

User Exits

Each user has unique change management requirements that may vary from time to time, or with different situations or special circumstances.

PAC accommodates the user's needs by providing user exit facilities. Control can be passed to user-written Natural programs (user exit routines) to override the change management procedure defaults established by PAC.

The following sections describe PAC user exits in detail. Refer to the General Defaults Maintenance chapter in the PAC Administration documentation for information about displaying and modifying PAC user exits.

This chapter covers the following topics:

- User Exit Groups
- Overview of Exits
- PACEX001 - PAC Initialization
- PACEX002 - PAC Termination
- PACEX004 - PAC Entity Purge Validation
- PACEX005 - Locking Objects at Migration Time
- PACEX006 - Compilation Error Verification
- PACEX007 - Change Control List Verification
- PACEX008 - Application Status Library Validation
- PACEX009 - Duplicate Object Verification
- PACEX010 - Object List Verification
- PACEX011 - Job Validation
- PACEX012 - Job Submission Verification
- PACEX013 - Migration Event Validation
- PACEX014 - Status Validation
- PACEX015 - Application Validation
- PACEX016 - File Translation Table Validation
- PACEX017 - Application Status Link Validation
- PACEX018 - Object Version Reporting
- PACEX019 - Maintenance Request Validation
- PACEX020 - Maintenance Request Processing Validation
- PACEX021 - Maintenance Request Name Verification

- PACEX022 - Object Version Used-By-List Reporting
- PACEX023 - Object Verification for Autoexpand
- PACEX025 - Migration Event Names
- PACEX026 - Object List Selection for Archiving
- PACEX027 - User Substitution Parameter Verification
- PACEX028 - Audit Report Message Verification
- PACEX030 - Event Authorization Verification
- PACEX031 - Passing CATALL Parameters to PAC
- PACEX032 - Rejecting Objects for Object List
- PACEX034 - Direct Command User Exit
- PACEX035 - SCANOBJ Utility
- PACEX036 - Object Origin Deletion
- PACEX037 - Predict Generation
- PACEX040 - Remote Node and Dataset Security Check
- MIGEX003 - File Security Check

User Exit Groups

PAC groups its user exits as follows:

Group	Members	Description
General	1, 2, 40	PAC initialization, termination; node security check
Maintenance	4, 8, 13-17, 19 - 21, 25, 26, 30	Custom maintenance of PAC entities
Migration	5-7, 9-12, 23, 27, 28, 31, 32	Customized migration events
Reporting	18, 22	Customized access to versioned object information
Special Use	34, 36, 37	Customize object purges in origin status with Move option; customize view generation for Predict migration, direct commands
Scan Utility	35	Exits for the scan utility
Migration Utility	MIGEX003 (3)	Exits for the migration utilities, file security
Not assigned:	24, 29, 33, 38, 39, 41-48	

Overview of Exits

This section covers the following topics:

- General Group
- Maintenance Group
- Migration Group
- Reporting Group
- Special Use Group
- Scan Utility Group
- Migration Utility Group
- Common Data Area used by all Exits

General Group

Exit	Description
PACEX001	PAC initialization: invoked during the initialization of PAC; allows the user to pass a 50-byte parameter area throughout the session.
PACEX002	PAC termination: invoked during the termination of PAC; any required processing may be done in this routine.
PACEX040	Security check for non-Natural datasets and nodes. When using Entire System Server to access a remote node, this exit allows you to specify a different user ID and password and the password for protected PDSs.

