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Adabas Native SQL

Adabas Native SQL Reference Manual

Version 2.5.0

September 2024

ADABAS & NATURAL

Document ID: SQL-REFERENCE-250-20240929

Table of Contents

Adabas Native SQL Reference Manual

This document describes the functions provided by Adabas Native SQL, Software AG's language for accessing Adabas files from Ada, COBOL, FORTRAN and PL/I programs. SQL stands for Structured Query Language.This document also describes how to code the statements that provide these functions.

The document's intended audience is an Ada, COBOL, FORTRAN77 or PL/I programmer who is also acquainted with Adabas concepts and who wishes to develop applications using Adabas Native SQL.

This documentation consists of the following sections:

Introduction	This describes the basic concepts of Adabas Native SQL.
Programming Considerations	This provides background information you should read before using Adabas Native SQL for the first time. This material will help you understand ■ the data structures that Adabas Native SQL builds in your programs, ■ how your program should react if Adabas Native SQL detects an error, ■ how Adabas Native SQL reads lists of records in sequence, ■ how to hold records in order to avoid updating conflicts, and ■ how to access and update files that are protected by the Adabas security mechanisms. This also includes a section on distributed data processing.
Single and Multiple-Record Processing	This deals with considerations when operating in single or multiple-record processing mode.
Overview of Statements	This provides an overview of the syntax used in Adabas Native SQL statements, together with a brief description of the statements themselves, grouped logically according to statement function. This chapter also describes in detail the clauses common to statements which retrieve data from the database.
Adabas Native SQL Statements	This describes in detail all the statements in alphabetical order for easy reference.
Using Adabas Native SQL Statements in TP Programs	This provides additional information on the facilities provided for writing teleprocessing (TP) application programs.
Global Parameters	This describes global parameters which can be used to define processing options and adapt them to your particular requirements.
Appendix A: Size Limitations	Lists the size limitations of Adabas Native SQL.
Appendix B: Descriptions of the Files used in the Examples	Contains a description of the files used in the sample programs and the FORTRAN synonyms that must be used.

Appendix C	Adabas Native SQL statements used in the examples.
Appendix D	ADA Examples
Appendix E	Example of ADA code generated by Adabas Native SQL.
Appendix F	COBOL Examples
Appendix G	Example of COBOL code generated by Adabas Native SQL.
Appendix H	FORTRAN Examples
Appendix I	Example of FORTRAN code generated by Adabas Native SQL.
Appendix J	PL/I Examples
Appendix K	Example of PL/I code generated by Adabas Native SQL.

Other Sources of Information

This reference guide, read in conjunction with the Adabas Introduction Manual, should provide all the information that you need when writing Adabas Native SQL application programs. However, when writing TP application programs or if the database is protected by the Adabas security features, you may need to refer to other sources, for example the database administrator (DBA) or the following literature:

- *Adabas Operations Manual*
- *Adabas Utilities Manual*
- *Adabas DBA Reference Manual*
- *Adabas Command Reference Manual*
- *Adabas Installation Manual*
- *Adabas Messages and Codes.*

1 About this Documentation

Document Conventions

Convention	Description
Bold	Identifies elements on a screen.
`Monospace font`	Identifies service names and locations in the format *folder.subfolder.service*, APIs, Java classes, methods, properties.
Italic	Identifies: Variables for which you must supply values specific to your own situation or environment. New terms the first time they occur in the text. References to other documentation sources.
`Monospace font`	Identifies: Text you must type in. Messages displayed by the system. Program code.
{ }	Indicates a set of choices from which you must choose one. Type only the information inside the curly braces. Do not type the { } symbols.
|	Separates two mutually exclusive choices in a syntax line. Type one of these choices. Do not type the | symbol.
[ ]	Indicates one or more options. Type only the information inside the square brackets. Do not type the [ ] symbols.
...	Indicates that you can type multiple options of the same type. Type only the information. Do not type the ellipsis (...).

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2 INTRODUCTION

Adabas Native SQL is an easy-to-use data manipulation language for accessing and updating information held in an Adabas database. The following example shows a typical Adabas Native SQL statement that selects a record from the database and retrieves the required data:

```
EXEC ADABAS
    SELECT NAME, AGE, SALARY
    FROM PERSONNEL
    WHERE NUMBER-OF-DEPENDENTS > 4
END-EXEC
```

This statement selects the data fields `NAME`, `AGE` and `SALARY` from the first record in the *PERSONNEL* file that satisfies the criterion "NUMBER-OF-DEPENDENTS > 4".

Statements such as this one are embedded into Ada, COBOL, FORTRAN77 or PL/I programs. This means you have the advantage of being able to use a familiar programming language to code the logic of your problem, whilst the Adabas Native SQL statements give you ready access to all the facilities of Adabas, a powerful modern database management system.

Adabas Native SQL incorporates the full power of the Natural userview concept. This means you refer to fields defined in a userview as logical entities without having to concern yourself with the physical details of file structure and record structure. For example, if you specify a group field, Adabas Native SQL automatically creates Ada, COBOL, FORTRAN or PL/I data declarations with the correct:

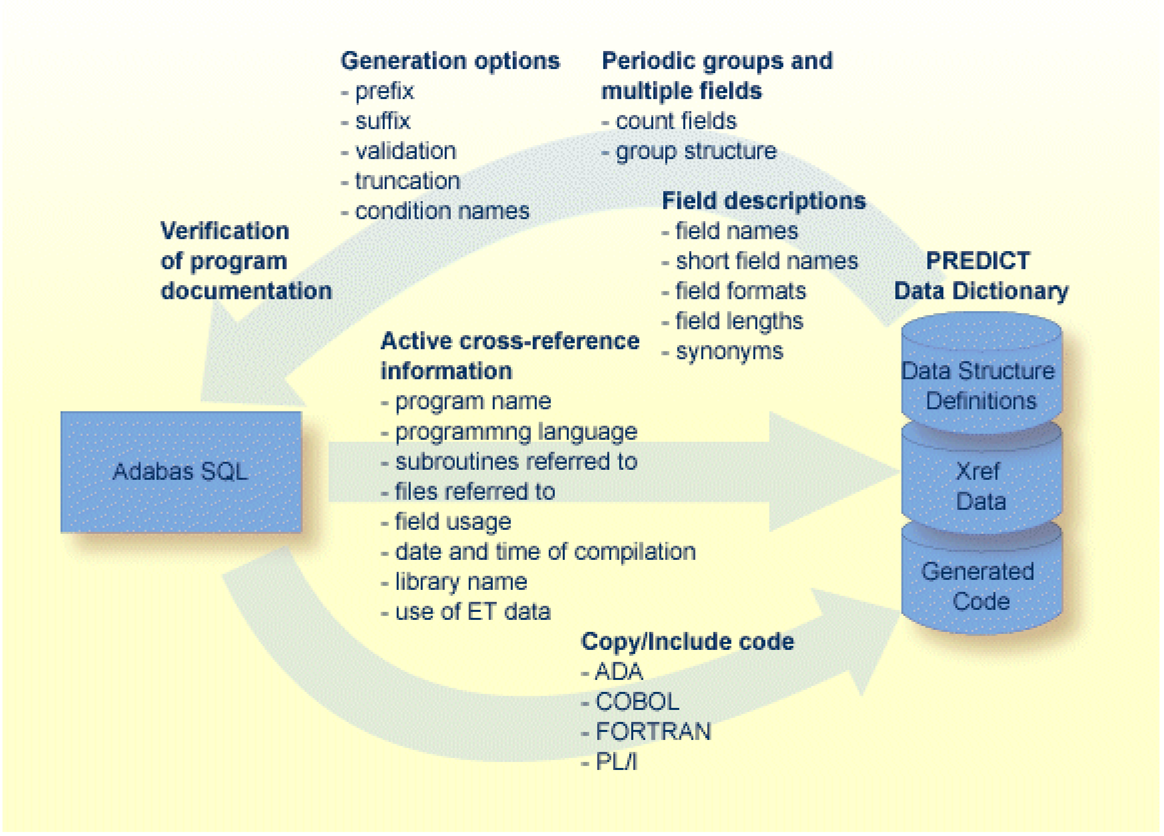
- set of fields (possibly a subset of the fields in the database record; conversely, a field may occur repeatedly in the userview if desired)
- field names
- field sequence
- record structure, including all groups, sub-groups, sub-sub-groups, etc.

- field formats (alphanumeric, numeric, packed numeric, etc.)
- field lengths.

Adabas Native SQL works in conjunction with Predict, Software AG's data dictionary system. The information about file and record layouts contained in Predict is used to generate the data structures that the generated Ada, COBOL, FORTRAN or PL/I program needs to access the database. As an Adabas Native SQL programmer, you do not need to code detailed data declarations in your program, so you are free to concentrate on the logic of the application.

Conversely, as Adabas Native SQL is processing the program, it records active cross-reference information, or Xref data, in Predict. This Xref data includes the names of the files and fields that the program accesses. Thus it is easy to find out which programs use which data fields, etc., so that the programs that need to be recompiled when data structures are altered can readily be determined.

The interaction between Adabas Native SQL and Predict is illustrated in the following figure.

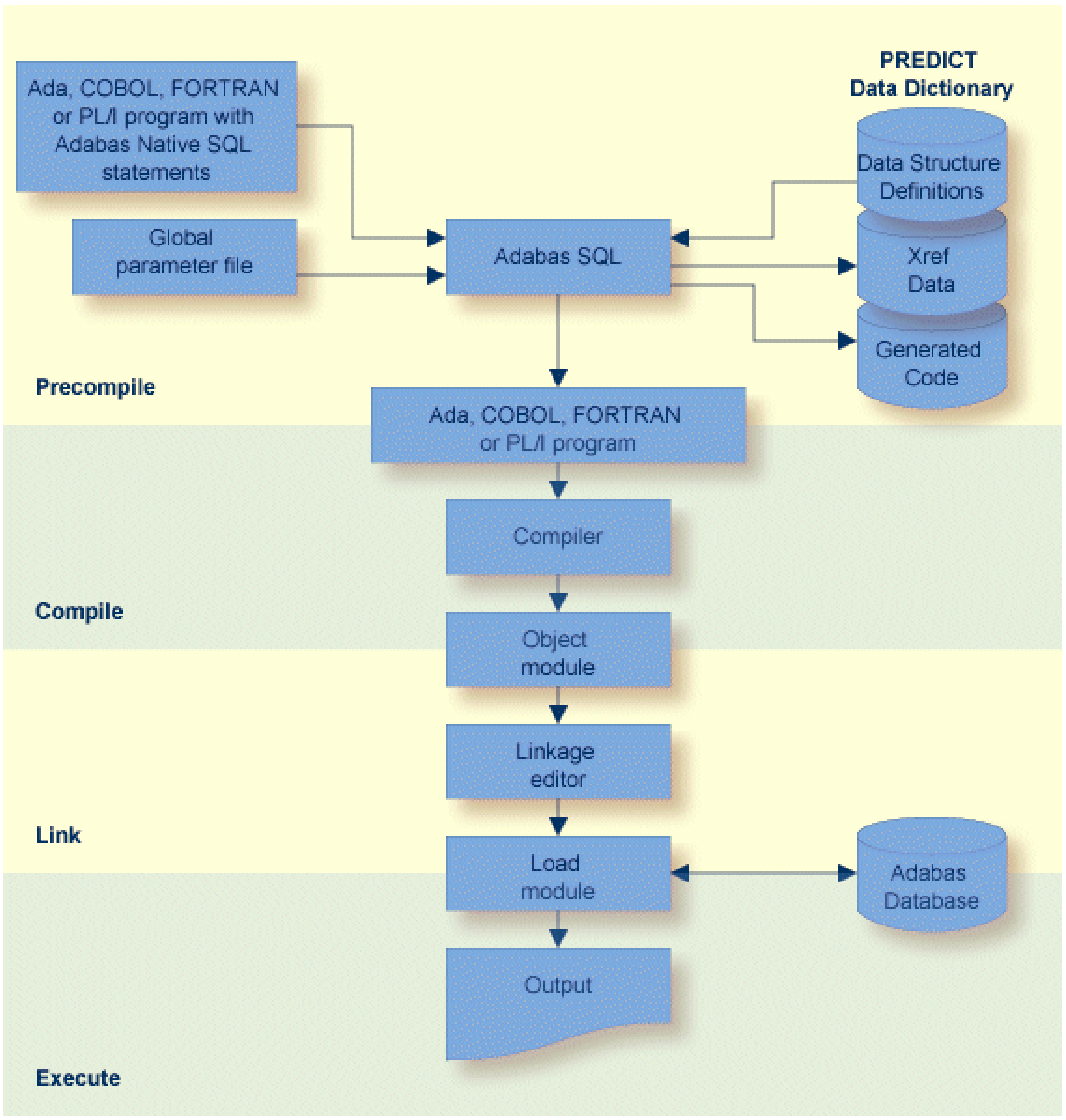


Consistent use of Adabas Native SQL throughout a data processing installation eliminates the risk of writing incorrect data declarations in programs that access the database. It also creates comprehensive records in the data dictionary that show which programs read from the database and which programs update it. This makes programs easier to maintain and provides the DBA with an effective management tool.

After it has been preprocessed by Adabas Native SQL, the program - containing data definitions and executable code generated by Adabas Native SQL as well as the original Ada, COBOL, FORTRAN or PL/I code written by the programmer - is compiled and link-edited in the normal manner.

3 PROGRAMMING CONSIDERATIONS

Using Adabas Native SQL does not require you to learn new programming techniques. Programs are written in Ada, COBOL, FORTRAN77 or PL/I as before, with Adabas Native SQL statements that access the Adabas database inserted at the required places. The Adabas Native SQL preprocessor converts the Adabas Native SQL statements into comments, inserts the generated code and data structures into the source stream and passes the remainder of the program through without alteration. At the same time, Adabas Native SQL optionally writes to the data dictionary a cross-reference list of the files and fields used by the program.



This chapter covers the following topics:

Rules for Adabas Native SQL Statements

Each Adabas Native SQL statement is preceded by "EXEC ADABAS". Each Adabas Native SQL statement is terminated by "END-EXEC" (in Ada, COBOL or FORTRAN), or by "END-EXEC" or ";" (in PL/I). These delimiters enable the preprocessor to distinguish Adabas Native SQL statements from regular Ada, COBOL, FORTRAN or PL/I code. The following COBOL program includes two Adabas Native SQL statements:

```
IDENTIFICATION DIVISION.
PROGRAM ID. EXAMPLE.
AUTHOR. SAG.
ENVIRONMENT DIVISION.
INPUT-OUTPUT SECTION.
DATA DIVISION.
WORKING-STORAGE SECTION.
    SKIP2
    EXEC ADABAS
         BEGIN DECLARE SECTION
    END-EXEC
PROCEDURE DIVISION.
    EXEC ADABAS
         SELECT NAME, AGE, SALARY
         FROM PERSONNEL
         WHERE NUMBER-OF-DEPENDENTS GT 4
    END-EXEC
    DISPLAY NAME AGE SALARY
    GOBACK.
```

"EXEC ADABAS" must be specified within one line. The same is true for "END-EXEC". Only one Adabas Native SQL statement may be written between "EXEC ADABAS" and "END-EXEC". The Adabas Native SQL statement is restricted to a maximum of 100 lines in length (including "EXEC ADABAS" and "END-EXEC").

Mixing Adabas Native SQL statements and regular source code statements is not allowed; Ada, COBOL, FORTRAN or PL/I code or comments should not appear between "EXEC ADABAS" and the corresponding "END-EXEC".

Note: (for COBOL users): The generated statements may include periods to terminate internal `IF` statements. Adabas Native SQL statements are therefore not permitted within `IF...ELSE` sections. This restriction does not apply to programs generated with the global parameter `LANG COBOL/II or LANG COBOL/LE`; in this case, Adabas Native SQL generates `END-IF` statements instead of periods, so there are no restrictions on nesting Adabas Native SQL statements within other `IF...ELSE...END-IF` statements.

Note: (for COBOL/II or COBOL/LE users): Adabas Native SQL will generate an extra statement with a period at the end while generating a SQL statement in COBOL/II in the case that the END–EXEC clause ends with a period: END–EXEC. In this case, users can "ask" Adabas Native SQL to generate a period at the end of the generation.

Source Program Maintenance

The source program stored in the programmer's library includes Adabas Native SQL statements, but not the code they generate. Therefore every compilation must be preceded by a pass through the Adabas Native SQL preprocessor. The preprocessor produces as its output a program in Ada, COBOL, FORTRAN or PL/I, including the original Adabas Native SQL statements, which are now marked as comments. This program should now be compiled and link-edited in the normal manner. In the compiler listing, the generated statements are identified in columns 73..80 by the characters "ADABAS" (executable code and internal data) or "ADADATA" (data definitions that are of use to you). This identification enables you to locate the lines that contain the data definitions easily.

Note: Do not alter variables that are declared in lines marked "ADABAS". You should only use those variables that are declared in lines marked "ADADATA".

Ada, FORTRAN and IBM PL/I source files may include line numbers in columns 73..80. COBOL source files may include line numbers in columns 1..6 and/or 73..80. Adabas Native SQL preserves this line-numbering, which serves as a cross-reference between the source code in the programmer's library and the compiler listing. The line sequence numbers are also used by the response code interpretation report and the TRACE report to help you when debugging.

PL/I source files in VMS environments may not include line numbers.

If the source code is not numbered, Adabas Native SQL automatically generates line numbers in columns 73..80.

The first Adabas Native SQL statement in the program must be the following:

```
EXEC ADABAS
    BEGIN DECLARE SECTION
END-EXEC ↩
```

Adabas Native SQL generates all the variables including the Adabas buffers after this statement.

Note for COBOL users: This statement must be in the WORKING-STORAGE SECTION of the DATA DIVISION.

The Record Buffer and Reference to Data

A record buffer is an area of storage in the user's program that is used by Adabas to transfer information to or from the database. Whenever an Adabas read command is executed, the desired database fields are located and copied into the record buffer.

Note: No record buffer is generated for FORTRAN programs; however, there is a character string which encompasses all fields and serves the same purpose as a record buffer. Throughout this document, the term *record buffer* is used; however if a FORTRAN program is being discussed, this term should be interpreted as the character string referred to above.

Referencing Database Fields

To use data in database fields, refer to it using qualified identifiers composed of the record buffer name together with the basic field name as defined in the data dictionary. See table below.

Language	Form of Reference
Ada, PL/I	BUFFER.FIELD
COBOL	FIELD OF BUFFER
FORTRAN	No qualification possible

Note: If more than one database field is used, a prefix or suffix (in the SELECT statement itself) should be used to make the name unique.

If the Adabas Native SQL statement that causes the record buffer to be generated does not have an alias name in the `FROM` clause, then the level-1 record buffer name is the same as the (first) file name. If the `FROM` clause does include an alias name, then the alias name is used as the level-1 record buffer name. Levels are not used in Ada or FORTRAN.

Adabas Native SQL generates a name at level 2 for internal use only. Do not use this name in your programs.

Synonyms

The field names are generated beginning at level 3. The variable names that Adabas Native SQL generates are taken from Predict. If the program is written in Ada and an Ada field name synonym is defined in the data dictionary, then the synonym is used to generate the field name in the Adabas Native SQL record buffer. If the program is written in COBOL, FORTRAN or PL/I, then the COBOL, FORTRAN or PL/I field name synonym is used respectively. If no field name synonym is defined for the language in which the program is written, the basic name of the field is used. Note that the cross-reference information written to the data dictionary by Adabas Native SQL is always the basic name of the field and not the language-dependent synonym.

Prefix/Suffix

Having selected the field name or synonym, Adabas Native SQL then attaches the prefix and suffix to the name. These are taken from one of the following sources:

Source	Description
Local (highest priority)	Use the PREFIX and SUFFIX options for the current COMPARE, FIND, HISTOGRAM, INSERT, READ, SORT or UPDATE statement.
Global	Use the PREFIX and SUFFIX clauses of the global Adabas Native SQL OPTIONS parameter (see page)
Predict (lowest priority)	The current generation defaults for the respective language are used.

The first two options can only be used if the appropriate field in the Predict Modify...Defaults screen for Ada, COBOL, FORTRAN or PL/I is marked with an "X", indicating it may be modified by the user. Otherwise the prefix and suffix values defined in the data dictionary cannot be overridden.

Validation

The field name is now validated by examining it for characters that do not conform with the rules for forming identifiers in the appropriate language (Ada, COBOL, FORTRAN or PL/I). If any illegal characters are found, they are processed according to the setting of the 'validation character'. See table below:

Validation Character	Result
Null string (two consecutive apostrophes) in global parameter or Blank (Predict default)	Invalid characters in a field name will result in an error message but will not be modified.
Replace character (letters A-Z, digits 0-9 or special character depending on language)	Invalid characters in a field name are replaced by this character.
Asterisk	Invalid characters in the field name are deleted.

The validation character is taken from one of the following sources:

Source	Description
Global (higher priority)	Use the `VALIDATION` clause of the global `OPTIONS` parameter of Adabas Native SQL. Only possible if the field `Validate` in the Predict Modify...Defaults screen is marked with an "X".
Predict	The current generation default for the respective language is used.

Truncation

If the field name is now too long, it is truncated by deleting characters from the left, middle or right, and a warning message is issued. The truncation character is taken from one of the following sources:

Source	Description
Global	Use the `TRUNCATION` clause of the global Adabas Native SQL `OPTIONS` parameter. Only possible if the field `Truncation` in the Predict Modify...Defaults screen is marked with an "X".
Predict	The current generation default for the respective language is used.

Field Attributes

The attributes of the variables (format, length, etc.) are also taken from the data dictionary. If the definition does not conform to the Ada, COBOL, FORTRAN or PL/I standards, the field is declared as an alphanumeric field. (Examples of non-conforming definitions would be 3 bytes binary or 5 bytes binary.)

Example: If there are fields called NAME and CITY in the Adabas file PERSONNEL, the following Adabas Native SQL statement-fragment is valid:

```
SELECT NAME, CITY
FROM PERSONNEL
```

You may refer to the variables in the record buffer as:

```
PERSONNEL.NAME, PERSONNEL.CITY                 (Ada)
NAME OF PERSONNEL, CITY OF PERSONNEL           (COBOL)
NAME, CITY                                     (FORTRAN)
PERSONNEL.NAME, PERSONNEL.CITY                 (PL/I)
```

If you use the alias name option:

```
SELECT NAME, CITY
FROM PERSONNEL PERSON-ALIAS
```

then Adabas Native SQL generates a record buffer structure with the name PERSON_ ALIAS (Ada, PL/I) or PERSON-ALIAS (COBOL). You may refer to the variables in the record buffer as:

```
PERSON_ALIAS.NAME, PERSON_ALIAS.CITY           (Ada)
NAME OF PERSON-ALIAS, CITY OF PERSON-ALIAS     (COBOL)
NAME, CITY                                     (FORTRAN)
PERSON_ALIAS.NAME, PERSON_ALIAS.CITY           (PL/I)
```

Note: (for FORTRAN users): Qualification is not possible in FORTRAN. However, if the database field is used in more than one Adabas Native SQL statement, a prefix or suffix (in the statement itself) must be used to make the name unique.

Note: (for Ada and FORTRAN users): Numeric fields are transformed into character fields; therefore, whenever these fields are initialized and whenever values are assigned to these fields, the values must be filled with leading zeros, for example, "0001".

Groups

If the name specified is the name of a group (GR), Adabas Native SQL automatically generates declarations for the lower-level fields at all levels, in accordance with the definition stored in the data dictionary. The field names will be the full field names as defined in the data dictionary. If Ada, COBOL, FORTRAN or PL/I synonyms are defined in the data dictionary, they will be used in place of the full field names.

Example:

```
SELECT PERSON
FROM PERSONNEL
```

The structure of the Ada record buffer is as follows:

```
type RECORD_BUFPERS is
 record

      NAME                 : STRING (1..20);
      FIRST_NAME           : STRING (1..15);
      INITIAL              : STRING (1..1);
      SEX                  : STRING (1..1);
      AGE                  : STRING (1..2);
      FAMILY_STATUS        : STRING (1..10);
      NUMBER_OF_DEPENDENTS : STRING (1..2);
      ISN                  : INTEGER;
      QUANTITY             : INTEGER;
      RESPONSE_CODE        : SHORT_INTEGER;

end record;
PERSONNEL: RECORD_BUFPERS;
```

The structure of the COBOL record buffer is as follows:

```
01  PERSONNEL.
    02 RECORD-BUF-0-1.
     03 PERSON.
      04 NAME                      PIC X(20).
      04 FIRST-NAME                PIC X(15).
      04 INITIAL                   PIC X(1).
      04 P-DES.
       05 SEX                      PIC X(1).
       05 AGE                      PIC 9(2).
       05 FAMILY-STATUS            PIC X(10).
       05 NUMBER-OF-DEPENDENTS     PIC 9(2).
    02 ISN                         PIC 9(9) COMP.
    02 QUANTITY                    PIC 9(9) COMP.
    02 RESPONSE-CODE               PIC 9(4) COMP.
```

The FORTRAN equivalent is as follows:

```
CHARACTER*    20 NAME
CHARACTER*    15 FNAME
CHARACTER*     1 INIIAL
CHARACTER*     1 SEX
CHARACTER*     2 AGE
CHARACTER*    10 FAMSTA
CHARACTER*     2 NUMNTS
CHARACTER*    51 PERSON
CHARACTER*    15 PDES
CHARACTER*    51 PERNEL
```

Note: Synonyms are assumed to be defined in the data dictionary as shown in Appendix **B** and truncation is assumed to occur in the middle of the word. (The maximum length of names depends on the operating system.)

Note: The field PERNEL encompasses all other fields and is the equivalent of the record buffer in Ada, COBOL and PL/I.

The structure of the PL/I record buffer is as follows:

```
DCL 1  PERSONNEL,
      2 RECORD_BUFPERS_1 UNAL,
       3 PERSON,
        4 NAME                     CHAR (20),
        4 FIRST_NAME               CHAR (15),
        4 INITIAL                  CHAR (1),
        4 P_DES,
         5 SEX                     CHAR (1),
         5 AGE                     PIC '(1)99',
         5 FAMILY_STATUS           CHAR (10),
         5 NUMBER_OF_DEPENDENTS    PIC '(1)99',
      2 ISN                        FIXED BIN(31),
      2 QUANTITY                   FIXED BIN(31),
      2 RESPONSE_CODE              FIXED BIN(15),
       RECORD_BUFPERS CHAR(51) BASED (ADDR(RECORD_BUFPERS_1));
```

Any field within a group may also be specified as a single field name.

Note: The level-2 name generated for the record buffer includes the cursor-name, if one was specified. The COBOL example shows a record buffer that was generated from an Adabas Native SQL statement without a cursor-name; the Ada and PL/I examples show a record buffer that was generated from an Adabas Native SQL statement with the cursor-name PERS.

Multiple-Value Fields

A multiple-value (MU) field is specified as a single field name; Adabas Native SQL takes the number of occurrences from the data dictionary. If the number of occurrences is specified as zero in the data dictionary, then Adabas Native SQL will declare 191 occurrences of the field. It is therefore strongly recommended that the number of occurrences be correctly specified in the data dictionary.

A single occurrence or a range of occurrences may optionally be specified within parentheses. The upper limit of the range or the number of the occurrence must not be greater than the number of occurrences as specified in the data dictionary, otherwise it will be ignored and a warning message will be printed. The valid formats are:

```
mu
```

```
mu(i)
```

```
mu(:var)
```

```
mu(i-j)
```

```
mu(LAST)
```

```
mu(i-LAST) (only at the end of the SELECT list)
```

where *mu* denotes the name of the multiple field; *i* and *j* denote integer constants; and *var* denotes the name of an integer variable. In Ada, *var* must be defined as "STRING(1..5)". In FORTRAN, *var* must be defined as "CHARACTER*5" and should contain a 5-digit number. LAST may be specified as the occurrence of an MU field to indicate that the last occurrence is to be read. For MU fields it is also possible to specify (*i*-LAST) at the end of the SELECT list to indicate a range of occurrences, from the occurrence with number *i* through to the last occurrence.

If a multiple-value field is referenced in the WHERE clause of a data retrieval statement, the only valid format is:

```
mu
```

If a single occurrence or a range not starting from 1 is specified, the name in the record buffer will be followed by a "-" or "_" and the number of the occurrence or the range.

Example:

```
SELECT OIL-CREDIT(1-5), OIL-CREDIT(7), OIL-CREDIT(9-10)
FROM FINANCE
```

The structure of the Ada record buffer is as follows:

```
type OIL_CREDITPERS is array (INTEGER range <>)
                       of STRING (1..7);
type OIL_CREDIT_9_10PERS is array (INTEGER range <>)
                            of STRING (1..7);

type RECORD_BUFPERS is
   record
      OIL_CREDIT      : OIL_CREDITPERS (1..5);
      OIL_CREDIT_7    : STRING (1..7);
      OIL_CREDIT_9_10 : OIL_CREDIT_9_10PERS (1..2);
      ISN             : INTEGER;
      QUANTITY        : INTEGER;
      RESPONSE_CODE   : SHORT_INTEGER;
   end record;
FINANCE : RECORD_BUFFERS;
```

The structure of the COBOL record buffer is as follows:

```
01  FINANCE.
    02 RECORD-BUFPERS.
     03 OIL-CREDIT      PIC X(7) OCCURS 5.
     03 OIL-CREDIT-7    PIC X(7).
     03 OIL-CREDIT-9-10 PIC X(7) OCCURS 2.
    02 ISN              PIC 9(9) COMP.
    02 QUANTITY         PIC 9(9) COMP.
    02 RESPONSE-CODE    PIC 9(4) COMP.
```

The FORTRAN equivalent is as follows:

```
CHARACTER*     7 OCRE   (00005)
CHARACTER*     7 OCRE7
CHARACTER*     7 OCR910 (00002)
CHARACTER*    56 FINNCE
```

Note: Synonyms are assumed to be defined in the data dictionary as shown in **Appendix B** and truncation is assumed to occur in the middle of the word. (The maximum length of names depends on the operating system.)

Note: The field FINNCE encompasses all other fields and is the equivalent of the record buffer in Ada, COBOL and PL/I.

The structure of the PL/I record buffer is as follows:

```
DCL 1  FINANCE,
      2 RECORD_BUFPERS_1 UNAL,
       3 OIL_CREDIT      (5) CHAR (7),
       3 OIL_CREDIT_7        CHAR (7),
       3 OIL_CREDIT_9_10 (2) CHAR (7),
      2 ISN                  FIXED BIN(31),
      2 QUANTITY             FIXED BIN(31),
      2 RESPONSE_CODE        FIXED BIN(15),
       RECORD_BUFPERS CHAR(56) BASED (ADDR(RECORD_BUFPERS_1));
```

If the range is not explicitly specified, the default range is from the first occurrence up to the number specified in the data dictionary file (or 191 if the number of occurrences is not specified in the data dictionary).

In conjunction with multiple-value fields, you may additionally code *mu*(COUNT), i.e., the field name followed by the keyword COUNT in parentheses. This causes Adabas Native SQL to generate a special field in which Adabas stores the actual number of occurrences in the record. The field is two bytes long and has the following binary format:

- SHORT_INTEGER in ADA;
- PIC S9(4) COMP in COBOL;
- INTEGER*2 in FORTRAN;
- FIXED BIN(15,0) in PL/I.

The name generated for the COUNT field is the same as the name of the multiple-value field, preceded by:

- "C_" in ADA;
- "C-" in COBOL;
- "C" in FORTRAN;

- "C_" in PL/I.

A count field is also generated if a count field is defined in a Predict field maintenance function. This is particularly useful in conjunction with the Adabas Native SQL `SELECT *` statement. A count field is never generated for a multiple-value field within a periodic group.

Example:

```
SELECT OIL-CREDIT, OIL-CREDIT(COUNT)
FROM FINANCE
```

The structure of the Ada record buffer is as follows:

```
   type OIL_CREDITPERS is array (INTEGER range <>)
                          of STRING (1..7);
   type RECORD_BUFPERS is
     record
        OIL_CREDIT    : OIL_CREDITPERS (1..191);
        C_OIL_CREDIT  : SHORT_INTEGER;
        ISN           : INTEGER;
        QUANTITY      : INTEGER;
        RESPONSE_CODE : SHORT_INTEGER;
    end record;
FINANCE: RECORD_BUFPERS;
```

The structure of the COBOL record buffer is as follows:

```
01   FINANCE.
     02 RECORD-BUFPERS.
      03 OIL-CREDIT   PIC X(7) OCCURS 191.
      03 C-OIL-CREDIT PIC S9(4) COMP.
     02 ISN           PIC 9(9) COMP.
     02 QUANTITY      PIC 9(9) COMP.
     02 RESPONSE-CODE PIC 9(4) COMP.
```

The FORTRAN equivalent is as follows:

```
CHARACTER*     7 OCRE   (00191)
INTEGER*       2 COCRE
CHARACTER*  1340 FINNCE
```

Note: Synonyms are assumed to be defined in the data dictionary as shown in **Appendix B** and truncation is assumed to occur in the middle of the word. (The maximum length of names depends on the operating system.)

Note: The field FINNCE encompasses all other fields and is the equivalent of the record buffer in Ada, COBOL and PL/I.

The structure of the PL/I record buffer is as follows:

```
DCL 1  FINANCE,
      2 RECORD_BUFPERS_1 UNAL,
       3 OIL_CREDIT   (191) CHAR (7),
       3 C_OIL_CREDIT       FIXED BIN(15,0),
      2 ISN                 FIXED BIN(31),
      2 QUANTITY            FIXED BIN(31),
      2 RESPONSE_CODE       FIXED BIN(15),
       RECORD_BUFPERS CHAR(1339) BASED (ADDR(RECORD_BUFPERS_1));
```

Periodic Groups

A periodic group (PE) consists of up to 65000 occurrences of a group. The default number of occurrences remains 99, as in the previous version. Adabas Native SQL automatically generates definitions of all fields within the periodic group, using the full field names as defined in the data dictionary, or the Ada, COBOL, FORTRAN or PL/I synonyms if present. You may limit the number of occurrences as for multiple value fields. A COUNT field containing the number of occurrences of the periodic group may be generated by coding *pe*(COUNT) or by defining a PE count field with a Predict field maintenance function. Valid formats:

```
pe
```

```
pe(i)
```

```
pe(:var)
```

```
pe(i-j)
```

where *pe* denotes the name of the periodic group; *i* and *j* denote integer constants; and var denotes the name of an integer variable. In Ada, var must be defined as "STRING(1..5)". In FORTRAN, *var* must be defined as "CHARACTER*5" and should contain a 5-digit number.

If a periodic group is referenced in the WHERE clause of a data retrieval statement, the valid formats are:

```
pe
```

```
pe(i)
```

Suffixes defining a single occurrence or a range of occurrences not starting from 1 will be added to all fields within the periodic group. A range starting from the first occurrence is not given a suffix.

If you do not need all the fields within the periodic group, you may request individual fields, which are treated as multiple-value fields, except that you may not request the COUNT of such a field, but only the COUNT of the periodic group as a whole.

For COBOL and PL/I, Adabas Native SQL supports the `GROUP STRUCT` attribute which can be defined in the data dictionary for periodic groups. Correct use of this attribute can result in a significantly shorter Adabas format buffer. For more information see *Defining More Attributes of Fields, 3GL Specification* in section *Field* of Chapter *Predefined Object Types* of the Predict Reference Manual.

Note: (for Ada and FORTRAN users): Periodic groups will always be generated with GROUP STRUCT = N, and no consideration will be given to the Predict definition.

Example:

```
SELECT MAJOR-CREDIT(1), MAJOR-CREDIT(3-5), MAJOR-CREDIT(7),
       MAJOR-CREDIT(COUNT)
FROM FINANCE
```

The structure of the Ada record buffer is as follows:

```
   type CREDIT_CARD_3_5PERS is array (INTEGER range <>)
                            of STRING (1..18);
   type CREDIT_LIMIT_3_5PERS is array (INTEGER range <>)
                             of STRING (1..4);
   type CURRENT_BALANCE_3_5PERS is array (INTEGER range <>)
                                of STRING (1..4);
   type RECORD_BUFPERS is
      record
        CREDIT_CARD_1       : STRING (1..18);
        CREDIT_LIMIT_1      : STRING (1..4);
        CURRENT_BALANCE_1   : STRING (1..4);
        CREDIT_CARD_3_5     : CREDIT_CARD_3_5PERS (1..3);
        CREDIT_LIMIT_3_5    : CREDIT_LIMIT_3_5PERS (1..3);
        CURRENT_BALANCE_3_5 : CURRENT_BALANCE_3_5PERS (1..3);
        CREDIT_CARD_7       : STRING (1..18);
        CREDIT_LIMIT_7      : STRING (1..4);
        CURRENT_BALANCE_7   : STRING (1..4);
        C_MAJOR_CREDIT      : SHORT_INTEGER;
        ISN                 : INTEGER;
        QUANTITY            : INTEGER;
        RESPONSE_CODE       : SHORT_INTEGER;
      end record;
FINANCE: RECORD_BUFPERS;
```

The structure of the COBOL record buffer is as follows:

```
01  FINANCE.
    02 RECORD-BUFFERS.
     03 MAJOR-CREDIT-1.
      04 CREDIT-CARD-1        PIC X(18).
      04 CREDIT-LIMIT-1       PIC 9(4).
      04 CURRENT-BALANCE-1    PIC 9(4).
     03 G-MAJOR-CREDIT-3-5.
      04 MAJOR-CREDIT-3-5               OCCURS 3.
       05 CREDIT-CARD-3-5     PIC X(18).
       05 CREDIT-LIMIT-3-5    PIC 9(4).
       05 CURRENT-BALANCE-3-5 PIC 9(4).
     03 MAJOR-CREDIT-7.
      04 CREDIT-CARD-7        PIC X(18).
      04 CREDIT-LIMIT-7       PIC 9(4).
      04 CURRENT-BALANCE-7    PIC 9(4).
     03 C-MAJOR-CREDIT        PIC S9(4) COMP.
    02 ISN                    PIC 9(9) COMP.
    02 QUANTITY               PIC 9(9) COMP.
    02 RESPONSE-CODE          PIC 9(4) COMP.
```

The FORTRAN equivalent is as follows:

```
CHARACTER*    18 CCARD1
CHARACTER*     4 CLIM1
CHARACTER*     4 CBAL1
CHARACTER*    26 MAJIT1
CHARACTER*    18 CCAD35(00003)
CHARACTER*     4 CLIM35(00003)
CHARACTER*     4 CBAL35(00003)
CHARACTER*    78 MAJT35
CHARACTER*    18 CCARD7
CHARACTER*     4 CLIM7
CHARACTER*     4 CBAL7
CHARACTER*    26 MAJIT7
INTEGER*       2 CMADIT
CHARACTER*   132 FINNCE
```

Note: Synonyms are assumed to be defined in the data dictionary as shown in **Appendix B** and truncation is assumed to occur in the middle of the word. (The maximum length of names depends on the operating system.)

Note: The field FINNCE encompasses all other fields and is the equivalent of the record buffer in Ada, COBOL and PL/I.

The structure of the PL/I record buffer is as follows:

```
DCL 1  FINANCE,
      2 RECORD_BUFPERS_1 UNAL,
       3 MAJOR_CREDIT_1,
        4 CREDIT_CARD_1          CHAR(18),
        4 CREDIT_LIMIT_1         PIC '(3)99',
        4 CURRENT_BALANCE_1      PIC '(3)99',
       3 G_MAJOR_CREDIT_3_5,
        4 MAJOR_CREDIT_3_5   (3),
         5 CREDIT_CARD_3_5       CHAR(18),
         5 CREDIT_LIMIT_3_5      PIC '(3)99',
         5 CURRENT_BALANCE_3_5   PIC '(3)99',
       3 MAJOR_CREDIT_7,
        4 CREDIT_CARD_7          CHAR(18),
        4 CREDIT_LIMIT_7         PIC '(3)99',
        4 CURRENT_BALANCE_7      PIC '(3)99',
       3 C_MAJOR_CREDIT          FIXED BIN(15,0),
      2 ISN                      FIXED BIN(31),
      2 QUANTITY                 FIXED BIN(31),
      2 RESPONSE_CODE            FIXED BIN(15),
       RECORD_BUFPERS CHAR(132) BASED(ADDR(RECORD_BUFPERS_1));
```

Multiple-Value Fields within Periodic Groups

Adabas Native SQL supports multiple-value fields that occur within periodic groups. If the number of occurrences is not specified, the number of occurrences is taken from the data dictionary. If the number of occurrences is not explicitly specified, or if the index is variable, the occurrence number is not appended as a suffix to the field name.

Reference to elements of such a field is made as follows:

```
mp
```

```
mp(i(k))
```

```
mp(i(k-l))
```

```
mp(i-j(k))
```

```
mp(i-j(k-l))
```

```
mp(:ivar(k))
```

```
mp(:ivar(k-l))
```

```
mp(i(:kvar))
```

```
mp(i-j(:kvar))
```

```
mp(:ivar(:kvar))
```

```
mp(LAST)
```

```
mp(LAST(LAST))
mp(i(k-LAST))      (only at the end of the SELECT list)
```

mp denotes the name of the multiple-value field. *i*, *i-j* and *ivar* indicate which group or groups are required. *k*, *k-l* and kvar indicate which occurrence or occurrences of the multiple-value field are required. *i*, *j*, *k* and *l* denote integer constants. *j* must be greater than *i*, and both must be in the range 1..191. *l* must be greater than *k*, and both must be in the range 1..191. *ivar* and *kvar* denote the names of integer variables. LAST means the last occurrence.

If a multiple-value field within a periodic group is referenced in the WHERE clause of a data retrieval statement, the only valid format is:

```
mp
```

Counter fields can also be generated for multiple-value fields occurring within periodic groups. *mp*(COUNT1) generates a counter field containing the number of occurrences of the multiple- value field *mp* in the first occurrence of the periodic group, *mp*(COUNT1-3) generates counter fields for the multiple-value field *mp* in each of the first three occurrences of the periodic group, and *mp*(COUNTLAST) generates a counter field for the multiple-value field in the last occurrence of the periodic group. The names of the counter fields are:

ADA	COBOL	FORTRAN	PL/I
C_*mp*_1	C-*mp*-1	C*mp*1	C_*mp*_1
C_*mp*_2	C-*mp*-2	C*mp*2	C_*mp*_2
C_*mp*_3	C-*mp*-3	C*mp*2	C_*mp*_3

Example:

```
SELECT INSURANCE-COMPANY(2-4(6-8))
FROM FINANCE
```

The structure of the Ada record buffer is as follows:

```
type INSURANCE_COMPANY_6_8PERS is array (INTEGER range <>,
                                         INTEGER range <>)
                              of STRING (1..25);
type RECORD_BUFPERS is
  record
    INSURANCE_COMPANY_6_8 : INSURANCE_COMPANY_6_8PERS (1..3, 1..3);
    ISN                   : INTEGER;
    QUANTITY              : INTEGER;
    RESPONSE_CODE         : SHORT_INTEGER;
  end record;
FINANCE: RECORD_BUFPERS;
```

The structure of the COBOL record buffer is as follows:

```
01  FINANCE.
    02 RECORD-BUFFERS.
     03 A-INSURANCE-COMPANY-2-4           OCCURS 3.
      04 INSURANCE-COMPANY-6-8  PIC X(25) OCCURS 3.
    02 ISN                      PIC 9(9) COMP.
    02 QUANTITY                 PIC 9(9) COMP.
    02 RESPONSE-CODE            PIC 9(4) COMP.
```

The FORTRAN equivalent is as follows:

```
CHARACTER*     25 INCM68(00003 , 00003)
CHARACTER*    225 FINNCE
```

Note: Synonyms are assumed to be defined in the data dictionary as shown in **Appendix B** and truncation is assumed to occur in the middle of the word. (The maximum length of names depends on the operating system.)

Note: The field FINNCE encompasses all other fields and is the equivalent of the record buffer in Ada, COBOL and PL/I.

The structure of the PL/I record buffer is as follows:

```
DCL 1  FINANCE,
      2 RECORD_BUFFERS_1 UNAL,
       3 A_INSURANCE_COMPANY_2_4     (3),
        4 INSURANCE_COMPANY_6_8      (3) CHAR(25),
      2 ISN                              FIXED BIN(31),
      2 QUANTITY                         FIXED BIN(31),
      2 RESPONSE_CODE                    FIXED BIN(15),
       RECORD_BUFPERS CHAR(225) BASED(ADDR(RECORD_BUFPERS_1));
```

Additional Fields in the Record Buffers (Ada, COBOL, PL/I)

If a field is specified in the SELECT clause, and Predict contains redefinitions for this field, then the redefined fields are also included in the record buffer. The prefix and suffix are added to the field names and the result is truncated if necessary. (Ada does not support redefinition.)

Unless the global parameter `ABORT` . is specified, Adabas Native SQL appends three fields to each record buffer. A record buffer containing these three fields is also generated for DELETE statements, although no database fields are generated. The names of the fields are shown in the tables below. They may only be used in conjunction with an adequate file name.

If the global parameter `ABORT` . is specified, these three fields are generated as global data and they have the names SQLISN, SQLQTY and SQLRSP, as used in FORTRAN programs. Since no record buffers are ever generated for FORTRAN, the field names are always global to the program.

The ISN variable is a 4-byte binary field in which Adabas returns the ISN (internal sequence number) of the (first) record found or read or, in the case of a HISTOGRAM command where the descriptor is in a periodic group, the number of the current occurrence. The ISN variable is defined as:

Language	Variable Name*	Format
ADA	ISN	INTEGER
COBOL	ISN	PIC 9(9) COMP
PL/I	ISN	FIXED BIN (31)

* The variable name is SQLISN if the global parameter `ABORT` . is coded. See description of the **ABORT** parameter for more information.

The QUANTITY variable is a 4-byte binary field which, when used in conjunction with a COMPARE, FIND, FIND COUPLED or SORT statement, is available after executing the OPEN statement. It returns the number of ISNs in the ISN list, or the number of ISNs in the ISN buffer. When used in conjunction with a HISTOGRAM statement, the quantity variable, which is available after executing the FETCH statement, returns the number of records that contain the specified descriptor value. (The quantity variable is not available in conjunction with READ statements.) The quantity variable is defined as:

Language	Variable Name*	Format
ADA	QUANTITY	INTEGER
COBOL	QUANTITY	PIC 9(9) COMP
PL/I	QUANTITY	FIXED BIN (31)

* The variable name is SQLQTY if the global parameter `ABORT` . is coded. See description of the **ABORT** parameter for more information.

The RESPONSE_CODE (Ada), RESPONSE-CODE (COBOL) or RESPONSE_CODE (PL/I) variable is a 2-byte binary field in which Adabas returns the response code after execution of the command. The response code variable is defined as:

Language	Variable Name*	Format
ADA	RESPONSE_CODE	SHORT_INTEGER
COBOL	RESPONSE-CODE	PIC 9(4) COMP
PL/I	RESPONSE_CODE	FIXED BIN (15)

* The variable name is SQLRSP if the global parameter `ABORT` . is coded.

See ***Response Code Interpretation*** and the description of the **ABORT** parameter for more information.

Additional Fields in FORTRAN Programs

Adabas Native SQL enters values in three global variables after each SQL statement. These variables contain only the values generated by the last command and will be changed when a new command is issued.

The ISN variable is a 4-byte binary field in which Adabas returns the ISN (internal sequence number) of the (first) record found or read or, in the case of a HISTOGRAM command where the descriptor is in a periodic group, the number of the current occurrence.

Language	Variable Name	Format
FORTRAN	SQLISN	INTEGER*4

The QUANTITY variable is a 4-byte binary field which, when used in conjunction with a COMPARE, FIND, FIND COUPLED or SORT statement, is available after executing the OPEN statement. It returns the number of ISNs in the ISN list, or the number of ISNs in the ISN buffer. When used in conjunction with a HISTOGRAM statement, the quantity variable, which is available after executing the FETCH statement, returns the number of records that contain the specified descriptor value. (The quantity variable is not available in conjunction with READ statements.)

Language	Variable Name	Format
FORTRAN	SQLQTY	INTEGER*4

The response code variable is a 2-byte binary field in which Adabas returns the response code after execution of the command.

Language	Variable Name	Format
FORTRAN	SQLRSP	INTEGER*2

See ***Response Code Interpretation*** and the description of the **ABORT** parameter for more information.

If you want to use for example the response codes returned by more than one statement, then you must save each response code before new SQL statements are executed.

End-of-File Flag (ADACODE, SQLCOD)

The ADACODE (Ada, COBOL, DEC FORTRAN and PL/I) or SQLCOD (IBM FORTRAN) variable is a 2-byte binary field in which Adabas Native SQL returns an end-of-file flag. The value 3 in this field indicates that end-of-file was detected in a sequential read command, or end-of-list after reading all the records found by a search statement. It is defined as:

Language	Variable Name	Format
ADA	ADACODE	SHORT_INTEGER
COBOL	ADACODE	PIC 9(4) COMP
FORTRAN	SQLCOD	INTEGER*2
FORTRAN/VMS	ADACODE	INTEGER*2
PL/I	ADACODE	FIXED BIN (15)

Response Code Interpretation

The Adabas response code is a code that is returned to the caller after every Adabas command. It is stored in a variable called RESPONSE-CODE (COBOL) or RESPONSE_CODE (Ada and PL/I) in the record buffer of the command that was executed, or in the global variable SQLRSP (FORTRAN). A value of zero returned in this variable indicates that the Adabas Native SQL statement has been executed successfully. A non-zero value (other than 3, which denotes end-of-file) indicates that an error occurred. In this case, the statement has not been executed. Each value is associated with a distinct type of error, as shown in the list below.

Adabas Native SQL automatically calls an error-checking routine after each Adabas command if the response code is non-zero. Software AG supplies default routines which check and interpret the response code. If the response code has a value other than 3, the routine prints out the appropriate error message, the contents of the Adabas control block and the line number of the erroneous statement in the source program, calls an appropriate trace module, issues a `backout transaction` (ROLLBACK WORK) command, closes the database (DBCLOSE), and finally terminates the program.

Language	Default Abort Module	Default Trace Module
ADA	RESPF	PRTRAC
COBOL	RESPINT	PRTRACE
FORTRAN	RESPF	PRTRAC
PL/I	RESPINT	PRTRACE

In many cases, the action described above may be all that is required. However, if the action taken by the standard routine is inappropriate or insufficient, the ABORT parameter can be used to specify that a user-defined error handling routine with a different name should be called instead.

The data administrator will know whether alternative error handling routines are available at your installation.

See also the description of the **ABORT** parameter.

Response Codes

The response code is returned in the variable RESPONSE_CODE (Ada), RESPONSE-CODE (COBOL), SQLRSP (FORTRAN) or RESPONSE_ CODE (PL/I) that is attached to every record buffer. The normal response code (success) is 0.

If the following response code occurs and the error handling routine is that shown in the table above, control will be returned to the user program directly following the statement that caused the response code.

Response code	Meaning
3	Response Code 3 (which is also signaled in the variable ADACODE (Ada, COBOL or PL/I) or SQLCOD (FORTRAN)) indicates that end-of-file was detected in a sequential read command, or end-of-list after reading all the records found by a search statement.

The following response codes may also occur during normal operation. If a user-written error handling routine is called, it should take appropriate action for all response codes that might occur. This might include printing an error message and/or returning to the application program. The standard error handling routines *RESPINT* and *RESPF* supplied by Software AG can be used as a model when writing this routine.

Response code	Meaning
1	The ISN list is too big to be sorted.
9	A partially-completed transaction has been automatically backed-out, possibly as the result of a timeout (for programs that use ET-mode). Note that Adabas may release the command-ID when Response Code 9 occurs. ISN lists, hold queue entries and user data (see also the CHECKPOINT, COMMIT WORK, CONNECT, DBCLOSE and READ USERDATA statements) are no longer accessible.
17	Invalid file number. A file required by the program could not be found in the database
19	An attempt has been made to update a file that was opened for access only
41	Adabas has detected an error in the format buffer. This can be caused by an incorrect data field definition in Predict.
48	The user-ID specified in the CONNECT statement is already in use; or the mode of usage specified for a file in the CONNECT statement conflicts with the file's current usage.
98	A descriptor value in a record to be INSERTed or UPDATEd exists already in the file and the file has the 'unique descriptor' attribute (VAX response code).
113	A READ ISN statement without the SEQUENCE option was issued and Adabas could not find a record having the specified ISN; or a READ ISN statement attempted to read a record

Response code	Meaning
	and the 'security by value' check failed. It can also indicate that an INSERT statement using the `WHERE ISN=n` clause specified an ISN that was already present in the file.
144	An UPDATE or DELETE statement was issued but the relevant record was not in hold status for the program that issued the statement.
145	The program attempted to hold a record that is already being held by another user. This code may be returned if the HOLD RETURN option is used.
148	The Adabas nucleus is not available.
198	A descriptor value in a record to be INSERTed or UPDATEd exists already in the file and the file has the 'unique descriptor' attribute.

See section *Adabas Response Codes* in the *Adabas Messages and Codes Manual* for more information.

Host Variables

Host variables are normal program variables that are also used in Adabas Native SQL statements. They are declared using normal Ada, COBOL, FORTRAN or PL/I statements. When used in an Adabas Native SQL statement, the name of each host variable must be immediately preceded by a colon (":"), for example ":NAME".

ISN Lists and the ISN Buffer

The abbreviation ISN occurs frequently in this manual. It stands for Internal Sequence Number: a reference number that identifies each record uniquely within an Adabas file. Each new record created by the INSERT statement must have an ISN. If you do not allocate the ISN explicitly, it is assigned automatically by Adabas. When allocating ISNs, care should be taken that each ISN is unique and that no ISN that exceeds the MAXISN parameter is specified.

When a FIND statement finds more than one record in the file, Adabas makes a list of the ISNs of these records and returns this ISN list as the result of the FIND operation.

You have the option of providing an ISN buffer, whose size is specified by the ISNSIZE parameter either in the global **OPTIONS** parameter or in each individual Adabas Native SQL statement. If an ISN buffer of adequate size is provided, Adabas stores the ISN list in this buffer. If an ISN buffer is not provided, or if it is too small to contain the ISN list created by a particular FIND statement, then the excess ISNs are automatically written to the Adabas workfile. They are then read from the ISN buffer and/or from the workfile and returned to the user one by one each time a statement (for example, FETCH) that requires an ISN is executed.

In general, programs run more efficiently if the ISN buffer is large enough to contain the entire ISN list. However, if the ISN buffer has to be made smaller, the program will continue to run exactly as before; the process of buffering excess ISNs in the Adabas workfile is completely transparent to the user.

The ISN buffer cannot be used if Adabas security by value is in effect, or in CICS or UTM programs that use the Adabas Native SQL statements SAVE and RESTORE.

HOLD Logic

The HOLD option can be used with all Adabas Native SQL data retrieval statements except HISTOGRAM to place the record in hold status. A record in hold status is prevented from being updated by other users until it is explicitly released by issuing a COMMIT WORK, ROLLBACK WORK or RELEASE statement. This avoids the conflict that would arise if two or more users attempted to update one record simultaneously.

RETURN Option

The presence or absence of the RETURN option determines Adabas's response if the record to be accessed is currently being held by another user.

If HOLD is used without the RETURN option and an attempt is made to access a record held by another user, the program is suspended until the record is released by the other user.

If HOLD is used with the RETURN option and an attempt is made to access a record held by another user, Adabas returns Response Code 145 to the user program. If the response code interpretation routine as supplied by Software AG is being used, an error message is printed and the program ABENDs. If some other action is required, an alternative routine that checks for this response code and takes appropriate action must be supplied (see also the description of the **ABORT** parameter). The response code is returned in the variable RESPONSE_CODE (Ada), RESPONSE-CODE (COBOL) or RESPONSE_CODE (PL/I), which is attached to every record buffer, or in the global variable SQLRSP (FORTRAN).

See section *Competitive Updating* in the Adabas Command Reference Manual for more information on Adabas hold logic.

Security Options

Adabas offers the following facilities to prevent unauthorized users from accessing or updating confidential data:

- Password protection
- Ciphering
- Security by value.

Password Protection

Password protection permits only those database operations that cite the correct password. Adabas commands that include an incorrect password, or no password at all, are rejected. Furthermore, access and update security levels are associated with each password. Whenever a database operation is executed, Adabas checks that the security level associated with the password equals or exceeds the security level of the database, both at the file level and at the field level. Password protection therefore provides a very flexible mechanism for controlling the degree of access individual computer users can exercise.

Ciphering

If a file is ciphered, the data are stored on disk in an encrypted format that is incomprehensible to any user who does not know the correct cipher key. Adabas uses the cipher key in conjunction with a special decryption algorithm to reconstruct the original data. Cipher protection offers a very high level of security against unauthorized efforts to read data from a database. Conversely, a file update made with a wrong cipher key is conspicuous because the decryption algorithm converts the data into a meaningless jumble when a legitimate user tries to read them.

Further details of the password and data encryption security facilities are given in the section *Security Planning* in the *Adabas DBA Reference Manual*.

Security by Value

The third security option Adabas offers is security by value. Using this facility, access to records is controlled by the values contained in specified fields. For example, a user may be forbidden from accessing records in the PERSONNEL file that have a value in the SALARY field exceeding 6000.

The ISNSIZE option cannot be used when processing files that are protected by this feature. See page for more information.

See the *Adabas Security Manual* for more information. Note that this manual is only sent to DBAs on written application.

Consult your DBA before writing programs that access files protected by any of the mechanisms described in this section.

Record Buffer - ADA

The fields generated in the record buffers in Ada programs have the clauses shown in the table below:

Predict Format	Predict Length	Ada clause	Observations
A	*nnn*	STRING (1..*nnn*)	
B or I	1	SHORT_SHORT_INTEGER	VMS only
B or I	2	SHORT_INTEGER	
B or I	4	INTEGER	
F	4	FLOAT	
F	8	LONG_FLOAT	VMS only
N or U	*nn.m*	STRING (1..*nn*+*m*)	
P	*nn.m*	STRING (1..*y*)	
L		BOOLEAN	
D		STRING (1..4)	
T		STRING (1..7)	
Counter fields	SHORT_INTEGER		

Note: Numeric fields are transformed into character fields; therefore, whenever these fields are initialized and whenever values are assigned to these fields, the values must be filled with leading zeros, for example "0001".

Note: *y* = (*nn*+*m*+1) / 2

Record Buffer - COBOL

The fields generated in the record buffers in COBOL programs have the clauses shown in the table below:

Predict Format	Predict Length	COBOL clause	Observations
A	nnn	PIC X(nnn)	
B or I	2	PIC S9(4) COMP	
B or I	4	PIC S9(9) COMP	
B or I	8	PIC S9(18) COMP	
F	4	COMP-1	
F	8	COMP-2	
N or U	nn.m	PIC 9(nn)V9(m)	In any of these fields, nn+m may not exceed 18, and if m=0 the term V9(m) is omitted
NS or US	nn.m	PIC S9(nn)V9(m)	
P	nn.m	PIC 9(nn)V9(m)COMP-3	
PS	nn.m	PIC S9(nn)V9(m)COMP-3	
L		PIC X	
D		PIC 9(7) COMP-3	
T		PIC 9(13) COMP-3	
Counter fields		PIC S9(4) COMP	

An automatically generated counter field has the clause PIC S9(4) COMP.

