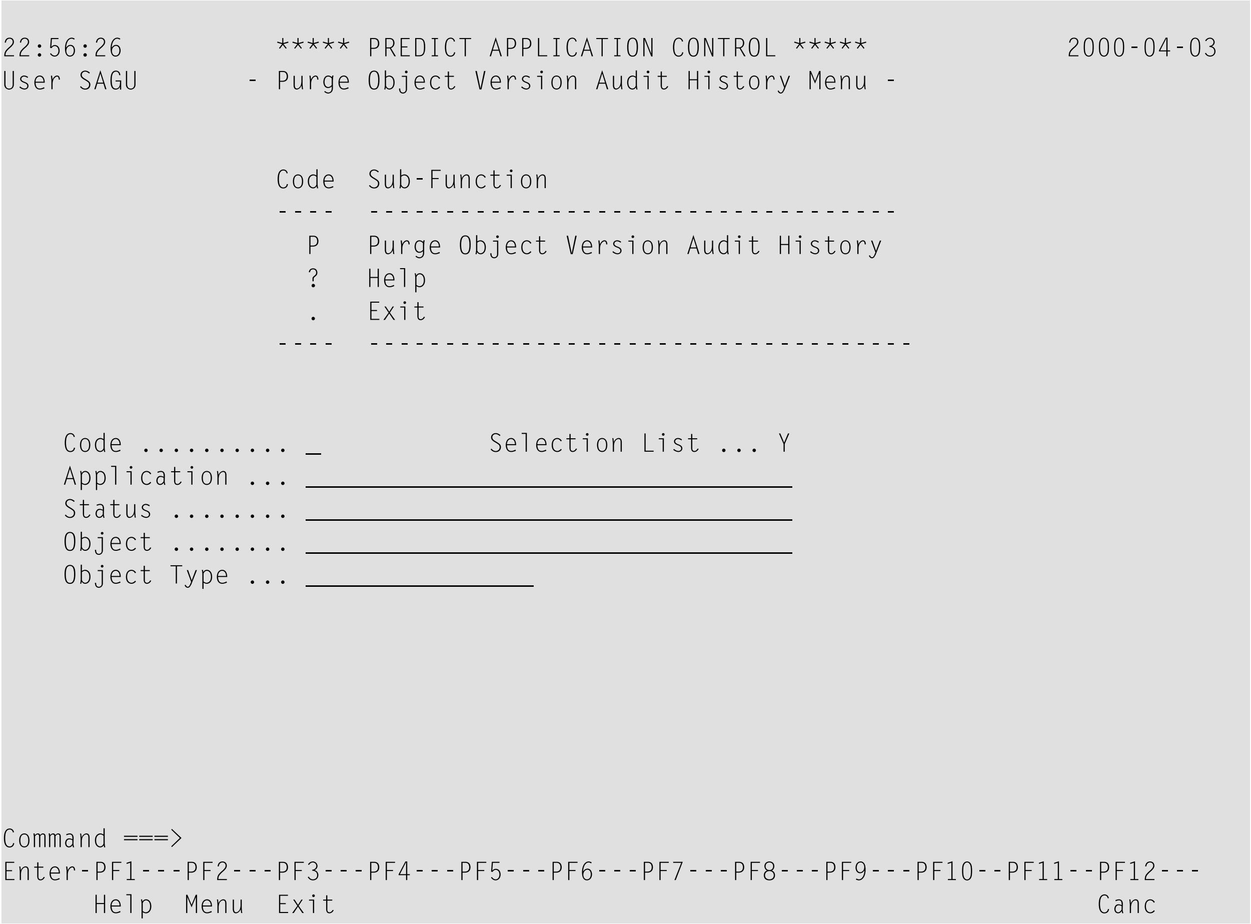
If the Selection List field of the Deactivate Object Version Menu is set to N rather than Y then objects are selected just as they would be selected with but instead of listing them PAC immediately produces a Deactivate Confirmation window and upon confirmation deactivates all selected objects.

Object Version Audit History

An object audit version history record is a record in the ACF system file which contains information about the migrated object. When an object is migrated to test, production or maintenance, an object-status link (record) is created in the ACF system file; this makes the object "known by PAC to be in the migration". If the object is overwritten during the migration with another object of the same application or retired from the migration, the object-status link becomes an audit version history record. Such a version audit history record stays in the ACF system file as long as the object or its archive stays in the application - unless an administrator purges the record, using the facility described in this section.

To access the object version audit history maintenance functions, enter Code H on the Object Version Maintenance screen.

The Purge Object Version Audit History Menu appears:

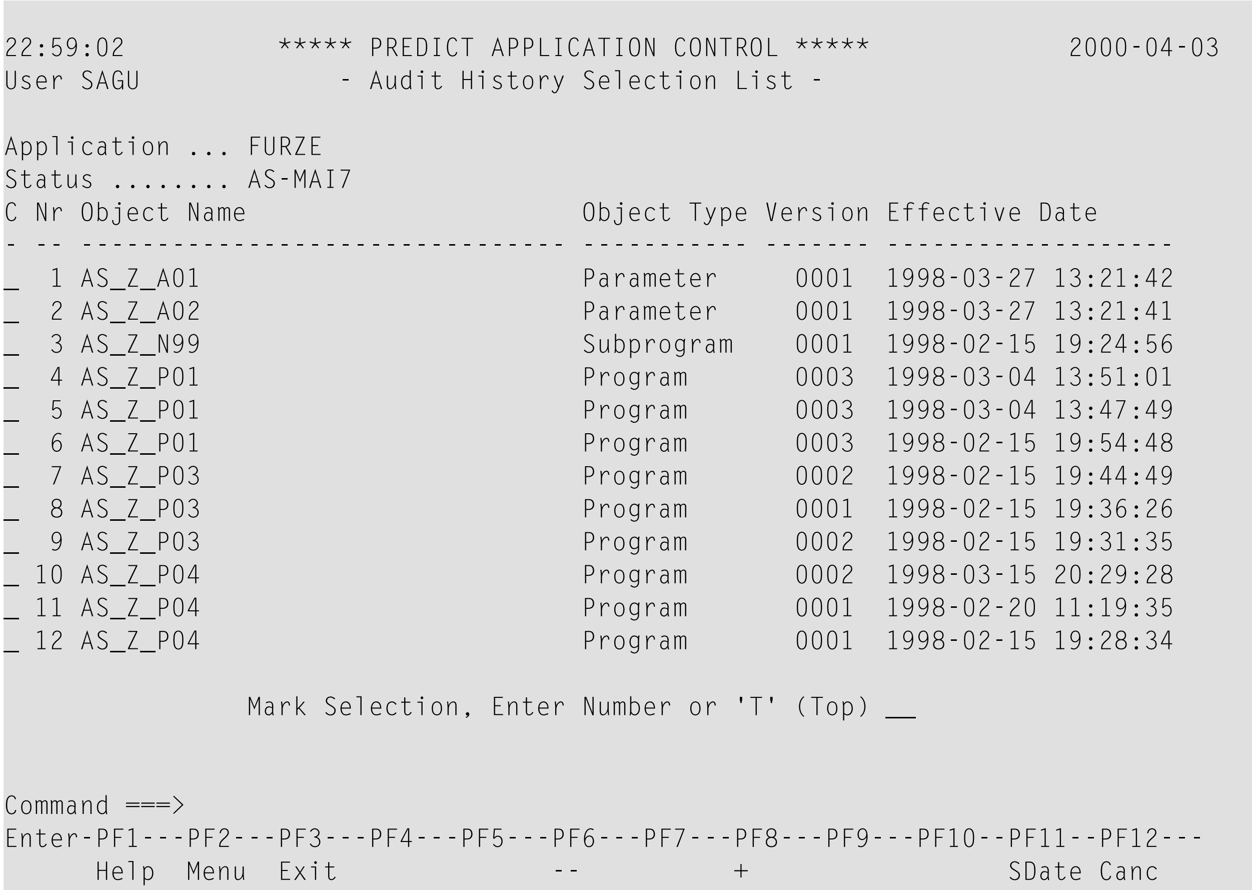


```
22:56:26          ***** PREDICT APPLICATION CONTROL *****             2000-04-03
User SAGU       - Purge Object Version Audit History Menu -


                  Code  Sub-Function
                  ----  -----------------------------------
                    P   Purge Object Version Audit History
                    ?   Help
                    .   Exit
                  ----  ------------------------------------


    Code .......... _           Selection List ... Y
    Application ... ________________________________
    Status ........ ________________________________
    Object ........ ________________________________
    Object Type ... _______________








Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

To select audit history records for viewing or purging, enter

- Code P;
- the name of an application;
- the name of a status;
- a range of object names - assumed "*" if left blank;
- a (possibly empty) string of one letter Natural object type designations: "E" for error messages, "V" for views, or "R" for rules.

If there is an audit history record satisfying the selection criteria then an Audit History Selection List appears:



```
22:59:02          ***** PREDICT APPLICATION CONTROL *****            2000-04-03
User SAGU             - Audit History Selection List -

Application ... FURZE
Status ........ AS-MAI7
C Nr Object Name                      Object Type Version Effective Date
- -- -------------------------------- ----------- ------- -------------------
_  1 AS_Z_A01                         Parameter     0001  1998-03-27 13:21:42
_  2 AS_Z_A02                         Parameter     0001  1998-03-27 13:21:41
_  3 AS_Z_N99                         Subprogram    0001  1998-02-15 19:24:56
_  4 AS_Z_P01                         Program       0003  1998-03-04 13:51:01
_  5 AS_Z_P01                         Program       0003  1998-03-04 13:47:49
_  6 AS_Z_P01                         Program       0003  1998-02-15 19:54:48
_  7 AS_Z_P03                         Program       0002  1998-02-15 19:44:49
_  8 AS_Z_P03                         Program       0001  1998-02-15 19:36:26
_  9 AS_Z_P03                         Program       0002  1998-02-15 19:31:35
_ 10 AS_Z_P04                         Program       0002  1998-03-15 20:29:28
_ 11 AS_Z_P04                         Program       0001  1998-02-20 11:19:35
_ 12 AS_Z_P04                         Program       0001  1998-02-15 19:28:34

                Mark Selection, Enter Number or 'T' (Top) __


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                 SDate Canc
```

If no audit history record satisfies the selection criteria, a message appears on the original screen.

If no application name is specified or if "*", "<", or ">" occurs in the Application field, an application selection list is displayed, allowing you to select an application.

If an application has been specified but no status has or "*", "<", or ">" occurs in the Status field, an application status-link selection list is displayed, allowing you to select a link, which defines a migration.

If the Object Type field has been left blank or contains an "*", the selection of audit history records is not restricted on its account. This is the only way to list the audit history records of foreign objects.

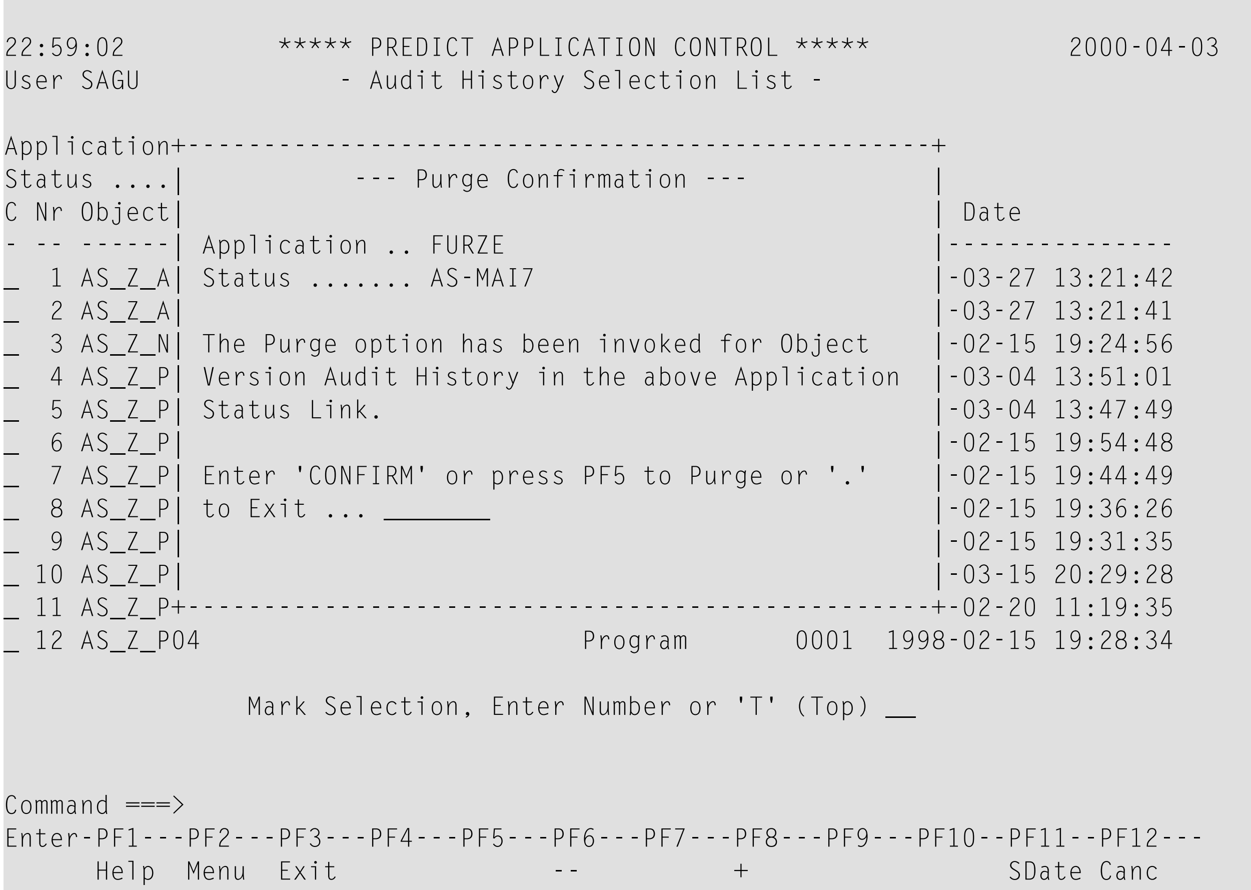
The last column of an Audit History Selection List screen can be switched from "Effective Date" to "Superseded Date" by pressing PF11 and PF10, respectively.

There can be more than one entry for a single versioned object in an Audit History Selection List. This occurs if the object has been migrated to the migration several times.

The C fields of a Deactivate Object Version Selection List screen can take the value - in addition to " ", "?" and "." - P(urge).

Purge Object Version Audit History

P(urge) produces a Purge Confirmation window:



```
22:59:02          ***** PREDICT APPLICATION CONTROL *****             2000-04-03
User SAGU             - Audit History Selection List -

Application+-------------------------------------------------+
Status ....|           --- Purge Confirmation ---            |
C Nr Object|                                                 | Date
- -- ------| Application .. FURZE                            |---------------
_  1 AS_Z_A| Status ....... AS-MAI7                          |-03-27 13:21:42
_  2 AS_Z_A|                                                 |-03-27 13:21:41
_  3 AS_Z_N| The Purge option has been invoked for Object    |-02-15 19:24:56
_  4 AS_Z_P| Version Audit History in the above Application  |-03-04 13:51:01
_  5 AS_Z_P| Status Link.                                    |-03-04 13:47:49
_  6 AS_Z_P|                                                 |-02-15 19:54:48
_  7 AS_Z_P| Enter 'CONFIRM' or press PF5 to Purge or '.'    |-02-15 19:44:49
_  8 AS_Z_P| to Exit ... ________                            |-02-15 19:36:26
_  9 AS_Z_P|                                                 |-02-15 19:31:35
_ 10 AS_Z_P|                                                 |-03-15 20:29:28
_ 11 AS_Z_P+-------------------------------------------------+-02-20 11:19:35
_ 12 AS_Z_P04                         Program       0001  1998-02-15 19:28:34

                Mark Selection, Enter Number or 'T' (Top) __


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                 SDate Canc
```

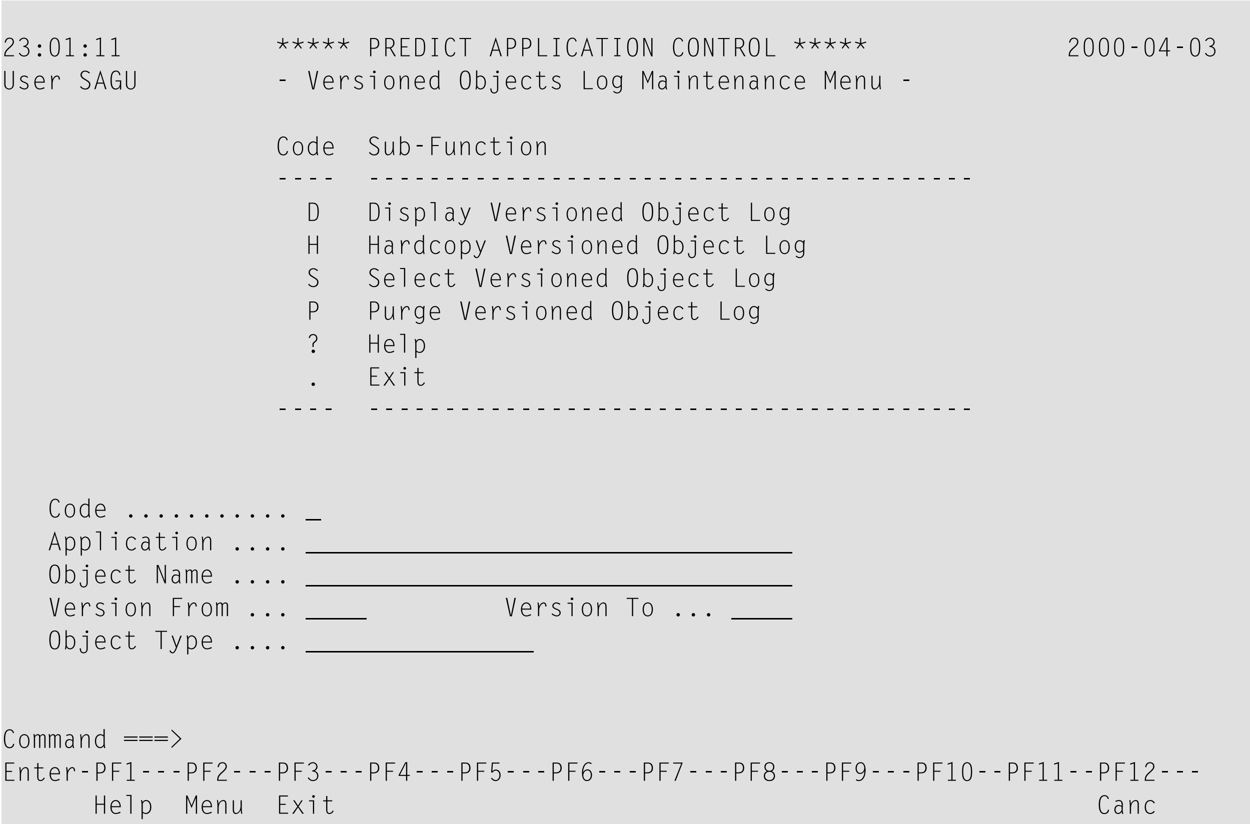
Enter CONFIRM or press PF5 to purge the audit history records marked with P's in the Audit History Selection List. Press PF3 to return to the Purge Object Version Audit History Menu without purging the audit history records.

Versioned Object Logs

A versioned object log is a record in the ACF system file containing information about the previous existence of an object in an application. When an object migrated to CONTROL, an object record is created in the ACF system file. If the object is retired or purged from CONTROL or from ARCHIVE, its record is deleted from the ACF system file or its record is recorded on an object log. (The latter occurs if the Versioned Object Log option of the application has been set to "Y".) Such an object log stays in the applicaltion as long as an administrator does not purge it, using the facility described in this section.

To access the object purge logs maintenance functions, enter Code L on the Object Maintenance screen.

The Versioned Objects Log Maintenance Menu appears:



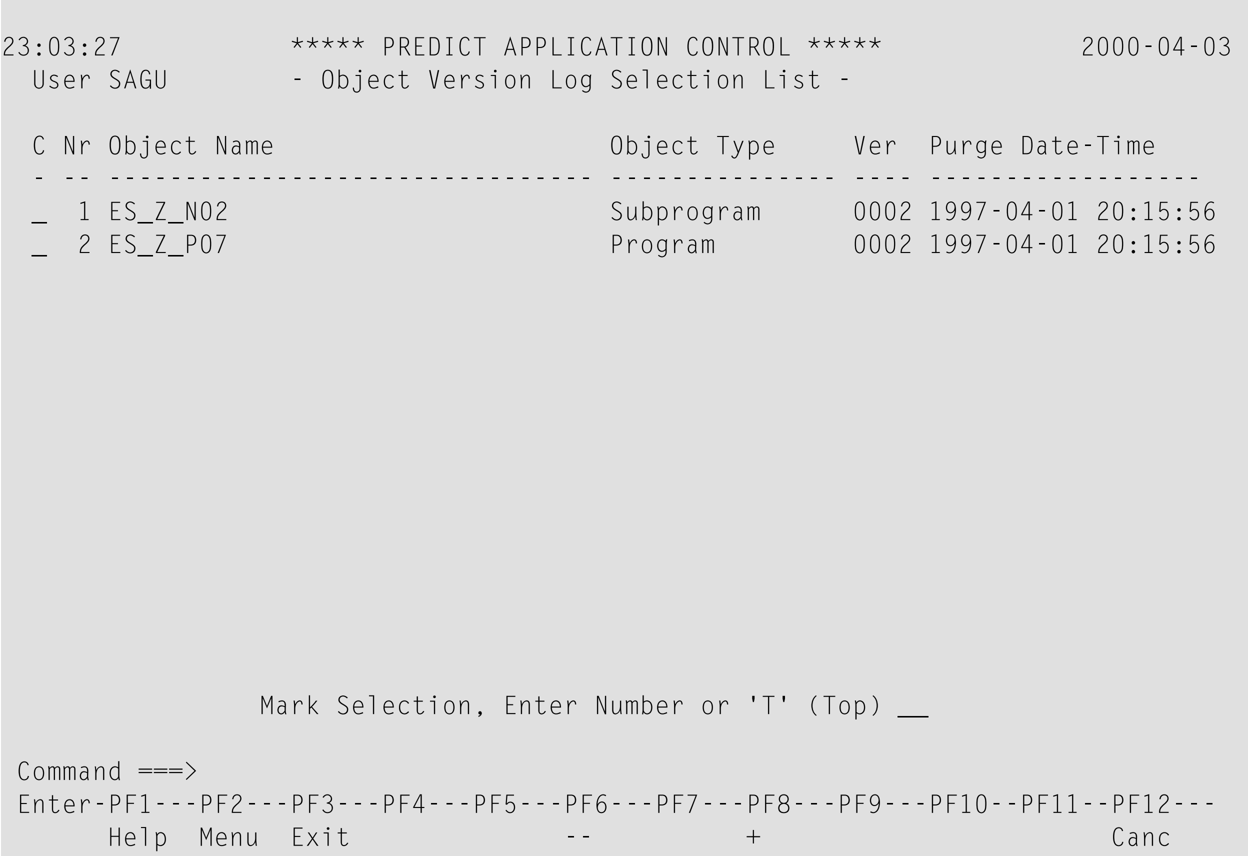
```
23:01:11          ***** PREDICT APPLICATION CONTROL *****            2000-04-03
User SAGU         - Versioned Objects Log Maintenance Menu -

                  Code  Sub-Function
                  ----  ----------------------------------------
                    D   Display Versioned Object Log
                    H   Hardcopy Versioned Object Log
                    S   Select Versioned Object Log
                    P   Purge Versioned Object Log
                    ?   Help
                    .   Exit
                  ----  ----------------------------------------



   Code ........... _
   Application .... ________________________________
   Object Name .... ________________________________
   Version From ... ____         Version To ... ____
   Object Type .... _______________


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

To select object purge logs for displaying, hardcopying, or purging, enter

- Code S;
- the name of an application;
- a range of object names - assumed "*" if left blank;
- a range of object version numbers - assumed from 1 to 9999 if both fields are left blank;
- a (possibly empty) string of one letter Natural object type designations, "E" for error messages, "V" for views, or "R" for rules.

Select Object Version Log from List

If there is an object log which satisfies the selection criteria, an Object Version Log Selection List appears:



```
23:03:27           ***** PREDICT APPLICATION CONTROL *****             2000-04-03
  User SAGU        - Object Version Log Selection List -

  C Nr Object Name                      Object Type     Ver  Purge Date-Time
  - -- -------------------------------- --------------- ---- -------------------
  _  1 ES_Z_N02                         Subprogram      0002 1997-04-01 20:15:56
  _  2 ES_Z_P07                         Program         0002 1997-04-01 20:15:56















                 Mark Selection, Enter Number or 'T' (Top) __

 Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit              --          +                        Canc
```

If no object log satisfies the selection criteria then a message is superimposed on the original screen.

If no application name is specified or "*", "<", or ">" occurs in the Application field then an application selection list is displayed letting one choose an application.

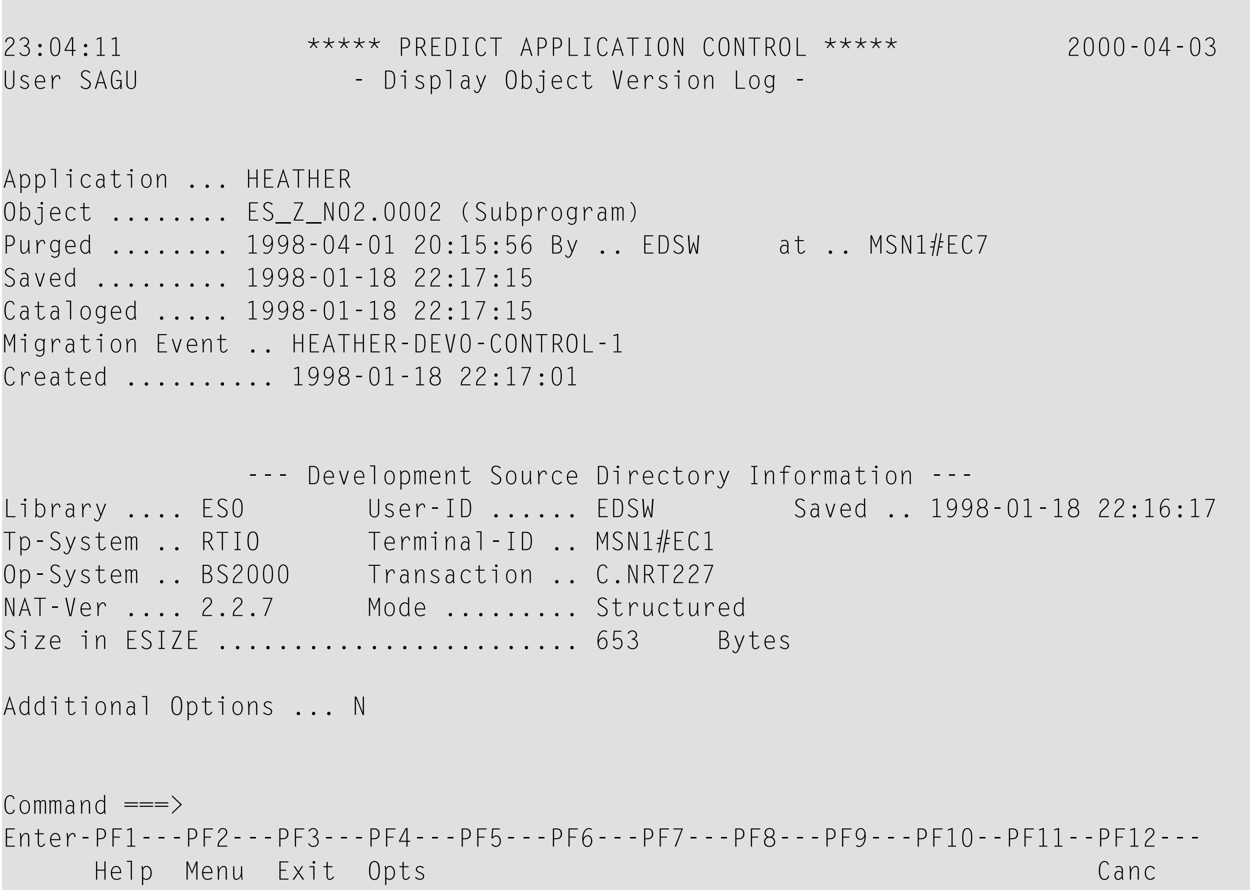
If the Object Type field has been left blank or contains an "*" then the selection of object purge logs is not restricted on its account. This is the only way of getting the foreign object purge logs listed.

The C fields of an Object Version Log Selection List screen can take as values - in addition to "?" and "." - D(isplay), H(ardcopy), S(elect), and P(urge).

S(elect) returns the Versioned Objects Log Maintenance Menu with its fields filled with the data of the selected log.

Display Object Version Log

D(isplay) produces a Display Object Purge Log screen:

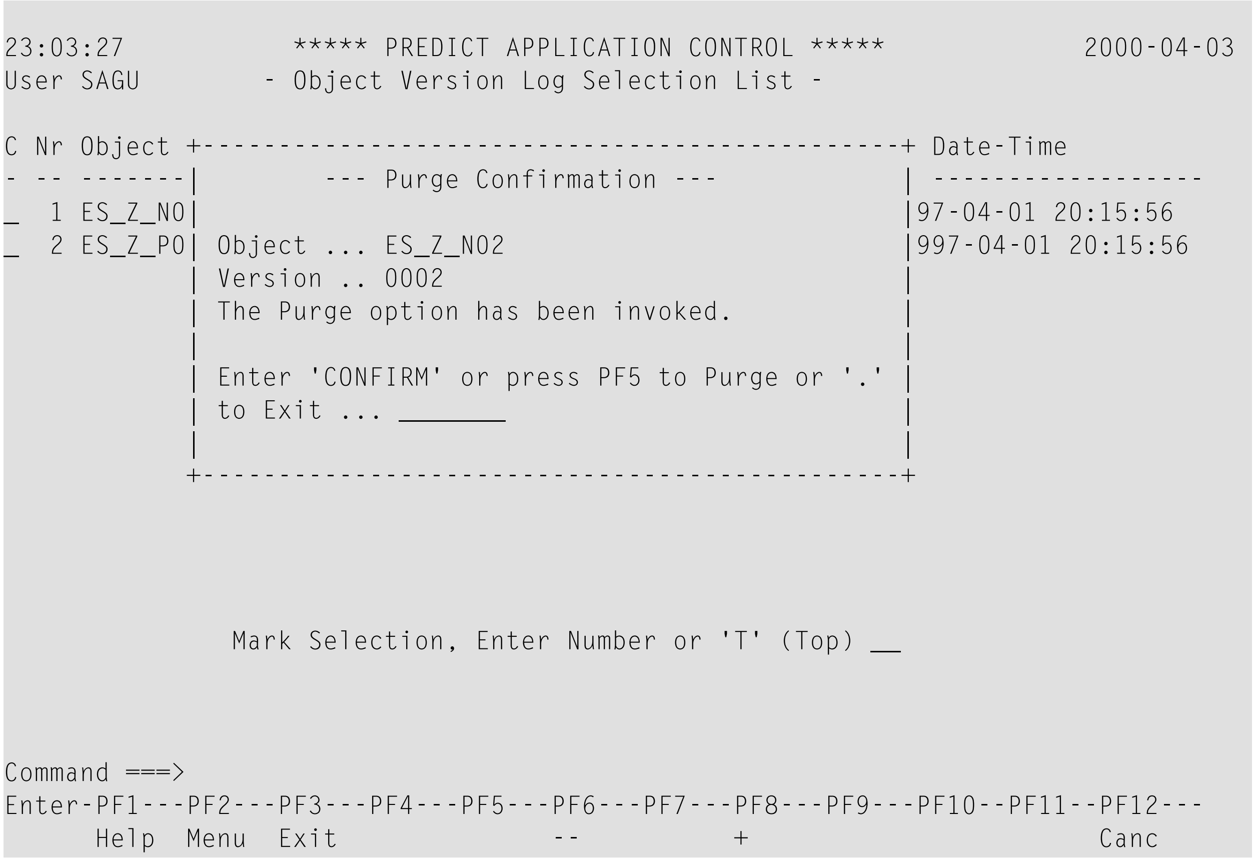


```
23:04:11            ***** PREDICT APPLICATION CONTROL *****           2000-04-03
User SAGU              - Display Object Version Log -


Application ... HEATHER
Object ........ ES_Z_N02.0002 (Subprogram)
Purged ........ 1998-04-01 20:15:56 By .. EDSW     at .. MSN1#EC7
Saved ......... 1998-01-18 22:17:15
Cataloged ..... 1998-01-18 22:17:15
Migration Event .. HEATHER-DEVO-CONTROL-1
Created .......... 1998-01-18 22:17:01



                --- Development Source Directory Information ---
Library .... ES0        User-ID ...... EDSW         Saved .. 1998-01-18 22:16:17
Tp-System .. RTIO       Terminal-ID .. MSN1#EC1
Op-System .. BS2000     Transaction .. C.NRT227
NAT-Ver .... 2.2.7      Mode ......... Structured
Size in ESIZE ........................ 653     Bytes

Additional Options ... N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc
```

The Display Object Version Log screen is similar to the Display Object Version screen for the object before its retirement or purging. There are two additional option: Dates and Audit Report. Audit Report is produced by the activity that retired or purged the object from CONTROL or ARCHIVE.