Maintenance Group

Exit	Description
PACEX004	PAC entity purge validation: invoked before the deletion of a PAC entity; allows the user to interrogate the entity to be deleted before processing by PAC.
PACEX008	Application status library validation: invoked during the creation of application status links for a particular application; allows the user to validate the specific libraries assigned to each specific application status link.
PACEX013	Migration event name/access validation: invoked whenever any migration event maintenance function is invoked; can be used to implement audits and security.
PACEX014	Status name/access validation: invoked whenever any status maintenance function is invoked; can be used to implement audits and security.
PACEX015	Application name/access validation: invoked whenever any application maintenance function is invoked; can be used to implement audits and security.
PACEX016	File translation table name/access validation: invoked whenever any FTT maintenance function is invoked; can be used to implement audits and security.
PACEX017	Application status link access validation: called whenever any migration paths function is invoked; can be used to implement audits and security.
PACEX019	Maintenance request name/access validation: invoked during the processing of a maintenance request subfunction. Because information can be passed to or from the exit, maintenance request information can be verified or derived from an external problem-tracking system.
PACEX020	Maintenance request processing validation: invoked for maintenance request processing whenever any maintenance request function is invoked; allows the user to implement audits and security.
PACEX021	Maintenance request name verification: invoked to validate the maintenance request name attribute whenever a migration event is added or modified; may be used to implement audits and security.
PACEX025	Migration event names: invoked when function code A (Add) or C (Copy) is selected from the Migration Event Maintenance menu; allows the user to implement automated migration event name generation/ verification routines.
PACEX026	Verification of object list selection for Archiving: invoked during the onset of the generation of an object list for an Archive unload event; allows the user to set up and/or verify the criteria for selecting the objects to be archived.
PACEX030	Event authorization verification: invoked before and after authorization begins; may be used to implement any required audits or security.

Migration Group

Exit	Description
PACEX005	Locking objects: invoked before locking an object for out-migrations only as well as when the 'from-status' is CONTROL. Non-zero response value will reject the object from locking and taking no further part in the migration. Is invoked once for every object that is to be locked.
PACEX006	Compilation Error Verification: invoked after the compile processing step of the event is completed when any compilation errors are detected. Normally, PAC would force the event to abnormally terminate; however, this exit may be used to prevent the termination.
PACEX007	Change control list validation: invoked during the check-out of objects to a development/maintenance type status and check-in from a development/maintenance type status, although change control logs are created only for the maintenance status type. The user may accept or reject the request to process each object in the event object list.
PACEX009	Verification of duplicate objects for migration. When PAC determines that the object being checked in from development or maintenance has the same date-time stamp as the most recent version in CONTROL, the object is treated as a duplicate. Normally, PAC creates a new version of all objects except copy code and text. This exit allows you to override PAC's decision to create a new version.
PACEX010	Object list verification: invoked for each entry in the object list when PAC is validating the objects to be processed for a migration event. As each entry in the object list is passed to the exit, the PAC administrator has the option to disallow that entry.
PACEX011	Job validation: called when a job maintenance subfunction is invoked; allows the user to implement tracking and customized security.
PACEX012	Job submission verification: invoked during JCL submission; passes the first 10 lines of JCL so that the user can examine them and make any desired changes or substitutions prior to job submission.
PACEX023	Object verification for autoexpand. During the Expand option processing of a migration event, this user exit is called before a particular object is expanded. PAC passes the object and the Expand option to the exit to be verified. The user may change the Expand option for the particular object or suppress the expansion of the object.
PACEX027	Verification of user substitution parameters for jobs: called whenever a batch job with user substitution parameters is submitted from PAC. Because it may be called before and after the substitution parameters are specified, the exit may be used to specify the default parameters before the job is presented to the user or for verification after the user has modified the job.
PACEX028	Migration audit report message verification: invoked during migration event processing, usually when a message is being written to the audit report; may optionally be used to suppress the writing of an audit message to the audit report.
PACEX031	Pass CATAL parameters to PAC: invoked prior to the CATAL; used for compiling objects in PAC during migrations from development or maintenance.
PACEX032	Reject objects for object list: invoked for each object elected by PAC during object list selection from the object list editor; used to reject objects based on a moving nonzero value for the MSG-NO parameter (Natural Optimizer Compiler).

Reporting Group

Exit	Description
PACEX018	Object version reporting: invoked whenever any versioned objects reporting function is invoked; can be used to implement audits and security.
PACEX02	Object versions 'used by list' reporting. When the Expand option of a migration event is in effect during the processing of a migration event, PAC audits and passes for verification each subordinate object for the object being processed. This facilitates the expansion of objects defined across applications; that is, STEPLIB applications.

Special Use Group

Exit	Description
PACEX034	Verification of PAC direct commands: allows you to process a string of characters before it is submitted to PAC as a direct command.
PACEX036	Object origin deletion: When the Move option is in effect for a batch work file migration, this exit provides the ability to generate CMSYNIN cards to be used with a batch Natural utility (SYSMAIN, MIGUNLD) for purging objects in the origin status.
PACEX037	Predict generation: an interface exit that may be used to suppress the generation of views during Predict migrations. Additionally, in the case of files linked to multiple databases, allows you to override the database ID for which the generation must be performed. PAC uses information from the generation defaults to determine which default database to use. This is only valid for files linked to multiple databases.

