

Printer Exits, User Separation Routines, Separator Pages

This section covers the following topics:

- Printer Exits
 - User Separation Routines
 - Separator Pages
-

Printer Exits

If a Printer Exit is specified in the logical printer definition, control is passed to this exit at print time for each record to be printed. Here you can insert, modify or suppress records.

Usually a Printer Exit is used to insert escape sequences, so that the printer can select special print styles.

As in the examples PRCANON and PRKYOCER in library SYSNOMS, this could be an escape sequence at the beginning of the printout to switch to landscape mode.

Ideally, the printout should contain mnemonics for all kinds of print attributes (highlighting, underscoring, etc.) which are translated into escape sequences depending on the physical printer to be used. In this way, the printout is independent of any physical printer type.

Printer Exit Interface

Printer Exit	Format	Description
PRT-RC	(B2)	Return code to be set by the exit: 0 = No modification 4 = Record was modified 8 = Record to be inserted 12 = Record to be suppressed 97 = Do not call the exit again until the next report separator start. On the next call, the exit PRT-WORK will be reset. 98 = Stop printing immediately. 99 = Do not call the exit again, but carry on printing. n = All other codes are reserved for future use. When printing a report 97 and 99 have the same effect.
PRT-RECORD	(A251)	The record to be printed.
PRT-RECNO	(N9)	The current record number.
PRT-FLAG	(A1)	Flag with the following meaning: F = First record, M = In the middle of printout, L = Last record.
PRT-WORK	(A250)	Work area for the Printer Exit.
PRT-REPORT	(A25)	The name of the report being printed.
PRT-BUNDLE	(A25)	The name of the bundle being printed.
PRT-RECFM	(A3)	The record format of the printout.

User Separation Routines

- How are User Separation Routines Coded?
- Examples
- Actions
- Parameters
- Source Parameters
- Bundle Parameters
- Report Parameters

A user separation routine separates a SYSOUT dataset into several reports. A new report starts every time the Routine detects a new value in a predefined line and column location on a SYSOUT page.

This section describes the user separation routine interface as well as some examples of supplied user separation routines. User separation routines determine the contents of a report. The contents of a report are a continuous part or parts in one SYSOUT dataset.

If user separation routines are defined for the report, they are called for each record in the identified SYSOUT dataset. However, the Routine can direct the Monitor to position anywhere else on the SYSOUT dataset.

How are User Separation Routines Coded?

User separation routines are normally coded in the Natural 4GL language, but there are no restrictions on using other languages, as far as they follow the rules for interfacing with the Monitor.

The Routine communicates with the Monitor by means of a parameter data area.

This data area contains various parameters. Some can be modified by the Routine and returned to the Monitor, others are read-only and cannot be modified.

The list of parameters is fixed. Their format, length, dimensions and position within the list must be followed.

A parameter data area called P-UEXIT is supplied and should be used when coding user separation routines.

Examples

Examples of the use of the 'action' parameters described on the following page can be found in the SYSNOMS library.

If you have not done so already (see *Adapting to Existing Environment* in *Installation and Customization* documentation), copy the examples to the SYSNOMU library.

You can try these examples by executing the UEXEMPL program in a batch job. Catalog the program first to point to the current employees file. The TRACE command can subsequently be used for testing.

The following programs are available:

Report	Exit	Description
UEX-ADDFP-OPEN	UEXADP	Separates SYSOUT into several reports depending on break of main department. Actions: FORW, ADDFP, OPEN
UEX-CREATE	UEXCRE	Separates SYSOUT into several reports depending on the break of department. Actions: CREATE
UEX-FORW-BACKW	UEXFBT	Forward and backward positioning. Actions: FORW, BACKW, GOTOP, NEXTP
UEX-GO	UEXGGN	Forward and backward positioning. Actions: GOTO, GOTOP, NEXTP.
UEX-UNSL-ADDP	UEXAPI	Replace first line of a page. Actions: INSL, ADDP

Actions

- Miscellaneous Actions
- Positioning Actions
- Inserting Text in a Report
- Including more than one Line in one Routine Call

The following actions may be invoked by a user exit to influence processing. Each action is based on various parameters, which are described below.

Miscellaneous Actions

Action	Description
CACHEON	Enable cacheing of source records. Entire Output Management will cache 126 records. This significantly improves performance, if the exit repositions on a page. CACHEON is the default.
CACHEOFF	Disable cacheing of source records.
BUNDLE	Add report to an active bundle.