Purge Object Version Log

P(urge) produces a Purge Confirmation window:



```
23:03:27           ***** PREDICT APPLICATION CONTROL *****             2000-04-03
User SAGU        - Object Version Log Selection List -

C Nr Object +-----------------------------------------------+ Date-Time
- -- -------|        --- Purge Confirmation ---            | -----------------
_  1 ES_Z_NO|                                              |97-04-01 20:15:56
_  2 ES_Z_PO| Object ... ES_Z_NO2                          |997-04-01 20:15:56
            | Version .. 0002                              |
            | The Purge option has been invoked.           |
            |                                              |
            | Enter 'CONFIRM' or press PF5 to Purge or '.' |
            | to Exit ... ________                         |
            |                                              |
            +-----------------------------------------------+




               Mark Selection, Enter Number or 'T' (Top) __



Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Enter CONFIRM or press PF5 to purge the object purge logs marked with P's in the Object Version Log Selection List. Press PF3 to return to the Versioned Objects Log Maintenance Menu without purging the logs.

To display, hardcopy, or purge a single object purge log from the Object Purge Logs Menu, enter

- Code D, H or P;
- the name of an application;
- a range of object names - assumed "*" if left blank;
- a range of object version numbers - assumed from 1 to 9999 if both fields are left blank;
- a (possibly empty) string of Natural object type designations consisting of one letter: "E" for error messages, "V" for views or "R" for rules.

If there are no logs satisfying the specified criteria then a message is superimposed on the original screen.

If there is exactly one log satisfying the specified criteria, it is displayed or hardcopied with Code at "D" or "H". For [Code] = "P", a Purge Confirmation window appears.

If there is more than one log satisfying the specified criteria, a modified S(elect) is applied instead. The modification consists in the restriction of the set of functions applicable to the selected logs to {D}, {H}, or {P}.

Purge Object Version

Objects can be removed from CONTROL

- by retirement from CONTROL;
- by archiving - i.e., by finalizing a completed CONTROL to ARCHIVE migration event;
- by purging from CONTROL, which is described in this section.

The removability of an object from a CONTROL status is affected by the values of the Minimum Current Versions and Current Retention Period fields of the application.

Note: If applymod 23 is not active, an object cannot be removed from a CONTROL compartment if it is known to have been migrated to test, production, or maintenance and is not known to have been subsequently overwritten there or retired to it. An object whose removal from CONTROL is not allowed for any of these reasons.

- will be passed over by any submitted retirement from CONTROL event;
- will be passed over at the finalization of any archiving event;
- will be neither presented on any Purge Object Version Selection List nor purged without being so presented.

When an object is archived, it is removed from CONTROL, and its record in the ACF system file is logged. While thelogged object remains in the application (and the work file to which the object has been copied remains available), the object itself can be restored. If the token is deleted, the object is no longer restorable. The deletion of a logged object from an application causes its "removal from ARCHIVE". It can be achieved

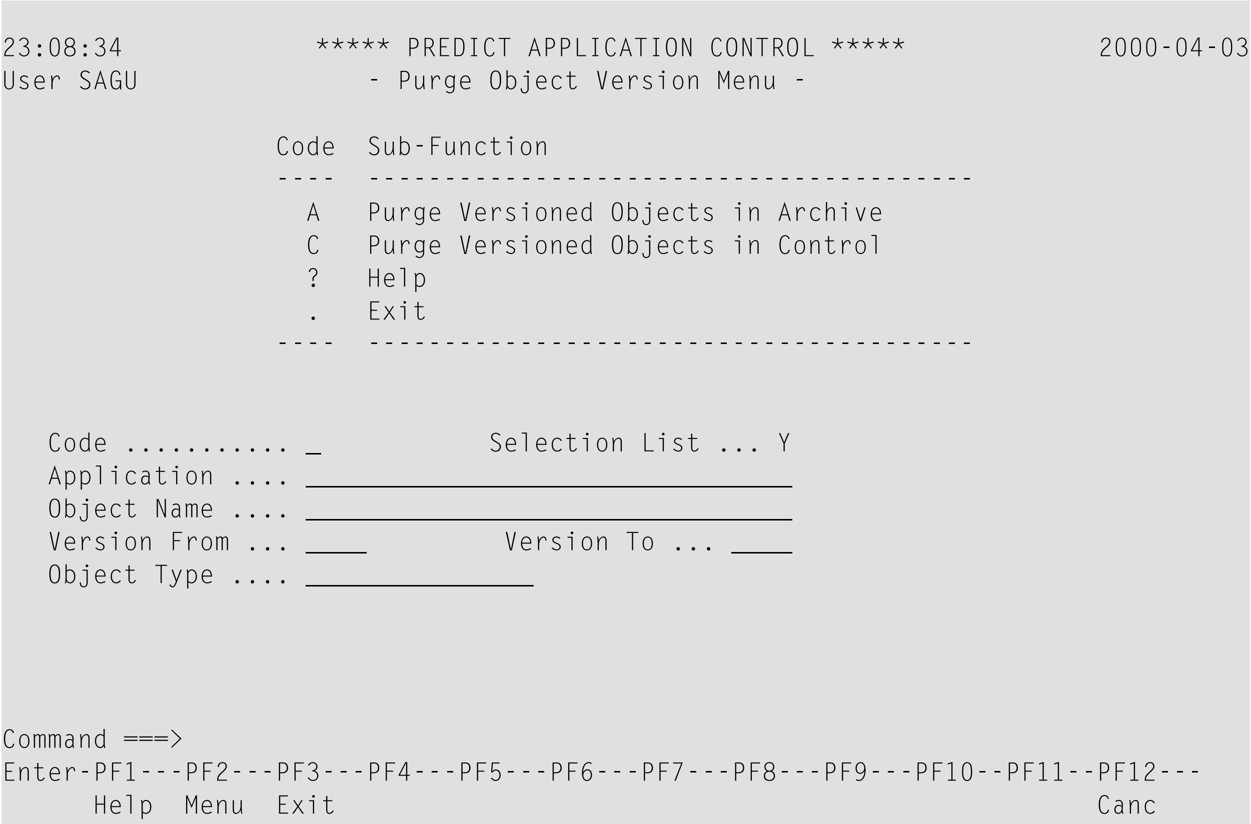
- by retirement from ARCHIVE;
- by purging from ARCHIVE, which is described in this section.

The removability of an object from ARCHIVE in the above sense is affected by the values of the Minimum Archive Versions and Archive Retention Period fields of the application. A logged object whose deletion is not allowed by either of the two values

- will be passed over by any submitted retirement from ARCHIVE event;
- will neither appear on any Purge (archived) Object Version Selection List nor be deleted without being so presented.

To access the object purging functions, enter Code P on the Object Version Maintenance screen.

The Purge Object Version Menu appears:

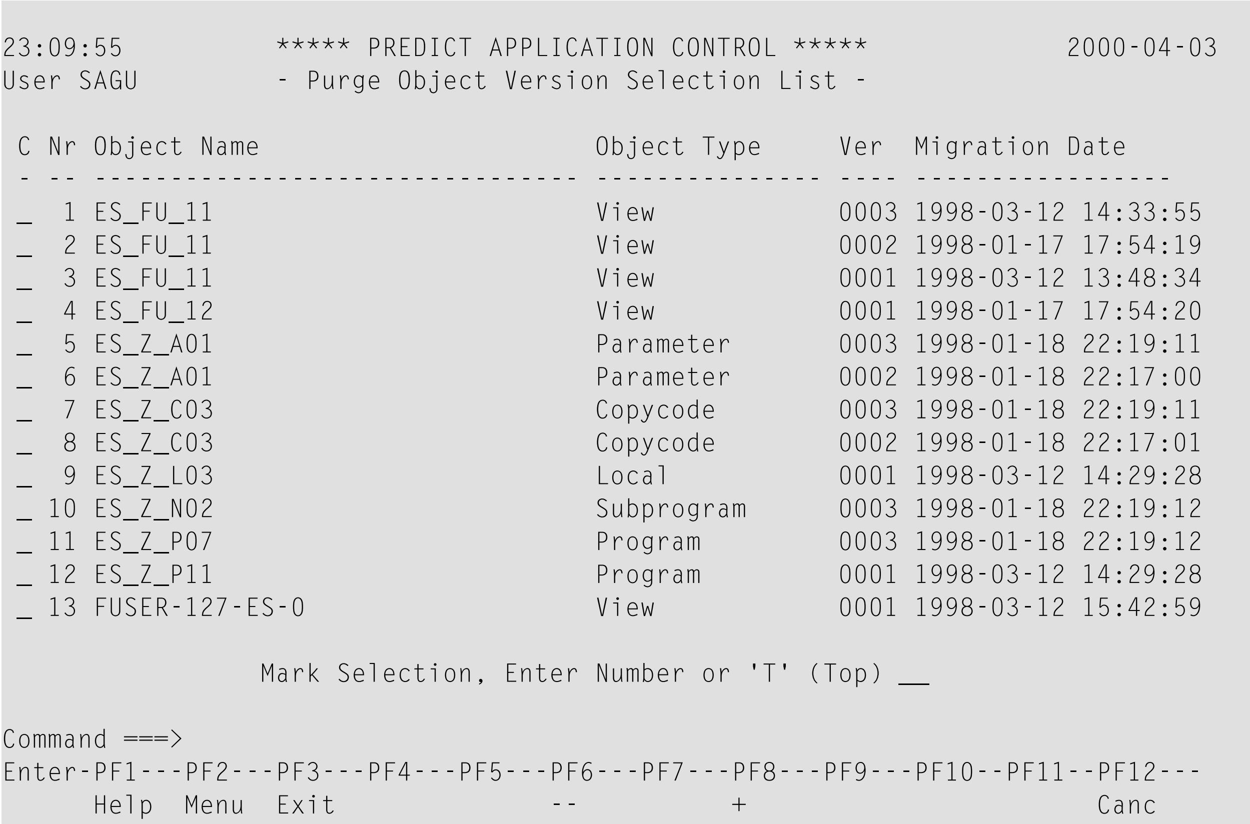


```
23:08:34             ***** PREDICT APPLICATION CONTROL *****            2000-04-03
User SAGU                 - Purge Object Version Menu -

                  Code  Sub-Function
                  ----  ----------------------------------------
                    A   Purge Versioned Objects in Archive
                    C   Purge Versioned Objects in Control
                    ?   Help
                    .   Exit
                  ----  ----------------------------------------


   Code ........... _            Selection List ... Y
   Application .... ________________________________
   Object Name .... ________________________________
   Version From ... ____         Version To ... ____
   Object Type .... _______________




Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

To select objects to be purged from CONTROL or ARCHIVE enter

- Code C or A;
- Selection List Y;
- the name of an application;
- a range of object names - assumed "*" if left blank;
- a range of object version numbers - assumed from 1 to 9999 if both fields are left blank;
- a (possibly empty) string of Natural object type designations consisting of one letter: "E" for error messages, "V"for views "R" for rules.

If there is an object version (for [Code] = "C") or object version (for [Code] = "A") which satisfies the selection criteria, a Purge Object Version Selection List appears:



```
23:09:55          ***** PREDICT APPLICATION CONTROL *****             2000-04-03
User SAGU         - Purge Object Version Selection List -

 C Nr Object Name                      Object Type     Ver  Migration Date
 - -- -------------------------------- --------------- ---- -----------------
 _  1 ES_FU_11                         View            0003 1998-03-12 14:33:55
 _  2 ES_FU_11                         View            0002 1998-01-17 17:54:19
 _  3 ES_FU_11                         View            0001 1998-03-12 13:48:34
 _  4 ES_FU_12                         View            0001 1998-01-17 17:54:20
 _  5 ES_Z_A01                         Parameter       0003 1998-01-18 22:19:11
 _  6 ES_Z_A01                         Parameter       0002 1998-01-18 22:17:00
 _  7 ES_Z_C03                         Copycode        0003 1998-01-18 22:19:11
 _  8 ES_Z_C03                         Copycode        0002 1998-01-18 22:17:01
 _  9 ES_Z_L03                         Local           0001 1998-03-12 14:29:28
 _ 10 ES_Z_N02                         Subprogram      0003 1998-01-18 22:19:12
 _ 11 ES_Z_P07                         Program         0003 1998-01-18 22:19:12
 _ 12 ES_Z_P11                         Program         0001 1998-03-12 14:29:28
 _ 13 FUSER-127-ES-0                   View            0001 1998-03-12 15:42:59

                 Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                        Canc
```

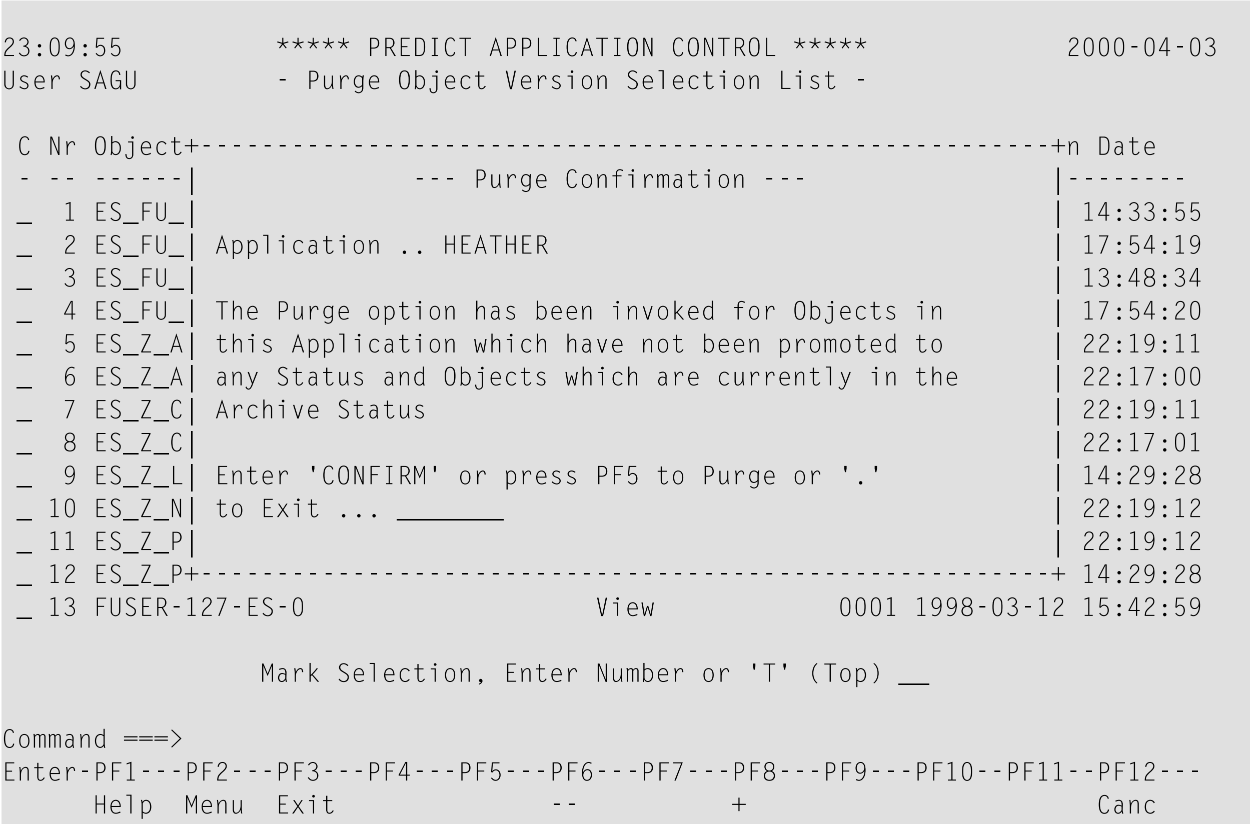
If no object of Control Status (for [Code] = "C") or object of Archive Status (for [Code] = "A") satisfies the selection criteria then a message is superimposed on the original screen.

If no application name is specified or "*", "<", or ">" occurs in the Application field then an application selection list is displayed letting one choose an application.

If the Object Type field has been left blank or contains an "*" then the selection of objects or tokens is not restricted on its account. This is the only way of getting the foreign objects listed.

The C fields of a Purge Object Version Selection List screen can take the value - in addition to " ", "?" and "." - P(urge).

P(urge) produces a Purge Confirmation window:



```
23:09:55          ***** PREDICT APPLICATION CONTROL *****          2000-04-03
User SAGU         - Purge Object Version Selection List -

 C Nr Object+---------------------------------------------------------+n Date
 - -- ------|               --- Purge Confirmation ---                |--------
 _  1 ES_FU_|                                                         | 14:33:55
 _  2 ES_FU_| Application .. HEATHER                                  | 17:54:19
 _  3 ES_FU_|                                                         | 13:48:34
 _  4 ES_FU_| The Purge option has been invoked for Objects in        | 17:54:20
 _  5 ES_Z_A| this Application which have not been promoted to        | 22:19:11
 _  6 ES_Z_A| any Status and Objects which are currently in the       | 22:17:00
 _  7 ES_Z_C| Archive Status                                          | 22:19:11
 _  8 ES_Z_C|                                                         | 22:17:01
 _  9 ES_Z_L| Enter 'CONFIRM' or press PF5 to Purge or '.'            | 14:29:28
 _ 10 ES_Z_N| to Exit ... _______                                     | 22:19:12
 _ 11 ES_Z_P|                                                         | 22:19:12
 _ 12 ES_Z_P+---------------------------------------------------------+ 14:29:28
 _ 13 FUSER-127-ES-0                   View           0001 1998-03-12 15:42:59

                 Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Enter CONFIRM or press PF5 to purge the objects whose entries are marked with P's in the Purge Object Version Selection List. Press PF3 to return to the Purge Object Version Menu without purging the logs.

If the Selection List field of the Purge Object Version Menu is set at N rather than Y then objects are selected just as they would be selected with Y; but instead of listing them, PAC immediately produces a Purge Confirmation window and, at confirmation, purges all selected objects or tokens.

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Part III - Maintenance Facilities

This part tells you how to use the change control facilities to track and maintain application objects.

1. Defining maintenance requests. PAC can be integrated with problem-tracking systems so that maintenance of objects can be monitored by PAC.
2. Tracking the maintenance activities of application objects with change control logs that can be reviewed for check-out/check-in information.
3. Comparing versioned objects both inside and outside the PAC environment.
4. Retrieving information about objects that have been moved into the PAC environment and assigned a version number.

These facilities are described under the following headings:

- Creating and Validating a Migration List
- Maintenance Requests
- Maintaining Natural Objects in PAC
- Using PAC with Predict Case or Natural for DB2
- Creating and Managing PAC Jobs
- Change Control Logs

33 Creating and Validating a Migration List

A migration list identifies a set of objects to be migrated with a specific event for a specific PAC application.

Except for the Predict applications, migration lists may contain Natural objects, foreign objects, and user error message objects. Migrations from PAC may contain Natural objects, foreign objects, and views.

For the Predict application, only those Predict objects supported by PAC may be specified in the migration list. When Predict userviews, files, and verifications are migrated into PAC, they are generated into views/DDMs and rules that are used by Natural objects.

A migration list may be created "automatically" by using the PAC Generate List facilities or "manually" by entering objects on the Migration List Editor. This section discusses the manual creation of migration lists using the Migration List Editor. For information about generating a migration list in batch mode using commands, see the *PAC Reference* documentation.

- **Using the Migration List Editor**
- **Object Types for the List**
- **Using the SEL (Select) Command**
- **Using the EXP (Expand) Command**
- **Using the IMP (Import) Command**
- **Validating a Migration List**
- **Displaying a Migration List**

34 Using the Migration List Editor

- Step 1. Accessing the Migration List Editor 388
- Step 2. Specifying Objects for the List 389
- Step 3. Saving the Migration List 390

With the Migration List Editor, you can:

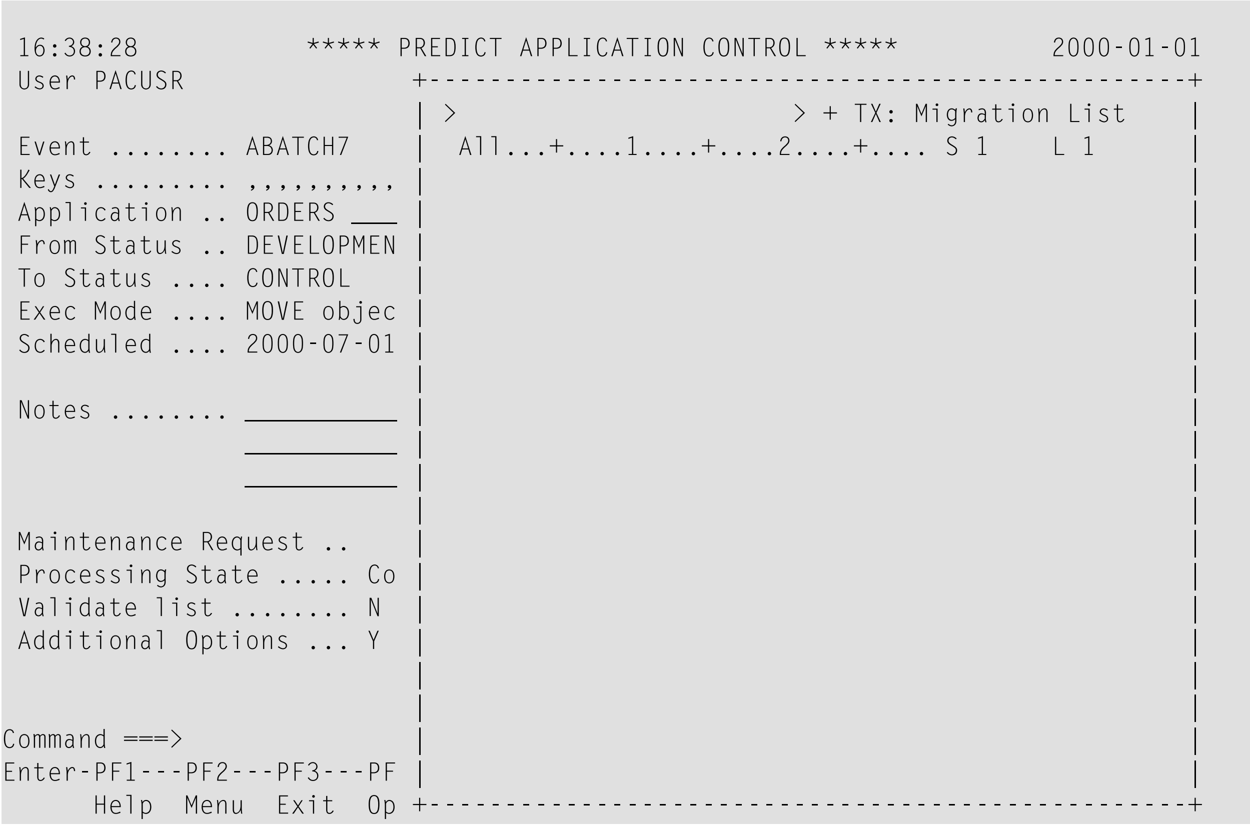
- Enter objects directly in the Migration List Editor window;
- Select objects from the Object Selection List screen using the SEL (Select) command;
- Use the EXP (Expand) option to add subcomponents to the migration list, once the base migration list exists.

You may combine these three methods, except when selecting objects for the Predict application.

This chapter covers the following topics:

Step 1. Accessing the Migration List Editor

Access the Migration List Editor window from the Add/Modify Event screens through Additional Options or by pressing PF7 (ObLst):



```
 16:38:28           ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User PACUSR               +---------------------------------------------------+
                           | >                     > + TX: Migration List     |
 Event ........ ABATCH7    |  All...+....1....+....2....+.... S 1    L 1       |
 Keys ......... ,,,,,,,,,, |                                                   |
 Application .. ORDERS ___ |                                                   |
 From Status .. DEVELOPMEN |                                                   |
 To Status .... CONTROL    |                                                   |
 Exec Mode .... MOVE objec |                                                   |
 Scheduled .... 2000-07-01 |                                                   |
                           |                                                   |
 Notes ........ __________ |                                                   |
                __________ |                                                   |
                __________ |                                                   |
                           |                                                   |
 Maintenance Request ..    |                                                   |
 Processing State ..... Co |                                                   |
 Validate list ........ N  |                                                   |
 Additional Options ... Y  |                                                   |
                           |                                                   |
                           |                                                   |
Command ===>               |                                                   |
Enter-PF1---PF2---PF3---PF |                                                   |
      Help  Menu  Exit  Op +---------------------------------------------------+
```

This editor is similar to the Natural editor. See the PAC Reference documentation for a review of Natural editor commands. At the top of the editor screen at the first ">" prompt, you may enter Natural system commands and line commands such as:

CLEAR	removes all entries displayed;
HELP	lists possible options;
SAVE	saves all entries displayed;
QUIT	leaves the editor;
SEL	selects objects;
SORT	sorts objects alphabetically.

Following the second ">" prompt is an indicator controlling the direction of some of the editor commands: + indicates "after"; and - indicates "before". The editor commands ADD and SCAN and the line commands ".C", ".M", and ".I" are influenced by this direction indicator.

Finally on the top line, the TX: (entity type) field identifies the migration list entity currently in the source work area. This field value cannot be modified.

The next line down from the top includes a scale with positional markings for a source line length of 43 characters, an S (number of lines) field indicating the size of the migration list being edited, and an L (source line number) field indicating the particular source line currently displayed as the first line in the editor.

Note: For events with From Status EXTERNAL the migration list editor provides a specific additional function, when using the SEL command. When adding or modifying a URL with the editor, you can expand each line in the editor with the PF5 key. You are then able to add or edit long URL strings (up to 250 characters) more easily. In addition, when you are in the expanded lines mode, you can scroll through the migration list back and forth using the PF7 and PF8 keys.

Step 2. Specifying Objects for the List

In the Migration List Editor, objects may be listed in any sequence, but each object must be entered on a separate line in the following general format:

```
object name, object type, reference (version or status)
```

Specific formats for different object types are described in detail in the section **Object Types for the List**. For these formats, square brackets indicate optional terms; curly braces indicate mutually exclusive options.

Names of Natural objects, except rules and views, may be up to (8) characters in length. Foreign objects may be up to 32 characters in length. Names of rules, views, and Predict objects may be 3-32 characters. An asterisk (*) or range notation may be used to specify a prefix or range of objects.

Note: Range notation is not currently available for foreign objects. To display a list of valid foreign object types, enter FTYPES on the command line of the Migration List Editor.

PAC interprets the migration list information according to the type of object being processed. The object type is a 1-4 character code. If an asterisk (*) is used, PAC determines the exact type(s) for objects based on the object name specification.

Note: The audit report interprets the asterisk as "GNERIC".

The reference includes the version of the object to be processed (a 1-4 character number) or the status of the object (a 1-32 character name or alias that uniquely identifies the status) if the version number is not known.

Step 3. Saving the Migration List

Once you have specified the objects (or selected them from lists; see **Using the SEL (Select) Command**), the Migration List Editor window displays the list in alphabetical order:

```
 11:41:07          ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User PACUSR                +-------------------------------------------------+
Library .. ORDERS   (235,9 | >            > + TX: object List                |
C Nr Object   Object Type  |  All...+....1....+....2....+.... S 1    L 12    |
- -- -------- -----------  |    ASMPGM,3ASL                                  |
_  1 MENU     Program      |    COBPGM,3COB                                  |
_  2 NHL      Helproutine  |    ORD-AHLP,H                                   |
_  3 ORD-AHLP Helproutine  |    ORD-CUST,S                                   |
_  4 ORD-COPY Copycode     |    ORD-END,S                                    |
_  5 ORD-CUST Subroutine   |    ORD-GLOB,G                                   |
_  6 ORD-END  Subroutine   |    ORD-LINE,S                                   |
_  7 ORD-GLOB Global       |    ORD-MAIN,P                                   |
_  8 ORD-INV  Subroutine   |    ORD-MAP,M                                    |
_  9 ORD-LINE Subroutine   |    ORD-MAP,M                                    |
_ 10 ORD-LIN1 Subroutine   |    ORD-NHLP,H                                   |
_ 11 ORD-MAIN Program      |    ORD-RLIN,S                                   |
_ 12 ORD-MAI1 Program      |                                                 |
_ 13 ORD-MAP  Map          |                                                 |
_ 14 ORD-NHLP Helproutine  |                                                 |
                Mark Selec |                                                 |
PAC7037: (E) Mark line(s) w|                                                 |
Command ===>               |                                                 |
Enter-PF1---PF2---PF3---PF |                                                 |
      Help  Menu  Exit      +-------------------------------------------------+
```

Natural objects, foreign objects, data areas, copy code, rules, views, and maps selected using the available options are listed.

On the Editor command line, enter SAVE to save the migration list or a period (.) to exit the Editor.

If you attempt to exit the Migration List Editor before you save your modifications, a warning window appears requesting you to enter:

- E to continue editing;
- C to save your modifications; or
- . (period) to abandon changes and exit the Migration List Editor.

35 Object Types for the List

- Predict Objects 394
- Foreign Objects 395
- Natural Objects 396
- Natural Dynamic Source Objects 401
- User Error Message Objects 402

Objects fall into basic groups: Predict, foreign, Natural and user error message. DDMs and rules are recognized as Natural objects. Files and verifications are recognized as Predict objects.

This chapter covers the following topics:

Predict Objects

A Predict object is an entity in the Predict environment. For Predict objects, the reference in the format is optional:

```
object-name,object-type[,reference]
```

You may specify single or multiple-character codes for Predict object types as indicated in the following table; single-character codes are translated to the longer codes during migration list validation.

Code	Translates to . . .	Object Type
C	FIC	File type (e.g., DB2, views, conceptual files, standard files)
D	DA	Database
F	FILE	Adabas file
G	PA	Package list
K	KY	Keyword
L	RL	Relationship
N	DS	Data space
O	ST	Storage space
P	PR	Program
Q	VM	Virtual machine
R	VE	Verification
S	SY	System
U	US	User
V	VIEW	View
W	NW	Network
*		All objects

Note: User-defined entities (UDEs) may not be specified.

Controlling the Predict Objects Included in a Migration

PAC uses the Predict SYSDICBE migration utility to load and unload Predict objects. Because of the nature of this migration utility, it is important to explicitly define the Predict object type. A single entry in the migration list may result in numerous Predict objects being processed. For example, if Predict type F or C is specified for an object, Predict automatically unloads the file together with all of the verifications and userviews linked to the file, and generates new automatic rules and DDMs for each object.

If you only need userviews and/or verifications for the migration list, place them individually in the list and omit the file itself.

However, the parent file (F or C) must have been previously migrated into PAC using the Predict migration utility SYSDICBE or an error will occur. Refer to **Migrating Predict Objects**, for detailed information. Refer to the Predict documentation for more information about the Predict migration utility.

Foreign Objects

A foreign object is an entity that exists outside the Natural system file. It may reside in a partitioned dataset (PDS) under z/OS or in an LMS library under BS2000. Foreign objects can be source code or object code or both. They are loaded into PAC without being compiled or recompiled.

For foreign objects, the reference in the format is optional:

```
object-name,object-type[,reference]
```

Foreign objects in a migration list are identified by the prefix 3 (for example, 3COB is recognized as a COBOL object).

The PAC administrator determines the classes and types of foreign objects that are supported at your site and a project leader has the ability to further limit that set of classes and types for a particular application.

Examples of foreign object classes and types that might be supported at your site include:

- JCL
- APL Load
- Assembler Copycode
- Assembler Load
- Assembler Program
- Assembler Macro

- DBRM
- DBRM Load

Selecting Foreign Objects

Before foreign objects are eligible for a migration list, your PAC administrator must have defined their datasets to PAC and to the application.

Range notation is not currently available for foreign objects.

1. Enter FTYPES on the command line of the Migration List Editor to display a list of valid foreign object types.

   PAC displays a list of all datasets defined for the application.
2. From the list of all datasets defined for the application, select the dataset.

   A list of the contents of the selected dataset appears.
3. From the list of dataset contents, select the objects you want to be included in the migration list.

Restrictions

Foreign objects cannot be expanded. However, Natural objects can be expanded to include foreign objects as subordinates.

You can generate a list of foreign objects only where the origin (From) status is the Control status. Foreign objects cannot be archived.

Natural Objects

The format used for Natural objects in the migration list depends on the particular migration path being used for the migration event.

The following Natural object types may be specified:

A	Parameter data area	R	Report
C	Copy code	S	Subroutine
G	Global data area	T	Text
H	Helproutine	Y	Expert model
K	Server	Z	Recording
L	Local data area	*	All objects
M	Map	3	Dialog

N	Subprogram	4	Class
P	Program	5	Processor

This section covers the following topics:

- Rules and Views
- Migration into PAC
- Migration from Control (Including Alignment)
- Migration from Test or Production

Rules and Views

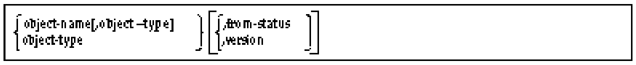
You may specify rules and views if they were generated when the object was identified to PAC by a Predict migration that generated the rule and/or view during the migration load. Object entries may also reference views/DDMs that were incorporated into PAC. Because these objects are already under the control of PAC, a status or version number has been assigned.

Note: Other than the views incorporated into PAC during the initial setup of Predict information in PAC, views and rules may not be specified for incorporations.

If the same view or rule is specified multiple times in the migration list, only the last entry is used.

Migration into PAC

Natural objects being migrated online from development, maintenance, or incorporation status types, with or without a work file as input, are specified in the migration list using the following format:



```
{object-name[,object-type]} [{,from-status}]
{object-type             }  [{,version    }]
```

You may use range notation for the object name and when specifying rules and views, even if you also specify the version number or status name.

From Development or Maintenance

When migrating objects from a development or a maintenance status, note the following:

- If the object name is specified, the type may optionally be specified, but if the type is inconsistent with the object name, a warning message may be issued indicating that the object type selected for the object is incorrect and that PAC has changed the type to be consistent with the object.
- You may limit the range of objects by entering a specific object type (currently limited to one type per entry) so that only objects of the specified type are selected during processing; or enter an asterisk (*) or blank for all types.

- You may specify a status or status alias for a maintenance status type; you may not specify a development status type because PAC does not track objects which are implicitly in development.
- You may specify a version number if the object is a subordinate and under the control of PAC.

  If a version number is specified for certain object types (that is, copy code; map; global, local, and parameter data areas), PAC invokes rolling for that object type. Refer to **Using the Rolling Facility** for information about the rolling facility.
- If neither version nor status is specified, PAC compiles the objects with the latest version of the subordinate object. If a view and/or rule is not available, PAC uses the latest version for the application.

  In the case of rules and views, the default version number may not necessarily be the highest existing version, but rather the highest version assigned (linked) to that application determined in a migration event where the From status is a development or maintenance type.
- When migrating objects from a development status, PAC processes the migration list and compares the date-time stamp of the object specified in the migration list with the date-time stamp of the latest version stored in PAC.
  - If the date-time stamps are identical and the object type is copy code or text, then the object is ignored; however, this may be overridden by User Exit 9.
  - For all other Natural objects (for example, program, subprogram, subroutine, data areas), PAC continues to process the object, even though the program has not been modified, because a copy code, or a view used by the program may have been changed.

From Incorporate

- When objects are incorporated from the Natural library directly (without using a work file), the migration list may be created as if it were a migration from development or maintenance (note the restriction on views and rules in the section **Rules and Views**).
- When objects are to be incorporated with input from a work file, the migration list consists of a single entry only as shown in the following examples:

Entry	Loads all . . .
,	objects except user error messages.
A*,*	objects starting with "A" except user error messages.
*,P	program-type objects.
S>,M	maps with a name greater than "S".
*,E	user error messages.

Note: User error message objects cannot be included in a migration list with other object types.

Migration from Control (Including Alignment)

When migrating Natural objects from the PAC Control status, version numbers or statuses may optionally be provided to identify the specific object(s) to be included during processing.

Status is Specified

If a status (or status alias) is specified, the following format is used for the object in the list:

```
object-name[,object-type],status
```

- The object name must be specified; however, range notation may be used.
- PAC accepts the object only if it has been migrated to the specified status. PAC determines the version number when the migration event is processed.
- The object type may optionally be specified.
- Rules and views may be specified if they have been registered to the application.
- For archiving, multiple objects with different versions may be added to the migration list.

Version is Specified

If a version number is specified, the following format is used for the object in the list:

```
object-name[,object-type],version
```

- The object name with the specified version number is processed regardless of the status(s) in which it exists (except the Archive status); it is then ignored and the user is notified.
- Object type is optional, but if the type is inconsistent with the object name, an error or warning message is issued.
- Range notation may be specified for rule and view objects only (except with alignment).
- Version number for rule and view objects must be valid for the application and not for the versions created during the migration of Predict data; that is, the rules and views must be registered to the application.

Neither Version nor Status is Specified

If neither version nor status is specified, the following format is used for the object in the list:

```
object-name[,object-type]
```

- The object name must be specified. Range notation may be used.
- The object type may optionally be specified.
- PAC defaults to the highest existing version number for the specified object, unless that version is archived.
- In the case of rules and views, the default version number may not necessarily be the highest existing version, but rather the highest version registered to that application.

Migration from Test or Production

When migrating Natural objects from test or production status types (that is, from a status other than Control, maintenance or development), the version number or status may optionally be provided to identify the specific object(s) to be processed. However, the reference will default to the name of the origin status.

Status is Specified

If status is specified, the following format is used for the object in the migration list:

```
object-name[,object-type],status
```

- The object name must be specified. Range notation may be used.
- The object type may optionally be specified.
- PAC accepts the object only if it has been migrated to the specified status. PAC determines the version number when the migration event is processed.
  - If the Control status is specified, the version number will always be the most recent one.
  - Status may not be used as a reference for the Archive and Retire statuses.
- In the case of rules and views, the object must be registered to the (foreign) application.

Version is Specified

If a version number is specified, the following format is used for the object in the list:

```
object-name[,object-type],version
```

- The object name with the specified version number is processed regardless of any status(s) in which it exists.
- If the destination status is Archive:
  - multiple versions of the same object may be specified.
  - asterisk (*) notation may be used for version to select the oldest as opposed to the most recent version.
- The object type may optionally be specified. If the object type is inconsistent with the object, an error or warning message is returned to the user.
- For rules and views, range notation may be specified.
- Version number for rules and views must be valid for the application and not for the versions created during the migration of Predict data; that is, they must be registered to the application.

Neither Version nor Status is Specified

If neither version nor status is specified, the following format is used for the object in the list:

```
object-name[,object-type]
```

- PAC defaults to the version of the object that is currently in the status from which the objects are being migrated. If the destination status is Archive, the default is the oldest version as opposed to the most recent version.
- PAC assumes that every object listed with no override version or status must exist in the origin (From) status of the migration event; if not, the object is ignored.
- For rules and views, range notation may be specified.

Natural Dynamic Source Objects

To migrate the source as well as the cataloged objects of copy code, maps, or programs from development, maintenance, or incorporation status types, manually enter the following codes in the migration list:

```
CS for source of copy code
MS for source of a map
PS for source of a program
```

Objects migrated into PAC with these designations are internally flagged to indicate that when they are migrated, the source will be migrated and objects will not be compiled. Refer to **Migrations Between Control, Test, and Production** for more information about dynamic source variables.

User Error Message Objects

The migration list also supports user error messages objects. User error messages are specified on the migration list in the following format:

```
error-number[,reference]
```

where error-number is the number assigned to the user error message preceded by E (for example, E1234); and reference is the version number or status of the user error message. The reference is optional; you may leave it blank.

Since the number of error messages used by any one application may vary from 1 to 9999, range notation may be used as follows:

```
from error number - to error number
```

For example: E100-E200,E

Since they cannot be compiled, user error messages do not need to reside in the Control status.

User error messages are migrated into and out of PAC. In a migration list, user error messages are treated similarly to Natural objects.

PAC validates user error messages in the migration list in the same way it validates Natural objects. User error messages must exist in the origin status.

User error messages consist of short and long error texts. For each error message, up to sixty languages for the same error message can exist. (The correlation of language codes to language text is defined in the ULANGTAB Natural macro.)

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Using the SEL (Select) Command

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- Other Migrations 415

You may use the SEL (Select) command from the Migration List Editor to create a migration list, either alone or in conjunction with its expand options.

Use of the SEL command and its options depends on whether the event migrates objects

- into the PAC controlled environment from development, maintenance or incorporation; or
- from or within the PAC controlled environment (other migrations).

The following SEL command options apply for migration events into PAC; for other migrations, only SEL, the default, is valid:

Cmd	Used to select...
SEL	(default) Natural and/or foreign objects.
SEL E	user error message objects from development.
SEL R	rules to be used during the compile phase of the migration event. Rules must have been previously migrated into the Predict application.
SEL U	one or several URLs to be used to access a repository in an external version control software. Alternatively, used to enter a root URL. You can either select all objects below a root URL or select (and expand) a specific node from the root URL. In addition, you can further narrow down the list of objects to be selected by specifying a pattern (file name and/or extension). For example using `.NS*` as input in the Extension field would only select Natural sources for the migration list. **Note:** Only available for events with source status External.
SEL V	views to be used during the compile phase of the migration event. Views must have been previously migrated into the Predict application.

This chapter covers the following topics:

Expand Options

The following expand options are available with the SEL command:

Option	**Include in the migration list:**
C	Marked object and subordinate objects; for compile time. Valid for the default SEL command only.
E	Marked object and both subordinate and referenced objects; for both compile time and runtime (expand options C+R). Valid for the default SEL command only.
R	Marked object and referenced objects; for runtime. Valid for the default SEL command only.
S or X	Marked object only.
U	Marked object and objects used by the marked object.

The expand options C, E, R, and U use cross-reference (Xref) data from:

- Predict for migrations into PAC.
- PAC for all other migrations.

When migrating objects into PAC (that is, from development or maintenance status), the expand options are valid only if cross-reference data exists for the object as specified by the Predict location for the application status.

C includes data areas, copy code, views, rules, or maps used as subordinate objects by the marked object. These objects are required in order to properly compile the marked object.

E includes both subordinate and referenced objects in the list with the marked object.

R includes all objects referenced by the marked object. For instance, if the marked object is a program, it may reference other programs, subprograms, or subroutines. These objects are required in order to properly execute the marked object at runtime.

S or X include just the marked object. You can also select individual objects by entering the object number (from the "Nr" column) in the Mark Selection... field.

U includes the marked object and all Natural objects that use that object. For example, if the marked object is a program, other programs that use the marked program would also be included in the list.

Creating the Migration List

To create the migration list for migrations using the SEL command, do the following:

1. Display the Migration List Editor window.
2. Select the objects to be migrated.
3. Save the resulting migration list in the Migration List Editor.

Migrations into PAC

The SEL command is used differently to migrate Natural, foreign, user error message, rule and view objects into the PAC controlled environment.

This section covers the following topics:

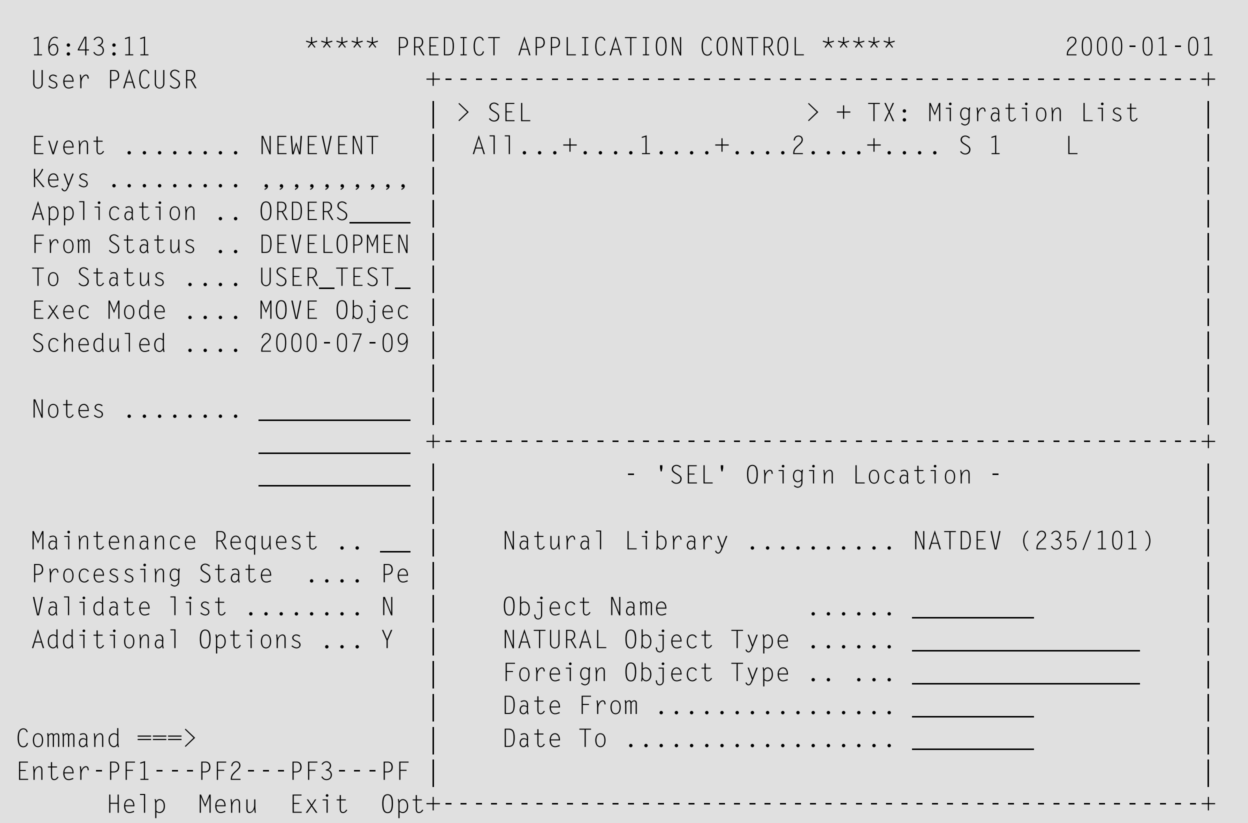
- Natural or Foreign Objects
- User Error Message Objects

- Rules and Views

Natural or Foreign Objects

To select Natural or foreign objects for the list, enter SEL on the command line of the Migration List Editor window.

The `SEL' Origin Location window for Natural objects appears:



```
 16:43:11          ***** PREDICT APPLICATION CONTROL *****           2000-01-01
 User PACUSR                +--------------------------------------------------+
                            | > SEL                  > + TX: Migration List    |
 Event ........ NEWEVENT    |  All...+....1....+....2....+.... S 1    L        |
 Keys ......... ,,,,,,,,,, |                                                  |
 Application .. ORDERS____ |                                                  |
 From Status .. DEVELOPMEN |                                                  |
 To Status .... USER_TEST_ |                                                  |
 Exec Mode .... MOVE Objec |                                                  |
 Scheduled .... 2000-07-09 |                                                  |
                           |                                                  |
 Notes ........ __________ |                                                  |
                __________ +--------------------------------------------------+
                __________ |            - 'SEL' Origin Location -             |
                           |                                                  |
 Maintenance Request .. __ |    Natural Library .......... NATDEV (235/101)   |
 Processing State  .... Pe |                                                  |
 Validate list ........ N  |    Object Name         ...... ________           |
 Additional Options ... Y  |    NATURAL Object Type ...... _______________    |
                           |    Foreign Object Type .. ... _______________    |
                           |    Date From ................ ________           |
Command ===>               |    Date To .................. ________           |
Enter-PF1---PF2---PF3---PF |                                                  |
      Help  Menu  Exit  Opt+--------------------------------------------------+
```

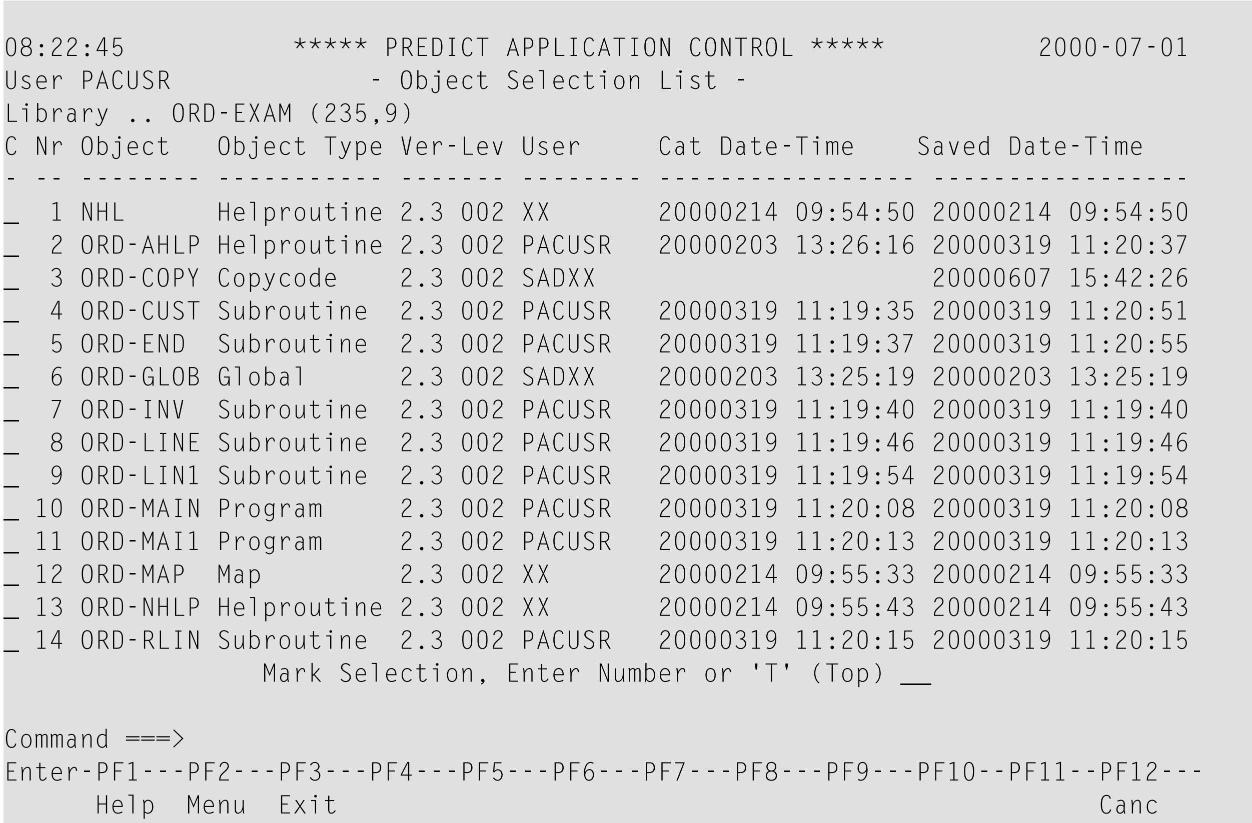
This `SEL' Origin Location window displays the Natural library name, database, and file number where the application origin status is located, as well as the Object Name, Natural Object Type, Foreign Object Type, and Date From/Date To fields in which you may enter your selection criteria.

For migrations from CONTROL and from a neighbour status, the fields Created by and Promoted by are also provided. The former criterion lets restrict the selection to objects immigrated with the specified event. The latter lets restrict the selection to objects emigrated, no matter where, with the specified event. The new criteria let users select for new migrations objects that participated in certain previous migrations even when the objects did not acquire object - status links as a result of the said previous migrations or the links were acquired but have been subsequently made historical or deleted.

For Natural Objects

Enter the desired object name and object type, and if desired, a compile date range in the Date From/Date To fields in yymmdd format. Alternatively, leave these fields blank, or specify a range of objects and/or object types to limit the selection list.

The Object Selection List screen appears displaying a list of all objects that satisfy the selection criteria:



```
08:22:45           ***** PREDICT APPLICATION CONTROL *****          2000-07-01
User PACUSR             - Object Selection List -
Library .. ORD-EXAM (235,9)
C Nr Object   Object Type Ver-Lev User     Cat Date-Time    Saved Date-Time
- -- -------- ----------- ------- -------- ---------------- ----------------
_  1 NHL      Helproutine 2.3 002 XX       20000214 09:54:50 20000214 09:54:50
_  2 ORD-AHLP Helproutine 2.3 002 PACUSR   20000203 13:26:16 20000319 11:20:37
_  3 ORD-COPY Copycode    2.3 002 SADXX                      20000607 15:42:26
_  4 ORD-CUST Subroutine  2.3 002 PACUSR   20000319 11:19:35 20000319 11:20:51
_  5 ORD-END  Subroutine  2.3 002 PACUSR   20000319 11:19:37 20000319 11:20:55
_  6 ORD-GLOB Global      2.3 002 SADXX    20000203 13:25:19 20000203 13:25:19
_  7 ORD-INV  Subroutine  2.3 002 PACUSR   20000319 11:19:40 20000319 11:19:40
_  8 ORD-LINE Subroutine  2.3 002 PACUSR   20000319 11:19:46 20000319 11:19:46
_  9 ORD-LIN1 Subroutine  2.3 002 PACUSR   20000319 11:19:54 20000319 11:19:54
_ 10 ORD-MAIN Program     2.3 002 PACUSR   20000319 11:20:08 20000319 11:20:08
_ 11 ORD-MAI1 Program     2.3 002 PACUSR   20000319 11:20:13 20000319 11:20:13
_ 12 ORD-MAP  Map         2.3 002 XX       20000214 09:55:33 20000214 09:55:33
_ 13 ORD-NHLP Helproutine 2.3 002 XX       20000214 09:55:43 20000214 09:55:43
_ 14 ORD-RLIN Subroutine  2.3 002 PACUSR   20000319 11:20:15 20000319 11:20:15
                 Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

Column	**Description**
C	Input field for entering selection (SEL) expand options.
Library	Name, database, and file number of library where objects are physically located in development or maintenance
Nr	Number assigned to the object on the immediate screen.
Object	Names of application objects that meet the specified selection criteria.
Object Type	Type of the named object. You must update the entry using the Object List Editor to include dynamic source.
Ver-Lev	The Natural version and system maintenance level under which the object resides in development or maintenance.
User	ID of the user who saved the object.
Cat Date-Time	Date and time the object was compiled (that is, cataloged).

Column	Description
Saved Date-Time	Date and time the object was saved. Highlighted date-times indicate the object was saved after the object version was compiled.

Select the objects you want to include by marking them in the "C" column; or enter the object number (from the "Nr" column) for an individual object in the Mark Selection... field.

All available expand options can be used when migrating Natural objects into PAC:

Option	Include in the migration list:
C	Marked object and subordinate objects; for compile time.
E	Marked object and both subordinate and referenced objects; for both compile time and runtime (expand options C+R).
R	Marked object and referenced objects; for runtime.
S or X	Marked object only.
U	Marked object and objects used by the marked object.

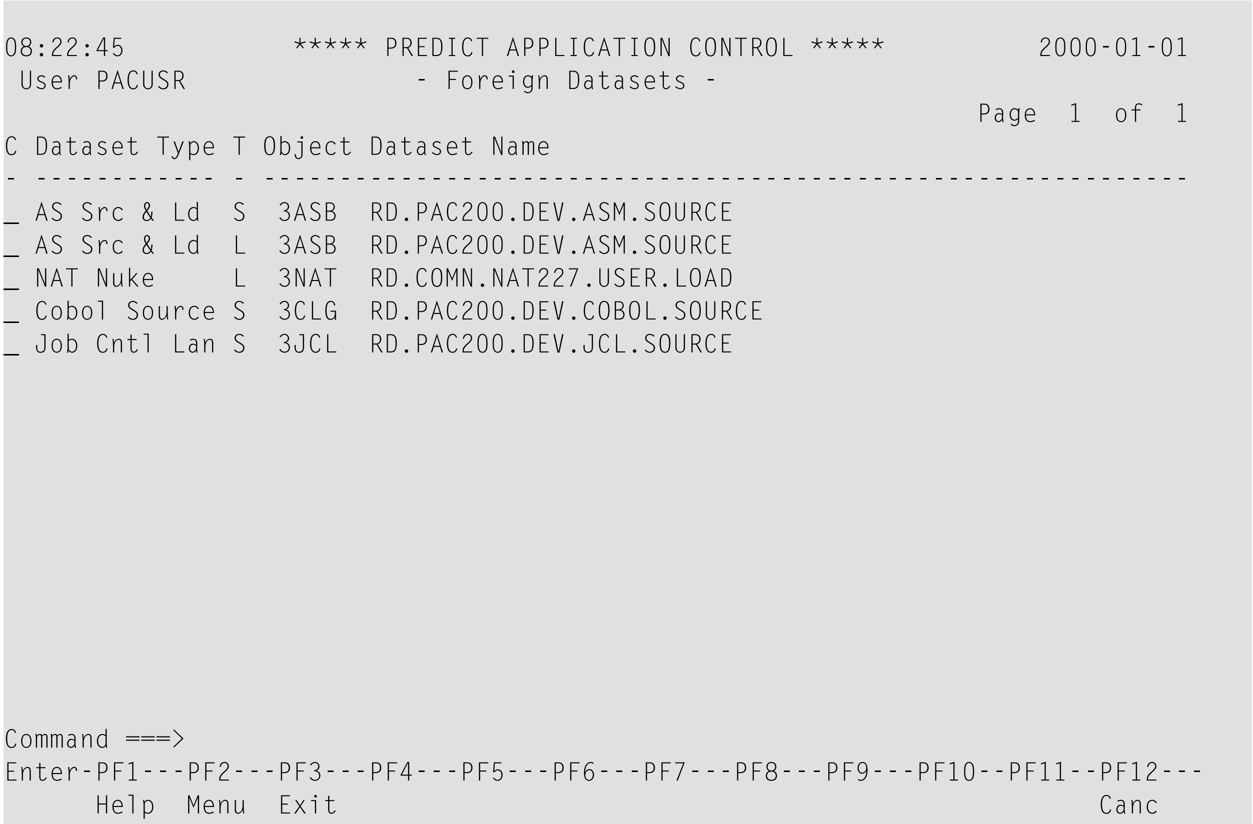
The expand options C, E, R, and U use cross-reference (Xref) data from Predict for migrations into PAC.

Foreign Object Types

Note: Range notation is not currently available for foreign objects.

On the `SEL' Origin Location screen, enter the name and type of the foreign object or an asterisk (*) in the Object Type field to display a list of all defined datasets and object types. Alternatively, leave the Object Name field blank.

The Foreign Datasets screen appears:



```
08:22:45           ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User PACUSR                   - Foreign Datasets -
                                                                Page  1  of  1
C Dataset Type T Object Dataset Name
- ------------ - -----------------------------------------------------------
_ AS Src & Ld  S  3ASB  RD.PAC200.DEV.ASM.SOURCE
_ AS Src & Ld  L  3ASB  RD.PAC200.DEV.ASM.SOURCE
_ NAT Nuke     L  3NAT  RD.COMN.NAT227.USER.LOAD
_ Cobol Source S  3CLG  RD.PAC200.DEV.COBOL.SOURCE
_ Job Cntl Lan S  3JCL  RD.PAC200.DEV.JCL.SOURCE











Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                   Canc
```

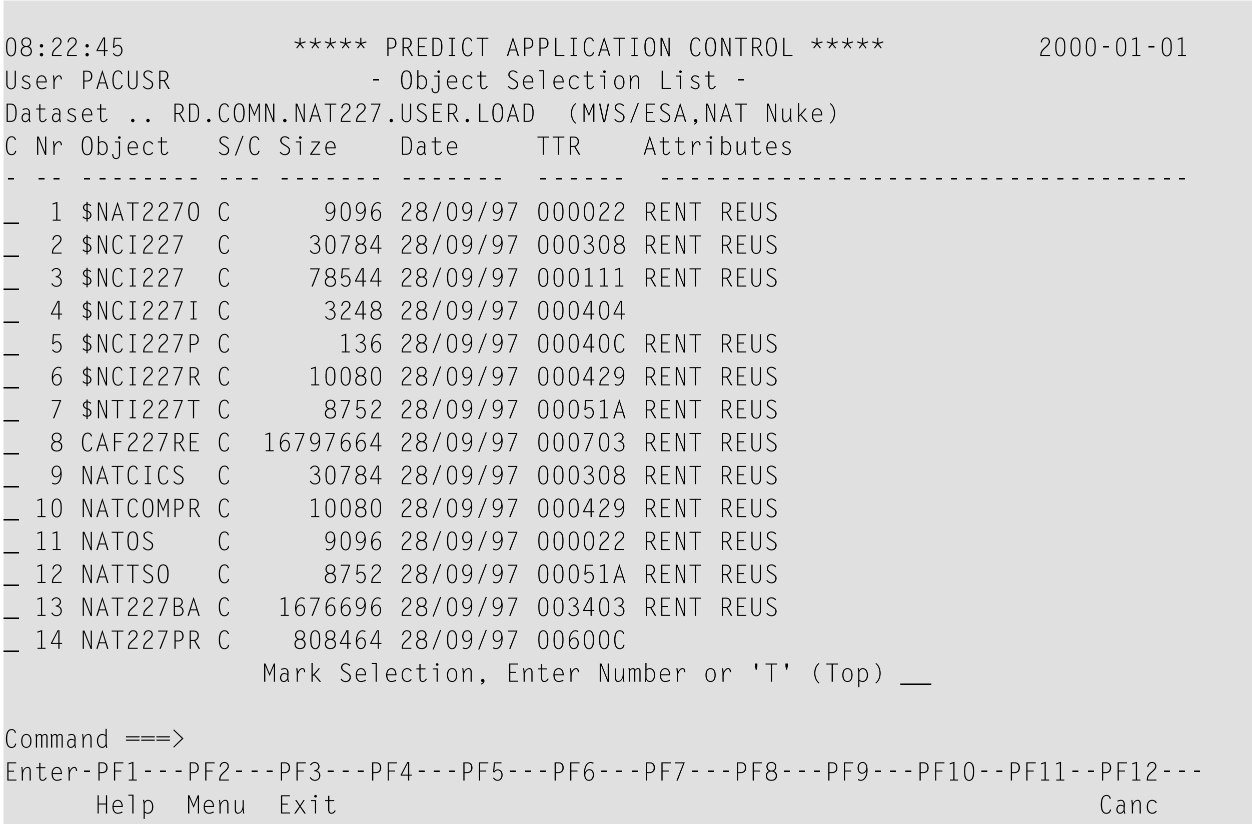
This screen displays a list of all datasets defined to the application that satisfy the selection criteria.

Column	**Description**
C	Input field for selecting a dataset with X.
Dataset Type	The type of foreign objects included in the dataset.
T	The type of dataset: L (load; that is, compiled) or S (source).
Object	The foreign object type code; all codes begin with `3'.
Dataset Name	The name of the dataset containing the foreign objects.

Select the dataset(s) that contain the objects to be included in the migration list by marking the dataset(s) with X in the "C" column.

If you mark more than one dataset, the resulting object selection list for each dataset you selected is displayed one after the other.

The Object Selection List screen appears:



```
08:22:45           ***** PREDICT APPLICATION CONTROL *****         2000-01-01
User PACUSR             - Object Selection List -
Dataset .. RD.COMN.NAT227.USER.LOAD  (MVS/ESA,NAT Nuke)
C Nr Object   S/C Size    Date     TTR    Attributes
- -- -------- --- ------- -------  ------  -----------------------------------
_  1 $NAT2270 C      9096 28/09/97 000022 RENT REUS
_  2 $NCI227  C     30784 28/09/97 000308 RENT REUS
_  3 $NCI227  C     78544 28/09/97 000111 RENT REUS
_  4 $NCI227I C      3248 28/09/97 000404
_  5 $NCI227P C       136 28/09/97 00040C RENT REUS
_  6 $NCI227R C     10080 28/09/97 000429 RENT REUS
_  7 $NTI227T C      8752 28/09/97 00051A RENT REUS
_  8 CAF227RE C  16797664 28/09/97 000703 RENT REUS
_  9 NATCICS  C     30784 28/09/97 000308 RENT REUS
_ 10 NATCOMPR C     10080 28/09/97 000429 RENT REUS
_ 11 NATOS    C      9096 28/09/97 000022 RENT REUS
_ 12 NATTSO   C      8752 28/09/97 00051A RENT REUS
_ 13 NAT227BA C   1676696 28/09/97 003403 RENT REUS
_ 14 NAT227PR C    808464 28/09/97 00600C
                 Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                  Canc
```

The information displayed on the Object Selection List screen is unique to the dataset you selected. This example screen displays the objects for an MVS/ESA Natural nucleus dataset as indicated in the Dataset field above the table on the screen.

Column	**Description**
C	Input field for selecting objects with X.
Nr	Number assigned the the entry for this particular screen.
Object	Name of the object within the specified dataset.
S/C	Indicates whether the object is saved (S) or cataloged (C).
Size	The size of the object in bytes.

The date listed is simply for documentation purposes and has no significance within PAC. The TTR field displays the address offset in the directory; and the Attributes field displays site-specific attributes of the object.

Select the objects to be included in the migration list by marking them with X in the "C" column.

Foreign objects cannot be expanded. However, Natural objects can be expanded to include foreign objects as subordinates.

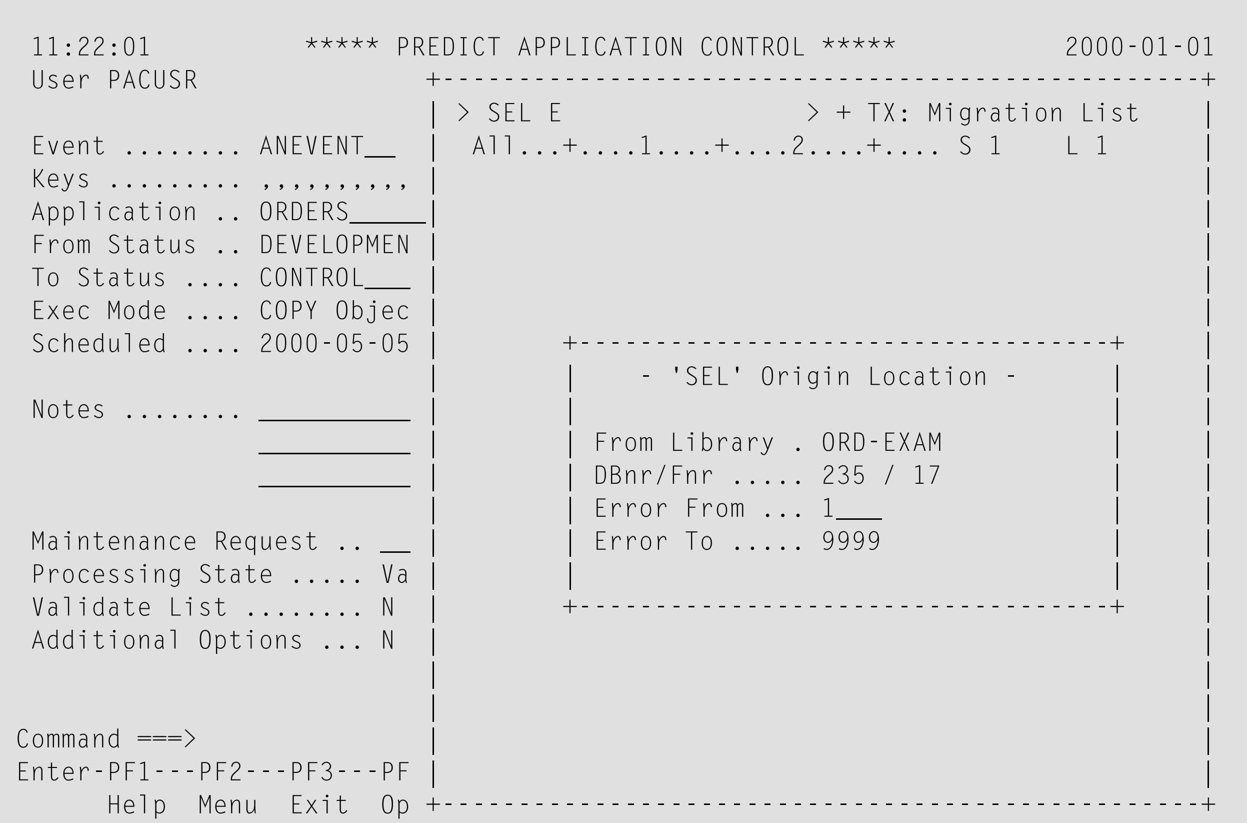
The Object List Editor reappears listing the objects you selected. PAC automatically identifies the foreign object by affixing a 3 to the foreign object type code; for example, COBPGM,3COB.

User Error Message Objects

Note: User error message objects cannot be included in a migration list with other object types.

To select user error message objects for a list, enter SEL E on the command line of the Migration List Editor window.

The `SEL' Origin Location window for user error messages appears:

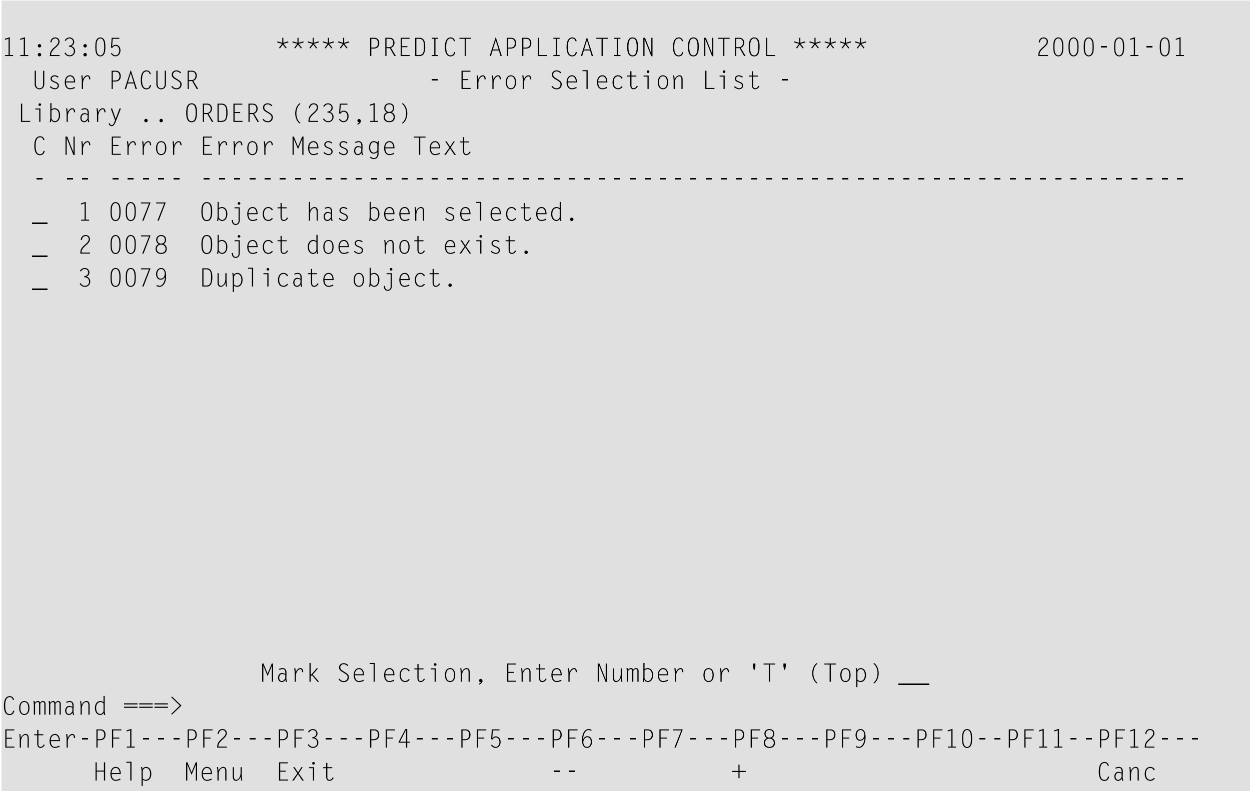


```
 11:22:01          ***** PREDICT APPLICATION CONTROL *****          2000-01-01
 User PACUSR                +---------------------------------------------------+
                            | > SEL E               > + TX: Migration List    |
 Event ........ ANEVENT__   |  All...+....1....+....2....+.... S 1    L 1       |
 Keys ......... ,,,,,,,,,,  |                                                   |
 Application .. ORDERS_____|                                                   |
 From Status .. DEVELOPMEN  |                                                   |
 To Status .... CONTROL___  |                                                   |
 Exec Mode .... COPY Objec  |                                                   |
 Scheduled .... 2000-05-05  |        +-----------------------------------+     |
                            |        |    - 'SEL' Origin Location -      |     |
 Notes ........ __________  |        |                                   |     |
                __________  |        | From Library . ORD-EXAM           |     |
                __________  |        | DBnr/Fnr ..... 235 / 17           |     |
                            |        | Error From ... 1___               |     |
 Maintenance Request .. __  |        | Error To ..... 9999               |     |
 Processing State ..... Va  |        |                                   |     |
 Validate List ........ N   |        +-----------------------------------+     |
 Additional Options ... N   |                                                   |
                            |                                                   |
                            |                                                   |
Command ===>                |                                                   |
Enter-PF1---PF2---PF3---PF  |                                                   |
      Help  Menu  Exit  Op  +---------------------------------------------------+
```

The `SEL' Origin Location window for user error messages displays the library name, database, and file number where the application origin status is located, as well as the Error From/Error To fields allowing you to specify an error message number or a range of numbers to be selected.