Scan Utility Group

Exit	Description
PACEX035	The scan utility exit, User Exit PACEX035, is invoked with the SCANOBJ utility for every object to be scanned in PAC.

Migration Utility Group

Exit	Description
MIGEX003	Security check for Natural or Predict files: invoked whenever PAC needs to access a Natural or Predict file to retrieve or store Natural or Predict objects; allows the user to establish the password and cipher code to be used when PAC accesses these files.

Common Data Area used by all Exits

PAC user exits are delivered in library SYSPACUS and serve as an example only on how the user exit is to be coded.

All PAC user exits use a standard Parameter Data Area PACEPDA, and it is explained in the table below:

Parameter	Format	Data Area
ENTITY-TYPE	A1	Applic, Event, Status, Job
ENTITY-NAME	A32	Name of Entity.
ENTITY-IDENTIFIER	A32	Secondary ident for Entity.
ENTITY-FUNCTION	A2	Function requested
RESP	P5	Response code to PAC.
MSG	A78	Message corresponding to RESP.
USER-AREA	A50	User data for all exits.

PACEX001 - PAC Initialization

This user exit is invoked during the initialization of PAC, and allows the user to set up a 50-byte parameter area to be passed throughout the session.

Control must be restored to PAC at the termination of the exit.

Possible Use

- Pre-initialization logic;
- Additional security;
- Accounting, logging, or tracking statistics.

Parameter

Parameter	Format	Description
USER-AREA	A50	Modifiable; area for user to use

PACEX002 - PAC Termination

This user exit is invoked during the termination of PAC. Any required processing may be done in this routine. The user area, if set up in PACEX001, will be made available for use in PACEX002. Because the user area is passed to PACEX002 using a stack, an INPUT statement is required to access it.

The user will be at ET status on entry into the routine. Control may optionally be returned to PAC at termination of this exit.

Possible Use

- Additional security;
- Accounting, logging, or tracking statistics;
- "Post-PAC" processing.

Parameter

Parameter	Format	Description
USER-AREA	A50	Modifiable; area for user to use; passed via STACK Data.

PACEX004 - PAC Entity Purge Validation

This user exit is invoked before a PAC entity is purged, and allows the user to interrogate the entity to be purged before processing by PAC. The purge request may optionally be disallowed.

The user will be at ET status on entry into the routine. Control must be restored to PAC at the termination of the exit.

Possible Use

This exit can be used to interrogate the entity to be purged before processing by PAC.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; the output is one of the following entity types: -A Application E Migration event F File translation table J Job L Application status link M Maintenance request S Status T Migration Path
ENTITY-NAME	A32	Not modifiable; the output is the entity name; for example, the name of the status, event, or application.
ENTITY-IDENTIFIER	A32	Not modifiable; the output is a secondary name to identify the entity; for example, the status name of an application status link.
ENTITY-FUNCTION	A2	Not modifiable; the output is the requested function: P Purge entity
RESP	P5	Input; return code. A non-zero return code disallows the purge function for the entity currently being processed.
MSG	A78	Input; user message to be displayed when disallowing the purge function for an entity.
USER-AREA	A50	Modifiable; area for user to use.

PACEX005 - Locking Objects at Migration Time

This user exit is invoked before the locking of an object, under the following two conditions:

- For out-migrations (migrations with the to-status either of type (D) or (M)).
- For migrations whose from-status is of type (C) Control.

A non-zero response value will stop the object being locked by PAC and thus excluding the said object from the migration. The user exit is invoked once for every object that is to be locked. If the response value is set to zero (0), PAC will process the object in the normal way.

Possible Use

When migrating objects out of PAC, the exit allows the user the opportunity to stop certain objects being migrated. If an event had already been created and authorized but the user wanted to stop a certain object from being migrated, without having to modify the event in any way, then this could be achieved with the use of this exit.