A numeric or binary format field with a length not included in the table above is treated in COBOL as an alphanumeric format field

Packed fields in COBOL/II under operating system BS2000 are generated as "PACKED DECIMAL" instead of "COMP-3".

No alignment is performed.

Fields in FORTRAN

The fields generated in FORTRAN programs have the clauses shown in the table below:

Predict		FORTRAN Clause	Compiler	
Format	Length			Alignment assuming word length=4
A	nnn	CHARACTER*nnn	any	
B or I	1	LOGICAL*1	IBM, Siemens, VMS	
B or I	2	INTEGER*2	IBM, Siemens, VMS	half-word boundary
B or I	4	INTEGER*4	IBM, Siemens, VMS	word boundary
B or I	8	INTEGER*8	Siemens	double-word boundary
B or I	8	CHARACTER*8	IBM, VMS	

Predict		FORTRAN Clause	Compiler	
Format	Length			Alignment assuming word length=4
F	4	REAL*4	IBM, Siemens, VMS	word boundary
F	8	REAL*8	IBM, Siemens, VMS	double-word boundary
N or NS, U or US	nn.m	CHARACTER*x where x=nn+m	any	
P or PS	nn.m	CHARACTER*y where y=(nn+m+1)/2	any	
L		LOGICAL*1	any	
D		CHARACTER*4	any	
T		CHARACTER*7	any	

- If generated for IBM, Siemens or VMS compilers: Any file number field, length fields and automatically generated counter fields have the clause INTEGER*2.

Note: Numeric fields are transformed into character fields; therefore, whenever these fields are initialized and whenever values are assigned to these fields, the values must be filled with leading zeros, for example "0001".

Record Buffer - PL/I

The fields generated in the record buffers in PL/I programs have the clauses shown in the table below:

Fields in the PL/I include code have a PL/I clause determined by the length and format of the corresponding Predict field object, as shown in the table below where s is the numeric sign whose content (`T`, `I`, or `9R`) and position (left or right) are defined in the PL/I generation defaults; `nn+m` must not exceed 15; and if `m` is zero, `V(m)9` is omitted.

Predict		PL/I clause	Observations
Format	Length		
A	nnn	CHAR (nnn)	
B	1	FIXED BIN(7)	VMS only
B or I	2	FIXED BIN (15,0)	
B or I	4	FIXED BIN (31,0)	
F	4	FLOAT DEC (6)	
F	8	FLOAT DEC (16)	
N or U	nn.m	PIC '(nn)9V(m)9'	

Predict		PL/I clause	Observations
Format	Length		
NS or US	nn.m	PIC 's(nn-1)9V(m)9' or PIC '(nn)9V(m-1)9s'	
P or PS	nn.m	FIXED DEC (nn+m,m)	
L		BIT (8)	
D		FIXED DEC (7,0)	
T		FIXED DEC(13,0)	
Counter fields		FIXED BIN (15,0)	

A numeric or binary format field with a length not included in the table above is treated in PL/I as an alphanumeric format field.

Date and Time Conversion Routines

The following routines are delivered with this version of Adabas Native SQL and can be used in the application:

- SQTODATE
- SQFRDATE
- SQTOTIME
- SQFRTIME

SQTODATE

This module accepts two parameters:

- N-DATE (N8) in format DDMMYYYY
- DATE (D)

It converts the first parameter into a format D number and returns it in the second parameter.

SQFRDATE

This module accepts two parameters:

- N-DATE (N8) in format DDMMYYYY
- DATE (D)

It converts the second parameter, which is a format D number, into a numeric date and returns it in the first parameter.

SQTOTIME

This module accepts three parameters:

- N-DATE (N8) in format DDMMYYYY
- N-TIME (N7) in format HHMMSSS
- TIME (T)

It converts the first and second parameters into a format T number and returns it in the third parameter.

SQFRTIME

This module accepts three parameters:

- N-DATE (N8) in format DDMMYYYY
- N-TIME (N7) in format HHMMSSS
- TIME (T)

It converts the third parameter, which is a format T number, into a numeric date and numeric time and returns them in the first and second parameters.

Support of Distributed Data Structures

Adabas Native SQL supports distributed data structures by the DBID or AUTODBID clauses in Adabas Native SQL statements, or the Global OPTIONS parameters AUTODBID-ALL , AUTODBID-ATM , AUTODBID and DBID. These clauses put the DBID number defined in Predict in the control block.

The Global Parameters NETWORK and VIRTUAL-MACHINE

These global parameters are mandatory if more than one network is defined in Predict.

These parameters define the network and virtual machine in which the program is to run. Adabas Native SQL checks that the network and virtual machine exist in Predict and that the virtual machine is linked as a child object to the network.

For every database used (DBID, AUTODBID, AUTODBID-ATM and AUTODBID-ALL clauses) Adabas Native SQL checks the following:

- that if the database is defined as local, it is linked to the current virtual machine,

- that if the database is defined as isolated, it is linked (via the current virtual machine) to the current network.

Note: In this section, the terms *current network* and *current virtual machine* are used to describe the network and virtual machine specified with the global parameters **NETWORK** and **VIRTUAL-MACHINE** respectively.

The Distribution handling

The distribution is handled by the application programmer. If the program uses the DBID, AUTODBID, AUTODBID-ATM and AUTODBID-ALL, Adabas Native SQL performs the following additional checks:

- If one of the DBID clauses is used, the Run Mode parameter of the corresponding Predict database object must be *I* (isolated) or *L* (local), otherwise an error message is given.
- If the database is *local*, Adabas Native SQL checks that it is linked to the current virtual machine.
- If the database is *isolated*, Adabas Native SQL checks that it is linked to the current network.

After checking the database, Adabas Native SQL checks the physical link between the file and the database. The physical link information is stored in the Adabas attributes in Predict for every physical file connected to the database. This information includes the physical file number and the physical Logical Distribution type (how the file is implemented). This type must be either *blank* (simple file) or *E* (expanded).

If the file is expanded, this means that there are several files with the same layout in the same database, and that every file has a different range of ISNs. Adabas Native SQL checks for the physical file with the lowest minimum ISN value (ADALOD LOAD parameter MINISN).

With both simple and expanded files, Adabas Native SQL takes the physical file number from this physical link information. Note that in previous versions of Predict, the physical file number and the logical file number (as exists in the file description) had to be identical. As of Predict Version 3.2 or above, however, the same logical file may have different physical file numbers.

With this kind of distribution, the application is responsible for defining the DBID where every file exists. The AUTODBID-ALL option allows an update program which updates one database and accesses up to five more databases. With AUTODBID-ALL, Adabas Native SQL automatically detects which is the updated database and issues the COMMIT and ROLLBACK commands to it. It also generates different CONNECT and DBCLOSE statements to the different databases.

There is another option AUTODBID-ATM that may be used only in cases that the application will run under the control of the Adabas Transaction Manager (ATM) . With this option Adabas Native SQL does not restrict the number of updated databases within one program. It automatically uses the DBID defined in Predict for every access or update statement while the Commit and Close statements will be pointed to the default database and ATM will take care of the synchronization.

Relational Null Support

Adabas supports relational Null fields. The Null field has an indicator in two binary Byte format which indicates whether the field has a value or is Null. This indicator appears in the Adabas record and value buffers.

The definition of a Null field in Predict is shown by 'R' or 'U' in the field Suppression Column.

Adabas Native SQL supports Null fields in the following three clauses:

1. `SELECT` clause

   Every field specified in the SELECT clause which has a Null value indication is generated in the record buffer as two fields. The first field is the Null value indicator as two binary Bytes and its name is the field name, prefixed with "S-". The second field is the field itself.

   This definition is generated for every Null field even if it belongs to a group, or even if `SELECT*` is used.

   When the record is read from the database, a value of zero in the Null field indicator means that the value in the field itself is a real value. A value of "-1" ("x'FFFF'") in the Null field indicator means that the field has no value and is a real Null.
2. `UPDATE/STORE` clauses

   There is a new reserved word "NULL" which may be specified as a value for Null fields. For example:

   ```
   SET field=NULL
   ```

   Adabas Native SQL will move "-1" ("x'FFFF'") to the Null field indicator of the specified field in the record buffer used for updating the file.

   If the user uses the SET clause and specifies a real value or a variable for a field which has a Null value indicator, Adabas Native SQL will automatically reset the Null field indicator of that field. If the user does not specify the SET clause, but initiates the fields in the record buffer by himself, he should also reset or turn on the Null field indicator.
3. `WHERE` clause

   There is an extension to the syntax:

```
WHERE descriptor IS [NOT] NULL
```

This may be used in order to search for all records where the specified descriptor is Null or not Null. This extension is allowed only for descriptors which are defined with the new relational Null support.

Long Alpha field Support

Adabas has a field format "LA", standing for Long Alpha field.

This format represents a variable field whose length may be up to 16K Bytes.

Because it is a variable field, Adabas returns its value together with two binary Bytes in front of the value which represents the actual length of the field (the length includes the two binary Bytes.).

The definition of a Long Alpha field in Predict uses the format "AV".

Adabas Native SQL generates a Long Alpha field as two separate elements in the record buffer. The first element is the field length as two binary Bytes with the name suffixed with "-LEN". Immediately after is the the second element, which is the definition of the field itself as a character string with a total length taken from Predict with the name suffixed with "-TXT".

Because Adabas returns the value of the field in a variable way, it is impossible to have a definition of a field following the Long Alpha field in the record buffer.

For this reason the following restrictions hold:

- the Long Alpha field may be generated only as the last element in the record buffer.
- Only an elementary field is supported as a Long Alpha field (no MU or PE allowed).

4 SINGLE AND MULTIPLE-RECORD PROCESSING

Adabas Native SQL data retrieval statements operate in one of two modes: single-record processing mode and multiple-record processing mode.

The READ ISN statement always operates in single-record mode. The Adabas Native SQL statements in the following list can be used in either single-record processing or multiple-record processing mode:

- COMPARE
- FIND
- FIND COUPLED
- HISTOGRAM
- READ LOGICAL
- READ PHYSICAL SEQUENCE
- SORT.

Adabas Native SQL generates the appropriate data declarations and code for multiple-record processing if the keyword FOR is present in the DECLARE clause of the statement (see list above). If the FOR keyword is not coded or if the DECLARE clause is omitted, Adabas Native SQL generates code for single-record processing.

This chapter covers the following topics:

Single-Record Processing

If single-record processing is to be used, the OPEN, FETCH and CLOSE statements are not required and only the FIND, READ, etc., statement is required. Adabas Native SQL generates executable code from this statement, which must therefore appear in the procedure division of COBOL programs. In FORTRAN, the statement must be included within the executable statements.

Single-record processing should be used if the user needs to access only one record from the file.

Example (single-record processing):

```
     .
     .
     .
EXEC ADABAS
     SELECT PERSON
     FROM PERSONNEL
     WHERE PERSONNEL-NUMBER = 180001
END-EXEC
DISPLAY NAME FIRST-NAME AGE SEX.
```

In this example, the program uses the single-record processing method to display data from the record located by the WHERE criterion.

Multiple-Record Processing

The OPEN, FETCH and CLOSE statements are used for multiple-record processing. The set of records to be processed is determined using a COMPARE, FIND, HISTOGRAM, READ or SORT statement, followed by an OPEN statement. The records are then processed one by one using the FETCH statement, which will normally be coded in a loop. Finally, the CLOSE statement, which releases the ISN list and other Adabas resources, must be issued if the records were located by a FIND, COMPARE or SORT statement, i.e., if an ISN list was created.

It is the FETCH statement that actually reads each record from the database file and retrieves the values in the fields specified in the SELECT clause of the COMPARE, FIND, HISTOGRAM, READ or SORT statement. The OPEN, FETCH and CLOSE statements generate executable Adabas commands, whereas the COMPARE, FIND, HISTOGRAM, READ or SORT statement merely sets up parameter lists for later use.

The keyword FOR must be specified in the DECLARE clause of COMPARE, FIND, HISTOGRAM, READ or SORT in multiple-record processing mode. Using the DECLARE clause, you define a cursor that associates a 'cursor-name' with the statement. Once the cursor has been defined, it may be referred to in the OPEN, FETCH and CLOSE statements. These statements have the following syntax:

```
EXEC ADABAS
    OPEN cursor-name
END-EXEC
```

```
EXEC ADABAS
    FETCH cursor-name
END-EXEC
```

```
EXEC ADABAS
    CLOSE cursor-name
END-EXEC
```

`cursor-name` is the name used in the FIND, READ, SORT, COMPARE or HISTOGRAM statement that was previously declared. The cursor-name provides the link between the parameter-defining statement (FIND, READ, SORT, COMPARE or HISTOGRAM) and the corresponding executable statements (OPEN, FETCH and CLOSE).

Example (multiple-record processing):

```
    .
    .
    .
    .
  EXEC ADABAS
       DECLARE PERS CURSOR FOR
       SELECT PERSON
       FROM PERSONNEL
       WHERE NAME > = 'BROWN'
  END-EXEC
    .
    .
    .
    .
  EXEC ADABAS
       OPEN PERS
  END-EXEC
  EXEC ADABAS
       FETCH PERS
  END-EXEC
  PERFORM READ-PERSONNEL UNTIL ADACODE = 3.
  EXEC ADABAS
       CLOSE PERS
  END-EXEC
    .
    .
    .
    .
READ-PERSONNEL.
  DISPLAY NAME FIRST-NAME AGE SEX.
  EXEC ADABAS
       FETCH PERS
  END-EXEC
```

5 OVERVIEW OF STATEMENTS

This chapter covers the following topics:

Syntax

The Adabas Native SQL statements use the following syntax conventions:

Upper Case

Words printed in upper case must be entered exactly as they appear in the definition. However, if the initial part of an upper-case word is underlined, it may be abbreviated by entering only the underlined portion.

Lower Case

Words or hyphenated terms printed in lower-case are either the names of further syntax definitions, or else they are self-descriptive words that must be replaced by a suitable substitution. For example, the first term in the syntax definition shown below is `statement-name`, which is in turn described in the next syntax definition; the word `constant` is self-descriptive and might be replaced by the number 667.

Braces

Braces {} are used:

- to enclose alternatives, which are either stacked vertically, or stacked horizontally and separated by vertical bars. One of the alternatives must be coded. Default values that apply when a parameter is omitted are underlined.
- to group terms together. Ellipsis (see below) following the closing brace applies to the entire group, that is, to everything within the braces.

Brackets

Brackets [] indicate that the enclosed expression is optional.

Ellipsis

Ellipsis (a series of dots ...) after a term indicates that the term may be repeated. If the ellipsis follows a bracketed expression, the whole of the expression must be repeated. Ellipsis followed by a number, for example ...$_4$, indicates the maximum number of times that the term may be coded. Example:

A...$_3$

denotes any one of the following strings:

```
A
AA
AAA
```

Ellipsis Preceded by a Comma

Ellipsis preceded by a comma (,...) after a term indicates that the term may be repeated; if it is repeated, the occurrences must be separated by commas. Ellipsis preceded by a comma and followed by a number, for example ,...$_3$, indicates the maximum number of times that the term may be coded. Example:

X,...$_3$

denotes any one of the following strings:

```
X
X,X
X,X,X
```

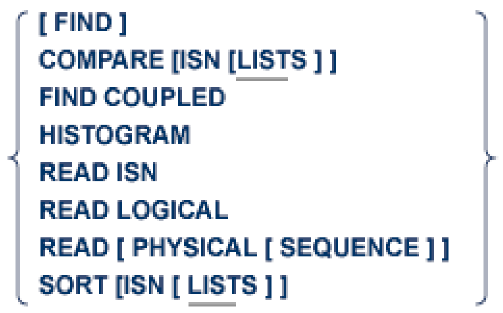
Other Special Characters

Other special characters, for example comma, asterisk * or parentheses ( ) must be coded exactly as they appear in the definition.

Syntax Diagram for Adabas Native SQL Data Retrieval Statements

```
EXEC ADABAS
    statement-name
    [ DECLARE cursor-name CURSOR [FOR] ]
    [SELECT { field-name,... | * } ]
    FROM {file [ alias ] },...
    [WHERE search-criterion ]
   [OPTIONS
     [{AUTODBID                          }]
     [{DBID= database-name value1 ]      }]
        [CIPHER=  value1 ]
        [COND-NAME={Y|N} ]
        [HOLD [RETURN]]
        [INDEXED={Y|N} ]
        [ISN= value2 ]
        [ISNSIZE= len ]
        [MAXTIME= value3 ]
        [PASSWORD= value4 ]
        [PREFIX= prefix ]
        [SAVE]
        [SEQUENCE]
        [STATIC={Y|N}]
        [SUFFIX= suffix ]                 ]
   [ORDER BY def...  { DESCENDING  } ]
                     { [ASCENDING] }
    [GROUP BY field-name ]
END-EXEC
```

Syntax Diagram for statement-name



```
[ FIND ]
COMPARE [ISN [LISTS ] ]
FIND COUPLED
HISTOGRAM
READ ISN
READ LOGICAL
READ [ PHYSICAL [ SEQUENCE ] ]
SORT [ISN [ LISTS ] ]
```

Overview of Adabas Native SQL Statements

This section describes briefly the function of each Adabas Native SQL statement.

Database Query Statements

Each of these statements produces a list containing the numbers of the database records (ISNs) that satisfy the given retrieval criterion.

If you are only interested in the record whose number appears first in the list, then the database query statement on its own will produce the list and then retrieve the data from this record. However, more generally you will wish to process all of the records identified by the list.

The database query statement, which in this case must include the `DECLARE` *`cursor-name`* `CURSOR FOR` clause, does not retrieve any data. It must be followed by the OPEN, FETCH and CLOSE statements, which are described in section ***Statements for Processing Multiple Records***.

Statement	Action
COMPARE	Produces an ISN list that is a logical combination of two ISN lists that have previously been produced. The ISN list may include all records whose ISNs appear ■ in the first list AND in the second list ■ in the first list OR in the second list, or ■ in the first list BUT NOT in the second list. If the keyword FOR is not coded in the DECLARE clause, this statement also reads data from the record whose ISN is at the beginning of this list. This statement generates the Adabas command S8 (Process ISN Lists).

Statement	Action
FIND	Produces an ISN list containing the ISNs of all records that satisfy the given retrieval criterion. If required, the ISN list will be sorted so that the records to which it points can be retrieved in ascending or descending sequence, ordered by the values in one, two or three descriptor fields. If the keyword FOR is not coded in the DECLARE clause, this statement also reads data from the record whose ISN is at the beginning of this list. This statement generates the Adabas command S1/4 (Find Records).
FIND COUPLED	Finds the records in a secondary file that are coupled to a specified record in the primary file. For example, having found a particular record in the PERSONNEL file (primary file), you could use the FIND COUPLED statement to find all the records in the AUTOMOBILES file (secondary file) that detail the cars owned by this employee. The PERSONNEL and AUTOMOBILES files are coupled by the PERSONNEL-NUMBER/OWNER-PERSONNEL-NUMBER fields. If the keyword FOR is not coded in the DECLARE clause, this statement also reads data from the record whose ISN is at the beginning of this list. This statement generates the Adabas command S5 (Find Coupled). Note that this statement is not available under VMS.
SORT	Sorts an ISN list that has been produced by a previous Adabas Native SQL FIND or COMPARE statement. The ISN list is sorted so that the records to which it points can be retrieved in ascending or descending sequence, ordered by the values in one, two or three descriptor fields. If the keyword FOR is not coded in the DECLARE clause, this statement also reads data from the record whose ISN is at the beginning of this list. This statement generates the Adabas command S9 (Sort ISN List).

Data Storage READ Statements

These statements read specified data fields from the database. The READ ISN statement always reads from a single record; the remaining statements can also read data from a single record but they will normally be used in conjunction with the OPEN and FETCH statements to read from a series of records.

Statement	Action
READ ISN	Reads data fields from a single record. The ISN of the record is specified by the program. This statement generates the Adabas command L1/4 (Read Record).
READ LOGICAL	Reads data fields from one or more records. The records are read in logical sequence, based on the ascending order of a given descriptor. The program may optionally specify a starting value for the descriptor. The user may request a Descending option. This statement generates the Adabas command L3/6 (Read Logical Sequence).
READ PHYSICAL SEQUENCE	Reads data fields from one or more records. The records are read in the order in which they are physically stored in the database. This is the most efficient method of reading if an entire file is to be processed and the record sequence is not important. This statement generates the Adabas command L2/5 (Read Physical Sequence).

Associator READ Statement

This statement will normally be used with the `DECLARE` *`cursor-name`* `CURSOR FOR` clause and in conjunction with the OPEN and FETCH statements in order to retrieve all descriptor values sequentially. The first FETCH statement will return the lowest descriptor value (and optionally the number of records that contain this value), the second FETCH statement will return the next descriptor value, and so forth.

Statement	Action
HISTOGRAM	Reads from the Adabas Associator but does not read from Data Storage. It returns to the user the values of a specified descriptor in ascending sequence. Optionally, it can also return the number of records that contain each descriptor value. The user may request that the order of the values returned be in descending order. This statement generates the Adabas command L9 (Read Descriptor Values).

Statements for Processing Multiple Records

As mentioned above, some of the Adabas Native SQL statements can be used to process multiple records or descriptor values. This applies to the following:

- statements that produce an ISN list (FIND, FIND COUPLED, SORT and COMPARE)
- statements that initiate sequential reading (READ LOGICAL and READ PHYSICAL SEQUENCE), and
- the HISTOGRAM statement, which initiates reading a sequence of descriptor values.

In each case, the records or descriptor values are actually read by a FETCH statement, which is normally executed in a loop. The FETCH statement is preceded by the statement that initiates processing and by the OPEN statement, both of which are executed once only. When as many records as desired have been processed, the program should issue a CLOSE statement to release the ISN list.

Statement	Action
OPEN	This statement must be issued after the statement that initiates reading and before the sequence of FETCH statements that actually retrieve the data from the database.
FETCH	This is the statement that actually retrieves data from the database. Normally it will be executed in a loop until the end-of-data response code is detected.
CLOSE	Performs housekeeping tasks, such as releasing the ISN list, which is no longer required. This statement must be issued after the FIND, FIND COUPLED, SORT and COMPARE statements. Optionally, it may be issued after a READ LOGICAL, READ PHYSICAL SEQUENCE or HISTOGRAM statement.

Database Modification Statements

These three statements modify the data held in the database. Normally, the DELETE and UPDATE statements will be preceded by other Adabas Native SQL statements that find the required record. This record must be placed in hold status so that other programs cannot interfere until the modification is completed.

All of these statements can be disabled by setting the global parameter MODE NOUPD. This can be useful when testing programs, and also for production programs which should not modify the database in any way.

Statement	Action
DELETE	Deletes a record from the database. This statement generates the Adabas command E1 (Delete Record).
INSERT	Inserts a new record in the database. This statement generates the Adabas command N1/2 (Add Record).
UPDATE	Updates the values held in one or more fields of the specified record. This statement is also used to update fields that were previously empty. This statement generates the Adabas command A1 (Record Update).

Logical Transaction Processing Statements

A logical transaction is defined as the smallest unit of change that, when applied to the database, leaves it in a logically consistent state from the point of view of the application. If processing were to be interrupted when a logical transaction had been only partially applied to the database, there would be a logical inconsistency; this state must be avoided at all costs. Adabas has been designed so that these inconsistent states can never occur if the following three statements are used correctly.

Statement	Action
COMMIT WORK	Marks the end of a logical transaction. This statement generates the Adabas command ET (End Transaction).
ROLLBACK WORK	Cancels all modifications made to the files which the user is accessing during the user's current logical transaction. This statement generates the Adabas command BT (Backout Transaction).
READ USERDATA	The COMMIT WORK, CHECKPOINT and DBCLOSE statements allow the program to store additional data in a special data area. This facility would typically be used to store information about the positions of input files, etc., so that processing can be restarted in the event of a system failure. The READ USERDATA statement is used to recover this information. This statement generates the Adabas command RE (Read ET User Data).

Checkpointing Statement

This statement applies only to programs that update a database in exclusive mode.

Statement	Action
CHECKPOINT	Generates a checkpoint entry in the Adabas checkpoint table. This statement generates the Adabas command C1 (Write a Checkpoint).

Other Adabas Native SQL Statements

Statement	Action
BEGIN	This statement must be included as the first Adabas Native SQL statement in every program, with the possible exception of the COPY and GENERATE statements. In Ada programs, it must be coded in the data declaration part of the program; in COBOL programs it must be coded in the DATA DIVISION; and in FORTRAN programs it must be coded in the DATA DEFINITION area of the program.
CONNECT	Indicates the files to be accessed and the access mode (read-only or read and update). Options are included to specify the processing mode, to specify the password to be used to gain access to password-protected files, and to retrieve user data that were written by a previous program (see also the description of the READ USERDATA statement above). This statement generates the Adabas command OP (Open User Session).
COPY	Permits a file layout generated by Predict as Ada, COBOL, FORTRAN or PL/I code to be copied into the program.
DBCLOSE	Flushes the Adabas buffer, so that database updates are written to the physical storage medium. It can be used if desired after a sequence of logically related transactions. In online applications, however, it should only be used at the end of a user session and not at the end of each TP transaction program. This statement generates the Adabas command CL (Close User Session).
GENERATE	The COPY statement copies a file layout that was generated using information contained in the data dictionary into the program. If it has not already been generated using Predict's facilities, or if the data dictionary information may have been changed since the layout was generated, this statement can be used to generate the file layout from the latest information and copy it into the program in a single step.
HOLD	Places a record in hold status. Other programs cannot interfere with this record so long as it is in hold status. A record must be put in hold status before it can be deleted or updated.

Statement	Action
	See also the HOLD option, which can be used with all Adabas Native SQL data retrieval statements except HISTOGRAM. This statement generates the Adabas command HI (Hold Record). See also the RELEASE ISN statement.
RELEASE	Releases an ISN list that was created by a COMPARE, FIND, FIND COUPLED or SORT statement and retained because the SAVE option was coded. This statement will only be required in exceptional circumstances. This statement generates the Adabas command RC (Release Command ID).
RELEASE ISN	Releases a record from hold status. The converse of the HOLD statement. This statement generates the Adabas command RI (Release Record).
RESTORE	Restores the Adabas Native SQL environment after swapping. Used in conjunction with the SAVE statement in CICS programs running in pseudo-conversational mode and in UTM programs with multi-step transactions. Adabas must be running in get-next mode, that is, you must not specify an ISN buffer (ISNSIZE parameter).
SAVE	Makes the Adabas Native SQL environment available to the user, who should save it in a safe place before swapping takes place. Used in conjunction with the RESTORE statement in CICS programs running in pseudo-conversational mode and in UTM programs with multi-step transactions. Adabas must be running in get-next mode, that is, you must not specify an ISN buffer (ISNSIZE parameter).
TRACE	A debugging aid used to switch trace printing of all executed Adabas Native SQL statements on and off.
WHENEVER	Controls generation of code that tests the response code after execution of Adabas Native SQL statements and, if a non-zero response code occurs, branches to a user-written error handling routine.
WRITE TO LOG	Writes data to the Adabas data protection log. The data can subsequently be read using an Adabas utility program. This statement will only be required in exceptional circumstances. This statement generates the Adabas command C5 (Write User Data To Protection Log).

Adabas Native SQL Clauses

The following clauses are common to the data retrieval statements, i.e., COMPARE, FIND, FIND COUPLED, HISTOGRAM, READ ISN, READ LOGICAL, READ PHYSICAL SEQUENCE and SORT.

- DECLARE Clause
- SELECT Clause
- FROM Clause
- WHERE Clause

DECLARE Clause

```
DECLARE cursor-name CURSOR [ FOR ]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name is used to generate the Adabas command-ID unless the **DYNAMCID** option is specified in the OPTIONS parameter.

The cursor-name may be up to four characters long and cannot contain special characters such as @, #, $ and %.

Note: In COBOL programs, all cursor-names should be exactly four characters long. Otherwise, some compilers may issue warning messages.

If multiple records are to be processed, the `DECLARE cursor-name CURSOR FOR` construction must be used. The keyword FOR indicates to Adabas Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name.

If only a single record is to be processed, the DECLARE clause may be omitted.

SELECT Clause

```
SELECT { field-name ,... }
       { *              }
```

The SELECT clause indicates which fields are to be retrieved from the database in the file which is specified in the FROM clause. All types of fields may be selected, with the exception of redefined fields and phonetic descriptors. Fields that are not mentioned in the SELECT clause are not included in the record buffer structure, they are not read from the Adabas file and consequently they cannot be referenced later in the program. The fields may be specified either by their full primary names or by appropriate language-specific synonyms as defined in the data dictionary. See **Synonyms** for more information.

If you intend to use language-specific synonyms in SELECT clauses and are running Predict 3.1, invert a new superdescriptor in the FDIC file. This superdescriptor must have the 2-character name `SN` and consist of the following parent fields:

SYNONYM-NAME (CL).

FILE-NAME (CC).

The message DESCRIPTOR SYNONYM will appear in the Adabas Native SQL MESSAGES. The message SYNONYM will appear whether or not this superdescriptor is inverted.

If the SELECT clause is omitted, then no records are processed, but other functions such as search may be performed.

The field expressions are used by Adabas Native SQL when generating the format buffer and record buffer. The field names generated by Adabas Native SQL for the record buffer are generated from the field-names as defined in the data dictionary, except that language-specific synonyms will be used if they have been defined in the data dictionary. The prefix and suffix are added to the basic field-name, invalid characters may be replaced by the 'validation character', and excess characters may be deleted (truncated) if the name is too long. The field attributes, including format, length, etc., are also taken from the data dictionary. The section ***Programming Considerations*** describes the record buffer structure that Adabas Native SQL generates using the SELECT clause, the FROM clause and the definitions stored in the data dictionary.

The name of the record buffer structure is the 'alias' specified in the FROM clause or, if no alias is specified, the file name specified in the FROM clause.

If an asterisk is specified following the keyword SELECT, all the fields within the userview are read.

Example:

```
SELECT *
FROM FINANCE
```

The structure of the Ada record buffer is as follows:

```
   type CREDIT_CARDPERS       is array (INTEGER range <>)
                              of STRING (1..0018);
   type CREDIT_LIMITPERS      is array (INTEGER range <>)
                              of STRING (1..0004);
   type CURRENT_BALANCEPERS   is array (INTEGER range <>)
                              of STRING (1..0004);
   type OIL_CREDITPERS        is array (INTEGER range <>)
                              of STRING (1..0007);
   type INSURANCE_COMPANYPERS is array (INTEGER range <>,
                                        INTEGER range <>)
                              of STRING (1..0025);
   type POLICY_AMOUNTPERS     is array (INTEGER range <>,
                                        INTEGER range <>)
                              of STRING (1..0006);
   type ON_VACPERS            is array (INTEGER range <>)
                              of STRING (1..0001);
   type RECORD_BUFPERS is
     record
        PERSONNEL_NUMBER  : STRING                (1..0008);
        CREDIT_CARD       : CREDIT_CARDPERS       (1..0002);
        CREDIT_LIMIT      : CREDIT_LIMITPERS      (1..0002);
        CURRENT_BALANCE   : CURRENT_BALANCEPERS   (1..0002);
        OIL_CREDIT        : OIL_CREDITPERS        (1..0010);
        NET_WORTH         : STRING                (1..0008);
        CREDIT_RATING     : STRING                (1..0002);
        INSURANCE_COMPANY : INSURANCE_COMPANYPERS (1..0003,1..0004);
        POLICY_AMOUNT     : POLICY_AMOUNTPERS     (1..0003,1..0004);
        COLLEGE           : STRING                (1..0016);
        ON_VAC            : ON_VACPERS            (1..0005);
        INVESTMENT        : STRING                (1..0015);
        SAVINGS           : STRING                (1..0007);
        BANK              : STRING                (1..0020);
        ISN               : INTEGER;
        QUANTITY          : INTEGER;
        RESPONSE_CODE     : SHORT_INTEGER;
     end record
FINANCE:                  RECORD_BUFPERS;
```

Note: This example shows a record buffer that was generated from an Adabas Native SQL statement with the cursor-name 'PERS'. The periodic group fields are always generated with STRUCT='N'.

The structure of the COBOL record buffer is as follows:

Note: The level-2 name generated for the record buffer includes the cursor-name, if one was specified. The COBOL example below shows a record buffer that was generated from an Adabas Native SQL statement without a cursor-name.

```
01  FINANCE.
    02 RECORD-BUF-0-1.
     03 PERSONNEL-NUMBER    PIC 9(8).
     03 G-MAJOR-CREDIT.
      04 MAJOR-CREDIT                 OCCURS 2.
       05 CREDIT-CARD       PIC X(18).
       05 CREDIT-LIMIT      PIC 9(4).
       05 CURRENT-BALANCE   PIC 9(4).
     03 OIL-CREDIT          PIC X(7)  OCCURS 10.
     03 NET-WORTH           PIC 9(8).
     03 CREDIT-RATING       PIC 9(2).
     03 G-INSURANCE-POLICY-TYPES.
      04 INSURANCE-POLICY-TYPES       OCCURS 3.
       05 INSURANCE-COMPANY PIC X(25) OCCURS 4.
       05 POLICY-AMOUNT     PIC 9(6)  OCCURS 4.
     03 COLLEGE             PIC X(16).
     03 G-VACATION.
      04 VACATION                     OCCURS 5.
       05 ON-VAC            PIC X(1).
     03 INVESTMENT          PIC X(15).
     03 SAVINGS             PIC 9(7).
     03 BANK                PIC X(20).
    02 ISN                  PIC 9(9) COMP.
    02 QUANTITY             PIC 9(9) COMP.
    02 RESPONSE-CODE        PIC 9(4) COMP.
```

The FORTRAN equivalent is as follows:

```
CHARACTER*    8 PERBER
CHARACTER*   18 CCARD (00002)
CHARACTER*    4 CLIM  (00002)
CHARACTER*    4 CBAL  (00002)
CHARACTER*   52 MAJDIT
CHARACTER*    8 NETRTH
CHARACTER*    2 CREING
INTEGER*      2 CINPES
CHARACTER*   25 INCOM (00003 , 00004)
CHARACTER*    6 POLUNT(00003 , 00004)
CHARACTER*  372 INSPES
CHARACTER*   16 COLEGE
CHARACTER*    1 ONVAC (00005)
CHARACTER*    5 VACION
CHARACTER*   15 INVENT
```

```
CHARACTER*    7 SAVNGS
CHARACTER*   20 BANK
CHARACTER*  507 FINNCE
```

Notes:

1. The cursor is not shown for FORTRAN.
2. Synonyms are assumed to be defined in the data dictionary as shown in Appendix B and truncation is assumed to occur in the middle of the word. (The maximum length of names is operating-system dependent.)
3. The field FINNCE encompasses all other fields and is the equivalent of the record buffer in COBOL and PL/I.

The structure of the PL/I record buffer is as follows:

Note: The level-2 name generated for the record buffer includes the cursor-name, if one was specified. The PL/I example shows a record buffer that was generated from an Adabas Native SQL statement with the cursor-name 'PERS'.

```
DCL 1  FINANCE,
      2 RECORD_BUFPERS_1 UNAL,
       3 PERSONNEL_NUMBER              PIC '(7)99',
       3 G_MAJOR_CREDIT,
        4 MAJOR_CREDIT           (2),
         5 CREDIT_CARD                 CHAR (18),
         5 CREDIT_LIMIT                PIC '(3)99',
         5 CURRENT_BALANCE             PIC '(3)99',
       3 OIL_CREDIT              (10) CHAR (7),
       3 NET_WORTH                     PIC '(7)99',
       3 CREDIT_RATING                 PIC '(1)99',
       3 G_INSURANCE_POLICY_TYPES,
        4 INSURANCE_POLICY_TYPES (3),
         5 INSURANCE_COMPANY     (4) CHAR (25),
         5 POLICY_AMOUNT         (4) PIC '(5)99',
       3 COLLEGE                       CHAR (16),
       3 G_VACATION,
        4 VACATION               (5),
         5 ON_VAC                      CHAR (1),
       3 INVESTMENT                    CHAR (15),
       3 SAVINGS                       PIC '(6)99',
       3 BANK                          CHAR (20),
      2 ISN                            FIXED BIN(31),
      2 QUANTITY                       FIXED BIN(31),
      2 RESPONSE_CODE                  FIXED BIN(15),
       RECORD_BUFPERS CHAR(585) BASED (ADDR(RECORD_BUFPERS_1));
```

FROM Clause

```
FROM {file [alias]} ,...
```

The FROM clause specifies the file from which data is to be retrieved. This clause is used together with the SELECT clause to generate the record buffer (Ada, COBOL or PL/I) or the equivalent FORTRAN data structure, and to control the retrieval of information from the database. The fields specified in the SELECT clause refer only to the first file named in the FROM clause; however, the retrieval criterion in the WHERE clause can refer to fields from a maximum of 5 physically-coupled files, or a maximum of 16 soft-coupled files.

file is the Adabas file name or view name as defined in the data dictionary. The *alias*, if present, is used as the name of the record buffer; otherwise, the name *file* is used. The alias, which should be unique within the program (including linked modules), is required if two or more Adabas Native SQL statements within the module refer to the same file. It can then be used as a qualifier in subsequent Ada, COBOL or PL/I statements that wish to refer to the fields in the respective record buffers. Note that the alias is not preceded by a comma.

Example:

```
SELECT NAME, CITY
FROM PERSONNEL
```

The record buffer has the name 'PERSONNEL'. You may refer to the variables in the record buffer as:

```
PERSONNEL.NAME                          (Ada)
PERSONNEL.CITY                          (Ada)
NAME OF PERSONNEL                       (COBOL)
CITY OF PERSONNEL                       (COBOL)
NAME                                    (FORTRAN)
CITY                                    (FORTRAN)
PERSONNEL.NAME                          (PL/I)
PERSONNEL.CITY                          (PL/I)
```

If you use the `alias` option:

```
SELECT NAME
FROM PERSONNEL PERSON-ALIAS
```

then Adabas Native SQL generates a record buffer structure with the name 'PERSON_ALIAS' (Ada or PL/I) or 'PERSON-ALIAS' (COBOL). You may refer to the variables in the record buffer as:

```
PERSON_ALIAS.NAME                        (Ada)
PERSON_ALIAS.CITY                        (Ada)
NAME OF PERSON-ALIAS                     (COBOL)
CITY OF PERSON-ALIAS                     (COBOL)
NAME                                     (FORTRAN)
CITY                                     (FORTRAN)
PERSON_ALIAS.NAME                        (PL/I)
PERSON_ALIAS.CITY                        (PL/I)
```

WHERE Clause

WHERE *search-criterion*

The `search-criterion` specifies the criterion for selecting the records to be read by the retrieval statement. Since individual statements use the `search-criterion` differently, it is explained for each statement separately. Fields taken from files that are not specified in the FROM clause must be qualified, for example, FILE.FIELD or ALIAS.FIELD.

Note: (for Ada and FORTRAN users): Packed and unpacked fields are generated as character fields, thus search values must include leading zeros in order to pass numeric values to an alphanumeric field. For example, WHERE PERSONNEL-NUMBER = '00000105'.

Note: (for Ada users): Character constants (literals) used as search values must be padded with leading spaces.

Special restrictions apply when referring to periodic groups, multiple-value fields and multiple-value fields within periodic groups in WHERE clauses. See the **respective sections on multiple value fields** for more information.

OPTIONS Clause

```
OPTIONS [ { AUTODBID              } ]
        [ { DBID= database-name   } ]
        [ CIPHER= value1 ]
        [ COND-NAME= { Y } ]
        [            { N } ]
        [ HOLD [RETURN] ]
        [ INDEXED= { Y } ]
        [          { N } ]
        [ ISN= value2 ]
        [ ISNSIZE= len ]
        [ MAXTIME= value3 ]
        [ PASSWORD= value4 ]
        [ PREFIX= prefix ]
        [ SAVE ]
        [ SEQUENCE ]
        [ STATIC= { Y } ]
        [         { N } ]
        [ SUFFIX= suffix ]
```

Note: Not all options apply to each retrieval statement.

AUTODBID Option

This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, the database specified first will be used.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

CIPHER Option

This option must be specified when accessing a ciphered file.

The keyword CIPHER is followed by an '=' sign and the cipher key (cipher code), which may be a constant of up to 8 characters or the name of a variable containing the cipher key. If the cipher key is specified as a constant, it will appear in the program listings and its security may be compromised. The use of a variable whose value is read in at run-time is recommended. If the cipher key is specified as the name of a variable, it must be preceded by a colon (':').

Great care should be taken to remember the cipher key used when updating a file. If you update a file and subsequently forget the cipher key, the data can never be recovered from the file correctly.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as Level-88 entries.

The value is taken from one of the following sources:

- Local (higher priority): Use the COND-NAME option for the current COMPARE, FIND, HISTOGRAM, INSERT, READ, SORT or UPDATE statement.
- Global (lower priority): Use the COND-NAME clause of the global **OPTIONS** parameter

This option can only be set if field `With Cond. names` in the Predict Modify COBOL Defaults screen is marked with an "X". See also *Generate COBOL Copy Code* in the *Predict Administration Manual*.

DBID Option

This option should be used if the program accesses more than one database. The *`database-name`* must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user.

A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode.

See the section ***HOLD Logic*** for more information.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

The value for this option is taken from one of the following sources:

- Local (higher priority): Use the INDEXED option for the current COMPARE, FIND, HISTOGRAM, INSERT, READ, SORT or UPDATE statement.
- Global (lower priority): Use the INDEXED clause of the global **OPTIONS** parameter.

This option can only be set if the field `Indexed by` in thePredict Modify COBOL Defaults screen is marked with an "X". See also *Generate COBOL Copy Code* in the *Predict Administration Manual*.

ISN Option

The ISN option may be used with the READ PHYSICAL SEQUENCE and READ LOGICAL statements. In the READ PHYSICAL SEQUENCE statement, it specifies the ISN of the first record to be read. If a record with this ISN does not exist, the record with the next higher ISN will be read. In the READ LOGICAL statement, the ISN option specifies the ISN of the first record to be read from the set of records that satisfy the WHERE clause.

The parameter that follows the keyword 'ISN', namely *`value2`*, may be either a constant or the name of a variable that contains the ISN. If *`value2`* is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'.

ISNSIZE Option

The ISNSIZE parameter defines the maximum number of ISNs that can be stored in the ISN buffer. If the number of records that satisfy the selection criterion exceeds ISNSIZE, the excess ISNs are stored by Adabas and retrieved automatically when required. This process is transparent to the programmer.

If this option is not coded locally, that is, as an option in a COMPARE, FIND, FIND COUPLED or SORT statement, the ISNSIZE defined in the global OPTIONS parameter (see) takes effect. If neither a local nor a global ISNSIZE definition is coded, an ISN buffer is not allocated. This latter mode must be used if the file is protected by the 'security by value' facility, or if the SAVE and RESTORE statements are used in CICS or UTM programs.

A larger value for the ISNSIZE parameter may improve processing speed. See your DBA for further advice about selecting an appropriate value for this option.

MAXTIME Option

This option specifies the time limit for Adabas Sx commands.

Specify either a number or a variable containing a number. The default is defined with the parameter `Maximum time for an Sx command` on the Adabas Native SQL Defaults screen.

See section *OP Command*, paragraph *Additions 4* in the *Adabas Command Reference Manual* for more information..

PASSWORD Option

The keyword PASSWORD is followed by an '=' sign and then the password, which may be a constant of up to 8 characters or the name of a variable containing the password.

Note: If the password contains special characters i.e. `@#$%`, it may not be specified as a constant and a variable should be used.

The use of a variable whose value is read in at run-time is recommended. If the password is specified as the name of a variable, it must be immediately preceded by a colon (':').

Example: PASSWORD = :VAR

where VAR is the name of a variable containing the password.

This option must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless the password is specified globally in the **CONNECT** statement. In this case, Adabas Native SQL will use this password in all generated Adabas commands unless it is overridden by a password specified in the PASSWORD parameter of the OPTIONS clause for an individual statement.

PREFIX Option

The prefix is taken from one of the following sources:

- Local (highest priority): Use the PREFIX option for the current COMPARE, FIND, HISTOGRAM, INSERT, READ, SORT or UPDATE statement.
- Global: Use the PREFIX clause of the global **OPTIONS** parameter.
- Predict (lowest priority): The current generation default for the respective language are taken from the data dictionary.

The first two options can only be used if the `Field name prefix` field in the Predict Modify...Defaults screen for Ada, COBOL, FORTRAN or PL/I is marked with "X", indicating it may be modified by the user. Otherwise the prefix value defined in the data dictionary cannot be overridden.

SAVE Option

Use this option if you need to retain the entire ISN list. The saved ISN list can be used later in COMPARE, FIND and SORT statements. The saved ISN list is discarded when:

- a further Adabas Native SQL statement that creates another ISN list with the same name (same command-ID) is executed, or
- an Adabas Native SQL 'CLOSE' or 'DBCLOSE' statement is executed, or
- the non-activity time limit or transaction time limit is exceeded.

Under these circumstances, response code 9 is returned when the next Adabas command is attempted.

A CLOSE statement must be executed to release the ISN list after every statement that generates an ISN list (COMPARE, FIND, FIND COUPLED and SORT). If the CLOSE statement is not executed, large amounts of storage will be occupied for the remainder of the Adabas session.

SEQUENCE Option

The SEQUENCE option is used only with the READ ISN statement.

If this option is coded, the record with the specified ISN or the next higher ISN is read. The ISN of the record that was read is returned in the field 'ISN', which is appended to every record buffer (see page). If the file does not contain a record having an ISN higher than the specified ISN, end-of-file is signaled. Therefore, when using this option, the flag ADACODE (Ada, COBOL and PL/I) or SQLCOD (FORTRAN) should be checked for end-of-file status.

If this option is not specified, the record with the specified ISN is read. If the file does not contain a record having the specified ISN, an error is reported (response-code = 113). This causes the program to terminate unless a user-written response code interpretation routine is provided.

See also description of the global parameter **ABORT**.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded, all buffers generated by Adabas Native SQL will be defined as static.

The value is taken from one of the following sources:

- Local (higher priority): Use the STATIC option for the current COMPARE, FIND, HISTOGRAM, INSERT, READ, SORT or UPDATE statement.
- Global (lower priority): Use the STATIC clause of the global **OPTIONS** parameter.

Note: This option can only be set if the field `Static` in the Predict Modify PL/I Defaults screen is marked with an "X". See also *Generate PL/I Include Code* in the *Predict Administration Manual*.

SUFFIX Option

The suffix is taken from one of the following sources:

- Local (highest priority): Use the SUFFIX option for the current COMPARE, FIND, HISTOGRAM, INSERT, READ, SORT or UPDATE statement.
- Global: Use the SUFFIX clause of the global **OPTIONS** parameter.
- Predict (lowest priority): The current generation default for the respective language is taken from the data dictionary.

The first two options can only be used if the `Field name suffix` field in the Predict Modify...Defaults screen for Ada, COBOL, FORTRAN or PL/I is marked with "X", indicating it may be modified by the user. Otherwise the suffix value defined in the data dictionary cannot be overridden.

ORDER BY Clause

$$\textbf{ORDER BY} \quad \textit{de1...}_{3} \left\{ \begin{array}{l} \underline{\textbf{DESC}}\textbf{ENDING} \\ [\,\underline{\textbf{ASC}}\textbf{ENDING}\,] \end{array} \right\}$$

The ORDER BY clause specifies the order in which the records are retrieved. It is used in the FIND, HISTOGRAM, READ LOGICAL and SORT statements.

In the FIND and SORT statements, the ISN list may be sorted on up to three descriptors in ascending or descending sequence. In the READ LOGICAL statement, this clause specifies one descriptor that determines the logical sequence in which the records are to be read.

A descriptor used in an ORDER BY clause may not be a member of a periodic group, nor may it be a phonetic descriptor.

The keyword DESCENDING, which may be abbreviated to DESC, specifies descending sequence, otherwise ascending sequence is assumed as default.

GROUP BY Clause

```
GROUP BY    field-name
```

The GROUP BY clause is used only in the HISTOGRAM statement. It specifies the descriptor for which the values are to be retrieved. If the 'WHERE' clause is coded, the field used in the GROUP clause must be the same as the field used in the WHERE clause.

6 ADABAS NATIVE SQL STATEMENTS

This chapter covers the following topics:

The BEGIN Statement

```
EXEC ADABAS
    BEGIN DECLARE SECTION
END-EXEC
```

This statement must appear in every program that uses Adabas Native SQL statements. The only Adabas Native SQL statements allowed to precede this statement are COPY and GENERATE.

- In Ada programs, the BEGIN statement must be coded in the data declaration part of the program.
- In COBOL programs it must be coded in the DATA DIVISION.
- In FORTRAN programs it must be coded in the DATA DEFINITION area of the program.

Adabas Native SQL generates Adabas control blocks, format buffers, search buffers, value buffers and other miscellaneous information in response to the BEGIN DECLARE SECTION statement.

The CHECKPOINT Statement

```
EXEC ADABAS
    CHECKPOINT USER= value1
END-EXEC
```

The CHECKPOINT statement is used by update programs that issue checkpoints. It is only applicable to programs that run in exclusive file control mode. One option is available:

- USER

USER

For user checkpoints made in exclusive file control mode. An Adabas C1 command is generated.

`value1` is a constant of 4 characters identifying the checkpoint code or the name of a variable containing the checkpoint code. If `value1` is a variable name, it must be preceded by a colon (':').

Examples:

```
EXEC ADABAS
  CHECKPOINT USER = 'CK01'
END-EXEC
```

```
EXEC ADABAS
  CHECKPOINT USER = :CURRENT-CKPT
END-EXEC
```

The CLOSE Statement

```
EXEC ADABAS
    CLOSE cursor-name
END-EXEC
```

This statement is part of the OPEN/FETCH/CLOSE sequence that is used for processing multiple records. See section 3 for further details.

The CLOSE statement must be used in conjunction with the COMPARE, FIND, FIND COUPLED and SORT statements, that is, with those statements that generate an ISN list. It may be used with the HISTOGRAM, READ LOGICAL and READ PHYSICAL SEQUENCE statements, but its use following these statements is not mandatory.

The CLOSE statement releases various Adabas resources, and it also releases the command-ID from the ISN list table. This makes it impossible to refer to the records after the CLOSE statement has been executed. No more FETCH statements can be executed after the CLOSE has taken place.

This statement generates an Adabas RC command.

The COMMIT WORK Statement

```
EXEC ADABAS
    COMMIT WORK
      [ USERDATA= value ]
END-EXEC
```

The COMMIT WORK statement is used to indicate the end of a logical transaction. It should be issued by ET mode users whenever the program has completed the processing of one logical transaction. Failure to do this may lead to an excessively large hold queue in the Adabas work file and eventually to hold queue overflow.

Should the application program ABEND, the status of the database at the time when the last COMMIT WORK was issued will automatically be restored when Adabas is restarted (autobackout).

An Adabas ET (end-of-transaction) command is generated.

USERDATA Clause

USERDATA= *value*

The user may write data to the Adabas system file using the 'USERDATA = value' clause. The data can be retrieved using the CONNECT and READ USERDATA statements. value can be a constant enclosed in apostrophes or the name of a variable containing the user data. If value is a variable name, it must be immediately preceded by a colon (':'). See the examples below.

If the USERDATA clause is used, a CONNECT statement with a valid user-ID must have been executed. The user-ID that was specified in the CONNECT statement is associated with the user data, and it must be quoted when recovering the user data with a subsequent CONNECT or READ USERDATA statement.

This facility can be used to record information required when performing a restart, for example the positions of files that are being processed sequentially.

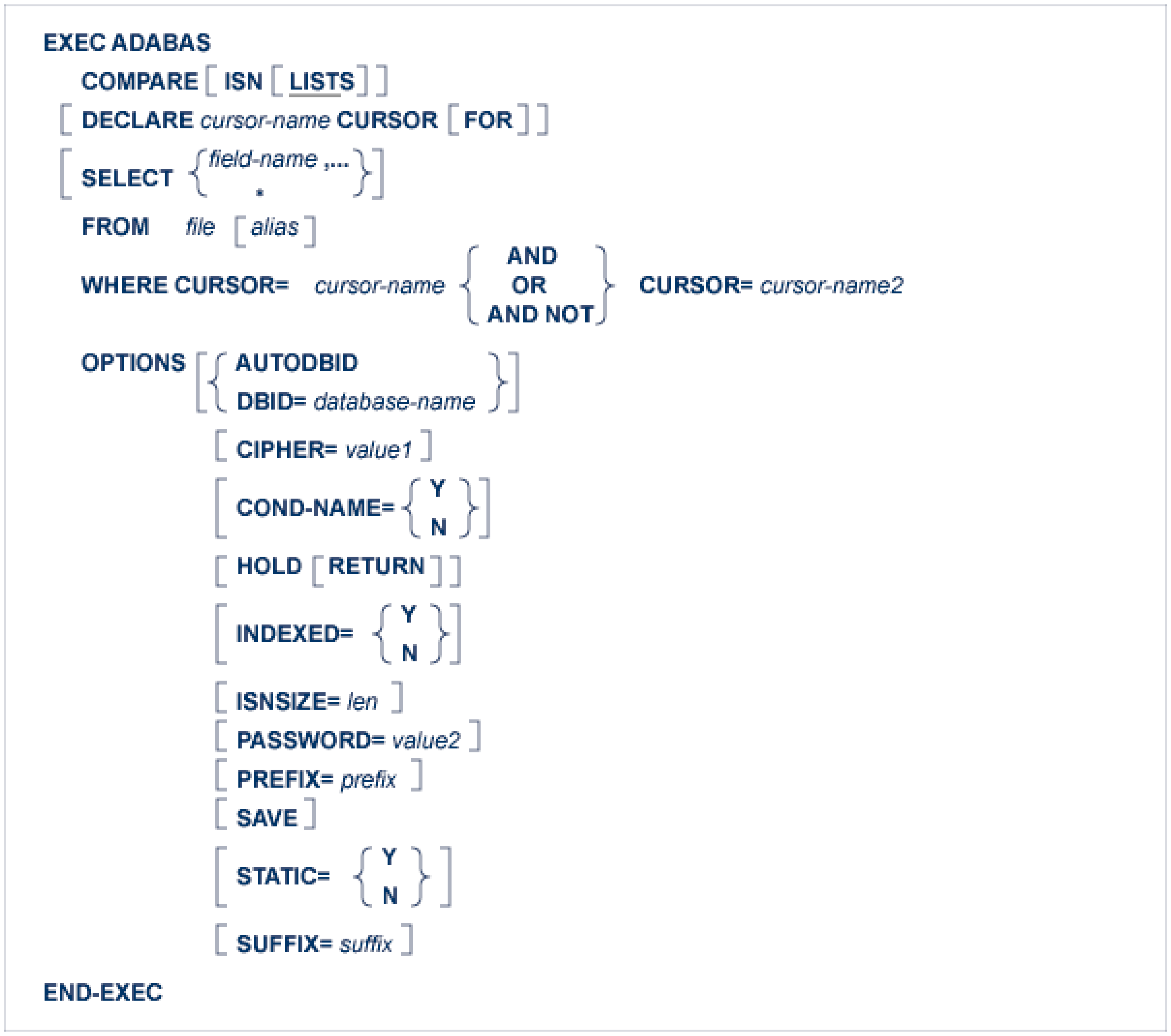
The length of the user data, i.e., the number of characters to be written, must not exceed the limit specified in the USERDATA clause of the global **OPTIONS** parameter.

Examples:

```
EXEC ADABAS
  COMMIT WORK
    USERDATA = :USERVAR
END-EXEC
```

```
EXEC ADABAS
  COMMIT WORK
    USERDATA = 'TEST1234'
END-EXEC
```

The COMPARE Statement



```
EXEC ADABAS
    COMPARE [ ISN [ LISTS ] ]
  [ DECLARE cursor-name CURSOR [ FOR ] ]
  [ SELECT { field-name ,... } ]
           { *               }
    FROM     file  [ alias ]
                                       { AND     }
    WHERE CURSOR=   cursor-name        { OR      }   CURSOR= cursor-name2
                                       { AND NOT }
    OPTIONS [ { AUTODBID              } ]
              { DBID= database-name   }
            [ CIPHER= value1 ]
            [ COND-NAME= { Y } ]
                         { N }
            [ HOLD [ RETURN ] ]
            [ INDEXED= { Y } ]
                       { N }
            [ ISNSIZE= len ]
            [ PASSWORD= value2 ]
            [ PREFIX= prefix ]
            [ SAVE ]
            [ STATIC= { Y } ]
                      { N }
            [ SUFFIX= suffix ]
END-EXEC
```

The COMPARE statement performs logical processing on two ISN lists that were previously created using FIND, FIND COUPLED or COMPARE statements with the SAVE option. It can compute the intersection (logical AND) or union (logical OR) of two ISN lists, or the set of ISNs that are in one list but not in the other (logical AND NOT).

The two ISN lists to be compared must relate to the same file, and they must be in ascending ISN sequence. Therefore the ORDER BY option is not permitted in the FIND statement that created the ISN lists to be compared.

The ISN lists to be compared must have been created by Adabas Native SQL statements with the SAVE option. They should be released with the CLOSE statement when they are no longer required.

In general, the COMPARE statement will return a list containing the ISNs of many records.

If more than one record is to be processed, the COMPARE statement must contain the DECLARE `cursor-name` CURSOR FOR clause and it must be followed by an OPEN/FETCH/CLOSE sequence as described in chapter [2004-07-02 tbd]. The fields specified in the SELECT clause are available after execution of the FETCH statement.

If only the record whose ISN is at the head of the resulting ISN list is to be processed, the DECLARE clause may be omitted and the fields specified in the SELECT clause are available after execution of the COMPARE statement. In this case Adabas Native SQL generates executable code for the COMPARE statement, which must therefore appear in the procedure division in COBOL programs.

An Adabas S8 command is generated.

DECLARE Clause

```
DECLARE cursor-name CURSOR [ FOR ]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

If multiple records are to be processed, the 'DECLARE `cursor-name` CURSOR FOR' construction must be used. The keyword 'FOR' indicates to Adabas Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name. If only a single record is to be processed, the **DECLARE** clause may be omitted.

SELECT Clause

```
        ⎧ field-name  ,... ⎫
SELECT  ⎨                  ⎬
        ⎩     *            ⎭
```

The SELECT clause specifies which fields are to be retrieved from the database. All types of fields may be selected, with the exception of phonetic descriptors. The fields must be specified by their full names as defined in the data dictionary.

If an asterisk is specified following the keyword 'SELECT', all the fields within the userview are read.

See also the **previous discussion on the SELECT clause** for more information.

FROM Clause

```
FROM {file [alias]} ,...
```

The FROM clause specifies the file from which data is to be retrieved. It is used together with the SELECT clause to generate the record buffer and to control the retrieval of information from the database.

`file` is the Adabas file name or view name as defined in the data dictionary. The `alias`, if present, is used as the name of the record buffer; otherwise, the name `file` is used.

See also the **previous discussion on the FROM clause** for more information.