Enter the user error message number (for example, 0078) in the Error From field, or a range in the Error From/Error To fields. Or you can leave these fields blank.

The Error Selection List screen appears:



```
11:23:05         ***** PREDICT APPLICATION CONTROL *****          2000-01-01
  User PACUSR               - Error Selection List -
 Library .. ORDERS (235,18)
  C Nr Error Error Message Text
  - -- ----- -----------------------------------------------------------------
  _  1 0077  Object has been selected.
  _  2 0078  Object does not exist.
  _  3 0079  Duplicate object.















                 Mark Selection, Enter Number or 'T' (Top) __
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                        Canc
```

This screen displays a list of all user error messages that satisfy the selection criteria. The library name, database, and file number where the objects listed are physically located in development or maintenance is displayed above the table on the screen.

Column	**Description**
C	Input field for entering object expand options.
Nr	Number identifying the list item on this particular screen.
Error	The user error message number.
Error Message Text	Text of the user error message.

Select the objects you want to include by marking them in the "C" column; or enter the screen number (from the "Nr" column) for an individual error message object in the Mark Selection... field.

The following expand options can be used when migrating user error messages into PAC:

Option	**Include in the migration list:**
S or X	Marked object only.
U	Marked object and objects used by the marked object.

Sorting the List

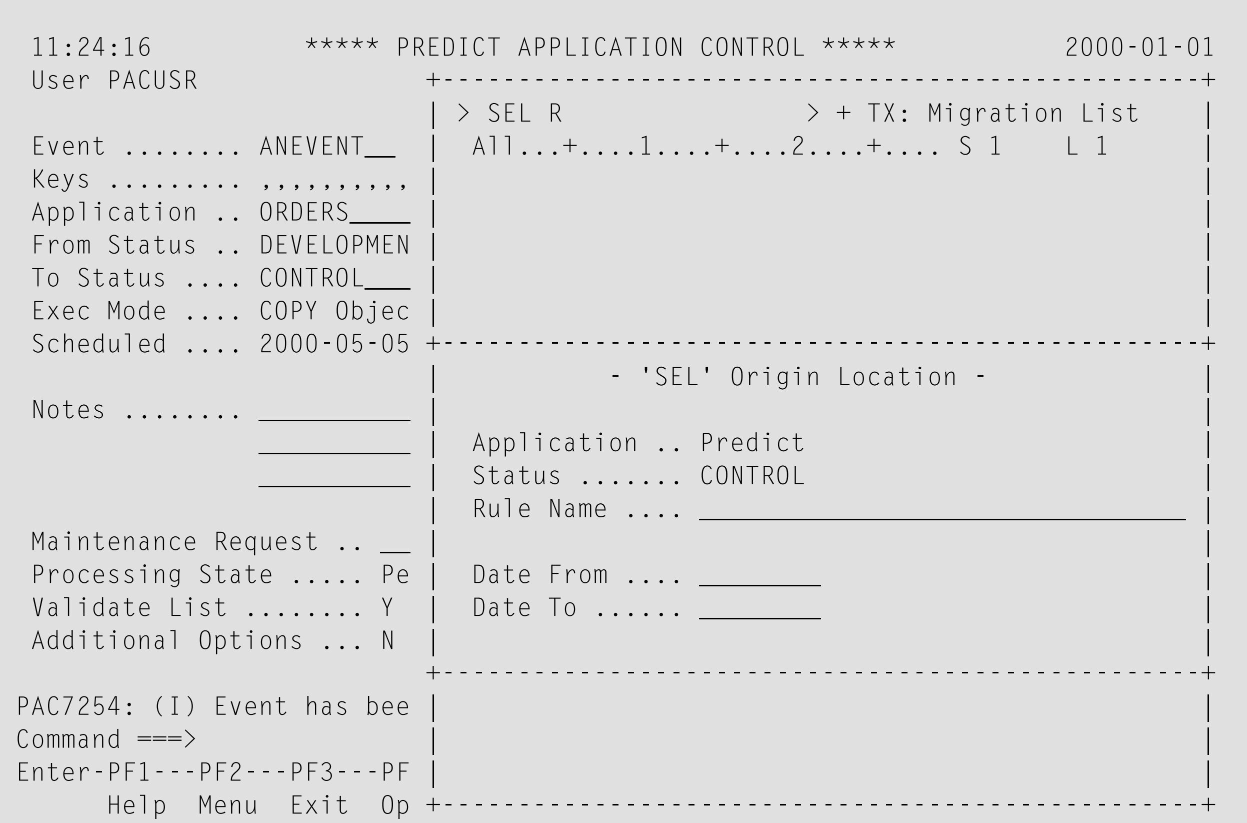
After you have made your selections on the above screen, PAC sorts the migration list. For migrations into PAC, the list is sorted in ascending sequence as illustrated in the following example:

1. E0001, E0002, E0003, E0006, E0007, and E0008 are selected on the Error Selection List screen.
2. When you press ENTER, you have the opportunity to select additional objects.
3. You select E0004 and E0005 and press ENTER again.
4. PAC sorts the list and the objects are selected as follows:
   E0001-E0005
   E0006-E0008

Rules and Views

To select rules or views for a list, enter SEL R or SEL V, respectively, on the command line of the Migration List Editor window.

The `SEL' Origin Location window appears for rules or views as specified. The window shown in the following example is for rules:

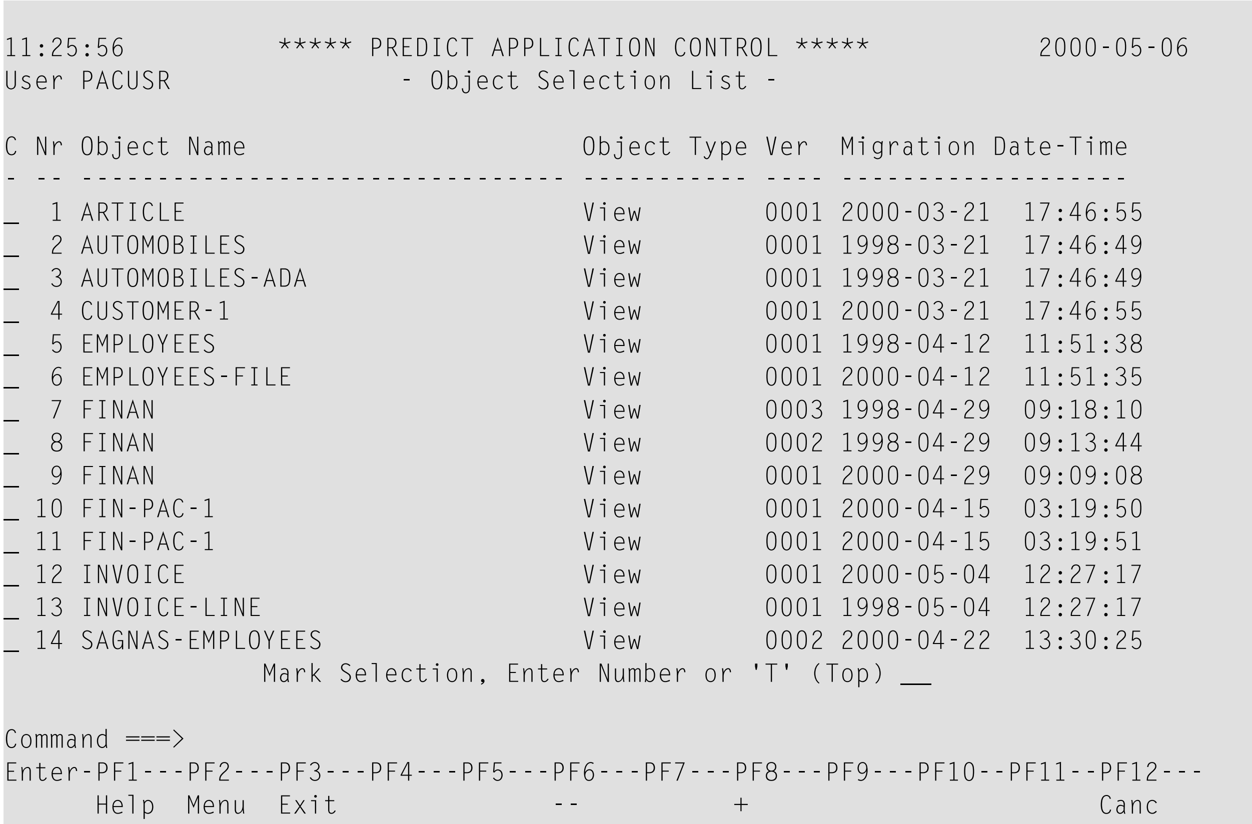


```
 11:24:16         ***** PREDICT APPLICATION CONTROL *****         2000-01-01
 User PACUSR              +---------------------------------------------------+
                          | > SEL R                  > + TX: Migration List   |
 Event ........ ANEVENT__ |  All...+....1....+....2....+.... S 1    L 1       |
 Keys ......... ,,,,,,,,, |                                                   |
 Application .. ORDERS____|                                                   |
 From Status .. DEVELOPMEN|                                                   |
 To Status .... CONTROL___|                                                   |
 Exec Mode .... COPY Objec|                                                   |
 Scheduled .... 2000-05-05+---------------------------------------------------+
                          |           - 'SEL' Origin Location -               |
 Notes ........ __________|                                                   |
                __________|  Application .. Predict                           |
                __________|  Status ....... CONTROL                           |
                          |  Rule Name .... ________________________________   |
 Maintenance Request .. __|                                                   |
 Processing State ..... Pe|  Date From .... ________                          |
 Validate List ........ Y |  Date To ...... ________                          |
 Additional Options ... N |                                                   |
                          +---------------------------------------------------+
PAC7254: (I) Event has bee|                                                   |
Command ===>              |                                                   |
Enter-PF1---PF2---PF3---PF|                                                   |
      Help  Menu  Exit  Op+---------------------------------------------------+
```

The 'SEL' Origin Location window for rules displays the application name Predict and status name CONTROL, as well as the Rule Name, Date From/Date To fields in which you may enter your selection criteria. The window for views is identical except that a View Name field replaces the Rule Name field.

Enter the rule or view name or range notation to limit the selection list. You may optionally specify a migration date in the Date From field or a range in the Date From/Date To fields in the format yymmdd. Alternatively, leave these fields blank to display a list of all rules or views.

The Object Selection List screen for rules or views appears displaying a list of all objects that satisfy the selection criteria. The example screen shown below is for views:



```
11:25:56          ***** PREDICT APPLICATION CONTROL *****           2000-05-06
User PACUSR                - Object Selection List -

C Nr Object Name                       Object Type Ver  Migration Date-Time
- -- -------------------------------- ----------- ---- -------------------
_  1 ARTICLE                           View        0001 2000-03-21  17:46:55
_  2 AUTOMOBILES                       View        0001 1998-03-21  17:46:49
_  3 AUTOMOBILES-ADA                   View        0001 1998-03-21  17:46:49
_  4 CUSTOMER-1                        View        0001 2000-03-21  17:46:55
_  5 EMPLOYEES                         View        0001 1998-04-12  11:51:38
_  6 EMPLOYEES-FILE                    View        0001 2000-04-12  11:51:35
_  7 FINAN                             View        0003 1998-04-29  09:18:10
_  8 FINAN                             View        0002 1998-04-29  09:13:44
_  9 FINAN                             View        0001 2000-04-29  09:09:08
_ 10 FIN-PAC-1                         View        0001 2000-04-15  03:19:50
_ 11 FIN-PAC-1                         View        0001 2000-04-15  03:19:51
_ 12 INVOICE                           View        0001 2000-05-04  12:27:17
_ 13 INVOICE-LINE                      View        0001 1998-05-04  12:27:17
_ 14 SAGNAS-EMPLOYEES                  View        0002 2000-04-22  13:30:25
                 Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Column	Description
C	Input field for entering object expand options.
Nr	Number identifying the list item on this particular screen.
Object Name	Name of the rule or view.
Object Type	Type of the object: rule or view
Ver(sion)	The version number assigned to the object if it has previously entered the PAC controlled environment.
Migration Date-Time	Date and time the object was migrated into PAC.

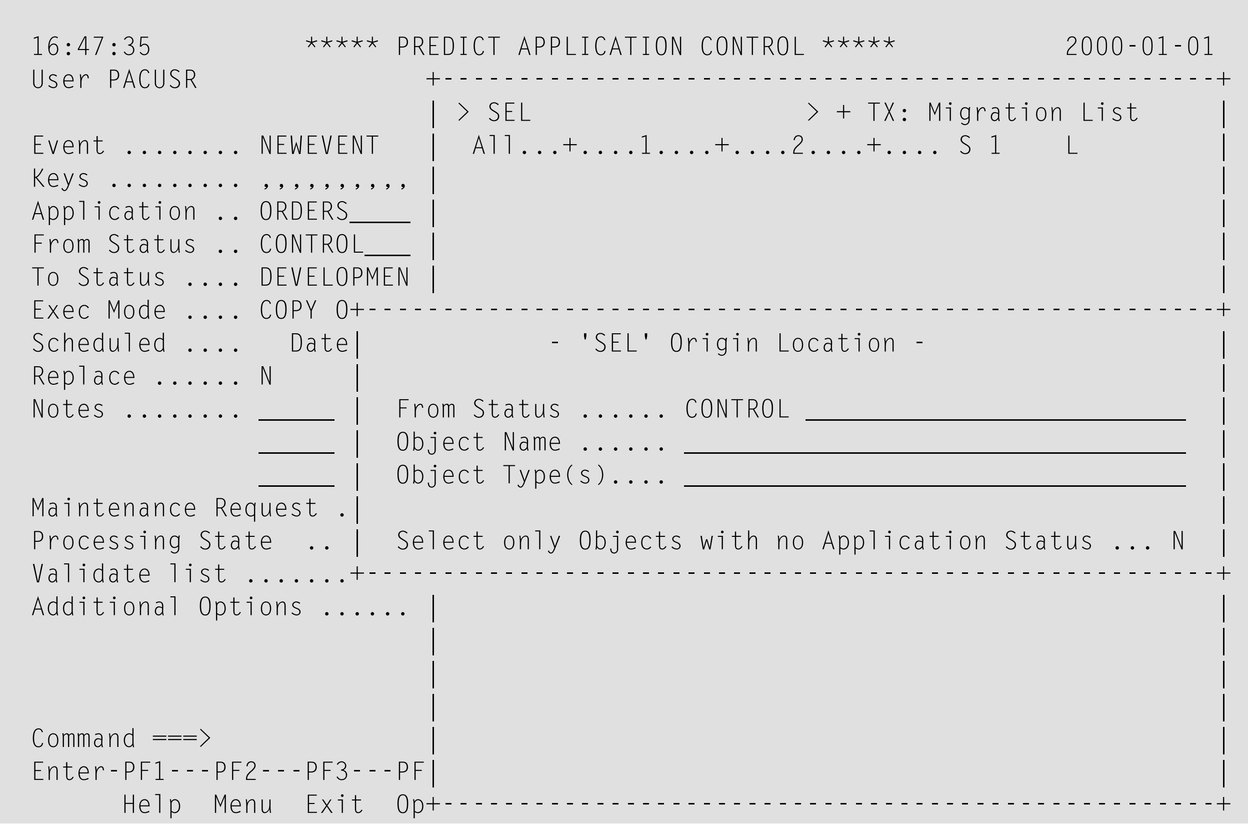
Select the objects you want to include by marking them in the "C" column; or enter the screen number (from the "Nr" column) for an individual object in the Mark Selection... field.

The following expand options are valid when migrating rules and views into PAC:

Option	**Include in the migration list:**
S or X	marked object only.
U	marked object and objects used by the marked object. This option uses cross-reference (Xref) data from Predict for migrations into PAC.

Other Migrations

The migration lists created using the procedure in this section apply to migrations from any origin status other than development, maintenance, or incorporation.



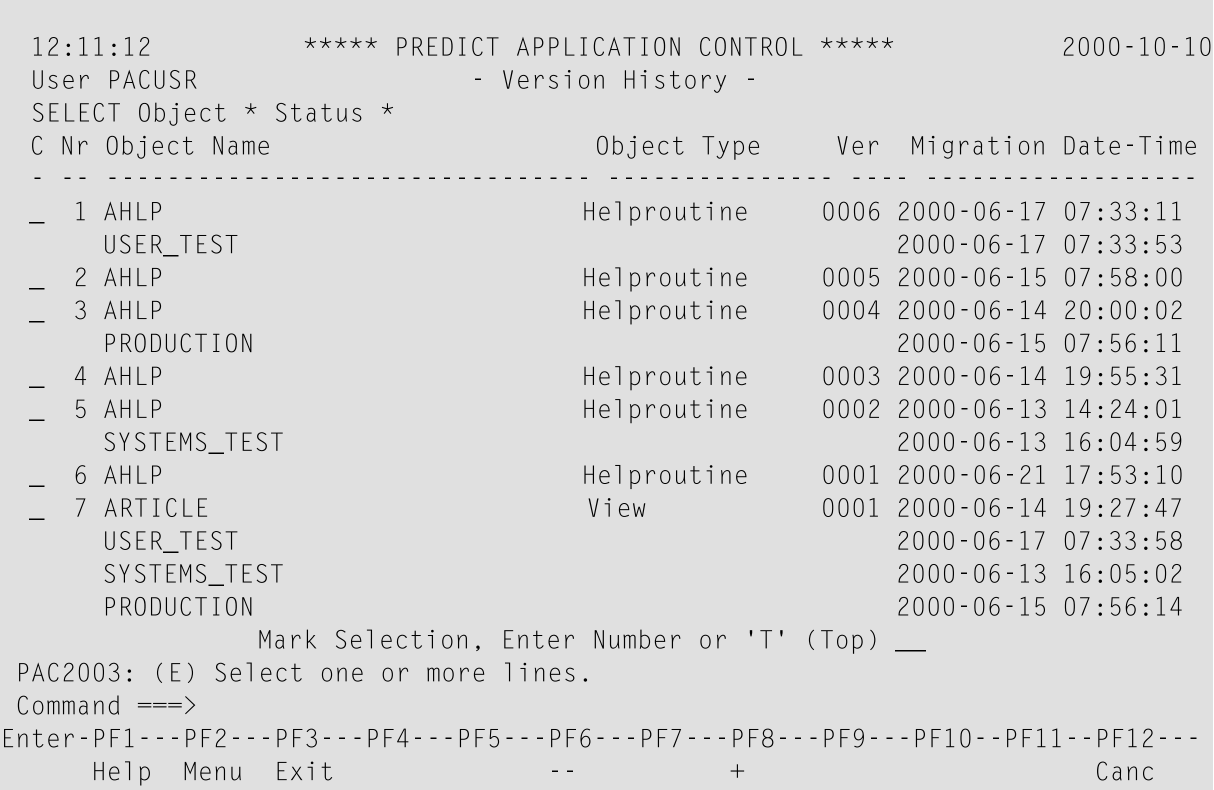
```
16:47:35          ***** PREDICT APPLICATION CONTROL *****            2000-01-01
User PACUSR               +----------------------------------------------------+
                          | > SEL                  > + TX: Migration List      |
Event ........ NEWEVENT   |  All...+....1....+....2....+.... S 1    L          |
Keys ......... ,,,,,,,,,, |                                                    |
Application .. ORDERS____ |                                                    |
From Status .. CONTROL___ |                                                    |
To Status .... DEVELOPMEN |                                                    |
Exec Mode .... COPY O+---------------------------------------------------------+
Scheduled ....   Date|            - 'SEL' Origin Location -                    |
Replace ...... N     |                                                         |
Notes ........ _____ |  From Status ...... CONTROL __________________________  |
               _____ |  Object Name ...... __________________________________  |
               _____ |  Object Type(s).... __________________________________  |
Maintenance Request .|                                                         |
Processing State  .. |  Select only Objects with no Application Status ... N  |
Validate list .......+---------------------------------------------------------+
Additional Options ...... |                                                    |
                          |                                                    |
                          |                                                    |
                          |                                                    |
Command ===>              |                                                    |
Enter-PF1---PF2---PF3---PF|                                                    |
      Help  Menu  Exit  Op+----------------------------------------------------+
```

1. Enter SEL on the command line of the Object List Editor window. The `SEL' Origin Location window appears.

   This window displays the status from which the objects are to be selected; that is, the From Status specified on the Add/Modify Event screen.
2. Enter the object name and/or object type in the relevant fields, or enter range notation to limit the list.

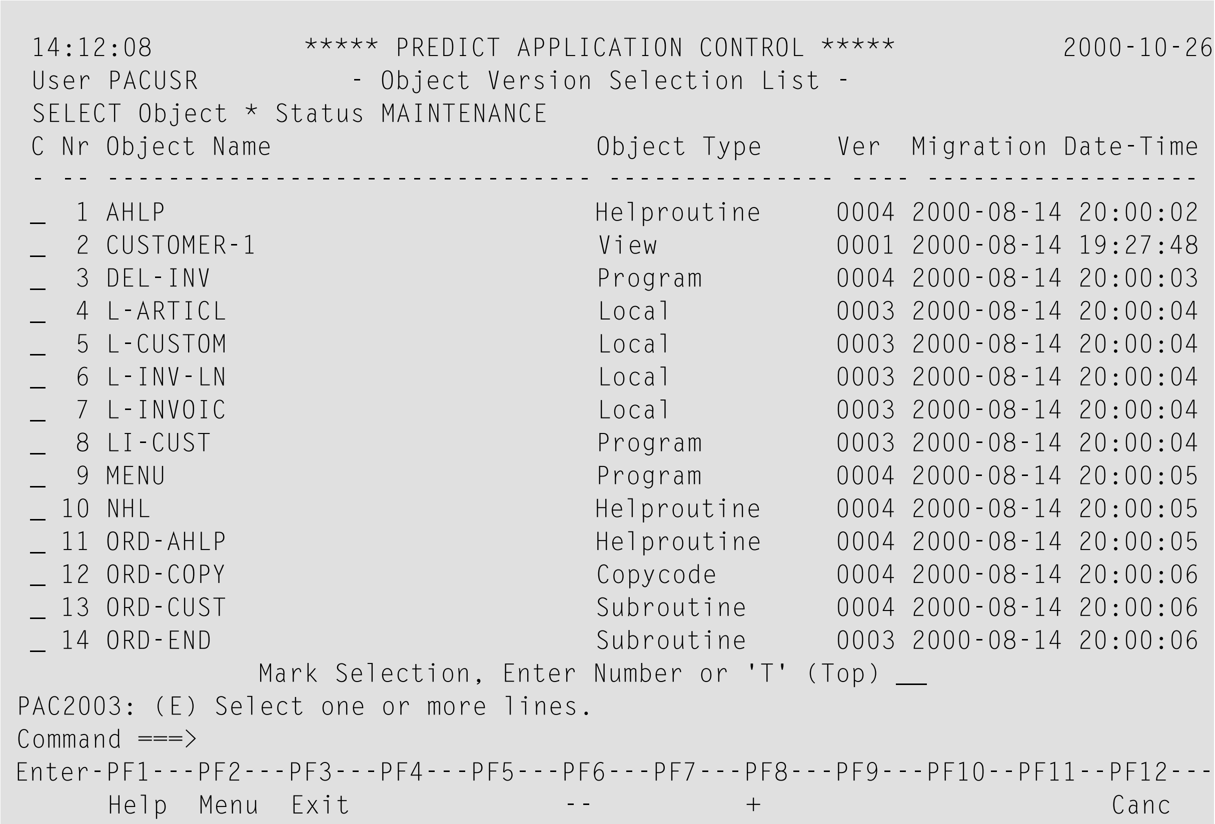
If the From Status (origin) is "CONTROL", you can specify whether you want the list to contain objects that exist in Control and other statuses as well (N, the default) or objects that exist only in the Control status.

3. If you want to limit the list to objects that exist only in Control, overtype the default with Y in the "Select only objects with no application status" field. For the origin status Control, the Version History screen appears displaying a list of object versions in the Control status and any other statuses current for the application.



```
  12:11:12          ***** PREDICT APPLICATION CONTROL *****           2000-10-10
  User PACUSR                     - Version History -
  SELECT Object * Status *
  C Nr Object Name                     Object Type     Ver  Migration Date-Time
  - -- -------------------------------- -------------- ---- ------------------
  _  1 AHLP                           Helproutine     0006 2000-06-17 07:33:11
       USER_TEST                                           2000-06-17 07:33:53
  _  2 AHLP                           Helproutine     0005 2000-06-15 07:58:00
  _  3 AHLP                           Helproutine     0004 2000-06-14 20:00:02
       PRODUCTION                                          2000-06-15 07:56:11
  _  4 AHLP                           Helproutine     0003 2000-06-14 19:55:31
  _  5 AHLP                           Helproutine     0002 2000-06-13 14:24:01
       SYSTEMS_TEST                                        2000-06-13 16:04:59
  _  6 AHLP                           Helproutine     0001 2000-06-21 17:53:10
  _  7 ARTICLE                        View            0001 2000-06-14 19:27:47
       USER_TEST                                           2000-06-17 07:33:58
       SYSTEMS_TEST                                        2000-06-13 16:05:02
       PRODUCTION                                          2000-06-15 07:56:14
                Mark Selection, Enter Number or 'T' (Top) __
 PAC2003: (E) Select one or more lines.
 Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
     Help  Menu  Exit              --          +                        Canc
```

For an origin status other than Control, the following Object Version Selection List screen appears displaying a list of objects currently in the specified origin status:



```
 14:12:08          ***** PREDICT APPLICATION CONTROL *****           2000-10-26
 User PACUSR          - Object Version Selection List -
 SELECT Object * Status MAINTENANCE
 C Nr Object Name                      Object Type     Ver  Migration Date-Time
 - -- -------------------------------- -------------- ---- -------------------
 _  1 AHLP                             Helproutine     0004 2000-08-14 20:00:02
 _  2 CUSTOMER-1                       View            0001 2000-08-14 19:27:48
 _  3 DEL-INV                          Program         0004 2000-08-14 20:00:03
 _  4 L-ARTICL                         Local           0003 2000-08-14 20:00:04
 _  5 L-CUSTOM                         Local           0003 2000-08-14 20:00:04
 _  6 L-INV-LN                         Local           0003 2000-08-14 20:00:04
 _  7 L-INVOIC                         Local           0003 2000-08-14 20:00:04
 _  8 LI-CUST                          Program         0003 2000-08-14 20:00:04
 _  9 MENU                             Program         0004 2000-08-14 20:00:05
 _ 10 NHL                              Helproutine     0004 2000-08-14 20:00:05
 _ 11 ORD-AHLP                         Helproutine     0004 2000-08-14 20:00:05
 _ 12 ORD-COPY                         Copycode        0004 2000-08-14 20:00:06
 _ 13 ORD-CUST                         Subroutine      0004 2000-08-14 20:00:06
 _ 14 ORD-END                          Subroutine      0003 2000-08-14 20:00:06
                Mark Selection, Enter Number or 'T' (Top) __
PAC2003: (E) Select one or more lines.
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Column	Description
C	Input field for entering object expand options.
Nr	Number identifying the list item on this particular screen.
Object Name	Name of the object and other statuses in which the object version also exists.
Object Type	Type of the object.
Ver(sion)	The version number assigned to the object when it entered the PAC controlled environment.
Migration Date-Time	Date and time the object was migrated into PAC.

The specified origin status is displayed on the line below the User field.

4. Select the objects you want to include by marking them in the "C" column; or enter the object number (from the "Nr" column) for an individual object in the Mark Selection... field.

All available expand options can be used for "other" migrations:

Option	Include in the migration list the marked object . . .
C	and subordinate objects; for compile time.
E	and both subordinate and referenced objects; for both compile time and runtime (expand options C+R).
R	and referenced objects; for runtime.

Option	**Include in the migration list the marked object . . .**
S or X	only.
U	and objects used by the marked object.

For "other" migrations, the expand options C, E, R, and U use cross-reference (Xref) data from PAC.

The Migration List Editor window now displays the objects you selected.

5. Enter SAVE on the editor command line to save the migration list.
6. Enter a period (.) on the editor command line to exit the Migration List Editor window.

If you attempt to exit the Migration List Editor before you save your modifications, a warning window appears requesting that you save or abandon changes, or return to the editor.

37 Using the EXP (Expand) Command

- Using EXP With Predict 420
- EXP Procedure 421
- Using EXP For Large Migrations 422

Note: A migration list is expanded automatically during migration if the Auto Expansion option is specified in the migration path definition.

You can expand an existing migration list using the EXP command. PAC processes each entry in the migration list in turn and, depending on the expand option selected, retrieves its subcomponents and adds them to the source area.

If the EXP command is then reissued, these subcomponents are expanded in turn, the list is sorted, and all duplicate objects are eliminated.

By default, the expand process expands only one level of subordinate and referenced objects. To expand more than one level (that is, to implement a recursive expand), use Applymod 13. To expand maps for multiple languages, use Applymod 9. Applymods are documented in the PAC Reference documentation.

Foreign objects cannot be expanded. Only Natural objects can be expanded to include subordinate foreign objects that are used by that Natural object.

When migrating objects into PAC, the expand function is valid only if cross-reference data exists for the object as specified by the Predict location for the application status.

This chapter covers the following topics:

- **Using EXP With Predict**
- **EXP Procedure**
- **Using EXP For Large Migrations**

Using EXP With Predict

With Predict, the EXP command can be used to include in the migration list all files linked to a database. A database will be expanded to include its files, and the files will be expanded to include the userviews.

The EXP field is valid for databases and files when they are entering PAC from development or maintenance.

EXP Procedure

1. To expand a migration list once it has been created, enter the EXP (Expand) command on the Migration List Editor command line.

   The Expand command has the format

   ```
   EXP [option]
   ```

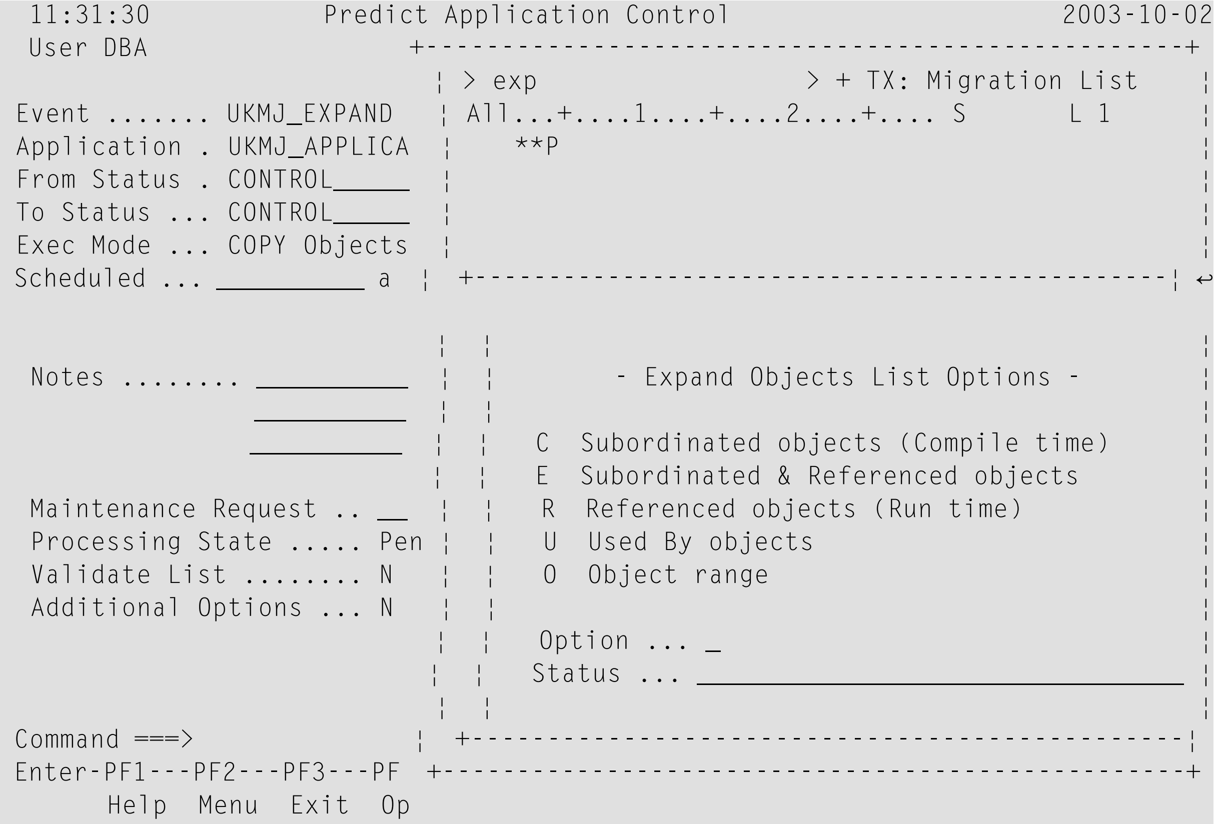
   where option is C, E, R, or U as explained in the following table:

Option	**Include in the migration list . . .**
EXP C	subordinate objects; for compile time.
EXP E	subordinate and referenced objects (options C+R); for compile time and runtime.
EXP R	referenced objects; for runtime.
EXP U	objects used by other objects.
EXP O	objects range.