Parameters

Parameter	Format	Description
APPL	A32	Not modifiable; name of the application for the event FM-STAT A32 Not modifiable; origin status name.
TO-STAT	A32	Not modifiable; destination status name.
FM-STAT-TYPE	A1	Not modifiable; origin status type.
TO-STAT-TYPE	A1	Not modifiable; destination status type.
EVENT	A32	Not modifiable; name of the event being processed.
OBJ	A32	Not modifiable; object name.
OBJ-TYPE	A4	Not modifiable; object type
OBJ-VERS	N4	Not modifiable; object version.
RESP	P5	Modifiable; response code.

PACEX006 - Compilation Error Verification

This user exit is invoked after the compile processing step of the event is completed when any compilation errors are detected. Normally, PAC would force the event to abnormally terminate; however, this exit may be used to prevent the termination.

If the error number (ERROR-NUM) is set to a non-zero value, it will instruct PAC to terminate processing abnormally as usual. The batch condition code will be 48. The Backout or Recovery functions may be performed normally. If necessary, the next step in the job may invoke a batch job to back out the event. When processing is terminated due to compile errors, this information is written to the event audit report.

If the error number is set to zero (0), PAC will not terminate the event and processing will continue.

Any required processing may be done in the routine. The user will not be at ET status on entry into the routine.

Possible Use

When migrating objects into PAC from development or maintenance status types, the object list may be an arbitrary list of objects or it may be a "unit of work" comprising a specific set of objects. In the latter case, it may be important for the event to be terminated and subsequently backed out if any of the objects are not successfully compiled.

By issuing a TERMINATE nn statement in the exit, or by leaving the error number as a non-zero value, the user may terminate the compile step of the migration with a specific condition code so that the next step in the JCL/JCS will be executed only if that condition code was received from the compile step. This conditional step may then be a batch command to PAC to back out the event that just failed.

Parameters

Parameter	Format	Description
USER-AREA	A50	Modifiable; area for user to use
EVENT-NAME	A32	Not modifiable; name of the event being processed
APPLICATION	A32	Not modifiable; name of the application for the event
FROM-STATUS	A32	Not modifiable; origin status name
FROM-STATUS-CODE	A1	Not modifiable; origin status type
TO-STATUS	A32	Not modifiable; destination status name
TO-STATUS-CODE	A1	Not modifiable; destination status type
COMPILED-OBJECTS	P8	Not modifiable; total objects compiled
ERROR-OBJECTS	P8	Not modifiable; total objects not compiled
ERROR-MSG	A32	Modifiable; error message text
ERROR-NUM	P5	Modifiable; error message number

PACEX007 - Change Control List Verification

This user exit is invoked during the check-out of objects to and the check-in from a development or maintenance status type. The user has the option to process the information or to reject the request.

Note:

Since PAC currently does not support message switching facilities, it is recommended that you integrate your own message switching facilities. For example, use Con-nect from User Exit 7 (PACEX007) in the check-out/check-in process of PAC so that all users are correctly informed about check-out/check-in activities.

The parameter list provided with this exit allows you to customize the check-in and check-out processing to your exact requirements.

As each object is being processed for maintenance, the user is given the opportunity to verify the information. A non-zero response will instruct PAC not to accept the specific object for processing.

Control must be restored to PAC after processing in the exit is completed.

Because PACEX007 processing can be complex, it is recommended that you keep the logic in this exit simple by using subprograms to perform specific functions, depending on the FUNCTION or OPTION TYPE parameters.

A detailed explanation of the parameters for PACEX007 is included later in this section.

Possible Use

The exit may be used to verify the check-out of objects as follows:

- Validate the user and the object being checked out, and optionally disallow the check-out; that is, restrict access to the object.
- Disallow the check-out for a particular object.

- Obtain reports using information about an object being checked out.
- Get a list of other users who also may have previously checked out the same object (concurrent maintenance).
- Validate the user and the object being checked in and optionally disallow the check-in.
- Perform message switching logic to inform users of the checking in or checking out of an object.
- Ensure that all maintenance activities have an associated maintenance request.
- Attach comments or instructions to an object being checked in or out.
- Validate the library where the object is being checked in or out for a user.