WHERE Clause

```
                           ⎧  AND    ⎫
WHERE CURSOR= cursor-name  ⎨  OR     ⎬  CURSOR= cursor-name2
                           ⎩ AND NOT ⎭
```

The WHERE clause is used to specify the cursor names defined in the FIND or COMPARE statements that created the ISN lists. Both of thes statements should have the SAVE option.

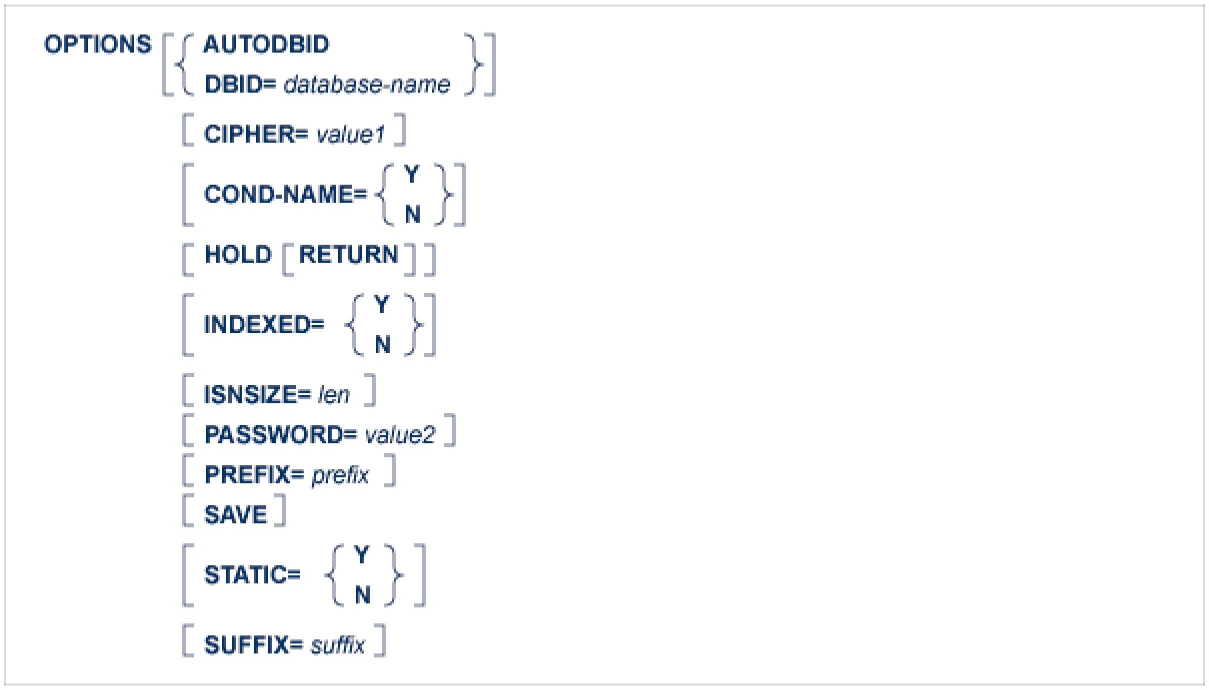
The COMPARE statement can be used to perform the following logical operations:

AND The resulting ISNs will contain those ISNs that are present in both ISN lists.

OR The resulting ISNs will contain those ISNs that are present in either the first ISN list or the second ISN list or both.

AND NOT The resulting ISN list will contain those ISNs that are present in the first ISN list (identified by *cursor-name1*) but not present in the second ISN list (identified by *cursor-name2*).

OPTIONS Clause



```
OPTIONS [ { AUTODBID               } ]
          { DBID= database-name    }
          [ CIPHER= value1 ]
          [ COND-NAME= { Y } ]
                       { N }
          [ HOLD [ RETURN ] ]
          [ INDEXED= { Y } ]
                     { N }
          [ ISNSIZE= len ]
          [ PASSWORD= value2 ]
          [ PREFIX= prefix ]
          [ SAVE ]
          [ STATIC= { Y } ]
                    { N }
          [ SUFFIX= suffix ]
```

AUTODBID Option

The AUTODBID option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued.

The AUTODBID option and the HOLD option may not be used together. This implies to Adabas Native SQL that you are attempting to update a database other than your default database. Also, AUTODBID and DBID may not be used together.

CIPHER Option

The cipher key must be specified when accessing a ciphered file. See also the **previous discussion on the CIPHER option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes as level-88 entries the condition names defined in Predict.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See also the **previous discussion on the COND-NAME option** for more information.

DBID Option

This option should be used if the program accesses more than one database. The *`database-name`* must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

The DBID option and the HOLD option may not be used together. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user.

A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode.

See ***HOLD Logic*** for more information.

The HOLD option may not be used together with the AUTODBID, AUTODBID-ALL or DBID options. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from the Predict additional field attribute `3GL specification, Indexed by`. If no index name is specified here, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See also the **previous discussion on the INDEXED option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

ISNSIZE Option

The ISNSIZE parameter defines the maximum number of ISNs that can be stored in the ISN buffer. If the number of records that satisfy the selection criterion exceeds ISNSIZE, the excess ISNs are stored by Adabas and retrieved automatically when required. This process is transparent to the programmer. See also the **previous discussion on the ISNSIZE option** for more information.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the password clause of the **CONNECT** statement .

See also the **discussion on security options** for more information.

PREFIX Option

If the option 'PREFIX = *`prefix`*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See also the **previous discussion on the PREFIX option** for more information.

SAVE Option

Use this option if you need to retain the entire ISN list. The saved ISN list can be used later in COMPARE, FIND and SORT statements. The saved ISN list is discarded when:

- A further Adabas Native SQL statement that creates another ISN list with the same name (same command-ID) is executed, or:
- An Adabas Native SQL CLOSE or DBCLOSE statement is executed, or:
- The non-activity time limit or transaction time limit is exceeded.

Under these circumstances, response code 9 is returned when the next Adabas command is attempted.

A CLOSE statement must be executed to release the ISN list after every statement that generates an ISN list (COMPARE, FIND, FIND COUPLED and SORT). If the CLOSE statement is not executed, large amounts of storage will be occupied for the remainder of the Adabas session.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter OPTIONS (see page).

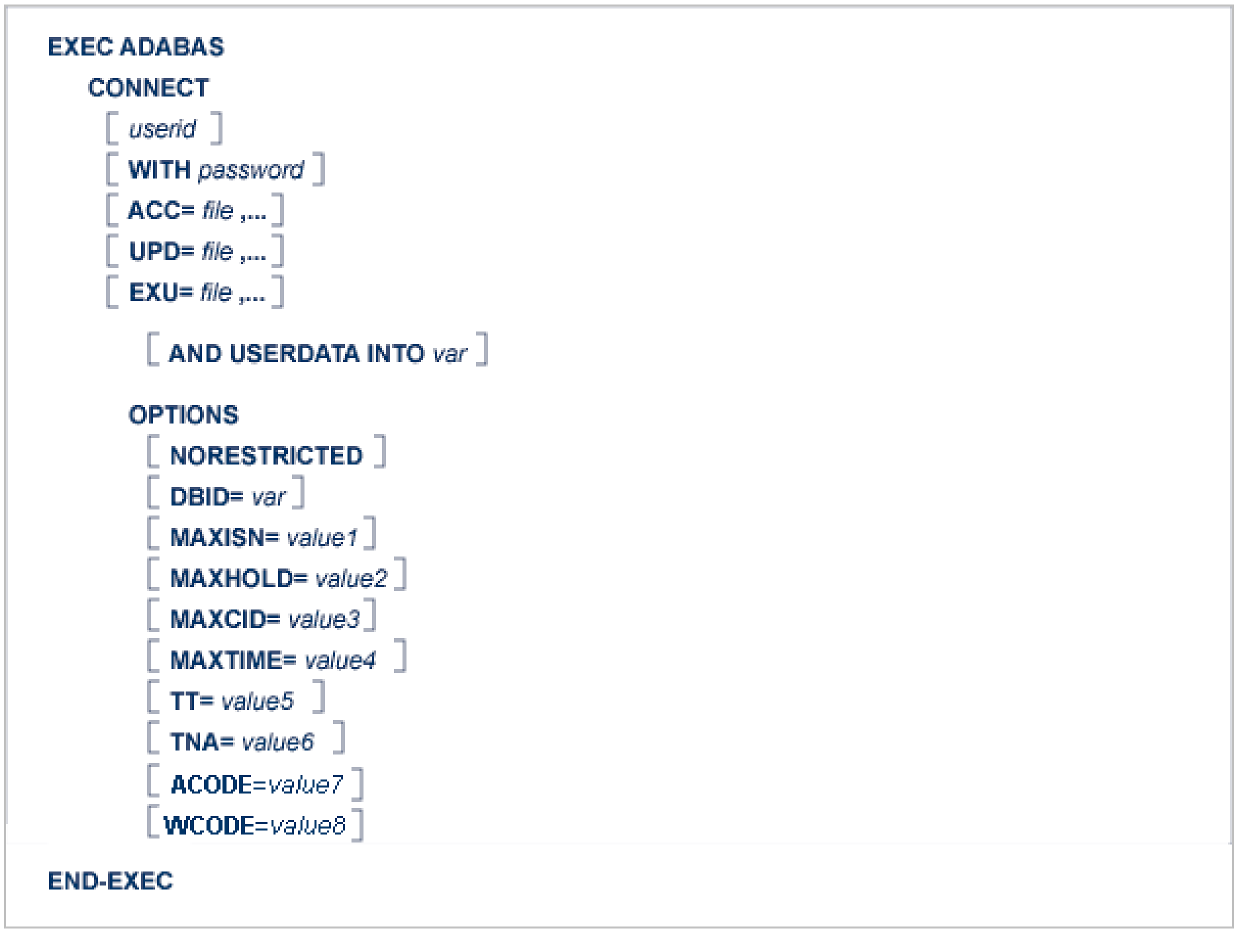
`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See also the **previous discussion on the STATIC option** for more information.

SUFFIX Option

If the option 'SUFFIX = *suffix*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

Field name suffix in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See also the **previous discussion on the SUFFIX option** for more information.

The CONNECT Statement



```
EXEC ADABAS
    CONNECT
      [ userid ]
      [ WITH password ]
      [ ACC= file ,... ]
      [ UPD= file ,... ]
      [ EXU= file ,... ]

          [ AND USERDATA INTO var ]

        OPTIONS
          [ NORESTRICTED ]
          [ DBID= var ]
          [ MAXISN= value1 ]
          [ MAXHOLD= value2 ]
          [ MAXCID= value3 ]
          [ MAXTIME= value4 ]
          [ TT= value5 ]
          [ TNA= value6 ]
          [ ACODE=value7 ]
          [WCODE=value8 ]

END-EXEC
```

The CONNECT statement is used to indicate the beginning of a user session and to list the files that will be used and the modes in which they are to be opened. The CONNECT statement should not be issued by modules called from the main program. If a CONNECT statement is used, it must be in the main program and it must include not only the files used by the main program but also those used by all modules called from the main program. It must be the first executable Adabas Native SQL statement in the program, with the possible exception of COPY and GENERATE statements (compare with the BEGIN statement).

If the CONNECT statement is omitted, the program will run in ET mode. Any files can be read and updated, with only the customary password and cipher restrictions on access.

If the program is to run in exclusive-control mode or if files are to be accessed in access-only mode (all attempts to modify the database will be rejected), then the CONNECT statement must be included.

If the Adabas user session is still active when the CONNECT statement is issued (from a previous program that was not terminated correctly with the DBCLOSE statement), a ROLLBACK WORK will be performed and Response Code 9 is returned.

This statement generates an Adabas OP (open) command.

USERID Clause

```
userid
```

This clause specifies the user-ID for the user session. A user-ID must be provided if you intend to store and/or read user data and you require this data to be available during a subsequent user session or Adabas session (see also the CHECKPOINT, COMMIT WORK, DBCLOSE, READ USERDATA and WRITE TO LOG statements). The value provided for the user-ID should be unique for this user (that is, it should not be used by any other user). Response Code 48 will be returned if the user-ID is already in use.

The first character must be an upper-case letter or a digit. `userid` may be a constant of up to 8 characters, or the name of a variable containing the user-ID. If `userid` is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'.

Note: If `userid` is a constant, it must be enclosed in single quotes.

Password Clause

WITH *password*

You may, if you wish, specify the password only once in your program, in the PASSWORD clause of the CONNECT statement. Adabas Native SQL will pass this password to all generated Adabas commands.

If you also code the PASSWORD option in an Adabas Native SQL statement, the local specification overrides the global specification in the CONNECT statement for that statement only.

`password` may be a constant of up to 8 characters or the name of a variable containing the password. If `password` is a variable name, it must be preceded by a colon (':') for example ':SECRET'.

ACC Clause

ACC= *file* **,...**

This is a list of the names of the Adabas files to be accessed by the program in access-only (read-only) mode. Any attempt to update a file opened in access-only mode or to add or delete records will be rejected (response-code=19).

If this clause is present, all files to be processed by the program must be listed in the CONNECT statement. An attempt to read a file that was not specified will cause an error (response code=17).

Example:

```
EXEC ADABAS
  CONNECT ACC = PERSONNEL, AUTOMOBILES, FINANCE
END-EXEC
```

This program uses the files PERSONNEL, AUTOMOBILES and FINANCE in access-only mode.

Adabas Native SQL automatically adds the ABEND file to the ACC list so that the error texts corresponding to non-zero response codes can be retrieved from it as required by the response code interpretation routine. The default is UPD.

UPD and EXU Clauses

```
UPD= file ,...
EXU= file ,...
```

All files updated by the program should be specified in the CONNECT statement. An attempt to update a file that is not specified in the CONNECT statement will cause an error (response code=17).

There are two types of update programs:

ET-mode: These are programs that can update files in parallel with other programs updating the same files. Programs that run in ET mode must put the required record in hold status before updating or deleting it, and must issue the COMMIT WORK statement at the end of each logical transaction. This mode is used for online update programs.

Exclusive mode: These are programs that have exclusive use of the selected files. During the entire execution time, other programs are prevented from updating these files.

Thus, one or more of the following possibilities may be specified:

- 'UPD =' followed by a list of file names, for programs that run in ET mode. The application program should check the response-code after each Adabas Native SQL statement that generates one or more Adabas commands for the value 9, which would mean that an automatic backout has occurred and the program should restart the transaction from the beginning;
- 'EXU =' followed by a list of file names, for EXCLUSIVE mode;

Further information about exclusive control updating may be found in the *Adabas Command Reference Manual* and the *Adabas DBA Reference Manual*. Consult your DBA before writing programs that run in exclusive file control mode or file cluster mode.

Examples:

```
EXEC ADABAS
  CONNECT 'MEMUNE'
          ACC = PERSONNEL UPD = AUTOMOBILES
END-EXEC
```

The program uses the PERSONNEL file in access-only mode and updates the AUTOMOBILES file in ET-logic mode.

```
EXEC ADABAS
  CONNECT 'MEMUNE'
          UPD = PERSONNEL EXU=PERSONNEL
END-EXEC
```

The program uses the PERSONNEL file in access-only mode and updates the PERSONNEL file in ET-logic mode.

USERDATA Clause

```
AND USERDATA INTO var
```

This clause enables the user to retrieve the user data stored in the Adabas system file by a CHECKPOINT, COMMIT WORK or DBCLOSE statement.

The last USERDATA record that was stored with a CHECKPOINT, COMMIT WORK or DBCLOSE statement is read into var. var must be preceded by a colon (':'), for example ':NAME'.

This option may only be used if the user specified the same user-ID for the current user session and also for the session during which the USERDATA were stored.

OPTIONS Clause

```
OPTIONS
  [ NORESTRICTED ]
  [ DBID= var ]
  [ MAXISN= value1 ]
  [ MAXHOLD= value2 ]
  [ MAXCID= value3 ]
  [ MAXTIME= value4 ]
  [ TT= value5 ]
  [ TNA= value6 ]
  [ ACODE=value7 ]
  [ WCODE=value8 ]
```

Note: Default values for some values are specified in the Predict Modify Adabas Native SQL Defaults screen.

NORESTRICTED option

If this option is used, the Adabas OPEN command will be generated without the RESTRICTED option, so files which are not specified in CONNECT may be added later to the Adabas user queue element.

DBID Option

This option should be used if the program accesses more than one database. The `database-name` must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

Note: Unless using the AUTODBID-ATM global option , only read or search access is permitted if the DBID option is used; the INSERT, UPDATE and DELETE statements must not be used. One CONNECT statement must be issued for each database to be accessed.

MAXISN Option

This option specifies the maximum number of ISNs resulting from the execution of Sx commands that Adabas can store internally in its ISN table. Increasing the default setting may reduce access to the Adabas work file.

MAXHOLD Option

This option specifies the maximum number of records that the user may have in hold status at any time.

MAXCID Option

This option specifies the maximum number of Command IDs that may be active for the user at the same time.

MAXTIME Option

This option specifies the time limit for the execution of Sx commands.

The programmer should consult with the DBA about the system default values for these parameters before changing them. For further details, see the *Adabas Command Reference Manual*, section *OP Command*, paragraph *Additions 4*.

TT Option

This option may be used to specify a transaction time limit.

TNA Option

This option may be used to specify a non-activity time limit.

ACODE option

This option allows for providing the encoding key for "A" format fields during the user session.

WCODE option

This option allows for providing the encoding key for "W" format fields during the user session.

The COPY Statement

```
1

EXEC ADABAS
    COPY  file-name  [member-name]
END-EXEC
```

```
2

EXEC ADABAS
    COPY
        FILE=  [file-name]
        MEMBER=  [member-name]
END-EXEC
```

Adabas Native SQL supports the COPY statement as described in the chapter *The Preprocessor* of the *Predict Administration Manual*. A file layout that has been generated as Ada, COBOL, FORTRAN or PL/I code by Predict can be copied into the program by means of this statement.

The `file-name` must always be specified. It is the name of the file as defined in the data dictionary.

The `member-name` must be specified if more than one file layout has been generated for this file.

The `file-name` and `member-name` can be specified as positional parameters (see [1] above) or as keyword parameters (see [2] above).

The DBCLOSE Statement

```
EXEC ADABAS
    DBCLOSE
      [ USERDATA= var ]
  [ OPTIONS
        DBID= [database-name] ]
END-EXEC
```

The DBCLOSE statement is used to terminate a user session. All Adabas resources are released.

This statement may be issued at the end of the main program. It should not be issued by modules called by a main program, nor should it be issued at the end of a TP transaction program unless this coincides with the end of the user session.

USERDATA Clause

```
USERDATA= var
```

The user may store user data in the Adabas system file by including the 'USERDATA = `var`' clause. The user data can be retrieved by a subsequent CONNECT or READ USERDATA statement. `var` is the name of the variable containing the user data. The variable name must be immediately preceded by a colon (':'), for example 'USERDATA = :NAME'. The length of the user data, that is the number of characters to be written, must not exceed the limit specified in the USERDATA clause of the global **OPTIONS** parameter.

This statement generates an Adabas CL (close) command.

Example:

```
EXEC ADABAS
  DBCLOSE
     USERDATA = :USERVAR
END-EXEC
```

OPTIONS Clause

```
OPTIONS
  [ DBID=  database-name ]
```

DBID Option

This option may be used if the program has accessed more than one database. The database-name must be defined in the data dictionary, including the file or files that have been accessed. One DBCLOSE statement should be issued per database.

The DELETE Statement

```
EXEC ADABAS
    DELETE
      [ DECLARE  cursor-name  CURSOR ]
        FROM  file1  [alias]

              (          ISN= value          )
        WHERE <                              >
              (   CURRENT OF cursor-name1    )
      [ OPTIONS                      ]
      [   [ PASSWORD= value1 ]       ]
      [   [ CIPHER= value2 ]         ]

END-EXEC
```

The DELETE statement deletes a record from the specified file. The record to be deleted must be retrieved by the FIND statement or one of the READ statements before issuing the DELETE statement. The record must be in hold status unless the program is running in EXU mode (see the CONNECT statement). A record can be 'held' either by specifying the 'HOLD' option in the statement that reads it, or by issuing a separate HOLD statement. If the record is not in hold status, it will implicitly be 'held'.

When the logical transaction has been completed, a COMMIT WORK statement should be issued. One of the effects of this statement is to release records that are in hold status.

This statement generates an Adabas E1 command.

DECLARE Clause

```
DECLARE   cursor-name   CURSOR
```

The cursor-name may be up to four characters long. The DECLARE clause will not normally be required, but it may be used if desired to define the Adabas command ID.

Note: This clause should not be used if the WHERE CURRENT OF clause is used.

FROM Clause

```
FROM file1 [alias]
```

file1 is the Adabas file name or view name, as defined in the data dictionary, of the file from which the record is to be deleted. If the same file appears in another statement, an `alias` should be used.

WHERE Clause

$$\textbf{WHERE} \left\{ \begin{array}{c} \textbf{ISN=}\ \textit{value} \\ \textbf{CURRENT OF}\ \textit{cursor-name1} \end{array} \right\}$$

The WHERE clause is used to specify the ISN of the record to be deleted.

In order to delete a record whose ISN is explicitly known, the 'WHERE ISN = `value`' option should be used. `value` may be a constant or the name of a variable containing the ISN. If `value` is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'. The colon must not be coded following the '=' sign if `value` is a numeric constant, for example 'WHERE ISN = 1234'.

The option 'WHERE CURRENT OF `cursor-name1`' should be coded in order to delete a record found by a previous Adabas Native SQL statement. `cursor-name1` is the name of the cursor defined in that statement.

OPTIONS Clause

```
OPTIONS
          [ PASSWORD= value1 ]
          [ CIPHER= value2 ]
```

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the CONNECT statement. See also the **previous discussion on this option** for more information.

CIPHER Option

The cipher key must be specified when accessing a ciphered file.

See also the **previous discussion on this option** for more information.

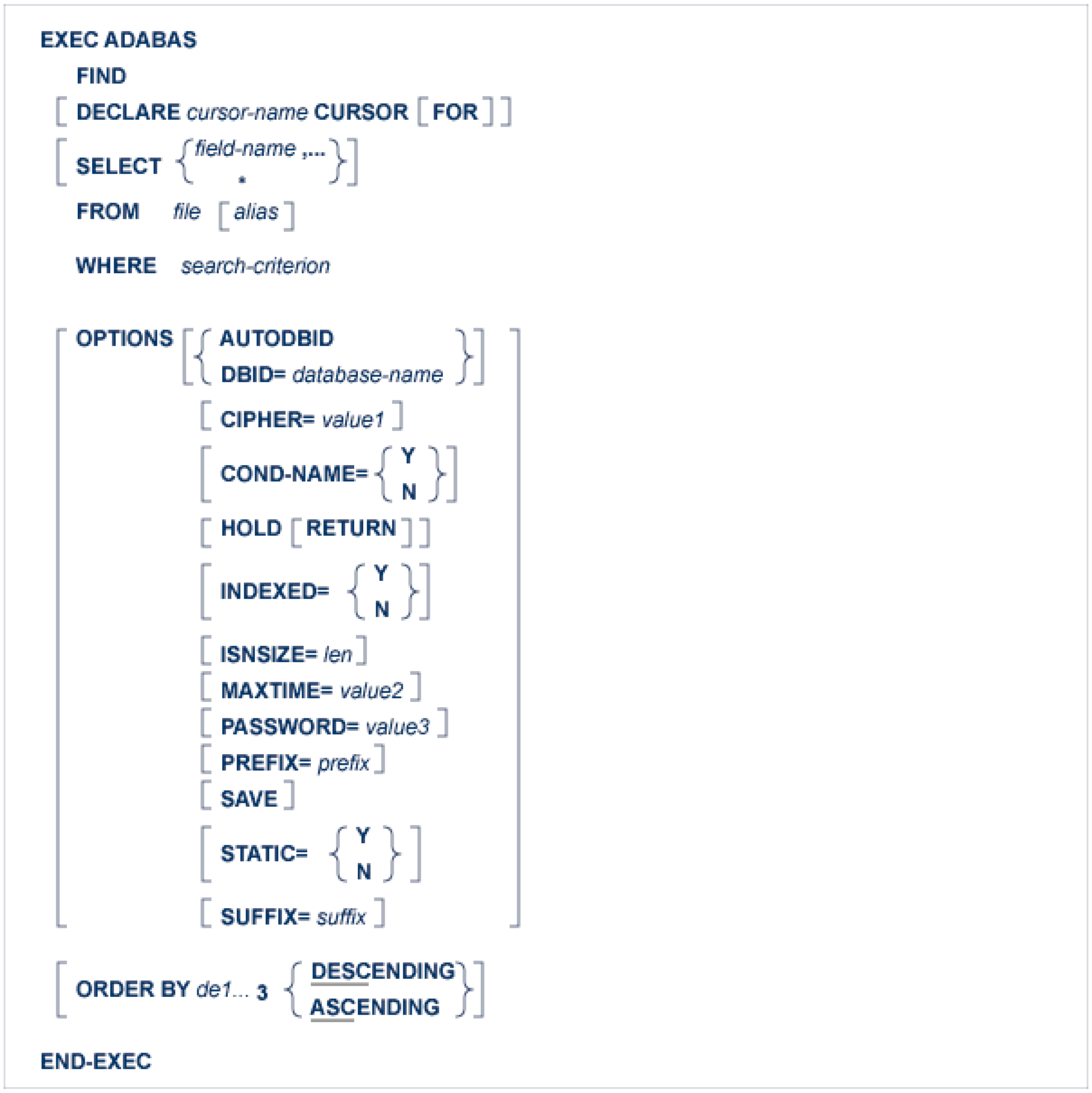
The FETCH Statement

```
EXEC ADABAS
    FETCH cursor-name
END-EXEC
```

This statement is part of the OPEN/FETCH/CLOSE sequence that is used for processing multiple records. See *Multiple-Record Processing* for more information.

The FETCH statement reads the data from the file into the record buffer. An OPEN statement must always be issued before the first FETCH statement can be executed when using multiple-record processing. Each successive FETCH statement automatically reads the next record (or delivers the next descriptor value in the case of the HISTOGRAM statement), until all the records have been passed to the user program. When all records have been read, an end-of-file condition is encountered and the flag ADACODE is set to 3.

The FIND Statement



The FIND statement performs a retrieval query against a database file, selecting the record or records specified by the search criterion in the WHERE clause. The keyword 'FIND' may optionally be omitted.

This statement returns either a list of the ISNs of the records that satisfy the search criterion, or an 'end-of-file' indication in the variable ADACODE (Ada, COBOL or PL/I) or SQLCOD (FORTRAN), indicating that no records satisfied the search criterion.

In general, the FIND statement will return a list containing the ISNs of many records.

If all of the records found by the FIND statement are to be processed, then the FIND statement must include the 'DECLARE `cursor-name` CURSOR FOR' clause and it must be followed by an OPEN/FETCH/CLOSE sequence as **described previously**. The fields specified in the SELECT clause are available after execution of the FETCH statement.

If only the first of these records is to be processed, then the DECLARE clause may be omitted and the fields specified in the SELECT clause are available after execution of the FIND statement. In this case, ADABAS Native SQL generates executable code for the FIND statement, which must therefore appear in the procedure division in COBOL programs.

The FIND statement can only retrieve data from the first file (main file) named in the FROM-clause, although the search criterion can include descriptor fields taken from up to five physically-coupled or 16 soft-coupled files (except in the case of VMS which does not support coupled files). The coupling relationships must be defined in PREDICT. If data fields are to be retrieved not from the main file but from a coupled file, the FIND COUPLED statement must be used in conjunction with the FIND statement.

The FIND statement causes an ADABAS S1/S4 command to be generated, or an S2 command if the 'ORDER BY' clause is coded.

DECLARE Clause

```
DECLARE cursor-name CURSOR [ FOR ]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

If multiple records are to be processed, the 'DECLARE `cursor-name` CURSOR FOR' construction must be used. The keyword 'FOR' indicates to ADABAS Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name. If only a single record is to be processed, the DECLARE clause may be omitted.

See also the **previous discussion on this clause** for more information.

SELECT Clause

$$\textbf{SELECT} \left\{ \begin{matrix} \textit{field-name} \text{ ,...} \\ * \end{matrix} \right\}$$

The SELECT clause specifies which fields are to be retrieved from the database. All types of fields may be selected, with the exception of phonetic descriptors. The fields must be specified by their full names as defined in the data dictionary.

If the SELECT clause is omitted, then no records are processed, but other functions such as search may be performed.

If an asterisk is specified following the keyword 'SELECT', all the fields within the userview are read.

See also the **previous discussion on this clause** for more information.

FROM Clause

```
FROM   file [alias]
```

The FROM clause specifies the file or files that contain the fields used in the search criterion. It is also used, in conjunction with the SELECT clause, to generate the record buffer and to control the retrieval of information from the database.

`file` is the ADABAS file name or view name as defined in the data dictionary. The `alias`, if present, is used as the name of the record buffer; otherwise, the name `file` is used.

In the FIND statement, up to 5 physically-coupled or 16 soft-coupled files may be specified in the FROM clause. This facility is used if the search criterion includes fields taken from more than one file. Every file containing fields used in the search criterion must be listed in the FROM clause. Data can only be retrieved from the first file (main file) whose name directly follows the keyword 'FROM'.

The second and subsequent files listed in the FIND statement must be physically coupled to the main file. Note that the names of the coupled files are separated by commas, but the alias is not preceded by a comma.

See also the **previous discussion on this clause** for more information.

Note: In VMS only one file can be specified in the FROM clause, because coupled files are not supported.

WHERE Clause

```
WHERE   search-criterion
```

The WHERE clause identifies the set of records to be selected. Only database fields that are defined as descriptors, subdescriptors, superdescriptors, hyperdescriptors or phonetic descriptors may be used to form the search-criterion. In ADABAS Version 5, non-descriptor fields may be used, if the NONDE indication in the ADABAS Native SQL DDA allows it.

The search-criterion is made up of descriptors, logical operators and values, according to the type of selection relevant to the application.

search-criterion

$$\textit{search-expression} \left[\begin{Bmatrix} \textbf{AND} \\ \textbf{OR} \end{Bmatrix} \quad \textit{search-expression} \ \textbf{...} \right]$$

search-expression

```
⎧ ⎧ file1  ⎫        ⎧ file2  ⎫                                        ⎫
⎪ ⎨        ⎬.de1  = ⎨        ⎬.de2                                    ⎪
⎪ ⎩ alias1 ⎭        ⎩ alias2 ⎭                                        ⎪
⎪ descriptor  comp  value                                             ⎪
⎨ descriptor  BETWEEN  value1  AND  value2  [exception]               ⎬
⎪ descriptor  IN (  value,...  )                                      ⎪
⎪ descriptor  IS  [NOT]  NULL                                         ⎪
⎩ SETID= 'cursor-name'                                                ⎭
```

descriptor

$$\left\{\begin{array}{l} \textit{de1} \\ \left\{\begin{array}{l} \textit{file} \\ \textit{alias} \end{array}\right\}.\textit{de2} \\ \textit{de3(i)} \end{array}\right\}$$

comp

```
  ⎧ NE ⎫
  ⎪ EQ ⎪
  ⎪ GT ⎪
  ⎪ GE ⎪
  ⎪ LT ⎪
 ⎨  LE  ⎬
  ⎪ =  ⎪
  ⎪ >  ⎪
  ⎪ >= ⎪
  ⎪ <  ⎪
  ⎩ <= ⎭
```

exception

$$\textbf{AND}\begin{Bmatrix} \textit{fieldname}\ \textbf{NOT=}\ \textit{value3} \\ \textit{fieldname}\ \textbf{NOT BETWEEN}\ \textit{value3}\ \textbf{AND}\ \textit{value4} \end{Bmatrix}$$

`de1` is the name of the descriptor to be used in the search expression. The name must refer to a descriptor, subdescriptor, superdescriptor, hyperdescriptor or phonetic descriptor. `de1` is a descriptor in the main file, that is, the file whose name appears first in the FROM clause, directly following the keyword.

The second construct, `file.de2`, shows the name of a descriptor (`de2`) qualified by the filename (`file`). The qualifier is required if the descriptor is in a coupled file, i.e., is not in the main file.

`de3 ( i )` is a reference to a specific occurrence of a descriptor which is a field in a periodic group.

`file1.de1` = `file2.de2`

This construction is used to connect two files via the soft coupling option of Adabas 5. The relationship should exist in Predict.

Example:

```
EXEC ADABAS
    FIND
    SELECT *
    FROM PERSONNEL,AUTOMOBILES
    WHERE NAME = 'SMITH' AND AUTOMOBILES.MAKE = 'FORD'
END-EXEC
```

In this example, NAME is a descriptor field in the main file PERSONNEL, whilst MAKE is a descriptor field in the file AUTOMOBILES which is coupled to the main file.

descriptor comp value

`value` is the descriptor value that is to be sought. value can be either a constant or the name of a variable. In the latter case, the name must be immediately preceded by a colon (':'), for example ':NAME'.

```
descriptor BETWEEN value1 AND value2 exception
```

The BETWEEN option indicates that any record in which the value of the specified descriptor lies between `value1` and `value2` will satisfy the search expression. `value1` contains the lower limit of the range, and `value2` contains the upper limit of the range.

```
descriptor NOT= value3
```

The NOT = option is used to exclude a specified value of the descriptor from a previous range (given in the BETWEEN option). `value3` must lie between `value1` and `value2` of the preceding BETWEEN option.

```
descriptor NOT BETWEEN value3 AND value4
```

The NOT BETWEEN option is used to exclude a specified range of values from a previous range (given in the BETWEEN option). `value3` and `value4` must lie between `value1` and `value2` of the preceding BETWEEN option.

```
descriptor IN ( value,... )
```

The IN option is used when the user wishes to select records in which a descriptor has any one of a number of values. The search expression is satisfied if the descriptor has any of the values specified in the list.

```
SETID= 'cursor-name'
```

The search expression may also be a `cursor-name` referring to another FIND statement in which the 'SAVE ISN-list' option was used. The search expression denotes the ISN list produced by the previous FIND statement. Records can be selected from this ISN list, so the search can be refined, by combining the SETID option with other search expressions.

descriptor **IS NULL**

This search expression will find all records where this descriptor has a relational NULL value (has no value at all).

descriptor **IS NOT NULL**

This search expression will find all records where this descriptor has a value.

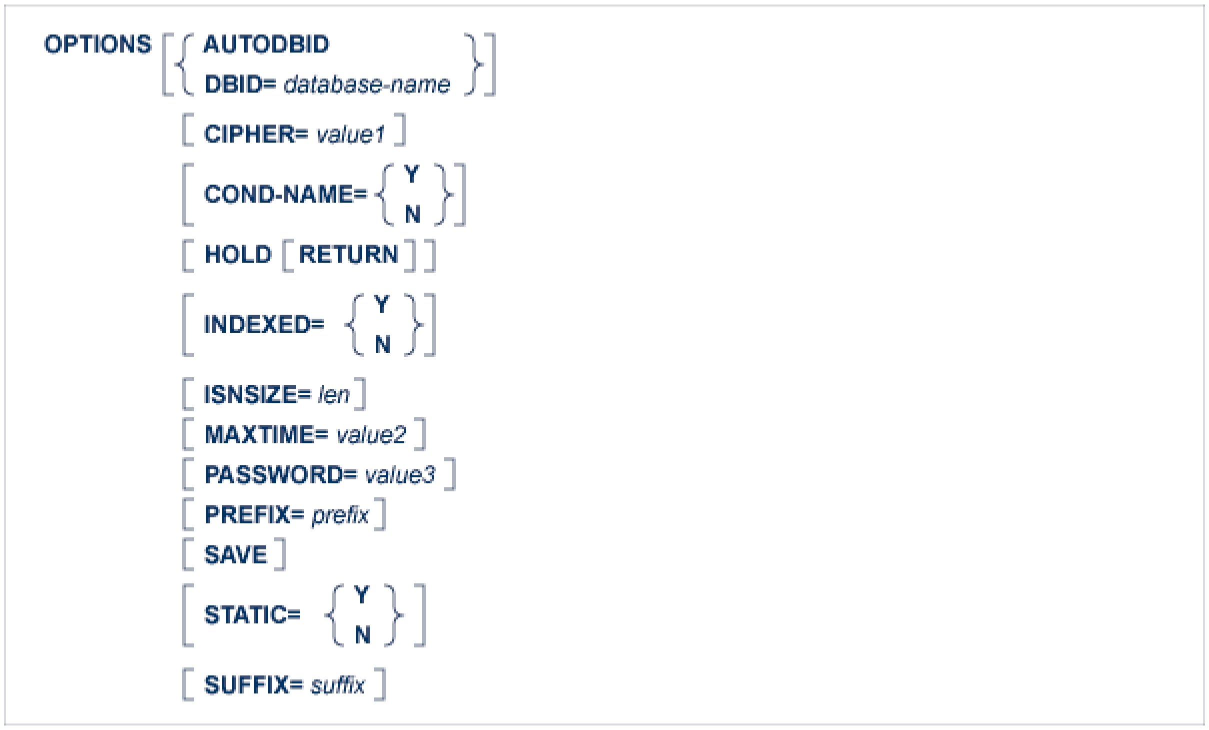
Note: The order of evaluation of the operators within the Adabas Search Algorithm is:

1. Evaluate the range of values and OR between values of the same descriptor.
2. Evaluate the AND operator.
3. Evaluate the new Logical OR operator (the Logical operator between different descriptors and search criteria).

Examples of Search Criteria

```
AGE = 27
AGE = 27 AND CITY = 'NY'
AGE BETWEEN 25 AND 35
CITY IN ('NY', 'WA', :CITA)
AGE BETWEEN 18 AND 21 OR AGE BETWEEN 65 AND 120
AGE BETWEEN :XAGE AND :YAGE AND AGE > = 18
AGE > 27 AND SETID = 'PERS'
SETID = 'PER1' AND SETID = 'PER2'
AGE BETWEEN 18 AND 30 AND AGE NOT BETWEEN 24 AND 26
AUTOMOBILES.MAKE = 'FORD'
AGE = 30 AND AUTOMOBILES.MAKE = 'FORD'
PERSONNEL.PERSONNEL_NUMBER = AUTOMOBILES.OWNER_PERSONNEL_NUMBER AND ...
```

OPTIONS Clause



```
OPTIONS [ { AUTODBID                 } ]
        [ { DBID= database-name      } ]
        [ CIPHER= value1 ]
        [ COND-NAME= { Y } ]
        [            { N } ]
        [ HOLD [ RETURN ] ]
        [ INDEXED= { Y } ]
        [          { N } ]
        [ ISNSIZE= len ]
        [ MAXTIME= value2 ]
        [ PASSWORD= value3 ]
        [ PREFIX= prefix ]
        [ SAVE ]
        [ STATIC= { Y } ]
        [         { N } ]
        [ SUFFIX= suffix ]
```

AUTODBID Option

The AUTODBID option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued.

The AUTODBID option and the HOLD option may not be used together. This implies to Adabas Native SQL that you are attempting to update a database other than your default database. Also, AUTODBID and DBID may not be used together.

CIPHER Option

The cipher key must be specified when accessing a ciphered file. See also the **previous discussion on this option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes as level-88 entries the condition names defined in Predict.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See also the **previous discussion on this option** for more information.

DBID Option

This option should be used if the program accesses more than one database. The *`database-name`* must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

The DBID option and the HOLD option may not be used together. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user.

A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode.

See ***HOLD Logic*** for more information.

The HOLD option may not be used together with the AUTODBID or DBID options. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from the Predict additional field attribute 3GL specification, Indexed by. If no index name is specified here, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

ISNSIZE Option

The ISNSIZE parameter defines the maximum number of ISNs that can be stored in the ISN buffer. If the number of records that satisfy the selection criterion exceeds ISNSIZE, the excess ISNs are stored by Adabas and retrieved automatically when required. This process is transparent to the programmer. See the **previous discussion on this option** for more information.

MAXTIME Option

Limits the time of executing the FIND statement. See the **previous discussion on this option** for more information.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the password clause of the **CONNECT** statement.

See the **previous discussion on this option** for more information

PREFIX Option

If the option 'PREFIX = *prefix*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SAVE Option

Use this option if you need to retain the entire ISN list. The saved ISN list can be used later in COMPARE, FIND and SORT statements. The saved ISN list is discarded when:

- A further Adabas Native SQL statement that creates another ISN list with the same name (same command-ID) is executed, or:
- An Adabas Native SQL CLOSE or DBCLOSE statement is executed, or:
- The non-activity time limit or transaction time limit is exceeded.

Under these circumstances, response code 9 is returned when the next Adabas command is attempted.

A CLOSE statement must be executed to release the ISN list after every statement that generates an ISN list (COMPARE, FIND, FIND COUPLED and SORT). If the CLOSE statement is not executed, large amounts of storage will be occupied for the remainder of the Adabas session.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = *suffix*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

Field name suffix in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

ORDER BY Clause

```
ORDER BY de1... 3  { DESCENDING }
                   { ASCENDING  }
```

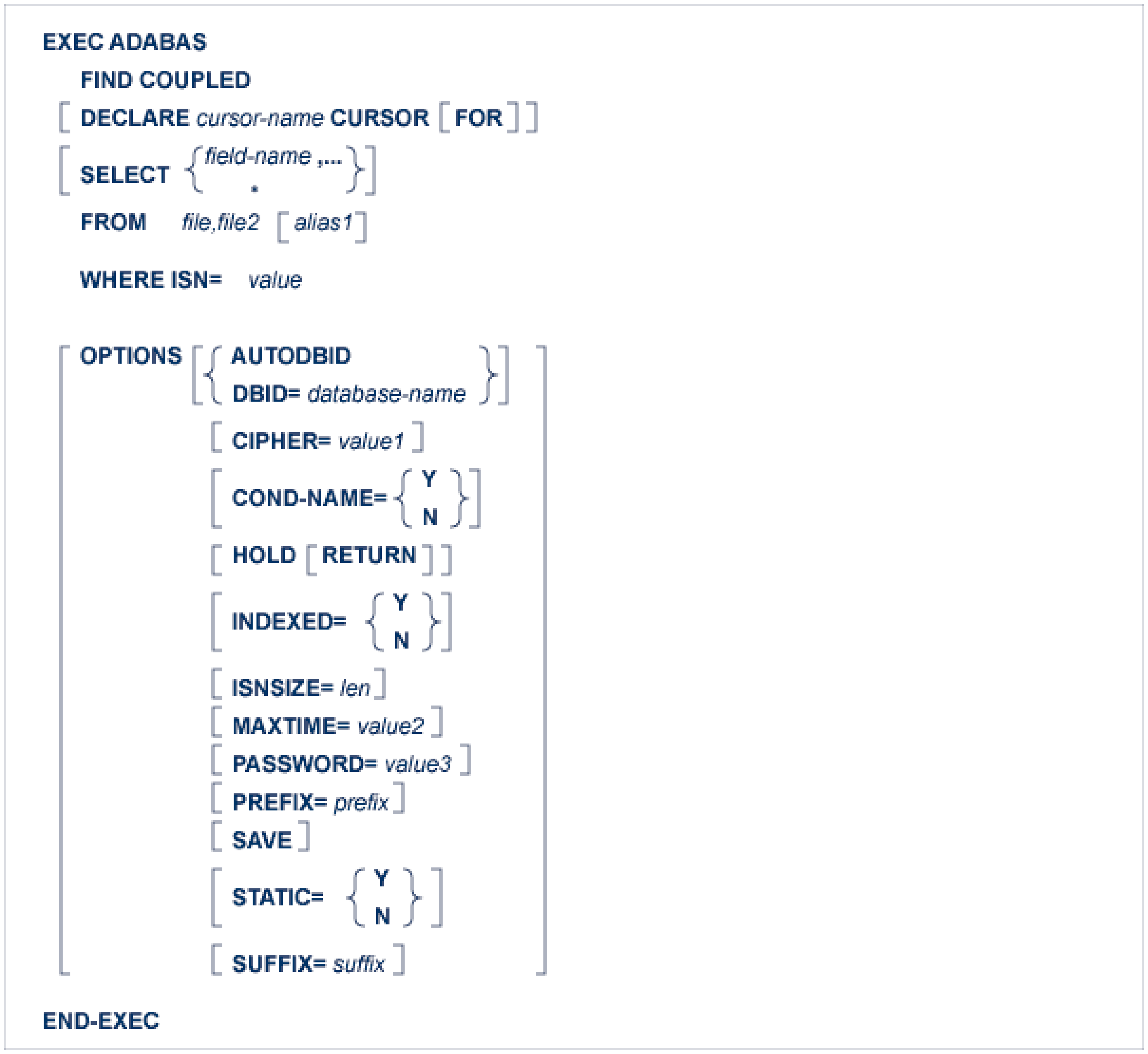
The ORDER BY clause specifies the order in which the records are retrieved.

The ISN list may be sorted on up to three descriptors in ascending or descending sequence.

A descriptor used in an ORDER BY clause may not be a member of a periodic group, nor may it be a phonetic descriptor.

The keyword DESCENDING, which may be abbreviated to DESC, specifies descending sequence, otherwise ascending sequence as default is assumed. If more than one descriptor is specified, the ASCENDING/DESCENDING option applies collectively to all of them. It is not possible to specify ascending sequence for one descriptor and descending sequence for another.

The FIND COUPLED Statement



```
EXEC ADABAS
    FIND COUPLED
  [ DECLARE cursor-name CURSOR [ FOR ] ]
  [ SELECT { field-name ,...
                 *          } ]
    FROM     file,file2  [ alias1 ]

    WHERE ISN=   value

  [ OPTIONS [ { AUTODBID
              { DBID= database-name } ]
              [ CIPHER= value1 ]
              [ COND-NAME= { Y
                             N } ]
              [ HOLD [ RETURN ] ]
              [ INDEXED= { Y
                           N } ]
              [ ISNSIZE= len ]
              [ MAXTIME= value2 ]
              [ PASSWORD= value3 ]
              [ PREFIX= prefix ]
              [ SAVE ]
              [ STATIC= { Y
                          N } ]
              [ SUFFIX= suffix ]              ]
END-EXEC
```

The FIND COUPLED statement retrieves fields from a record or records coupled to a given record in another file. Specify the names of both files and the ISN of the record to which the records to be retrieved are coupled.

FIND COUPLED is normally used together with FIND. The FIND statement is used to find a record of interest (the search criterion may include fields from several files); the FIND COUPLED statement is then used to retrieve information from the record or records that are coupled to that record. If more than one record satisfied the search criterion of the original FIND statement, the FIND COUPLED statement must be repeated for each record in the ISN list returned by the FIND statement.

In general, the FIND COUPLED statement will return a list containing the ISNs of several records that are coupled to the specified record in the main file.

If all of the records found by the FIND COUPLED statement are to be processed, then the FIND COUPLED statement must include the 'DECLARE `cursor-name` CURSOR FOR' clause and it must be followed by an OPEN/FETCH/CLOSE sequence as described from page **[2004-08-24 tbd]**. The fields specified in the SELECT clause are available after execution of the FETCH statement.

If, however, only the first of these records is to be processed, then the DECLARE clause may be omitted and the fields specified in the SELECT clause are available after execution of the FIND COUPLED statement. In this case, Adabas Native SQL generates executable code for the FIND COUPLED statement, which must therefore appear in the procedure division in COBOL programs.

Examples including the FIND COUPLED statement may be found in the appendices.

Note: The examples using coupled files cannot be executed under VMS, since coupled files are not supported.

An Adabas S5 command is generated.

DECLARE Clause

```
DECLARE cursor-name CURSOR [ FOR ]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

If multiple records are to be processed, the 'DECLARE `cursor-name` CURSOR FOR' construction must be used. The keyword FOR indicates to Adabas Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name. If only a single record is to be processed, the DECLARE clause may be omitted.

See the **previous discussion on this clause** for more information.

SELECT Clause

```
SELECT { field-name ,... }
       {     *           }
```

The SELECT clause specifies which fields are to be retrieved from the database. All types of fields may be selected, with the exception of phonetic descriptors. The fields must be specified by their full names as defined in the data dictionary.

If the SELECT clause is omitted, then no records are processed, but other functions such as search may be performed.

If an asterisk is specified following the keyword SELECT, all the fields within the userview are read.

See the **previous discussion on this clause** for more information.

FROM Clause

```
FROM    file,file2 [alias1]
```

This is the file list. `file1` and `file2` are Adabas file names or view names as defined in the data dictionary. The two files must be coupled. `file1` is the name of the file from which the records are to be read. `file2` is the name of the file containing the record whose ISN is specified in the WHERE clause.

`alias1` is the alias associated with `file1`. If present, it is used as the name of the record buffer; otherwise, the name `file1` is used. The alias - which should be unique within the program (including linked modules) - is required if two or more Adabas Native SQL statements within the module refer to the same file. It can then be used as a qualifier in subsequent Ada, COBOL or PL/I statements that wish to refer to the fields in the respective record buffers.

The names of the coupled files are separated by a comma, but the alias - if present - is not preceded by a comma.

Example:

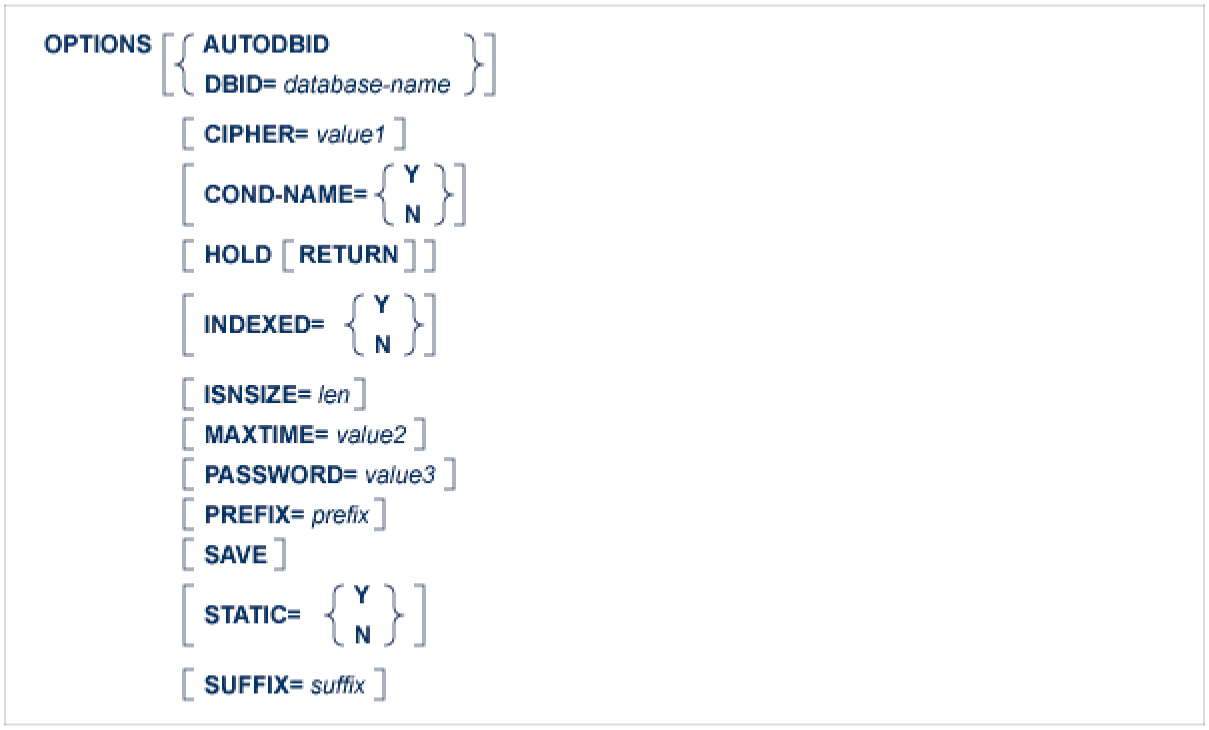
```
EXEC ADABAS
    FIND COUPLED
    SELECT NAME, CITY
    FROM PERSONNEL,AUTOMOBILES
    WHERE ISN = :VAR
END-EXEC
```

WHERE Clause

```
WHERE ISN=    value
```

The WHERE clause specifies the ISN of the record in `file2` to which the records in `file1` are coupled. `value` may be a numeric constant or the name of a variable containing the ISN. If value is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'. The colon must not be coded following the '=' sign if `value` is a numeric constant, for example 'WHERE ISN = 1234'.

OPTIONS Clause



```
OPTIONS [ { AUTODBID                } ]
          { DBID= database-name     }
        [ CIPHER= value1 ]
        [ COND-NAME= { Y } ]
                     { N }
        [ HOLD [ RETURN ] ]
        [ INDEXED= { Y } ]
                   { N }
        [ ISNSIZE= len ]
        [ MAXTIME= value2 ]
        [ PASSWORD= value3 ]
        [ PREFIX= prefix ]
        [ SAVE ]
        [ STATIC= { Y } ]
                  { N }
        [ SUFFIX= suffix ]
```

AUTODBID Option

The AUTODBID option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

CIPHER Option

The cipher key must be specified when accessing a ciphered file.

See the **previous discussion on this option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as level-88 entries.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

DBID Option

This option should be used if the program accesses more than one database. The database-name must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user.

A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode. See ***HOLD Logic*** for more information.

The HOLD option may not be used together with the AUTODBID or DBID options. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**).

`Indexed by` in the Predict *`Modify COBOL Defaults`* screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

ISNSIZE Option

The ISNSIZE parameter defines the maximum number of ISNs that can be stored in the ISN buffer. If the number of records that satisfy the selection criterion exceeds ISNSIZE, the excess ISNs are stored by Adabas and retrieved automatically when required. This process is transparent to the programmer. See the **previous discussion on this option** for more information.

MAXTIME Option

This option is used to limit the time of executing the FIND statement. The user may specify a number or variable containing a number.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the CONNECT statement. See the **previous discussion on this option** for more information.

PREFIX Option

If the option 'PREFIX = *prefix*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SAVE Option

Use this option if you need to retain the entire ISN list. The saved ISN list can be used later in COMPARE, FIND and SORT statements. The saved ISN list is discarded when:

- A further Adabas Native SQL statement that creates another ISN list with the same name (same command-ID) is executed, or:
- An Adabas Native SQL CLOSE or DBCLOSE statement is executed, or:
- The non-activity time limit or transaction time limit is exceeded.

Under these circumstances, response code 9 is returned when the next Adabas command is attempted.

A CLOSE statement must be executed to release the ISN list after every statement that generates an ISN list (COMPARE, FIND, FIND COUPLED and SORT). If the CLOSE statement is not executed, large amounts of storage will be occupied for the remainder of the Adabas session.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = *suffix*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

Field name suffix in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

The GENERATE Statement

```
EXEC ADABAS
    GENERATE
    FILE= file-id

 [  OPTIONS                          ]
 [    [ COND-NAME= { Y } ]           ]
 [    [            { N } ]           ]
 [    [ INDEXED= { Y } ]             ]
 [    [          { N } ]             ]
 [    [ PREFIX= prefix ]             ]
 [    [ START-LEVEL= start-level ]   ]
 [    [ STATIC= { Y } ]              ]
 [    [         { N } ]              ]
 [    [ SUFFIX= suffix ]             ]

END-EXEC
```

This statement is used to generate copy code you wish to include in your program or to regenerate copy code for which the Predict dictionary definitions have been modified after generation.

This Adabas Native SQL statement provides a subset of the facilities provided by the Predict GENERATE statement. If you require any of the extended range of facilities, use the Predict pre-processor.

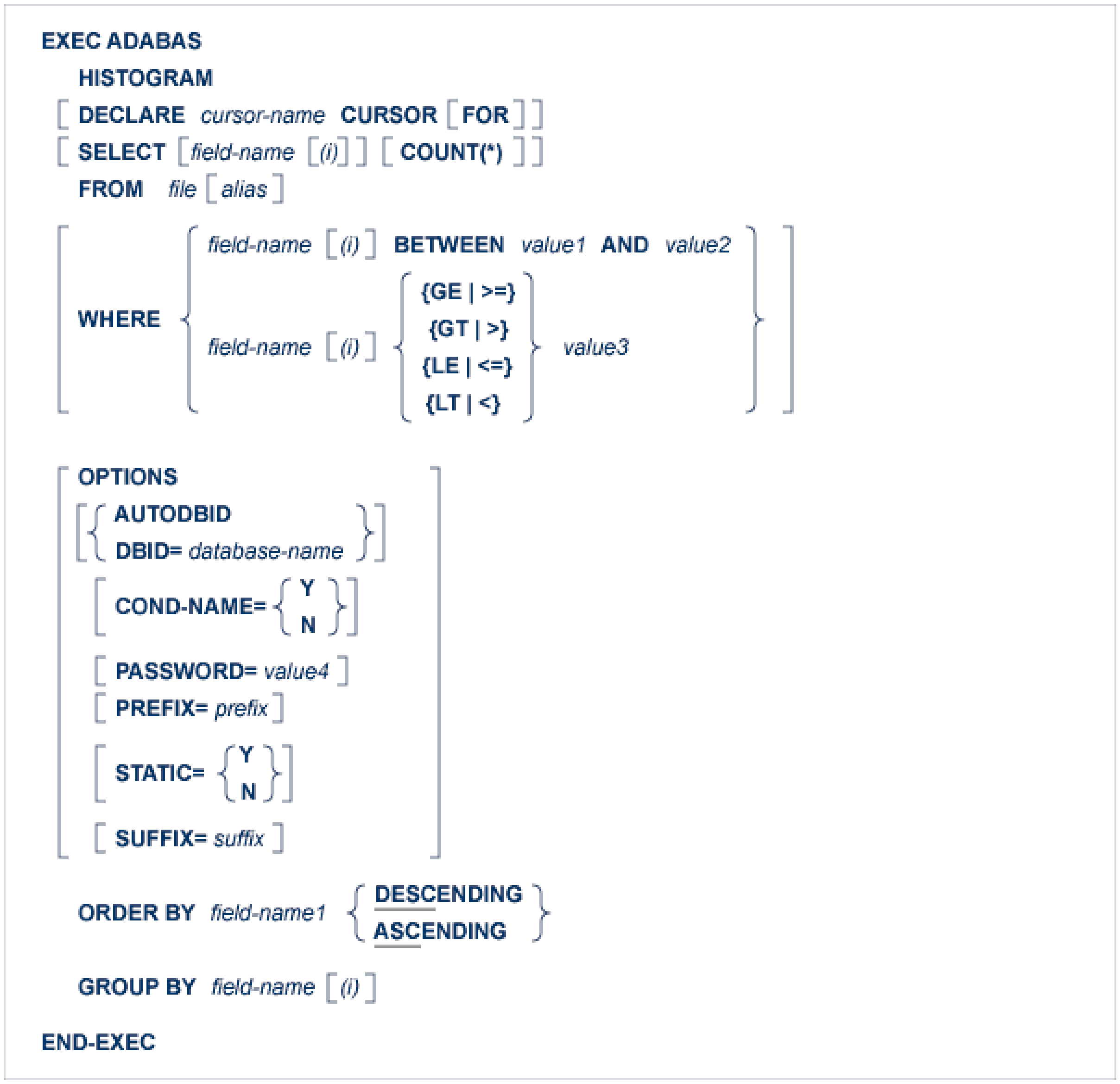
If more than one preprocessor is used, they must be used in the following order:

- Predict
- Adabas Native SQL
- CICS.