   The expand options C, E, R, and U use cross-reference (Xref) data

   - from Predict for migrations into PAC; and
   - from PAC for all other migrations.

   If you do not specify an expand option, the Expand Objects List Options window appears:



```
 11:31:30          Predict Application Control                     2003-10-02
 User DBA                +-----------------------------------------------+
                         ¦ > exp                 > + TX: Migration List   ¦
Event ....... UKMJ_EXPAND ¦ All...+....1....+....2....+.... S       L 1    ¦
Application . UKMJ_APPLICA ¦    **P                                        ¦
From Status . CONTROL_____ ¦                                               ¦
To Status ... CONTROL_____ ¦                                               ¦
Exec Mode ... COPY Objects ¦                                               ¦
Scheduled ... __________ a ¦ +-------------------------------------------¦ ↩

                          ¦  ¦                                             ¦
 Notes ........ __________ ¦  ¦       - Expand Objects List Options -       ¦
                __________ ¦  ¦                                             ¦
                __________ ¦  ¦   C  Subordinated objects (Compile time)    ¦
                           ¦  ¦   E  Subordinated & Referenced objects      ¦
 Maintenance Request .. __ ¦  ¦    R  Referenced objects (Run time)         ¦
 Processing State ..... Pen ¦  ¦    U  Used By objects                      ¦
 Validate List ........ N  ¦  ¦    O  Object range                          ¦
 Additional Options ... N  ¦  ¦                                             ¦
                           ¦  ¦   Option ... _                              ¦
                           ¦  ¦   Status ... ______________________________ ¦
                           ¦  ¦                                             ¦
Command ===>              ¦  +-------------------------------------------¦
Enter-PF1---PF2---PF3---PF  +---------------------------------------------+
      Help  Menu  Exit  Op
```

This window lists the expand options and prompts you to enter your choice in the Option field. As an alternative, the Status field is provided. If you identify a status here, all subordinates that exist in that status are migrated (or "rolled in" from development or maintenance).

2. Enter an option or the name of a status.
3. Enter SAVE on the editor command line to save the migration list.
4. Press ENTER or enter a period (.) on the editor command line to exit the Migration List Editor window.

If you attempt to exit the Migration List Editor before you save your modifications, a warning window appears requesting that you save or abandon changes, or return to the editor.

Using EXP For Large Migrations

When PAC processes a migration event, the migration list is placed in the Natural extended buffer (ESIZE), which may impose limits on the number of objects that may be processed by a single migration event. If this number is exceeded, error NAT0886 is received.

For large migrations (of several thousands of individually specified objects), use one of the following methods to ensure that the number of objects in the migration list does not exceed the maximum size of the ESIZE buffer:

1. Set your ESIZE to 128 KB, or greater if necessary;
2. Use asterisk (*) and/or range notation to limit the number of individual entries in the migration list, but still include all necessary objects.

Large numbers of objects may be processed using range notation because the specified ranges of objects are not expanded (with ESIZE) unless the expand options are used.

38

Using the IMP (Import) Command

- IMP Procedure 426

For events with status External you can import a list of objects (this can also be references to objects such as URLs or path names) from a workfile into the migration list using the IMP command with Entire Connection. PAC processes each entry in the migration list in turn and retrieves its subcomponents and adds them to the source area.

IMP Procedure

1. To import a migration list, enter the IMP (Import) command on the Migration List Editor command line.

   A new window appears where you can select the appropriate file from your environment.
2. Select the desired file and choose OK.
3. The window is closed automatically.
4. Press ENTER or enter a period (.) on the editor command line to exit the Migration List Editor window.

If you attempt to exit the Migration List Editor before you save your modifications, a warning window appears requesting that you save or abandon changes, or return to the editor.

39 Validating a Migration List

- Correcting Errors in the Migration List 428

The migration list must be validated before the migration event may be authorized. Validation occurs after the migration event has been defined and the list of objects has been selected.

Once the migration list has been created, it is validated immediately unless you specified N in the Validate List field on the Add Event screen. In that case, access the Modify Event screen for the event when you are ready to validate the migration list and overtype the N in the Validate List field with Y.

In either case, the validation is performed for the current status of the objects in the list; that is, the precise definition of the object specified in the migration list must exist at the time the validation check is performed.

Note: Validation of migration lists of events with source status External takes place during event processing. Automatic validation during authorization will be suppressed (for performance reasons). By default, the Validate List option is set to N for such events and can not be set to Y.

This chapter covers the following topic:

- Correcting Errors in the Migration List

Correcting Errors in the Migration List

If an entry in the migration list fails the validation check, a window is displayed so that you can modify the entry.

Review the entry and determine the exact cause of the error. Use the following table as a guide to problem resolution:

Error	Questions
Object name	Is the name spelled correctly?
Object type	Is the type valid? Is the type consistent with the object name?
Range notation	Is the range notation for the object name valid for the migration path? For archiving or retiring, is the range notation valid for the migration type?
Version number	Is the number within the acceptable PAC range? For a rule or view, was the version registered to the application in a previous migration?
Status name	Is the name valid? Does the object currently exist in the specified status?
Replace option object list Object list replace option Replace option	If set to N (no) in a migration to development, does the object already exist in development?

Error	Questions
Rules and views	For verification rules or userviews, was the Predict migration done? For rules or views, was the object registered to the application in a previous migration?
Number of entries	Is there more than the one allowed entry in the migration list for incorporation or migration from development that includes input from a work file?

If you are unable to resolve the error, either press PF3 to exit the validation check, or comment out the entry by placing "*" or "**" in the first two positions of that entry.

PAC then treats this entry as a comment.

40 Displaying a Migration List

To display the list of objects included in a migration event, enter Code L (Display Migration List of Event) and the name of the event on the Migration Event Menu.

The Migration List window appears displaying the list of objects and object types included in the migration list of the event:

```
   12:25:10          ***** PREDICT APPLICATION CONTROL *****           2000-12-02
 User VMU                  +--------------------------------------------------+
                           ! >                      > + TX: Migration List    !
   Code  Sub-Function      !  Top...+....1....+....2....+.... S 20   L 1      !
   ----  ----------------- !    NATPNIP,3SRC                                  !
     A   Add an Event      !    NATPM,3SRC                                    !
     C   Copy an Event     !    NATOS,3SRC                                    !
     D   Display an Event  !    NATGBPTX,3SRC                                 !
     H   Hardcopy an Event !    NATEDPRM,3SRC                                 !
     L   Display Migration !    NATCONFG,3SRC                                 !
     M   Modify an Event   !    NAMXNOD,3SRC                                  !
   ----  ----------------- !    NAMVIEWP,3SRC                                 !
                           !    NAMVER,3SRC                                   !
               Code ...... !    NAMSTUB,3SRC                                  !
               Event ..... !    NAMSTRT,3SRC                                  !
               New Event . !    NAMSTFE,3SRC                                  !
        Selection criteria !    NAMSTCB,3SRC                                  !
        User-Id .... _____ !    NAMSIR,3SRC                                   !
        State ...... __    !    NAMSFT,3SRC                                   !
        Date from .. _____ !    NAMSEC,3SRC                                   !
PAC2007: (I) No Event sele !    NAMSCTAB,3SRC                                 !
Command ===>               !    NAMRSRQ,3SRC                                  !
Enter-PF1---PF2---PF3---PF !                                                  !
      Help  Menu  Exit     +--------------------------------------------------+
```

If you need to modify the list, you must use the Modify Event function.

To exit the Migration List window, enter a period (.) at the cursor position.

41 Maintenance Requests

- Generating Maintenance Requests 434
- Accessing the Maintenance Request Sub-Functions 435
- Adding a Maintenance Request 436
- Selecting a Maintenance Request 439
- Modifying/Displaying a Maintenance Request 441
- Copying a Maintenance Request 443
- Purging a Maintenance Request 443

Maintenance requests track problems within the PAC system and extend the usability of external problem-tracking systems:

- User exits can be used to establish user-defined rules and standards.
- Application Program Interfaces (APIs) can be used to reflect problems from external problem-tracking systems in PAC.
- The user who identified a problem in an external problem-tracking system can be reflected in the PAC maintenance request.
- A list of all objects required to resolve the problem can be obtained.
- A list of the objects involved in the generated maintenance is provided.

Maintenance requests can be defined when maintenance is required for an application. The information returned by the maintenance request can be maintained entirely by the user.

Once defined, a maintenance request can be assigned to a migration event. This enhances check-out/check-in tracking, and allows the user to review all events, created or completed, for a particular request.

For detailed information about maintenance requests, refer to **Maintaining Natural Objects in PAC**.

This chapter covers the following topics:

Generating Maintenance Requests

You may generate unique maintenance requests using the "@GEN" string in the maintenance request name. See page **Generating a Name Automatically**.

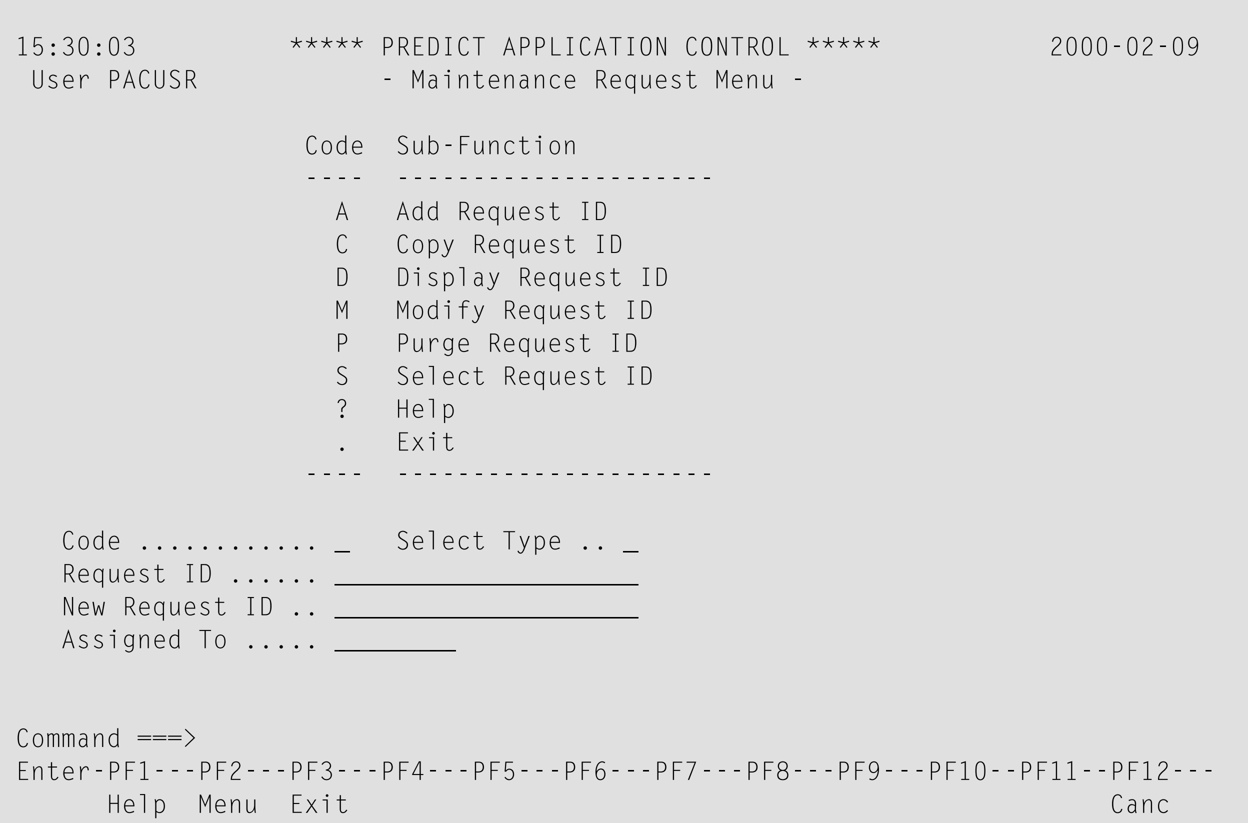
If a duplicate number is encountered, PAC issues an error and a request that the user enter a unique value for the maintenance request name.

The maintenance request number is maintained as a system default. The generated number may be reset or changed at any time by the PAC administrator.

Accessing the Maintenance Request Sub-Functions

From the PAC Main Menu, enter Code M (Maintenance Requests).

The menu that appears depends on your user profile. The Maintenance Request Menu, which combines both reporting and maintenance functions, is used for discussions in this section:



```
15:30:03          ***** PREDICT APPLICATION CONTROL *****          2000-02-09
 User PACUSR            - Maintenance Request Menu -

                   Code  Sub-Function
                   ----  ---------------------
                     A   Add Request ID
                     C   Copy Request ID
                     D   Display Request ID
                     M   Modify Request ID
                     P   Purge Request ID
                     S   Select Request ID
                     ?   Help
                     .   Exit
                   ----  ---------------------

   Code ............ _   Select Type .. _
   Request ID ...... ____________________
   New Request ID .. ____________________
   Assigned To ..... ________


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                    Canc
```

Note: All of the sub-functions on this screen except Add may be processed directly from the Maintenance Request Selection List that is accessed using the Select Request ID sub-function.

Select Type Field

When you are selecting maintenance requests from a list, this field allows you to identify how you want the maintenance requests to be listed:

L	by maintenance request ID: to access a list of maintenance requests displayed alphabetically by maintenance request name. (ID).
S	by status, priority, and maintenance request ID: to access a list of maintenance requests displayed by status, priority, and maintenance request ID. The values and priority sequences are determined in the table definitions by the PAC administrator.
U	by assigned user ID: to access a list of maintenance requests displayed alphabetically by the ID of the user to whom they are assigned.

Request ID and New Request ID Fields

These fields are used to identify new and existing request IDs. The New Request ID field is used for the name of the event created when an existing event is copied.

Assigned To Field

The value in this field specifies the ID of the user to whom the maintenance request is assigned.

Adding a Maintenance Request

Note: Edit all other values on the Add Request screen before you access the Additional Options. Once you access Additional Options, all other fields on the screen are protected.

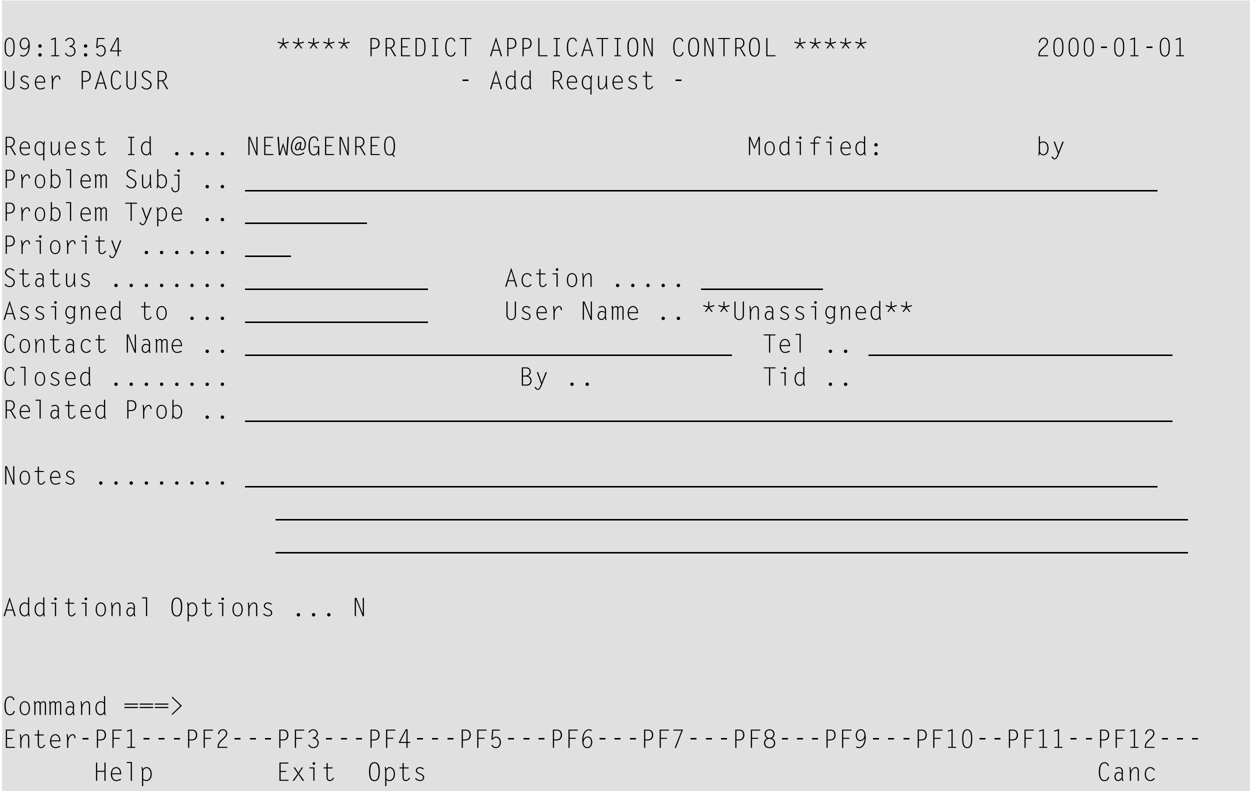
Step 1. Accessing the Add Request Screen

From the Maintenance Request Menu, enter Code A and a unique maintenance request name in one of the following ways:

- Enter a unique name.
  The name may be numeric and/or alphabetic and up to 20 characters in length. Embedded blanks are allowed, but are automatically changed to the underscore ( ) character. If a duplicate maintenance request ID is entered, an error message is displayed.
- Use the @GEN string in the name.
  The name must begin with an alphabetic character and may be up to 19 characters in length including the resolution of the @GEN string. Do not use all 20 characters of the Request ID field because the @GEN string will be expanded from 4 to 5 characters, which could jeopardize the uniqueness of the maintenance request ID. Embedded blanks are allowed, but will be translated automatically to the underscore (_) character.

Alternatively, enter ADD REQUEST on the command line. Refer to the PAC Reference documentation for the correct command syntax.

The Add Request screen is displayed:



```
09:13:54          ***** PREDICT APPLICATION CONTROL *****           2000-01-01
User PACUSR                        - Add Request -

Request Id .... NEW@GENREQ                      Modified:          by
Problem Subj .. ____________________________________________________________
Problem Type .. ________
Priority ...... ___
Status ........ ____________     Action ..... ________
Assigned to ... ____________     User Name .. **Unassigned**
Contact Name .. ________________________________  Tel .. ____________________
Closed ........                   By ..           Tid ..
Related Prob .. _____________________________________________________________

Notes ......... ____________________________________________________________
                  ____________________________________________________________
                  ____________________________________________________________

Additional Options ... N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit  Opts                                            Canc
```

If you used the @GEN string in the maintenance request name, the string remains until you edit the fields and confirm by pressing ENTER.

Step 2. Enter Information in the Add Request Screen Fields

In Field ...	Enter ...
Problem Subj(ect)	(required) a description of the problem (up to 60 characters).
Problem Type	(required) the type of problem.
Priority	(required) a numeric value (1-999) to assign the priority.
Status	(required) a previously defined status for the maintenance request: either a value or a code. An asterisk (*) produces a list of statuses defined by the PAC administrator.
Action	(required) a previously defined action: either a value or a code. An asterisk (*) produces a list of actions defined by the PAC administrator.
Assigned To	the ID of the user to whom the maintenance request is to be assigned.
User Name	the name of the user to whom the maintenance request is to be assigned.
Contact Name	the name of the user who reported the problem.

In Field ...	Enter ...
Tel(ephone)	the telephone number of the user who reported the problem.
Related Prob(lem)	information about a problem already reported that is related to the maintenance you are currently requesting.
Notes	information related to the request you are currently adding.

Step 3. (Optional) Accessing the Additional Options

Notes:

1. Edit all other values on the Add Request screen before you access the Additional Options. Once you access Additional Options, all other fields on the screen are protected.
2. When you leave the Add Request screen, PAC substitutes a 5-digit number for the @GEN string in the maintenance request name.

Access Additional Options by pressing PF4 (Opts), or typing over the default in the Additional Options field with Y (yes).

The following additional options may be edited:

Option	Action
Description	The Extended Description editor appears. Enter a description of the request you are adding and type a period (.) to exit.
Extended User Info(rmation)	Invokes a modifiable routine for displaying user-defined information.
Related Object Versions	Displays the object versions related to the maintenance request you are adding. See the section Display Related Object Versions on page for more information about the screen displayed.
Related Requests	Maintenance request related request Screens Related Requests Maintenance request related request The Related Requests window appears. Enter the name of an existing maintenance request(s) to be linked with the maintenance request you are adding. Press ENTER to confirm your edits; press PF3 to exit.
Migration Events Usage	Maintenance request migration event Migration event The Migration Events window appears. Enter the name of an existing migration event(s) to be processed in conjunction with the maintenance request you are adding. Press ENTER to confirm your edits; press PF3 to exit.

When you have completed editing the options, press ENTER to confirm the edits and return to the Add Request screen.

Step 4. Adding the Maintenance Request

Press ENTER again on the Add Request screen to display the Maintenance Request Menu with the message that the maintenance request has been added successfully.

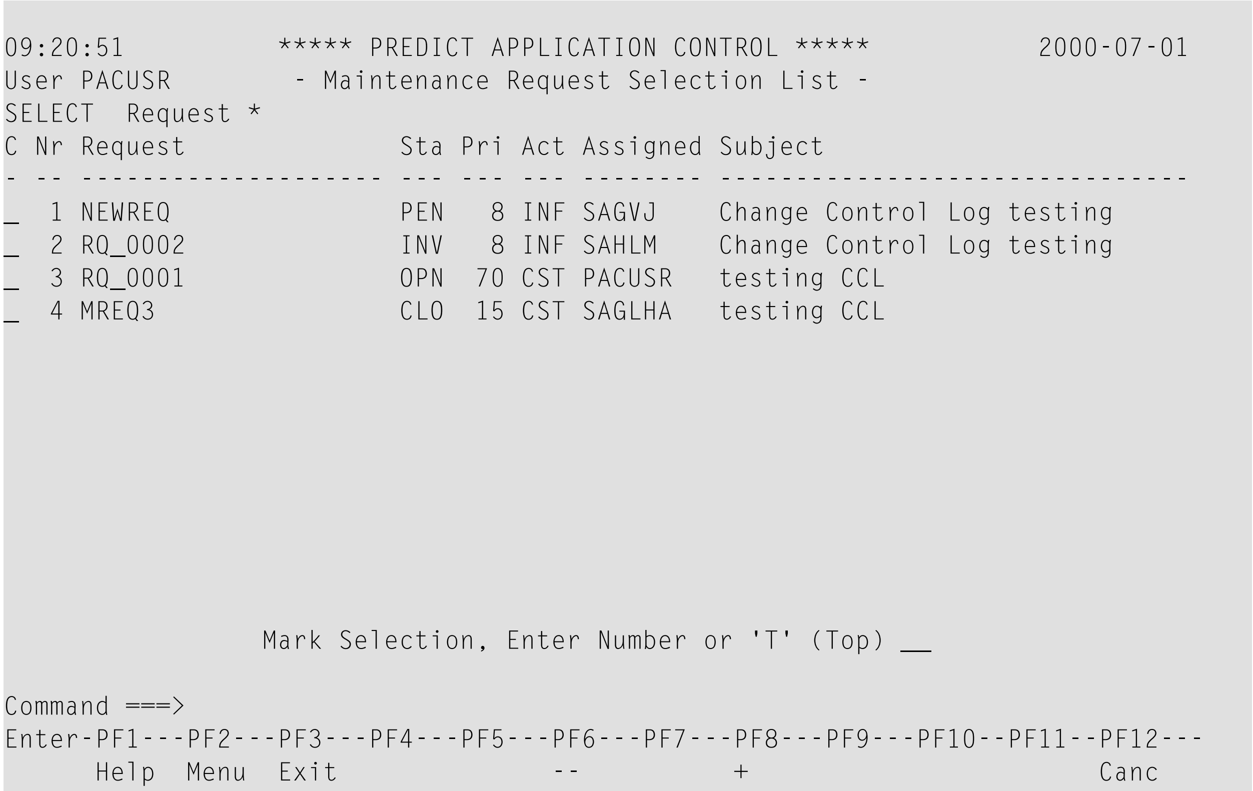
Selecting a Maintenance Request

From the Maintenance Request Menu, enter Code S (Select by Request ID) and the type of list as described in the section **Select Type Field**.

L	alphabetically by maintenance request ID
S	by status, priority, and maintenance request ID
U	alphabetically by assigned user ID

The Maintenance Request Selection List screen appears listing maintenance requests in the order you specified. The columns on all screens are exactly the same. The sub-function information also applies to all screens. The only difference is the sequence in which the maintenance requests are listed.

The following screen is an example of a listing by status, priority, and maintenance request ID:



```
09:20:51          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR        - Maintenance Request Selection List -
SELECT  Request *
C Nr Request              Sta Pri Act Assigned Subject
- -- -------------------- --- --- --- -------- -------------------------------
_  1 NEWREQ               PEN   8 INF SAGVJ    Change Control Log testing
_  2 RQ_0002              INV   8 INF SAHLM    Change Control Log testing
_  3 RQ_0001              OPN  70 CST PACUSR   testing CCL
_  4 MREQ3                CLO  15 CST SAGLHA   testing CCL










                 Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Column	Description
Request	Maintenance request name (ID).
Sta(tus)	Three-character abbreviation for the status of the maintenance request. Valid options may include: OPN-Open CLO - Closed INV - Investigate PEN - Pending C/E-Change/Enhancement The options available at your site are defined by your PAC administrator.
Pri(ority)	A number from 1-999 indicating the priority sequence of the maintenance request.
Act(ion)	A three-character code for the action of the maintenance request. The action codes are defined by your PAC administrator.
Assigned	ID of the user to whom the maintenance request is assigned.
Subject	Description of the maintenance request topic - truncated, if necessary.

The sub-function displayed on the status line directly under the User field indicates whether you accessed this screen using

- the Select sub-function (Code S);
- range notation in the Request ID field along with the Display, Modify, Copy, Purge, or Select sub-function;
- the SELECT direct command. Refer to the PAC Reference documentation for more information about PAC commands.

If you accessed the screen with the Select (S) sub-function, you may invoke the following sub-functions for one or more of the listed requests by entering the appropriate code in the "C" column: D (Display); M (Modify); P (Purge); S (Select).

If you mark the maintenance request with the cursor, or enter an X or an S in the "C" column, or if you enter the request number (from the "Nr" column) in the Mark Selection... field, you are returned to the Maintenance Request Menu where the specified request is displayed in the Request ID field.

Modifying/Displaying a Maintenance Request

You may modify or display a maintenance request on the Modify Request or Display Request screens. These screens are similar to the Add Request screen. Maintenance may not be performed on the Display Request ID screen.

All of the attributes are modifiable, except the Closed/By/TID, and Related Problem fields. Refer to **Adding a Maintenance Request** for more information.

To modify or display a maintenance request, enter Code M (Modify...) or D (Display...) and the name of the maintenance request in the Request ID field of the Maintenance Request Menu.

This section covers the following topics:

- Modifying/Displaying Additional Options
- Displaying Related Object Versions

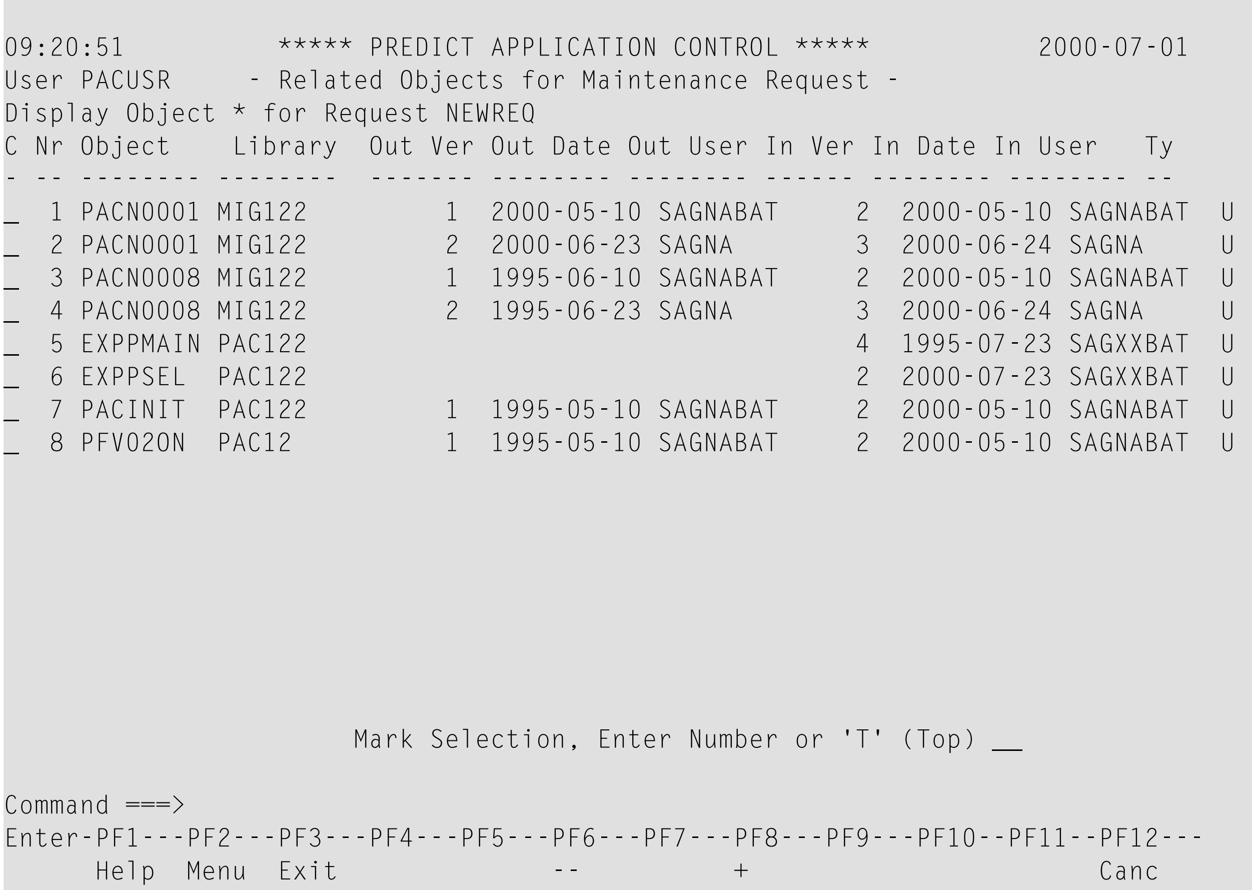
Modifying/Displaying Additional Options

To modify or display the additional options for a maintenance request, press PF4 (Opts), or type over the default in the Additional Options field with Y (Yes) on the Modify or Display Maintenance Request screens.

- You may modify/display migration events used in conjunction with the maintenance request.
- You may display related object versions.

Refer to **Additional Options for maintenance requests** for more information.

Displaying Related Object Versions



```
09:20:51          ***** PREDICT APPLICATION CONTROL *****          2000-07-01
User PACUSR     - Related Objects for Maintenance Request -
Display Object * for Request NEWREQ
C Nr Object    Library  Out Ver Out Date Out User In Ver In Date In User   Ty
- -- -------- --------  ------- -------- -------- ------ -------- -------- --
_  1 PACN0001 MIG122         1  2000-05-10 SAGNABAT     2  2000-05-10 SAGNABAT  U
_  2 PACN0001 MIG122         2  2000-06-23 SAGNA        3  2000-06-24 SAGNA     U
_  3 PACN0008 MIG122         1  1995-06-10 SAGNABAT     2  2000-05-10 SAGNABAT  U
_  4 PACN0008 MIG122         2  1995-06-23 SAGNA        3  2000-06-24 SAGNA     U
_  5 EXPPMAIN PAC122                                    4  1995-07-23 SAGXXBAT  U
_  6 EXPPSEL  PAC122                                    2  2000-07-23 SAGXXBAT  U
_  7 PACINIT  PAC122         1  1995-05-10 SAGNABAT     2  2000-05-10 SAGNABAT  U
_  8 PFV02ON  PAC12          1  1995-05-10 SAGNABAT     2  2000-05-10 SAGNABAT  U









                       Mark Selection, Enter Number or 'T' (Top) __

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

This screen displays the Natural object versions related to the specified maintenance request. These object versions are retrieved from the associated migration event(s).

In this example, objects EXPPMAIN and EXPPSEL were checked in although the user did not first check the objects out to maintenance. This may indicate that the source form of the objects was checked in from a development status to the maintenance library using the Natural SYSMAIN function.

Information on this screen is described in the following table:

Column	Description
Object	Name of an object related to the specified maintenance request.
Library	Routine invoked to display user-defined information (modifiable).
Out Ver(sion)	Version number of the object when it was checked out for maintenance.
Out Date	Date that the object version was checked out for maintenance.
Out User	ID of the user who checked out the object version.

Column	Description
In Ver(sion)	Version number assigned to the object when it was checked back into PAC.
In Date	Date the object version was checked back into PAC.
In User	ID of the user who checked out the object version.
Ty(pe)	Purpose for or result of the check-out: U checked out with the intention to update the object. If the object has been checked in, and Type is still U, the object was updated. A checked out for access to the object only; when the object was checked in, it was determined that no maintenance (updates or modifications) had been performed.

Press PF3 to close the window.

Copying a Maintenance Request

1. To copy a maintenance request, enter Code C (Copy Request ID) on the Maintenance Request Menu along with the name of the maintenance request to be copied and a new name for the maintenance request copy.

   The resulting Copy Request screen is similar to the Add Request ID screen and displays the new name of the maintenance request and the attributes of the original (copied) maintenance request.
2. Modify the attributes on the Copy Request screen, if required.
3. Press ENTER to confirm your modifications and return to the Maintenance Request Menu.

Purging a Maintenance Request

From the Maintenance Request Menu, enter Code P (Purge Request ID) and the request ID name. Alternatively, enter PURGE REQUEST on the command line.

If migration events exist for the maintenance request you wish to purge, a warning message appears telling you that the events existing for the maintenance request must be deleted or the maintenance request removed from the events before the maintenance request can be purged.

Otherwise, the Purge Confirmation window appears reminding you that the maintenance request will be purged.

- Press PF5 or type Confirm to purge the request.
- Press PF3 or type a period (.) to return to the Maintenance Request Menu without purging the request.