Positioning Actions

Action	Description
GOTOP	Reposition Monitor to top of current page. The next time the Routine is called, it gets the record at the top of the current page. Page top is detected either by channel 1 ANSI or by machine code.
GOTO	Reposition to record number returned in parameter P-RECNO.
NEXTP	Go to top of next page.
FORW, BACKW	Number of lines in P-RECNO.

Inserting Text in a Report

Action	Description
INSL	Insert up to 10 lines at the current position. The number of lines to be inserted is returned in parameter P-RECNO and the text lines to be inserted are returned in the array parameter P-INSERT-LINES.

Including more than one Line in one Routine Call

Action	Description
ADDR	<i>Add range of lines</i> , where the record number of the range to be included is returned in the parameters P-FROMLINE and P-TOLINE: The next call to the exit starts one line after the last record in the range specified (P-TOLINE + 1).
ADDP	<i>Add all records</i> from the current line until end of current page to the current report. The next call to the exit starts at the top of the next page.
ADDFP	<i>Add full page</i> . All of the current page is added to the current report. The next call to the exit starts at the top of the next page.
CREATE	<i>Create report</i> from a range of record numbers supplied in the P-FROMLINE and P-TOLINE parameters. The report number to be created must be returned in P-REPNAME. If the report is not defined in the master database, it is created dynamically in the master database using the parameters returned by the exit. When this action is specified and there is an opened report, the report is closed first. The next call to the exit starts one line after the last record in the range specified (P-TOLINE + 1).
OPEN	<i>Close current report and open new report</i> . The new report to be opened must be returned in P-REPNAME.
CLOSE	<i>Close current report</i> . Report processing parameters can be overwritten, if supplied in the exit parameters.

Parameters

The following is a description of the parameters for user separation routines.

General Parameters

Parameter	Description
P-RC	This is a <i>return code</i> which tells whether to include the current record in the report or not. The return code is returned by the exit to the Monitor and can contain the following values: 0 Include current record in Report 1 Ignore the current record 3 End of processing, close current report
P-ACTION	This is an <i>action code</i> which tells the Monitor to perform a specific action (see Actions).
P-MASTER	Name of the master or default report definition currently processed.
P-UPARM1	An array of five parameters supplied by the monitor to the routine. The values are defined in the appropriate master or default report definitions. Evaluate or save these parameters upon the first call to the exit.
P-RECNO	Current record number within the source being processed.
P-RECORD	Contents of the current record.
P-INSERT-LINES	An array of ten lines which may be inserted with action INSL.
P-FROMLINE	Start record number of a range of lines referenced by actions which add lines to the current active report.
P-TOLINE	End record number of a range of lines referenced by actions which add lines to the current active report.
P-WORK	Work area for the user separation routines to save data for subsequent calls.

Source Parameters

- Parameters for Source Type POWER
- Parameters for Source Type "Sequential File z/VSE"

These parameters are common to all sources.

Parameter	Description
P-SOURCE-TYPE	Indicates the type of source being processed.
	1 JES2
	2 JES3
	3 POWER
	4 Entire Output Management database (container file)
	5 Sequential file (z/OS)
	6 Sequential file (z/VSE)
	7 BS2000/OSD
	11 Natural Advanced Facilities
	14 CMASPOOL
P-SOURCE-CC-TYPE	Indicates the type of carriage control characters.
	1 ASA
	2 Machine
	3 Reserved for BS2000/OSD
	4 No carriage control.
P-SOURCE-NUMBER-OF-LINES	Total number of lines in the source.
P-MAXREC	See P-SOURCE-NUMBER-OF-LINES above. This field is still available for compatibility reasons but will be deleted with the next version.
P-SOURCE-RECORD-LENGTH	The current record length in bytes including carriage control characters, if present. It should not be modified.
P-RECLEN	See P-SOURCE-RECORD-LENGTH above. This field is still available for compatibility reasons but will be deleted with the next version.
P-SOURCE-ATTRIBUTES	Source-specific attributes which are redefined depending on P-SOURCE-TYPE are described below.