The `start-level` is in the range 1..40.

See the description of the analogous GENERATE command in chapter *The Preprocessor* of the *Predict Administration Manual* for more information.

The HISTOGRAM Statement



```
EXEC ADABAS
   HISTOGRAM
 [ DECLARE cursor-name CURSOR [ FOR ] ]
 [ SELECT [ field-name [ (i) ] ] [ COUNT(*) ] ]
   FROM  file [ alias ]

 [         { field-name [ (i) ] BETWEEN value1 AND value2          } ]
 [ WHERE   {                      { {GE | >=} }                    } ]
 [         { field-name [ (i) ]   { {GT | >}  }   value3           } ]
 [         {                      { {LE | <=} }                    } ]
 [         {                      { {LT | <}  }                    } ]

 [ OPTIONS                                ]
 [  [ { AUTODBID              } ]         ]
 [  [ { DBID= database-name   } ]         ]
 [   [ COND-NAME= { Y } ]                 ]
 [   [            { N } ]                 ]
 [   [ PASSWORD= value4 ]                 ]
 [   [ PREFIX= prefix ]                   ]
 [   [ STATIC= { Y } ]                    ]
 [   [         { N } ]                    ]
 [   [ SUFFIX= suffix ]                   ]

   ORDER BY  field-name1 { DESCENDING }
                         { ASCENDING  }

   GROUP BY  field-name [ (i) ]

END-EXEC
```

The HISTOGRAM statement is used to determine the values present for a given descriptor in the specified file. The values are returned in ascending or descending sequence. Along with each descriptor value, Adabas Native SQL indicates the number of records that contain that value. This information is read from the Associator inverted lists; no access is made to Data Storage.

The HISTOGRAM statement will normally be used to read many descriptor values in sequence. In this case, the 'DECLARE `cursor-name` CURSOR FOR' clause must be coded, and the HISTOGRAM statement must be followed by the OPEN and FETCH statements. The descriptor field specified in the SELECT clause and also the QUANTITY, i.e., the number of records with that descriptor value, are available after execution of the FETCH statement.

If only the first (lowest) descriptor value that is greater than or equal to the specified starting value is required, the DECLARE clause may be omitted. The descriptor field specified in the SELECT clause is available directly after execution of the HISTOGRAM statement.

An Adabas L9 command is generated.

DECLARE Clause

```
DECLARE cursor-name CURSOR [FOR]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

If multiple descriptor values are to be processed, the 'DECLARE `cursor-name` CURSOR FOR' construction must be used. The keyword FOR indicates to Adabas Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name. If only a single descriptor value is to be processed, the DECLARE clause may be omitted.

See the **previous discussion on this clause** for more information.

SELECT Clause

```
SELECT [field-name [(i)] ] [ COUNT(*) ]
```

`field-name` is the name of the descriptor for which the values are to be returned. `field-name` must be the same descriptor as in the GROUP BY clause. The values are provided in ascending or descending order. Null values are not returned for descriptors that were defined with the null value suppression option.

Use the COUNT(*) option to find out how many records contain each descriptor value. The count will then be returned in the variable QUANTITY attached to the record buffer. Note that the string 'COUNT(*)' must be written without spaces.

If the descriptor is a field within a periodic group, the field 'ISN' (Ada, COBOL or PL/I unless the global parameter 'ABORT .' is specified) or 'SQLISN' (Ada, COBOL or PL/I if the global parameter 'ABORT .' is specified; also FORTRAN) will contain the number of the occurrence in which the returned value is located.

FROM Clause

```
FROM   file [ alias ]
```

The FROM clause specifies the file from which the descriptor values are to be retrieved.

`file` is the Adabas file name or view name as defined in the data dictionary. The `alias`, if present, is used as the name of the record buffer; otherwise, the name `file` is used.

See the **previous discussion on this clause** for more information.

WHERE Clause

```
        ⎧ field-name [(i)] BETWEEN value1 AND value2  ⎫
        ⎪                   ⎧ {GE | >=} ⎫              ⎪
WHERE   ⎨                   ⎪ {GT | >}  ⎪              ⎬
        ⎪ field-name [(i)]  ⎨ {LE | <=} ⎬ value3       ⎪
        ⎩                   ⎩ {LT | <}  ⎭              ⎭
```

The range of descriptor values to be read may be restricted by coding an appropriate WHERE clause.

Starting and ending values may be specified using the 'WHERE `field-name` BETWEEN `value1` AND `value2`' option. `value1` represents the value with which reading is to begin and `value2` represents the value with which reading is to end.

The following restriction applies only if ADA-VERSION=62 in the global OPTIONS statement or if the ADA-VERSION= `paramete`r is omitted: to specify only a starting value, use the '`field-name` >= `value3`' or '`field-name` GE `value3`' option for ascending order or '`field-name` <= `value3`' or '`field-name` LE `value3`' for descending order (if the Adabas version allows it). `value3` represents the value with which reading is to begin.

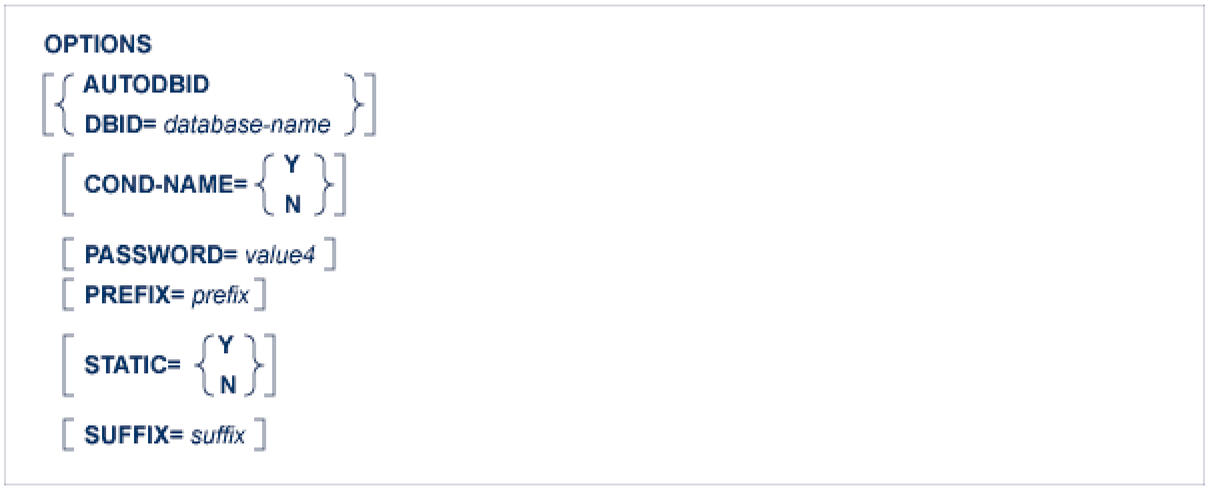
In the case of ADA-VERSION=71 in the global OPTIONS statement, all the comparator operators can be used for both ascending and descending order.

The `field-name` must be the descriptor specified in the GROUP BY clause. If the starting value `(value1`, `value3`) is not contained in the file, the next higher value in the list will be used. If no higher value exists, an end-of-file condition will result. `value1`, `value2` and `value3` may be constants or the names of variables containing the values. If they are variable names, they must be immediately preceded by colons (':'), for example ':NAME'.

`field-name ( i )` is a reference to an occurrence within a periodic group.

Note: If a prefix or suffix is used for a field-name specified in the data dictionary, you may not use the BETWEEN option if ADA-VERSION=62 in the global OPTIONS statement or if the ADA-VERSION= parameter is omitted.

OPTIONS Clause



```
OPTIONS
[ { AUTODBID
    DBID= database-name } ]
[ COND-NAME= { Y
               N } ]
[ PASSWORD= value4 ]
[ PREFIX= prefix ]
[ STATIC= { Y
            N } ]
[ SUFFIX= suffix ]
```

AUTODBID Option

The AUTODBID option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in PREDICT as level-88 entries.

If specified here, any value specified with the global parameter **OPTIONS**) will be overridden.

`With Cond. names` in the PREDICT Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this optin** for more information.

DBID Option

This option should be used if the program accesses more than one database. The *`database-name`* must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the **CONNECT** statement.

PREFIX Option

If the option 'PREFIX = prefix' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS**) or taken from PREDICT.

`Field name prefix` in the PREDICT Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the PREDICT Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = *`suffix`*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from PREDICT.

`Field name suffix` in the PREDICT Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

ORDER BY Clause

```
                        ┌ DESCENDING ┐
ORDER BY  field-name1  <              >
                        └ ASCENDING  ┘
```

The `field-name1` parameter specifies the descriptor that is to control the reading sequence. Note that the descriptor specified may not be a member of a periodic group, nor may it be a phonetic field.

If the descriptor was defined with the null value suppression option, records having a null value in the descriptor field will not be read.

If the WHERE clause is coded, the descriptor field used in the WHERE clause must be the same as the descriptor field used in the ORDER BY clause.

If DESCENDING is specified, the records are read in descending order.

Note: The 'GE' operator cannot be specified together with the DESCENDING keyword if ADA-VERSION=62 in the global OPTIONS statement or if the ADA-VERSION= *parameter* is omitted.

GROUP BY Clause

```
GROUP BY field-name [(i)]
```

`field-name` is the descriptor for which the values are to be returned.

The descriptor may not be a phonetic descriptor or a field in a periodic group. The use of descriptors defined as multiple-value fields is not recommended.

If the SELECT, WHERE and/or ORDER BY clauses are coded, the `field-name` used in these clauses must be the same as the `field-name` used in the GROUP BY clause.

The HOLD Statement

```
EXEC ADABAS
    HOLD  cursor-name
  [ OPTIONS RETURN ]

END-EXEC
```

This statement is used to place a record in hold status. This reserves the record for subsequent updating or deleting, preventing other users from updating the record until it is released by a COMMIT WORK, RELEASE or ROLLBACK WORK statement. This statement should be used after reading the record and before updating or deleting it, unless the read statement itself included the HOLD option. The `cursor-name` identifies the statement that retrieved the record.

OPTIONS Clause

```
OPTIONS RETURN
```

If the RETURN option is coded and the record is already being held for another program, the value 145 will be returned in the response-code. This will cause an error printout followed by an ABEND unless a user-written response code interpretation routine is provided.

See description of the **ABORT** parameter for more information.

If the RETURN option is not coded and the record is being held for another program, the program will be suspended until the record is released.

In many applications, it is preferable to specify the HOLD option in the READ or FIND statement rather than to use a separate HOLD statement.

This statement generates an Adabas HI command.

The INSERT Statement

```
EXEC ADABAS
    INSERT
        INTO file [alias]
    [ DECLARE cursor-name CURSOR ]
    [ WHERE [ ISN= value ] [CURRENT OF cursor-name1 ] ]
    [ assignments ]

    [ OPTIONS                          ]
    [   [ PASSWORD= value1 ]           ]
    [   [ CIPHER= value2 ]             ]
    [   [ PREFIX= value3 ]             ]
    [   [ SUFFIX= value4 ]             ]

END-EXEC
```

The INSERT statement adds a new record to the Adabas file.

When an attempt is made to add a new record with one or more fields that have been defined as unique descriptors, response code 198 will be returned if a record having the same descriptor value as the new record already exists in the file. This will cause an error print-out (response code 98 in VAX, otherwise 198) followed by an ABEND unless the user provides an alternative response code interpretation routine. See description of the **ABORT** parameter on page .

This statement generates an Adabas N1 command, or an N2 command if the 'WHERE ISN' clause is coded.

INTO Clause

```
INTO file [alias]
```

`file` is the Adabas file name or view name as defined in the data dictionary. The `alias`, if present, is used as the name of the record buffer; otherwise, the name `file` is used. The alias, which should be unique, is required if two or more Adabas Native SQL statements within the module refer to the same file. It can then be used as a qualifier in subsequent Ada, COBOL or PL/I statements that refer to the fields in the record buffer.

DECLARE Clause

```
DECLARE cursor-name  CURSOR
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

The `cursor-name` specified in the DECLARE clause is used by Adabas as the command-ID. Adabas avoids re-translating the format buffer when it recognizes a command-ID that has been used before, so using this clause can improve performance, particularly if the 'WHERE ISN' option is used.

WHERE Clause

```
WHERE [ ISN= value ] [ CURRENT OF cursor-name1 ]
```

Use one or both options. If both options are used, they can be specified in any order.

The 'WHERE ISN=`value`' option is used if you wish to specify the ISN of the record to be added (user-ISN option). `value` may be either a constant or the name of a variable containing the ISN. The ISN must lie between 1 and the maximum ISN value that was defined for the file. If `value` is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'. The colon must not be coded following the '=' sign if `value` is a numeric constant, for example 'WHERE ISN = 1234'. If a record with the specified ISN already exists, the value 113 will be returned in the response-code. The 'DECLARE `cursor-name` CURSOR' clause should be used if 'WHERE ISN=value' is coded, in order to avoid unnecessary format buffer translations.

If the option 'WHERE CURRENT OF `cursor-name1`' is used and no assignments are used, it is not necessary to build a new record buffer; the existing record buffer is written to the database. This can improve performance.

If the WHERE clause is omitted, the ISN of the new record will be allocated automatically by Adabas.

Assignments

Note: If the option 'WHERE CURRENT OF `cursor-name1`' is used, multiple-value fields and periodic groups are not supported in the assignments. If multiple-value fields or periodic groups are present, all assignments must be made before the statement. No assignments are permitted within the statement.

```
{  SET { expression  ...  }                                   }
{      { expression  ,... }                                   }
{                                                             }
{  (field-name ,... )  VALUES ( { constant } ,... )           }
{                               { var-name }                  }
```

This clause specifies the fields to be written to the record and, optionally, the values to be assigned to them. The expressions may be separated by blanks (spaces) or commas.

A new record buffer is built if this clause is coded. Avoiding this clause may improve performance, because the record buffer of the statement specified in the CURRENT OF clause is used.

expression

```
  ┌ field-name                         ┐
  │                ┌ constant ┐        │
 <  field-name =  <  var-name  >       >
  │                └ NULL     ┘        │
  └                                    ┘
```

`field-name` denotes the name of the elementary field. This is the full field name as defined in the data dictionary. If necessary, the `field-name` can be subscripted to select the required field from a multiple-value field, from a periodic group, or from a multiple-value field within a periodic group.

Note: `field-name` can be a multiple-value or a part of a periodic group, but in this case an index must be specified within parentheses. For a multiple-value within a periodic group the user should move the value by himself before the INSERT/UPDATE statement.

The option 'SET `field-name`' is used when the required value has already been assigned to the field in the record buffer by means of normal Ada, COBOL, FORTRAN or PL/I statements.

The option 'SET `field-name` = `constant`' or 'SET field-name = `var-name`' is used to specify the value to be assigned to the field.

`constant` denotes a constant (literal) value and `var-name` denotes the name of a variable defined in the Ada, COBOL, FORTRAN or PL/I program, which must be preceded by a colon.

If NULL is specified, Adabas Native SQL will move -1 (x'FFFF') to the Null field indicator of the specified field in the Record buffer used for updating the file.

If the user uses the SET clause and specifies a real value or a variable for a field which has a Null value indicator, Adabas Native SQL will automatically reset the Null field indicator of that field. If the user does not specify the SET clause, but initiates the fields in the Record buffer by himself, he should also reset or turn on the Null field indicator.

var-name

$$\left\{\begin{array}{l} :\mathit{var}\ \left[\,(\mathit{index})\,\right] \\ :\mathit{root.var}\ \left[\,(\mathit{index})\,\right] \\ :\mathit{var}\ \left[\,(\mathit{index})\,\right] \left\{\begin{array}{l}\textbf{OF}\\ \textbf{IN}\end{array}\right\} \mathit{root} \end{array}\right\}$$

If the variable name is unique within the program, it can be specified as :`var`. Otherwise, it should be made unique by preceding it by root, a higher-level data name (qualifier) in the data structure hierarchy. Both the COBOL-type construction (:`var` OF `root` or :`var` IN `root`) and the PL/I-type construction (`:root.var`) are valid in Ada, COBOL and PL/I programs.

Both the 'SET `field-name`' option and the 'SET `field-name` = `data`' option can be used in the same SET clause.

The optional `index` may be an integer constant or the name of a variable preceded by a colon. Note that blanks (spaces) are not allowed between the :`var` and the parenthesis preceding the `index`.

OPTIONS Clause

```
OPTIONS
  [ PASSWORD= value1 ]
  [ CIPHER= value2 ]
  [ PREFIX= value3 ]
  [ SUFFIX= value4 ]
```

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the **CONNECT** statement.

CIPHER Option

The cipher key must be specified when accessing a ciphered file. See the **previous discussion on this option** for more information.

PREFIX Option

If the option 'PREFIX = *prefix*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = *suffix*' is coded, the field names generated for the record buffer will include the specified suffix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name suffix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

Example 1: Ada

```
type RECORD_BUFPERS is
     record
     SALARY: STRING (...
      .
      .
      .
     end record;
FINANCE: RECORD_BUFPERS;

FINANCE.OIL_CREDIT_2:= "0001000";
EXEC ADABAS
     INSERT
       INTO FINANCE
         SET PERSONNEL-NUMBER = "005333756"
         OIL_CREDIT(3) = "0002000"
         OIL_CREDIT(1) = "0001000"
         INSURANCE_COMPANY(1(1)) = "AAA "
         OIL_CREDIT(2)
END-EXEC
```

Example 2: COBOL

```
01 REC
   02 SALARY ......
   02 AGE ......
   02 PERSON-NAME ......hg
    .
    .
    .
MOVE 1000 TO OIL-CREDIT-2
EXEC ADABAS
    INSERT
    INTO FINANCE
    SET PERSONNEL-NUMBER =  5333756
         OIL-CREDIT(3) = 2000
         OIL-CREDIT(1) = 1000
         INSURANCE-COMPANY(1(1)) = 'AAA'
         OIL-CREDIT(2)
END-EXEC
```

Example 3: FORTRAN

```
CHARACTER* 8 PERBER
CHARACTER* 7 OCRE1
CHARACTER* 7 OCRE3
CHARACTER*25 INCOM (00001 , 00001)
CHARACTER* 7 OCRE2
CHARACTER* 14002 FINNCE
.....
OCRE2 = '0001000'

EXEC ADABAS
    INSERT
    INTO FINANCE
    SET PERSONNEL-NUMBER = '005333756'
        OIL-CREDIT(1) = '0002000'
        OIL-CREDIT(3) = '0001000'
        INSURANCE-COMPANY(1(1)) = 'AAA'
        OIL-CREDIT (2)
END-EXEC
```

Note: Synonyms are assumed to be defined in the data dictionary as shown in Appendix B, and truncation is assumed to occur in the middle of the word. (The maximum length of names is operating-system dependent.)

The field FINNCE encompasses all other fields and is the equivalent of the record buffer in Ada, COBOL and PL/I.

Example 4: PL/I

```
DCL 01 REC,
      02 SALARY ......,
      02 AGE ......,
      02 PERSON_NAME ......;
    .
    .
    .
OIL_CREDIT_2 = 1000;
EXEC ADABAS
     INSERT
     INTO FINANCE
     SET PERSONNEL-NUMBER = 5333756
     OIL-CREDIT(3) = 2000
     OIL-CREDIT(1) = 1000
     INSURANCE-COMPANY(1(1)) = 'AAA'
     OIL-CREDIT(2)
END-EXEC
```

The OPEN Statement

```
EXEC ADABAS
    OPEN cursor-name
END-EXEC
```

This statement is part of the OPEN/FETCH/CLOSE sequence that is used for processing multiple records.

The OPEN statement processes the parameters defined in the WHERE clause of the statement referenced by `cursor-name` and then issues the actual Adabas command if necessary. Once the OPEN statement has been executed, the contents of the WHERE clause are not re-examined. Therefore, changes to the variables in a WHERE clause will not have any effect until the OPEN statement is re-executed.

In the case of the HISTOGRAM, READ LOGICAL and READ PHYSICAL SEQUENCE statements, the OPEN statement does nothing more than to initialize the variables for the executable Adabas commands. For the COMPARE, FIND, FIND COUPLED and SORT statements, the OPEN statement initializes the variables and also executes the command (FIND, SORT,...) that produces the ISN list. No records are actually fetched from the file until the FETCH statement is executed.

When used in conjunction with a COMPARE, FIND, FIND COUPLED or SORT statement, the OPEN statement puts the ISN quantity in the record buffer. Thus the number of records can be found before executing the first FETCH statement.

The READ ISN Statement

```
EXEC ADABAS
    READ ISN
  [ DECLARE cursor-name CURSOR ]
  [ SELECT  { field-name ,... } ]
            {       *         }
    FROM    file [ alias ]
    WHERE   { ISN=  value                }
            { CURRENT OF  cursor-name1   }

  [ OPTIONS [ { AUTODBID                } ]  ]
  [         [ { DBID= database-name     } ]  ]
  [           [ CIPHER= value1 ]             ]
  [           [ COND-NAME= { Y } ]           ]
  [           [            { N } ]           ]
  [           [ HOLD [ RETURN ] ]            ]
  [           [ INDEXED= { Y } ]             ]
  [           [          { N } ]             ]
  [           [ PASSWORD= value2 ]           ]
  [           [ PREFIX= prefix ]             ]
  [           [ SAVE ]                       ]
  [           [ STATIC= { Y } ]              ]
  [           [         { N } ]              ]
  [           [ SUFFIX= suffix ]             ]
END-EXEC
```

The READ ISN statement is used to read from a file a single record whose ISN is known, or the first record whose ISN is greater than a specified value.

This statement causes an Adabas L1 command to be generated, or an L4 command if the HOLD option is coded.

DECLARE Clause

DECLARE *cursor-name* **CURSOR**

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long. See the **previous discussion on this clause** for more information.

SELECT Clause

$$\textbf{SELECT} \left\{ \begin{array}{c} \textit{field-name} \text{ ,...} \\ * \end{array} \right\}$$

The SELECT clause specifies which fields are to be retrieved from the database. All types of fields may be selected, with the exception of subdescriptors, superdescriptors and phonetic descriptors. The fields must be specified by their full names as defined in the data dictionary.

If the SELECT clause is omitted, then no records are processed, but other functions such as search may be performed.

If an asterisk ('*') is specified following the keyword 'SELECT', all the fields within the userview are read.

See the **previous discussion on this clause** for more information.

FROM Clause

```
FROM   file  [ alias ]
```

The FROM clause specifies the file from which data are to be retrieved. It is used together with the SELECT clause to generate the record buffer and to control the retrieval of information from the database.

`file` is the Adabas file name or view name as defined in the data dictionary. The `alias`, if present, is used as the name of the record buffer; otherwise, the name `file` is used.

See the **previous discussion on this clause** for more information.

WHERE Clause

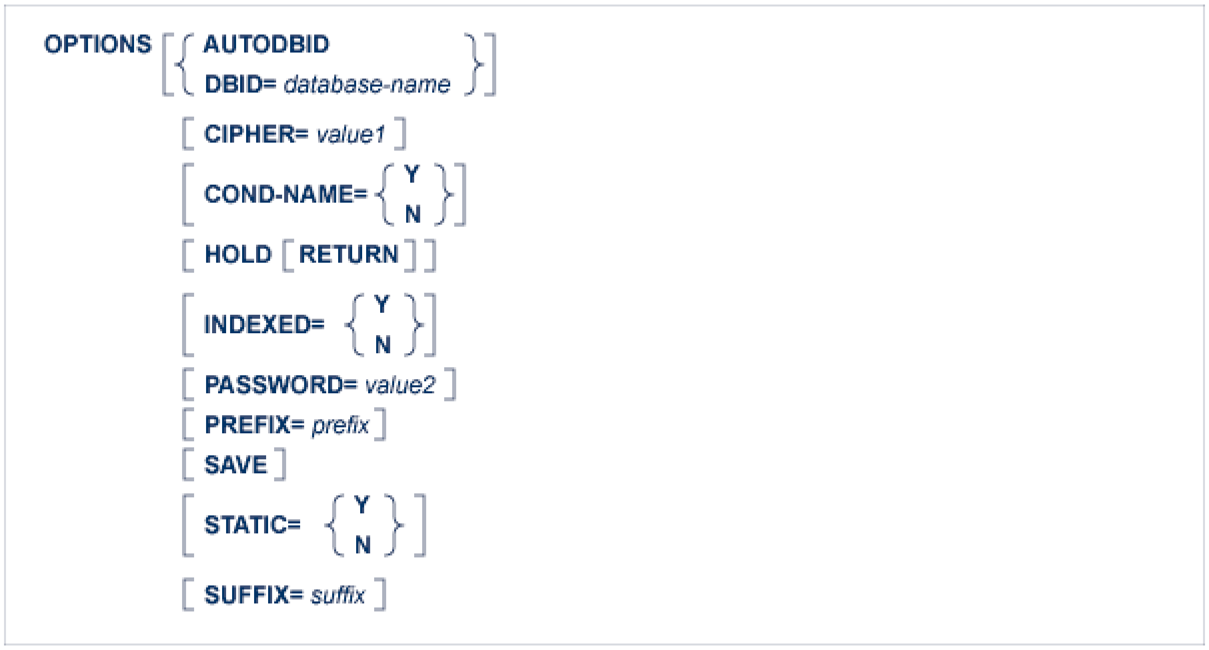
$$\textbf{WHERE} \left\{ \begin{array}{l} \textbf{ISN=}\ \textit{value} \\ \textbf{CURRENT OF}\ \textit{cursor-name1} \end{array} \right\}$$

The WHERE clause is used to specify the ISN of the record to be read. If the SEQUENCE option is not specified, an error (response-code = 113) will result if the file does not contain a record with this ISN. If the SEQUENCE option is specified and the file does not contain a record with the given ISN, then the record with the next higher ISN will be read, or end-of-file will be signaled if there is no such record.

value can be a constant or the name of a variable. If *value* is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'. Note that the colon is not part of the '=' sign that follows the 'ISN' keyword.

If the programmer wishes Adabas Native SQL to use the ISN of a record found by a previous statement, he should use the 'CURRENT OF' option, specifying the *cursor-name* of that statement.

OPTIONS Clause



```
OPTIONS [ { AUTODBID               } ]
          { DBID= database-name    }
        [ CIPHER= value1 ]
        [ COND-NAME= { Y } ]
                     { N }
        [ HOLD [ RETURN ] ]
        [ INDEXED= { Y } ]
                   { N }
        [ PASSWORD= value2 ]
        [ PREFIX= prefix ]
        [ SAVE ]
        [ STATIC= { Y } ]
                  { N }
        [ SUFFIX= suffix ]
```

AUTODBID Option

The AUTODBID option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

CIPHER Option

The cipher key must be specified when accessing a ciphered file.

See the **previous discussion on this option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as level-88 entries.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

DBID Option

This option should be used if the program accesses more than one database. The `database-name` must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user.

A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode.

The HOLD option may not be used together with the AUTODBID or DBID options. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

See ***HOLD Logic*** for more information.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the CONNECT statement.

See the **previous discussion on this option** for more information.

PREFIX Option

If the option 'PREFIX = *prefix*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SEQUENCE Option

If this option is coded, the record with the specified ISN or the next higher ISN is read. The ISN of the record that was read is returned in the field 'ISN', which is appended to every record buffer. If the file does not contain a record having an ISN higher than the specified ISN, end-of-file is signaled. Therefore, when using this option, the flag ADACODE (Ada, COBOL, PL/I) or SQLCOD (FORTRAN) should be checked for end-of-file status.

If this option is not specified, the record with the specified ISN is read. If the file does not contain a record having the specified ISN, an error is reported (response-code = 113). This causes the program to terminate unless a user-written response code interpretation routine is provided.

See description of the ABORT parameter on page .

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = *suffix*' is coded, the field names generated for the record buffer will include the specified suffix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name suffix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

The READ LOGICAL Statement

```
EXEC ADABAS
    READ LOGICAL
  [ DECLARE  cursor-name  CURSOR [ FOR ] ]
  [         { field-name ,...  } ]
  [ SELECT  {                  } ]
  [         {       *          } ]
    FROM   file [ alias ]
  [                          { BETWEEN  value1  AND  value2       } ]
  [                          {    { {GE | >=} }                   } ]
  [ WHERE field-name         {    { {GT | >}  }                   } ]
  [                          {    { {LE | <=} }  value3           } ]
  [                          {    { {LT | <}  }                   } ]

  [ OPTIONS                                        ]
  [ [{ AUTODBID               }]                   ]
  [ [{ DBID= database-name    }]                   ]
  [   [ CIPHER= value4        ]                    ]
  [   [ COND-NAME= { Y }      ]                    ]
  [   [            { N }      ]                    ]
  [   [ HOLD [ RETURN ] ]                          ]
  [   [ INDEXED=   { Y }      ]                    ]
  [   [            { N }      ]                    ]
  [   [ ISN= value5           ]                    ]
  [   [ PASSWORD= value6      ]                    ]
  [   [ PREFIX= prefix ]                           ]
  [   [ STATIC= { Y } ]                            ]
  [   [         { N } ]                            ]
  [   [ SUFFIX= suffix ]                           ]

    ORDER BY  field-name1  { DESCENDING }
                           { ASCENDING  }

END-EXEC
```

Note: The BETWEEN clause only applies if ADA-VERSION=71 in the global OPTIONS statement.

The READ LOGICAL statement is used to read a file, or portion thereof, in logical sequential order based on the ascending or descending sequence of the values for a given descriptor.

This statement will normally be used to read many records in logical sequence. In this case, the 'DECLARE `cursor-name` CURSOR FOR' clause must be coded, and the READ LOGICAL statement must be followed by the **OPEN and FETCH statements**. The fields specified in the SELECT clause are available after execution of the FETCH statement.

If only the first record in the file is required, the DECLARE clause may be omitted and the fields specified in the SELECT clause are available directly after execution of the READ LOGICAL statement.

This statement causes an Adabas L3 command to be generated, or an L6 command if the HOLD option is coded.

DECLARE Clause

```
DECLARE cursor-name CURSOR [FOR]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

If multiple records are to be processed, the 'DECLARE `cursor-name` CURSOR FOR' construction must be used. The keyword 'FOR' indicates to Adabas Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name. If only a single record is to be processed, the DECLARE clause may be omitted.

SELECT Clause

```
        { field-name ,... }
SELECT  {                 }
        {        *        }
```

The SELECT clause specifies which fields are to be retrieved from the database. All types of fields may be selected, with the exception of subdescriptors, superdescriptors and phonetic descriptors. The fields must be specified by their full names as defined in the data dictionary.

If the SELECT clause is omitted, then no records are processed, but other functions such as search may be performed.

If an asterisk is specified following the keyword 'SELECT', all the fields in the userview are read.

See the **previous discussion on this clause** for more information.

FROM Clause

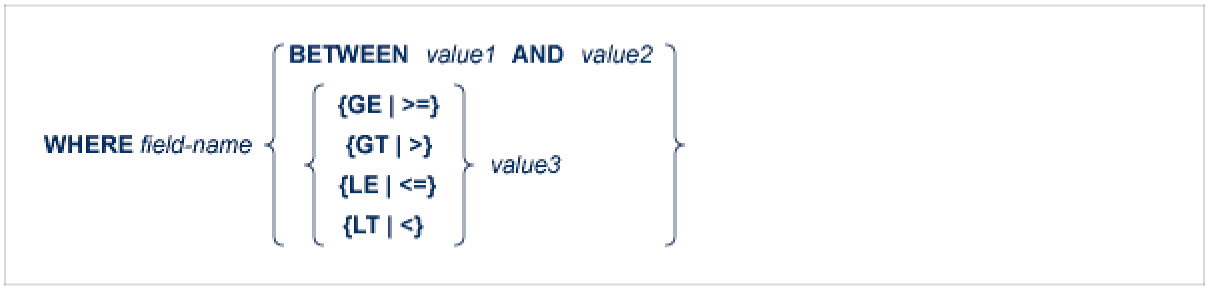
```
FROM   file [alias]
```

The FROM clause specifies the file from which data are to be retrieved. It is used together with the SELECT clause to generate the record buffer and to control the retrieval of information from the database.

file is the Adabas file name or view name as defined in the data dictionary. The *alias*, if present, is used as the name of the record buffer; otherwise, the name *file* is used.

See the **previous discussion on this clause** for more information.

WHERE Clause



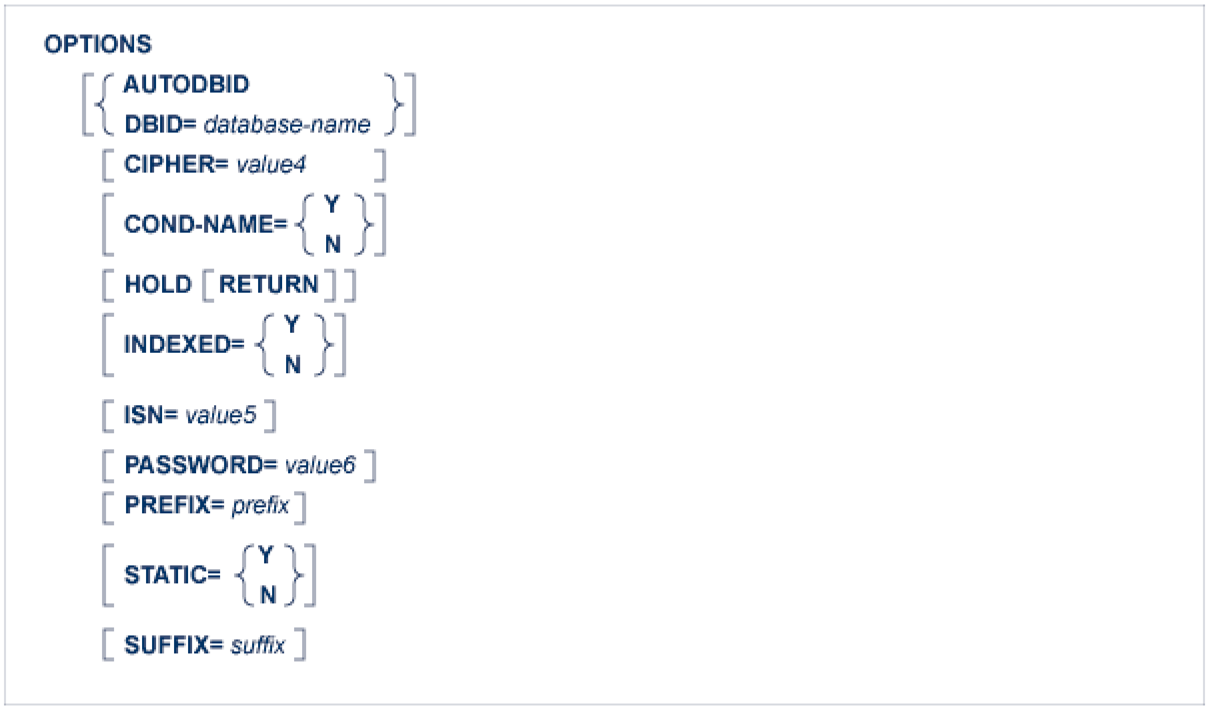
The records may be read starting from a particular descriptor value by using the WHERE clause, where `value` represents the value from which reading is to begin. *`field-name1`* must be the name of the descriptor specified in the ORDER BY clause (see below).

If the starting value is not found in the file, the next higher value in the file will be used for ascending sequence. If no higher value exists, an end-of-file condition (in ADA, COBOL and PL/I programs: ADACODE = 3; in FORTRAN programs: SQLCOD = 3) will result. `value` may be a constant or the name of a variable.

If `value1`, `value2` or `value3` is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'.

The BETWEEN clause only applies when Adabas Version 7.1 or higher is used and the ADA-VERSION parameter in the global OPTIONS statement is set to 71 or when Adabas Version 3.1 or higher in OpenVMS is used.

OPTIONS Clause



```
OPTIONS
   [{ AUTODBID               }]
   [{ DBID= database-name    }]
    [ CIPHER= value4         ]
    [ COND-NAME= { Y | N }   ]
    [ HOLD [ RETURN ] ]
    [ INDEXED= { Y | N } ]
    [ ISN= value5 ]
    [ PASSWORD= value6 ]
    [ PREFIX= prefix ]
    [ STATIC= { Y | N } ]
    [ SUFFIX= suffix ]
```

AUTODBID Option

This option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued. (If the file is linked to more than one database, the DBID option should be used.)

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

CIPHER Option

The cipher key must be specified when accessing a ciphered file. See the **previous discussion on this option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as Level-88 entries.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

DBID Option

This option should be used if the program accesses more than one database. The *`database-name`* must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user.

A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode.

See ***HOLD Logic*** for more information.

The HOLD option may not be used together with the AUTODBID or DBID options. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

ISN Option

The ISN parameter indicates the place within a group of records with the same descriptor value where reading is to begin. Of the records which satisfy the selection criterion *`field-name1`* = *`value`* (see the WHERE clause), reading begins at the record whose ISN is greater than *`value3`*. If there is no record with *`field-name1`* = *`value`* whose ISN is greater than *`value3`*, the first record with the next descriptor value *`field-name1`* > *`value`* is read. If there is none, the end-of-file condition (in Ada, COBOL and PL/I programs: ADACODE=3; in FORTRAN programs: SQLCOD=3) will be set.

The ISN value is specified in the *`value3`* field. *`value3`* may be a constant or the name of a variable containing the ISN. If *`value3`* is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the CONNECT statement. See the **previous discussion on this option** for more information.

PREFIX Option

If the option 'PREFIX = *`prefix`*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = `suffix`' is coded, the field names generated for the record buffer will include the specified suffix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name suffix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

ORDER BY Clause

```
                        ┌ DESCENDING ┐
ORDER BY field-name1   {              }
                        └ ASCENDING  ┘
```

The `field-name1` parameter specifies the descriptor that is to control the reading sequence. Note that the descriptor specified may not be a member of a periodic group, nor may it be a phonetic field.

If the descriptor was defined with the null value suppression option, records having a null value in the descriptor field will not be read.

If the WHERE clause is coded, the descriptor field used in the WHERE clause must be the same as the descriptor field used in the ORDER BY clause.

If DESCENDING is specified, the records are read in descending order.

Note: If the ADA-VERSION parameter in the global OPTIONS statement is set to 62 or if the ADA-VERSION= parameter is omitted, the 'GE' operator cannot be specified together with the DESCENDING keyword on mainframe platforms, and if the 'LE' operator is specified, the DESCENDING keyword may be omitted on mainframe platforms.

The READ PHYSICAL SEQUENCE Statement

```
EXEC ADABAS
   READ [PHYSICAL [SEQUENCE ]]
 [ DECLARE cursor-name CURSOR [FOR]]
 [ SELECT { field-name ,... } ]
          {       *         }
   FROM  file [alias]
 [ OPTIONS
   [{ AUTODBID              }]
    { DBID= database-name   }
    [ CIPHER= value1         ]
    [ COND-NAME= { Y } ]
                 { N }
    [ HOLD [RETURN]]
    [ INDEXED= { Y } ]
               { N }
    [ ISN= value2 ]
    [ PASSWORD= value3 ]
    [ PREFIX= prefix ]
    [ STATIC= { Y } ]
              { N }
    [ SUFFIX= suffix ]                ]
END-EXEC
```

This statement is used to read records in the sequence in which they are physically located in the data files. It does not read records in any particular logical order.

This statement may be used to read an entire file at maximum speed, since no access is required to the Associator.

This statement is normally used to read many records (possibly the entire file). In this case, the 'DECLARE `cursor-name` CURSOR FOR' clause must be coded, and the READ PHYSICAL SEQUENCE statement must be followed by the **OPEN and FETCH statements**. The fields specified in the SELECT clause are available after execution of the FETCH statement.

If only the first record in the file is required, the DECLARE clause may be omitted and the fields specified in the SELECT clause are available directly after execution of the READ PHYSICAL SEQUENCE statement.

This statement causes an Adabas L2 command to be generated, or an L5 command if the HOLD option is coded.

DECLARE Clause

```
DECLARE cursor-name CURSOR [ FOR ]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

If multiple records are to be processed, the 'DECLARE `cursor-name` CURSOR FOR' construction must be used. The keyword 'FOR' indicates to Adabas Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name. If only a single record is to be processed, the DECLARE clause may be omitted.

See the **previous discussion on this clause** for more information.

SELECT Clause

```
SELECT { field-name ,... }
       { *               }
```

The SELECT clause specifies which fields are to be retrieved from the database. All types of fields may be selected, with the exception of subdescriptors, superdescriptors and phonetic descriptors. The fields must be specified by their full names as defined in the data dictionary.

If this clause is omitted, no records are processed, but other functions such as search may be performed.

If an asterisk is specified following the keyword 'SELECT', all the fields within the userview are read.

See the **previous discussion on this clause** for more information.

FROM Clause

```
FROM   file [ alias ]
```

This clause specifies the file from which data are to be retrieved. It is used together with the SELECT clause to generate the record buffer and to control the retrieval of information from the database.

`file` is the Adabas file name or view name as defined in the data dictionary. The `alias`, if present, is used as the name of the record buffer; otherwise, the name `file` is used. See the **previous discussion on this clause** for more information.

OPTIONS Clause

```
OPTIONS
   [ { AUTODBID                 } ]
   [ { DBID= database-name      } ]
    [ CIPHER= value1 ]
    [ COND-NAME= { Y } ]
    [            { N } ]
    [ HOLD [ RETURN ] ]
    [ INDEXED= { Y } ]
    [          { N } ]
    [ ISN= value2 ]
    [ PASSWORD= value3 ]
    [ PREFIX= prefix ]
    [ STATIC= { Y } ]
    [         { N } ]
    [ SUFFIX= suffix ]
```

AUTODBID Option

The AUTODBID option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

CIPHER Option

The cipher key must be specified when accessing a ciphered file. See the **previous discussion on this option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as level-88 entries.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

DBID Option

This option should be used if the program accesses more than one database. The *`database-name`* must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user. A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode.

See ***HOLD Logic*** for more information.

The HOLD option may not be used together with the AUTODBID or DBID options. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

ISN Option

This option is used if the file is to be read in physical sequence starting at some position other than the beginning of the file.

The ISN parameter specifies the ISN of the record preceding the record where reading is to begin. The ISN is specified in the `value2` field. `value2` may be a constant or the name of a variable containing the ISN. If `value2` is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'. This field is updated automatically by Adabas and need not be modified by the user every time the next record is to be read.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the CONNECT statement. See the **previous discussion on this option** for more information.

PREFIX Option

If the option 'PREFIX = `prefix`' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

Field name prefix in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = `suffix`' is coded, the field names generated for the record buffer will include the specified suffix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name suffix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

The READ USERDATA Statement

```
EXEC ADABAS
    READ USERDATA
        INTO   var1
      [ USERID=   value ]

EXEC-END
```

This statement reads user data previously stored in the Adabas system file by a CHECKPOINT, COMMIT WORK or DBCLOSE statement.

The user data will be read into the variable whose name is `var1`. The variable name must be immediately preceded by a colon (':'), for example 'READ USERDATA INTO :NAME'.

This statement generates an Adabas RE command.

USERID Clause

USERID= *value*

If you wish to read data stored by another user, or stored by you during a different Adabas session, the USERID parameter must be used, specifying the user-ID that was used when the data was written. *value* can be an alphanumeric constant or the name of a variable containing the user-ID. If *value* is a variable name, it must be immediately preceded by a colon (':'). The colon must not be coded if *value* is a constant.

Examples:

```
EXEC ADABAS
  READ USERDATA INTO :USER-VAR
        USERID = 'US01'
END-EXEC

EXEC ADABAS
  READ USERDATA INTO :TEMP1
        USERID = :HISNAME
END-EXEC
```

The RELEASE Statement

```
EXEC ADABAS
    RELEASE [cursor-name]
     [ FOR [FORMAT] [GLOBAL] [SEQ] [LIST ] ]
END-EXEC
```

You will not normally need this statement. It is used to release the Adabas global format-ID and/or an Adabas command-ID.

The command-ID has three functions:

- to identify a format buffer so that further use of the same format buffer with the same command-ID is more efficient,
- to identify the next READ statement in a sequential read process,
- to identify a list of ISNs found in a FIND statement.

You can release the command-ID from one, two or all three of the above functions. If the FOR clause is not specified, then the command-ID will be released from all the functions and in addition the global format-ID will be released.

Function	Meaning
FORMAT	Releases the command-ID from the internal format buffer pool.
GLOBAL	Releases the ADABAS global format-ID.
SEQ	Releases the command-ID from the table of sequential commands.
LIST	Releases the command-ID from the table of ISN lists.

The command-ID that will be released is the command-ID generated by Adabas Native SQL for the set of buffers identified by `cursor-name`.

If `cursor-name` is not specified, all command-IDs will be released.

See the description of the RC command in the *Adabas Command Reference Manual* for more information.

This statement generates an Adabas RC command.

The RELEASE ISN Statement

```
EXEC ADABAS
    RELEASE ISN   cursor-name
END-EXEC
```

This statement releases from hold status a record that has been held by a previous READ or HOLD statement with the same `cursor-name` identification.

If you are using ET logic, do not use this statement to release a record that has been updated during your current session.

The COMMIT WORK statement, which is used in ET-mode programs to mark the end of a logical transaction, automatically releases records that were put into hold status during the current transaction.

This statement generates an Adabas RI command.

The RESTORE Statement

```
EXEC ADABAS
    RESTORE
        cursor   var1
END-EXEC
```

This statement is used in programs that run under the control of a TP monitor, for example CICS in pseudo-conversational mode or UTM with multiple-step transactions.

The data to be restored must be passed to the RESTORE statement in `var1`, which must have a length of 80 bytes. The name of the variable `var1` must be preceded by a colon (':'). The data is passed to the Adabas Native SQL statement identified by `cursor`.

The data must be the same data that was returned from a preceding SAVE statement. The user is responsible for preserving the data between the SAVE statement and the RESTORE statement.

See also the complementary SAVE statement.

The ROLLBACK WORK Statement

```
EXEC ADABAS
    ROLLBACK WORK
      [ WITHOUT  filename ]
END-EXEC
```

This statement is used to remove all the database modifications (insertions, deletions and updates) that have been performed since the beginning of the Adabas user session or the last COMMIT WORK or ROLLBACK statement. Note that the ROLLBACK WORK statement can modify the state of files other than the files used in the program that issued the statement. After the ROLLBACK WORK has been completed, the database has the status that it had when the last COMMIT WORK was issued.

This statement generates an Adabas BT (backout transaction) command.

WITHOUT Clause

```
WITHOUT filename
```

The user may backout all files except one by specifying the appropriate file name in the WITHOUT parameter.

Example:

```
EXEC ADABAS
  ROLLBACK WORK
      WITHOUT PERSONNEL
END-EXEC
```

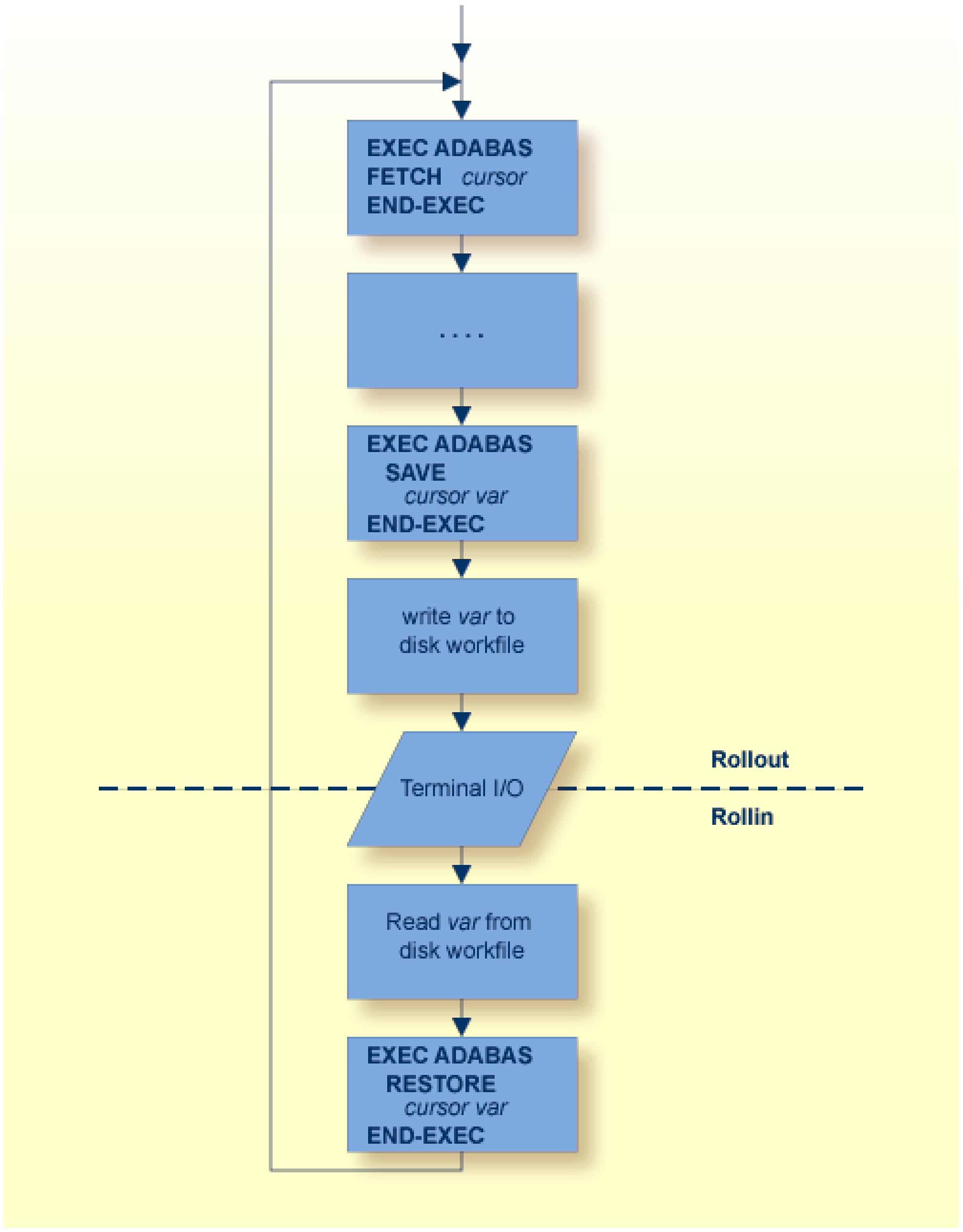
In this example, all files in the database should be backed out with the exception of file PERSONNEL.

The SAVE Statement

```
EXEC ADABAS
    SAVE
        cursor   var1
END-EXEC
```

This statement is used in programs that run under the control of a TP monitor, for example CICS in pseudo-conversational mode or UTM with multiple-step transactions. Several SAVE statements may be used, one for each Adabas Native SQL statement whose context must be preserved over an I/O transaction. However, unnecessary SAVE statements should be avoided.

A typical sequence of operations is shown in the following diagram:



The data to be saved from the Adabas Native SQL statement identified by cursor is returned in `var1`, which must have a length of 80 bytes. The name of the variable `var1` must be preceded by a colon (':'). The data will normally be used in a subsequent RESTORE statement. The user is responsible for preserving the data between the SAVE statement and the RESTORE statement.

See also the complementary RESTORE statement.

Programs that use the SAVE statement must not use the ISNSIZE option in any Adabas SQL statements.

The SORT Statement

```
EXEC ADABAS
    SORT [ISN [LISTS]]
 [ DECLARE cursor-name CURSOR [FOR]]
 [ SELECT { field-name ,... } ]
 [        {      *          } ]
    FROM  file [alias]
    WHERE CURSOR= cursor-name

 [ OPTIONS
   [{ AUTODBID             }]
   [{ DBID= database-name  }]
    [ CIPHER= value1       ]
    [ COND-NAME= { Y } ]
    [            { N } ]
    [ HOLD [RETURN]]
    [ INDEXED= { Y } ]
    [          { N } ]
    [ ISNSIZE= len ]
    [ PASSWORD= value2 ]
    [ PREFIX= prefix ]
    [ SAVE          ]
    [ STATIC= { Y } ]
    [         { N } ]
    [ SUFFIX= suffix ]                ]

 [ ORDER BY de 1..3 { DESCENDING } ]
 [                  { ASCENDING  } ]

END-EXEC
```

The SORT statement may be used to sort an ISN list that was created by a COMPARE or FIND statement. The SAVE option must be used in the COMPARE or FIND statement in order to save the ISN list.

The ISN list is sorted according to the values of one, two or three descriptors in the records indicated by the entries in the given ISN list. The keyword DESCENDING, which may be abbreviated to DESC, specifies descending sequence, otherwise ascending sequence will be assumed. If more than one descriptor is specified, the ASCENDING/DESCENDING option applies collectively to all of them. It is not possible to specify ascending sequence for one descriptor and descending sequence for another.

The ISN list to be sorted must be in ascending ISN sequence. An ISN list that was produced by a FIND statement with the ORDER BY clause or a SORT command cannot be sorted.

In general, the SORT statement will return a list containing the ISNs of many records.

If more than one of the records listed in the ISN list returned by the SORT statement are to be processed, then the SORT statement must include the 'DECLARE *cursor-name* CURSOR FOR' clause and it must be followed by an **OPEN/FETCH/CLOSE sequence**. The fields specified in the SELECT clause are available after execution of the FETCH statement.

If, however, only the first of these records is to be processed, then the DECLARE clause may be omitted and the fields specified in the SELECT clause are available after execution of the SORT statement. In this case, Adabas Native SQL generates executable code for the SORT statement, which must therefore appear in the procedure division in COBOL programs.

An Adabas S9 command is generated.

DECLARE Clause

```
DECLARE cursor-name CURSOR [ FOR ]
```

This clause specifies a cursor-name that identifies, or labels, the current statement. Subsequent statements can refer back to a statement that is labeled with a DECLARE clause by quoting the cursor-name. The cursor-name may be up to four characters long.

If multiple records are to be processed, the 'DECLARE `cursor-name` CURSOR FOR' construction must be used. The keyword 'FOR' indicates to Adabas Native SQL that the statement is used in conjunction with OPEN and FETCH statements that appear later in the program quoting the same cursor-name. If only a single record is to be processed, the DECLARE clause may be omitted.

SELECT Clause

```
SELECT { field-name ,... }
       {       *         }
```

The SELECT clause specifies which fields are to be retrieved from the database. All types of fields may be selected, with the exception of subdescriptors, superdescriptors and phonetic descriptors. The fields must be specified by their full names as defined in the data dictionary.

If an asterisk is specified following the keyword 'SELECT', all the fields within the userview are read.

See page for more information.

FROM Clause

FROM *file* [*alias*]

The FROM clause specifies the file from which data are to be retrieved. It is used together with the SELECT clause to generate the record buffer and to control the retrieval of information from the database.

file is the Adabas file name or view name as defined in the data dictionary. The *alias*, if present, is used as the name of the record buffer; otherwise, the name *file* is used.

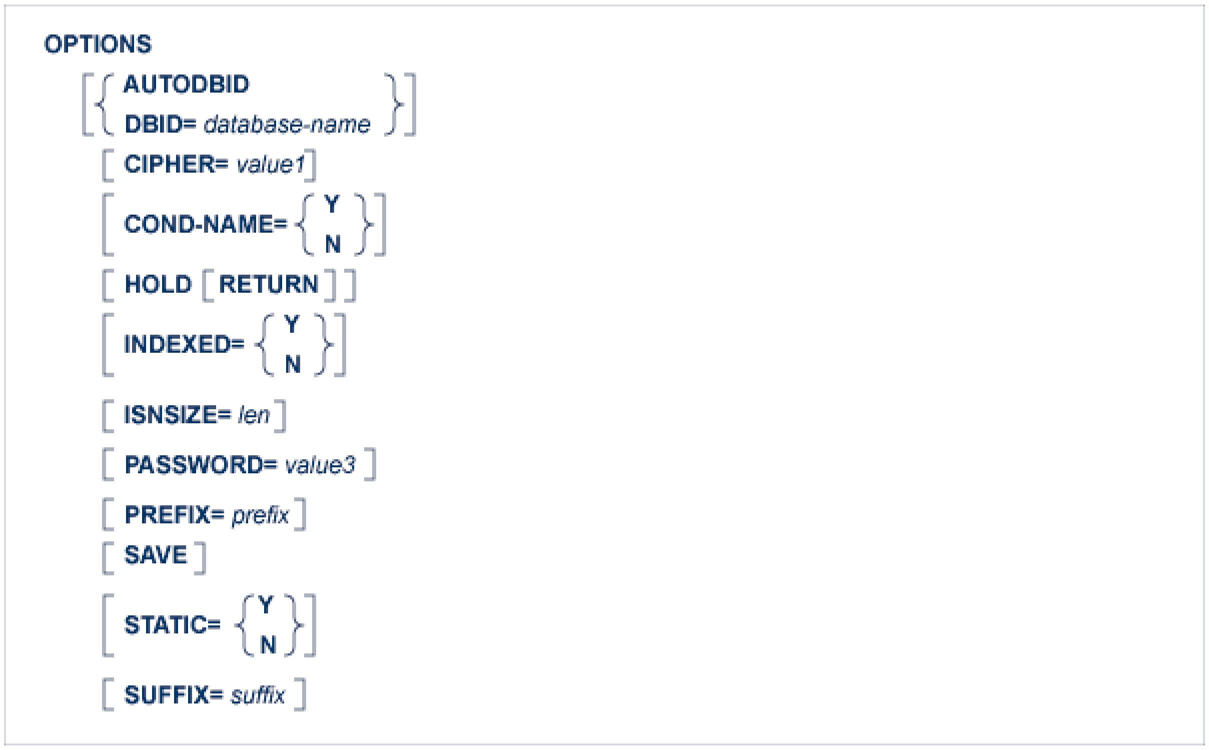
See the **previous discussion on this clause** for more information

WHERE Clause

```
WHERE CURSOR=   cursor-name
```

The `cursor-name` is the name coded in the DECLARE clause of the statement that created the ISN list to be sorted. This statement must include the SAVE option. It must not be a FIND statement with the ORDER BY clause or a SORT statement.

OPTIONS Clause



```
OPTIONS
    [ { AUTODBID              } ]
    [ { DBID= database-name   } ]
     [ CIPHER= value1 ]
     [ COND-NAME= { Y } ]
     [            { N } ]
     [ HOLD [ RETURN ] ]
     [ INDEXED= { Y } ]
     [          { N } ]
     [ ISNSIZE= len ]
     [ PASSWORD= value3 ]
     [ PREFIX= prefix ]
     [ SAVE ]
     [ STATIC= { Y } ]
     [         { N } ]
     [ SUFFIX= suffix ]
```

AUTODBID Option

The AUTODBID option can be used if the file is linked to a single database. This option indicates to Adabas Native SQL that the database ID is to be taken from the data dictionary. If the file is linked to more than one database, an error message will be issued.

If the file is linked to more than one database, the DBID option should be used.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

CIPHER Option

The cipher key must be specified when accessing a ciphered file. See the **previous discussion on this option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as level-88 entries.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

DBID Option

This option should be used if the program accesses more than one database. The *`database-name`* must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed.

This option may not be used together with the HOLD option. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

HOLD Option

If the HOLD option is coded, the record retrieved is placed in hold status. As long as a record is in hold status, it cannot be updated or deleted by any other user.