Parameters

Parameter	Format	Description
FUNCTION	A1	Not modifiable; the function may be one of the following: I check-in O check-out
OPT-TYPE	A1	Not modifiable; the option type may be one of the following: blank self (first time call) C closed D duplicate I check-in of object N object not checked out O check-out of object
ACC-TYPE	A1	Not modifiable; the type of access may be one of the following: A access only C check-out request cancelled D development type event called U update
APPLICATION	A32	Not modifiable; name of the application for the object
EVENT	A32	Not modifiable; name of the migration event
MAIN-REQ-ID	A20	Not modifiable; maintenance request ID
FROM-STATUS	A32	Not modifiable; origin status
FROM-STATUS-TYPE	A1	Not modifiable; origin status type
TO-STATUS	A32	Not modifiable; destination status
TO-STATUS-TYPE	A1	Not modifiable; destination status type
OBJECT-ID	A32	Not modifiable; object currently being processed
CHECKOUT-VERNO	P5	Not modifiable; check-out version number
CHECKOUT-USER	A8	Not modifiable; identity of user who checked out the object
CHECKOUT-DATE	T	Not modifiable; date and time the object was checked out
CHECKOUT-TID	A8	Not modifiable; identity of terminal from which the object was checked out
CHECKIN-VERNO	P5	Not modifiable; check-in version number for closed logs only

Parameter	Format	Description
CHECKIN-USER	A8	Not modifiable; identity of user who checked in the object
CHECKIN-DATE	T	Not modifiable; date and time the object was checked in
CHECKIN-TID	A8	Not modifiable; identity of terminal from which the object was checked in
MNT-LIBRARY	A8	Not modifiable; destination library
MNT-DBID	N5	Not modifiable; destination DBnr
MNT-FNR	N5	Not modifiable; destination Fnr
COMMENT-01	A60	Modifiable; comment area
COMMENT-02	A60	Modifiable; comment area
COMMENT-03	A60	Modifiable; comment area
WORK-AREA	A100	Modifiable; area for user to use
AUD-MSG	A72	Modifiable; text of message to audit report
RESP	N4	Modifiable; response code

Explanation of Parameters

FUNCTION

When objects are migrated to a (destination) maintenance status type, change control logs containing check-out information are created for each object being migrated. For migrations with an (origin) maintenance status type, the change control log is updated with check-in information for each object checked in from maintenance. No change control logs are created for migrations to or from a development status type. The following options are valid:

- I Check-in function being performed on object.
- O Check-out function being performed on object.

OPT-TYPE

Option type specifies the following:

- blank Indicates the first time the exit is called for a particular object. At this point, the user may reject the object check-out/check-in based on the name of the object or the user invoking the request. For check-in, the user may wait to decide whether to reject the object until the exit is invoked again with a subsequent call (the exit is invoked with the I option or the N option if the object was not checked out before the check-in request).
- C Closed. Indicates that the object being checked in was previously checked out and then checked back in (which closed the check-out log).
- D Duplicate object. Indicates that the object being checked out was already checked out to this library with a previous migration event. This could occur when the wrong version was checked out or the version being checked out needs to be refreshed. This situation does not occur with check-ins. It is the user's responsibility to resolve inconsistencies that may occur when multiple versions of the same object are maintained at the same time. Depending on timing and circumstances, programmers may implement the same change in different ways and PAC has no way to determine this.
- I In. Indicates that the log information being passed to the exit is for the object currently being checked in. This occurs only on check-ins and gives all of the check-out information about this object. I differs from the (blank) option in that the check-out information is not made available to the user with the (blank) option.
- N Never checked out. Indicates that an object now being checked in was never checked out of PAC (for example, a completely new object with no versions in PAC, or a version of a PAC object that was created in development but is being migrated into PAC through maintenance).
- O Out. Always indicates that the object is checked out. This may be seen with check-ins or check-outs. Thus, with a check-out, the user is informed about other users who have checked out this same object (but perhaps a different version). For check-ins, the user is informed about the user who still has this same object (but perhaps a different version) checked out. This information is stored in the audit report of the migration event.

ACC-TYPE

Access type informs the user whether or not the object has been modified after a check-out.

- U Update. When the object is checked out, PAC always sets the access type to U (update) and is retained as a U if the object checked out was changed.
- A Access. If PAC notes at check-in that the object checked out was not modified, then the access type is set to A (access).
- C Cancelled. Occurs when an object was checked out for maintenance, but the request is being cancelled. This is only possible when the user is performing a migration from a maintenance (M) status type to a retire (R) status type.
- D Development. This special access type, which can be ignored, occurs when users are migrating objects out of PAC to a development (D) status type. It allows the user to control programming changes between development and maintenance. For example, it may be useful for development to know of changes to objects in a maintenance environment so that the same changes may be made to the objects in the development environment. Where development and maintenance are the same environment, the D option is irrelevant. Alternatively, development may be disallowed if the object is in maintenance.