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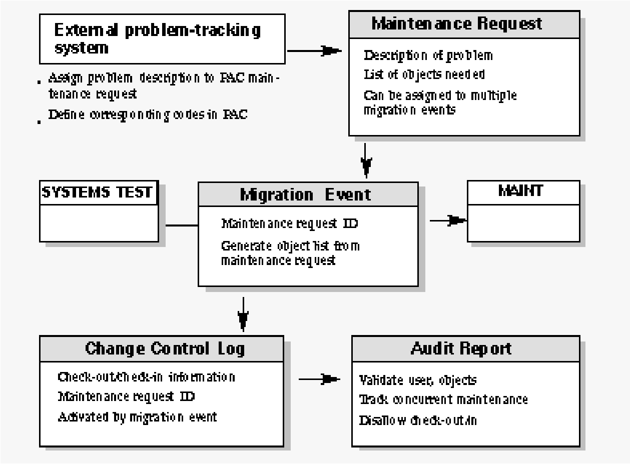
- Maintenance Requests 447
- Change Control Logs 452

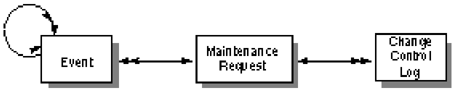
PAC provides facilities for checking and maintaining the integrity of application object versions, including maintenance requests, check-out/check-in processes and change control logs. User exits and Application Program Interfaces (APIs) allow you to customize these facilities to meet your site requirements.

The diagram below shows the relationships among PAC migrations to and from maintenance, change control logs and audits, and maintenance requests.


External problem-tracking system
Assign problem description to PAC maintenance request
Define corresponding codes in PAC
Maintenance Request
Description of problem
List of objects needed
Can be assigned to multiple migration events
SYSTEMS TEST
Migration Event
Maintenance request ID
Generate object list from maintenance request
MAINT
Change Control Log
Check-out/check-in information
Maintenance request ID
Activated by migration event
Audit Report
Validate user, objects
Track concurrent maintenance
Disallow check-out/in

This chapter covers the following topics:

Maintenance Requests



When maintenance is required for an application, a maintenance request can be created to document problems and maintenance activities. It allows you to identify to PAC certain problems, change enhancements, or topical information associated with a list of programming objects that are to be used to solve a problem or implement a relevant function. As a user, you can maintain the information returned by the maintenance request.

In addition to describing the problem and related activities, a maintenance request can list all objects required to resolve the problem; PAC can then generate an object list automatically from the list in the maintenance request.

Activities performed for a given maintenance request, as well as all objects participating in the associated migrations, are linked and can be tracked.

This maintenance request may span applications, a capability that is important when generating migration events.

When you assign a maintenance request to an event migrating an object to or from maintenance, PAC automatically assigns the request to a change control log. You can select and view change control logs related to the maintenance request.

As related problems emerge, they can be added to a request. Related problems can be grouped in a single maintenance request which can be assigned to multiple migrations. You can view all migration events related to a problem or assign them to a group migration event.

To document complex problems and activities, you can also group requests, each of which may be assigned to multiple migrations.

Once a maintenance request is defined to PAC, you may invoke additional user-defined maintenance request facilities using the "Extended User Info" facility of the maintenance requests Additional Options.

You can define and assign site-specific codes to indicate the state of a maintenance request (for example, open or closed) and the action to be taken in response. You can also prioritize requests. Using user exits, you can establish your own rules and standards. Application Program Interfaces (APIs) enable you to call PAC directly from outside PAC to perform maintenance request activities.

If a maintenance request is defined for the migration event, then the objects are also added to the maintenance request Related Object Versions list.

Interfacing with External Problem-Tracking Systems

Although not a problem-tracking system itself, PAC does provide some basic problem-tracking facilities and may be used to extend the facilities of existing external problem-tracking systems.

You can integrate PAC with an external problem-tracking system through the Maintenance Requests sub-function.

1. Define the PAC maintenance request ID to match the problem ID in the external problem-tracking system.
2. Define the maintenance request so that the identifier of the problem in the external problem-tracking system is synonymous with the maintenance request in PAC.
3. Assign the problem description in the external system as an attribute to the PAC maintenance request.
4. Define the codes for PAC problem states, priorities, and actions to correspond with codes in the external system.
5. Record the description of a problem in a problem-tracking system and use Application Program Interfaces (APIs) to reflect or copy these external problem descriptions into PAC.
6. Use provided user exits to derive the maintenance request data from, or keep the maintenance request data in synchronization with, the data in the external problem-tracking system.

Assigning Maintenance Requests to Migration Events

Once a maintenance request is defined, you may assign it to a migration event to enhance check-out/check-in tracking and allow you to review all events, created or completed, for a particular request.

The following example illustrates how a maintenance request is used to enhance tracking of object maintenance activities:

Seq	Action
1.	User A discovers a problem in production.
2.	User A identifies the object causing the problem.
3.	User A opens a maintenance request (RQ 00001) for the problem.
4.	Programmer B creates a migration event (production to maintenance) ORD-PM-0001 with a maintenance request of RQ 00001.
5.	Programmer B starts making modifications to resolve the problem. Subsequently, User A discovers the need to maintain other objects and creates another migration event (Control to maintenance) ORD-CM-0007 with the same maintenance request of RQ 00001.
6.	When the updates are completed, Programmer B generates an event (maintenance to Control) ORD-MC-0011 to migrate the new objects into PAC.
7.	Maintenance request RQ 00001 is again specified.

Seq	Action
8.	Programmer B now creates an event (Control to integration-test) ORD-CTI-0036 with maintenance request RQ 00001 to test the new changes.
9.	At this point, the project leader may access maintenance request RQ_00001 to review its status; and then may review all events completed as part of the change. The list of events will be as follows: ORD-CM-0007 ORD-CTI-0036 ORD-MC-0011 ORD-PM-0001

Table Maintenance

When maintenance requests are defined to PAC, Status tables and Action tables are used to determine the sequence in which maintenance requests are retrieved for selective processing.

These tables must be defined before you can enter maintenance requests. Status and Action information codes are required input when you add maintenance requests to PAC, and the values provided are validated against the Status and Action tables defined at your site.

Tables are defined by the PAC administrator who uses the table maintenance facility to set up table entries and perform maintenance functions for maintenance requests. Tables should be defined so that they extend the integration of PAC maintenance requests with the external problem-tracking system currently used at your site.

Depending on the table type (Status or Action), the PAC administrator specifies the possible codes along with descriptive text for each as table entries.

Status Table Examples

Code	Status Text
OPE	Open
INI	Initial, new problem
CLO	Closed
INF	Inform user
WER	Waiting for additional error information
INC	Incomplete information given
QUE	Question

Note: The only Status code that cannot be deleted is CLO (Closed). A maintenance request with the Status of Closed can no longer be modified.

Action Table Examples

Code	**Action Text**
SRC	Source change
VER	Next version
DOC	Documentation change
MSC	Miscellaneous
HDW	Hardware problem
SFT	Software problem

Maintenance Request Reporting Facilities

The PAC administrator also establishes a mechanism to prioritize the sequence in which the list of maintenance requests is retrieved. Table entries must have an associated sequence number. This number along with the maintenance request priority determines the sequence in which maintenance requests are displayed with the Selection option.

To facilitate reporting, PAC uses a grouping facility. The grouping hierarchy is as follows:

Status	Status of the maintenance request;
Priority	Priority assigned to the problem;
Action	The action or reason code to further define the status;
Request	The name of the maintenance request. This may be a numeric and/or alphabetic value.

Also, the list of maintenance requests may be retrieved in alphabetical order.

User Exits

You may use PAC user exits for interfacing with external problem-tracking systems, rules, security, extended processing, and customization.

Exit	**Description**
19	User Exit 19 maintenance request Data Manipulation◎invoked during the processing (adding, modifying, displaying) of the maintenance request data. PAC uses this user exit to pass the data and/or allow the user to update the PAC information.
20	User Exit 4 maintenance request User Exit 20 maintenance request Invoking Maintenance Requests◎invoked whenever any function (except Purge, which may be handled with User Exit 4) for maintenance requests is invoked. User Exit 20 can be used to meet security requirements and validate and/or override the maintenance request ID. (The maintenance request ID may be updated using this exit).
21	User Exit 21 maintenance request Linking to Events◎allows you to validate the use of maintenance requests specified with migration events. For example, the exit may be set up to ensure that a maintenance request is always specified for a migration event where the origin or destination status is a maintenance status type. This is important for tracking the actual state

Exit Description

of the maintenance request and the progression of objects through the defined application life-cycle.

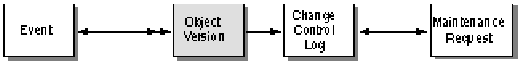
Refer to the PAC Reference documentation for detailed information about PAC user exits.

Application Program Interface (APIs)

The Maintenance Request API (APINMREQ) allows users to add, modify, purge or display (retrieve) information about a particular maintenance request.

A list of current APIs is provided in the PAC Reference documentation.

Change Control Logs



The PAC check-out/check-in facility is activated automatically by a migration to or from a maintenance status. The facility tracks and documents the actions taken to maintain Natural objects under the control of PAC.

Note: Check-out/check-in facilities are not currently available for foreign objects.

When an event migrating an object to a maintenance status is processed, PAC creates a change control log for the check-out, which records the

- application name;
- object name and version;
- user ID of the user checking it out;
- terminal ID or batch ID;
- date and time of the check-out;
- library and user system file to which the object is migrated;
- maintenance request ID (if applicable); and
- optional notes by the user.

When the object version is checked back in from the maintenance status, PAC updates the log with the new version number created as a result of the maintenance.

In conjunction with a maintenance request, the check-out/check-in process may be used to maintain a list of all objects required to satisfy a specific maintenance request.

Although users may check out the same version of an object, each user has a unique copy of that object.

PAC audits check-out and check-in activities. A user exit lets you view the audit information, validate the user and object, and disallow the check-out or check-in. The user exit also lets you track and control concurrent maintenance activities. When a user checks an object out, you can list other users who currently have the same object checked out. When a user checks an object back in, you can list other users who still have the object checked out, or who checked the object in after this user checked it out.

Check-Out Processing

When you set up the initial migration event to check an object out for maintenance, you may optionally specify an associated maintenance request ID.

The processing of the migration event results in the following:

- The specified version of each object is migrated to the location of the maintenance status.
- A change control log is created for each object.
- An object status entry is created for each object indicating that it has been migrated to a maintenance status.

If PAC detects that any object being checked out is already checked out to a maintenance status or that its most recent migration was to a development status, PAC writes a warning about the concurrent maintenance to the audit report. If User Exit 7 has been implemented, it may be used to permit or disallow the concurrent check-out of the object in question. The exit may also be used to write additional user information to the audit report.

Check-in Processing

After maintenance has been performed on an object, the object must reenter PAC before the change can be recorded. A migration event must be set up to return the object to the PAC controlled environment; the migration event should specify

- the maintenance origin status where the object is being maintained;
- the destination status, which must be Control, or a test or production status type; and
- the maintenance request ID (recommended but optional).

As a result of the migration, the object is moved or copied from the maintenance status into the destination status and implicitly to Control status if the destination status is other than Control. The link of the object version checked out to the maintenance status is purged.

During the check-in process, PAC locates the corresponding change control log (check-out record), updates it with the check-in information, and closes it. If there is no corresponding open change control log for an object (for example, a new object was created as the result of the maintenance process), a change control log is created and will contain only the check-in information.

Move Option

The Move option results in the object being compiled and assigned a new version number. The new version of the object is migrated to the destination status.

By default, the Move option is in effect for all migration paths where the origin status is a maintenance status type. This means that when objects are migrated from maintenance back into PAC (that is, checked in), both the saved and cataloged objects are physically purged from the maintenance library.

If Applymod 24 is active, only the saved (source) object is purged from the maintenance library. The cataloged object is not purged. This helps to protect the integrity of the environment for any subsequent testing of other maintenance changes.

Copy Option

If the Copy option is used, the object is recompiled in PAC and assigned a new version number. The new version of the object must then be copied to the maintenance library.

A new change control log recording the check-out of the new version of the object is created, and the new version of the object is placed in the maintenance status from which the previous version of the object was migrated. The new change control log is created to maintain consistency between what is in PAC and what is in the maintenance environment.

The following example illustrates the steps used when the Copy option is selected for migrating objects from maintenance:

1. APGMP1.0003 is checked out to the status MAINTENANCE (status type M).
   - An object-status link is created for APGMP1.0003-MAINTENANCE.
   - A change control log is created for APGMP1.0003 and the check-out information is recorded in the log.
2. APGMP1.0003 is modified and saved; the saved date-time stamp information is also updated.
3. APGMP1.0003 is checked in from the status MAINTENANCE and assigned a new version of 0007 and recompiled in PAC.
   - The object-status link for APGMP1.0003-MAINTENANCE is purged.
   - The change control log that corresponds to APGMP1.0003 is located and updated with the check-in information for APGMP1.0007.

   Thus, the change control log documents that APGMP1 was checked out to maintenance as Version 3, modified, then checked back into PAC as Version 7. Version 3 is the maintenance version of Version 7.
4. To maintain consistency between what is in PAC and what is in the maintenance environment:
   - An object-status link for APGMP1.0007-MAINTENANCE is created.

- A new change control log with associated check-out information is created for APGMP1.0007.
- APGMP1.0007 is copied to the maintenance status specified in the migration path.

Canceling Maintenance

If an object version has been checked out to maintenance, and it is later decided that the object requires no modification, a migration event may be set up to cancel the maintenance for the object. The migration event specifies

- the maintenance origin status where the object is being maintained;
- the destination status, which must be a retire status type; and
- the maintenance request ID (recommended but optional).

As a result of the migration, PAC locates the corresponding change control log with the check-out information; updates it to indicate that the maintenance was cancelled; and purges the object from the maintenance status location.

Selecting Objects With User Exit 7

User Exit 7 is invoked during the check-out/in of objects to/from a maintenance status type. As each object is processed, you can allow or disallow the migration of that object. A nonzero response code returned from the exit instructs PAC to reject a specific object for processing.

Note: Since PAC currently does not support message switching facilities, it is recommended that users integrate their own message switching facilities. For example, use Con-nect from User Exit 7 in the check-out/check-in process of PAC so that all users are correctly informed about check-out/check-in activities.

Refer to the PAC Reference documentation for more information about User Exit 7.

When PAC User Exit 7) is active during check-out of an object, you may

- validate the user and the object being checked out;
- display information about the object being checked out;
- obtain a list of other users who also may have previously checked out the same object (concurrent maintenance); and
- disallow the check-out of the object.

When a same or different version of an object is checked out by another user, User Exit 7 may be used to notify that user that another version of the object may be undergoing modification in another library. It is the user's responsibility to check the validity of the notification.

If PAC User Exit 7 is active during check-in of an object, you may

- validate the user and the object being checked in;
- display information (for example, terminal, library, maintenance request) about the object being checked in;
- obtain a list of all users who
  - have the same object still checked out;
  - checked in the same object subsequent to the check-out date of the object.
- disallow the check-in of the object.

43 Using PAC with Predict Case or Natural for DB2

- Predict Case 458
- Natural for DB2 461

This chapter covers the following topics:

Predict Case

PAC provides the following integration with Predict Case:

- Natural object lists can be generated from a Predict Case object set.
- PAC verifies that Natural object versions are synchronized with the corresponding Predict Case object.
- PAC identifies the Predict Case object versions that were used to compose the actual source of the Natural object and maintains a usage list of them.

This section covers the following topics:

- Establishing PAC in a Predict Case Environment
- Generating a Natural Object List
- Natural Object List Validation
- Information Stored by PAC
- Reporting Facilities
- Predict Case Object Classes

Establishing PAC in a Predict Case Environment

When PAC is started, it uses the Entire DB files defined for Predict Case by the NTFILE macro in the Natural parameter module to establish direct communication with Predict Case.

Predict Case must be installed with NTFILE values 249 and 250 established as a valid Predict Case/Entire DB environment.

Generating a Natural Object List

For Predict Case applications, you must specify a Predict Case library in application status link definitions that have an origin status of either "development" or "maintenance". PAC communicates with Predict Case to verify the relationship between the objects residing in the Natural library and the objects defined to the Predict Case library used to compose them.

Although the Predict Case library name can be specified at any time, it is validated only when an event with a development or maintenance origin status is validated and authorized, and again during the actual migration of the objects from development or maintenance.

The Predict Case library contains the Predict Case object set, which is identified by set name and user ID in the PAC Generate List option.

You can create a Natural object list for the Predict Case application by

- manually entering the objects;
- generating the list from a Predict Case object set (GENTYPE C);
- comparing the date-time stamps of objects in the origin and destination statuses and including the objects that are different (GENTYPE P).

In all cases, the Natural objects are compared with the Predict Case library during validation to verify that the Natural objects are consistent with the Predict Case objects used to compose them.

Any inconsistencies detected during validation produce an error message. You can then either remove the object from the list or correct the inconsistency before migrating the object.

As with all PAC migrations, the object list is validated again at execution time. If any inconsistencies are detected at this time, the object is automatically rejected for the migration.

Natural Object List Validation

During the validation of the object list, when it is detected that a particular application status link has an associated Predict Case library, PAC verifies that all objects being processed (except those being rolled) were composed by Predict Case.

Note: Rules and views are processed normally since Predict Case does not treat these objects in any special manner.

Objects for which an error condition is returned are not migrated.

PAC checks the following for each object in the object list and issues an error if all conditions are not verified:

- The Natural object has corresponding Predict Case source objects from which it was composed. The corresponding Predict Case objects that composed the Natural object must still exist.
- The Natural objects have the save/stow date recorded on the Predict Case object.
- None of the Predict Case objects used to compose the Natural source object has been changed since the Natural object was last composed.

Information Stored by PAC

For auditing purposes, PAC stores the following information about the Predict Case objects used to compose the Natural objects migrated:

- A list of the Predict Case objects used to compose each Natural object as part of that Natural object's usage list;
- The Predict Case source library name recorded in the directory information for the Natural object;
- The date-time stamp of the Predict Case object as it is stored in Predict Case;
- A list of all Natural objects that used a particular Predict Case object to compose.

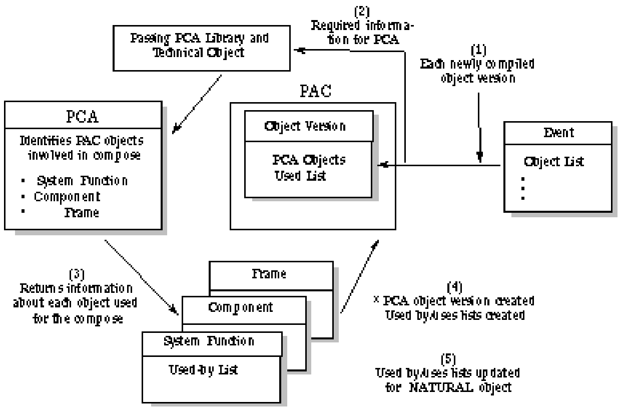
- The following information about each Predict Case object referenced by a Natural object:
  Object type
  Abstract
  Date created
  User who created
  Date modified
  User who modified

Reporting Facilities

PAC makes the following information available through the PAC reporting facilities in the PAC reporting subsystem:

- The Predict Case source objects used to compose each Natural object;
- The Natural objects that were composed using Predict Case source objects;
- The Natural/Predict Case object versions used, including the date migrated, the date effective in production, and the date superseded;
- Audit trail information in audit reports.
  The relevant audit reporting screens display the following:
  - Objects that Predict Case uses
  - Information about specific Predict Case objects
  - The data structure of the Predict Case object
  - The objects that use the Predict Case object

The diagram below illustrates the life-cycle of a Natural object for Predict Case (PCA):



Passing PCA Library and Technical Object
(2)
Required information for PCA
(1)
Each newly compiled object version
PCA
Identifies PAC objects involved in compose
• System Function
• Component
• Frame
PAC
Object Version
PCA Objects Used List
Event
Object List
⋮
(3)
Returns information about each object used for the compose
Frame
Component
System Function
Used-by List
(4)
× PCA object version created
Used by/Uses lists created
(5)
Used by/Uses lists updated for NATURAL object

× PAC stores a "base" PCA object version; updates an existing version with an entry about the NATURAL object that composed it.

Explanation of the Steps in the Diagram

Step	Action
1	Natural objects are composed from Predict Case objects specified for the migration of objects into the PAC controlled environment; each composed Natural object is verified before being newly compiled and versioned.
2	Predict Case library and technical object information about the Natural objects composed in PAC from Predict Case objects is communicated to Predict Case. Predict Case identifies the Predict Case objects involved in the composition of Natural objects in PAC.
3	Predict Case returns to PAC system function, component, and frame information about each Predict Case object used for the composition of Natural objects in PAC. The Predict Case objects are assigned a version number.
4	An object version is created for the Natural composed objects; used-by and uses lists are created. PAC updates the object version with an entry concerning the Predict Case objects used to compose it and including their version numbers.
5	Used-by and uses lists are updated for the Natural object versions.

Predict Case Object Classes

A Predict Case object is an entity used to compose Natural objects in a Predict Case environment. Examples of Predict Case object classes supported by PAC include

- System Function
- Frame Component

Natural for DB2

If you are running Natural for DB2 applications, PAC supports migrations for both qualified and non-qualified DB2 tables/views. The Truncate Creator option is supported for non-qualified tables/views.

This section covers the following topics:

- Predict Event Prerequisite
- Migrating Qualified DB2 Tables/Views
- Migrating Non-Qualified DB2 Tables/Views
- Truncate Creator Support for Non-Qualified DB2 Tables/Views

- Qualified and Non-Qualified Tables/Views

Predict Event Prerequisite

Migrations for qualified and non-qualified DB2 tables/views must be performed separately. Ensure that the Predict generation defaults for views are set correctly before running the migration.

Migrating Qualified DB2 Tables/Views

If you are migrating qualified DB2 tables/views, then before running the Predict migration into PAC, check that the Truncate Creator option in the Predict generation defaults for views is set to N.

Migrating Non-Qualified DB2 Tables/Views

If you are migrating non-qualified DB2 tables/views, then before running the Predict migration into PAC, check that the Truncate Creator option in the Predict generation defaults for views is set to Y.

For information about copying Predict generation defaults, refer to the section General Defaults Maintenance in the PAC Administration Manual. For information about the Truncate Creator option in Predict generation defaults, refer to the Predict Administration Manual.

Truncate Creator Support for Non-Qualified DB2 Tables/Views

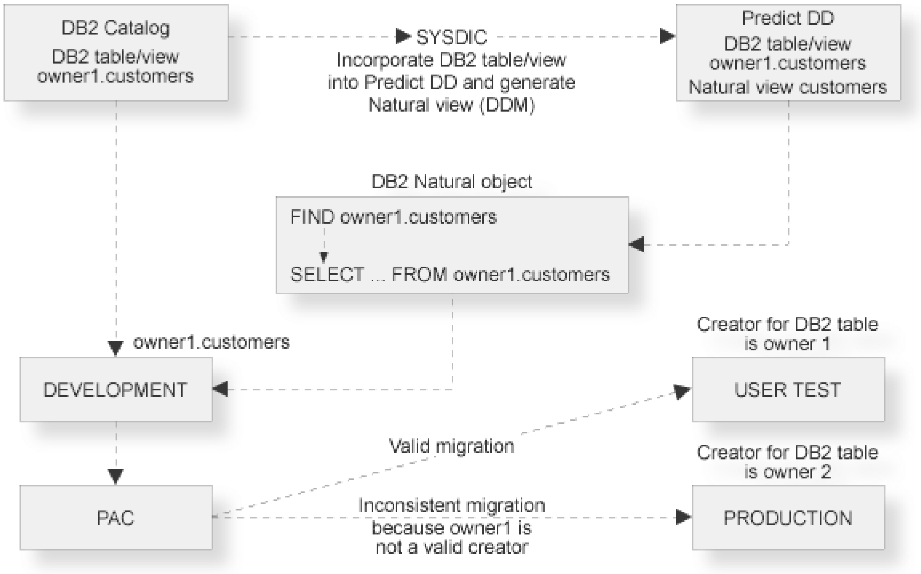
You may write Natural FOR DB2 applications with non-qualified tables/views by using the Truncator Creator option in the Generation Defaults for Natural views.

PAC supports the Truncate Creator option for DB2 tables/views with the following restrictions:

- The truncated view name of the DB2 table/view must not correspond to a view name which already exists for another
  - file; or
  - DB2 table/view.

Qualified and Non-Qualified Tables/Views

The diagrams in the following sections show examples of qualified and non-qualified DB2 tables/views:

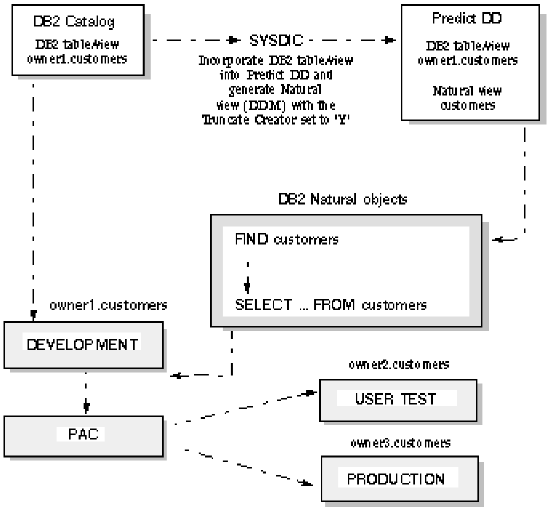

DB2 Catalog
DB2 table/view
owner1.customers
SYSDIC
Incorporate DB2 table/view into Predict DD and generate Natural view (DDM)
Predict DD
DB2 table/view
owner1.customers
Natural view customers
DB2 Natural object
FIND owner1.customers
SELECT ... FROM owner1.customers
owner1.customers
DEVELOPMENT
Creator for DB2 table is owner 1
USER TEST
Valid migration
Creator for DB2 table is owner 2
PAC
Inconsistent migration because owner1 is not a valid creator
PRODUCTION

In the example above for qualified DB2 tables/views, objects that access owner1.customers should not be migrated to any other environment unless that environment supports the high level qualifier owner1.

If all environments support qualifier owner1, then the objects are valid for all environments.

If the objects are valid only for some environments, then the objects must be recompiled with different DB2 tables/views so that the objects may be executed against these DB2 tables.

Note: Even if the SET CURRENT SQLID DB2 command is issued in dynamic mode, or the owner parameter is specified on the BIND for the application PLAN in static mode, the qualifier of customers will still be owner1.



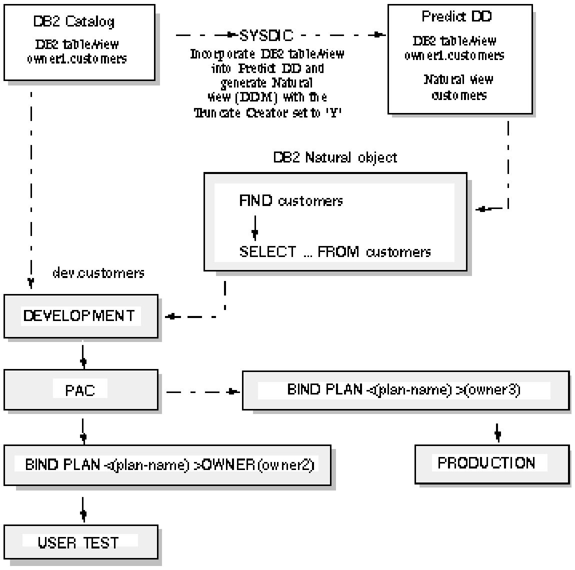
In the example above for non-qualified DB2 tables/views in dynamic mode, the user refers to the truncated name of the DB2 view and will run the application in dynamic mode.

All objects may refer to customers and the qualifier will be determined during execution; therefore, the objects may be migrated to any environment where they can access the DB2 table based on the qualifier assigned by the SET CURRENT SQLID DB2 command.

For dynamic PLANs, the creator must be set up before executing the code that accesses the table in each environment. The setup may be performed in several ways; the following program is one example. This program may be found in library SYSDB2:

```
* SET CURRENT SQLID
*
DEFINE DATA
LOCAL USING DEMSQLCA
LOCAL
*                                        Parameter for DB2SERV
1 STMT         (A250)
1 STMTL        (I2)       CONST <250>
1 RETCODE      (I2)
1 OLDSQLID     (A8)
1 NEWSQLID     (A8)
*
END-DEFINE
*
SELECT DISTINCT CURRENT SQLID
  INTO OLDSQLID
  FROM SYSIBM.SYSTABLES
ESCAPE BOTTOM
END-SELECT
*
MOVE  'SET CURRENT SQLID="PROD"'
  TO   STMT
```

```
CALL 'DB2SERV' 'D' STMT STMTL SQLCA RETCODE
*
IF RETCODE > 0
  FETCH
'SQLERR' 0290 ELSE
  SELECT DISTINCT CURRENT SQLID
    INTO NEWSQLID
    FROM SYSIBM.SYSTABLES
  ESCAPE BOTTOM
  END-SELECT
*
  WRITE ' Old SQLID was :' OLDSQLID
  WRITE ' New SQLID is  :' NEWSQLID
END-IF
*
END
```


DB2 Catalog
DB2 table/view
owner1.customers
SYSDIC
Incorporate DB2 table/view into Predict DD and generate Natural view (DDM) with the Truncate Creator set to 'Y'
Predict DD
DB2 table/view
owner1.customers
Natural view
customers
DB2 Natural object
FIND customers
SELECT ... FROM customers
dev.customers
DEVELOPMENT
PAC
BIND PLAN <(plan-name) >(owner3)
BIND PLAN <(plan-name) >OWNER(owner2)
PRODUCTION
USER TEST

In the example above for non-qualified DB2 tables/views in static mode, the user's objects reference the truncated name of the DB2 table/view, and the qualifier will be determined by the BIND statement of the application PLAN.

Using this method, the user compiles the code only once and then can migrate the Natural for DB2 objects to any environment where the DB2 tables/views are accessible.

44 Creating and Managing PAC Jobs

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PAC provides jobs for processing migration events, for submitting jobs, and for importing to and exporting from partitioned datasets (PDS). Refer to Sample Jobs for a list of the jobs provided by PAC.

PAC jobs are grouped by operating system. Within each of these groups, the jobs are classified by the type of migration to be processed. The job for each migration type follows its own set of steps to completion, allowing the event to be processed in increments.

PAC maintenance facilities can be used to customize batch jobs to meet the requirements at your site for job names, account codes, dataset names, and other standards.

User-defined/specific jobs can also be loaded into PAC and submitted for execution using the Remote Job Entry (RJE) facility.

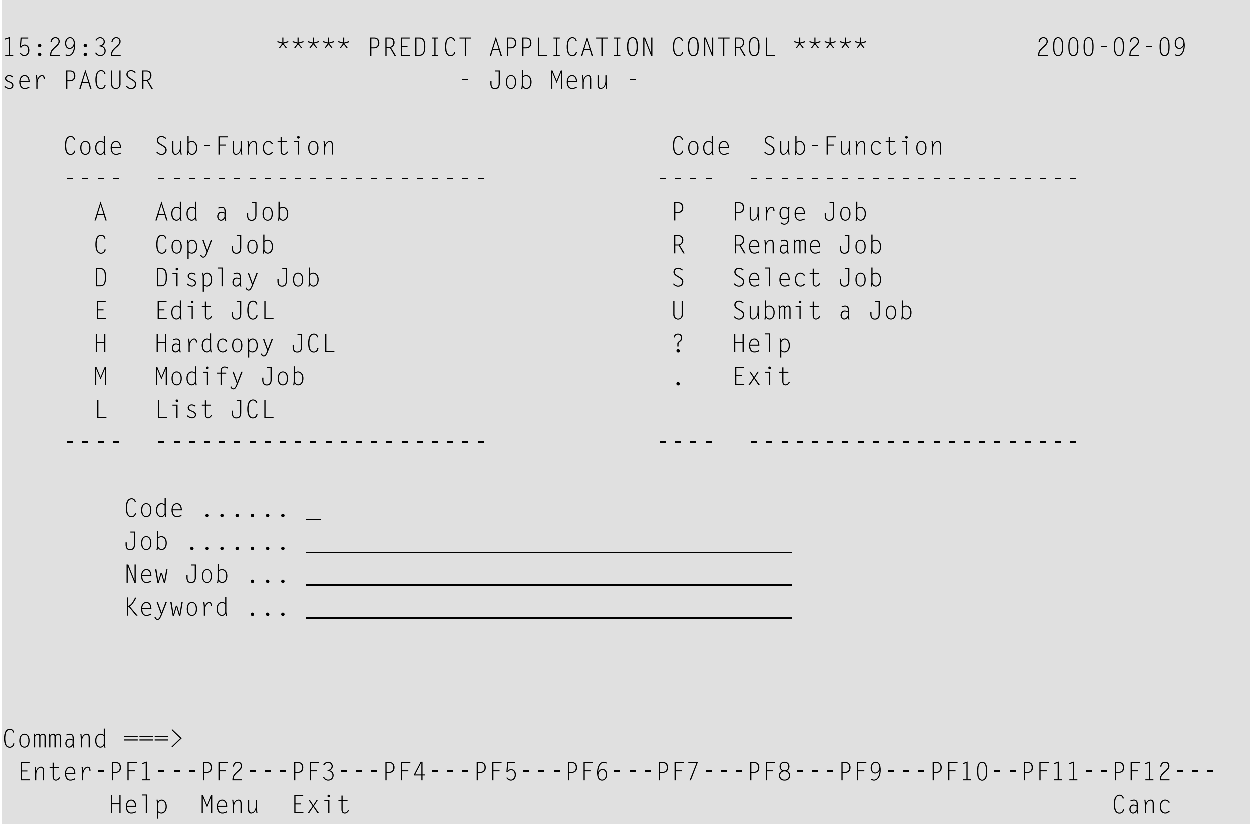
Note: As part of the installation / upgrade process includes the re-loading of PAC jobs, it is recommended that you copy the delivered jobs to customized names, before any site-specific information is changed. Otherwise these changes will be lost when upgrading to a higher version.

This chapter covers the following topics:

Accessing the Job Sub-Functions

To access the PAC job maintenance and reporting sub-functions, enter Code J (Jobs) on the PAC Main Menu.

Depending on your user profile, either the Job Menu or the Job Reporting Menu appears. The Job Menu, which combines the maintenance and reporting menus, is used in discussions throughout this section.



```
15:29:32          ***** PREDICT APPLICATION CONTROL *****           2000-02-09
ser PACUSR                          - Job Menu -

    Code  Sub-Function                        Code  Sub-Function
    ----  ---------------------------        ----  ----------------------
      A   Add a Job                           P    Purge Job
      C   Copy Job                            R    Rename Job
      D   Display Job                         S    Select Job
      E   Edit JCL                            U    Submit a Job
      H   Hardcopy JCL                        ?    Help
      M   Modify Job                          .    Exit
      L   List JCL
    ----  ---------------------------        ----  ----------------------

        Code ...... _
        Job ....... ________________________________
        New Job ... ________________________________
        Keyword ... ________________________________



Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit                                                    Canc
```

Field	Description
Job	Identifies new or existing jobs. You may enter a job name, an alias, or range notation. The job name must begin with an alphabetic character and may be up to 32 characters in length. Embedded blanks are allowed but are translated by PAC to the underscore (_) character. Job names must be unique: if a duplicate job name is entered, an error message is displayed.
New Job	Used to designate a new name for an existing job that is being copied or renamed.
Keyword	Keyword for job Identifies a keyword already assigned to a job(s); used to facilitate job selection. Keywords may be assigned using Additional Options from a relevant sub-function.