A record that is to be updated or deleted must be in hold status unless the program is running in exclusive-control mode. See ***HOLD Logic*** for more information.

The HOLD option may not be used together with the AUTODBID or DBID options. This implies to Adabas Native SQL that you are attempting to update a database other than your default database.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

ISNSIZE Option

The ISNSIZE parameter defines the maximum number of ISNs that can be stored in the ISN buffer. For the SORT statement, the ISN buffer must either be defined with size 0, or else it must be large enough to contain the entire ISN list that is to be sorted. If an ISN buffer is defined that is too small to contain the entire ISN list, the value 1 will be returned in the response-code.

The value of len must be either 0 or at least four times the number of records to be sorted.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the CONNECT statement (see the **previous discussion on this option** for more information).

PREFIX Option

If the option 'PREFIX = `prefix`' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SAVE Option

The SAVE option is used if the programmer needs to retain the entire ISN list. The saved ISN list is discarded when:

- a further Adabas Native SQL statement that creates another ISN list with the same name (same command ID) is executed, or
- an Adabas Native SQL CLOSE or DBCLOSE statement is executed, or
- the non-activity time limit or transaction time limit is exceeded. Under these circumstances, response code 9 is returned when the next Adabas command is attempted.

A CLOSE statement must be executed to release the ISN list after every statement that generates an ISN list (COMPARE, FIND, FIND COUPLED and SORT). If the CLOSE statement is not executed, large amounts of storage will be occupied for the remainder of the Adabas session.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

SUFFIX Option

If the option 'SUFFIX = *suffix*' is coded, the field names generated for the record buffer will include the specified suffix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name suffix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

ORDER BY Clause

$$\textbf{ORDER BY } \mathit{de}_{1..3} \left\{ \begin{array}{l} \underline{\textbf{DESC}}\textbf{ENDING} \\ \underline{\textbf{ASC}}\textbf{ENDING} \end{array} \right\}$$

The ORDER BY clause specifies the order in which the records are retrieved.

The ISN list may be sorted on up to three descriptors in ascending or descending sequence.

A descriptor used in an ORDER BY clause may not be a member of a periodic group, nor may it be a phonetic descriptor.

The keyword DESCENDING, which may be abbreviated to DESC, specifies descending sequence, otherwise ascending sequence is assumed. If more than one descriptor is specified, the ASCENDING/DESCENDING option applies collectively to all of them. It is not possible to specify ascending sequence for one descriptor and descending sequence for another.

If the ISN list is too big to be sorted, an error is reported with response-code=1. See also the LS (sort work space) parameter in the *Adabas Operations Manual*.

Note: Sorting large ISN lists may take a long time.

The TRACE Statement

```
EXEC ADABAS
         ⎧ ON  ⎫
   TRACE ⎨     ⎬
         ⎩ OFF ⎭
END-EXEC
```

This statement is used in conjunction with the global option **MODE TRACE**.

Provided 'MODE TRACE.' has been specified, the TRACE ON and TRACE OFF statements can be used within the application program to control trace output statically. Trace output will only be produced in those program sections where TRACE ON is in effect.

Tracing is also controlled dynamically by a variable with the name TRCE (Ada, COBOL, PL/I) or SQDE00 (FORTRAN) in sections where TRACE ON is in effect. The application program can disable tracing dynamically by setting the content of this variable to the value 'OFF', and can re-enable tracing by setting its content to any other value.

Three conditions must be satisfied for tracing to be active:

- the global option 'MODE TRACE.' must be set,
- the 'TRACE ON' statement must be issued, and
- the variable 'TRCE' or 'SQDE00' must not contain the value 'OFF'.

Note: tracing is switched off when the program is started. No trace output will be produced until a TRACE ON statement is executed.

The UPDATE Statement

```
EXEC ADABAS
    UPDATE file [alias]
  [ DECLARE cursor-name CURSOR ]
    WHERE { ISN= value                 }
          { CURRENT OF cursor-name1    }
  [ SET expression ,... ]

  [ OPTIONS                          ]
  [   [ CIPHER= value1 ]             ]
  [   [ COND-NAME= { Y } ]           ]
  [   [            { N } ]           ]
  [   [ INDEXED= { Y } ]             ]
  [   [          { N } ]             ]
  [   [ PASSWORD= value2 ]           ]
  [   [ PREFIX= prefix ]             ]
  [   [ STATIC= { Y } ]              ]
  [   [         { N } ]              ]
  [   [ STATUS ]                     ]
  [   [ SUFFIX= suffix ]             ]

END-EXEC
```

The UPDATE statement is used to update one or more fields of a record in the specified file. The record to be updated must be retrieved by the FIND statement or one of the READ statements before issuing the UPDATE statement. The record must be in hold status unless the program is running in EXU mode (see the CONNECT statement). A record can be 'held' either by specifying the HOLD option in the statement that reads it, or by issuing a separate HOLD statement.

When the logical transaction has been completed, a COMMIT WORK statement should be issued. One of the effects of this statement is to release records that are in hold status.

```
UPDATE file [alias]
```

`file` is the Adabas file name or view name as defined in the data dictionary. The `alias`, if present, is used as the name of the record buffer; otherwise, the name `file` is used. The alias, which should be unique, is required if two or more Adabas Native SQL statements within the module refer to the same file. It can be used as a qualifier in subsequent Ada, COBOL, FORTRAN or PL/I statements that refer to the fields in the record buffer.

This statement generates an Adabas A1 command.

DECLARE Clause

```
DECLARE cursor-name CURSOR
```

The cursor-name may be up to four characters long. A cursor-name should be specified if this Adabas Native SQL statement is executed repeatedly; Adabas can recognize the cursor-name, which is also used as the Adabas command-ID, and avoid re-translating the format buffer when the statement is executed subsequently.

WHERE Clause

$$\textbf{WHERE} \begin{Bmatrix} \textbf{ISN=}\ \textit{value} \\ \textbf{CURRENT OF}\ \textit{cursor-name1} \end{Bmatrix}$$

The WHERE clause is used to specify the ISN of the record to be updated.

To update a record having a specific ISN, the programmer should use the 'ISN = value' option. value may be a constant or the name of a variable containing the ISN. If value is a variable name, it must be immediately preceded by a colon (':'), for example ':NAME'. The colon must not be coded following the '=' sign if value is a numeric constant, for example 'WHERE ISN = 1234'. If the 'WHERE ISN = value' option is used, the SET clause must be coded.

To update a record using the ISN returned by a previous Adabas Native SQL statement, the programmer should use the 'CURRENT OF' option. `cursor-name1` is the cursor-name defined in that statement.

If the user uses the 'CURRENT OF `cursor-name1`' option in the WHERE clause and the DECLARE and SET clauses are omitted, Adabas Native SQL will use the Adabas variables generated for the statement identified by cursor-name1 and will not generate variables for this statement. In this case, modify the desired fields before issuing the UPDATE statement.

Example:

```
EXEC ADABAS
     FIND
     DECLARE PERS CURSOR
     SELECT SALARY
     FROM PERSONNEL
     WHERE PERSONNEL-NUMBER = 180001
     OPTIONS HOLD
END-EXEC
   .
   .
   .
SALARY = SALARY * 1.2
EXEC ADABAS
     UPDATE PERSONNEL
     WHERE CURRENT OF PERS
END-EXEC
```

SET Clause

```
SET expression ,...
```

The SET clause specifies the fields to be updated and, optionally, the values to be given to these fields. The expressions may be separated by blanks (spaces) or commas.

The SET clause must always be coded if the option 'WHERE ISN = value' is used.

If the SET clause is coded, it is recommended that the 'DECLARE `cursor-name` CURSOR' clause be used as well to enhance performance.

Coding the SET clause causes Adabas Native SQL to generate a record buffer for this statement. If the SET clause is not coded, the record buffer of the statement referenced by cursor-name1 will be used to update the database.

expression

$$\left\{\begin{array}{l} \textit{field-name} \\ \textit{field-name} = \left\{\begin{array}{l} \textit{constant} \\ \textit{var-name} \\ \textit{NULL} \end{array}\right\} \end{array}\right\}$$

field-name denotes the name of the field to be updated. This is the full field name as defined in the data dictionary. If necessary, the *field-name* can be subscripted to select the required field from a multiple-value field, from a periodic group, or from a multiple-value field within a periodic group.

The option 'SET *field-name*' is used when the required value has already been assigned to the field by means of normal Ada, COBOL, FORTRAN or PL/I statements.

Note: *field-name* can be a multiple-value or a part of a periodic group, but in this case an index must be specified within parentheses. For a multiple-value within a periodic group the user should move the value by himself before the INSERT/UPDATE statement.

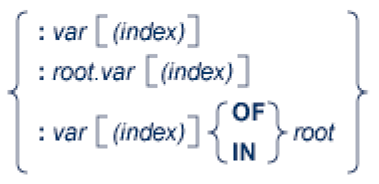
The option 'SET *field-name* = *constant*' or 'SET *field-name* = *var-name*' is used to specify the new value to be assigned to the field.

constant denotes a constant (literal) value and *var-name* denotes the name of a variable defined in the Ada, COBOL, FORTRAN or PL/I program, which must be preceded by a colon.

If NULL is specified, Adabas Native SQL will move -1 (x'FFFF') to the Null field indicator of the specified field in the Record buffer used for updating the file.

If the user uses the SET clause and specifies a real value or a variable for a field which has a Null value indicator, Adabas Native SQL will automatically reset the Null field indicator of that field. If the user does not specify the SET clause, but initiates the fields in the Record buffer by himself, he should also reset or turn on the Null field indicator.

var-name



If the variable name is unique within the program, it can be specified as :`var`. Otherwise, it should be made unique by preceding it by `roo`t, a higher-level data name (qualifier) in the data structure hierarchy. Both the COBOL-type construction (:`var` OF `root` or :`var` IN `root`) and the PL/I-type construction (:`root.var`) are valid in Ada, COBOL, FORTRAN and PL/I programs.

Both the 'SET `field-name`' option and the 'SET `field-name` = `data`' option can be used in the same SET clause.

The optional `index` may be an integer constant or the name of a variable preceded by a colon. Note that blanks (spaces) are not allowed between the :`var` and the parenthesis preceding the `index`.

Example 1: Ada

```
type REC_1 is
  record
     SALARY     : STRING (1..6);
     AGE        : STRING (1..2);
     PERSON_NAME: STRING (1..20);
  end record;
REC: REC_1;
   .
   .
   .
EXEC ADABAS
     FIND
     DECLARE PERS CURSOR
     FROM PERSONNEL PRSNNL
     WHERE PERSONNEL_NUMBER = "00180001"
     OPTIONS HOLD
END-EXEC
    .
    .
PERSONNEL.PHONE_NR = "00746127";
EXEC ADABAS
     UPDATE PERSONNEL
     WHERE CURRENT OF PERS
     SET NAME             = :REC.PERSON-NAME
         AGE              = :REC.AGE
         SALARY           = :REC.SALARY
         PHONE_NR
         ZIP              = "06100"
         STATE            = "BS"
END-EXEC
```

Example 2: COBOL

```
01 REC
   02 SALARY ......
   02 AGE ......
   02 PERSON-NAME ......
      .
      .
EXEC ADABAS
     FIND
     DECLARE PERS CURSOR
     FROM PERSONNEL PRSNNL
     WHERE PERSONNEL-NUMBER = 180001
     OPTIONS HOLD
END-EXEC
      .
      .
MOVE 746127 to PHONE-NR OF PERSONNEL
EXEC ADABAS
     UPDATE PERSONNEL
     WHERE CURRENT OF PERS
     SET NAME   = :PERSON-NAME
         AGE    = :AGE OF REC
         SALARY = :REC.SALARY
         PHONE-NR
         ZIP    = 35
         STATE  = 'BS'
END-EXEC
```

Example 3: FORTRAN

```
CHARACTER*    20 VARNAM
CHARACTER*     2 VARAGE
CHARACTER*     6 VARSAL
.......
CHARACTER*    20 NAME
CHARACTER*     2 AGE
CHARACTER*     6 SALARY
CHARACTER*     8 PHONE
CHARACTER*     5 ZIP
CHARACTER*     2 STATE
CHARACTER*    43 PERNEL

EXEC ADABAS
    DECLARE PERS CURSOR
    FROM PERSONNEL
    WHERE PERSONNEL-NUMBER = '00180001'
    OPTIONS HOLD PREFIX=A
END-EXEC

PNONE = '00746127'

EXEC ADABAS
    UPDATE PERSONNEL
    WHERE  CURRENT OF PERS
    SET NAME     =   :VARNAM
        AGE      =   :VARAGE
        SALARY   =   :VARSAL
        PHONE
        ZIP      = '35'
        STATE    = 'BS'
END-EXEC
```

Note: Synonyms are assumed to be defined in the data dictionary as shown in Appendix B, and truncation is assumed to occur in the middle of the word. (The maximum length of names is operating-system dependent.)

Note: The field PERNEL encompasses all other fields and is the equivalent of the record buffer in Ada, COBOL and PL/I.

Example 4: PL/I

```
DCL 01 REC,
      02 SALARY ......,
      02 AGE ......,
      02 PERSON_NAME ......;
     .
     .
EXEC ADABAS
     FIND
     DECLARE PERS CURSOR
     FROM PERSONNEL PRSNNL
     WHERE PERSONNEL-NUMBER = 180001
     OPTIONS HOLD
END-EXEC
    .
    .
PERSONNEL.PHONE_NR = 746127;
EXEC ADABAS
     UPDATE PERSONNEL
     WHERE CURRENT OF PERS
     SET NAME             = :PERSON-NAME
         AGE              = :AGE OF REC
         SALARY           = :REC.SALARY
         PHONE-NR
         ZIP              = 6100
         STATE            = 'BS'
END-EXEC
```

OPTIONS Clause

```
OPTIONS
  [ CIPHER= value1 ]
  [ COND-NAME= { Y | N } ]
  [ INDEXED= { Y | N } ]
  [ PASSWORD= value2 ]
  [ PREFIX= prefix ]
  [ STATIC= { Y | N } ]
  [ STATUS ]
  [ SUFFIX= suffix ]
```

CIPHER Option

The cipher key must be specified when accessing a ciphered file. See the **previous discussion on this option** for more information.

COND-NAME Option

This option applies only to COBOL programs.

If the option 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as level-88 entries.

If specified here, any value specified with the global parameter **OPTIONS** will be overridden.

`With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

INDEXED Option

This option applies only to COBOL programs.

If the INDEXED option is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

Any specification here will override any setting of the global parameter **OPTIONS**.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

PASSWORD Option

The password must be specified in each Adabas Native SQL statement that accesses a password-protected file or a file that is protected by security by value, unless it is specified globally in the CONNECT statement. See the **previous discussion on this option** for more information.

PREFIX Option

If the option 'PREFIX = *`prefix`*' is coded, the field names generated for the record buffer will include the specified prefix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

STATIC Option

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded here, all buffers generated by Adabas Native SQL will be defined as static. This will override any setting of the global parameter **OPTIONS**.

`Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

STATUS Option (available with Adabas Version 4 only)

The STATUS option invokes the Status Protection option of Adabas. This causes the data protection information for the statement to be physically written to the Data Protection Log at the time the statement is processed.

Note: Use of the STATUS option is not recommended. See section *Status Protection Option* in chapter *Concepts and Facilities* of the *Adabas Command Reference Manual* for more information.

SUFFIX Option

If the option 'SUFFIX = `suffix`' is coded, the field names generated for the record buffer will include the specified suffix. Any value here will override values specified with the global parameter **OPTIONS** or taken from Predict.

`Field name suffix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this option** for more information.

The WHENEVER Statement

```
EXEC ADABAS
                                    ⎧ CONTINUE         ⎫
     WHENEVER ⎧ NOT FOUND ⎫         ⎨ GO TO    label   ⎬
              ⎩ SQLERROR  ⎭         ⎩ GOTO     label   ⎭
END-EXEC
```

The WHENEVER statement is used to control the error handling of the program. It affects the code generated by the Adabas Native SQL preprocessor for handling exception conditions.

The 'WHENEVER NOT FOUND GOTO `label`' statement specifies a label to which the program should jump if the 'no records found' condition occurs as a result of the execution of a COMPARE, FIND, FIND COUPLED or SORT statement.

The 'WHENEVER SQLERROR GOTO `label`' statement specifies a label to which the program should jump if an error response code (response code neither = 0 nor = 3) occurs as a result of the execution of an Adabas Native SQL statement.

The 'WHENEVER ... CONTINUE' statement causes the Adabas Native SQL preprocessor to stop generating test-&-branch code after each ADABAS Native SQL statement.

If a 'WHENEVER SQLERROR ...' statement is coded, it deactivates the error handling routine of the standard abort module. You should normally use the SQLERROR together with ABORT.

The variables ISN, QUANTITY and RESPONSE_CODE (Ada, COBOL and PL/I unless the global parameter 'ABORT .' is coded) or SQLISN, SQLQTY and SQLRSP (Ada, COBOL and PL/I if the global parameter 'ABORT .' is coded; also FORTRAN) contain the values from the most recent ADABAS Native SQL statement. These can be used for error analysis.

See sections ***Additional Fields in the Record Buffers*** and ***Response Code Interpretation*** for more information.

See also description of the **ABORT** parameter for more information on error processing.

The WRITE TO LOG Statement

```
EXEC ADABAS
    WRITE TO LOG
        USERDATA= var
END-EXEC
```

This statement is used to write user data to the Adabas data protection log. This data may be read and displayed with the ADASEL utility program. See the *Adabas Utilities Manual* for more information.

USERDATA Clause

```
USERDATA= var
```

The data to be written must be stored in the variable denoted by var. The variable name must be immediately preceded by a colon (':'), for example 'USERDATA = :NAME'. The length of the user data, that is, the number of characters to be written, must not exceed the limit specified in the USERDATA clause of the global parameter. **OPTIONS**.

7 USING ADABAS NATIVE SQL STATEMENTS IN TP PROGRAMS

This chapter describes the procedures that must be observed when writing teleprocessing application programs under COM-PLETE, CICS or UTM that issue Adabas Native SQL statements.

No special precautions need to be taken when writing programs that are to run under BS2000/RTIO, z/VM, TSO or equivalent compatible systems. Programs should be coded in exactly the same way as batch programs.

See also the *Adabas Programmer's Guide* for Teleprocessing Applications.

This chapter covers the following topics:

COM-PLETE

TP application programs that are to run under the control of Software AG's COM-PLETE TP monitor should be coded in exactly the same way as batch programs.

The COM-PLETE utility program USCHC can be used to set the default hard-copy device to 0, so that output produced by DISPLAY statements will be sent to the user's terminal.

Customer Information Control System (CICS)

The CICS Transaction Work Area (TWA) provides a standardized interface for passing parameters to the program. The first six words of the TWA are used by Adabas Native SQL for communication with CICS. Alternatively, the user may choose to use the COMMAREA. Refer to the global parameter **MONITOR**.

The CICS command level interface for Ada, COBOL, FORTRAN and PL/I ensures that programs written in these languages will be quasi-reentrant.

Programs can be written in CICS pseudo-conversational mode with the aid of the SAVE and RESTORE statements. Programs that use this facility must not use the ISNSIZE option.

Adabas Native SQL provides an easy way of defining parameters for generating the CICS code. For further information, see the global parameter **MONITOR**.

See also the global parameter **CICS STUB**.

Passing Parameters to Adabas

The addresses of the Adabas control block, format buffer, record buffer, search buffer, value buffer and ISN buffer are passed in the same manner for all releases of CICS. These addresses must be placed in the first six words of the TWA. Software AG provides an Assembler subroutine, ADASTWA, which places the parameter address in the TWA. The Adabas/CICS interface routine, ADALNC, retrieves these addresses from the TWA. This module must be used instead of the standard Adabas interface routine, ADALNK. The Ada, COBOL, FORTRAN or PL/I program should call ADASTWA with the TWA as the first parameter; the next six parameters are the customary parameters as used with Adabas direct calls.

Compiling and Executing Adabas Native SQL/CICS Programs

CICS applications programs that use Adabas Native SQL statements must be processed in the following order:

1. Run the program through the Adabas Native SQL preprocessor;
2. Run the program through the CICS preprocessor;
3. Compile the program in the normal manner;
4. Link-edit the program. An INCLUDE statement must be coded to force the inclusion of the subroutine ADASTWA (Ada, COBOL and PL/I) or ADATWA (FORTRAN);
5. Execute the program.

COBOL TP Programs Using Adabas Native SQL and CICS (Command Level)

The following global option parameters must be specified when preprocessing COBOL programs:

```
ADACALL ADASTWA USING TWA.
TELE "EXEC CICS LINK PROGRAM ('ADABAS') END-EXEC".
ABORT RESPCICS CICS.
```

The ADACALL parameter causes each 'CALL ADABAS' statement to be replaced by a 'CALL ADASTWA' statement. The TELE parameter causes the CICS command level instruction to be inserted after every Adabas command. The ABORT parameter causes the call to the response code analysis module 'RESPCICS' to be called in a "CICS" way.

Alternatively 'MONITOR CICS.' may be used.

Also, the TWA must be declared in the linkage section of the program and the address of the TWA must be made available.

FORTRAN Programs Using Adabas Native SQL and CICS (Command Level)

The code for FORTRAN programs is identical to that for COBOL; however ADASTWA (supplied in the Adabas source library) must be changed to ADATWA.

PL/I TP Programs Using Adabas Native SQL and CICS (Command Level)

The following global option parameters must be specified when preprocessing PL/I programs:

```
ADACALL ADASTWA USING TWA.
TELE "EXEC CICS LINK PROGRAM ('ADABAS');".
ABORT RESPCICS CICS.
```

The ADACALL parameter causes each 'CALL Adabas' statement to be replaced by a 'CALL ADASTWA' statement. The TELE parameter causes the CICS command level instruction to be inserted after every Adabas command. The ABORT parameter causes the call to the response code analysis module 'RESPCICS' to be called in a "CICS" way.

Alternatively, 'MONITOR CICS.' may be used.

Also, the TWA must be declared and its address must be made available.

If you implement a multiple-step transaction under UTM, the contents of the control block are lost. You should therefore use the SAVE and RESTORE statements before and after every screen-IO. Also, Adabas must be running in get-next mode, this means specify no ISNSIZE.

8 GLOBAL PARAMETERS

Adabas Native SQL provides a range of global parameters that can be used to define processing options and adapt them to your particular requirements. The options are specified in a parameter file, which is typically included in the job control stream and read by an '//ADAGLOB DD *' JCL card or equivalent.

This chapter lists the global parameters and describes their syntax and their effect.

Note that each of these parameters is terminated by a period ('.').

Global parameters can now contain comment lines. Comment lines are signified by two asterisks ('**') starting in column 1.

This chapter covers the following topics:

The ABORT Parameter

```
ABORT [ module-name ]
      [ IDENT ]
      [ PLI ]
      [ CICS ]
      [ FILE= file-number ]
      [ DBID= database-number ] .
```

The ABORT parameter is used to modify Adabas Native SQL's action when an Adabas command returns a response code other than 0 or 3.

See also ***Response Code Interpretation*** and the *Adabas Messages and Codes Manual*.

In the absence of an ABORT parameter, the abort module RESPINT (Ada, COBOL or PL/I) or RESPF (FORTRAN) is called. This module interprets the response code and prints the appropriate text from the ABEND error message file, the content of the CONTROL-BLOCK and the line sequence number of the erroneous source statement in the SYSOUT file, calls the appropriate trace module, issues an Adabas BT command, and closes the database. Finally, it ABENDs the run.

In particular, the following fields are passed to the error-handling routine:

```
CONTROL-BLOCK
DDFILE
CSEQ
FORMAT-BUF
RECORD-BUF
SEARCH-BUF
VALUE-BUF
CLN1
CLN2
TRCE
CLNNUM
DDDBID
```

CLN1 and CLN2 are arrays that contain the Adabas Native SQL statement. CLN1 contains characters 1..40 of each statement and CLN2 contains characters 41..80. CLNNUM is a variable that indicates the number of elements used in each of these two arrays.

If you want to trap certain error conditions and handle them differently, you must write your own error handling routine. Adabas Native SQL will generate calls to that module instead of to RESPINT if an ABORT parameter with the appropriate module-name is executed. The fields listed above are passed to the module.

If 'ABORT FILE=0.' is coded, Adabas Native SQL does not generate an OPEN for the Natural system.

If ABORT is coded with no module-name, i.e., 'ABORT .', Adabas Native SQL will not check the response code after executing Adabas commands and no exception handling routine will be called. You must write inline code following each Adabas Native SQL statement to handle exception conditions, or use the WHENEVER statement. In addition, if ABORT is coded with no module-name, Adabas Native SQL generates three global fields with the names SQLISN, SQLQTY and SQLRSP instead of generating the three fields ISN, QUANTITY and RESPONSE_CODE for each record buffer.

See also *Additional Fields in the Record Buffers (Ada, COBOL, PL/I)*. (In FORTRAN programs, since there are no record buffers, Adabas Native SQL always generates the above-mentioned three global fields.)

IDENT Clause

If the ABORT parameter is used with the IDENT keyword, Adabas Native SQL generates a statement of the form:

```
CALL identifier ...
```

where the variable identified by the identifier contains the name of the error-handling routine. Otherwise, a statement of the form:

```
CALL 'module-name' ...
```

is generated, where the name of the error-handling routine appears as a literal constant in the CALL statement.

The first form is used for dynamic calls, the second for static calls.

This option is only available in COBOL programs, and it is not supported by all COBOL compilers.

PLI Clause

If the user-written module is in PL/I, the keyword 'PLI' must be coded.

CICS Clause

This clause specifies that the calling mechanism to the response code analysis routine should be generated for CICS. Hence Adabas Native SQL will generate the following:

```
CALL 'ADASTWA' USING ADASQL-LINK-ADDRESSES CONTROL-BLOCKxxxx
DDFILE CSEQ FORMAT-BUFxxxx RECORD-BUFxxxx SEARCH-BUFxxxx VALUE-BUFxxxx
CLN1 CLN2 TRCE CLNNUM DDDBID
CALL 'ADASTWA' USING TWA ADASQL-LINK-ADDRESSES
EXEC CICS LINK PROGRAM ('RESPCICS') END-EXEC
```

Note: The definition of ADASQL-LINK-ADDRESSES is generated by Adabas Native SQL, and the user should define the TWA as a 24-byte string.

FILE Clause

If the error texts reside in a file other than the standard Natural system file (FNAT), the FILE clause should be used to specify the file number. This number will be passed to the response code interpretation routine as the second parameter, DDFILE. If FILE=0 is coded, no OPEN command will be issued.

The error texts are commonly stored in the Natural system file (parameter FNAT in the SYSFILE statement).

DBID Clause

This clause may be used to specify a database where the FNAT exists in another environment. RESPINT now accepts another parameter DDDBID which has the database number of the FNAT or zero (if the DBID clause is not specified).

The ADACALL Parameter

```
ADACALL module-name [IDENT] [USING id1] [LAST id2] .
```

The ADACALL parameter is used to instruct Adabas Native SQL to generate non-standard Adabas calls. Instead of the standard call:

```
CALL 'ADABAS' USING CONTROL-BLOCK... etc.
```

Adabas Native SQL will generate a call as follows:

```
CALL 'module-name' USING id1... CONTROL-BLOCK... etc.
```

The subroutine name 'ADABAS' is replaced by the specified module name in each executable command generated by Adabas Native SQL.

This parameter is used mainly in teleprocessing (TP) applications programs, where the user must call the ADASTWA module. The first parameter of the 'CALL' statement is the terminal work area (TWA); this is followed by the Adabas buffers.

A TP program should therefore specify the following ADACALL parameter:

```
ADACALL ADASTWA USING TWA.
```

This will cause Adabas Native SQL to generate the following call instead of 'CALL 'ADABAS'':

```
CALL 'ADASTWA' USING TWA CONTROL-BLOCK... etc.
```

The ADACALL parameter may also be useful in installations that maintain an I/O interface between the application and Adabas. The ADACALL parameter can be used to direct the calls to the I/O interface, instead of to Adabas.

In CICS environments, the ADALNK module must be replaced by the ADALNC module, which fetches the Adabas parameters (control block, record buffer, etc.) from the TWA.

See also the description of the 'MONITOR' and 'TELE' parameters.

CICS users should also refer to *Using Adabas Native SQL Statements in TP Programs*.

IDENT Clause

If the ADACALL parameter is used with the IDENT keyword, Adabas Native SQL generates a statement of the form:

```
CALL identifier ...
```

where the variable identified by the identifier contains the name of the Adabas link routine. Otherwise, a statement of the form:

```
CALL 'module-name' ...
```

is generated, where the name of the Adabas link routine appears as a literal constant in the CALL statement. The first form can be desirable in certain circumstances. This option is only available in COBOL programs, and it is not supported by all COBOL compilers.

LAST Clause

The LAST clause is used to specify the seventh parameter generated for the Adabas call. id2 is a structure generated by Adabas Native SQL. It can be modified by the user as desired.

The seventh parameter is only an option of Adabas. It contains information that can be evaluated by an Adabas user exit. Adabas Review uses the seventh parameter to receive information on the program name and library name. Adabas Native SQL put the value of the program name within the structure. The user should plug in the library name, using a simple MOVE statement into the L-variable field. The last clause also causes Adabas Native SQL to generate code that may enable Review to identify the use of the seventh parameter.

The LAST clause of the ADACALL parameter generates a structure with the following names (not applicable to VMS or UNIX):

```
01 Variable
        02      FILLER PIC x(276).
        02      PR-variable PIC x(8)VALUE
                'program'.
        02      L-variable PIC x(8) VALUE
                'library'.
        02      RE-variable PIC x(76).
```

The APOS Parameter

```
APOS NO .
```

If the APOS parameter is set to 'NO', character strings generated by Adabas Native SQL will be enclosed in double quotes ("). If the APOS parameter is not coded, character strings will be enclosed in single quotes, sometimes known as apostrophes (').

The CICS STUB Parameter

```
CICS STUB .
```

This global parameter is used to improve performance of interpartition commands when using CICS.

In this case, the call is made to the modulle "Adabas", supplying as the first parameter the stub pointer. Adabas Native SQL generates the definition of the stub pointer, and the user should supply the name by using the ADACALL parameter:

```
ADACALL ADABAS USING pointer
```

With the CICS stub, the user should also use the ABORT CICS parameter if the response code analysis routine should be invoked for CICS.

Note: The user should define the TWA for this purpose.

The LANG Parameter

```
        ⎧ ADA         ⎫
        ⎪ COBOL       ⎪
        ⎪ COBOL/II    ⎪
LANG    ⎨ COBOL/LE    ⎬     .
        ⎪ FORTRAN     ⎪
        ⎪ FORTRAN/VMS ⎪
        ⎩ PLI         ⎭
```

Adabas Native SQL generates declarations and code in the language specified by this parameter. The code generated with the setting 'COBOL' is also compatible with the COBOL/II compiler, but the code generated with the 'COBOL/II' setting makes use of the structured 'END-IF', 'END-PERFORM', etc., clauses.

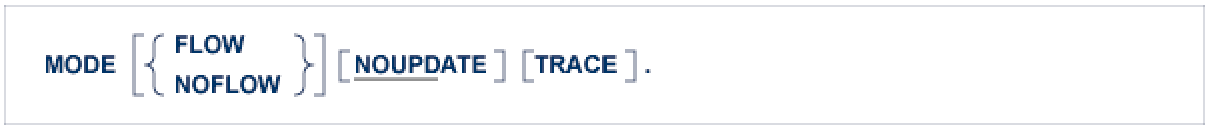
If this parameter is omitted, Adabas Native SQL attempts to determine the language in which the program is written by examining its first line. However, this technique is not completely reliable, so we strongly recommend you include this parameter in every Adabas Native SQL run.

The LIBRARY Parameter

```
LIBRARY   module-name   .
```

This new parameter is used to support a library concept for 3GL applications. name represents a logical library name (max. 8 characters). If the library is not defined in Predict, an error message is displayed.

The MODE Parameter



This parameter controls debugging facilities that are built in to Adabas Native SQL.

MODE FLOW

If the parameter 'MODE FLOW' is specified, all Adabas Native SQL statements will be printed out at runtime as they are executed.

MODE NOFLOW

If the parameter 'MODE NOFLOW' is specified, the code that copies Adabas Native SQL source statements into a buffer is not generated. This reduces the size of the generated Ada, COBOL, FORTRAN or PL/I code, but the FLOW and TRACE facilities are not available and Adabas Native SQL cannot print out the source statement if a runtime error is detected. This could make debugging more difficult.

MODE NOUPDATE

If MODE NOUPDATE is coded, statements that would modify the database (DELETE, INSERT, UPDATE) have no effect.

MODE TRACE

This parameter must be coded if diagnostic output is required. Conversely, when a program has been debugged and diagnostic output is no longer required, you can delete this parameter and recompile the program. The resulting object module will be smaller and will run faster.

Diagnostic output is controlled by the following:

- the global parameter 'MODE TRACE.'
- the Adabas Native SQL statements 'TRACE ON' and 'TRACE OFF', and
- the value contained in the variable TRCE (Ada, COBOL, PL/I) or SQDE00 (FORTRAN).

The action of the global parameter 'MODE TRACE' is described above.

When processing an Ada, COBOL, FORTRAN or PL/I program, and assuming that the global parameter 'MODE TRACE' has been coded, Adabas Native SQL only generates the code for producing diagnostic output when it encounters a 'TRACE ON' statement, it stops generating this code when it encounters a 'TRACE OFF' statement. These two statements provide static control of the diagnostic output, that is, they control the section or sections of the program in which diagnostic code is generated.

When an Adabas Native SQL statement is executed, the first action of the diagnostic code is to test the value contained in the variable TRCE (Ada, COBOL, PL/I) or SQDE00 (FORTRAN). If this value is 'OFF', then no further action is performed. Otherwise, the statement is printed out together with the contents of the buffers. This variable provides dynamic control of the diagnostic output. By assigning values to this variable at runtime, you have greater control over the diagnostic output. For example, you could limit output to the first five executions of a loop that may be executed several hundred times.

The MONITOR Parameter

MONITOR CICS [*twa*] [**COMMAREA** *commarea-name* **POINTERS** *addr-name*] .

This parameter makes it unnecessary to code the ADACALL and TELE global parameters.

If the optional `twa` clause is coded, this name is used instead of the default name 'TWA'.

For COBOL programs, coding 'MONITOR CICS.' is equivalent to coding the following three global parameters:

```
ADACALL ADASTWA USING TWA.
TELE "EXEC CICS LINK PROGRAM ('ADABAS') END-EXEC".
ABORT RESPCICS CICS
```

The MONITOR CICS parameter is not valid in FORTRAN programs.

For PL/I programs, coding 'MONITOR CICS.' is equivalent to coding the following three global parameters:

```
ADACALL ADASTWA USING TWA.
TELE "EXEC CICS LINK PROGRAM ('ADABAS') ;".
ABORT RESPCICS CICS
```

These defaults may be overridden by coding one or both of the ADACALL or TELE parameters.

Prior to all calls created by the ADACALL parameter, the following code will be generated for COBOL if 'MONITOR CICS.' has been coded:

```
MOVE xxxxxxxxxx to ADASQL-SAVE-TWA
```

The corresponding code for PL/I programs is:

```
ADASQL_SAVE_TWA = xxxxxxxxxx

            ↩
```

xxxxxxxxxx is the field name supplied after USING in the global parameter ADACALL. (TWA is the default ADACALL used.)

After each TELE line is generated, the following COBOL code is inserted if 'MONITOR CICS.' has been coded:

```
MOVE ADASQL-SAVE-TWA TO xxxxxxxxxx
```

The code for PL/I programs is:

```
               xxxxxxxxxx = ADASQL_SAVE_TWA
```

If you are using more than 28 bytes in the TWA, code the following:

```
01 TWA.
             02 ADABAS-TWA         PIC X(28)
             02 REST-OF-TWA        PIC X(nnnn).
```

Then code the following ADACALL parameter for COBOL:

```
ADACALL ADASTWA USING ADABAS-TWA
```

We recommend defining the layout of the TWA in COBOL copy books which can be accessed by all Adabas Native SQL programs.

The code for PL/I is:

```
DCL 01 TWA,
          02 ADABAS_TWA        CHAR(28)
          02 REST_OF_TWA       CHAR(nnnnn);
```

This parameter also controls the generation of EXEC CICS LINK to RESPCICS and PRTRCICS instead of RESPINT and PRTRACE.

The COMMAREA parameter is for using the COMMAREA instead of the TWA.

The user then will have to define a structure for the Commarea usage as follows:

```
01 COMMAREA-NAME.
02 FILLER PIC X(8) VALUE 'ADABAS52'.
02 ADDR-NAME.
03 FILLER PIC X(4) OCCURS 6.
```

Adabas Native SQL will then generate

- a call to ADASTWA with addr-name to move the addresses of the Adabas buffers into it;

- and then an EXEC CICS command with COMMAREA(*commarea-name*) instead of TWA.

The constant "ADABAS52" is the indicator for the Adabas CICS interface to detect the COMMAREA parameter list. For the syntax of the Adabas parameter list, see also the Adabas CICS command level interface description for CICS Version 3.2 and higher.

Note: The RESPCICS and PRTRCICS will continue to use the TWA.

The NAME Parameter

```
NAME   program-name   .
```

The program-name specified in the 'NAME' parameter is used by Adabas Native SQL in conjunction with the programming language (Ada, COBOL, FORTRAN or PL/I) when Adabas Native SQL writes Xref data to the data dictionary. The `program-name` is referred to in Predict as *Member*.

Adabas Native SQL provides cross-reference reports of programs, modules and fields using the Xref facilities of Predict. This information is automatically created during the preprocessor pass. The names of the files and fields that are used are taken from the FROM, SELECT, WHERE, SET, etc., clauses of the Adabas Native SQL statements; the name of the program that uses them is taken from the 'NAME' parameter.

If the NAME parameter is omitted, Adabas Native SQL takes the program name from the following sources:

Language	Program name taken from
ADA	the procedure
COBOL	PROGRAM-ID paragraph in the environment division
FORTRAN	the first line of the program, which must be PROGRAM `progname`
PL/I	the label preceding 'PROC OPTIONS(MAIN)'

The NETWORK Parameter

```
NETWORK   network-name   .
```

This global parameter defines the network in which the program is to run. `network-name` must be defined in Predict, and must be linked to the virtual machine specified with the parameter **VIR-TUAL-MACHINE**.

This parameter is mandatory, if one or more networks other than HOME are defined in Predict.

A network contains all virtual machines and databases that are to be accessed. In fact, all databases that are used in the program should belong to the network specified here.

For every database used (DBID, AUTODBID, AUTODBID-ATM or AUTODBID-ALL clauses), Adabas Native SQL checks that if the database is defined as local it belongs to the current virtual machine, and if the database is isolated that it belongs to the current network.

The OPTIONS Parameter

```
OPTIONS
  [ ADA-VERSION= { 62 | 71 } ]
  [ { AUTODBID                } ]
  [ { AUTODBID-ATM            } ]
  [ { AUTODBID-ALL            } ]
  [ { DBID= database-name     } ]
  [ BINARY ]
  [ COND-NAME= { Y | N } ]
  [ DYNAMCID ]
  [ GFORMAT ]
  [ INDEXED= {Y | N } ]
  [ INIT-LOW-VALUE ]
  [ ISNSIZE= len1 ]
  [ LONG-COUNTER ]
  [ LARGE-NUMBERS ]
  [ NEW-CONTROL-BLOCK ]
  [          { Y } ]
  [ NONDE=   { N } ]
  [          { D } ]
  [ OLDCOND-NAME ]
  [ OPEN ]
  [ PREFIX= prefix ]
  [ SOFT= { Y | N } ]
  [ STATIC= { Y | N } ]
  [ SUFFIX= suffix ]
  [               { L } ]
  [ TRUNCATION=   { M } ]
  [               { R } ]
  [ USERDATA= len2 ]
  [               { *           } ]
  [ VALIDATION=   { ' character ' } ]  .
  [               { "           } ]
  [ VISTA ]
```

The OPTIONS parameter enables the user to specify various processing options that will take effect for the whole of the program unless they are overridden by declarations made at the individual statement level.

The OPTIONS parameter should not be confused with the OPTIONS clause of individual Adabas Native SQL statements.

ADA-VERSION Clause

The ADA-VERSION clause indicstes to Adabas Native SQL in which Adabas version the precompiled program is to be executed. The default is 62, and this will generate code that can be executed in all Adabas versions. The value 71 will enable using new features introduced in Adabas Version 7.1 in the READ LOGICAL and HISTOGRAM statements.

Note: A precompiled program with ADA-VERSION=71 may fail or give unpredicted results if executed in an Adabas version lower than 7.1.

AUTODBID Clause

The AUTODBID option causes every access statement to use the database identified in Predict for that file. If the file is linked to a database and no specific DBID is specified in the statement, an error message is given.

AUTODBID-ALL Clause

The AUTODBID-ALL option causes all statements (both access and update) to use the database identified in Predict for that file. If the file is linked to a database and no specific DBID is specified in the statement, an error message is issued.

If AUTODBID-ALL is specified, neither the DBID nor the AUTODBID clause may be used.

The following rules apply to the various statements when using the AUTODBID-ALL clause:

Statement	Remarks
All statements	One file must be documented in exactly one database. If separate test and production environments are used, separate dictionary files (FDIC) are necessary. No source changes are necessary if only a recompile with the production dictionary is required.
CONNECT, DBCLOSE	These statements are mandatory and must be used within one program. The files specified in the UPDATE clause define the database to be updated. All update files must be within one database otherwise an error message is displayed. If more

Statement	Remarks
	than one database is accessed, several OPEN commands must be generated, but only one OPEN command is generated for update. To generate a CLOSE command to the same databases which are opened using CONNECT, the DBCLOSE must occur within the same program, otherwise an error message is given.
COMMIT	The COMMIT statement is always sent to exactly one database. This database is identified by the CONNECT statement (updatefiles => database) or by the UPDATE statements available in the program. An UPDATE or CONNECT statement must be coded, otherwise an error message is given.
UPDATE, DELETE, INSERT	If the program does not contain a CONNECT statement, a warning is issued that CONNECT must be executed before the updates are performed, otherwise consistency cannot be guaranteed. Adabas Native SQL must be able to check that within one program updates are performed only on files that belong to the same database. The update of only one database is supported.

AUTODBID–ATM Clause

The AUTODBID–ATM option causes all statements (both accesss and update) to use the database identified in Predict for that file. If the file is linked to more than one database and no specific DBID is specified in the statement, an error message is issued.

If AUTODBID–ATM is specified, neither the AUTODBID-ALL nor the AUTODBID clause may be used.

With this option we do not restrict the number of updated databases (unlike the AUTODBID-ALL parameter) and the user does not have to specify any DBID in any of the statements.

Note: Please note that if such a program will be run without the supervision of the Adabas Transaction Manager, we cannot guaranty the data integrity and this will be the user's responsibility to ensure the use of the Adabas Transaction Manager.

The Commit statement will be generated with the default DBID and the Adabas Transaction Manager will take care of the two phase commit.

If within this program the user would like to use the CONNECT statement, then he should specify in this statement the DBID to which this CONNECT should run. The same would apply to the DBCLOSE statement.

BINARY Clause

This clause applies to COBOL programs only.

It will cause all binary fields to be generated as BINARY instead of COMP.

COND-NAME Clause

This clause applies to COBOL programs only.

If the clause 'COND-NAME = Y' is coded, the record buffer generated by Adabas Native SQL includes the condition names defined in Predict as level-88 entries.

This global value will be overridden by any value specified in a clause of an individual Adabas Native SQL statement.

The field `With Cond. names` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See also *Generate COBOL Copy Code* in the *Predict Administration Manual*.

DBID Clause

This clause should be used if the program accesses more than one database. The database-name must be defined in the data dictionary, and the data dictionary description of the database must include the file or files to be accessed. All statements including UPDATE, DELETE and STORE are affected by this clause.

DYNAMCID Clause

If the DYNAMCID keyword is coded, Adabas Native SQL generates the command IDs of the Adabas control blocks dynamically during program execution.

The automatic Adabas routine for generating the command ID is used. Using DYNAMCID increases performance significantly.

If this clause is not specified, the command ID used for each Adabas command is generated from the cursor-name of the corresponding Adabas Native SQL statement. If the DYNAMCID keyword is not coded in the global OPTIONS parameter and a cursor-name is not defined for a particular Adabas Native SQL statement, because the DECLARE option was not used, Adabas Native SQL will generate command IDs in the form -m-n, where mn is a sequence number starting from 01. The first statement without a DECLARE clause will have command ID -0-1, the second statement will have -0-2, etc.

The command ID is used by Adabas for the following purposes:

- As an identifier for the internal, decoded version of the format buffer. Efficiency is improved if Adabas statements that use the same format buffer use the same command ID, otherwise Adabas is compelled to re-interpret the format buffer each time.
- When executing HISTOGRAM, READ LOGICAL and READ PHYSICAL SEQUENCE statements. If the command ID is not given when the statement is executed, Adabas 'loses its place' in the file and gives inconsistent results.
- To identify ISN lists. The command ID links the Adabas command (COMPARE, FIND, FIND COUPLED, or SORT) that creates the ISN list with subsequent commands that retrieve the records whose ISNs are stored in the list.

If several programs that use Adabas Native SQL statements are linked together, all command IDs must be unique. This can be achieved explicitly, that is, by coding a unique cursor-name for each statement, or by allowing Adabas Native SQL to allocate the command IDs dynamically by means of the DYNAMCID global option. Coding unique cursor-names has the advantage that the Adabas command log is easier to interpret.

See section *Command ID Usage* in the *Adabas Command Reference Manual* for more information.

GFORMAT Clause

This clause indicates that a global format is to be generated for this program. Adabas Native SQL generates a unique global format ID for every declaration generated (with the exception of variable index used for periodic groups or multiple-value fields). The global format ID is unique and will not exist in other programs. This clause can help to improve application performance, particularly in on-line environments, by reducing the number of format buffer translations that Adabas has to perform.

If this option is used, the global format ID is generated from the following information:

```
GFID = abcdeeef
```

Where for FDIC file number and DBID < 255,

a = x'C0'
b = x'83'
c = FDIC DBID
d = FDIC FNR
eee = Adabas Native SQL sequence number from Predict defaults
f = An internal sequence number within the program

Where for FDIC file number or DBID > 255

a = x'C1'
b = Possible value x'00' to x'FF'
c = Right byte of FDIC DBID
d = Right byte of FDIC FNR
eee = Adabas Native SQL sequence number from Predict defaults
f = An internal sequence number within the program

The GFORMAT clause is not available in Ada programs.

INDEXED Clause

This clause applies to COBOL programs only.

If the INDEXED clause is specified, all multiple-value fields and periodic groups are generated with the 'INDEXED BY' keywords. The name of the index is taken from Predict. If no index name is defined in the data dictionary, the name of the multiple-value field or periodic group is used, prefixed with 'I-'.

This global value will be overridden by any value specified in a clause of an individual Adabas Native SQL statement.

`Indexed by` in the Predict Modify COBOL Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this clause** and section *Generate COBOL Copy Code* in the *Predict Administration Manual* for more information.

INIT-LOW-VALUE Clause

By default, Adabas Native SQL is generating the Value buffer fields with an initial value of blanks for alphanumeric fields and zeroes for numeric fields. In this way a Read logical command without a WHERE clause will start the sequential read from those starting values.

With this option the generated alphanumeric fields in the Value buffer will have an initial value of X’00’ which has a collating sequence lower than blanks. In this way if the descriptor which we use for the Read logical has values lower than blanks and we don’t specify the WHERE clause we will start the sequential read from the lowest value available for this field.

Please note that this feature is available for Cobol and PL/1 languages only.

ISNSIZE Clause

If the ISNSIZE clause is specified, the default size of the ISN buffer is defined and all Adabas Native SQL statements run in 'ISN buffer' mode; however, the buffer size can be modified for individual retrieval statements by local ISNSIZE specifications.

If a global ISNSIZE value is not specified, ISN buffers are allocated for individual statements as determined by the presence or absence of the ISNSIZE parameter in the OPTIONS clause of each individual statement.

ISN buffer mode must not be used when accessing files that use the 'security by value' facility.

See also ***ISN Lists and the ISN Buffer***.

LARGE-NUMBERS Clause

This option will cause Adabas Native SQL to generate numeric (Unpacked)and Packed fields in Cobol for numeric fields with up to 31 digits. Without this option numeric fields with more than 18 digits will be generated as a character string. Users should note that in case of using the LARGE-NUMBER clause, they should make sure that the Cobol compiler option that allows for up to 31 digits numeric fields is set.

LONG-COUNTER Clause

This option will cause Adabas native SQL to generate the Multiple Value and Periodic Group counters as 4 binary bytes instead of the default of 2 binary bytes. This option should be used if the total occurrences of the Multiple Value or the Periodic group may exceed 32767 occurrences.

NEW-CONTROL-BLOCK Clause

This option will cause Adabas Native SQL to generate the new control block structure introduced in Adabas 6.1 on mainframe platforms and Adabas 4.1 in OpenVMS.

The new control block will allow file numbers and dbid's to be greater than 255.

NONDE Clause

This clause is available with Adabas 5 only. It is used to allow (NONDE=Y) or inhibit (NONDE=N) the use of non-descriptors within database search criteria. The option NONDE=D specifies that each search criterion must include at least one descriptor (and possibly some non-descriptors).

The field `Non-descriptor search allowed` in the Predict Modify Adabas Native SQL Defaults screen must be set to "Y" if you want to use this option.

OLDCOND-NAME Clause

Adabas Native SQL allows for the condition values to contain blanks. In versions prior to V231, a blank in the value of the condition name definition in Predict was considered as a delimiter and Adabas Native SQL generated several values for the same condition name value line.

With version 231 and up, only one value will be generated per value line definition in Predict and this value may contain blanks.

Users that would like to keep the old functionality may use this keyword.

With this option, Adabas Native SQL will generate the Condition names as in versions prior to V231 and consider a blank in the value to be a delimiter.

OPEN Clause

If this clause is coded, Adabas Native SQL performs an explicit 'open' on Predict file as it preprocesses your application program.

PREFIX Clause

If the option 'PREFIX = `prefix`' is coded, the field names generated for the record buffer will include the specified prefix. This global value will be overridden by any value specified in a clause of an individual Adabas Native SQL statement or taken from the data dictionary.

`Field name prefix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this clause** for more information.

SOFT Clause

This clause is used to enable (SOFT=Y) or inhibit (SOFT=N) the soft-coupling option.

The field `Use of soft-coupling allowed` in the Predict Modify Adabas Native SQL Defaults screen must be set to "Y" if you want to specify this option.

STATIC Clause

This option applies to PL/I programs only.

If the option 'STATIC = Y' is coded, all buffers generated by Adabas Native SQL will be defined as static. This global value will be overridden by any value specified in a clause of an individual Adabas Native SQL statement.

The field `Static` in the Predict Modify PL/I Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this clause** for more information.

SUFFIX Clause

If the option 'SUFFIX = *suffix*' is coded, the field names generated for the record buffer will include the specified suffix. This global value will be overridden by any value specified in a clause of an individual Adabas Native SQL statement or taken from the data dictionary.

`Field name suffix` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option. See the **previous discussion on this clause** for more information.

TRUNCATION Clause

A field name may exceed the maximum number of characters permitted by the language, particularly if a prefix and/or suffix has been added. Adabas Native SQL uses the TRUNCATION clause to delete excess characters:

TRUNCATION = L	truncate from the left
TRUNCATION = M	truncate from the middle
TRUNCATION = R	truncate from the right

This global value will override the value in the data dictionary.

The field `Truncation` in the Predict Modify...Defaults screen must be marked with an "X" if you want to specify this option.

USERDATA Clause

The USERDATA clause may be used to specify the size of the ET-data buffer, i.e., RECORD-BUFOPN. The default size is 500 bytes. This buffer is used in COMMIT WORK, DBCLOSE and CHECKPOINT statements.

VALIDATION Clause

This option determines how invalid characters in field names - including prefix and suffix, if specified - are handled by Adabas Native SQL.

Validation Character	Result
Null string (two consecutive apostrophes)	Invalid characters in a field name will result in an error message but will not be modified.
Replace character (letters A-Z, digits 0-9 or special character depending on language)	Invalid characters in a field name are replaced by this character.
Asterisk	Invalid characters in the field name are deleted.

This global value will override the value in the data dictionary.

`Validation` in the Predict Modify...Defaults screen must be marked with an "X" if you want to use this option.

VISTA Clause

In case that the Predict file is defined under Adabas Vista configuration, the DBID and file number of the physical Predict file may differ from the Adabas Native SQL `SYSFILE` parameter. In this case Adabas Native SQL will issue an error that these numbers do not match the Predict Control record.

The VISTA clause will cause Adabas Native SQL to ignore the different values and use the numbers from the Predict Control record for generating the global format id.

The SYSFILE Parameter

```
SYSFILE   [ FNAT=( dbid1,fnr1  [,password1  [,cipher1 ] ] ) ]
          [ FDIC= ( dbid2,fnr2  [,password2  [,cipher2 ] ] ) ]
```

The SYSFILE parameter specifies to Adabas Native SQL the number of the Natural system file and the number of Predict file. The Adabas Native SQL error messages are normally stored in the Natural system file. The SYSFILE parameter is mandatory, and the `dbid` and `fnr` must be specified. These numbers are checked against the DDA default record in Predict and, in case of incompatibility, execution stops.

PASSWORD Clause

If the Predict file or Natural system file is password-protected, the correct password must be specified using this clause.

CIPHER Clause

If the Predict file or Natural system file is enciphered, the correct cipher key (cipher code) must be specified using this clause.

Example:

```
SYSFILE  FNAT = (3,9)  FDIC = (3,8)
```

The database ID (DBID) of the Natural system file is 3, and its filenumber (FNR) is 9. The DBID of the Predict file is 3, and its FNR is 8.

The TELE Parameter

```
TELE "text" .
```

The TELE parameter specifies a source statement to be inserted after each CALL command in the generated executable statements. The text may, for example, be a command required by a teleprocessing monitor.

Example:

```
TELE "EXEC CICS LINK PROGRAM ('ADABAS') END-EXEC".    (COBOL)
TELE "EXEC CICS LINK PROGRAM ('ADABAS');".            (PL/I)
TELE "EXEC CICS LINK PROGRAM ('ADABAS') END-EXEC".    (FORTRAN)
```

The above example inserts the CICS command level instruction after every CALL. This parameter should be used in conjunction with the ADACALL parameter. See the example in the ADACALL parameter.

There may be up to five TELE statements, so that up to five additional lines of text may be generated after the call.

Note that in COBOL programs the `text` must not include a period.

See also the **MONITOR** parameter.

Ada is still not supported by the CICS translator.

The USER Parameter

```
USER userid .
```

This parameter is used to identify the user responsible for the program. This userid will be documented in XREF. If no USER parameter is specified, Adabas Native SQL takes the first 3 characters of the program as the userid.

The VIRTUAL-MACHINE Parameter

```
VIRTUAL-MACHINE virtual-machine .
```

This statement defines the virtual machine, that is the real computer or node, in which the program is to run.

`virtual-machine` must be defined in Predict, and must be linked as a child object to the network specified with the **NETWORK** parameter.

This parameter is mandatory if one or more databasesVirtual Machines other than HOME are defined in Predict.

For every database used (DBID, AUTODBID, AUTODBID-ATM or AUTODBID-All clauses), Adabas Native SQL checks that if the database is defined as *local* it belongs to the current virtual machine, and if the database is *isolated* that it belongs to the current network.

The XREF Parameter

```
       ┌ ON    ┐
XREF  ─┤ OFF   ├─ .
       └ FORCE ┘
```

This parameter controls the writing of cross-reference information (Xref data) to the data dictionary.

Note that the XREF global Adabas Native SQL parameter interacts with Predict's Preprocessor force option. If the Predict option is set to 'Y', then Adabas Native SQL ignores the XREF parameter in the Adabas Native SQL global parameter file (if present) and proceeds as though 'XREF FORCE' had been coded.

For details of the Predict `Preprocessor Force` option, see section *Common Parameters* in chapter *Generation* of the *Predict Administration Manual*.

XREF ON.	Adabas Native SQL makes entries in the data dictionary indicating which files and fields are used by the current program.
XREF OFF.	No entries are made in the data dictionary.
XREF FORCE.	Adabas Native SQL makes entries as for 'XREF ON' and additionally checks that the data dictionary contains a program description bearing the name of the current program. An error message is output if this condition is not satisfied.

If the data dictionary is opened for access only (global parameter DDFILE ACC.), 'XREF OFF.' must be coded.

The program is identified by its name (referred to in Predict as *Member*) together with the language in which it is written (Ada, COBOL, FORTRAN or PL/I). See the **NAME** parameter.

9 APPENDIX A - SIZE LIMITATIONS

The standard version of Adabas Native SQL is limited to the following maximum sizes:

- Length of an Adabas Native SQL source statement: 100 lines.

  Note: If the length of the statement exceeds 15 lines, then only the first 11 lines, a line of dots, and the last 3 lines will be stored for the purposes of TRACE, FLOW and runtime error reporting.

- Number of fields mentioned by name in the SELECT clause: 300.
- Number of fields contained in a file that is referenced with SELECT *: 500. (This number includes also the Redefinition fields within this file).
- Number of distinct field names used within the program (these are the field names that will be written into the data dictionary by the cross-reference facility): 2000.
- Number of distinct external subroutines used within the programs (their names will be written into the data dictionary by the cross-reference facility): 500.
- Number of variable indices used within the program: 99.
- Number of elements of redefinitions in one SELECT (PL/I only): 99.
- Number of Adabas Native SQL SELECT statements without a 'CURSOR' : 100
- Number of Adabas Native SQL statements that use 'CURSOR FOR' (multiple record processing): 120 (only applicable to operating systems z/OS, BS2000 and VMS).
- Number of Adabas Native SQL statements that use 'CURSOR' (including statements that use 'CURSOR FOR'): 150 (only applicable to operating systems z/OS, BS2000 and VMS).
- Number of files mentioned in the CONNECT statement: 100.
- Number of declarations without a 'CURSOR': 100
- Number of lines of ADA, COBOL, FORTRAN or PL/I code generated for one Adabas Native SQL statement, not including the direct calls: 200.

- Maximum numbers supported for DBID: 32767.
- Size of format buffer generated: 32767 bytes.
- Number of selection criteria in a 'WHERE' clause: 30.
- Number of constants (literals) used in selection criteria throughout the program: 250.
- Number of constants (literals) used in selection criteria within one Adabas Native SQL statement: 69.
- Number of variables in SET clause of UPDATE/INSERT statement: 300.
- Number of characters in a literal within an Adabas Native SQL statement: 38.

Restrictions in ADA:

- No redefinition.
- No groups generated.
- Periodic groups are always generated with STRUCT=N.
- PACKED and UNPACKED fields are generated as alpha.
- Superdescriptors are not divided into parts in the value buffer.
- The DBID option is not supported.
- FIND COUPLED is not supported.
- The GLOBAL FORMAT-ID option is not supported.