Parameters for Source Type POWER

Parameter	Description
P-POWER-NODE	Entire System Server node by which the source is being read.
P-POWER-JOB-NAME	The job name of the SYSOUT currently being processed.
P-POWER-JOB-NUMBER	The POWER job number of the SYSOUT currently being processed.
P-POWER-TYPE	Always LS for POWER list queue.
P-POWER-SEGMENTS	Number of segments.
P-POWER-SEG-LASTLINE	An array of up to 40 occurrences indicating the last logical line for each segment.

Parameters for Source Type "Sequential File z/VSE"

Parameter	Description
P-FVSE-NODE	The Entire System Server node by which the current source is being read.
P-FVSE-VOLSER	The volume serial number on which the file resides.
P-FVSE-DSNAME	The dataset name.
P-FVSE-RECFM	The record format of the dataset.
P-FVSE-LRECL	The record length of the dataset.
P-FVSE-BLKSIZE	The block size of the dataset.

Bundle Parameters

These parameters are used to put reports into bundles dynamically.

Parameter	Description
P-BUNDLE	An array of up to 5 bundles into which the report is put.
P-BUNDLE-COORDINATOR	User ID of the bundle coordinator.
P-FLUSH-TIME	Time when the bundle is to be closed and printed.
P-BUNDLE-FLUSH-LINES	Number of lines at which the bundle is to be closed and printed.
P-BUNDLE-SEPSTART	Bundle start separator.
P-BUNDLE-SEPEND	Bundle end separator.
P-BUNDLE-SEPNO	Number of separator copies.
P-BUNDLE-PRINTER	Printer on which the bundle is to be printed.
P-BUNDLE-JOBCARDS	Up to 3 job cards used when printing bundle in batch mode.
P-BUNDLE-GROUP	Up to 5 bundle groups.
P-BUNDLE-SEQUENCE-NR	Up to 5 sequence numbers.
P-BUNDLE-REPORT-SEPARATORS	Bundle report separator.

Parameter	Description
P-BUNDLE-PRINTERS	Up to 20 bundle printers.
P-BUNDLE-PRINTERS-COPY	Up to 20 bundle printer copies.
P-BUNDLE-HOLD	Bundle hold status.
P-BUNDLE-GRANT	Up to 6 granted users (P-BUNDLE-GRANTED-USER) for the bundles created by this exit. Each specification consists of a user ID and its granting options (P-BUNDLE-GRANT-OWNER, -MODIFY, -PURGE, -DISPLAY, -ARCHIVE, -REVIVE). Grant options should be set to "Y" or "N".
P-BUNDLE-DESCRIPTION	Bundle description.
P-CONTROL-EXIT-LIBRARY	Natural library containing bundle print control exit.
P-CONTROL-EXIT-MEMBER	Name of bundle print control exit.
P-BUNDLE-FLUSH-REPORT	Up to 4 report names which will cause the bundle to flush.
P-BUNDLE-FLUSH-START	Scheduled flush start time in format HHII (hours and minutes).
P-BUNDLE-FLUSH-END	Scheduled flush end time in format HHII (hours and minutes). Must be greater than P-BUNDLE-FLUSH-START.
P-BUNDLE-FLUSH-INT	Scheduled flush time interval in format HHII (hours and minutes).
	Note: all 3 of the above parameters must be supplied, or the flush schedule is ignored)
P-BUNDLE-FLUSH-DAYS	Days of the month when the bundle should be flushed. Must be in the range 1-31, ALL or LD.
P-BUNDLE-FLUSH-WEEK-DAYS	Days of the week when the bundle should be flushed. Must specify the first two letters of the day name. English: SA, SU, MO, TU, WE, TH, FR. German: SA, SO, MO, DI, MI, DO, FR.
P-BUNDLE-FLUSH-CALENDAR	Calendar to be used for distinguishing holidays from working days - must be specified if P-BUNDLE-FLUSH-BEFORE-AFTER is specified.
P-BUNDLE-FLUSH-BEFORE-AFTER	A or B to flush the bundle after or before a day defined as a holiday in the specified calendar.

If any of the bundle flush parameters are invalid, they are all ignored and an error message is written to the monitor output listing.