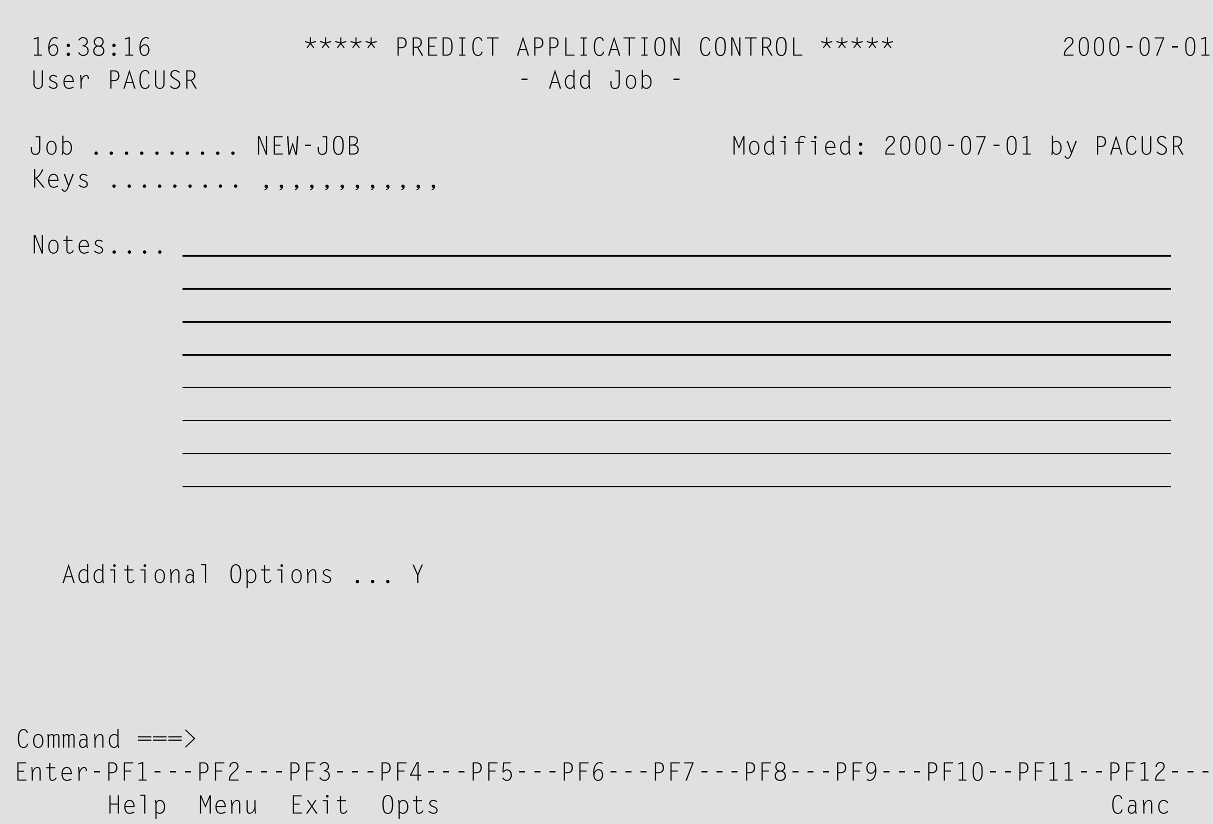
Note: All of the sub-functions listed above, except Add, may be selected for processing directly from the Job Selection List that is accessed using the Select Job sub-function.

Adding (Defining) a Job

1. To access the Add Job screen, enter Code A and a unique job name on the Job Menu.

   The job name must begin with an alphabetic character and may be up to 32 characters in length. Embedded blanks are allowed but are translated by PAC to the underscore (_) character. If a duplicate job name is entered, an error message is displayed.

   Alternatively, you may enter the ADD JOB direct command on the command line. Refer to the PAC Reference documentation for the correct syntax.



```
 16:38:16         ***** PREDICT APPLICATION CONTROL *****          2000-07-01
 User PACUSR                      - Add Job -

 Job .......... NEW-JOB                        Modified: 2000-07-01 by PACUSR
 Keys ......... ,,,,,,,,,,,,

 Notes.... _____________________________________________________________
           _____________________________________________________________
           _____________________________________________________________
           _____________________________________________________________
           _____________________________________________________________
           _____________________________________________________________
           _____________________________________________________________
           _____________________________________________________________


   Additional Options ... Y




Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                              Canc
```

   The job name you entered on the Job Menu is reflected on the Add Job screen and cannot be modified.

2. (Optional) You may add notes in the Notes field. See the **Job Selection List** for an example of how these notes are used in PAC.
3. Select the Additional Options field by pressing PF4 (Opts), or by typing Y (Yes) over the default.
4. From the resulting Additional Options window, select the options you wish to edit:

Option	**Description**
Aliases	Alias for job Job alias Add an alternative name for the job. Refer to the section Assigning Aliases to a PAC Entity on page for more information.

Option	Description
Keys	Job keyword Keyword for job Assign keywords for the job. Keywords must already have been defined to PAC. Refer to Appendix , Defining Keywords to PAC, on page for more information.
JCL	Edit the JCL/JCS for the job on the Natural Editor screen. Refer to the PAC Reference documentation for information about using the editor.

The Date option displays information about the dates and times the job was added/modified, and also identifies the user who performed the addition/modification.

5. Press ENTER to add the job.

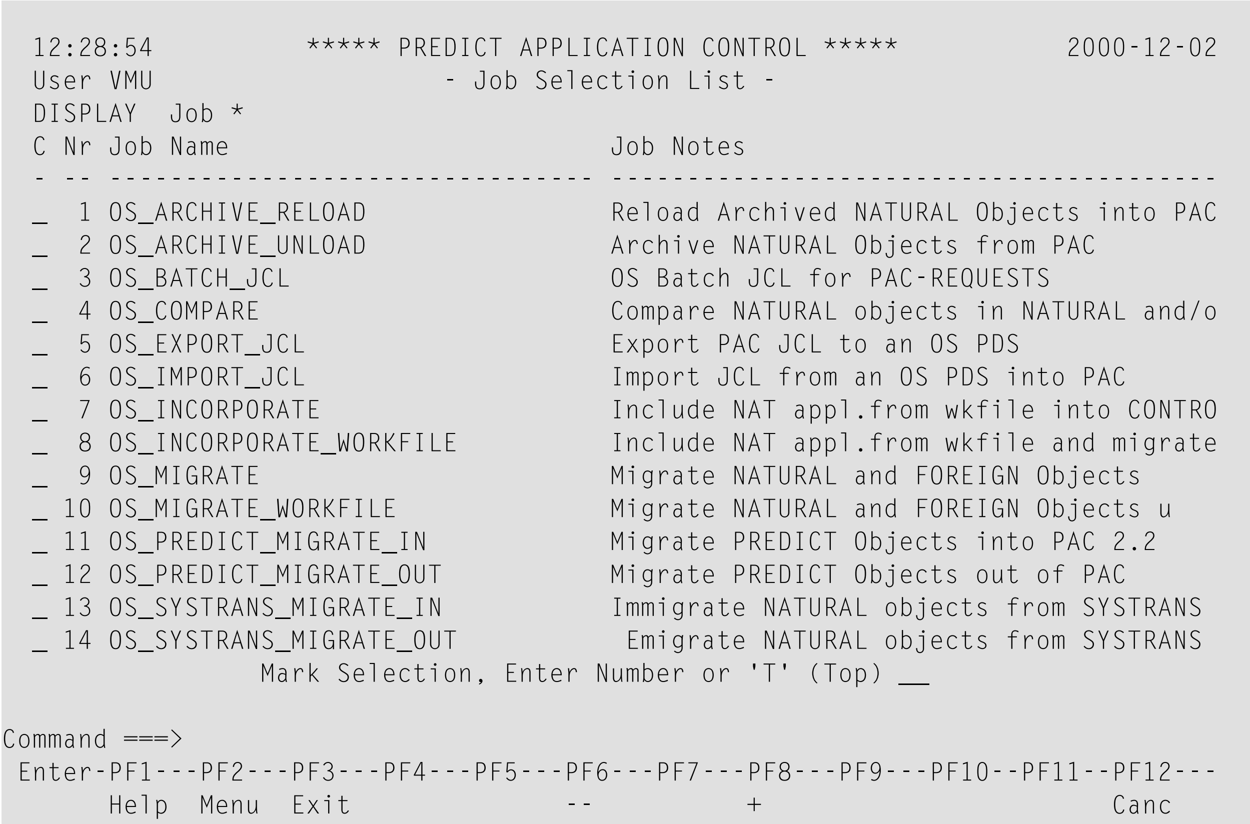
Displaying or Modifying a Job

The Display Job and Modify Job screens are similar to the Add Job screen: they display notes and keywords for the specified job. The Display screen may not be modified. Refer to **Add (Define) an Application** for more information.

To access the Display or Modify screens, enter Code D (Display Job) or M (Modify Job) and the name of the job on the Job Menu. Alternatively, enter the DISPLAY or MODIFY direct command on the command line. Refer to the PAC Reference documentation for the correct syntax.

Selecting a Job

To display a list of jobs, enter Code S (Select Job) on the Job Menu. Alternatively, enter the SELECT JOB direct command on the command line to access the Job Selection List screen. Refer to the PAC Reference documentation for the correct syntax.



```
 12:28:54          ***** PREDICT APPLICATION CONTROL *****           2000-12-02
 User VMU                    - Job Selection List -
 DISPLAY  Job *
 C Nr Job Name                        Job Notes
 - -- ------------------------------- ---------------------------------------
 _  1 OS_ARCHIVE_RELOAD               Reload Archived NATURAL Objects into PAC
 _  2 OS_ARCHIVE_UNLOAD               Archive NATURAL Objects from PAC
 _  3 OS_BATCH_JCL                    OS Batch JCL for PAC-REQUESTS
 _  4 OS_COMPARE                      Compare NATURAL objects in NATURAL and/o
 _  5 OS_EXPORT_JCL                   Export PAC JCL to an OS PDS
 _  6 OS_IMPORT_JCL                   Import JCL from an OS PDS into PAC
 _  7 OS_INCORPORATE                  Include NAT appl.from wkfile into CONTRO
 _  8 OS_INCORPORATE_WORKFILE         Include NAT appl.from wkfile and migrate
 _  9 OS_MIGRATE                      Migrate NATURAL and FOREIGN Objects
 _ 10 OS_MIGRATE_WORKFILE             Migrate NATURAL and FOREIGN Objects u
 _ 11 OS_PREDICT_MIGRATE_IN           Migrate PREDICT Objects into PAC 2.2
 _ 12 OS_PREDICT_MIGRATE_OUT          Migrate PREDICT Objects out of PAC
 _ 13 OS_SYSTRANS_MIGRATE_IN          Immigrate NATURAL objects from SYSTRANS
 _ 14 OS_SYSTRANS_MIGRATE_OUT          Emigrate NATURAL objects from SYSTRANS
                 Mark Selection, Enter Number or 'T' (Top) __

Command ===>
 Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
       Help  Menu  Exit              --          +                       Canc
```

If you accessed the Job Selection List screen with Code S (Select a Job) or with the SELECT direct command for one of the listed jobs, you may invoke the following sub-functions directly by entering the code in the "C' column:

Code	Sub-Function
C	Copy
D	Display
E	Edit
M	Modify
P	Purge
X or S	Select
R	Rename
U	Submit

The Copy, Rename, and Submit sub-functions each display a window on which you may enter the new name of the job to be copied, renamed, or submitted.

If you mark the job with the cursor, or enter an X or an S in the "C" column, or enter the job number (from the "Nr" column) in the Mark Selection... field, the Job Menu appears with the specified job already displayed in the Job field.

Copying a Job

You may copy a job from the Job Menu, from the Job Selection List, or by issuing a direct command.

1. To copy an existing job from the Job Menu, enter Code C (Copy Job), the name of the job you wish to copy (Job field) and a new name for the job (New Job field).

   In the **Job Selection List** mark the job you wish to copy with C in the "C" column. On the resulting Copy Job window, enter a new name for the copied job.

   Alternatively, enter the COPY JOB command on the command line. Refer to the PAC Reference documentation for the correct syntax.

   The Copy PAC Job screen appears; this screen is similar to the **Add Job screen**. You may modify the Notes field and the Additional Options, including Aliases, Keywords, and the JCL.
2. Press ENTER to confirm your modifications.

The message that the job (that is, the old job name) has been copied appears at the bottom of the screen.

Renaming a Job

You may rename a job from the Job Menu, from the Job Selection List, or by issuing a direct command.

Note: If you rename a job, you must also rename it in the migration paths that use this job. Refer to **Migration Path** for information about migration path defaults.

1. To rename an existing job from the Job Menu, enter Code R (Rename Job), the name of the job you wish to rename (Job field), and a new name for the job (New Job field).

   From the **Job Selection List** mark the job you wish to rename with R in the "C" column. On the resulting Rename Job window, enter a new name for the job.

   Alternatively, enter the RENAME JOB command on the command line. Refer to the PAC Reference documentation for the correct syntax.
2. Press ENTER to confirm your modifications.

The message that the job (that is, the old job name) has been renamed appears at the bottom of the screen.

Submitting a Job

You may submit a job for execution from the Job Menu, from the Job Selection List, or by issuing a direct command.

Note: Jobs for migration events must be submitted from the Submit Migration Event screen because of the automatic substitution of various PAC substitution characters. Refer to **Authorizing and Submitting a Migration Event** for more information. For more information about PAC substitution characters, see **Job Control Substitution Parameters**.

1. To submit a job from the Job Menu, enter Code U (Submit a Job) and the name of the job.

   From the **Job Selection List** mark the job you wish to submit with U in the "C" column.

   Alternatively, enter the SUBMIT JOB command on the command line or the SUB command on the command line of the JCL screen (i.e., the Natural editor). Refer to the PAC Reference documentation for the correct syntax.
2. On the resulting Submit Confirmation window, confirm the request by entering Confirm or pressing PF5 (Sub).

When a job is submitted successfully, a message to that effect appears at the bottom of the screen.

Editing Job Control

You may edit job control statements (JCL/JCS) on the Natural editor screen using Natural editor commands and variable substitution parameters identified by an "@" prefix. Setting and modifying the @ prefix character is a PAC administrator function.

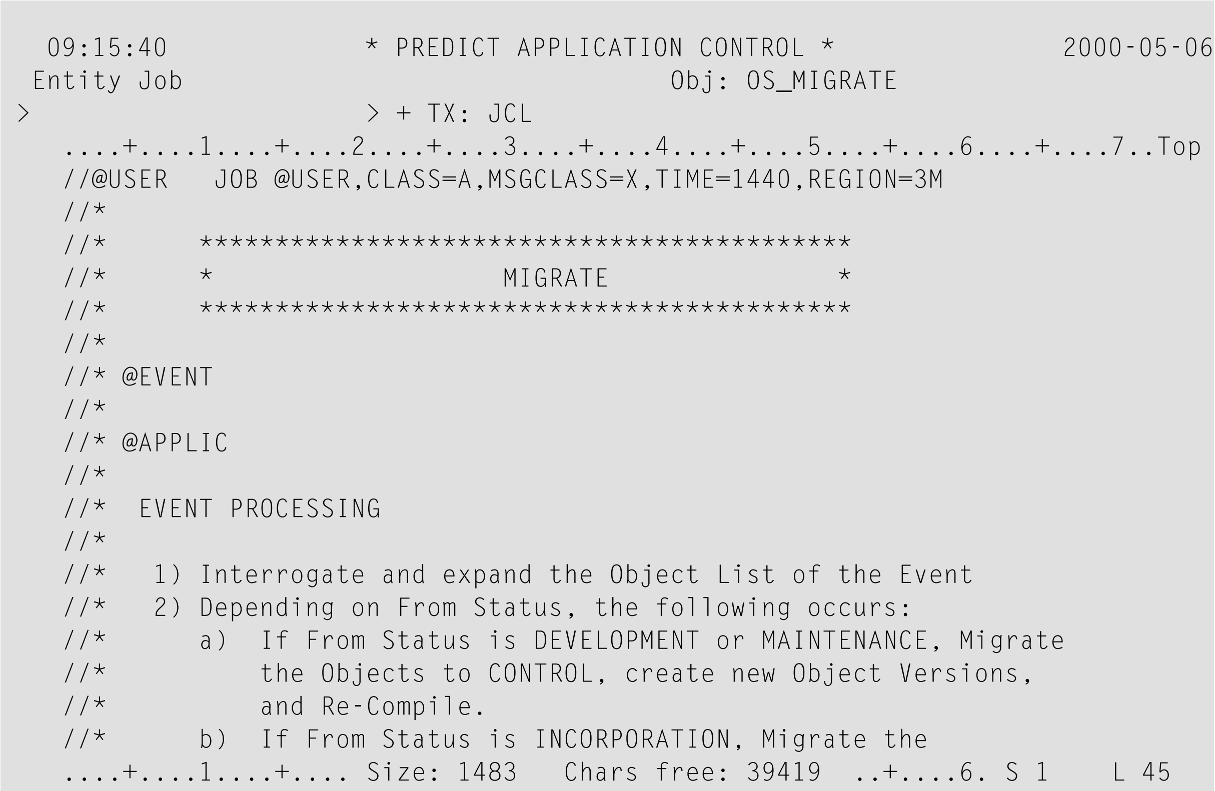
Refer to the PAC Reference documentation for more information about Natural editor commands.

Variable substitution parameters are discussed in the section **Job Control Substitution Parameters**.

1. Access the Natural editor from one of the following screens as indicated:

Screen	Action
Add Job	Access Additional Options and enter Y (yes) in the JCL field.
Job Menu	Enter Code E (Edit JCL) and the job name.
Job Menu	Enter Code M (Modify Job) and the job name; from the resulting Modify Job screen, access Additional Options and enter Y (yes) in the JCL field.
Any Job screen	Enter EDIT JOB on the command line. Refer to the PAC Reference documentation for the correct syntax.

The Natural editor screen appears. The following example shows JCL source in the editor:



```
 09:15:40             * PREDICT APPLICATION CONTROL *              2000-05-06
Entity Job                              Obj: OS_MIGRATE
>                      > + TX: JCL
   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7..Top
   //@USER   JOB @USER,CLASS=A,MSGCLASS=X,TIME=1440,REGION=3M
   //*
   //*      *******************************************
   //*      *                   MIGRATE               *
   //*      *******************************************
   //*
   //* @EVENT
   //*
   //* @APPLIC
   //*
   //*  EVENT PROCESSING
   //*
   //*   1) Interrogate and expand the Object List of the Event
   //*   2) Depending on From Status, the following occurs:
   //*      a)  If From Status is DEVELOPMENT or MAINTENANCE, Migrate
   //*          the Objects to CONTROL, create new Object Versions,
   //*          and Re-Compile.
   //*      b)  If From Status is INCORPORATION, Migrate the
   ....+....1....+.... Size: 1483   Chars free: 39419  ..+....6. S 1    L 45
```

2. Enter new JCL/JCS or modify existing JCL/JCS on the Natural editor screen.
3. Type SAVE on the command line to save your changes.

   The message "CATALOG/SAVE completed successfully" appears at the bottom of the screen.

4. To exit the Natural editor screen, type a period (.) on the command line.

   If you have made changes and attempt to exit the screen without typing SAVE, a window appears giving you the following options:

   - Enter a period (.) to abandon any changes;
   - Enter E to continue editing;
   - Enter C to save changes.

   Otherwise, the Job Menu appears displaying the message "Text editing completed."

Job Control Substitution Parameters

Variable substitution parameters add flexibility to the standard Natural editor commands and facilities. These parameters are uniquely identified by an "@" prefix (for example, "@PASSWORD") and fall into the following categories:

- **Automatic Substitution Parameters** are predefined to PAC. Each time a job is submitted, PAC automatically substitutes values for these parameters. These parameters may exist in JCL/JCS for either job submission or migration events.
- User-prompted substitution parameters require additional, manual input before they can be executed. Each time the job is submitted, a window is displayed requesting values for these substitution variables. The JCL/JCS text is scanned for such substitution parameters. These parameters are used in job submission JCL/JCS only.

Rules for Using Substitution Parameters

The following rules apply when using all JCL/JCS substitution parameters:

- A maximum of 10 variables is allowed for any given job.
- There is no limit to the number of occurrences of any given parameter within a job.
- A default character other than "@" may be specified by the PAC administrator for identifying substitution parameters.
- The name of the job itself may be substituted in the JCL/JCS by using the text string @JOB-ID.
- When a particular line of JCL/JCS is parsed, the substitution string is terminated if any of the following characters is encountered:

'	quote (apostrophe)
,	comma
(	left parenthesis
)	right parenthesis
;	semicolon
:	colon
$	dollar sign

In addition to these characters, another instance of the substitution character "@" will terminate the substitution string.

Automatic Substitution Parameters

Automatic JCL substitution parameters are identified and explained in the following table:

Automatic Parameter	Replaced by . . .
@APPLIC	the name of the application being migrated.
@APL-CONTROL	the DBnr/Fnr of the ACF system file.
@DATD	the current date in the format dd.mm.yy.
@DATE	the current date in the format dd/mm/yy.
@DATG	the current date in the format ddmonthnameyyyy.
@DATI	the current date in the format yy-mm-dd.
@DATJ	the current Julian date in the format yyddd.
@DATN	the current date in the format yyyymmdd.
@DATU	the current date in the format mm-dd-yy.
@DBID_LIBRARY	database ID of transfer library for OpenSystem objects
@EVENT	the name of the migration event being processed.
@FDIC-FROM	the FDIC (the Predict dictionary file) from which the files are being migrated (in the format "(DBnr/Fnr)").
@FDIC-TO	the FDIC to which the files are being migrated (in the format "(DBnr/Fnr)").
@FNR_LIBRARY	file number of transfer library for OpenSystem objects
@FUSER-FROM	the name of the Natural FUSER from which the files are being migrated (in the format "(DBnr/Fnr)").
@FUSER-TO	the name of the Natural FUSER to which the files are being migrated (in the format "(DBnr/Fnr)").
@LIBRARY_TEMP	temporary transfer library for OpenSystem objects
@PASSWORD	an 8-character user password that is obtained from the user at submission time. (Input will be "hidden").
@PRD-CONTROL	the DBnr/Fnr of the PCF system file (in the format "(DBnr/Fnr)").
@TIME	the current time in the format `hhmmss'.
@USER	the user ID of the user submitting the job. If a batch ID has been specified in the user profile, the batch ID will be substituted.

User-Prompted Substitution Parameters

Caution: When using the "@" prefix with user-prompted substitution parameters, the length of the expanded job card must not exceed 72 characters.

User-prompted JCL substitution parameters are displayed on the Job Submission screen each time the job is submitted.; the user must supply the appropriate value for each unique substitution parameter. If there are no user-prompted substitution parameters in the JCL, this screen does not appear and the job is submitted without intervention.

The variables you enter on the Job Submission screen are then substituted into the job stream so that you may specify each variable for each job without using the Natural editor.

As an example of this feature, the JCL for your job might consist of the following statements:

```
//USER    JOB @USER,CLASS=A,MSGCLASS=X,REGION=2048K
//*
//CMWKF01 DD DSN=@LIBRARY(@MEMBER),DISP=SHR
```

The first line of the listed JCL statements contains the automatic JCL substitution parameter "@USER"; this value will automatically be replaced in the job stream with the user ID of the user submitting the job.

In addition to this automatic JCL substitution parameter, the JCL statements contain the user-prompted JCL substitution parameters @LIBRARY and @MEMBER. You will need to specify a value for each of these variable on the Job Submission screen. You will only be prompted once for each unique user-prompted substitution parameter.

Purging a Job

To purge a job, enter Code P (Purge a Job) and the job name on the Job Menu. Alternatively, enter PURGE JOB on the command line of the Job Menu. Refer to the PAC Reference documentation for the complete syntax.

From the resulting Purge Confirmation window

- Type Confirm or press PF5 to purge the job.
- Type a period (.) or PF3 to return to the Job Menu without purging the job.

45 Change Control Logs

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- Checking Objects Back In to PAC 480
- Accessing the Change Control Log Sub-Functions 481
- Selecting a Log from a List 482
- Displaying a Change Control Log 484

When objects are migrated to or from a maintenance status, the check-out/check-in facility of PAC is automatically activated: objects are checked out of PAC to a maintenance status type, then are checked back into PAC. The maintenance activities are tracked through the audit history of the change control logs that record these events.

Detailed information about the maintenance of Natural objects can be retrieved using the change control log sub-function of the PAC check-out/check-in facility

For general information about change control logs, refer to **Maintaining Natural Objects in PAC**.

This chapter covers the following topics:

Checking Objects Out for Maintenance

Note: Different users may check out the same object since each user has a unique copy of the object.

When you set up the migration event to check an object out to a maintenance status, you may identify a maintenance request ID, but that is not required. When the migration event is processed

- the specified versions of the objects are migrated to the maintenance status location;
- an object status is created; and
- a change control log is created for each object.

Information recorded when the change control log is created can be displayed on the **Display Change Control Log**screen.

Checking Objects Back In to PAC

Before a maintenance change to an object can be recorded, the object must be returned to PAC. The migration event to return the object to the PAC controlled environment should specify

- the maintenance status in which the object is being maintained;
- the destination status, which must be Control, test, or production; and
- optionally, the maintenance request ID.

When the migration event is processed

- the object is moved or copied from the maintenance status into Control;
- the link of the object version checked out to the maintenance status is purged; and
- the change control log for that object is located, updated, and closed.

- If the Copy option is used, a new change control log of the new version of the object is created, and the new version of the object is placed in the origin maintenance status.
- If the Move option is used, the object is checked in and physically deleted from the maintenance library.

If applymod 24 is switched on, only the source of the object is deleted from the maintenance library.

If PAC User Exit 7 is active, the user may verify the check-in.

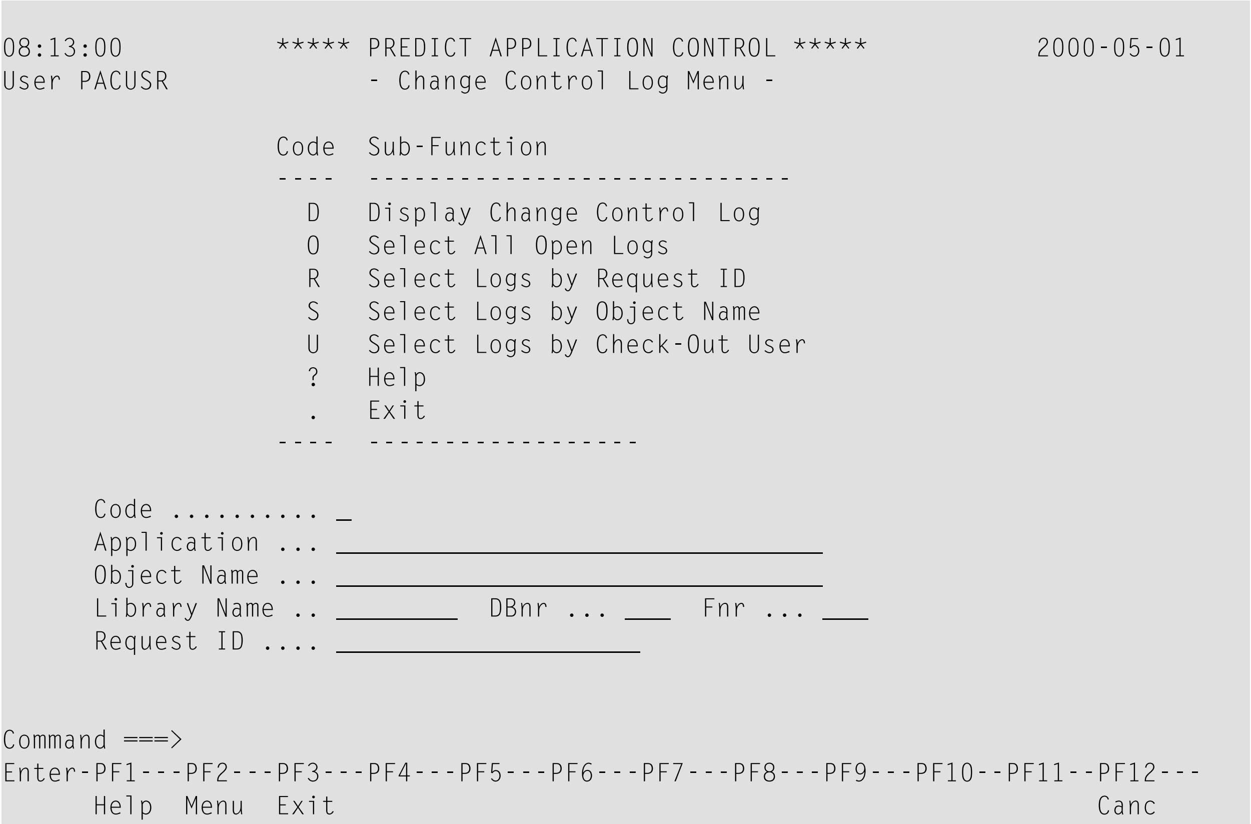
PAC audits the check-in of the object. This information can be viewed in the audit report.

The updated change control log can be displayed on the **Display Change Control Log** screen.

Accessing the Change Control Log Sub-Functions

To access the PAC Change Control Log sub-functions, enter Code Q on the PAC Main Menu.

The Change Control Log Menu appears:



```
08:13:00          ***** PREDICT APPLICATION CONTROL *****           2000-05-01
User PACUSR             - Change Control Log Menu -

                  Code  Sub-Function
                  ----  ----------------------------
                    D   Display Change Control Log
                    O   Select All Open Logs
                    R   Select Logs by Request ID
                    S   Select Logs by Object Name
                    U   Select Logs by Check-Out User
                    ?   Help
                    .   Exit
                  ----  ------------------


      Code .......... _
      Application ... ________________________________
      Object Name ... ________________________________
      Library Name .. ________  DBnr ... ___  Fnr ... ___
      Request ID .... ____________________


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                    Canc
```

From this menu, you can retrieve change control log information for a specific log, or you can retrieve lists of all logs, logs for objects checked out but not yet checked back in, logs displayed alphabetically by maintenance request ID, object name, or user who checked the object out.

The input fields on the screen are used to enter search criteria for retrieving logs. Depending on the sub-function, entries may be required or optional. See **Selecting a Log from a List** for more information. You may specify a value or a range for Object Name, Library Name, and Request ID. In the DBnr and Fnr fields, you may indicate a search of all numbers by leaving the field blank or entering a 0; or you may enter a specific value (1-254 for DBnr; 1-255 for Fnr).

Selecting a Log from a List

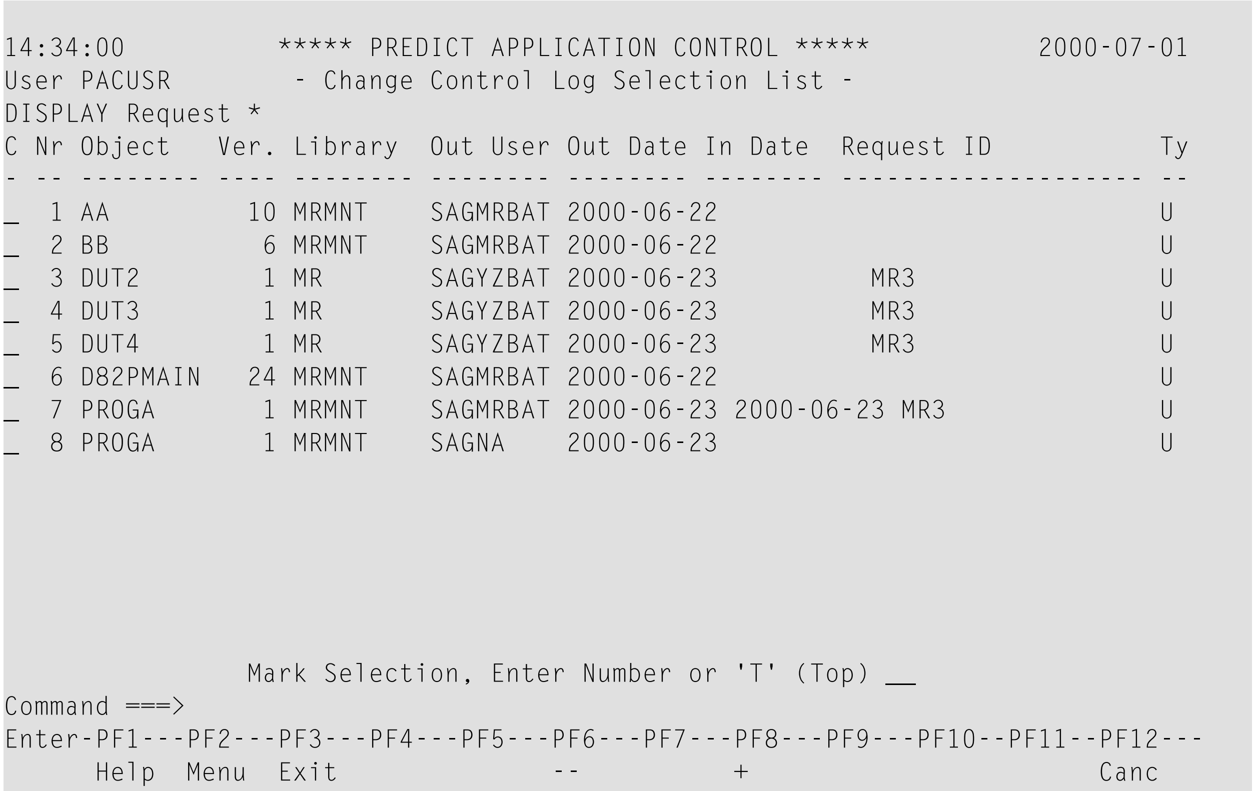
To access a list of logs from the Change Control Log Menu, enter one of the Select ... sub-functions (O, R, S, U) and the required search criteria.

The requirements for each available option are indicated in the following table:

Code	**Description and Requirements**
O	All open logs for an application. Enter any relevant selection criteria; the application name is required.
R	All logs for a specified maintenance request. Enter the name of the maintenance request or a range in the Request ID field; the application name is optional.
S	All logs for a specified object. Enter the object name or a range in the Object Name field; the application name is optional.
U	All logs for an application for the current check-out user. Enter any relevant selection criteria; the application name is required. To select all logs that are checked out but not yet checked in, enter Code U and in the Request ID field, enter the user ID followed by ".O"; for example, SAGNA.O.

Note: Since the selection criteria may result in many reads before a selection is made, the monitor option may be used to view all activities. You may set the monitor on by typing "MON" on the command line and turn it off by typing "NOMON". By default, the monitor is set to off.