10 APPENDIX B - DESCRIPTIONS OF THE FILES USED IN THE EXAMPLES

These file descriptions, which are used in the Ada, COBOL, FORTRAN and PL/I examples shown in the following appendices, are supplied on the Predict installation tape. They can be loaded into the data dictionary using the Load function of the migration utility as described in the *Predict Administration Manual*. FORTRAN synonyms that must be used in order for the examples to run are listed at the end of this appendix.

```
 >                     > + Fi: EMPLOYEES                        L: 1    S:
36
Ty L Field name                       F  Length   Occ   D U DB S
*- - -------------------------------- *- -------- ----- * * -- *
   1 PERSONNEL-ID                     A      8.0        D U AA
GR 1 FULL-NAME                                              AB
   2 FIRST-NAME                       A     20.0            AC N
   2 MIDDLE-I                         A      1.0            AD N
   2 NAME                             A     20.0        D   AE
   1 MIDDLE-NAME                      A     20.0            AD N
   1 MAR-STAT                         A      1.0            AF F
   1 SEX                              A      1.0            AG F
   1 BIRTH                            U      6.0        D   AH
GR 1 FULL-ADDRESS                                           A1
MU 2 ADDRESS-LINE                     A     20.0  8         AI N
   2 CITY                             A     20.0        D   AJ N
   2 ZIP                              A     10.0            AK N
   2 POST-CODE                        A     10.0            AK N
   2 COUNTRY                          A      3.0            AL N
GR 1 TELEPHONE                                              A2
   2 AREA-CODE                        A      6.0            AN N
   2 PHONE                            A     15.0            AM N
   1 DEPT                             A      6.0        D   AO
   1 JOB-TITLE                        A     25.0        D   AP N
PE 1 INCOME                                       40        AQ
   2 CURR-CODE                        A      3.0            AR N
   2 SALARY                           P      9.0            AS N
MU 2 BONUS                            P      9.0  12        AT N
GR 1 LEAVE-DATA                                             A3
   2 LEAVE-DUE                        U      2.0            AU
   2 LEAVE-TAKEN                      U      2.0            AV N
PE 1 LEAVE-BOOKED                                 20        AW
   2 LEAVE-START                      U      6.0            AX N
   2 LEAVE-END                        U      6.0            AY N
MU 1 LANG                             A      3.0  15    D   AZ N
PH 1 PHONETIC-NAME                    A     20.0        D   PH
SP 1 LEAVE-LEFT                       B      4.0        D   H1 N
SB 1 DEPARTMENT                       A      4.0        D   S1
SP 1 DEPT-PERSON                      A     26.0        D   S2
SP 1 CURRENCY-SALARY                  A     12.0        D   S3 N
-- - -------------------------------- -- -------- ----- - - -- -
```

```
 >                    > + Fi: VEHICLES                         L: 1    S: 16

Ty L Field name                       F  Length   Occ    D U DB S       All
*- - -------------------------------- *- -------- -----  * * -- *
   1 REG-NUM                          A     15.0         D U AA N
   1 CHASSIS-NUM                      B      4.0             AB F
   1 PERSONNEL-ID                     A      8.0         D   AC
GR 1 CAR-DETAILS                                             CD
   2 MAKE                             A     20.0         D   AD N
   2 MODEL                            A     20.0             AE N
   2 COLOR                            A     10.0         D   AF N
   2 COLOUR                           A     10.0         D   AF N
   1 YEAR                             U      2.0             AG N
   1 CLASS                            A      1.0         D   AH F
   1 LEASE-PUR                        A      1.0             AI F
   1 DATE-ACQ                         U      6.0             AJ N
   1 CURR-CODE                        A      3.0             AL N
MU 1 MAINT-COST                       P      7.0  60         AM N
SP 1 DAT-ACQ-DESC                     B      4.0         D   AN
SP 1 MODEL-YEAR-MAKE                  A     22.0         D   AO



-- - -------------------------------- -- -------- -----  - - -- -
```

This chapter covers the following topics:

FORTRAN Synonyms

File EMPLOYEES:

PERSONNEL-ID	PID
FIRST-NAME	FNAME
INCOME	INC

File VEHICLES:

PERSONNEL-ID	PID
MODEL-YEAR-MAKE	MOYEMA
REG-NUM	REGNUM

In order to run FORTRAN example 3, the field SALARY must be changed from P9 to I4. The small difference in the total is attributable to rounding in the integer-to-real and real-to-integer conversions.

11 APPENDIX C - ADABAS NATIVE SQL STATEMENTS USED IN THE EXAMPLES

The table below shows which statements are used in each example. For example, the BEGIN and CLOSE statements are used in every example; the COMMIT WORK statement is used in Examples 2 and 3.

The correspondingly numbered Ada, COBOL, FORTRAN and PL/I examples are equivalent.

Example	1	2	3
BEGIN	x	x	x
CLOSE	x	x	x
COMMIT WORK		x	x
CONNECT			x
DBCLOSE	x	x	x
DELETE		x	
FETCH	x	x	x
FIND	x	x	
HISTOGRAM			x
OPEN	x	x	x
READ LOGICAL		x	x
UPDATE		x	x

12 APPENDIX D - ADA EXAMPLES

This chapter covers the following topics:

Example 1

```
with TYPES, ADABAS_GENERIC_CALLS, TEXT_IO ;
use  TYPES, TEXT_IO ;
--
--  AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH
--  CONTAINS FIELDS TAKEN FROM TWO FILES.  THE FIELDS PERSONNEL-ID
--  NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,
--  PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE
--  FOLLOWING CONDITION:
--     PERSONNEL-ID BETWEEN 10000001 AND 19999999
--     MODEL-VEAR-MAKE >
--     CLASS = 'C'
procedure AEX1 is
    START_MODEL : STRING (1..20) := "MERCEDES-BENZ      ";
    START_YEAR_MAKE : STRING (1..2) := "86" ;
    START_MODEL_YEAR_MAKE : STRING(1..22) := START_MODEL &
                             START_YEAR_MAKE ;

    FILLE1 : STRING(1..20) := " PERSONNEL-ID        " ;
    FILLE2 : STRING(1..17) := " NAME             " ;
    FILLE3 : STRING(1..18) := " FIRST-NAME        " ;
    FILLE4 : STRING(1..6) := "BIRTH   " ;
    FILLE5 : STRING(1..3) := "SEX" ;
    HEADER : STRING(1..64) := FILLE1 & FILLE2 & FILLE3 & FILLE4
                                       & FILLE5 ;
    HEADER2:  STRING(1..64) := (1..64 => '*');
    SPACE_LINE : STRING(1..80) := (1..80 => ' ');
          EXEC ADABAS
    BEGIN DECLARE SECTION
          END-EXEC

          EXEC ADABAS
    DECLARE EMPL CURSOR FOR
    SELECT PERSONNEL-ID, NAME, FIRST-NAME, BIRTH, SEX
    FROM EMPLOYEES, VEHICLES
    WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID
          AND PERSONNEL-ID BETWEEN "100000001" AND "19999999"
          AND VEHICLES.MODEL-YEAR-MAKE > :START_MODEL_YEAR_MAKE
          AND VEHICLES.CLASS = "C"
          END-EXEC
```

```
begin

        EXEC ADABAS
     OPEN EMPL
        END-EXEC
     PUT_LINE (HEADER) ;
     PUT_LINE (HEADER2) ;
     PUT_LINE (SPACE_LINE) ;

         EXEC ADABAS
     FETCH EMPL
         END-EXEC

   while ADACODE /= 3 loop
     PUT_LINE (" " & EMPLOYEES.PERSONNEL_ID & "    " & EMPLOYEES.NAME &
              " " & EMPLOYEES.FIRST_NAME & " " & EMPLOYEES.BIRTH & " "
                  & EMPLOYEES.SEX ) ;

         EXEC ADABAS
     FETCH EMPL
         END-EXEC

   end loop ;

         EXEC ADABAS
     CLOSE EMPL
         END-EXEC

         EXEC ADABAS
     DBCLOSE
         END-EXEC
end AEX1 ;
```

Example 2

```
with TYPES, ADABAS_GENERIC_CALLS, TEXT_IO ;
use  TYPES, TEXT_IO ;
--
--  DELETE AN EMPLOYEE RECORD AND RELEASE ALL CARS WHICH ARE
--  ASSIGNED TO THIS EMPLOYEE. APRIVATE CAR WILL BE DELETED
--  AND A COMPANY CAR WILL BE MADE A POOL-CAR WHICH IS IDENTIFIED
--  BY ITS PERSONNEL-ID CONTAINING ONLY THE COUNTRY CODE.

procedure AEX2 is
    PERSONNEL_NUMBER : STRING(1..8) := "20007100" ;
    EMPLOYEE_ISN : INTEGER := 0 ;
```

```
          EXEC ADABAS
    BEGIN DECLARE SECTION
          END-EXEC

          EXEC ADABAS
    READ LOGICAL
    DECLARE VEH1 CURSOR FOR
    SELECT REG-NUM, PERSONNEL-ID, CLASS
    FROM VEHICLES
    WHERE PERSONNEL-ID GE :PERSONNEL-NUMBER
    OPTIONS HOLD
    ORDER BY PERSONNEL-ID
          END-EXEC
```

```

begin
--
--  FIND EMPLOYEE
--
          EXEC ADABAS
      FIND
      SELECT
      FROM EMPLOYEES EMPLOYEES_1
      WHERE PERSONNEL-ID = :PERSONNEL_NUMBER
      OPTIONS HOLD
          END-EXEC
--
--   IF THE PERSONNEL-ID EXISTS DELETE THE EMPLOYEE AND READ THE
--   VEHICLES FILE

     if EMPLOYEES_1.QUANTITY = 1 then

        EMPLOYEE_ISN := EMPLOYEES_1.ISN ;
--
--           DELETE EMPLOYEE
--
             EXEC ADABAS
        DELETE
        FROM EMPLOYEES
        WHERE ISN = :EMPLOYEE_ISN
             END-EXEC
--
--           READ VEHICLES-FILE
--
            EXEC ADABAS
        OPEN VEH1
            END-EXEC

            EXEC ADABAS
        FETCH VEH1
            END-EXEC
     while ADACODE /= 3 AND
           VEHICLES.PERSONNEL_ID = PERSONNEL_NUMBER loop
        if VEHICLES.CLASS = "P" then
               EXEC ADABAS
           DELETE
           FROM VEHICLES
           WHERE CURRENT OF VEH1
               END-EXEC
           PUT_LINE ("PRIVATE CAR" & VEHICLES.REG_NUM &
                     "HAS BEEN DELETED");
        else
           VEHICLES.PERSONNEL_ID := VEHICLES.PERSONNEL_ID (1..1)
                                    & "        " ;
               EXEC ADABAS
           UPDATE VEHICLES
           WHERE CURRENT OF VEH1
               END-EXEC
           PUT_LINE ( "COMPANY CAR " & VEHICLES.REG_NUM &
                      " HAS BEEN UPDATED" ) ;
       end if ;
            EXEC ADABAS
       FETCH VEH1
            END-EXEC
    end loop ;

        EXEC ADABAS
    CLOSE VEH1
        END-EXEC
        EXEC ADABAS
    COMMIT WORK
        END-EXEC

 else
    PUT_LINE ( "NO EMPLOYEES FOUND WITH PERSONNEL-ID " &
               PERSONNEL_NUMBER ) ;
end if ;
    EXEC ADABAS
 DBCLOSE
    END-EXEC
end AEX2 ;
```

Example 3

```
with TYPES, ADABAS_GENERIC_CALLS, TEXT_IO ;
use  TYPES, TEXT_IO ;
--  SALARY INCREASE
--  THIS PROGRAM INCREASES THE SALARY OF EVERY EMPLOYEE BY
--  4 PERCENT.
--  THE DEPARTMENT, THE OVERALL AMOUNT OF PAY RISE FOR THE
--  DEPARTMENT AND THE PAY RISE FOR ALL DEPARTMENTS WILL BE PRINTED
--  OUT.
--  THE PROGRAM IS RESTARTABLE. AFTER AN ABNORMAL TERMINATION THE
--  PROGRAM EXECUTION WOULD RESTART FROM THE LAST DEPARTMENT
--  WHOSE SALARY UPDATE HAD BEEN COMPLETED BEFORE THE ABEND
--  OCCURED.

procedure AEX3 is
    type COMMIT_DATA_1 is
     RECORD
      COMMIT_DEPARTMENT : STRING(1..6) := "      " ;
      COMMIT_SUM : INTEGER := 0 ;
      COMMIT_FIL : STRING(1..490) := (1..490 => ' ');
     end record ;
    COMMIT_DATA : COMMIT_DATA_1 ;
    COMMIT_DATA_2 : STRING(1..500);
    for COMMIT_DATA use at COMMIT_DATA_2'ADDRESS;
    START_DEPT : STRING(1..6) := "      " ;
    J : INTEGER := 0 ;
    NEW_SALARY : INTEGER := 0 ;
    INCREASE : INTEGER := 0 ;
    SUM_DEPARTMENT : INTEGER := 0 ;
    SUM_TOTAL : INTEGER := 0 ;
    FILLE1 : STRING(1..10) := " DEPARTMENT" ;
    FILLE2 : STRING(1..15) :=  (1..15 => ' ' ) ;
    FILLE3 : STRING(1..15) := "SALARY INCREASE " ;
    HEADER : STRING(1..40) := FILLE1 & FILLE2 & FILLE3 ;
    HEADER2 : STRING(1..40) := (1..40 => '*') ;
    SPACE_LINE : STRING(1..40)  := (1..40 => ' ' ) ;

          EXEC ADABAS
    BEGIN DECLARE SECTION
          END-EXEC

          EXEC ADABAS
      HISTOGRAM
      DECLARE EMP1 CURSOR FOR
      SELECT DEPT
      FROM EMPLOYEES EMPLOYEES_1
      WHERE DEPT GE :COMMIT_DATA.COMMIT_DEPARTMENT
      GROUP BY DEPT
          END-EXEC

          EXEC ADABAS
      READ LOGICAL
      DECLARE EMP2 CURSOR FOR
      SELECT PERSONNEL-ID, DEPT, SALARY, INCOME(COUNT)
      FROM EMPLOYEES
      WHERE DEPT GE :START_DEPT
      ORDER BY DEPT
      OPTIONS HOLD
          END-EXEC
```

```
begin

         EXEC ADABAS
      CONNECT 'INCREASE'
      UPD=EMPLOYEES
      AND USERDATA INTO :COMMIT_DATA_2
         END-EXEC
--
--    A HISTOGRAM STATEMENT IS USED TO ASCERTAIN THE NUMBER OF
--    EMPLOYEES PER DEPARTMENT
--
           EXEC ADABAS
      OPEN EMP1
           END-EXEC

           EXEC ADABAS
      FETCH EMP1
           END-EXEC

      if COMMIT_DATA.COMMIT_DEPARTMENT /= "      " then

         PUT_LINE (" LAST PROGRAM RUN TERMINATED ABNORMALLY ") ;
         PUT_LINE (" LAST DEPARTMENT WAS: " &
                    COMMIT_DATA.COMMIT_DEPARTMENT) ;

           EXEC ADABAS
     FETCH EMP1
           END-EXEC

  end if ;

  START_DEPT := EMPLOYEES_1.DEPT ;

         EXEC ADABAS
     OPEN EMP2
         END-EXEC

     PUT_LINE(HEADER) ;
     PUT_LINE(HEADER2) ;
     PUT_LINE(SPACE_LINE) ;

     while ADACODE /= 3 loop
--
--     THE EMPLOYEES FILE WILL BE READ UNTIL ALL RECORDS FOR THE
--     DEPARTMENT HAVE BEEN PROCESSED AND THE SALARY HAS BEEN
--     UPDATED.
--
       J := 1 ;
       while J <= EMPLOYEES_1.QUANTITY loop
               EXEC ADABAS
         FETCH EMP2
               END-EXEC
         J := J + 1 ;
--          THE SALAYRY INCREASE CAN BE EXECUTED WHEN THE COUNT OF THE
--          PERIODIC GROUP IS LESS THAN 40.
         if EMPLOYEES.C_INCOME < 40 then
         INCREASE := (EMPLOYEES.SALARY(1) * 4)/100 ;
         NEW_SALARY := EMPLOYEES.SALARY(1) + INCREASE ;
         EMPLOYEES.SALARY(2..40) := EMPLOYEES.SALARY(1..39) ;
         EMPLOYEES.SALARY(1) := NEW_SALARY ;
              EXEC ADABAS
         UPDATE EMPLOYEES
         WHERE CURRENT OF EMP2
              END-EXEC
         SUM_DEPARTMENT := SUM_DEPARTMENT + INCREASE ;
         SUM_TOTAL := SUM_TOTAL + INCREASE ;
      else
         PUT_LINE("UPDATE PERSON " & EMPLOYEES.PERSONNEL_ID &
                  "NOT POSSIBLE") ;
      end if ;
      end loop ;
      PUT_LINE("    " & EMPLOYEES.DEPT & "                " &
               INTEGER'IMAGE(SUM_DEPARTMENT)) ;
      SUM_DEPARTMENT := 0 ;
      COMMIT_DATA.COMMIT_DEPARTMENT := EMPLOYEES.DEPT ;
      COMMIT_DATA.COMMIT_SUM := SUM_TOTAL;
          EXEC ADABAS
      COMMIT WORK
      USERDATA = :COMMIT_DATA_2
          END-EXEC

          EXEC ADABAS
      FETCH EMP1
          END-EXEC
    end loop ;

         EXEC ADABAS
    CLOSE EMP1
         END-EXEC
         EXEC ADABAS
    CLOSE EMP2
         END-EXEC
    PUT_LINE(SPACE_LINE) ;
    SPACE_LINE(1..50) := (1..50 => '-') ;
    PUT_LINE(SPACE_LINE) ;
    SPACE_LINE(1..50) := (1..50 => ' ') ;
    PUT_LINE(SPACE_LINE) ;
    PUT_LINE("TOTAL SALARY INCREASE : " & INTEGER'IMAGE(SUM_TOTAL)) ;
    COMMIT_DATA.COMMIT_DEPARTMENT := "      " ;

        EXEC ADABAS
    DBCLOSE
    USERDATA = :COMMIT_DATA_2
        END-EXEC
    end AEX3 ;
```

13 APPENDIX E - EXAMPLE OF ADA CODE GENERATED BY ADABAS NATIVE SQL

```
with TYPES, ADABAS_GENERIC_CALLS, TEXT_IO ;
use  TYPES, TEXT_IO ;
--
--  AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH
--  CONTAINS FIELDS TAKEN FROM TWO FILES.  THE FIELDS PERSONNEL-ID
--  NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,
--  PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE
--  FOLLOWING CONDITION:
--     PERSONNEL-ID BETWEEN 10000001 AND 19999999
--     MODEL-VEAR-MAKE >
--     CLASS = 'C'

procedure AEX1 is
    START_MODEL : STRING (1..20) := "MERCEDES-BENZ     ";
    START_YEAR_MAKE : STRING (1..2) := "86" ;
    START_MODEL_YEAR_MAKE : STRING(1..22) := START_MODEL &
                             START_YEAR_MAKE ;

    FILLE1 : STRING(1..20) := " PERSONNEL-ID        " ;
    FILLE2 : STRING(1..17) := " NAME              " ;
    FILLE3 : STRING(1..18) := " FIRST-NAME        " ;
    FILLE4 : STRING(1..6) := "BIRTH   " ;
    FILLE5 : STRING(1..3) := "SEX" ;
    HEADER : STRING(1..64) := FILLE1 & FILLE2 & FILLE3 & FILLE4
                                       & FILLE5 ;
    HEADER2:  STRING(1..64) := (1..64 => '*');
    SPACE_LINE : STRING(1..80) := (1..80 => ' ');
--
--        EXEC ADABAS
--  BEGIN DECLARE SECTION
--        END-EXEC
--
```

```
    ADACODE : SHORT_INTEGER := 0 ;
    CB_OPN : CONTROL_BLOCK :=
                           (FILLER1                   => "AS"      ,
                            COMMAND_CODE              => "  "      ,
                            COMMAND_ID                => "OPEN"    ,
                            FILE_NUMBER               =>         0,
                            RESPONSE_CODE             =>         0,
                            ISN                       =>         0,
                            ISN_LOWER_LIMIT           =>         0,
                            ISN_QUANTITY              =>         0,
                            FORMAT_BUFFER_LENGTH      =>         0,
                            RECORD_BUFFER_LENGTH      =>         0,
                            SEARCH_BUFFER_LENGTH      =>         0,
                            VALUE_BUFFER_LENGTH       =>         0,
                            ISN_BUFFER_LENGTH         =>         4,
                            COMMAND_OPTION_1          => " "       ,
                            COMMAND_OPTION_2          => " "       ,
                            ADDITIONS_1               => "         ",
                            ADDITIONS_2               => "     "   ,
                            ADDITIONS_3               => "         ",
                            ADDITIONS_4               => "         ",
                            ADDITIONS_5               => "         ",
                            COMMAND_TIME              =>         0,
                            USER_AREA                 => "AS   "    ) ;
      FORMAT_BUF_OPN                      :  FORMAT_BUFFER (1..0001)  ;
      SEARCH_BUF_OPN                      :  SEARCH_BUFFER (1..0001)  ;
      VB_OPN                              :  VALUE_BUFFER  (1..0001)  ;
      RB_OPN                              :  RECORD_BUFFER (1..1500)  ;
      ISN_BUF_OPN                         :  ISN_BUFFER    (1..0001)  ;
      package A_OPN is new ADABAS_GENERIC_CALLS
     (FORMAT_BUFFER,RECORD_BUFFER,SEARCH_BUFFER,VALUE_BUFFER) ;
      DDFILE   : STRING(1..3)  :=            "061"                    ;
      CSEQ     : STRING(1..8)                                         ;
      CLN1     : CLN_TYPE                                             ;
      CLN2     : CLN_TYPE                                             ;
      TRCE     : STRING(1..7)                                         ;
      CLNNUM   : SHORT_INTEGER                                        ;
      SQLRSP   : SHORT_INTEGER                                        ;
      SQLQTY   : INTEGER                                              ;
      SQLISN   : INTEGER                                              ;
    type FORMAT_BUFEMPL_1                 is
      record
         FILLE001 : STRING(1..32) :="AA,8,A,AE,20,A,AC,20,A,AH,6,U,AG";
         FILLE002 : STRING(1..05) :=",1,A.";
      end record                                                      ;
    FORMAT_BUFEMPL                        :  FORMAT_BUFEMPL_1         ;
    type SEARCH_BUFEMPL_1                 is
      record
         FILLE001 : STRING(1..32) :="(22,AA,24,AC)/22/AA,8,A,S,AA,8,A";
         FILLE002 : STRING(1..27) :=",D,/24/AO,22,A,GT,D,AH,1,A.";
      end record                                                      ;
    SEARCH_BUFEMPL                        :  SEARCH_BUFEMPL_1         ;
    type RECORD_BUFEMPL                   is
      record
         PERSONNEL_ID                     :  STRING (1..0008)         ;
         NAME                             :  STRING (1..0020)         ;
         FIRST_NAME                       :  STRING (1..0020)         ;
         BIRTH                            :  STRING (1..0006)         ;
         SEX                              :  STRING (1..0001)         ;
         ISN                              :  INTEGER                  ;
         QUANTITY                         :  INTEGER                  ;
         RESPONSE_CODE                    :  SHORT_INTEGER            ;
      end record                                                      ;
```

```

    EMPLOYEES                             :  RECORD_BUFEMPL           ;
    type VALUE_BUFEMPL                    is
      record
         V_PERSONNEL_ID_F                 :  STRING (1..0008)
                                          :=        (1..0008 => ' ' ) ;
         V_PERSONNEL_ID_T                 :  STRING (1..0008)
                                          :=        (1..0008 => ' ' ) ;
         V_MODEL_YEAR_MAKE                :  STRING (1..0022)
                                          :=        (1..0022 => ' ' ) ;
         V_CLASS                          :  STRING (1..0001)
                                          :=        (1..0001 => ' ' ) ;

      end record                                                      ;
    VBEMPL                                :  VALUE_BUFEMPL            ;
      ISN_BUFEMPL                         :  ISN_BUFFER    (1..0001)  ;
      package AEMPL is new ADABAS_GENERIC_CALLS
     (FORMAT_BUFEMPL_1,RECORD_BUFEMPL,SEARCH_BUFEMPL_1,VALUE_BUFEMPL) ;
    CBEMPL : CONTROL_BLOCK :=
                           (FILLER1                   => "AS"      ,
                            COMMAND_CODE              => "  "      ,
                            COMMAND_ID                => "EMPL"    ,
                            FILE_NUMBER               =>         22,
                            RESPONSE_CODE             =>          0,
                            ISN                       =>          0,
                            ISN_LOWER_LIMIT           =>          0,
                            ISN_QUANTITY              =>          0,
                            FORMAT_BUFFER_LENGTH      =>         37,
                            RECORD_BUFFER_LENGTH      =>         55,
                            SEARCH_BUFFER_LENGTH      =>         59,
                            VALUE_BUFFER_LENGTH       =>         39,
                            ISN_BUFFER_LENGTH         =>          4,
                            COMMAND_OPTION_1          => " "       ,
                            COMMAND_OPTION_2          => " "       ,
                            ADDITIONS_1               => "        ",
                            ADDITIONS_2               => "    "    ,
                            ADDITIONS_3               => "        ",
                            ADDITIONS_4               => "        ",
                            ADDITIONS_5               => "        ",
                            COMMAND_TIME              =>          0,
                             USER_AREA                 => "AS  "    ) ;
     ISNSIZEEMPL                        :  INTEGER                 ;
     ISNMOREEMPL                        :  INTEGER                 ;
     ISNINDEMPL                         :  INTEGER                 ;
     EOFEMPL                            :  BOOLEAN  := FALSE       ;

--
--        EXEC ADABAS
--  DECLARE EMPL CURSOR FOR
--  SELECT PERSONNEL-ID, NAME, FIRST-NAME, BIRTH, SEX
--  FROM EMPLOYEES, VEHICLES
--  WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID
--        AND PERSONNEL-ID BETWEEN "10000001" AND "19999999"
--        AND VEHICLES.MODEL-YEAR-MAKE > :START_MODEL_YEAR_MAKE
--        AND VEHICLES.CLASS = "C"
--        END-EXEC
```

```
--

begin

--
--      EXEC ADABAS
--   OPEN EMPL
--      END-EXEC
--
           VBEMPL.V_PERSONNEL_ID_F  := "10000001"  ;
           VBEMPL.V_PERSONNEL_ID_T  := "19999999"  ;
           VBEMPL.V_MODEL_YEAR_MAKE  := START_MODEL_YEAR_MAKE  ;
           VBEMPL.V_CLASS  := "C"  ;
     ISNSIZEEMPL := INTEGER(CBEMPL.ISN_BUFFER_LENGTH / 4) ;
     ISNINDEMPL := 1 ;
     CBEMPL.ISN_LOWER_LIMIT := 0 ;
     CBEMPL.COMMAND_OPTION_1 := " " ;
     CBEMPL.COMMAND_OPTION_2 := " " ;
     CBEMPL.ISN_QUANTITY := 0                                ;
     CBEMPL.ISN_BUFFER_LENGTH := 0 ;
     CBEMPL.COMMAND_CODE := "S1" ;
     AEMPL.ADABAS    (
        CBEMPL,FORMAT_BUFEMPL,
            EMPLOYEES                    ,SEARCH_BUFEMPL,VBEMPL,
        ISN_BUFEMPL                              ) ;
     EMPLOYEES.RESPONSE_CODE                    :=
                           CBEMPL.RESPONSE_CODE ;
     EMPLOYEES.QUANTITY                         :=
                           CBEMPL.ISN_QUANTITY ;
     EMPLOYEES.ISN                              :=
                           CBEMPL.ISN ;
     if CBEMPL.RESPONSE_CODE /= 0
        then
     CSEQ := "00000000" ;
     CLN1(01) := "        EXEC ADABAS                    " ;
     CLN2(01) := "                                       " ;
     CLN1(02) := "     OPEN EMPL                         " ;
     CLN2(02) := "                                       " ;
     CLN1(03) := "        END-EXEC                       " ;
     CLN2(03) := "                                       " ;
     CLNNUM := 03 ;
         AEMPL.RESPF
           (CBEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,
            EMPLOYEES                      ,SEARCH_BUFEMPL,VBEMPL,
            CLN1,CLN2,TRCE,CLNNUM) ;
          end if ;
     ISNMOREEMPL := CBEMPL.ISN_QUANTITY ;
     if ISNMOREEMPL > 0 then
       EOFEMPL := FALSE ;
     else
       EOFEMPL := TRUE ;
     end if ;
     if ISNMOREEMPL < ISNSIZEEMPL then
        ISNSIZEEMPL := ISNMOREEMPL ;
     end if ;
     ISNINDEMPL :=0 ;

     PUT_LINE (HEADER) ;
     PUT_LINE (HEADER2) ;
     PUT_LINE (SPACE_LINE) ;
```

```
--
--       EXEC ADABAS
--   FETCH EMPL
--       END-EXEC
--
     if ISNINDEMPL = ISNMOREEMPL then
         EOFEMPL := TRUE ;
     end if ;
     if not(EOFEMPL) then
     EOFEMPL := FALSE ;
     CBEMPL.COMMAND_OPTION_2 := "N" ;
     CBEMPL.COMMAND_OPTION_1 := " " ;
     CBEMPL.COMMAND_CODE := "L1" ;
     AEMPL.ADABAS    (
        CBEMPL,FORMAT_BUFEMPL,
            EMPLOYEES                      ,SEARCH_BUFEMPL,VBEMPL,
        ISN_BUFEMPL                                ) ;
     EMPLOYEES.RESPONSE_CODE                      :=
                              CBEMPL.RESPONSE_CODE ;
     EMPLOYEES.QUANTITY                           :=
                              CBEMPL.ISN_QUANTITY ;
     EMPLOYEES.ISN                                :=
                              CBEMPL.ISN ;
     if CBEMPL.RESPONSE_CODE = 3 then
```

```
       EOFEMPL := TRUE ;
     else
     if CBEMPL.RESPONSE_CODE /= 0
        then
     CSEQ := "00000000" ;
     CLN1(01) := "         EXEC ADABAS                    " ;
     CLN2(01) := "                                        " ;
     CLN1(02) := "     FETCH EMPL                         " ;
     CLN2(02) := "                                        " ;
     CLN1(03) := "         END-EXEC                       " ;
     CLN2(03) := "                                        " ;
     CLNNUM := 03 ;
         AEMPL.RESPF
           (CBEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,
            EMPLOYEES                      ,SEARCH_BUFEMPL,VBEMPL,
            CLN1,CLN2,TRCE,CLNNUM) ;
          end if ;
     end if ;
     end if ;
     if EOFEMPL then
        ADACODE := 003 ;
     else
        ADACODE := 0 ;
     end if ;

   while ADACODE /= 3 loop
     PUT_LINE (" " & EMPLOYEES.PERSONNEL_ID & "   " & EMPLOYEES.NAME &
               " " & EMPLOYEES.FIRST_NAME & " " & EMPLOYEES.BIRTH & " "
                   & EMPLOYEES.SEX ) ;
```

```
--
--       EXEC ADABAS
--   FETCH EMPL
--       END-EXEC
--
     if ISNINDEMPL = ISNMOREEMPL then
         EOFEMPL := TRUE ;
     end if ;
     if not(EOFEMPL) then
     EOFEMPL := FALSE ;
     CBEMPL.COMMAND_OPTION_2 := "N" ;
     CBEMPL.COMMAND_OPTION_1 := " " ;
     CBEMPL.COMMAND_CODE := "L1" ;
     AEMPL.ADABAS    (
        CBEMPL,FORMAT_BUFEMPL,
            EMPLOYEES                      ,SEARCH_BUFEMPL,VBEMPL,
        ISN_BUFEMPL                               ) ;
     EMPLOYEES.RESPONSE_CODE                     :=
                                 CBEMPL.RESPONSE_CODE ;
     EMPLOYEES.QUANTITY                          :=
                                 CBEMPL.ISN_QUANTITY ;
     EMPLOYEES.ISN                                 :=
                              CBEMPL.ISN ;
     if CBEMPL.RESPONSE_CODE = 3 then
       EOFEMPL := TRUE ;
     else
     if CBEMPL.RESPONSE_CODE /= 0
        then
     CSEQ := "00000000" ;
     CLN1(01) := "         EXEC ADABAS                   " ;
     CLN2(01) := "                                       " ;
     CLN1(02) := "     FETCH EMPL                        " ;
     CLN2(02) := "                                       " ;
     CLN1(03) := "         END-EXEC                      " ;
     CLN2(03) := "                                       " ;
     CLNNUM := 03 ;
         AEMPL.RESPF
           (CBEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,
            EMPLOYEES                      ,SEARCH_BUFEMPL,VBEMPL,
            CLN1,CLN2,TRCE,CLNNUM) ;
          end if ;
     end if ;
     end if ;
     if EOFEMPL then
        ADACODE := 003 ;
     else
        ADACODE := 0 ;
     end if ;

   end loop ;
```

```
--
--       EXEC ADABAS
--   CLOSE EMPL
--       END-EXEC
--
     CBEMPL.COMMAND_OPTION_1 := "I" ;
     CBEMPL.COMMAND_OPTION_2 := "S" ;
     CBEMPL.COMMAND_CODE := "RC" ;
     AEMPL.ADABAS    (
        CBEMPL,FORMAT_BUFEMPL,
            EMPLOYEES                      ,SEARCH_BUFEMPL,VBEMPL,
        ISN_BUFEMPL                                ) ;
     EMPLOYEES.RESPONSE_CODE                       :=
                              CBEMPL.RESPONSE_CODE ;
     EMPLOYEES.QUANTITY                            :=
                              CBEMPL.ISN_QUANTITY ;
     EMPLOYEES.ISN                                 :=
                              CBEMPL.ISN ;
     if CBEMPL.RESPONSE_CODE /= 0
        then
     CSEQ := "00000000" ;
     CLN1(01) := "         EXEC ADABAS                     " ;
     CLN2(01) := "                                         " ;
     CLN1(02) := "     CLOSE EMPL                          " ;
     CLN2(02) := "                                         " ;
     CLN1(03) := "         END-EXEC                        " ;
     CLN2(03) := "                                         " ;
     CLNNUM := 03 ;
         AEMPL.RESPF
           (CBEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,
            EMPLOYEES                       ,SEARCH_BUFEMPL,VBEMPL,
            CLN1,CLN2,TRCE,CLNNUM) ;
          end if ;

--
--       EXEC ADABAS
--   DBCLOSE
--       END-EXEC
--
     CB_OPN.RECORD_BUFFER_LENGTH := 1500 ;
     CB_OPN.COMMAND_OPTION_2 := " " ;
     CB_OPN.COMMAND_CODE := "CL" ;
     A_OPN.ADABAS    (
        CB_OPN,FORMAT_BUF_OPN,
            RB_OPN                          ,SEARCH_BUF_OPN,VB_OPN,
        ISN_BUF_OPN                                ) ;
     if CB_OPN.RESPONSE_CODE /= 0
        then
     CSEQ := "00000000" ;
     CLN1(01) := "         EXEC ADABAS                     " ;
     CLN2(01) := "                                         " ;
     CLN1(02) := "     DBCLOSE                             " ;
     CLN2(02) := "                                         " ;
     CLN1(03) := "         END-EXEC                        " ;
     CLN2(03) := "                                         " ;
     CLNNUM := 03 ;
         A_OPN.RESPF
           (CB_OPN,DDFILE,CSEQ,FORMAT_BUF_OPN,
            RB_OPN                          ,SEARCH_BUF_OPN,VB_OPN,
            CLN1,CLN2,TRCE,CLNNUM) ;
          end if ;
end AEX1 ;
```

14 APPENDIX F - COBOL EXAMPLES

This chapter covers the following topics:

Example 1

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID. CEX1.
 REMARKS.
* AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH     *
* CONTAINS FIELDS TAKEN FROM TWO FILES. THE FIELDS PERSONNEL-ID *
* NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,          *
* PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE        *
* FOLLOWING CONDITION:
*     PERSONNEL-ID BETWEEN 10000001 AND 19999999
*     MODEL-YEAR-MAKE >
*     CLASS = 'C'
 ENVIRONMENT DIVISION.
```

```
 DATA DIVISION.
 WORKING-STORAGE SECTION.
 01  START-MODEL-YEAR-MAKE.
     02 START-MODEL            PIC X(20) VALUE 'MERCEDES-BENZ'.
     02 START-YEAR-MAKE        PIC 9(2)  VALUE 86.
*
 01  HEADER.
     02 FILLER          PIC X(12) VALUE 'PERSONNEL-ID'.
     02 FILLER          PIC X(8)  VALUE SPACE.
     02 FILLER          PIC X(4)  VALUE 'NAME'.
     02 FILLER          PIC X(13) VALUE SPACE.
     02 FILLER          PIC X(10) VALUE 'FIRST NAME'.
     02 FILLER          PIC X(8)  VALUE SPACE.
     02 FILLER          PIC X(5)  VALUE 'BIRTH'.
     02 FILLER          PIC X(1)  VALUE SPACE.
     02 FILLER          PIC X(3)  VALUE 'SEX'.
 01  HEADER2            PIC X(64) VALUE ALL '*'.
 01  SPACE-LINE         PIC X(80) VALUE SPACE.
 01  LINE1.
     02 FILLER          PIC X(2)  VALUE SPACE.
     02 PERSONNEL-NR    PIC X(8)  VALUE SPACE.
     02 FILLER          PIC X(3)  VALUE SPACE.
     02 LAST-NAME       PIC X(20) VALUE SPACE.
     02 FILLER          PIC X(1)  VALUE SPACE.
     02 F-NAME          PIC X(20) VALUE SPACE.
     02 FILLER          PIC X(1)  VALUE SPACE.
     02 BIRTHDAY        PIC X(6)  VALUE SPACE.
     02 FILLER          PIC X(1)  VALUE SPACE.
     02 KIND            PIC X(1)  VALUE SPACE.
```

```
*
          EXEC ADABAS
     BEGIN DECLARE SECTION
          END-EXEC
*
          EXEC ADABAS
     DECLARE EMPL CURSOR FOR
     SELECT PERSONNEL-ID, NAME, FIRST-NAME, BIRTH, SEX
     FROM EMPLOYEES, VEHICLES
     WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID
           AND PERSONNEL-ID BETWEEN '10000001' AND '19999999'
           AND VEHICLES.MODEL-YEAR-MAKE > :START-MODEL-YEAR-MAKE
           AND VEHICLES.CLASS = 'C'
          END-EXEC
```

```

 PROCEDURE DIVISION.
*
     DISPLAY HEADER.
     DISPLAY HEADER2.
     DISPLAY SPACE-LINE.
*
          EXEC ADABAS
     OPEN EMPL
          END-EXEC
*
          EXEC ADABAS
     FETCH EMPL
          END-EXEC
*
     PERFORM READ-EMPLOYEES UNTIL ADACODE = 3.
*
          EXEC ADABAS
     CLOSE EMPL
          END-EXEC
*
          EXEC ADABAS
     DBCLOSE
          END-EXEC
*
     STOP RUN.
*
 READ-EMPLOYEES.
     MOVE PERSONNEL-ID TO PERSONNEL-NR.
     MOVE NAME TO LAST-NAME.
     MOVE FIRST-NAME TO F-NAME.
     MOVE BIRTH TO BIRTHDAY.
     MOVE SEX TO KIND.
     DISPLAY LINE1.
     MOVE SPACE TO LINE1.
*
          EXEC ADABAS
     FETCH EMPL
           END-EXEC
```

Example 2

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID. CEX2.
 REMARKS.
* DELETE AN EMPLOYEE RECORD AND RELEASE ALL CARS WHICH ARE       *
* ASSIGNED TO THIS EMPLOYEE. A PRIVATE CAR WILL BE DELETED       *
* AND A COMPANY CAR WILL BE MADE A POOL-CAR WHICH IS IDENTIFIED  *
* BY ITS PERSONNEL-ID CONTAINING ONLY THE COUNTRY CODE.          *
 ENVIRONMENT DIVISION.
 DATA DIVISION.
 WORKING-STORAGE SECTION.
*
 01  PERSONNEL-NUMBER            PIC X(8)  VALUE '20007100'.
 01  EMPLOYEE-ISN                PIC 9(9)  COMP VALUE ZERO.
 01  COUNTRY-NUMBER.
     02 COUNTRY-NO               PIC X(1)  VALUE SPACE.
     02 FILLER                   PIC X(14) VALUE SPACE.
*
          EXEC ADABAS
     BEGIN DECLARE SECTION
          END-EXEC
*
          EXEC ADABAS
     READ LOGICAL
     DECLARE VEH1 CURSOR FOR
     SELECT REG-NUM, PERSONNEL-ID, CLASS
     FROM VEHICLES
     WHERE PERSONNEL-ID GE :PERSONNEL-NUMBER
     OPTIONS HOLD
     ORDER BY PERSONNEL-ID
          END-EXEC
*
 PROCEDURE DIVISION.
*
*** FIND EMPLOYEE
*
          EXEC ADABAS
     FIND
     SELECT
     FROM EMPLOYEES EMPLOYEES-1
     WHERE PERSONNEL-ID = :PERSONNEL-NUMBER
     OPTIONS HOLD
          END-EXEC
*
```

```
*** IF THE PERSONNEL-ID EXISTS DELETE THE EMPLOYEE AND READ THE
*** VEHICLES FILE
*
     IF QUANTITY OF EMPLOYEES-1 = 1
        MOVE ISN OF EMPLOYEES-1 TO EMPLOYEE-ISN
        PERFORM DELETE-EMPLOYEE
        PERFORM READ-VEHICLES-FILE
     ELSE
        DISPLAY
        'NO EMPLOYEE FOUND WITH PERSONNEL-ID ', PERSONNEL-NUMBER.
*
          EXEC ADABAS
     DBCLOSE
          END-EXEC
*
     STOP RUN.
```

```

*
 DELETE-EMPLOYEE.
          EXEC ADABAS
     DELETE
     FROM EMPLOYEES
     WHERE ISN = :EMPLOYEE-ISN
          END-EXEC
*
     DISPLAY 'EMPLOYEE ', PERSONNEL-NUMBER, ' HAS BEEN DELETED'.
*
 READ-VEHICLES-FILE.
          EXEC ADABAS
     OPEN VEH1
          END-EXEC
*
          EXEC ADABAS
     FETCH VEH1
          END-EXEC
*
     PERFORM READ-VEHICLES UNTIL ADACODE = 3 OR
                  PERSONNEL-ID OF VEHICLES > PERSONNEL-NUMBER.
*
        EXEC ADABAS
     CLOSE VEH1
        END-EXEC
*
        EXEC ADABAS
     COMMIT WORK
        END-EXEC
*
 READ-VEHICLES.
     IF CLASS = 'P'
        PERFORM DELETE-PRIVATE-CAR
     ELSE
```

```
        PERFORM UPDATE-COMPANY-CAR.
*
        EXEC ADABAS
     FETCH VEH1
        END-EXEC
*
  DELETE-PRIVATE-CAR.
        EXEC ADABAS
     DELETE
     FROM VEHICLES
     WHERE CURRENT OF VEH1
        END-EXEC
     DISPLAY 'PRIVATE CAR ', REG-NUM, ' HAS BEEN DELETED'.
*
 UPDATE-COMPANY-CAR.
     MOVE PERSONNEL-ID OF VEHICLES TO COUNTRY-NUMBER.
     MOVE COUNTRY-NO TO PERSONNEL-ID OF VEHICLES.
*
        EXEC ADABAS
     UPDATE VEHICLES
     WHERE CURRENT OF VEH1
        END-EXEC
     DISPLAY 'COMPANY CAR ', REG-NUM, ' HAS BEEN UPDATED'.
```

Example 3

```

 IDENTIFICATION DIVISION.
 PROGRAM-ID. CEX3.
 REMARKS.
* SALARY INCREASE.
* THIS PROGRAM INCREASES THE SALARY OF EVERY EMPLOYEE BY
* 4 PERCENT.
* THE DEPARTMENT, THE OVERALL AMOUNT OF PAY RISE FOR THE
* DEPARTMENT AND THE PAY RISE FOR ALL DEPARTMENTS WILL BE PRINTED
* OUT.
* THE PROGRAM IS RESTARTABLE. AFTER AN ABNORMAL TERMINATION THE
* PROGRAM EXECUTION WOULD RESTART WITH THE LAST DEPARTMENT
* WHOSE SALARY UPDATE HAD BEEN COMPLETED BEFORE THE ABEND
* OCCURED.
```

```
 ENVIRONMENT DIVISION.
 DATA DIVISION.
 WORKING-STORAGE SECTION.
*
 01  COMMIT-DATA.
     02 COMMIT-DEPARTMENT    PIC X(6)           VALUE SPACE.
     02 COMMIT-SUM           PIC S9(10) COMP-3  VALUE +0.
 01  START-DEPT              PIC X(6)           VALUE SPACE.
 01  IND                     PIC 9(4)   COMP    VALUE 0.
 01  I                       PIC 9(4)   COMP    VALUE 0.
 01  J                       PIC 9(4)   COMP    VALUE 0.
 01  NEW-SALARY              PIC S9(9)  COMP-3  VALUE +0.
 01  INCREASE                PIC S9(9)  COMP-3  VALUE +0.
 01  SUM-DEPARTMENT          PIC S9(10) COMP-3  VALUE +0.
 01  SUM-TOTAL               PIC S9(11) COMP-3  VALUE +0.
*
 01  HEADER.
     02 FILLER           PIC X(10) VALUE 'DEPARTMENT'.
     02 FILLER           PIC X(15) VALUE SPACE.
     02 FILLER           PIC X(15) VALUE 'SALARY INCREASE'.
 01  HEADER2             PIC X(40) VALUE ALL '*'.
 01  SPACE-LINE          PIC X(50) VALUE SPACE.
 01  LINE1.
     02 FILLER           PIC X(3)  VALUE SPACE.
     02 DEPARTMENT       PIC X(6)  VALUE SPACE.
     02 FILLER           PIC X(16) VALUE SPACE.
     02 SUM-DEPT         PIC Z,ZZZ,ZZZ,ZZ9.
 01  LAST-LINE.
     02 FILLER           PIC X(21) VALUE 'TOTAL SALARY INCREASE'.
     02 FILLER           PIC X(3)  VALUE ' : '.
     02 TOTAL-SUM-DEPT   PIC ZZ,ZZZ,ZZZ,ZZZ.
*
          EXEC ADABAS
     BEGIN DECLARE SECTION
          END-EXEC
*
          EXEC ADABAS
     HISTOGRAM
     DECLARE EMP1 CURSOR FOR
     SELECT  DEPT
     FROM EMPLOYEES EMPLOYEES-1
     WHERE DEPT GE :COMMIT-DEPARTMENT
     GROUP BY DEPT
          END-EXEC
*
          EXEC ADABAS
     READ LOGICAL
     DECLARE EMP2 CURSOR FOR
     SELECT PERSONNEL-ID, DEPT, SALARY, INCOME(COUNT)
     FROM EMPLOYEES
     WHERE DEPT GE :START-DEPT
     OPTIONS HOLD
     ORDER BY DEPT
          END-EXEC
*
```

```
 PROCEDURE DIVISION.
*
          EXEC ADABAS
     CONNECT 'INCREASE'
     UPD=EMPLOYEES
     AND USERDATA INTO :COMMIT-DATA
          END-EXEC
*
***  A HISTOGRAM STATEMENT IS USED TO ASCERTAIN THE NUMBER OF
***  EMPLOYEES PER DEPARTMENT
*
          EXEC ADABAS
     OPEN EMP1
          END-EXEC
*
          EXEC ADABAS
     FETCH EMP1
          END-EXEC
*
     IF COMMIT-DATA NOT =  ' '
        PERFORM RESTART.
*
     MOVE DEPT OF EMPLOYEES-1 TO START-DEPT.
*
          EXEC ADABAS
     OPEN EMP2
          END-EXEC
*
     DISPLAY HEADER.
     DISPLAY HEADER2.
     DISPLAY SPACE-LINE.
     PERFORM HIST-EMPL UNTIL ADACODE = 3.
*
          EXEC ADABAS
     CLOSE EMP1
           END-EXEC
*
          EXEC ADABAS
     CLOSE EMP2
          END-EXEC
*
     DISPLAY SPACE-LINE.
     MOVE ALL '-' TO SPACE-LINE.
     DISPLAY SPACE-LINE.
     MOVE SPACES TO SPACE-LINE.
     DISPLAY SPACE-LINE.
     MOVE SUM-TOTAL TO TOTAL-SUM-DEPT.
     DISPLAY LAST-LINE.
     MOVE ' ' TO COMMIT-DATA.
*
          EXEC ADABAS
     DBCLOSE
     USERDATA = :COMMIT-DATA
          END-EXEC
*
     STOP RUN.
*
```

```
 RESTART.
     DISPLAY 'LAST PROGRAM RUN TERMINATED ABNORMALLY'.
     DISPLAY 'LAST DEPARTMENT WAS: ', COMMIT-DEPARTMENT.
*
          EXEC ADABAS
     FETCH EMP1
         END-EXEC.
*
 HIST-EMPL.
*
***  THE EMPLOYEES FILE WILL BE READ UNTIL ALL RECORDS FOR THE
***  DEPARTMENT HAVE BEEN PROCESSED AND THE SALARY HAS BEEN
***  UPDATED.
*
     PERFORM READ-EMPL VARYING J FROM 1 BY 1 UNTIL
                               J > QUANTITY OF EMPLOYEES-1.
     MOVE DEPT OF EMPLOYEES TO DEPARTMENT.
     MOVE SUM-DEPARTMENT TO SUM-DEPT.
     MOVE ZERO TO SUM-DEPARTMENT.
     DISPLAY LINE1.
     MOVE SPACE TO LINE1.
*
     MOVE DEPT OF EMPLOYEES TO COMMIT-DEPARTMENT.
     MOVE SUM-TOTAL TO COMMIT-SUM.
         EXEC ADABAS
     COMMIT WORK
     USERDATA = :COMMIT-DATA
         END-EXEC
*
          EXEC ADABAS
     FETCH EMP1
         END-EXEC.
*
 READ-EMPL.
          EXEC ADABAS
     FETCH EMP2
          END-EXEC.
```

```
*
***  THE SALARY INCREASE CAN BE EXECUTED WHEN THE COUNT OF THE
***  PERIODIC GROUP IS LESS THAN 40.
*
     IF C-INCOME < 40
        PERFORM SALARY-INCREASE
      ELSE
     DISPLAY 'UPDATE PERSON ', PERSONNEL-ID, ' NOT POSSIBLE'.
*
 SALARY-INCREASE.
     COMPUTE INCREASE = SALARY(1) * 0.04.
     COMPUTE NEW-SALARY = SALARY(1) + INCREASE.
     ADD 1 C-INCOME OF EMPLOYEES GIVING IND.
     PERFORM INCREASE-IN-SALARY VARYING I FROM C-INCOME BY -1
                                       UNTIL I = 0.
     MOVE NEW-SALARY TO SALARY(1).
*
         EXEC ADABAS

     UPDATE EMPLOYEES
     WHERE CURRENT OF EMP2
         END-EXEC
*
     COMPUTE SUM-DEPARTMENT = SUM-DEPARTMENT + INCREASE.
     COMPUTE SUM-TOTAL = SUM-TOTAL + INCREASE.
*
 INCREASE-IN-SALARY.
     MOVE SALARY(I) TO SALARY(IND).
     SUBTRACT 1 FROM IND.
```