Report Parameters

Parameter	Description
P-REPNAME	Used in OPEN and CREATE actions to specify the report to be opened or created.
P-REPORT-DESCRIPTION	Long description of the report.
P-OWNER	Master owner of the report.
P-KEYWORDS	An array of up to 6 keywords which are used when creating the report or overwriting at close time.
P-STORE-NRM	Y means store report in Entire Output Management database. Used only when opening or creating new reports.
P-DISTRIBUTION	An array of up to 10 members for distribution. Used at create and open.
P-STORE-CONNECT	Con-nect cabinet. Used only when opening or creating new reports.
P-CONNECT-SUBJECT	Document subject in Con-nect.
P-CONNECT-DISTRIBUTION	Con-nect distribution list. Used only when opening or creating new reports.
P-PRINTERS	An array of up to 20 logical printers to print the report. Used to overwrite with CREATE, OPEN or CLOSE actions.
P-COPIES	The number of copies of the report to be printed on each printer specified with P-PRINTERS.

Parameter	Description	
P-HOLD	Hold status to queue printouts. Used to overwrite with CREATE, OPEN or CLOSE actions. Can have the following values:	
	H	Hold printout
	R	Release printout
	C	Confirm all users in the distribution to release
P-REPORT-SEPSTART	Report start separator.	
P-REPORT-SEPEND	Report end separator.	
P-REPORT-SEPNO	Number of separator copies.	
P-REPORT-JOBCARDS	Up to 3 job cards used when printing reports in batch mode.	
P-ARCHIVE	Y	Report is marked for archiving upon creation.
P-RETENTION-NUM	The number of retention period units the report contents is available online.	
P-RETENTION-UNIT	Retention period unit.	
	W	Working days
	A	Absolute days
	V	Weeks
	M	Months.
P-RETENTION-CALENDAR	The name of the calendar used to calculate working days.	
P-RETENTION-ACTION	Used to overwrite with CREATE, OPEN or CLOSE actions.	
	P	Purge report after expiration
	A	Archive report after expiration.

Separator Pages

- Carriage Control Character
- NOP Symbols
- Substitution Variables

Separator Pages can be created for reports or bundles. All Separator members containing parameters for the Separator Pages must reside on the Entire Output Management user library, SYSNOMU, as source members. The names of Separator members for reports must start with an "RS-" prefix. The names of Separator members for bundles must start with BS- prefix. Use the Natural editor to create the Separator member.

The Separator member consists of four types of data:

Carriage control character	Entered in the first byte of every line. Leave this byte empty when no carriage control is required for the line.
Text	Printed as is.
Substitution variables	Starting with @ which are replaced by their current value at print time.
NOP symbols	Starting with @@, replaced by appropriate NOP symbol value at print time.

Carriage Control Character

The first byte on every line of the member is assumed to be a carriage control character (ANSI code). A special control character K can be specified in the first byte, to represent BLOCK LETTER character mode.

NOP Symbols

Entered in the form:

```
@@owner.symbol-table.symbol-name
```

for master symbols

or

```
@@owner.symbol-table.symbol-name.network.run
```

for active symbols

where owner, symbol-table, network, run are values of predefined NOP symbols and symbol-name is the name of a defined NOP symbol.

Substitution Variables

The following keywords can be specified as substitution variables anywhere in the text of the Separator member:

Substitution Variable	Description
@REPORT	Report name
@BUNDLE	Bundle name
@DATE	Current date
@TIME	Current time
@CDATE	Report creation or bundle open date
@CTIME	Report creation or bundle open time
@EXIT	Exit name used for separating SYSOUT
@DESCR	Report or bundle description for a separator
@JOBNAME	Job name of SYSOUT
@JOBNO	Job number of SYSOUT
@USER	User ID
@NAME	User name (first and last concatenated)
@DEPTNO	User's department number
@DEPTNAME	Name of user's department
@LOCATION	Location of user's department
@ORGANIZATION	Name of user's organization
@ADDRESS1	User's address, line 1
@ADDRESS2	User's address, line 2
@ADDRESS3	User's address, line 3
@PHONE	User's phone number

Substitution Variable	Description
@COORDINATOR	Coordinator ID
@COORD-NAME	Coordinator name(first and last concatenated)
@COORD-DEPTNO	Coordinator's department number
@COORD-DEPTNAME	Name of coordinator's department
@COORD-PHONE	Coordinator's phone number
@COORD-LOCATION	Location of coordinator's department
@COORD-ORGANIZATION	Name of coordinator's organization
@COORD-ADDRESS1	Coordinator's address, line 1
@COORD-ADDRESS2	Coordinator's address, line 3
@COORD-ADDRESS3	Coordinator's address, line 3