The Change Control Log Selection List screen appears displaying the requested list of logs:



```
14:34:00          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR        - Change Control Log Selection List -
DISPLAY Request *
C Nr Object   Ver. Library  Out User Out Date In Date  Request ID           Ty
- -- -------- ---- -------- -------- -------- -------- -------------------- --
_  1 AA         10 MRMNT    SAGMRBAT 2000-06-22                             U
_  2 BB          6 MRMNT    SAGMRBAT 2000-06-22                             U
_  3 DUT2        1 MR       SAGYZBAT 2000-06-23          MR3                U
_  4 DUT3        1 MR       SAGYZBAT 2000-06-23          MR3                U
_  5 DUT4        1 MR       SAGYZBAT 2000-06-23          MR3                U
_  6 D82PMAIN   24 MRMNT    SAGMRBAT 2000-06-22                             U
_  7 PROGA       1 MRMNT    SAGMRBAT 2000-06-23 2000-06-23 MR3              U
_  8 PROGA       1 MRMNT    SAGNA    2000-06-23                             U







                Mark Selection, Enter Number or 'T' (Top) __
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit              --          +                       Canc
```

Note: Objects with no check-out/check-in information are ignored.

The status line directly under the User field displays the sub-function you used to access this screen.

This particular screen is the result of selecting a list in alphabetical order by maintenance request ID. The same columns are displayed for all Select options.

The columns of the Change Control Log Selection List are described as follows:

Column	Description
C	Input field for sub-function codes to display a specific log.
Nr	Screen number assigned to a particular list item.
Object	Name of the object checked out of or back into PAC.
Ver(sion)	Version number of the migrated object.
Library	Name of the maintenance library. If set to ">Cancel<", a check-out was cancelled by a migration from maintenance to Retire.
Out User	Identity of the user who checked the object out to maintenance.
Date	Date the object was checked out of or back into PAC.
Request ID	Name or number of the maintenance request for the object, if there is one.
Ty(pe)	Maintenance request type of check-out The intention or result of the check-out: U indicates an intention to update the object. If a checked-in object displays type U, the

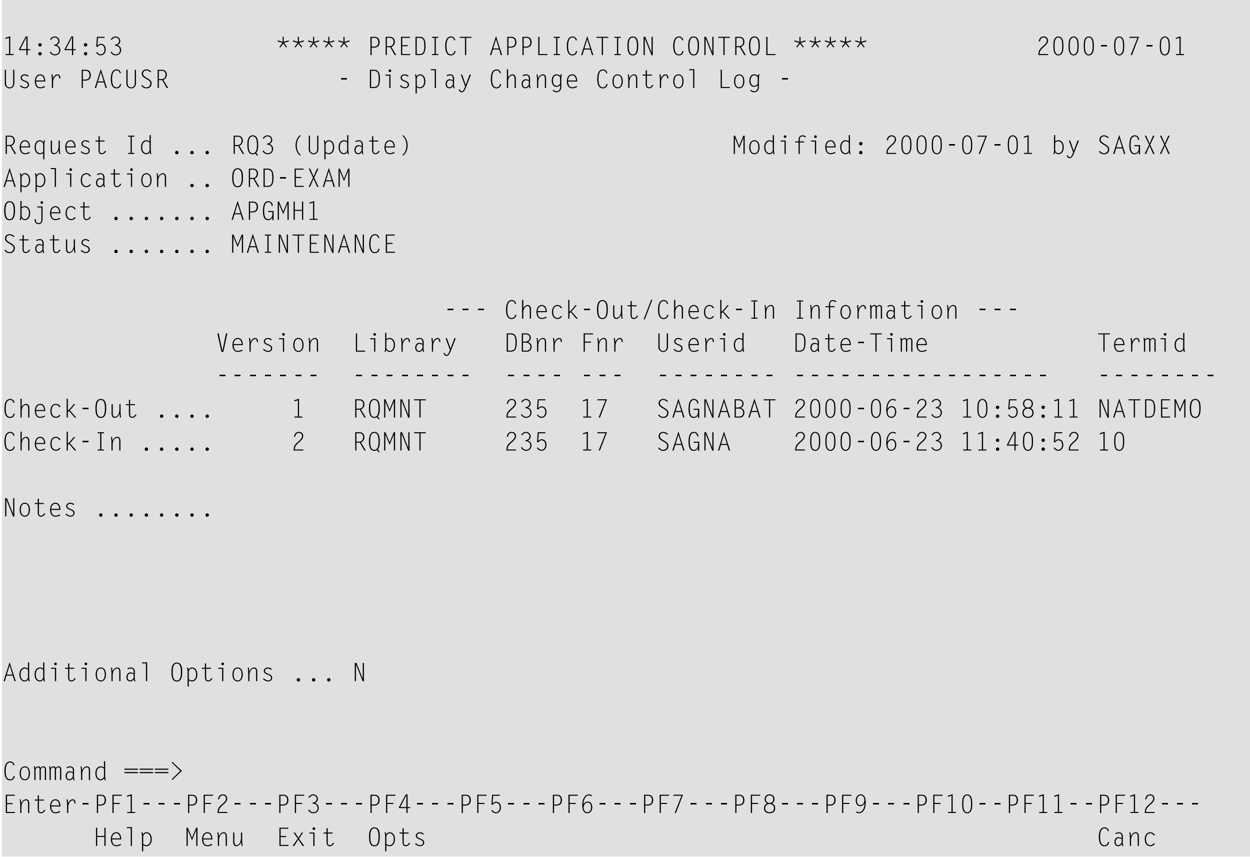
Column	Description
	object has been updated. A indicates an intention to access the object only. PAC determines whether changes were in fact made when the object is checked-in.

To display the log entries for a specific object, type the number of the object (from the "Nr" column) in the Mark Selection... field, or mark the object with D in the "C" column.

The **Display Change Control Log screen** appears.

Displaying a Change Control Log

To select a specific change control log, enter Code D on the Change Control Log Menu and selection criteria sufficient to uniquely identify the log, or select a log from a list.



```
14:34:53          ***** PREDICT APPLICATION CONTROL *****           2000-07-01
User PACUSR           - Display Change Control Log -

Request Id ... RQ3 (Update)                     Modified: 2000-07-01 by SAGXX
Application .. ORD-EXAM
Object ....... APGMH1
Status ....... MAINTENANCE

                             --- Check-Out/Check-In Information ---
              Version  Library   DBnr Fnr  Userid   Date-Time           Termid
              -------  --------  ---- ---  -------- -----------------   --------
Check-Out ....     1   RQMNT     235  17   SAGNABAT 2000-06-23 10:58:11 NATDEMO
Check-In .....     2   RQMNT     235  17   SAGNA    2000-06-23 11:40:52 10

Notes ........




Additional Options ... N


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit  Opts                                            Canc
```

If you specified a maintenance request ID on the migration event, that ID along with the type (Update or Access only) in parentheses is recorded along with the name of the object migrated, its application, and the name of the maintenance status.

The table of Check-Out/Check-In Information provides for each event:

Version	the version of the specified object migrated out of/into PAC.
Library	the name of the maintenance library.
DBnr/Fnr	the location of the object before it was migrated.
Userid	the value of the *USER variable at the time the event was processed.
Date-Time	the date and time of the event, and
Termid	the value of the *INIT-ID variable at the time the event was processed - a terminal ID or batch.

The Notes field displays additional information created during the processing of the event, or comments you may want to attach to the change control log.

The Additional Options (change the default N to Y or press PF4) available from this screen allow you to

- display the date and time the object was added / modified, and by whom.
- display the Events for Maintenance Request screen which lists the other migration events to which the current maintenance request ID is assigned.

A Appendices

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- Using the Change Control Facilities 491
- The PAC Administrator Functions 492
- Checklist for Setting Up Applications in PAC 495
- Overview of PAC Activities 495

This appendix lists a series of actions for using PAC as follows:

- Setting up the PAC system in your environment;
- Setting up the PAC environment for an application; and
- Moving an application through its life-cycle, and ultimately into production.

Change control activities, reporting activities, and PAC administrator functions are also included.

These actions are not necessarily listed in the sequence in which they are to be accomplished; however, any prerequisites to a particular action or step are indicated. Note the following:

- Applications and statuses must be defined before application status links can be defined.
- Some steps are optional and/or can be performed at any time. For example, keywords can be defined to PAC at any time; however, they must be defined to PAC before they can be assigned to PAC entities.
- Authorization suggests the users who may be authorized to perform these functions, for example:
  - PAC configurator (PC);
  - Administrator (ADM);
  - Project leader (PL);
  - Authorized user (AUTH);
  - Database administrator (DBA);
  - Natural Security administrator (NSA);
  - User (USER). Users may be developers, quality assurance personnel, or coordinators; however, authorization requirements are specific to individual environments.
  - Reference indicates the location in this documentation or in another PAC documentation where you can find detailed instructions for the particular step.

The following sections summarize the actions used to set up PAC in your environment.

This document covers the following topics:

- **Setting Up the Application Environment**
- **Setting Up the Environment for Processing Applications**
- **Using the Change Control Facilities**
- **The PAC Administrator Functions**
- **Checklist for Setting Up Applications in PAC**
- **Overview of PAC Activities**

Setting Up the Application Environment

Define the Application to PAC

Authorization:	PC
Reference:	Configuring a PAC Environment

Define and Locate the Statuses and Associated Predict Files

Define and locate the statuses and associated Predict files from/to which the application can be migrated. The following status types have the specified location considerations:

Authorization:	PC/PL
Reference:	Configuring a PAC Environment

Define the Application Status Links

Note: The application and statuses must be defined to PAC first.

Authorization:	PC/PL
Reference:	Configuring a PAC Environment

Define a File Translation Table as Required

Authorization:	PC
Reference:	Configuring a PAC Environment

Define a Migration Path (Select Migration (Jobs)

Define the origin and destination statuses for the application. The migration path must be set up before you can set up a migration event.

Authorization:	PC
Reference:	Configuring a PAC Environment

Set Up a Migration Authorization

Specify the user(s) who may authorize a migration; that is, someone who may be identifies as "AUTH".

Authorization: PC
Reference: Configuring a PAC Environment

Incorporate an Application

Bring an application already implemented in a production status type into PAC.

Authorization: USER
Reference: Migrations, andMigrations Into, Within, and Out of PAC

Setting Up the Environment for Processing Applications

The following actions are performed in sequence:

1. Create the migration event to move the application from one status to another (migration path). Identify the activities that must take place during the migration of the objects of an application.

   Note: The event that moves Predict objects must be run before the event that moves/copies the Natural application objects.

   Authorization: USER
   Reference: Migration Events

2. Build the object list. The object list identifies the objects of an application to be migrated.

   The expand status option may be used to specify the status from which subordinate objects are to be compiled.

   Authorization: USER
   Reference: Creating and Validating an Object List

3. Validate the object list. PAC checks the list of objects to be migrated.

   Authorization: USER
   Reference: Creating and Validating an Object List

4. Authorize the event. Permission is given to execute the migration.

Authorization: AUTH

Reference: Authorizing and Submitting Migration Events

5. Submit the event; this activates the job that runs the migration event.

   Authorizer: USER

   Reference: Authorizing and Submitting Migration Events

6. Monitor the processing of the migration event. The Audit Report and the Job Information screens show the progress of the migration.

   Authorizer: USER

   Reference: Authorizing and Submitting Migration Events

Using the Change Control Facilities

The following change control facilities are used to track and maintain application objects.

Maintain Table Entries

Maintenance request table entries are maintained by the PAC administrator.

Authorizer: ADM

Reference: Assigning and Maintaining Object Versions; Administration documentation section Object Version Maintenance

Define Maintenance Requests

Integrates PAC with problem-tracking systems so that maintenance of objects can be monitored by PAC.

Authorizer: USER

Reference: Assigning and Maintaining Object Versions and Maintenance Requests

Track the Maintenance Activities of Application Objects

Change control logs can be reviewed for check-out/check-in information.

Authorizer:	USER
Reference:	Assigning and Maintaining Object Versions and Changing Control Logs

Compare Versioned Objects

Use this PAC-related utility for comparing objects both inside and outside the PAC environment.

Authorizer:	USER
Reference:	Reference documentation section Compare Utility

Retrieve Information About Versioned Objects

Retrieve information about objects that have been moved into the PAC environment and assigned a version number.

Authorizer:	USER
Reference:	Assigning and Maintaining Object Versions

The PAC Administrator Functions

The following functions are available to the PAC administrator.

Maintain Archive Events

- Remove objects from the PAC environment;
- Restore archived objects to the PAC environment.

Authorization:	ADM/DBA
Reference:	Chapter , Migration Into, Within, and Out of PAC; Administration documentation chapter Archive Event Maintenance

Maintain General Defaults

Modify the following:

- Application defaults to generate migration event names automatically;
- Applymods to override selected PAC defaults;
- Profile defaults, such as screen header, number of transactions performed before an ET is issued, number of transactions before a Natural rollout;
- Extended Descriptions (textual attributes) of applications, job JCL/JCS, and migration events;
- JCL for jobs;
- Predict generation defaults may be copied to the Predict Control File (PCF).

Authorization:	ADM/DBA
Reference:	Administration documentation chapter General Defaults Maintenance

Maintain View Security

Identify and assign protection levels for view usage by objects.

Authorization:	ADM/DBA
Reference:	Administration documentation chapter View Security Maintenance

Verify Locked Data

Display or release data currently being processed or locked due to incomplete processing.

Authorization:	ADM/DBA
Reference:	Administration documentation chapter Locked Data Maintenance

Maintain User Profiles

Add or modify profiles of users of the PAC system.

Authorization:	ADM/DBA
Reference:	Administration documentation chapter User Profile Maintenance

Maintain Versioned Objects

Maintain versioned objects; purging object versions, archived objects, change control logs.

Authorization:	ADM
Reference:	Administration documentation chapter Object Version Maintenance

Define and Maintain Maintenance Requests: Customize Tables Defined to PAC

Maintain the status and action tables used when maintenance requests are defined to PAC.

Authorization:	ADM
Reference:	Chapter , Assigning and Maintaining Object Versions; Administration documentation chapter Table Maintenance

Maintain User Exits

User exits provide facilities that allow control to be passed to a user-written Natural program (user exit routine).

Authorization:	ADM/NSA/PC
Reference:	Reference documentation chapter User Exits

Maintain Application Program Interface (API) Facilities

Maintain the Natural facilities that allow the user to call PAC directly from within a user-written program outside the control of PAC.

Authorization:	ADM/NSA/PC
Reference:	Reference documentation chapter Application Programming Interface

Maintain System Applymods (System Defaults)

Switch on/off the applymods currently used by PAC.

Authorization:	ADM
Reference:	Reference documentation chapter System Applymods

Checklist for Setting Up Applications in PAC

Application setup activities for PAC are summarized below. The overall environment can be modified at any time; applications can be defined to PAC at any time.

Define the Overall Environment

- Identify your application life-cycle environments: development, maintenance, test, and production
- Identify the type(s) of status(es) applicable for each environment;
- Identify the typical flow of an application through the identified environments;
- Identify the Predict usage for each environment.

Define the Application

- Identify the application and application subsystems, if applicable.
- Identify the application library usage.
- Map the application, subsystems, and library to a PAC application.
- Define the application to PAC.

Review the Application Statuses

- Identify the development, test, maintenance, and production locations of each application.
- Verify the type of status in terms of the behavior of the application attributes as defined by PAC.
- Identify the Predict location of each environment.
- Modify the supplied PAC statuses as required.
- If any new status is identified at this time, add it to the PAC configuration.

Overview of PAC Activities

PAC controls the movement of your application through its life-cycle by prescribing the procedures described in the following paragraphs.

Define and Maintain the Application Environment

- Identify and predefine the development, test, production, and maintenance environments for an application.
- Identify the physical library, database and file numbers of the Natural and Predict system files; identify the foreign nodes and datasets.

Migrate Application Objects

- Define test plans (migration paths) for the secured movement of objects.
- Use automated online/batch migration facilities to migrate objects.
- Document the movement of objects from one status to another.

Maintain Application Objects

- Version each new instance of an object migrated into PAC.
- Track the movement of objects to different maintenance, test, and production libraries; check-out and check-in objects for maintenance.

Audit and Report

- Audit activities performed on an application including compilation and migration of its objects.
- Audit the activities of an application in the production environment.
- Retrieve information about application and object history and status.

Archive and Retire Application Objects

- Remove objects from PAC either temporarily or permanently using the off-line archiving facility.
- Purge objects permanently from PAC or from an application status.

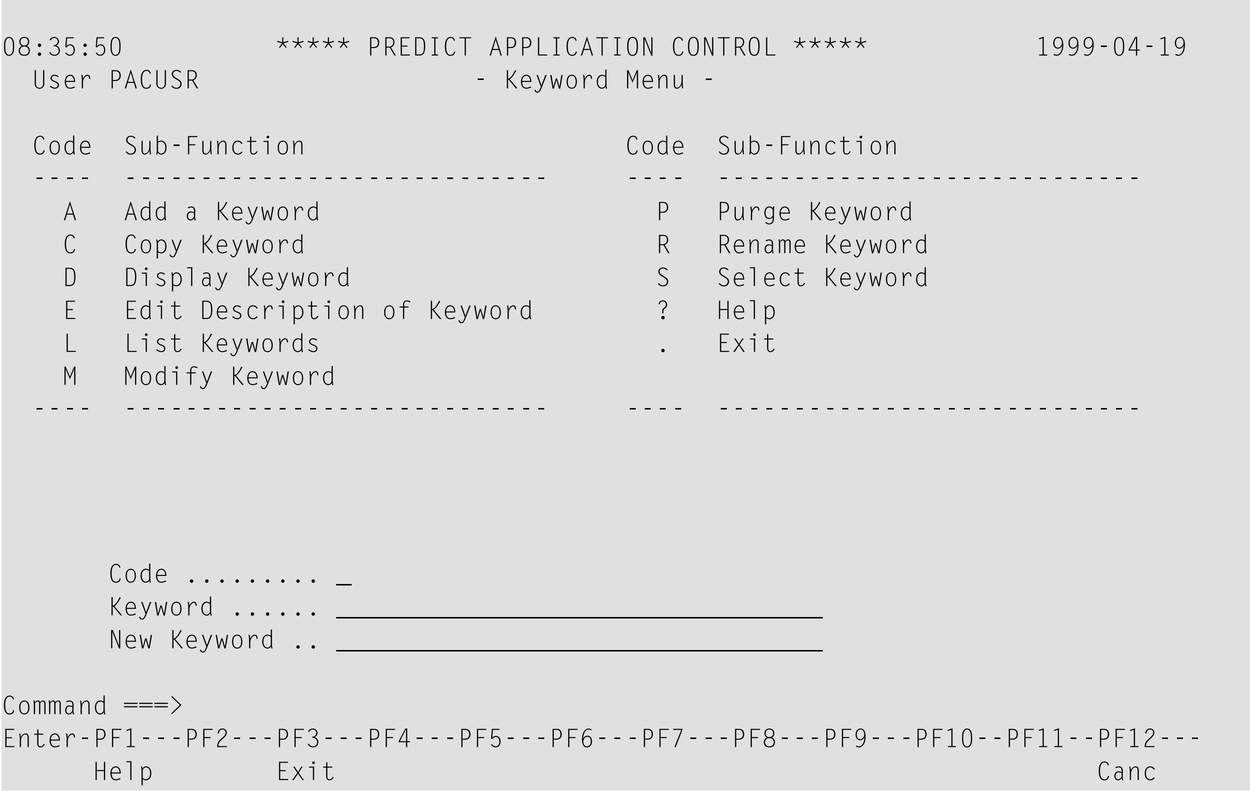
B Appendix

- Keyword and New Keyword Fields 499
- Keyword Menu Sub-Functions 499

Keywords are tags defined by the user to identify and select PAC entities or objects for reporting purposes. Keywords are a PAC option, and may be defined at any time.

Keywords are first defined to the PAC system and subsequently assigned to PAC entities or objects. The Additional Options, available on many PAC screens, provide the "Keys" option for assigning predefined keywords to PAC entities. Direct commands currently are not available for processing keywords.

To access the PAC keyword sub-functions, enter Code K (Keywords) on the PAC Main Menu. Depending on your user profile, you will see the Keyword Menu or the Keyword Reporting Menu. The Keyword Menu which combines the maintenance and reporting menus, is referred to throughout this section.



```
08:35:50          ***** PREDICT APPLICATION CONTROL *****             1999-04-19
  User PACUSR                  - Keyword Menu -

  Code  Sub-Function                     Code  Sub-Function
  ----  ----------------------------     ----  ----------------------------
    A   Add a Keyword                      P   Purge Keyword
    C   Copy Keyword                       R   Rename Keyword
    D   Display Keyword                    S   Select Keyword
    E   Edit Description of Keyword        ?   Help
    L   List Keywords                      .   Exit
    M   Modify Keyword
  ----  ----------------------------     ----  ----------------------------




       Code ......... _
       Keyword ...... ________________________________
       New Keyword .. ________________________________

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit                                                  Canc
```

This document covers the following topics:

- **Keyword and New Keyword Fields**
- **Keyword Menu Sub-Functions**

Keyword and New Keyword Fields

The Keyword field is provided for entering the name of a new or existing keyword.

A keyword name must begin with an alphabetic character and may be up to 32 characters long. Embedded blanks are allowed, but they will be translated automatically to the underscore (_) character. If a duplicate keyword name is entered, an error message is displayed.

The New Keyword field is provided for use with the Copy and Rename functions to name the newly created keyword copy or to rename an existing keyword.

Keyword Menu Sub-Functions

The sub-functions listed on the Keyword Menu are described below:

Code	Sub-Function	Description
A	Add a Keyword	Add a new keyword.
C	Copy Keyword	Copy an existing keyword to a new keyword.
D	Display Keyword	Display a keyword and description on the Display Keyword screens.
L	List Keyword	Displays a list of keywords, and the number of times each keyword has been used.
M	Modify Keyword	Modify an existing keyword.
P	Purge Keyword	Purge a keyword.
R	Rename Keyword	Specify a new name for a keyword.
S	Select Keyword	Select a keyword from a list of keywords.

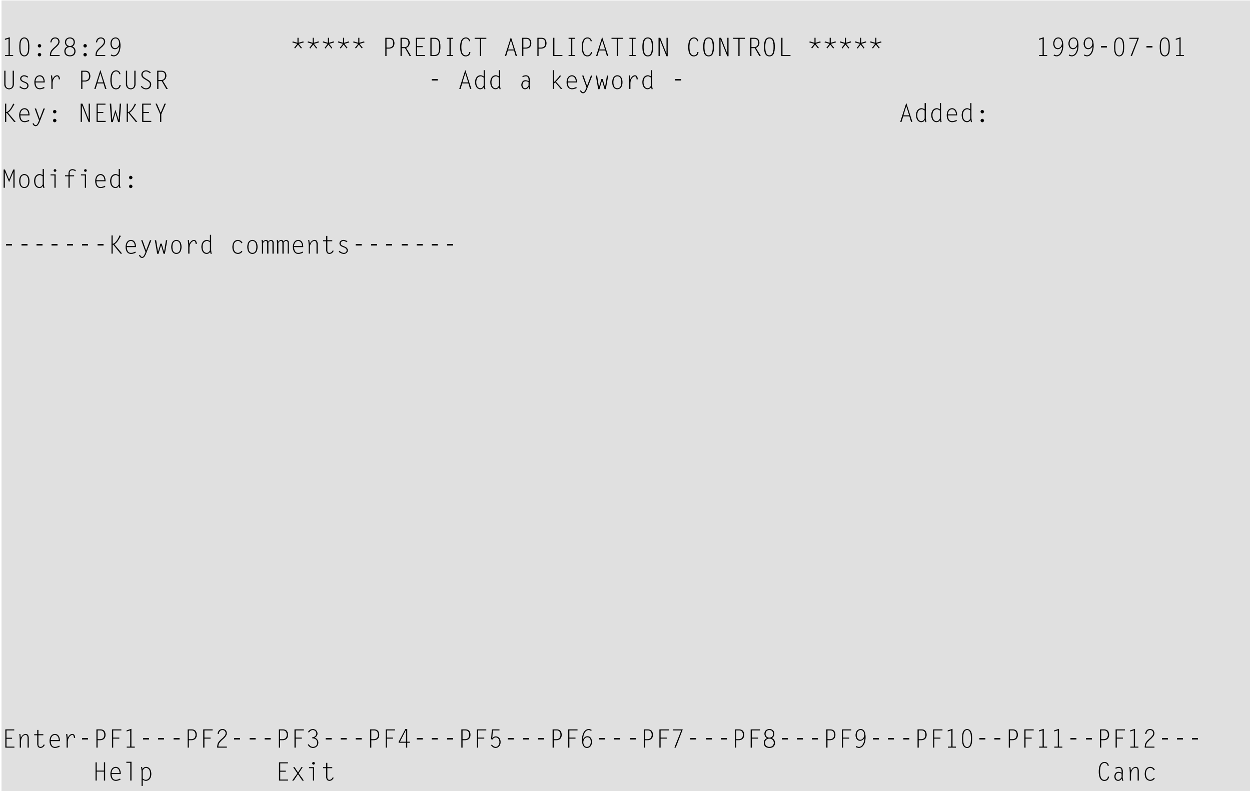
Note: The sub-functions listed above, except Add, may be invoked from the Keyword Selection List displayed when sub-function S is selected.

Adding a Keyword

To add a keyword to PAC, enter Code A and a unique keyword name on the Keyword Menu.

Alternatively, enter the ADD KEYWORD direct command on the command line. Refer to the PAC Reference documentation for the correct syntax.

The Add a Keyword screen appears as shown in the following example:



```
10:28:29           ***** PREDICT APPLICATION CONTROL *****          1999-07-01
User PACUSR                 - Add a keyword -
Key: NEWKEY                                                Added:

Modified:

-------Keyword comments-------
















Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit                                                  Canc
```

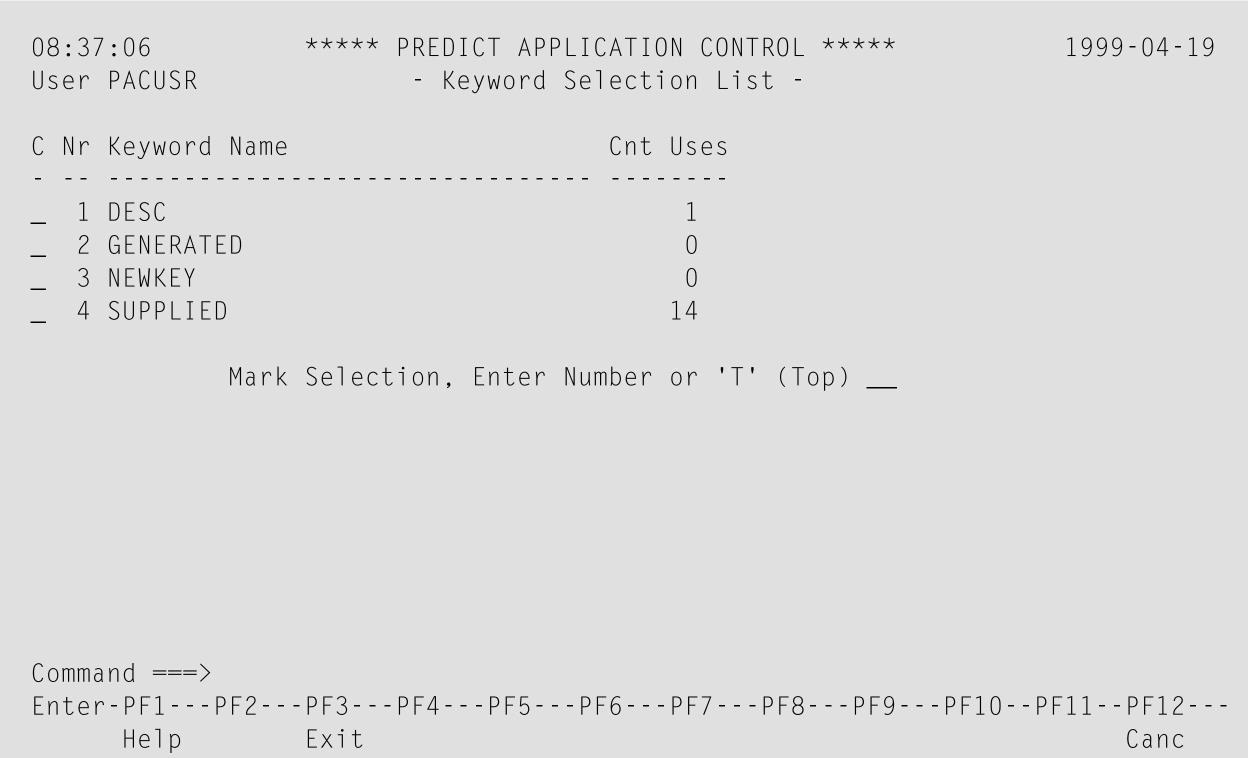
(Optional) In the Keywords Comments field, enter comments.

Selecting a Keyword

To select a keyword from a list, enter Code S (Select a Keyword) on the Keyword Menu.

Alternatively, enter SELECT KEYWORD on the command line. Refer to the PAC Reference documentation for the correct syntax.

The Keyword Selection List appears:



```
08:37:06          ***** PREDICT APPLICATION CONTROL *****           1999-04-19
User PACUSR                - Keyword Selection List -

C Nr Keyword Name                     Cnt Uses
- -- -------------------------------- --------
_  1 DESC                                1
_  2 GENERATED                           0
_  3 NEWKEY                              0
_  4 SUPPLIED                           14

             Mark Selection, Enter Number or 'T' (Top) __










Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help        Exit                                                   Canc
```

The Keyword Selection List displays the names of the keywords defined to PAC and the number of entities that use each keyword.

Either mark the desired keyword with the cursor, or enter the number of the keyword (from the "Nr" column) in the Mark Selection... field.

The Keyword Menu reappears with the specified keyword displayed in the Keyword field.

Displaying/Modifying a Keyword Definition

You may display or modify information about a specific keyword.

From the Keyword Menu, enter Code D (Display Keyword) of M (Modify Keyword) and the complete keyword name.

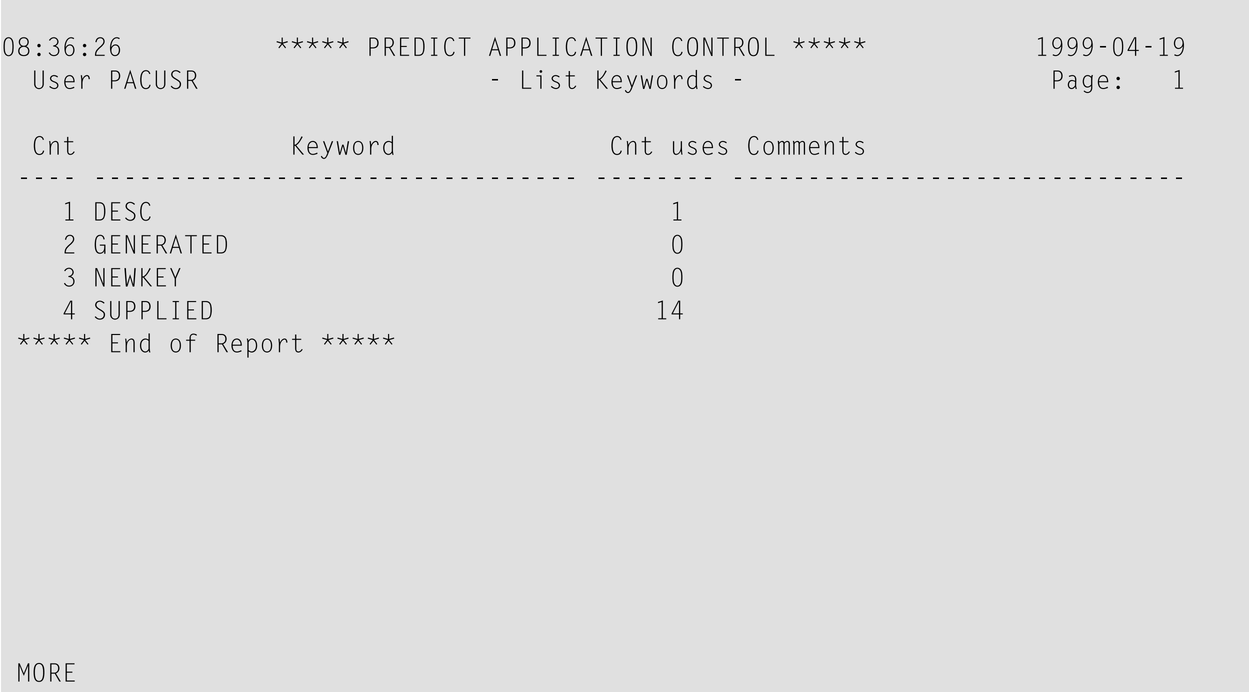
The Display and Modify Keyword screens are similar to the **Add Keyword screen**. They display the name of the keyword; the date it was added (defined) to the PAC system; the date it was modified and comments, if any.

Press ENTER to access the Keyword Additional Description screen (not shown).

Listing Keywords

To display a list of keywords, enter Code L (List Keywords) on the Keyword Menu. To limit the list, you may add the complete name of the keyword where the list is to begin, or range notation.

The resulting List Keywords screen displays a list of keywords, the number of times each keyword has been used (in the Cnt Uses column), and comments entered for each keyword, if any.



```
08:36:26          ***** PREDICT APPLICATION CONTROL *****           1999-04-19
  User PACUSR                   - List Keywords -                    Page:   1

  Cnt              Keyword              Cnt uses Comments
 ---- ------------------------------- -------- -----------------------------
    1 DESC                                  1
    2 GENERATED                             0
    3 NEWKEY                                0
    4 SUPPLIED                             14
 ***** End of Report *****










 MORE
```

Copying a Keyword

To copy a keyword, enter Code C (Copy Keyword) on the Keyword Menu along with the name of the keyword you wish to copy (Keyword field) and a name for the new keyword.

Alternatively, enter the COPY KEYWORD command on the command line. Refer to the PAC Reference documentation for the correct syntax.

On the resulting Copy Keyword screen, edit the attributes for the new keyword and press ENTER to confirm your modifications.

Renaming a Keyword

To change the name of an existing keyword, do the following from the Keyword Menu:

1. Enter R (Rename Keyword) in the Code field.
2. Enter the name of the keyword you wish to rename in the Keyword field.
3. Enter the new name for the keyword in the New Keyword field.
4. Press ENTER.

Alternatively, enter the RENAME KEYWORD direct command on the command line and press ENTER. Refer to the PAC Reference documentation for the correct syntax.

When the keyword has been renamed, the message "Keyword renamed successfully" appears at the bottom of the screen.

Purging a Keyword

To purge a keyword, enter function code P (Purge a Keyword) in the Code field, the name of the keyword you wish to purge in the Keyword field, and press ENTER.

Alternatively, enter the PURGE KEYWORD direct command on the command line. Refer to the PAC Reference documentation for the correct syntax.

From the Purge Confirmation window, you have the following options:

- Type Confirm at the cursor position and press ENTER, or press PF5, if you still wish to purge the keyword.
- Type a period (.) at the cursor position and press ENTER if you do not want to purge the keyword.
- Press PF3 to return to the Keyword Menu without purging the application.