15 APPENDIX G - EXAMPLE OF COBOL CODE GENERATED BY ADABAS NATIVE SQL

```
 1
 0 000001               IDENTIFICATION DIVISION.                                ↩
       00000010
   000002               PROGRAM-ID. CEX1.                                       ↩
       00000020
   000003              * WITH COBOL II SET THE NEXT LINE TO COMMENT
   000004              *REMARKS.
   000005            * AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH ↩
     *
   000006              * CONTAINS FIELDS TAKEN FROM TWO FILES. THE FIELDS ↩
PERSONNEL-ID *
   000007             * NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,    ↩
      *
   000008             * PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE  ↩
      *
   000009              * FOLLOWING CONDITION:
   000010              *     PERSONNEL-ID BETWEEN 10000001 AND 19999999
   000011              *     MODEL-YEAR-MAKE >
   000012               ENVIRONMENT DIVISION.                                   ↩
       00000030
   000013               DATA DIVISION.                                          ↩
       00000040
   000014               WORKING-STORAGE SECTION.                                ↩
       00000050
   000015               01  START-MODEL-YEAR-MAKE.                              ↩
       00000060
   000016                   02 START-MODEL            PIC X(20) VALUE ↩
'MERCEDES-BENZ'.   00000070
   000017                   02 START-YEAR-MAKE        PIC 9(2)  VALUE 86.       ↩
       00000080
   000018              *
   000019               01  HEADER.                                             ↩
```

```
     00000090
000020                02 FILLER         PIC X(12) VALUE 'PERSONNEL-ID'.   ↩
     00000100
000021                02 FILLER         PIC X(8)  VALUE SPACE.            ↩
     00000110  IMP
000022                02 FILLER         PIC X(4)  VALUE 'NAME'.           ↩
     00000120
000023                02 FILLER         PIC X(13) VALUE SPACE.            ↩
     00000130  IMP
000024                02 FILLER         PIC X(10) VALUE 'FIRST NAME'.     ↩
     00000140
000025                02 FILLER         PIC X(8)  VALUE SPACE.            ↩
     00000150  IMP
000026                02 FILLER         PIC X(3)  VALUE 'SEX'.            ↩
     00000160
000027             01  HEADER2          PIC X(64) VALUE ALL '*'.          ↩
     00000170
000028             01  SPACE-LINE       PIC X(80) VALUE SPACE.            ↩
     00000180  IMP
000029             01  LINE1.                                             ↩
     00000190
000030                02 FILLER         PIC X(2)  VALUE SPACE.            ↩
     00000200  IMP
000031                02 PERSONNEL-NR   PIC X(8)  VALUE SPACE.            ↩
     00000210  IMP
000032                02 FILLER         PIC X(3)  VALUE SPACE.            ↩
     00000220  IMP
000033                02 LAST-NAME      PIC X(20) VALUE SPACE.            ↩
     00000230  IMP
000034                02 FILLER         PIC X(1)  VALUE SPACE.            ↩
     00000240  IMP
000035                02 F-NAME         PIC X(20) VALUE SPACE.            ↩
     00000250  IMP
000036                02 FILLER         PIC X(1)  VALUE SPACE.            ↩
     00000260  IMP
000037                02 KIND           PIC X(1)  VALUE SPACE.            ↩
     00000270  IMP
000038             *
```

```
000039             *
000040             *         EXEC ADABAS
000041             *    BEGIN DECLARE SECTION
000042             *         END-EXEC
000043             *
000044             01  ADACODE PIC 9(4) COMP VALUE 0.                     ↩
      ADABAS
000045             01  CONTROL-BLOCKOPN.                                  ↩
      ADABAS
000046                03 FILLER1OPN              PIC 9(4) COMP   VALUE 0. ↩
      ADABAS
000047                03 FILLER1-CHAROPN  REDEFINES FILLER1OPN  PIC XX.   ↩
```

```
         ADABAS   46
   000048                   03 COMMAND-CODEOPN          PIC XX          VALUE ↩
SPACE.      ADABAS   IMP
   000049                   03 COMMAND-IDOPN            PIC X(4)        VALUE ↩
'OPEN'.     ADABAS
   000050                  03 FILE-NUMBEROPN          PIC 9(4) COMP   VALUE    ↩
 0.      ADABAS
   000051                  03 FILLER REDEFINES FILE-NUMBEROPN .                ↩
         ADABAS   50
   000052                     04 DBIDOPN  PIC X.                               ↩
         ADABAS
   000053                     04 FILLER PIC X.                                 ↩
         ADABAS
   000054                  03 RESPONSE-CODEOPN        PIC 9(4) COMP   VALUE 0. ↩
         ADABAS
   000055                  03 ISNOPN                  PIC 9(9) COMP   VALUE 0. ↩
         ADABAS
   000056                  03 ISN-LOWER-LIMITOPN      PIC 9(9) COMP   VALUE 0. ↩
         ADABAS
   000057                  03 ISN-QUANTITYOPN         PIC 9(9) COMP   VALUE 0. ↩
         ADABAS
0  000058                  03 FORMAT-BUFFER-LENGTHOPN  PIC 9(4) COMP   VALUE    ↩
 0.      ADABAS
  000059                03 FBL-CHAROPN  REDEFINES FORMAT-BUFFER-LENGTHOPN  PIC ↩
XX.    ADABAS   58
   000060                  03 RECORD-BUFFER-LENGTHOPN  PIC 9(4) COMP   VALUE    ↩
 0.      ADABAS
  000061                03 RBL-CHAROPN  REDEFINES RECORD-BUFFER-LENGTHOPN  PIC ↩
XX.    ADABAS   60
   000062                  03 SEARCH-BUFFER-LENGTHOPN  PIC 9(4) COMP   VALUE    ↩
 0.      ADABAS
   000063                  03 VALUE-BUFFER-LENGTHOPN   PIC 9(4) COMP   VALUE    ↩
 0.      ADABAS
   000064                  03 ISN-BUFFER-LENGTHOPN     PIC 9(4) COMP   VALUE    ↩
 4.      ADABAS
   000065                   03 COMMAND-OPTION-1OPN      PIC X           VALUE ↩
SPACE.      ADABAS   IMP
   000066                   03 COMMAND-OPTION-2OPN      PIC X           VALUE ↩
SPACE.      ADABAS   IMP
   000067                   03 ADDITIONS-1OPN                           VALUE ↩
SPACE.      ADABAS   IMP
   000068                    04 ADDITIONS-1-12OPN  PIC XX.                    ↩
         ADABAS
   000069                    04 FILLER PIC XX.                                 ↩
         ADABAS
   000070                    04 ADDITIONS-1-58OPN  PIC X(4).                  ↩
         ADABAS
   000071                  03 FILLER REDEFINES ADDITIONS-1OPN .                ↩
         ADABAS   67
   000072                    04 ADDITIONS-1-BNOPN  PIC 9(4) COMP.              ↩
         ADABAS
   000073                    04 FILLER PIC X(6).                               ↩
```

```
      ADABAS
  000074                    03 ADDITIONS-2OPN           PIC X(4)        VALUE ↩
SPACE.      ADABAS   IMP
  000075                    03 ADDITIONS-3OPN           PIC X(8)        VALUE ↩
SPACE.      ADABAS   IMP
  000076                    03 ADDITIONS-4OPN           .                     ↩
      ADABAS
  000077                      04 ADDITIONS-4-12OPN PIC 9(4) COMP VALUE 0.     ↩
      ADABAS
  000078                      04 ADDITIONS-4-34OPN PIC 9(4) COMP VALUE 0.     ↩
      ADABAS
  000079                      04 ADDITIONS-4-56OPN PIC 9(4) COMP VALUE 0.     ↩
      ADABAS
  000080                      04 ADDITIONS-4-78OPN PIC 9(4) COMP VALUE 0.     ↩
      ADABAS
  000081                    03 ADDITIONS-5OPN           .                     ↩
      ADABAS
  000082                      04 ADDITIONS-5-BNOPN  PIC 9(9) COMP VALUE 0.    ↩
      ADABAS
  000083                      04 ADDITIONS-5-58OPN  PIC X(4) VALUE SPACE.     ↩
      ADABAS   IMP
  000084                    03 FILLER REDEFINES ADDITIONS-5OPN .              ↩
      ADABAS   81
  000085                      04 ADDITIONS-5-1OPN  PIC X.                     ↩
      ADABAS
  000086                      04 ADDITIONS-5-28OPN  PIC X(7).                 ↩
      ADABAS
  000087                    03 COMMAND-TIMEOPN          PIC 9(9) COMP.        ↩
      ADABAS
  000088                    03 USER-AREAOPN             PIC X(4)        VALUE ' ↩
  '.    ADABAS
  000089                01  FORMAT-BUFOPN                       PIC X.        ↩
      ADABAS
  000090                01  SEARCH-BUFOPN                       PIC X.        ↩
      ADABAS
  000091                01  VALUE-BUFOPN                        PIC X.        ↩
      ADABAS
  000092                01  ISN-BUFOPN                          PIC X.        ↩
      ADABAS
  000093                01  OPENTYPE                            PIC X(00010). ↩
      ADABAS
  000094                01  RECORD-BUFOPN.                                    ↩
      ADABAS
  000095                    02 RECORD-BUFOPN-01                 PIC X(00100). ↩
      ADABAS
  000096                    02 RECORD-BUFOPN-02                 PIC X(00100). ↩
      ADABAS
  000097                    02 RECORD-BUFOPN-03                 PIC X(00100). ↩
      ADABAS
  000098                    02 RECORD-BUFOPN-04                 PIC X(00100). ↩
      ADABAS
  000099                    02 RECORD-BUFOPN-05                 PIC X(00100). ↩
```

```
        ADABAS
  000100                    02 RECORD-BUFOPN-06                  PIC X(00100).   ↩
        ADABAS
  000101                    02 RECORD-BUFOPN-07                  PIC X(00100).   ↩
        ADABAS
  000102                    02 RECORD-BUFOPN-08                  PIC X(00100).   ↩
        ADABAS
  000103                    02 RECORD-BUFOPN-09                  PIC X(00100).   ↩
        ADABAS
  000104                    02 RECORD-BUFOPN-10                  PIC X(00100).   ↩
        ADABAS
  000105                    02 RECORD-BUFOPN-11                  PIC X(00100).   ↩
        ADABAS
  000106                    02 RECORD-BUFOPN-12                  PIC X(00100).   ↩
        ADABAS
  000107                    02 RECORD-BUFOPN-13                  PIC X(00100).   ↩
        ADABAS
  000108                    02 RECORD-BUFOPN-14                  PIC X(00100).   ↩
        ADABAS
  000109                    02 RECORD-BUFOPN-15                  PIC X(00100).   ↩
        ADABAS
  000110                01  DDFILE                      PIC 99999       VALUE    ↩
 7.     ADABAS
  000111                01  DDDBID                      PIC 99999       VALUE ↩
11177.     ADABAS
  000112                01  CSEQ                        PIC X(8).                ↩
        ADABAS
  000113                01  CLN1.                                                ↩
        ADABAS
  000114                    02 CLN1V PIC X(40) OCCURS 20.                        ↩
        ADABAS
```

```
0 000115                01  CLN2.                                                ↩
        ADABAS
  000116                    02 CLN2V PIC X(40) OCCURS 20.                        ↩
        ADABAS
  000117                01  CLNNUM                      PIC 9(4) COMP.           ↩
        ADABAS
  000118                01  TRCE                        PIC X(7).                ↩
        ADABAS
  000119                01  SQLRSP                      PIC 9(4) COMP.           ↩
        ADABAS
  000120                01  SQLQTY                      PIC 9(9) COMP.           ↩
        ADABAS
  000121                01  SQLISN                      PIC 9(9) COMP.           ↩
        ADABAS
  000122                01  ADA-FULL-INTOPN PIC 9(9) COMP VALUE 12288.           ↩
        ADABAS
  000123                01  FILLER REDEFINES ADA-FULL-INTOPN.                    ↩
        ADABAS   122
  000124                    02 FILLER PIC XX.                                    ↩
```

```
      ADABAS
   000125                02 ADA-HALF-INTOPN PIC XX.                     ↩
      ADABAS
   000126             01  SAVE-DBID-1OPN            PIC 9(9) COMP   VALUE 0. ↩
      ADABAS
   000127             01  SAVE-DBID-DEFOPN  REDEFINES SAVE-DBID-1OPN .       ↩
      ADABAS   126
   000128                02 FILLER PIC X(2).                            ↩
      ADABAS
   000129                02 SAVE-DBIDOPN  PIC 9(4) COMP.                ↩
      ADABAS
   000130             01  FORMAT-BUFEMPL.                               ↩
      ADABAS
   000131                02 FILLER PIC X(30) VALUE                      ↩
      ADABAS
   000132                'AA,8,A,AE,20,A,AC,20,A,AG,1,A.'.              ↩
      ADABAS
   000133             01  SEARCH-BUFEMPL.                               ↩
      ADABAS
   000134                02 FILLER PIC X(46) VALUE                      ↩
      ADABAS
   000135                '(1,AA,2,AC)/1/AA,8,A,S,AA,8,A,D,/2/AO,24,A,GT.'.  ↩
      ADABAS
   000136             01  EMPLOYEES.                                    ↩
      ADADATA
   000137                02 RECORD-BUFEMPL.                             ↩
      ADADATA
   000138                 03 PERSONNEL-ID                  PIC X(00008).  ↩
      ADADATA
   000139                 03 NAME                          PIC X(00020).  ↩
      ADADATA
   000140                 03 FIRST-NAME                    PIC X(00020).  ↩
      ADADATA
   000141                 03 SEX                           PIC X(00001).  ↩
      ADADATA
   000142                02 ISN                            PIC 9(9) COMP ↩
VALUE 0.   ADADATA
   000143                02 QUANTITY                       PIC 9(9) COMP ↩
VALUE 0.   ADADATA
   000144                02 RESPONSE-CODE                  PIC 9(4) COMP ↩
VALUE 0.   ADADATA
   000145             01  VALUE-BUFEMPL.                                ↩
      ADABAS
   000146                02 V-PERSONNEL-ID-F               PIC X(00008)   ↩
      ADABAS
   000147                                                      VALUE ↩
LOW-VALUE.     ADABAS   IMP
   000148                02 V-PERSONNEL-ID-T               PIC X(00008)   ↩
      ADABAS
   000149                                                      VALUE ↩
LOW-VALUE.     ADABAS   IMP
   000150                02 V-MODEL-YEAR-MAKE.                          ↩
```

```
          ADABAS
   000151                   03 S-YEAR                          PIC  9(0004)    ↩
          ADABAS
   000152                                                                VALUE ↩
   0.   ADABAS
   000153                   03 S-MAKE                          PIC X(00020)    ↩
          ADABAS
   000154                                                           VALUE ↩
LOW-VALUE.     ADABAS   IMP
   000155               01  ISN-BUFEMPL.                                       ↩
          ADABAS
   000156                  03 ISN-BUFVECEMPL OCCURS     1  PIC 9(9) COMP.      ↩
          ADABAS
   000157               01  CONTROL-BLOCKEMPL.                                 ↩
          ADABAS
   000158                  03 FILLER1EMPL             PIC 9(4) COMP   VALUE 0. ↩
          ADABAS
   000159                  03 FILLER1-CHAREMPL REDEFINES FILLER1EMPL PIC XX.   ↩
          ADABAS   158
   000160                   03 COMMAND-CODEEMPL         PIC XX          VALUE ↩
SPACE.      ADABAS   IMP
   000161                   03 COMMAND-IDEMPL           PIC X(4)        VALUE ↩
'EMPL'.     ADABAS
   000162                  03 FILE-NUMBEREMPL         PIC 9(4) COMP   VALUE    ↩
 1.     ADABAS
   000163                  03 FILLER REDEFINES FILE-NUMBEREMPL.                ↩
          ADABAS   162
   000164                     04 DBIDEMPL PIC X.                               ↩
          ADABAS
   000165                     04 FILLER PIC X.                                 ↩
          ADABAS
   000166                  03 RESPONSE-CODEEMPL       PIC 9(4) COMP   VALUE 0. ↩
          ADABAS
   000167                  03 ISNEMPL                 PIC 9(9) COMP   VALUE 0. ↩
          ADABAS
   000168                  03 ISN-LOWER-LIMITEMPL     PIC 9(9) COMP   VALUE 0. ↩
          ADABAS
   000169                  03 ISN-QUANTITYEMPL        PIC 9(9) COMP   VALUE 0. ↩
          ADABAS
   000170                  03 FORMAT-BUFFER-LENGTHEMPL PIC 9(4) COMP   VALUE    ↩
30.     ADABAS
  000171                 03 FBL-CHAREMPL REDEFINES FORMAT-BUFFER-LENGTHEMPL PIC ↩
XX.    ADABAS   170
0  000172                  03 RECORD-BUFFER-LENGTHEMPL PIC 9(4) COMP   VALUE    ↩
49.     ADABAS
  000173                 03 RBL-CHAREMPL REDEFINES RECORD-BUFFER-LENGTHEMPL PIC ↩
XX.    ADABAS   172
   000174                  03 SEARCH-BUFFER-LENGTHEMPL PIC 9(4) COMP   VALUE    ↩
46.     ADABAS
   000175                  03 VALUE-BUFFER-LENGTHEMPL  PIC 9(4) COMP   VALUE    ↩
40.     ADABAS
   000176                  03 ISN-BUFFER-LENGTHEMPL    PIC 9(4) COMP   VALUE    ↩
 4.      ADABAS
   000177                    03 COMMAND-OPTION-1EMPL     PIC X           VALUE ↩
SPACE.      ADABAS   IMP
   000178                    03 COMMAND-OPTION-2EMPL     PIC X           VALUE ↩
SPACE.      ADABAS   IMP
   000179                    03 ADDITIONS-1EMPL                          VALUE ↩
SPACE.      ADABAS   IMP
   000180                      04 ADDITIONS-1-12EMPL PIC XX.                     ↩
         ADABAS
   000181                      04 FILLER PIC XX.                                 ↩
         ADABAS
   000182                      04 ADDITIONS-1-58EMPL PIC X(4).                   ↩
         ADABAS
   000183                    03 FILLER REDEFINES ADDITIONS-1EMPL.                ↩
         ADABAS   179
   000184                      04 ADDITIONS-1-BNEMPL PIC 9(4) COMP.              ↩
         ADABAS
   000185                      04 FILLER PIC X(6).                               ↩
         ADABAS
   000186                    03 ADDITIONS-2EMPL          PIC X(4)        VALUE ↩
SPACE.      ADABAS   IMP
   000187                    03 ADDITIONS-3EMPL          PIC X(8)        VALUE ↩
SPACE.      ADABAS   IMP
   000188                    03 ADDITIONS-4EMPL          PIC X(8)        VALUE ↩
SPACE.      ADABAS   IMP
   000189                    03 ADDITIONS-5EMPL          .                       ↩
         ADABAS
   000190                      04 ADDITIONS-5-BNEMPL PIC 9(9) COMP VALUE 0.      ↩
         ADABAS
   000191                      04 ADDITIONS-5-58EMPL PIC X(4) VALUE SPACE.       ↩
         ADABAS   IMP
   000192                    03 FILLER REDEFINES ADDITIONS-5EMPL.                ↩
         ADABAS   189
   000193                      04 ADDITIONS-5-1EMPL PIC X.                       ↩
         ADABAS
   000194                      04 ADDITIONS-5-28EMPL PIC X(7).                   ↩
         ADABAS
   000195                    03 COMMAND-TIMEEMPL         PIC 9(9) COMP.          ↩
         ADABAS
   000196                    03 USER-AREAEMPL            PIC X(4)        VALUE ' ↩
  '.     ADABAS
   000197                01  ISNSIZEEMPL  PIC 9(9) COMP.                         ↩
         ADABAS
   000198                01  ISNMOREEMPL  PIC 9(9) COMP.                         ↩
         ADABAS
   000199                01  ISNINDEMPL PIC 9(4) COMP.                           ↩
         ADABAS
   000200                01  EOF-COBEMPL PIC 9 VALUE 0.                          ↩
         ADABAS
   000201                    88 EOFEMPL VALUE 1.                                 ↩
         ADABAS
   000202                    88 NOT-EOFEMPL VALUE 0.                             ↩
```

```
      ADABAS
  000203              01  SAVE-DBID-1EMPL            PIC 9(9) COMP   VALUE    ↩
 0.      ADABAS
  000204              01  SAVE-DBID-DEFEMPL REDEFINES SAVE-DBID-1EMPL.        ↩
      ADABAS   203
  000205                  02 FILLER PIC X(2).                                 ↩
      ADABAS
  000206                  02 SAVE-DBIDEMPL PIC 9(4) COMP.                     ↩
      ADABAS
  000207              *
  000208              *
  000209              *         EXEC ADABAS
  000210              *    DECLARE EMPL CURSOR FOR
  000211              *    SELECT PERSONNEL-ID, NAME, FIRST-NAME,  SEX
  000212              *    FROM EMPLOYEES, VEHICLES
  000213              *    WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID
  000214             *         AND PERSONNEL-ID BETWEEN '10000001' AND '19999999'
  000215              *           AND VEHICLES.MODEL-YEAR-MAKE > ↩
:START-MODEL-YEAR-MAKE
  000216              *         END-EXEC
```

```
  000217              *
  000218                                                                      ↩
     00000280
  000219               PROCEDURE DIVISION.                                    ↩
     00000290
  000220              *
  000221              *
  000222              *         EXEC ADABAS
  000223              *    TRACE ON
  000224              *         END-EXEC
  000225              *
  000226                  DISPLAY HEADER.                                     ↩
     00000300  19
  000227                  DISPLAY HEADER2.                                    ↩
     00000310  27
  000228                  DISPLAY SPACE-LINE.                                 ↩
     00000320  28
0  000229             *
  000230              *
  000231              *         EXEC ADABAS
  000232              *    OPEN EMPL
  000233              *         END-EXEC
  000234              *
  000235                 MOVE '10000001' TO V-PERSONNEL-ID-F OF VALUE-BUFEMPL ↩
      ADABAS   146 145
  000236                 MOVE '19999999' TO V-PERSONNEL-ID-T OF VALUE-BUFEMPL ↩
      ADABAS   148 145
  000237                 MOVE START-MODEL-YEAR-MAKE TO V-MODEL-YEAR-MAKE OF   ↩
      ADABAS   15 150
  000238                  VALUE-BUFEMPL                                       ↩
```

```
        ADABAS   145
   000239                  MOVE ADA-HALF-INTOPN TO FILLER1-CHAREMPL          ↩
        ADABAS   125 159
   000240                  COMPUTE ISNSIZEEMPL = ISN-BUFFER-LENGTHEMPL / 4   ↩
        ADABAS   197 176
   000241                  MOVE 1 TO ISNINDEMPL                              ↩
        ADABAS   199
   000242                  MOVE 0 TO ISN-LOWER-LIMITEMPL                     ↩
        ADABAS   168
   000243                 MOVE 0                        TO ISN-QUANTITYEMPL ↩
    ADABAS   169
   000244                  MOVE ' ' TO COMMAND-OPTION-2EMPL                  ↩
        ADABAS   178
   000245                  MOVE ' ' TO COMMAND-OPTION-1EMPL                  ↩
        ADABAS   177
   000246                  MOVE 0 TO ISN-BUFFER-LENGTHEMPL                   ↩
        ADABAS   176
   000247                  MOVE SAVE-DBIDEMPL TO RESPONSE-CODEEMPL           ↩
        ADABAS   206 166
   000248                  MOVE 'S1' TO COMMAND-CODEEMPL                     ↩
        ADABAS   160
   000249                  CALL 'ADABAS'   USING                             ↩
        ADABAS   EXT
   000250                       CONTROL-BLOCKEMPL FORMAT-BUFEMPL RECORD-BUFEMPL ↩
     ADABAS   157 130 137
   000251                          SEARCH-BUFEMPL VALUE-BUFEMPL              ↩
        ADABAS   133 145
   000252                          ISN-BUFEMPL                               ↩
        ADABAS   155
   000253                  MOVE ISNEMPL TO ISN OF                            ↩
        ADABAS   167 142
   000254                                          EMPLOYEES                 ↩
        ADABAS   136
   000255                  MOVE RESPONSE-CODEEMPL TO RESPONSE-CODE OF        ↩
        ADABAS   166 144
   000256                                          EMPLOYEES                 ↩
        ADABAS   136
   000257                  MOVE ISN-QUANTITYEMPL TO QUANTITY OF              ↩
        ADABAS   169 143
   000258                                          EMPLOYEES                 ↩
        ADABAS   136
   000259                   MOVE 0 TO ISNINDEMPL                             ↩
        ADABAS   199
   000260                  IF RESPONSE-CODEEMPL NOT = 0                      ↩
        ADABAS   166
   000261      1           MOVE '        ' TO CSEQ                           ↩
        ADABAS   112
   000262      1           MOVE '                EXEC ADABAS              ' TO ↩
CLN1V (01) ADABAS   114
   000263      1           MOVE '                                         ' TO ↩
CLN2V (01) ADABAS   116
   000264      1           MOVE '           OPEN EMPL                     ' TO ↩
```

```
CLN1V (02) ADABAS   114
   000265      1            MOVE '                                        ' TO ↩
CLN2V (02) ADABAS   116
   000266      1            MOVE '                END-EXEC                ' TO ↩
CLN1V (03) ADABAS   114
   000267      1            MOVE '                                        ' TO ↩
CLN2V (03) ADABAS   116
   000268      1            MOVE 03 TO CLNNUM                                ↩
         ADABAS   117
   000269      1                CALL 'RESPINT'                               ↩
         ADABAS   EXT
  000270     1                USING CONTROL-BLOCKEMPL DDFILE CSEQ FORMAT-BUFEMPL ↩
     ADABAS   157 110 112 130
   000271      1                   RECORD-BUFEMPL SEARCH-BUFEMPL VALUE-BUFEMPL   ↩
         ADABAS   137 133 145
   000272      1                   CLN1 CLN2 TRCE CLNNUM DDDBID.             ↩
         ADABAS   113 115 118 117 111
   000273                   MOVE ISN-QUANTITYEMPL TO ISNMOREEMPL             ↩
         ADABAS   169 198
   000274                   IF ISNMOREEMPL > 0 MOVE 0 TO EOF-COBEMPL         ↩
         ADABAS   198 200
   000275      1                         ELSE MOVE 1 TO EOF-COBEMPL.         ↩
         ADABAS   200
   000276                   IF ISNMOREEMPL < ISNSIZEEMPL                     ↩
         ADABAS   198 197
   000277      1                        MOVE ISNMOREEMPL TO ISNSIZEEMPL.     ↩
         ADABAS   198 197
   000278              *
   000279              *
   000280              *         EXEC ADABAS
   000281              *    FETCH EMPL
   000282              *         END-EXEC
   000283              *
   000284                   MOVE ADA-HALF-INTOPN TO FILLER1-CHAREMPL         ↩
         ADABAS   125 159
   000285                   IF ISNINDEMPL = ISNMOREEMPL MOVE 1 TO EOF-COBEMPL.   ↩
         ADABAS   199 198 200
0  000286                   IF NOT-EOFEMPL                                   ↩
         ADABAS   202
   000287      1            MOVE 0 TO EOF-COBEMPL                            ↩
         ADABAS   200
   000288      1            MOVE 'N' TO COMMAND-OPTION-2EMPL                 ↩
         ADABAS   178
   000289      1            MOVE ' ' TO COMMAND-OPTION-1EMPL                 ↩
         ADABAS   177
   000290      1            MOVE SAVE-DBIDEMPL TO RESPONSE-CODEEMPL          ↩
         ADABAS   206 166
   000291      1            MOVE 'L1' TO COMMAND-CODEEMPL                    ↩
         ADABAS   160
   000292      1            CALL 'ADABAS'   USING                            ↩
         ADABAS   EXT
  000293     1                CONTROL-BLOCKEMPL FORMAT-BUFEMPL RECORD-BUFEMPL ↩
```

```
    ADABAS   157 130 137
 000294      1                   SEARCH-BUFEMPL VALUE-BUFEMPL              ↩
       ADABAS   133 145
 000295      1                   ISN-BUFEMPL                               ↩
       ADABAS   155
 000296      1               MOVE ISNEMPL TO ISN OF                        ↩
       ADABAS   167 142
 000297      1                                    EMPLOYEES                ↩
       ADABAS   136
 000298      1               MOVE RESPONSE-CODEEMPL TO RESPONSE-CODE OF    ↩
       ADABAS   166 144
 000299      1                                    EMPLOYEES                ↩
       ADABAS   136
 000300      1               IF RESPONSE-CODEEMPL = 3                      ↩
       ADABAS   166
 000301      2                  MOVE 1 TO EOF-COBEMPL                      ↩
       ADABAS   200
 000302      2               ELSE IF RESPONSE-CODEEMPL NOT = 0             ↩
       ADABAS   166
 000303      3               MOVE '        ' TO CSEQ                       ↩
       ADABAS   112
 000304      3               MOVE '               EXEC ADABAS           ' TO ↩
CLN1V (01) ADABAS   114
 000305      3               MOVE '                                     ' TO ↩
CLN2V (01) ADABAS   116
 000306      3               MOVE '          FETCH EMPL                 ' TO ↩
CLN1V (02) ADABAS   114
 000307      3               MOVE '                                     ' TO ↩
CLN2V (02) ADABAS   116
 000308      3               MOVE '               END-EXEC              ' TO ↩
CLN1V (03) ADABAS   114
 000309      3               MOVE '                                     ' TO ↩
CLN2V (03) ADABAS   116
 000310      3               MOVE 03 TO CLNNUM                             ↩
       ADABAS   117
 000311      3                   CALL 'RESPINT'                            ↩
       ADABAS   EXT
 000312     3                  USING CONTROL-BLOCKEMPL DDFILE CSEQ FORMAT-BUFEMPL ↩
   ADABAS   157 110 112 130
 000313      3                    RECORD-BUFEMPL SEARCH-BUFEMPL VALUE-BUFEMPL  ↩
       ADABAS   137 133 145
 000314      3                    CLN1 CLN2 TRCE CLNNUM DDDBID.            ↩
       ADABAS   113 115 118 117 111
 000315                      IF EOFEMPL MOVE 003 TO ADACODE                ↩
       ADABAS   201 44
 000316      1                    ELSE MOVE 0 TO ADACODE.                  ↩
       ADABAS   44
   000317               *
   000318                      PERFORM READ-EMPLOYEES UNTIL ADACODE = 3.          ↩
        00000330  383 44
   000319               *
   000320               *
   000321               *        EXEC ADABAS
   000322               *    CLOSE EMPL
   000323               *        END-EXEC
   000324               *
   000325                      MOVE ADA-HALF-INTOPN TO FILLER1-CHAREMPL           ↩
         ADABAS   125 159
   000326                      MOVE 'I' TO COMMAND-OPTION-1EMPL                   ↩
         ADABAS   177
   000327                      MOVE 'S' TO COMMAND-OPTION-2EMPL                   ↩
         ADABAS   178
   000328                      MOVE SAVE-DBIDEMPL TO RESPONSE-CODEEMPL            ↩
         ADABAS   206 166
   000329                      MOVE 'RC' TO COMMAND-CODEEMPL                      ↩
         ADABAS   160
   000330                      CALL 'ADABAS'   USING                              ↩
         ADABAS   EXT
   000331                           CONTROL-BLOCKEMPL FORMAT-BUFEMPL RECORD-BUFEMPL ↩
      ADABAS   157 130 137
   000332                              SEARCH-BUFEMPL VALUE-BUFEMPL               ↩
         ADABAS   133 145
   000333                              ISN-BUFEMPL                                ↩
         ADABAS   155
   000334                      MOVE ISNEMPL TO ISN OF                             ↩
         ADABAS   167 142
   000335                                               EMPLOYEES                 ↩
         ADABAS   136
   000336                      MOVE RESPONSE-CODEEMPL TO RESPONSE-CODE OF         ↩
         ADABAS   166 144
   000337                                               EMPLOYEES                 ↩
         ADABAS   136
   000338                      IF RESPONSE-CODEEMPL NOT = 0                       ↩
         ADABAS   166
   000339      1               MOVE '        ' TO CSEQ                            ↩
         ADABAS   112
   000340      1               MOVE '                EXEC ADABAS             ' TO ↩
CLN1V (01) ADABAS   114
   000341      1               MOVE '                                        ' TO ↩
CLN2V (01) ADABAS   116
   000342      1               MOVE '            CLOSE EMPL                  ' TO ↩
CLN1V (02) ADABAS   114
0  000343      1               MOVE '                                        ' TO ↩
CLN2V (02) ADABAS   116
   000344      1               MOVE '                END-EXEC                ' TO ↩
CLN1V (03) ADABAS   114
   000345      1               MOVE '                                        ' TO ↩
CLN2V (03) ADABAS   116
```

```
   000346      1             MOVE 03 TO CLNNUM                                  ↩
         ADABAS   117
   000347      1                 CALL 'RESPINT'                                 ↩
         ADABAS   EXT
  000348     1                 USING CONTROL-BLOCKEMPL DDFILE CSEQ FORMAT-BUFEMPL ↩
     ADABAS   157 110 112 130
   000349      1                    RECORD-BUFEMPL SEARCH-BUFEMPL VALUE-BUFEMPL   ↩
         ADABAS   137 133 145
   000350      1                    CLN1 CLN2 TRCE CLNNUM DDDBID.                 ↩
         ADABAS   113 115 118 117 111
   000351               *
   000352               *
   000353               *         EXEC ADABAS
   000354               *    DBCLOSE
   000355               *         END-EXEC
   000356               *
   000357                    MOVE ADA-HALF-INTOPN TO FILLER1-CHAROPN              ↩
         ADABAS   125 47
   000358                    MOVE  1500 TO RECORD-BUFFER-LENGTHOPN                ↩
         ADABAS   60
   000359                    MOVE ' ' TO COMMAND-OPTION-2OPN                      ↩
         ADABAS   66
   000360                    MOVE ' ' TO COMMAND-OPTION-1OPN                      ↩
         ADABAS   65
   000361                    MOVE SAVE-DBIDOPN  TO RESPONSE-CODEOPN               ↩
         ADABAS   129 54
   000362                    MOVE 'CL' TO COMMAND-CODEOPN                         ↩
         ADABAS   48
   000363                    CALL 'ADABAS'   USING                                ↩
         ADABAS   EXT
  000364                          CONTROL-BLOCKOPN  FORMAT-BUFOPN  RECORD-BUFOPN ↩
       ADABAS   45 89 94
   000365                           SEARCH-BUFOPN  VALUE-BUFOPN                   ↩
         ADABAS   90 91
   000366                           ISN-BUFOPN                                    ↩
         ADABAS   92
   000367                    IF RESPONSE-CODEOPN  NOT = 0                         ↩
         ADABAS   54
   000368      1             MOVE '        ' TO CSEQ                              ↩
         ADABAS   112
   000369      1             MOVE '                EXEC ADABAS            ' TO ↩
CLN1V (01) ADABAS   114
   000370      1             MOVE '                                       ' TO ↩
CLN2V (01) ADABAS   116
   000371      1             MOVE '           DBCLOSE                     ' TO ↩
CLN1V (02) ADABAS   114
   000372      1             MOVE '                                       ' TO ↩
CLN2V (02) ADABAS   116
   000373      1             MOVE '                END-EXEC               ' TO ↩
CLN1V (03) ADABAS   114
   000374      1             MOVE '                                       ' TO ↩
CLN2V (03) ADABAS   116
```

```
   000375      1            MOVE 03 TO CLNNUM                                       ↩
         ADABAS   117
   000376      1                CALL 'RESPINT'                                      ↩
         ADABAS   EXT
  000377     1                 USING CONTROL-BLOCKOPN  DDFILE CSEQ FORMAT-BUFOPN ↩
      ADABAS   45 110 112 89
   000378      1                   RECORD-BUFOPN  SEARCH-BUFOPN  VALUE-BUFOPN    ↩
         ADABAS   94 90 91
   000379      1                   CLN1 CLN2 TRCE CLNNUM DDDBID.                 ↩
         ADABAS   113 115 118 117 111
```

```
   000380                *
   000381                     STOP RUN.                                            ↩
        00000340
   000382                *
   000383                 READ-EMPLOYEES.                                          ↩
        00000350
   000384                     MOVE PERSONNEL-ID TO PERSONNEL-NR.                   ↩
        00000360  138 31
   000385                     MOVE NAME TO LAST-NAME.                              ↩
        00000370  139 33
   000386                     MOVE FIRST-NAME TO F-NAME.                           ↩
        00000380  140 35
   000387                     MOVE SEX TO KIND.                                    ↩
        00000390  141 37
   000388                     DISPLAY LINE1.                                       ↩
        00000400  29
   000389                     MOVE SPACE TO LINE1.                                 ↩
        00000410  IMP 29
   000390                *
   000391                *                                                         ↩
        00000420
   000392                *         EXEC ADABAS                                     ↩
        00000430
   000393                *    FETCH EMPL                                           ↩
        00000440
   000394                *         END-EXEC                                        ↩
        00000450
   000395                *                                                         ↩
        00000460
   000396                     MOVE ADA-HALF-INTOPN TO FILLER1-CHAREMPL             ↩
         ADABAS   125 159
   000397                     IF ISNINDEMPL = ISNMOREEMPL MOVE 1 TO EOF-COBEMPL.   ↩
         ADABAS   199 198 200
   000398                     IF NOT-EOFEMPL                                       ↩
         ADABAS   202
   000399      1              MOVE 0 TO EOF-COBEMPL                                ↩
         ADABAS   200
0  000400      1              MOVE 'N' TO COMMAND-OPTION-2EMPL                     ↩
         ADABAS   178
   000401      1              MOVE ' ' TO COMMAND-OPTION-1EMPL                     ↩
```

```
         ADABAS   177
   000402      1            MOVE SAVE-DBIDEMPL TO RESPONSE-CODEEMPL           ↩
         ADABAS   206 166
   000403      1            MOVE 'L1' TO COMMAND-CODEEMPL                     ↩
         ADABAS   160
   000404      1            CALL 'ADABAS'   USING                             ↩
         ADABAS   EXT
  000405     1                   CONTROL-BLOCKEMPL FORMAT-BUFEMPL RECORD-BUFEMPL ↩
      ADABAS   157 130 137
   000406      1                   SEARCH-BUFEMPL VALUE-BUFEMPL               ↩
         ADABAS   133 145
   000407      1                   ISN-BUFEMPL                                ↩
         ADABAS   155
   000408      1            MOVE ISNEMPL TO ISN OF                            ↩
         ADABAS   167 142
   000409      1                                    EMPLOYEES                 ↩
         ADABAS   136
   000410      1            MOVE RESPONSE-CODEEMPL TO RESPONSE-CODE OF        ↩
         ADABAS   166 144
   000411      1                                    EMPLOYEES                 ↩
         ADABAS   136
   000412      1            IF RESPONSE-CODEEMPL = 3                          ↩
         ADABAS   166
   000413      2               MOVE 1 TO EOF-COBEMPL                          ↩
         ADABAS   200
   000414      2            ELSE IF RESPONSE-CODEEMPL NOT = 0                 ↩
         ADABAS   166
   000415      3            MOVE '        ' TO CSEQ                           ↩
         ADABAS   112
   000416      3            MOVE '                EXEC ADABAS           ' TO ↩
CLN1V (01) ADABAS   114
   000417      3            MOVE '                                      ' TO ↩
CLN2V (01) ADABAS   116
   000418      3            MOVE '           FETCH EMPL                 ' TO ↩
CLN1V (02) ADABAS   114
   000419      3            MOVE '                                      ' TO ↩
CLN2V (02) ADABAS   116
   000420      3            MOVE '                END-EXEC              ' TO ↩
CLN1V (03) ADABAS   114
   000421      3            MOVE '                                      ' TO ↩
CLN2V (03) ADABAS   116
   000422      3            MOVE 03 TO CLNNUM                                 ↩
         ADABAS   117
   000423      3                CALL 'RESPINT'                                ↩
         ADABAS   EXT
  000424     3                USING CONTROL-BLOCKEMPL DDFILE CSEQ FORMAT-BUFEMPL ↩
     ADABAS   157 110 112 130
   000425      3                  RECORD-BUFEMPL SEARCH-BUFEMPL VALUE-BUFEMPL  ↩
         ADABAS   137 133 145
   000426      3                   CLN1 CLN2 TRCE CLNNUM DDDBID.              ↩
         ADABAS   113 115 118 117 111
   000427                   IF EOFEMPL MOVE 003 TO ADACODE                    ↩
```

```
          ADABAS   201 44
  000428      1                   ELSE MOVE 0 TO ADACODE.                         ↩
          ADABAS   44
```

16 APPENDIX H - FORTRAN EXAMPLES

This chapter covers the following topics:

Example 1

```
      PROGRAM FEX1
C       AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH
C       CONTAINS FIELDS TAKEN FROM TWO FILES. THE FIELDS PERSONNEL-ID
C       NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,
C       PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE
C       FOLLOWING CONDITION:
C           PERSONNEL-ID BETWEEN 10000001 AND 19999999
C           MODEL-YEAR-MAKE >
C           CLASS = 'C'
      CHARACTER*22  STARTS
      CHARACTER*20  STARTM  /'MERCEDES BENZ'/
      CHARACTER*2   STAYM   /'86'/
      EQUIVALENCE  (STARTS,STARTM)
      EQUIVALENCE  (STARTS(21:21),STAYM)
C
           EXEC ADABAS
      BEGIN DECLARE SECTION
           END-EXEC
C
           EXEC ADABAS
      DECLARE EMPL CURSOR FOR
      SELECT PERSONNEL-ID, NAME, FIRST-NAME, BIRTH, SEX
      FROM EMPLOYEES, VEHICLES
      WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID
            AND PERSONNEL-ID BETWEEN '10000001' AND '19999999'
            AND VEHICLES.MODEL-YEAR-MAKE > :STARTS
            AND VEHICLES.CLASS = 'C'
           END-EXEC
C
      WRITE (6,10)
C
           EXEC ADABAS
      OPEN EMPL
           END-EXEC
C
           EXEC ADABAS
      FETCH EMPL
           END-EXEC
C
    1 IF (SQLCOD .EQ. 3) GOTO 2
C
         WRITE (6,20) PID,NAME,FNAME,BIRTH,SEX
C
              EXEC ADABAS
         FETCH EMPL
              END-EXEC
C
      GOTO 1
C
```

```

    2 CONTINUE
C
           EXEC ADABAS
      CLOSE EMPL
           END-EXEC
C
           EXEC ADABAS
      DBCLOSE
           END-EXEC
C
    10 FORMAT ('1PERSONNEL-ID',8X,'NAME',13X,'FIRST-NAME',8X,
     *        'BIRTH',1X,'SEX' / 1X,64('*') / )
  20 FORMAT (3X,A8,3X,A20,1X,A20,1X,A6,1X,A1)
C
      END
```

Example 2

```

      PROGRAM FEX2
C        DELETE AN EMPLOYEE RECORD AND RELEASE ALL CARS WHICH ARE
C        ASSIGNED TO THIS EMPLOYEE. A PRIVATE CARS WILL BE DELETED
C        AND A COMPANY CAR WILL BE MADE A POOL-CAR WHICH IS IDENTIFIED
C        BY ITS PERSONNEL-ID CONTAINING ONLY THE COUNTRY CODE.
C
      CHARACTER*8  PERSNR  /'20007100'/
      INTEGER*4    EMPISN
      CHARACTER*15 CNUM
      CHARACTER*1  CNO
      EQUIVALENCE  (CNUM,CNO)
C
           EXEC ADABAS
      BEGIN DECLARE SECTION
           END-EXEC
C
           EXEC ADABAS
      READ LOGICAL
      DECLARE VEH1 CURSOR FOR
      SELECT REG-NUM, PERSONNEL-ID, CLASS
      FROM VEHICLES
      WHERE PERSONNEL-ID GE :PERSNR
      OPTIONS HOLD
      ORDER BY PERSONNEL-ID
           END-EXEC
C
C     FIND EMPLOYEE
C
           EXEC ADABAS
      FIND
      SELECT
      FROM EMPLOYEES EMPL1
      WHERE PERSONNEL-ID = :PERSNR
      OPTIONS HOLD
           END-EXEC
C
C         IF THE PERSONNEL-ID EXISTS DELETE THE EMPLOYEE AND READ THE
C         VEHICLES FILE
C
      IF (SQLQTY .EQ. 1) THEN
         EMPISN = SQLISN
         GOTO 3
    1    GOTO 4
      ELSE
         WRITE (6,10) PERSNR
      END IF
C
    2 CONTINUE
C
           EXEC ADABAS
      DBCLOSE
           END-EXEC
C
      STOP
```

```
C
C*** DELETE EMPLOYEE
C
    3 CONTINUE
C
           EXEC ADABAS
      DELETE
      FROM EMPLOYEES
      WHERE ISN = :EMPISN
           END-EXEC
C
      WRITE (6,20) PERSNR
C
      GOTO 1
C
C*** DEALLOCATE CARS
C
    4 CONTINUE
```

```
C
           EXEC ADABAS
      OPEN VEH1
           END-EXEC
C
           EXEC ADABAS
      FETCH VEH1
           END-EXEC
C
    5 IF (SQLCOD .EQ. 3 .OR. PID .NE. PERSNR) GOTO 6
C
          IF (CLASS .EQ. 'P') THEN
                  EXEC ADABAS
               DELETE
               FROM VEHICLES
               WHERE CURRENT OF VEH1
                  END-EXEC
               WRITE (6,30) REGNUM
          ELSE
               CNUM = PID
               PID = CNO
                  EXEC ADABAS
               UPDATE VEHICLES
               WHERE CURRENT OF VEH1
                  END-EXEC
               WRITE (6,40) REGNUM
          END IF
C
             EXEC ADABAS
          FETCH VEH1
             END-EXEC
C
          GOTO 5
C
    6 CONTINUE
C
         EXEC ADABAS
      CLOSE VEH1
         END-EXEC
C
         EXEC ADABAS
      COMMIT WORK
         END-EXEC
C
      GOTO 2
```

```
C
   10 FORMAT (' NO EMPLOYEE FOUND WITH PERSONNEL-ID ',A8)
   20 FORMAT (' EMPLOYEE ',A8,' HAS BEEN DELETED')
   30 FORMAT (' PRIVATE CAR ',A15,' HAS BEEN DELETED')
   40 FORMAT (' COMPANY CAR ',A15,' HAS BEEN UPDATED')
      END
```

Example 3

```
      PROGRAM FEX3
C        SALARY INCREASE.
C        THIS PROGRAM INCREASES THE SALARY OF EVERY EMPLOYEE BY
C        4 PERCENT.
C        THE DEPARTMENT, THE OVERALL AMOUNT OF PAY RISE FOR THE
C        DEPARTMENT AND THE PAY RISE FOR ALL DEPARTMENTS WILL BE PRINTED
C        OUT.
C        THE PROGRAM IS RESTARTABLE. AFTER AN ABNORMAL TERMINATION THE
C        PROGRAM EXECUTION WOULD RESTART WITH THE LAST DEPARTMENT
C        WHOSE SALARY UPDATE HAD BEEN COMPLETED BEFORE THE ABEND
C        OCCURED.
C
      CHARACTER*10 COMDAT
      CHARACTER*6  COMDEP
      INTEGER*4    COMSUM
      EQUIVALENCE  (COMDAT,COMDEP)
      EQUIVALENCE  (COMDAT(7:7),COMSUM)
      CHARACTER*6  SDEP
      INTEGER*4    IND, I, J, NEWSAL, INCRS, SUMDEP, SUMTOT, E1QTY
C
          EXEC ADABAS
      BEGIN DECLARE SECTION
          END-EXEC
C
          EXEC ADABAS
      HISTOGRAM
      DECLARE EMP1 CURSOR FOR
      SELECT  DEPT
      FROM EMPLOYEES E1
      WHERE DEPT GE :COMDEP
      OPTIONS PREFIX=E1
      GROUP BY DEPT
          END-EXEC
C
          EXEC ADABAS
      READ LOGICAL
      DECLARE EMP2 CURSOR FOR
      SELECT PERSONNEL-ID, DEPT, SALARY, INCOME(COUNT)
      FROM EMPLOYEES
      WHERE DEPT GE :SDEP
      OPTIONS HOLD
      ORDER BY DEPT
           END-EXEC
C
           EXEC ADABAS
      CONNECT 'INCREASE'
      UPD=EMPLOYEES
      AND USERDATA INTO :COMDAT
           END-EXEC
C
C     A HISTOGRAM STATEMENT IS USED TO ASCERTAIN THE NUMBER OF
C     EMPLOYEES PER DEPARTMENT
C
           EXEC ADABAS
      OPEN EMP1
           END-EXEC
```

```
C
           EXEC ADABAS
      FETCH EMP1
           END-EXEC
      E1QTY = SQLQTY
C
      IF (COMDAT .NE. ' ') THEN
C
C          RESTART PROCESSING
C
           WRITE (6,*) 'LAST PROGRAM RUN TERMINATED ABNORMALLY'
           WRITE (6,50) COMDEP
C
                EXEC ADABAS
           FETCH EMP1
                END-EXEC.
           E1QTY = SQLQTY
      END IF
C
      SDEP = E1DEPT
C
           EXEC ADABAS
      OPEN EMP2
           END-EXEC
C
      WRITE (6,10)
C
    1 IF (SQLCOD .EQ. 3) GOTO 4
C
C     THE EMPLOYEES FILE WILL BE READ UNTIL ALL RECORDS FOR THE
C     DEPARTMENT HAVE BEEN PROCESSED AND THE SALARY HAS BEEN
C     UPDATED
```

```
C
      DO 3 J=1, E1QTY
                EXEC ADABAS
           FETCH EMP2
                END-EXEC
C            THE SALARY INCREASE CAN BE EXECUTED WHEN THE COUNT OF THE
C            PERIODIC GROUP IS LESS THAN 40.
           IF (CINC .LT. 40) THEN
              INCRS = NINT(REAL(SALARY(1)) * 0.04)
              NEWSAL = SALARY(1) + INCRS
              IND = CINC + 1
C
              DO 2 I = CINC, 0, -1
                   SALARY(IND) = SALARY(I)
                   IND = IND - 1
    2         CONTINUE
C
              SALARY(1) = NEWSAL
C
                  EXEC ADABAS
              UPDATE EMPLOYEES
              WHERE CURRENT OF EMP2
                  END-EXEC
C
              SUMDEP = SUMDEP + INCRS
              SUMTOT = SUMTOT + INCRS
           ELSE
              WRITE (6,40) PID
           END IF
C
    3 CONTINUE
```

```
C
      WRITE (6,20) DEPT, SUMDEP
      SUMDEP = 0
C
      COMDEP = DEPT
      COMSUM = SUMTOT
          EXEC ADABAS
      COMMIT WORK
      USERDATA = :COMDAT
          END-EXEC
C
           EXEC ADABAS
      FETCH EMP1
          END-EXEC
      E1QTY = SQLQTY
C
      GOTO 1
C
    4 CONTINUE
```

```
C
          EXEC ADABAS
      CLOSE EMP1
          END-EXEC
C
          EXEC ADABAS
      CLOSE EMP2
          END-EXEC
C
      WRITE (6,30) SUMTOT
      COMDAT = ' '
C
          EXEC ADABAS
      DBCLOSE
      USERDATA = :COMDAT
          END-EXEC
C
   10 FORMAT (' DEPARTMENT',15X,'SALARY INCREASE'/1X,40('*'))
   20 FORMAT (4X,A6,16X,I10)
   30 FORMAT (/50('-')//' TOTAL SALARY INCREASE : ',I11)
   40 FORMAT (' UPDATE PERSON ',A8,' NOT POSSIBLE')
   50 FORMAT (' LAST DEPARTMENT WAS ',A6)
      END
```

17 APPENDIX I - EXAMPLE OF FORTRAN CODE GENERATED BY ADABAS NATIVE SQL

```
      PROGRAM FEX1                                                      00000010
C       AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH       00000020
C       CONTAINS FIELDS TAKEN FROM TWO FILES. THE FIELDS PERSONNEL-ID   00000030
C       NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,            00000040
C       PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE          00000050
C       FOLLOWING CONDITION:                                            00000060
C           PERSONNEL-ID BETWEEN 10000001 AND 19999999                  00000070
C           MODEL-YEAR-MAKE >                                           00000080
C           CLASS = 'C'                                                 00000090
      CHARACTER*22  STARTS                                              00000100
      CHARACTER*20  STARTM  /'MERCEDES BENZ'/                           00000110
      CHARACTER*2   STAYM   /'86'/                                      00000120
      EQUIVALENCE  (STARTS,STARTM)                                      00000130
      EQUIVALENCE  (STARTS(21:21),STAYM)                                00000140
C                                                                       00000150
*                                                                       00000160
*          EXEC ADABAS                                                  00000170
*     BEGIN DECLARE SECTION                                             00000180
*          END-EXEC                                                     00000190
*                                                                       00000200
      INTEGER*2 SQLCOD /0/                                               ADABAS
      CHARACTER*     2 SQC000                         /'AS'   /          ADABAS
      CHARACTER*     2 SQCC00                         /' '    /          ADABAS
      CHARACTER*     4 SQCI00                         /'OPEN' /          ADABAS
      INTEGER*       2 SQCF00                         /     0 /          ADABAS
      INTEGER*       2 SQCR00                         /     0 /          ADABAS
      INTEGER*       4 SQCS00                         /     0 /          ADABAS
      INTEGER*       4 SQCL00                         /     0 /          ADABAS
      INTEGER*       4 SQCQ00                         /     0 /          ADABAS
      INTEGER*       2 SQC300                         /     0 /          ADABAS
      INTEGER*       2 SQC400                         /     0 /          ADABAS
      INTEGER*       2 SQC500                         /     0 /          ADABAS
      INTEGER*       2 SQC600                         /     0 /         ADABAS
      INTEGER*       2 SQC700                         /     4 /         ADABAS
      CHARACTER*     1 SQC100                         /' '    /         ADABAS
      CHARACTER*     1 SQC200                         /' '    /         ADABAS
      CHARACTER*     8 SQCM00                         /' '    /         ADABAS
      CHARACTER*     4 SQCN00                         /' '    /         ADABAS
      CHARACTER*     8 SQCO00                         /' '    /         ADABAS
      INTEGER*       2 SQCE00                         /     0 /         ADABAS
      INTEGER*       2 SQCH00                         /     0 /         ADABAS
      INTEGER*       2 SQCJ00                         /     0 /         ADABAS
      INTEGER*       2 SQCK00                         /     0 /         ADABAS
      INTEGER*       4 SQC800                         /     0 /         ADABAS
      INTEGER*       4 SQCT00                         /     0 /         ADABAS
      CHARACTER*     4 SQCU00                         /'AS  ' /         ADABAS
      CHARACTER*     4 SQC900                         /' '    /         ADABAS
      CHARACTER*     1 SQCD00                                           ADABAS
      CHARACTER*     2 SQCV00                                           ADABAS
      CHARACTER*     4 SQCW00                                           ADABAS
      CHARACTER*     8 SQCP00                                           ADABAS
      CHARACTER*     7 SQCG00                                           ADABAS
      CHARACTER*     1 SQCZ00                                           ADABAS
      CHARACTER*    80 SQCB00                                           ADABAS
      INTEGER*       2 SQCY00                                           ADABAS
      CHARACTER*     1 SQCA00(00080)                                    ADABAS
      EQUIVALENCE     (SQCA00(00001),SQCB00)                            ADABAS
      EQUIVALENCE     (SQCA00(00001),SQC000)                            ADABAS
      EQUIVALENCE     (SQCA00(00003),SQCC00)                            ADABAS
      EQUIVALENCE     (SQCA00(00005),SQCI00)                            ADABAS
      EQUIVALENCE     (SQCA00(00009),SQCF00)                            ADABAS
      EQUIVALENCE     (SQCA00(00009),SQCD00)                            ADABAS
      EQUIVALENCE     (SQCA00(00011),SQCR00)                            ADABAS
      EQUIVALENCE     (SQCA00(00013),SQCS00)                            ADABAS
      EQUIVALENCE     (SQCA00(00017),SQCL00)                            ADABAS
      EQUIVALENCE     (SQCA00(00021),SQCQ00)                            ADABAS
      EQUIVALENCE     (SQCA00(00025),SQC300)                            ADABAS
      EQUIVALENCE     (SQCA00(00027),SQC400)                            ADABAS
      EQUIVALENCE     (SQCA00(00029),SQC500)                            ADABAS
      EQUIVALENCE     (SQCA00(00031),SQC600)                            ADABAS
      EQUIVALENCE     (SQCA00(00033),SQC700)                            ADABAS
      EQUIVALENCE     (SQCA00(00035),SQC100)                            ADABAS
      EQUIVALENCE     (SQCA00(00036),SQC200)                            ADABAS
      EQUIVALENCE     (SQCA00(00037),SQCM00)                            ADABAS
      EQUIVALENCE     (SQCA00(00037),SQCV00)                            ADABAS
      EQUIVALENCE     (SQCA00(00037),SQCY00)                            ADABAS
      EQUIVALENCE     (SQCA00(00041),SQCW00)                            ADABAS
      EQUIVALENCE     (SQCA00(00045),SQCN00)                            ADABAS
      EQUIVALENCE     (SQCA00(00049),SQCO00)                            ADABAS
      EQUIVALENCE     (SQCA00(00057),SQCP00)                            ADABAS
      EQUIVALENCE     (SQCA00(00057),SQCE00)                            ADABAS
      EQUIVALENCE     (SQCA00(00059),SQCH00)                            ADABAS
      EQUIVALENCE     (SQCA00(00061),SQCJ00)                            ADABAS
      EQUIVALENCE     (SQCA00(00063),SQCK00)                            ADABAS
      EQUIVALENCE     (SQCA00(00065),SQC800)                            ADABAS
      EQUIVALENCE     (SQCA00(00065),SQCZ00)                            ADABAS
      EQUIVALENCE     (SQCA00(00066),SQCG00)                            ADABAS
      EQUIVALENCE     (SQCA00(00069),SQC900)                            ADABAS
      EQUIVALENCE     (SQCA00(00073),SQCT00)                            ADABAS
      EQUIVALENCE     (SQCA00(00077),SQCU00)                            ADABAS
      CHARACTER*     1 SQFB00                                           ADABAS
      CHARACTER*     1 SQSB00                                           ADABAS
      CHARACTER*     1 SQVB00                                           ADABAS
      CHARACTER*     1 SQDS00                                           ADABAS
      CHARACTER*   500 SQRB00                                           ADABAS
      CHARACTER*    10 SQDK00                                           ADABAS
      CHARACTER*     3 SQDD00                        /'030'  /          ADABAS
      CHARACTER*     8 SQDA00                                           ADABAS
      CHARACTER*    40 SQDB00(00020)                                    ADABAS
      CHARACTER*    40 SQDC00(00020)                                    ADABAS
      CHARACTER*     7 SQDE00                                           ADABAS
      INTEGER*       2 SQDG00                                           ADABAS
      INTEGER*       2 SQLRSP                                           ADABAS
      INTEGER*       4 SQLQTY                                           ADABAS
      INTEGER*       4 SQLISN                                           ADABAS
      CHARACTER*     8 SQDL00                                           ADABAS
      INTEGER*       2 SQDN00                                           ADABAS
      INTEGER*       4 SQDO00                                           ADABAS
      REAL*          4 SQDP00                                           ADABAS
      REAL*          8 SQDQ00                                           ADABAS
      CHARACTER*     1 SQDM00(00008)                                    ADABAS
      EQUIVALENCE     (SQDM00(00001),SQDL00)                            ADABAS
      EQUIVALENCE     (SQDM00(00001),SQDN00)                            ADABAS
      EQUIVALENCE     (SQDM00(00001),SQDO00)                            ADABAS
      EQUIVALENCE     (SQDM00(00001),SQDP00)                            ADABAS
      EQUIVALENCE     (SQDM00(00001),SQDQ00)                            ADABAS
      INTEGER*       2 SQDR00                                           ADABAS
      CHARACTER*     1 SQDF00                                           ADABAS
      CHARACTER*     1 SQDT00(00002)                                    ADABAS
      EQUIVALENCE     (SQDT00(00001),SQDR00)                            ADABAS
      EQUIVALENCE     (SQDT00(00002),SQDF00)                            ADABAS
      CHARACTER*    37 SQFB01                                           ADABAS
      CHARACTER*     1 SQFA01(00037)                                    ADABAS
      EQUIVALENCE     (SQFA01(00001),SQFB01)                            ADABAS
      CHARACTER*37 SQFC01/'AA,8,A,AE,20,A,AC,20,A,AH,6,U,AG,1,A.'/      ADABAS
      EQUIVALENCE     (SQFA01(00001),SQFC01)                            ADABAS
      CHARACTER*    59 SQSB01                                           ADABAS
      CHARACTER*     1 SQSA01(00059)                                    ADABAS
      EQUIVALENCE     (SQSA01(00001),SQSB01)                            ADABAS
      CHARACTER*40 SQSC01/'(22,AA,24,AC)/22/AA,8,A,S,AA,8,A,D,/24/A'/   ADABAS
      EQUIVALENCE     (SQSA01(00001),SQSC01)                            ADABAS
      CHARACTER*19 SQSD01/'0,22,A,GT,D,AH,1,A.'/                        ADABAS
      EQUIVALENCE     (SQSA01(00041),SQSD01)                            ADABAS
      EQUIVALENCE     (SQRA01(00001),SQRB01)                            ADADATA
      EQUIVALENCE     (SQRA01(00001),EMPLOY)                            ADADATA
      CHARACTER*     8 PID                                              ADADATA
      EQUIVALENCE     (SQRA01(00001),PID   )                        ADADATA
      CHARACTER*    20 NAME                                         ADADATA
      EQUIVALENCE     (SQRA01(00009),NAME  )                        ADADATA
      CHARACTER*    20 FIRSTN                                       ADADATA
      EQUIVALENCE     (SQRA01(00029),FIRSTN)                        ADADATA
      CHARACTER*     6 BIRTH                                        ADADATA
      EQUIVALENCE     (SQRA01(00049),BIRTH )                        ADADATA
      CHARACTER*     1 SEX                                          ADADATA
      EQUIVALENCE     (SQRA01(00055),SEX   )                        ADADATA
      CHARACTER*    55 EMPLOY                                       ADADATA
      CHARACTER*    55 SQRB01                                       ADADATA
      CHARACTER*     1 SQRA01(00055)                                ADADATA
      EQUIVALENCE     (SQVA01(00001),SQVB01)                        ADABAS
      CHARACTER*     8 SQVC01                    /' '    /          ADABAS
      EQUIVALENCE     (SQVA01(00001),SQVC01)                        ADABAS
      CHARACTER*     8 SQVD01                    /' '    /          ADABAS
      EQUIVALENCE     (SQVA01(00009),SQVD01)                        ADABAS
      CHARACTER*    22 SQVE01                    /' '    /          ADABAS
      EQUIVALENCE     (SQVA01(00017),SQVE01)                        ADABAS
      CHARACTER*     1 SQVF01                    /' '    /          ADABAS
      EQUIVALENCE     (SQVA01(00039),SQVF01)                        ADABAS
      CHARACTER*    39 SQVB01                                       ADABAS
      CHARACTER*     1 SQVA01(00039)                                ADABAS
      INTEGER*       4 SQDS01(00001)                                ADABAS
      CHARACTER*     2 SQC001                    /'AS'   /          ADABAS
      CHARACTER*     2 SQCC01                    /' '    /          ADABAS
      CHARACTER*     4 SQCI01                    /'EMPL' /          ADABAS
      INTEGER*       2 SQCF01                    /    22 /          ADABAS
      INTEGER*       2 SQCR01                    /     0 /          ADABAS
      INTEGER*       4 SQCS01                    /     0 /          ADABAS
      INTEGER*       4 SQCL01                    /     0 /          ADABAS
      INTEGER*       4 SQCQ01                    /     0 /          ADABAS
      INTEGER*       2 SQC301                    /    37 /          ADABAS
      INTEGER*       2 SQC401                    /    55 /          ADABAS
      INTEGER*       2 SQC501                    /    59 /          ADABAS
      INTEGER*       2 SQC601                    /    39 /          ADABAS
      INTEGER*       2 SQC701                    /     4 /          ADABAS
      CHARACTER*     1 SQC101                    /' '    /          ADABAS
      CHARACTER*     1 SQC201                    /' '    /          ADABAS
      CHARACTER*     8 SQCM01                    /' '    /          ADABAS
      CHARACTER*     4 SQCN01                    /' '    /          ADABAS
      CHARACTER*     8 SQCO01                    /' '    /          ADABAS
      CHARACTER*     8 SQCP01                    /' '    /          ADABAS
      INTEGER*       4 SQC801                    /     0 /          ADABAS
      INTEGER*       4 SQCT01                    /     0 /          ADABAS
      CHARACTER*     4 SQCU01                    /'AS  ' /          ADABAS
      CHARACTER*     4 SQC901                    /' '    /          ADABAS
      CHARACTER*     1 SQCD01                                       ADABAS
      CHARACTER*     2 SQCV01                                       ADABAS
      CHARACTER*     4 SQCW01                                       ADABAS
      CHARACTER*     7 SQCG01                                       ADABAS
      CHARACTER*     1 SQCZ01                                       ADABAS
      CHARACTER*    80 SQCB01                                           ADABAS
      INTEGER*       2 SQCY01                                           ADABAS
      CHARACTER*     1 SQCA01(00080)                                    ADABAS
      EQUIVALENCE     (SQCA01(00001),SQCB01)                            ADABAS
      EQUIVALENCE     (SQCA01(00001),SQC001)                            ADABAS
      EQUIVALENCE     (SQCA01(00003),SQCC01)                            ADABAS
      EQUIVALENCE     (SQCA01(00005),SQCI01)                            ADABAS
      EQUIVALENCE     (SQCA01(00009),SQCF01)                            ADABAS
      EQUIVALENCE     (SQCA01(00009),SQCD01)                            ADABAS
      EQUIVALENCE     (SQCA01(00011),SQCR01)                            ADABAS
      EQUIVALENCE     (SQCA01(00013),SQCS01)                            ADABAS
      EQUIVALENCE     (SQCA01(00017),SQCL01)                            ADABAS
      EQUIVALENCE     (SQCA01(00021),SQCQ01)                            ADABAS
      EQUIVALENCE     (SQCA01(00025),SQC301)                            ADABAS
      EQUIVALENCE     (SQCA01(00027),SQC401)                            ADABAS
      EQUIVALENCE     (SQCA01(00029),SQC501)                            ADABAS
      EQUIVALENCE     (SQCA01(00031),SQC601)                            ADABAS
      EQUIVALENCE     (SQCA01(00033),SQC701)                            ADABAS
      EQUIVALENCE     (SQCA01(00035),SQC101)                            ADABAS
      EQUIVALENCE     (SQCA01(00036),SQC201)                            ADABAS
      EQUIVALENCE     (SQCA01(00037),SQCM01)                            ADABAS
      EQUIVALENCE     (SQCA01(00037),SQCV01)                            ADABAS
      EQUIVALENCE     (SQCA01(00037),SQCY01)                            ADABAS
      EQUIVALENCE     (SQCA01(00041),SQCW01)                            ADABAS
      EQUIVALENCE     (SQCA01(00045),SQCN01)                            ADABAS
      EQUIVALENCE     (SQCA01(00049),SQCO01)                            ADABAS
      EQUIVALENCE     (SQCA01(00057),SQCP01)                            ADABAS
      EQUIVALENCE     (SQCA01(00065),SQC801)                            ADABAS
      EQUIVALENCE     (SQCA01(00065),SQCZ01)                            ADABAS
      EQUIVALENCE     (SQCA01(00066),SQCG01)                            ADABAS
      EQUIVALENCE     (SQCA01(00069),SQC901)                            ADABAS
      EQUIVALENCE     (SQCA01(00073),SQCT01)                            ADABAS
      EQUIVALENCE     (SQCA01(00077),SQCU01)                            ADABAS
      INTEGER*       4 SQDH01                                           ADABAS
      INTEGER*       4 SQDJ01                                           ADABAS
      INTEGER*       2 SQDI01                                           ADABAS
      LOGICAL*       1 SQEF01                         /.FALSE./         ADABAS
      INTEGER*       2 SQDR01                                           ADABAS
      CHARACTER*     1 SQDF01                                           ADABAS
      CHARACTER*     1 SQDT01(00002)                                    ADABAS
      EQUIVALENCE     (SQDT01(00001),SQDR01)                            ADABAS
      EQUIVALENCE     (SQDT01(00002),SQDF01)                            ADABAS
C                                                                      00000210
*                                                                      00000220
*          EXEC ADABAS                                                 00000230
*     DECLARE EMPL CURSOR FOR                                          00000240
*     SELECT PERSONNEL-ID, NAME, FIRST-NAME, BIRTH, SEX                00000250
*     FROM EMPLOYEES, VEHICLES                                         00000260
*     WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID             00000270
*           AND PERSONNEL-ID BETWEEN '10000001' AND '19999999'         00000280
*           AND VEHICLES.MODEL-YEAR-MAKE > :STARTS                     00000290
*           AND VEHICLES.CLASS = 'C'                                   00000300
*          END-EXEC                                                    00000310
*                                                                      00000320
C                                                                      00000330
      WRITE (6,10)                                                     00000340
C                                                                      00000350
*                                                                      00000360
*          EXEC ADABAS                                                 00000370
*     OPEN EMPL                                                        00000380
*          END-EXEC                                                    00000390
*                                                                      00000400
           SQVC01 ='10000001'                                           ADABAS
           SQVD01 ='19999999'                                           ADABAS
           SQVE01 =STARTS                                               ADABAS
           SQVF01 ='C'                                                  ADABAS
      SQDA00='00000400'                                                 ADABAS
      SQDB00(01)='          EXEC ADABAS                        '        ADABAS
      SQDC00(01)='                                             '        ADABAS
      SQDB00(02)='     OPEN EMPL                               '        ADABAS
      SQDC00(02)='                                             '        ADABAS
      SQDB00(03)='          END-EXEC                           '        ADABAS
      SQDC00(03)='                                             '        ADABAS
      SQDG00=03                                                         ADABAS
      SQDH01=SQC701 / 4                                                 ADABAS
      SQDI01=1                                                          ADABAS
      SQCL01=0                                                          ADABAS
      SQCQ01=0                                                          ADABAS
      SQC201=' '                                                        ADABAS
      SQC101=' '                                                        ADABAS
      SQC701=0                                                          ADABAS
      SQDR01=188                                                        ADABAS
      SQCD01=SQDF01                                                     ADABAS
      SQCC01='S1'                                                       ADABAS
      CALL  ADABAS    (                                                 ADABAS
     1  SQCB01,SQFB01,SQRB01,SQSB01,SQVB01,                             ADABAS
     1  SQDS01                                         )                ADABAS
      SQLRSP=SQCR01                                                     ADABAS
      SQLQTY=SQCQ01                                                     ADABAS
      SQLISN=SQCS01                                                     ADABAS
      IF (SQCR01 .NE. 0                                                 ADABAS
     1  ) THEN                                                          ADABAS
       CALL RESPF  (                                                    ADABAS
     1  SQCB01,SQDD00,SQDA00,SQFB01,SQRB01,SQSB01,                      ADABAS
     1  SQVB01,SQDB00,SQDC00,SQDE00,SQDG00)                             ADABAS
           END IF                                                       ADABAS
      SQDJ01=SQCQ01                                                     ADABAS
      IF (SQDJ01 .GT. 0) THEN                                           ADABAS
          SQEF01=.FALSE.                                                ADABAS
        ELSE                                                            ADABAS
          SQEF01=.TRUE.                                                 ADABAS
        END IF                                                          ADABAS
      IF (SQDJ01 .LT. SQDH01) SQDH01=SQDJ01                             ADABAS
      SQDI01=0                                                          ADABAS
```

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C                                                                       00000410
*                                                                       00000420
*          EXEC ADABAS                                                  00000430
*     FETCH EMPL                                                        00000440
*          END-EXEC                                                     00000450
*                                                                       00000460
      SQDA00='00000460'                                                  ADABAS
      SQDB00(01)='           EXEC ADABAS                  '              ADABAS
      SQDC00(01)='                                        '              ADABAS
      SQDB00(02)='      FETCH EMPL                        '              ADABAS
      SQDC00(02)='                                        '              ADABAS
      SQDB00(03)='           END-EXEC                     '              ADABAS
      SQDC00(03)='                                        '              ADABAS
      SQDG00=03                                                          ADABAS
      IF (SQDI01 .EQ. SQDJ01) SQEF01=.TRUE.                              ADABAS
      IF (.NOT. SQEF01) THEN                                             ADABAS
      SQEF01=.FALSE.                                                     ADABAS
      SQC201='N'                                                         ADABAS
      SQC101=' '                                                         ADABAS
      SQDR01=188                                                         ADABAS
      SQCD01=SQDF01                                                      ADABAS
      SQCC01='L1'                                                        ADABAS
      CALL  ADABAS    (                                                  ADABAS
     1  SQCB01,SQFB01,SQRB01,SQSB01,SQVB01,                              ADABAS
     1  SQDS01                                            )              ADABAS
      SQLRSP=SQCR01                                                      ADABAS
      SQLQTY=SQCQ01                                                      ADABAS
      SQLISN=SQCS01                                                      ADABAS
      IF (SQCR01 .EQ. 3) THEN                                            ADABAS
        SQEF01=.TRUE.                                                    ADABAS
      ELSE                                                               ADABAS
     1IF (SQCR01 .NE. 0                                                  ADABAS
     1  ) THEN                                                           ADABAS
       CALL RESPF  (                                                     ADABAS
     1  SQCB01,SQDD00,SQDA00,SQFB01,SQRB01,SQSB01,                       ADABAS
     1  SQVB01,SQDB00,SQDC00,SQDE00,SQDG00)                              ADABAS
           END IF                                                        ADABAS
      END IF                                                             ADABAS
      IF (SQEF01) THEN                                                   ADABAS
         SQLCOD=003                                                      ADABAS
      ELSE                                                               ADABAS
         SQLCOD=0                                                        ADABAS
      END IF                                                             ADABAS
C                                                                       00000470
    1 IF (SQLCOD .EQ. 3) GOTO 2                                         00000480
C                                                                       00000490
         WRITE (6,20) PID,NAME,FNAME,BIRTH,SEX                          00000500
C                                                                       00000510
*                                                                       00000520
*             EXEC ADABAS                                               00000530
*        FETCH EMPL                                                     00000540
*             END-EXEC                                                  00000550
*                                                                       00000560
      SQDA00='00000560'                                                  ADABAS
      SQDB00(01)='              EXEC ADABAS              '               ADABAS
      SQDC00(01)='                                       '               ADABAS
      SQDB00(02)='         FETCH EMPL                    '               ADABAS
      SQDC00(02)='                                       '               ADABAS
      SQDB00(03)='              END-EXEC                 '               ADABAS
      SQDC00(03)='                                       '               ADABAS
      SQDG00=03                                                          ADABAS
      IF (SQDI01 .EQ. SQDJ01) SQEF01=.TRUE.                              ADABAS
      IF (.NOT. SQEF01) THEN                                             ADABAS
      SQEF01=.FALSE.                                                     ADABAS
      SQC201='N'                                                         ADABAS
      SQC101=' '                                                         ADABAS
      SQDR01=188                                                         ADABAS
      SQCD01=SQDF01                                                      ADABAS
      SQCC01='L1'                                                        ADABAS
      CALL  ADABAS    (                                                  ADABAS
     1  SQCB01,SQFB01,SQRB01,SQSB01,SQVB01,                              ADABAS
     1  SQDS01                                           )               ADABAS
      SQLRSP=SQCR01                                                      ADABAS
      SQLQTY=SQCQ01                                                      ADABAS
      SQLISN=SQCS01                                                      ADABAS
      IF (SQCR01 .EQ. 3) THEN                                            ADABAS
        SQEF01=.TRUE.                                                    ADABAS
      ELSE                                                               ADABAS
     1IF (SQCR01 .NE. 0                                                  ADABAS
     1  ) THEN                                                           ADABAS
       CALL RESPF  (                                                     ADABAS
     1  SQCB01,SQDD00,SQDA00,SQFB01,SQRB01,SQSB01,                       ADABAS
     1  SQVB01,SQDB00,SQDC00,SQDE00,SQDG00)                              ADABAS
           END IF                                                        ADABAS
      END IF                                                             ADABAS
      IF (SQEF01) THEN                                                   ADABAS
         SQLCOD=003                                                      ADABAS
      ELSE                                                               ADABAS
         SQLCOD=0                                                        ADABAS
      END IF                                                             ADABAS
C                                                                       00000570
      GOTO 1                                                            00000580
C                                                                       00000590
    2 CONTINUE                                                          00000600
C                                                                       00000610
*                                                                       00000620
*          EXEC ADABAS                                                  00000630
*     CLOSE EMPL                                                        00000640
*          END-EXEC                                                     00000650
*                                                                       00000660
      SQDA00='00000660'                                                  ADABAS
      SQDB00(01)='           EXEC ADABAS                 '               ADABAS
      SQDC00(01)='                                       '               ADABAS
      SQDB00(02)='      CLOSE EMPL                       '               ADABAS
      SQDC00(02)='                                        '          ADABAS
      SQDB00(03)='          END-EXEC                      '          ADABAS
      SQDC00(03)='                                        '          ADABAS
      SQDG00=03                                                      ADABAS
      SQC101='I'                                                     ADABAS
      SQC201='S'                                                     ADABAS
      SQDR01=188                                                     ADABAS
      SQCD01=SQDF01                                                  ADABAS
      SQCC01='RC'                                                    ADABAS
      CALL  ADABAS    (                                              ADABAS
     1  SQCB01,SQFB01,SQRB01,SQSB01,SQVB01,                          ADABAS
     1  SQDS01                                )                      ADABAS
      SQLRSP=SQCR01                                                  ADABAS
      SQLQTY=SQCQ01                                                  ADABAS
      SQLISN=SQCS01                                                  ADABAS
      IF (SQCR01 .NE. 0                                              ADABAS
     1  ) THEN                                                       ADABAS
       CALL RESPF  (                                                 ADABAS
     1  SQCB01,SQDD00,SQDA00,SQFB01,SQRB01,SQSB01,                   ADABAS
     1  SQVB01,SQDB00,SQDC00,SQDE00,SQDG00)                          ADABAS
          END IF                                                     ADABAS
C                                                                   00000670
*                                                                   00000680
*         EXEC ADABAS                                               00000690
*     DBCLOSE                                                       00000700
*         END-EXEC                                                  00000710
*                                                                   00000720
      SQDA00='00000720'                                              ADABAS
      SQDB00(01)='          EXEC ADABAS                   '          ADABAS
      SQDC00(01)='                                        '          ADABAS
      SQDB00(02)='     DBCLOSE                            '          ADABAS
      SQDC00(02)='                                        '          ADABAS
      SQDB00(03)='          END-EXEC                      '          ADABAS
      SQDC00(03)='                                        '          ADABAS
      SQDG00=03                                                      ADABAS
      SQC400=0500                                                    ADABAS
      SQC200=' '                                                     ADABAS
      SQDR00=188                                                     ADABAS
      SQCD00=SQDF00                                                  ADABAS
      SQCC00='CL'                                                    ADABAS
      CALL  ADABAS    (                                              ADABAS
     1  SQCB00,SQFB00,SQRB00,SQSB00,SQVB00,                          ADABAS
     1  SQDS00                                )                      ADABAS
      IF (SQCR00 .NE. 0                                              ADABAS
     1  ) THEN                                                       ADABAS
       CALL RESPF  (                                                 ADABAS
     1  SQCB00,SQDD00,SQDA00,SQFB00,SQRB00,SQSB00,                   ADABAS
     1  SQVB00,SQDB00,SQDC00,SQDE00,SQDG00)                          ADABAS
          END IF                                                     ADABAS
C                                                                   00000730
   10 FORMAT ('1PERSONNEL-ID',8X,'NAME',13X,'FIRST-NAME',8X,        00000740
     *        'BIRTH',1X,'SEX' / 1X,64('*') / )                     00000750
   20 FORMAT (3X,A8,3X,A20,1X,A20,1X,A6,1X,A1)                       00000760
C                                                                     00000770
      END                                                             00000780
```

18 APPENDIX J - PL/I EXAMPLES

This chapter covers the following topics:

Example 1

```
PEX1 : PROC OPTIONS(MAIN);
/*     AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH
       CONTAINS FIELDS TAKEN FROM TWO FILES. THE FIELDS PERSONNEL-ID
       NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,
       PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE
       FOLLOWING CONDITION:
           PERSONNEL-ID BETWEEN 10000001 AND 19999999
           MODEL-YEAR-MAKE >
           CLASS = 'C'                                              */
/*                                                                  */
  DCL 1  START_STRUC,
         2  START_MODEL          CHAR(20)     INIT('MERCEDES-BENZ'),
         2  START_YEAR_MAKE      PIC '(2)9'   INIT(86);
  DCL    START_MODEL_YEAR_MAKE   CHAR(22)     BASED(ADDR(START_STRUC));
/*                                                                  */
  DCL 1  HEADER,
         2  FILLER1              CHAR(12)     INIT('PERSONNEL-ID'),
         2  FILLER2              CHAR(8)      INIT(' '),
         2  FILLER3              CHAR(4)      INIT('NAME'),
         2  FILLER4              CHAR(13)     INIT(' '),
         2  FILLER5              CHAR(10)     INIT('FIRST-NAME'),
         2  FILLER6              CHAR(8)      INIT(' '),
         2  FILLER7              CHAR(5)      INIT('BIRTH'),
         2  FILLER8              CHAR(1)      INIT(' '),
         2  FILLER9              CHAR(3)      INIT('SEX');
  DCL 1  HEADER2                 CHAR(64)     INIT((64)'*');
  DCL 1  LINE1,
         2  FILLER1              CHAR(2)      INIT(' '),
         2  PERSONNEL_NR         CHAR(8)      INIT(' '),
         2  FILLER2              CHAR(3)      INIT(' '),
         2  LAST_NAME            CHAR(20)     INIT(' '),
         2  FILLER3              CHAR(1)      INIT(' '),
         2  F_NAME               CHAR(20)     INIT(' '),
         2  FILLER4              CHAR(1)      INIT(' '),
         2  BIRTHDAY             CHAR(6)      INIT(' '),
         2  FILLER5              CHAR(1)      INIT(' '),
         2  KIND                 CHAR(1)      INIT(' ');
/*                                                                  */
               EXEC ADABAS
          BEGIN DECLARE SECTION
               END-EXEC
```

```
/*                                                                    */
               EXEC ADABAS
          DECLARE EMPL CURSOR FOR
          SELECT PERSONNEL-ID, NAME, FIRST-NAME, BIRTH, SEX
          FROM EMPLOYEES, VEHICLES
          WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID
                AND PERSONNEL-ID BETWEEN '10000001' AND '19999999'
                AND VEHICLES.MODEL-YEAR-MAKE > :START_MODEL_YEAR_MAKE
                AND VEHICLES.CLASS = 'C'
               END-EXEC
/*                                                                    */
          PUT SKIP EDIT (HEADER) (A);
          PUT SKIP EDIT (HEADER2) (A);
          PUT SKIP;
/*                                                                    */
               EXEC ADABAS
          OPEN EMPL
               END-EXEC
/*                                                                    */
               EXEC ADABAS
          FETCH EMPL
               END-EXEC
/*                                                                    */
          DO WHILE (ADACODE *= 3);
               PERSONNEL_NR = PERSONNEL_ID;
               LAST_NAME = NAME;
               F_NAME = FIRST_NAME;
               BIRTHDAY = BIRTH;
               KIND = SEX;
               PUT SKIP EDIT (LINE1) (A);
                    EXEC ADABAS
               FETCH EMPL
                    END-EXEC
          END;
/*                                                                    */
               EXEC ADABAS
          CLOSE EMPL
               END-EXEC
/*                                                                    */
               EXEC ADABAS
          DBCLOSE
               END-EXEC
/*                                                                    */
END PEX1;
```

Example 2

```
PEX2 : PROC OPTIONS(MAIN);
/*      DELETE AN EMPLOYEE RECORD AND RELEASE ALL CARS WHICH ARE
        ASSIGNED TO THIS EMPLOYEE. A PRIVATE CARS WILL BE DELETED
        AND A COMPANY CAR WILL BE MADE A POOL-CAR WHICH IS IDENTIFIED
        BY ITS PERSONNEL-ID CONTAINING ONLY THE COUNTRY CODE.
                                                                    */
/*                                                                  */
DCL    PERSONNEL_NUMBER            CHAR(8)        INIT ('20007100');
DCL    EMPLOYEE_ISN                FIXED BIN(31)  INIT(0);
DCL 1  COUNTRY_NUM,
       2 COUNTRY_NO                CHAR(1)        INIT (' ') ,
       2 FILLER                    CHAR(14)       INIT (' ');
DCL    COUNTRY_NUMBER              CHAR(15) BASED(ADDR(COUNTR_NUM));
/*                                                                  */
                EXEC ADABAS
           BEGIN DECLARE SECTION
                END-EXEC
/*                                                                  */
                EXEC ADABAS
           READ LOGICAL
           DECLARE VEH1 CURSOR FOR
           SELECT REG-NUM, PERSONNEL-ID, CLASS
           FROM VEHICLES
           WHERE PERSONNEL-ID GE :PERSONNEL-NUMBER
           OPTIONS HOLD
           ORDER BY PERSONNEL-ID
                END-EXEC
/*
 *** FIND EMPLOYEE
                                                                    */
               EXEC ADABAS
          FIND
          SELECT
          FROM EMPLOYEES EMPLOYEES_1
          WHERE PERSONNEL-ID = :PERSONNEL_NUMBER
          OPTIONS HOLD
               END-EXEC
/*
***      IF THE PERSONNEL-ID EXISTS DELETE THE EMPLOYEE AND READ THE
***      VEHICLES FILE
                                                                    */
          IF EMPLOYEES_1.QUANTITY = 1 THEN
          DO;
             EMPLOYEE_ISN = EMPLOYEES_1.ISN;
             CALL DELETE_EMPLOYEE;
             CALL READ_VEHICLES_FILE;
          END;
          ELSE
           PUT SKIP EDIT
          ('NO EMPLOYEE FOUND WITH PERSONNEL-ID ',PERSONNEL_NUMBER)(A);
/*                                                                     */
               EXEC ADABAS
          DBCLOSE
               END-EXEC
/***********************************************************************/
```

```

DELETE_EMPLOYEE : PROC;
/*                                                                     */
               EXEC ADABAS
          DELETE
          FROM EMPLOYEES
          WHERE ISN = :EMPLOYEE_ISN
               END-EXEC
/*                                                                     */
          PUT SKIP EDIT
         ('EMPLOYEE ',PERSONNEL_NUMBER,' HAS BEEN DELETED')(A);
/*                                                                     */
END DELETE_EMPLOYEE;
/***********************************************************************/
READ_VEHICLES_FILE : PROC;
/*                                                                     */
               EXEC ADABAS
          OPEN VEH1
               END-EXEC
/*                                                                     */
               EXEC ADABAS
          FETCH VEH1
               END-EXEC
/*                                                                     */
          DO WHILE (ADACODE *= 3 &
                        VEHICLES.PERSONNEL_ID = PERSONNEL_NUMBER);
                IF CLASS = 'P' THEN
                DO;
                        EXEC ADABAS
                     DELETE
                     FROM VEHICLES
                     WHERE CURRENT OF VEH1
                        END-EXEC
                     PUT SKIP EDIT
                    ('PRIVATE CAR ',REG_NUM,' HAS BEEN DELETED')(A);
                END;
                ELSE
                DO;
                     COUNTRY_NUMBER = VEHICLES.PERSONNEL_ID;
                     VEHICLES.PERSONNEL_ID = COUNTRY_NO;
                        EXEC ADABAS
                     UPDATE VEHICLES
                     WHERE CURRENT OF VEH1
                        END-EXEC
                     PUT SKIP EDIT
                    ('COMPANY CAR ',REG_NUM,' HAS BEEN UPDATED')(A);
               END;
/*                                                                     */
                   EXEC ADABAS
               FETCH VEH1
                   END-EXEC
/*                                                                     */
         END;
/*                                                                     */
             EXEC ADABAS
         CLOSE VEH1
             END-EXEC
/*                                                                     */
             EXEC ADABAS
         COMMIT WORK
             END-EXEC
/*                                                                     */
END READ_VEHICLES_FILE;
/*                                                                     */
END PEX2;
```

Example 3

```
PEX3 : PROC OPTIONS(MAIN);
/*      SALARY INCREASE.
        THIS PROGRAM INCREASES THE SALARY OF EVERY EMPLOYEE BY
        4 PERCENT.
        THE DEPARTMENT, THE OVERALL AMOUNT OF PAY RISE FOR THE
        DEPARTMENT AND THE PAY RISE FOR ALL DEPARTMENTS WILL BE PRINTED
        OUT.
        THE PROGRAM IS RESTARTABLE. AFTER AN ABNORMAL TERMINATION THE
        PROGRAM EXECUTION WOULD RESTART WITH THE LAST DEPARTMENT
        WHOSE SALARY UPDATE HAD BEEN COMPLETED BEFORE THE ABEND
        OCCURED.
                                                                       */
/*                                                                     */
DCL 1  COMM_DATA,
       2 COMMIT_DEPARTMENT    CHAR(6)       INIT (' '),
       2 COMMIT_SUM           FIXED DEC(10) INIT (0);
DCL    COMMIT_DATA            CHAR(12) BASED(ADDR(COMM_DATA));
DCL    START_DEPT             CHAR(6)       INIT (' ');
DCL    IND                    FIXED BIN(15) INIT (0);
DCL    I                      FIXED BIN(15) INIT (0);
DCL    J                      FIXED BIN(15) INIT (0);
DCL    NEW_SALARY             FIXED DEC(9)  INIT (0);
DCL    INCREASE              FIXED DEC(9)  INIT (0);
DCL    SUM_DEPARTMENT        FIXED DEC(10) INIT (0);
DCL    SUM_TOTAL             FIXED DEC(11) INIT (0);
/*                                                                   */
DCL 1 HEADER,
      2 FILLER1              CHAR(10)      INIT ('DEPARTMENT'),
      2 FILLER2              CHAR(15)      INIT (' '),
      2 FILLER3              CHAR(15)      INIT ('SALARY INCREASE');
DCL 1 LINE1,
      2 FILLER1              CHAR(3)       INIT (' '),
      2 DEPARTMENT           CHAR(6)       INIT (' '),
      2 FILLER2              CHAR(16)      INIT (' '),
      2 SUM_DEPT             PIC 'Z,ZZZ,ZZZ,ZZ9';
DCL 1 FOOT_LINE,
      2 FILLER1              CHAR(21)  INIT ('TOTAL SALARY INCREASE'),
      2 FILLER               CHAR(3)   INIT (' : '),
      2 TOTAL_SUM_DEPT       PIC 'ZZ,ZZZ,ZZZ,ZZZ';
/*                                                                   */
                EXEC ADABAS
           BEGIN DECLARE SECTION
                END-EXEC
```

```
/*                                                                   */
                EXEC ADABAS
           HISTOGRAM
           DECLARE EMP1 CURSOR FOR
           SELECT  DEPT
           FROM EMPLOYEES EMPLOYEES_1
           WHERE DEPT GE :COMMIT_DEPARTMENT
           GROUP BY DEPT
                END-EXEC
/*                                                                   */
                EXEC ADABAS
           READ LOGICAL
           DECLARE EMP2 CURSOR FOR
           SELECT PERSONNEL-ID, DEPT, SALARY, INCOME(COUNT)
           FROM EMPLOYEES
           WHERE DEPT GE :START_DEPT
           OPTIONS HOLD
           ORDER BY DEPT
                END-EXEC
/*                                                                   */
                EXEC ADABAS
           CONNECT 'INCREASE'
           UPD=EMPLOYEES
           AND USERDATA INTO :COMMIT_DATA
                END-EXEC
/*
           A HISTOGRAM STATEMENT IS USED TO ASCERTAIN THE NUMBER OF
           EMPLOYEES PER DEPARTMENT
                                                                     */
                EXEC ADABAS
           OPEN EMP1
                END-EXEC
/*                                                                    */
                EXEC ADABAS
           FETCH EMP1
                END-EXEC
/*                                                                    */
           IF COMMIT_DATA *= ' ' THEN CALL RESTART;
/*                                                                    */
           START_DEPT = EMPLOYEES_1.DEPT;
/*                                                                    */
                EXEC ADABAS
           OPEN EMP2
                END-EXEC
/*                                                                    */
           PUT SKIP EDIT (HEADER) (A);
           PUT SKIP LIST ((40)'*');
           PUT SKIP;
/*                                                                    */
           DO WHILE (ADACODE *= 3);
              CALL HIST_EMPL;
           END;
```

```
/*                                                                    */
                EXEC ADABAS
           CLOSE EMP1
                END-EXEC
/*                                                                    */
                EXEC ADABAS
           CLOSE EMP2
                END-EXEC
/*                                                                    */
           PUT SKIP;
           PUT SKIP LIST ((50)'-');
           PUT SKIP;
           TOTAL_SUM_DEPT = SUM_TOTAL;
           PUT SKIP EDIT (FOOT_LINE) (A);
           COMMIT_DATA = ' ';
/*                                                                    */
                EXEC ADABAS
           DBCLOSE
           USERDATA = :COMMIT_DATA
                END-EXEC
/**********************************************************************/
RESTART : PROC;
          PUT SKIP LIST ('LAST PROGRAM RUN TERMINATED ABNORMALLY');
          PUT SKIP EDIT ('LAST DEPARTMENT WAS: ',COMMIT_DEPARTMENT)(A);
/*                                                                    */
                EXEC ADABAS
           FETCH EMP1
```

```
               END-EXEC
END RESTART;
/*********************************************************************/
```

```
HIST_EMPL : PROC;
/*
           THE EMPLOYEES FILE WILL BE READ UNTIL ALL RECORDS FOR THE
           DEPARTMENT HAVE BEEN PROCESSED AND THE SALARY HAS BEEN
           UPDATED
                                                                     */
           DO J=1 BY 1 TO EMPLOYEES_1.QUANTITY;
                     EXEC ADABAS
                FETCH EMP2
                     END-EXEC
/*            THE SALARY INCREASE CAN BE EXECUTED WHEN THE COUNT OF THE
              PERIODIC GROUP IS LESS THAN 40.                        */
                IF C_INCOME <= 40 THEN
                   CALL SALARY_INCREASE;
                ELSE
                   PUT SKIP EDIT
                  ('UPDATE PERSON ',PERSONNEL_ID,' NOT POSSIBLE')(A);
           END;
/*                                                                   */
           DEPARTMENT = EMPLOYEES.DEPT;
           SUM_DEPT = SUM_DEPARTMENT;
           SUM_DEPARTMENT = 0;
           PUT SKIP EDIT (LINE1) (A);
/*                                                                   */
           COMMIT_DEPARTMENT = EMPLOYEES.DEPT;
           COMMIT_SUM = SUM_TOTAL;
               EXEC ADABAS
           COMMIT WORK
           USERDATA = :COMMIT_DATA
               END-EXEC
/*                                                                   */
                EXEC ADABAS
           FETCH EMP1
               END-EXEC
/*                                                                   */
END HIST_EMPL;
/*********************************************************************/
SALARY_INCREASE : PROC;
           INCREASE = SALARY(1) * 0.04;
           NEW_SALARY = SALARY(1) + INCREASE;
           IND = C_INCOME + 1;
/*                                                                   */
           DO I=C_INCOME BY -1 TO 0;
                SALARY(IND) = SALARY(I);
                IND = IND - 1;
           END;
/*                                                                   */
```

```
          SALARY(1) = NEW_SALARY;
/*                                                              */
              EXEC ADABAS
          UPDATE EMPLOYEES
          WHERE CURRENT OF EMP2
              END-EXEC
/*                                                              */
          SUM_DEPARTMENT = SUM_DEPARTMENT + INCREASE;
          SUM_TOTAL = SUM_TOTAL + INCREASE;
END SALARY_INCREASE;
/*                                                              */
END PEX3;
```

19 APPENDIX - EXAMPLE OF PL/I CODE GENERATED BY ADABAS NATIVE SQL

```
 PEX1 : PROC OPTIONS(MAIN);
/*     AN EXAMPLE OF SOFT COUPLING WITH A SEARCH CRITERION WHICH
       CONTAINS FIELDS TAKEN FROM TWO FILES. THE FIELDS PERSONNEL-ID
       NAME, FIRST-NAME, BIRTH AND SEX (FROM THE MAIN FILE,
       PERSONNEL-ID) ARE PRINTED FOR RECORDS THAT SATISFY THE
       FOLLOWING CONDITION:
           PERSONNEL-ID BETWEEN 10000001 AND 19999999
           MODEL-YEAR-MAKE >
           CLASS = 'C'                                                  */
/*                                                                      */
  DCL 1  START_STRUC,
         2  START_MODEL          CHAR(20)     INIT('MERCEDES-BENZ'),
         2  START_YEAR_MAKE      PIC '(2)9'   INIT(86);
  DCL    START_MODEL_YEAR_MAKE   CHAR(22)     BASED(ADDR(START_STRUC));
/*                                                                      */
  DCL 1  HEADER,
         2  FILLER1              CHAR(12)     INIT('PERSONNEL-ID'),
         2  FILLER2              CHAR(8)      INIT(' '),
         2  FILLER3              CHAR(4)      INIT('NAME'),
         2  FILLER4              CHAR(13)     INIT(' '),
         2  FILLER5              CHAR(10)     INIT('FIRST-NAME'),
         2  FILLER6              CHAR(8)      INIT(' '),
         2  FILLER7              CHAR(5)      INIT('BIRTH'),
         2  FILLER8              CHAR(1)      INIT(' '),
         2  FILLER9              CHAR(3)      INIT('SEX');
  DCL 1  HEADER2                 CHAR(64)     INIT((64)'*');
  DCL 1  LINE1,
         2  FILLER1              CHAR(2)      INIT(' '),
         2  PERSONNEL_NR         CHAR(8)      INIT(' '),
         2  FILLER2              CHAR(3)      INIT(' '),
         2  LAST_NAME            CHAR(20)     INIT(' '),
         2  FILLER3              CHAR(1)      INIT(' '),
          2  F_NAME               CHAR(20)     INIT(' '),              00000330
          2  FILLER4              CHAR(1)      INIT(' '),              00000340
          2  BIRTHDAY             CHAR(6)      INIT(' '),              00000350
          2  FILLER5              CHAR(1)      INIT(' '),              00000360
          2  KIND                 CHAR(1)      INIT(' ');              00000370
 /*                                                                  */00000380
-/*                                                                 ** 00000390
                EXEC ADABAS                                            00000400
           BEGIN DECLARE SECTION                                       00000410
                END-EXEC                                               00000420
 **                                                                */ 00000430
   DCL ADACODE FIXED BIN(15)  INIT (0);                                 ADABAS
   DCL  ADABAS    ENTRY OPTIONS(ASM,INTER);                             ADABAS
   DCL  RESPINT   ENTRY OPTIONS(ASM,INTER);                             ADABAS
   DCL  1 CONTROL_BLOCKOPN    UNAL,                                     ADABAS
         3 FILLER1OPN               CHAR(2)       INIT ('AS')     ,      ADABAS
         3 COMMAND_CODEOPN          CHAR(2)                       ,      ADABAS
         3 COMMAND_IDOPN            CHAR(4)       INIT ('OPEN')   ,      ADABAS
         3 FILE_NUMBEROPN           FIXED BIN(15) INIT (     0)   ,      ADABAS
         3 RESPONSE_CODEOPN         FIXED BIN(15) INIT (0)        ,      ADABAS
         3 ISNOPN                   FIXED BIN(31) INIT (0)        ,      ADABAS
         3 ISN_LOWER_LIMITOPN       FIXED BIN(31) INIT (0)        ,      ADABAS
         3 ISN_QUANTITYOPN          FIXED BIN(31)                 ,      ADABAS
         3 FORMAT_BUFFER_LENGTHOPN  FIXED BIN(15) INIT (     0)   ,      ADABAS
         3 RECORD_BUFFER_LENGTHOPN  FIXED BIN(15) INIT (     0)   ,      ADABAS
         3 SEARCH_BUFFER_LENGTHOPN  FIXED BIN(15) INIT (     0)   ,      ADABAS
         3 VALUE_BUFFER_LENGTHOPN   FIXED BIN(15) INIT (     0)   ,      ADABAS
         3 ISN_BUFFER_LENGTHOPN     FIXED BIN(15) INIT (     4)   ,      ADABAS
         3 COMMAND_OPTION_1OPN      CHAR(1)       INIT (' ')      ,      ADABAS
         3 COMMAND_OPTION_2OPN      CHAR(1)       INIT (' ')      ,      ADABAS
         3 ADDITIONS_1OPN           CHAR(8)       INIT (' ')      ,      ADABAS
         3 ADDITIONS_2OPN           CHAR(4)       INIT (' ')      ,      ADABAS
         3 ADDITIONS_3OPN           CHAR(8)       INIT (' ')      ,      ADABAS
         3 ADDITIONS_4OPN           CHAR(8)       INIT (' ')      ,      ADABAS
         3 ADDITIONS_5OPN                                         ,      ADABAS
         4 ADDITIONS_5_BNOPN        FIXED BIN(31) INIT (0)        ,      ADABAS
         4 ADDITIONS_5_58OPN        CHAR(4)                       ,      ADABAS
         3 COMMAND_TIMEOPN          FIXED BIN(31)                 ,      ADABAS
         3 USER_AREAOPN             CHAR(4)       INIT ('AS')     ;      ADABAS
   DCL CONTROL_BLOCK_1OPN  CHAR(80)                                     ADABAS
               BASED(ADDR(CONTROL_BLOCKOPN ));                          ADABAS
   DCL ADDITIONS_1_12OPN  CHAR(2) DEF ADDITIONS_1OPN ;                  ADABAS
   DCL ADDITIONS_1_BNOPN  FIXED BIN(15) UNAL                            ADABAS
               BASED (ADDR(ADDITIONS_1OPN ));                           ADABAS
   DCL ADDITIONS_1_58OPN  CHAR(4) DEF ADDITIONS_1OPN  POS(5);           ADABAS
   DCL 1 ADDITIONS_5_DEFOPN  BASED (ADDR(ADDITIONS_5OPN )),             ADABAS
         2 ADDITIONS_5_1OPN  CHAR(1),                                   ADABAS
         2 ADDITIONS_5_28OPN  CHAR(7);                                  ADABAS
   DCL 1 ADDITIONS_4_DEFOPN BASED (ADDR(ADDITIONS_4OPN)),               ADABAS
         2 ADDITIONS_4_12OPN FIXED BIN(15),                             ADABAS
         2 ADDITIONS_4_34OPN FIXED BIN(15),                             ADABAS
         2 ADDITIONS_4_56OPN FIXED BIN(15),                             ADABAS
```

```
      2 ADDITIONS_4_78OPN FIXED BIN(15);                            ADABAS
DCL DBIDOPN  CHAR(1) BASED (ADDR(FILE_NUMBEROPN ));                 ADABAS
DCL    FORMAT_BUFOPN                            CHAR (0001)      ;  ADABAS
DCL    SEARCH_BUFOPN                            CHAR (0001)      ;  ADABAS
DCL    VALUE_BUFOPN                             CHAR (0001)      ;  ADABAS
DCL    ISN_BUFOPN                               CHAR (0001)      ;  ADABAS
DCL    RECORD_BUFOPN                            CHAR (1500)      ;  ADABAS
DCL    OPENTYPE                                 CHAR (0010)      ;  ADABAS
DCL    DDFILE                 PIC'999'      INIT (    30)        ;  ADABAS
DCL    CSEQ                   CHAR(8)                            ;  ADABAS
DCL    CLN1(20)               CHAR(40)                           ;  ADABAS
DCL    CLN2(20)               CHAR(40)                           ;  ADABAS
DCL    TRCE                   CHAR(7)                            ;  ADABAS
DCL    CLNNUM                 FIXED BIN(15)                      ;  ADABAS
DCL    SQLRSP                 FIXED BIN(15)                      ;  ADABAS
DCL    SQLQTY                 FIXED BIN(31)                      ;  ADABAS
DCL    SQLISN                 FIXED BIN(31)                      ;  ADABAS
DCL    SAVE_DBID_1OPN         FIXED BIN(15)                  ;      ADABAS
DCL 1 SAVE_DBID_DEFOPN  BASED(ADDR(SAVE_DBID_1OPN )),               ADABAS
      2 FILLEROPN  CHAR(1),                                         ADABAS
      2 SAVE_DBIDOPN  CHAR(1);                                      ADABAS
DCL  1 FORMAT_BUFEMPL_1    ,                                        ADABAS
      2 FILLE001 CHAR(34) INIT('AA,8,A,AE,20,A,AC,20,A,AH,6,U,AG,1'), ADABAS
      2 FILLE002 CHAR(03) INIT(',A.'),                              ADABAS
       FORMAT_BUFEMPL      CHAR(00037)                              ADABAS
                             BASED (ADDR(  FORMAT_BUFEMPL_1   ));   ADABAS
DCL  1 SEARCH_BUFEMPL_1    ,                                        ADABAS
      2 FILLE001 CHAR(34) INIT('(22,AA,24,AC)/22/AA,8,A,S,AA,8,A,D'), ADABAS
      2 FILLE002 CHAR(25) INIT(',/24/AO,22,A,GT,D,AH,1,A.'),        ADABAS
       SEARCH_BUFEMPL      CHAR(00059)                              ADABAS
                             BASED (ADDR(  SEARCH_BUFEMPL_1   ));   ADABAS
DCL  1 EMPLOYEES                        UNAL,                       ADADATA
      2 RECORD_BUFEMPL_1                ,                           ADADATA
       3 PERSONNEL_ID                           CHAR (0008)      ,  ADADATA
       3 NAME                                   CHAR (0020)      ,  ADADATA
       3 FIRST_NAME                             CHAR (0020)      ,  ADADATA
       3 BIRTH                                  PIC  '(0005)99'  ,  ADADATA
       3 SEX                                    CHAR (0001)      ,  ADADATA
      2 ISN                                     FIXED BIN(31),      ADADATA
      2 QUANTITY                                FIXED BIN(31),      ADADATA
      2 RESPONSE_CODE                           FIXED BIN(15),      ADADATA
       RECORD_BUFEMPL      CHAR(00055)                              ADADATA
                              BASED (ADDR( RECORD_BUFEMPL_1   ));   ADADATA
DCL  1 VALUE_BUFEMPL_1     UNAL,                                    ADABAS
      2 V_PERSONNEL_ID_F                        CHAR (0008)         ADABAS
                                                INIT(' '),          ADABAS
      2 V_PERSONNEL_ID_T                        CHAR (0008)         ADABAS
                                                INIT(' '),          ADABAS
      2 V_MODEL_YEAR_MAKE,                                          ADABAS
       3 S_YEAR                                 PIC  '(0001)99'     ADABAS
                                                INIT(0),            ADABAS
       3 S_MAKE                                 CHAR (0020)         ADABAS
```

```
                                                INIT(' '),          ADABAS
      2 V_CLASS                                 CHAR (0001)         ADABAS
                                                INIT(' '),          ADABAS
       VALUE_BUFEMPL       CHAR(00039)                              ADABAS
                               BASED (ADDR(VALUE_BUFEMPL_1    ));     ADABAS
  DCL      V_MODEL_YEAR_MAKE_EMPL               CHAR (0022)         ADABAS
        BASED (ADDR(                                                ADABAS
        VALUE_BUFEMPL_1.V_MODEL_YEAR_MAKE                        )); ADABAS
  DCL    ISN_BUFEMPL         (    1)              FIXED BIN(31);      ADABAS
  DCL  1 CONTROL_BLOCKEMPL   UNAL,                                  ADABAS
      3 FILLER1EMPL             CHAR(2)       INIT ('AS')     ,     ADABAS
      3 COMMAND_CODEEMPL        CHAR(2)                       ,     ADABAS
      3 COMMAND_IDEMPL          CHAR(4)       INIT ('EMPL')   ,     ADABAS
      3 FILE_NUMBEREMPL         FIXED BIN(15) INIT (    22)   ,     ADABAS
      3 RESPONSE_CODEEMPL       FIXED BIN(15) INIT (0)        ,     ADABAS
      3 ISNEMPL                 FIXED BIN(31) INIT (0)        ,     ADABAS
      3 ISN_LOWER_LIMITEMPL     FIXED BIN(31) INIT (0)        ,     ADABAS
      3 ISN_QUANTITYEMPL        FIXED BIN(31)                 ,     ADABAS
      3 FORMAT_BUFFER_LENGTHEMPL FIXED BIN(15) INIT (    37)   ,     ADABAS
      3 RECORD_BUFFER_LENGTHEMPL FIXED BIN(15) INIT (    55)   ,     ADABAS
      3 SEARCH_BUFFER_LENGTHEMPL FIXED BIN(15) INIT (    59)   ,     ADABAS
      3 VALUE_BUFFER_LENGTHEMPL  FIXED BIN(15) INIT (    39)   ,     ADABAS
      3 ISN_BUFFER_LENGTHEMPL    FIXED BIN(15) INIT (     4)   ,     ADABAS
      3 COMMAND_OPTION_1EMPL    CHAR(1)       INIT (' ')      ,     ADABAS
      3 COMMAND_OPTION_2EMPL    CHAR(1)       INIT (' ')      ,     ADABAS
      3 ADDITIONS_1EMPL         CHAR(8)       INIT (' ')      ,     ADABAS
      3 ADDITIONS_2EMPL         CHAR(4)       INIT (' ')      ,     ADABAS
      3 ADDITIONS_3EMPL         CHAR(8)       INIT (' ')      ,     ADABAS
      3 ADDITIONS_4EMPL         CHAR(8)       INIT (' ')      ,     ADABAS
      3 ADDITIONS_5EMPL                                       ,     ADABAS
      4 ADDITIONS_5_BNEMPL      FIXED BIN(31) INIT (0)        ,     ADABAS
      4 ADDITIONS_5_58EMPL      CHAR(4)                       ,     ADABAS
      3 COMMAND_TIMEEMPL        FIXED BIN(31)                 ,     ADABAS
      3 USER_AREAEMPL           CHAR(4)       INIT ('AS')     ;     ADABAS
  DCL CONTROL_BLOCK_1EMPL CHAR(80)                                  ADABAS
          BASED(ADDR(CONTROL_BLOCKEMPL));                           ADABAS
  DCL ADDITIONS_1_12EMPL CHAR(2) DEF ADDITIONS_1EMPL;               ADABAS
  DCL ADDITIONS_1_BNEMPL FIXED BIN(15) UNAL                         ADABAS
          BASED (ADDR(ADDITIONS_1EMPL));                            ADABAS
  DCL ADDITIONS_1_58EMPL CHAR(4) DEF ADDITIONS_1EMPL POS(5);        ADABAS
  DCL 1 ADDITIONS_5_DEFEMPL BASED (ADDR(ADDITIONS_5EMPL)),          ADABAS
      2 ADDITIONS_5_1EMPL CHAR(1),                                  ADABAS
      2 ADDITIONS_5_28EMPL CHAR(7);                                 ADABAS
  DCL DBIDEMPL CHAR(1) BASED (ADDR(FILE_NUMBEREMPL));               ADABAS
  DCL    ISNSIZEEMPL            FIXED BIN(31)                   ;  ADABAS
  DCL    ISNMOREEMPL            FIXED BIN(31)                   ;  ADABAS
  DCL    ISNINDEMPL             FIXED BIN(15)                   ;  ADABAS
  DCL    SAVE_DBID_1EMPL        FIXED BIN(15)                 ;     ADABAS
  DCL 1 SAVE_DBID_DEFEMPL BASED(ADDR(SAVE_DBID_1EMPL)),             ADABAS
      2 FILLEREMPL CHAR(1),                                         ADABAS
      2 SAVE_DBIDEMPL CHAR(1);                                      ADABAS
  DCL EOFEMPL BIT(1) INIT ('0'B);                                   ADABAS
```

```
 /*                                                                  */00000440
-/*                                                                 ** 00000450
             EXEC ADABAS                                               00000460
        DECLARE EMPL CURSOR FOR                                        00000470
        SELECT PERSONNEL-ID, NAME, FIRST-NAME, BIRTH, SEX              00000480
        FROM EMPLOYEES, VEHICLES                                       00000490
        WHERE EMPLOYEES.PERSONNEL-ID = VEHICLES.PERSONNEL-ID           00000500
              AND PERSONNEL-ID BETWEEN '10000001' AND '19999999'       00000510
              AND VEHICLES.MODEL-YEAR-MAKE > :START_MODEL_YEAR_MAKE    00000520
              AND VEHICLES.CLASS = 'C'                                 00000530
             END-EXEC                                                  00000540
 **                                                                 */ 00000550
 /*                                                                  */00000560
        PUT SKIP EDIT (HEADER) (A);                                    00000570
        PUT SKIP EDIT (HEADER2) (A);                                   00000580
        PUT SKIP;                                                      00000590
 /*                                                                  */00000600
-/*                                                                 ** 00000610
             EXEC ADABAS                                               00000620
        OPEN EMPL                                                      00000630
             END-EXEC                                                  00000640
 **                                                                 */ 00000650
        VALUE_BUFEMPL_1.V_PERSONNEL_ID_F = '10000001';                  ADABAS
        VALUE_BUFEMPL_1.V_PERSONNEL_ID_T = '19999999';                  ADABAS
        V_MODEL_YEAR_MAKE_EMPL  = START_MODEL_YEAR_MAKE;                ADABAS
        VALUE_BUFEMPL_1.V_CLASS = 'C';                                  ADABAS
    DO;                                                                 ADABAS
    ISNSIZEEMPL=ISN_BUFFER_LENGTHEMPL/4;                                ADABAS
    ISNINDEMPL=1;                                                       ADABAS
    ISN_LOWER_LIMITEMPL=0;                                              ADABAS
    COMMAND_OPTION_1EMPL=' ';                                           ADABAS
    COMMAND_OPTION_2EMPL=' ';                                           ADABAS
    ISN_BUFFER_LENGTHEMPL=0;                                            ADABAS
    ISN_QUANTITYEMPL=0                             ;                    ADABAS
    COMMAND_CODEEMPL='S1';                                              ADABAS
    CALL  ADABAS    (                                                   ADABAS
            CONTROL_BLOCKEMPL,FORMAT_BUFEMPL,RECORD_BUFEMPL,            ADABAS
            SEARCH_BUFEMPL,VALUE_BUFEMPL,                               ADABAS
            ISN_BUFEMPL                             );                  ADABAS
    EMPLOYEES.RESPONSE_CODE                    =RESPONSE_CODEEMPL;      ADABAS
    EMPLOYEES.QUANTITY                         =ISN_QUANTITYEMPL;       ADABAS
    EMPLOYEES.ISN                              =ISNEMPL;                ADABAS
    IF RESPONSE_CODEEMPL*=0                                             ADABAS
     THEN DO;                                                           ADABAS
    CSEQ='00000650';                                                    ADABAS
    CLN1(01)='               EXEC ADABAS            ';                  ADABAS
    CLN2(01)='                                      ';                  ADABAS
    CLN1(02)='          OPEN EMPL                   ';                  ADABAS
    CLN2(02)='                                      ';                  ADABAS
    CLN1(03)='               END-EXEC               ';                  ADABAS
    CLN2(03)='                                      ';                  ADABAS
    CLNNUM=03;                                                          ADABAS
```

```
          CALL RESPINT                                                      ADABAS
             (CONTROL_BLOCKEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,                 ADABAS
              RECORD_BUFEMPL,SEARCH_BUFEMPL,VALUE_BUFEMPL,                  ADABAS
              CLN1,CLN2,TRCE,CLNNUM);                                       ADABAS
          END;                                                              ADABAS
       ISNMOREEMPL=ISN_QUANTITYEMPL;                                        ADABAS
       IF ISNMOREEMPL > 0 THEN EOFEMPL= '0'B;                               ADABAS
                          ELSE EOFEMPL= '1'B;                               ADABAS
       IF ISNMOREEMPL<ISNSIZEEMPL THEN ISNSIZEEMPL=ISNMOREEMPL;             ADABAS
       ISNINDEMPL=0;                                                        ADABAS
       END;                                                                 ADABAS
 /*                                                                      */00000660
-/*                                                                     ** 00000670
             EXEC ADABAS                                                    00000680
        FETCH EMPL                                                          00000690
             END-EXEC                                                       00000700
 **                                                                     */ 00000710
       DO;                                                                  ADABAS
       IF ISNINDEMPL=ISNMOREEMPL THEN EOFEMPL='1'B;                         ADABAS
       IF *EOFEMPL THEN DO;                                                 ADABAS
       EOFEMPL='0'B;                                                        ADABAS
       COMMAND_OPTION_2EMPL='N';                                            ADABAS
       COMMAND_OPTION_1EMPL=' ';                                            ADABAS
       COMMAND_CODEEMPL='L1';                                               ADABAS
       CALL  ADABAS    (                                                    ADABAS
               CONTROL_BLOCKEMPL,FORMAT_BUFEMPL,RECORD_BUFEMPL,             ADABAS
               SEARCH_BUFEMPL,VALUE_BUFEMPL,                                ADABAS
               ISN_BUFEMPL                                );                ADABAS
       EMPLOYEES.RESPONSE_CODE                     =RESPONSE_CODEEMPL;      ADABAS
       EMPLOYEES.QUANTITY                          =ISN_QUANTITYEMPL;       ADABAS
       EMPLOYEES.ISN                               =ISNEMPL;                ADABAS
       IF RESPONSE_CODEEMPL=3                                               ADABAS
       THEN EOFEMPL='1'B;                                                   ADABAS
       ELSE                                                                 ADABAS
       IF RESPONSE_CODEEMPL*=0                                              ADABAS
        THEN DO;                                                            ADABAS
       CSEQ='00000710';                                                     ADABAS
       CLN1(01)='                EXEC ADABAS            ';                  ADABAS
       CLN2(01)='                                       ';                  ADABAS
       CLN1(02)='           FETCH EMPL                  ';                  ADABAS
       CLN2(02)='                                       ';                  ADABAS
       CLN1(03)='                END-EXEC               ';                  ADABAS
       CLN2(03)='                                       ';                  ADABAS
       CLNNUM=03;                                                           ADABAS
          CALL RESPINT                                                      ADABAS
             (CONTROL_BLOCKEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,                 ADABAS
              RECORD_BUFEMPL,SEARCH_BUFEMPL,VALUE_BUFEMPL,                  ADABAS
              CLN1,CLN2,TRCE,CLNNUM);                                       ADABAS
          END;                                                              ADABAS
       END;                                                                 ADABAS
       END;                                                                 ADABAS
           IF EOFEMPL THEN ADACODE = 003;                                   ADABAS
```

```
                     ELSE ADACODE = 0;                                   ADABAS
 /*                                                                   */00000720
           DO WHILE (ADACODE *= 3);                                     00000730
                PERSONNEL_NR = PERSONNEL_ID;                            00000740
                LAST_NAME = NAME;                                       00000750
                F_NAME = FIRST_NAME;                                    00000760
                BIRTHDAY = BIRTH;                                       00000770
                KIND = SEX;                                             00000780
                PUT SKIP EDIT (LINE1) (A);                              00000790
-/*                                                                  ** 00000800
                     EXEC ADABAS                                        00000810
                FETCH EMPL                                              00000820
                     END-EXEC                                           00000830
 **                                                                  */ 00000840
       DO;                                                               ADABAS
       IF ISNINDEMPL=ISNMOREEMPL THEN EOFEMPL='1'B;                      ADABAS
       IF *EOFEMPL THEN DO;                                              ADABAS
       EOFEMPL='0'B;                                                     ADABAS
       COMMAND_OPTION_2EMPL='N';                                         ADABAS
       COMMAND_OPTION_1EMPL=' ';                                         ADABAS
       COMMAND_CODEEMPL='L1';                                            ADABAS
       CALL  ADABAS    (                                                 ADABAS
               CONTROL_BLOCKEMPL,FORMAT_BUFEMPL,RECORD_BUFEMPL,          ADABAS
               SEARCH_BUFEMPL,VALUE_BUFEMPL,                             ADABAS
               ISN_BUFEMPL                                 );            ADABAS
       EMPLOYEES.RESPONSE_CODE                      =RESPONSE_CODEEMPL;  ADABAS
       EMPLOYEES.QUANTITY                           =ISN_QUANTITYEMPL;   ADABAS
       EMPLOYEES.ISN                                =ISNEMPL;            ADABAS
       IF RESPONSE_CODEEMPL=3                                            ADABAS
       THEN EOFEMPL='1'B;                                                ADABAS
       ELSE                                                              ADABAS
       IF RESPONSE_CODEEMPL*=0                                           ADABAS
        THEN DO;                                                         ADABAS
       CSEQ='00000840';                                                  ADABAS
       CLN1(01)='                     EXEC ADABAS        ';              ADABAS
       CLN2(01)='                                        ';              ADABAS
       CLN1(02)='                FETCH EMPL              ';              ADABAS
       CLN2(02)='                                        ';              ADABAS
       CLN1(03)='                     END-EXEC           ';              ADABAS
       CLN2(03)='                                        ';              ADABAS
       CLNNUM=03;                                                        ADABAS
          CALL RESPINT                                                   ADABAS
             (CONTROL_BLOCKEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,              ADABAS
              RECORD_BUFEMPL,SEARCH_BUFEMPL,VALUE_BUFEMPL,               ADABAS
              CLN1,CLN2,TRCE,CLNNUM);                                    ADABAS
          END;                                                           ADABAS
       END;                                                              ADABAS
       END;                                                              ADABAS
           IF EOFEMPL THEN ADACODE = 003;                                ADABAS
                     ELSE ADACODE = 0;                                   ADABAS
           END;                                                         00000850
 /*                                                                   */00000860
```

```
-/*                                                                   ** 00000870
             EXEC ADABAS                                                00000880
        CLOSE EMPL                                                      00000890
             END-EXEC                                                   00000900
 **                                                                  */ 00000910
      DO;                                                                ADABAS
      COMMAND_OPTION_1EMPL='I';                                          ADABAS
      COMMAND_OPTION_2EMPL='S';                                          ADABAS
      COMMAND_CODEEMPL='RC';                                             ADABAS
      CALL  ADABAS    (                                                  ADABAS
             CONTROL_BLOCKEMPL,FORMAT_BUFEMPL,RECORD_BUFEMPL,            ADABAS
             SEARCH_BUFEMPL,VALUE_BUFEMPL,                               ADABAS
             ISN_BUFEMPL                                 );              ADABAS
      EMPLOYEES.RESPONSE_CODE                 =RESPONSE_CODEEMPL;  ADABAS
      EMPLOYEES.QUANTITY                      =ISN_QUANTITYEMPL;   ADABAS
      EMPLOYEES.ISN                           =ISNEMPL;            ADABAS
      IF RESPONSE_CODEEMPL*=0                                            ADABAS
       THEN DO;                                                          ADABAS
      CSEQ='00000910';                                                   ADABAS
      CLN1(01)='               EXEC ADABAS            ';                 ADABAS
      CLN2(01)='                                      ';                 ADABAS
      CLN1(02)='          CLOSE EMPL                  ';                 ADABAS
      CLN2(02)='                                      ';                 ADABAS
      CLN1(03)='               END-EXEC               ';                 ADABAS
      CLN2(03)='                                      ';                 ADABAS
      CLNNUM=03;                                                         ADABAS
         CALL RESPINT                                                    ADABAS
            (CONTROL_BLOCKEMPL,DDFILE,CSEQ,FORMAT_BUFEMPL,               ADABAS
             RECORD_BUFEMPL,SEARCH_BUFEMPL,VALUE_BUFEMPL,                ADABAS
             CLN1,CLN2,TRCE,CLNNUM);                                     ADABAS
         END;                                                            ADABAS
      END;                                                               ADABAS
 /*                                                                   */00000920
-/*                                                                   ** 00000930
             EXEC ADABAS                                                00000940
        DBCLOSE                                                         00000950
             END-EXEC                                                   00000960
 **                                                                  */ 00000970
      DO;                                                                ADABAS
      RECORD_BUFFER_LENGTHOPN=1500;                                      ADABAS
      COMMAND_OPTION_2OPN =' ';                                          ADABAS
      COMMAND_CODEOPN ='CL';                                             ADABAS
      CALL  ADABAS    (                                                  ADABAS
             CONTROL_BLOCKOPN ,FORMAT_BUFOPN ,RECORD_BUFOPN ,            ADABAS
             SEARCH_BUFOPN ,VALUE_BUFOPN ,                               ADABAS
             ISN_BUFOPN                                  );              ADABAS
      IF RESPONSE_CODEOPN *=0                                            ADABAS
       THEN DO;                                                          ADABAS
      CSEQ='00000970';                                                   ADABAS
      CLN1(01)='               EXEC ADABAS            ';                 ADABAS
      CLN2(01)='                                      ';                 ADABAS
      CLN1(02)='          DBCLOSE                     ';                 ADABAS
```

```
       CLN2(02)='                                        ';             ADABAS
       CLN1(03)='               END-EXEC                 ';             ADABAS
       CLN2(03)='                                        ';             ADABAS
       CLNNUM=03;                                                       ADABAS
          CALL RESPINT                                                  ADABAS
             (CONTROL_BLOCKOPN ,DDFILE,CSEQ,FORMAT_BUFOPN ,             ADABAS
              RECORD_BUFOPN ,SEARCH_BUFOPN ,VALUE_BUFOPN ,              ADABAS
              CLN1,CLN2,TRCE,CLNNUM);                                   ADABAS
          END;                                                          ADABAS
       END;                                                             ADABAS
 /*                                                                  */00000980
```