APPLICATION

This parameter identifies the application to which the object belongs. In PAC, all activities on objects are always performed at the application level.

EVENT

This parameter is the migration event being used for the processing of objects. If event naming standards are defined, the event name may help to determine whether or not the checking in or checking out of an object is valid.

MAIN-REQ-ID

This parameter may be useful to relate a particular migration to a specific problem. All objects being checked in and out will be assigned to that particular maintenance request thus making tracking easier. For example, it may be useful to disallow check-in or check-out of an object unless there is an associated maintenance request.

Status Parameters

FROM-STATUS origin status of the migration; that is, where the objects are being migrated from.
FROM-STATUS-TYPE origin status type.
TO-STATUS destination status of the migration; that is, where the objects are being migrated to.
TO-STATUS-TYPE destination status type.

OBJECT-ID

This parameter identifies the object currently being processed by PAC.

Check-Out Parameters

CHECKOUT-VERNO object version number of the object being checked out.
CHECKOUT-USER user who is checking out the object.
CHECKOUT-DATE date and time the object is being checked out.
CHECKOUT-TID terminal where the object is being checked out.

Check-In Parameters

CHECKIN-VERNO object version number of the object being checked in.
CHECKIN-USER user who is checking in the object.
CHECKIN-DATE date and time the object is being checked in.
CHECKIN-TID terminal where the object is being checked in.

Maintenance Parameters

MNT-LIBRARY maintenance library location to which the object was checked out, or the maintenance library location from which the object is being checked in. For example, if the migration is from production to maintenance, then PAC does not provide the location of production; that is, the origin status.
MNT-DBID database number of the maintenance library.
MNT-FNR file number of the maintenance library.

COMMENT

This parameter identifies the comments passed to the exit. Comments may be modified by the user, for example, to pass messages, reminders, or instructions to someone reviewing change control logs. This information may be set up during the check-out and then used as verification of the object during check-in.

WORK-AREA

The WORK-AREA parameter is a 100-byte area that the user may use during the processing of the exit. The work area may be set up when the exit is invoked for the first time (OPT-TYPE blank) and then used each time the exit is invoked for that particular object. PAC does not clear the area until the next object is processed.

AUD-MSG

If this parameter is set to a non-blank value, PAC will write the value as a message to the audit report.

RESP

This parameter tells PAC what to do with the object being processed.

- A zero response indicates that there are no problems and processing can continue.
- A non-zero response instructs PAC to reject the object.

If updates are performed on user-defined files during exit processing, the End Transaction (ET) is performed by PAC. If the user wants to write information to the job listing or to the screen, then this should be done in the exit itself.

PACEX008 - Application Status Library Validation

This user exit is invoked during the creation of application status links for a particular application. The exit allows the user to validate the specific libraries assigned to each specific application status link.

If the error number (ERROR-NUM) is set to a non-zero value, it will instruct PAC to not accept the specific library being validated. No END/BACKOUT TRANSACTION statements should be issued.

Any required processing may be done in this routine. The user will not be at ET status on entry into the routine.

Possible Use

Possible uses for this exit are as follows:

- Restrict the assignment of a library for use by a specific application;
- Assign automatic definitions for the value of a library and/or file and/or database for an application when it is linked to a status;
- Override the default settings of the library, database, and file number when an application is linked to a status.

Parameters

Parameter	Format	Description
FUNCTION	A1	Not modifiable; type of request: A add M modify
APPLICATION	A32	Not modifiable; name of application
STATUS	A32	Not modifiable; name of status
STATUS-TYPE	A1	Not modifiable; type of status
LIBRARY	A8	Modifiable; library for link
DBID	N5	Modifiable; database location of library
FNR	N5	Modifiable; file location of library
XREF-FLAG	A1	Modifiable; XREF usage indicator
ERROR-NUM	P5	Modifiable; response code
MSG	A78	Modifiable; text of message to be given to user
USER-AREA	A50	Modifiable; area for user to use

PACEX009 - Duplicate Object Verification

This user exit is invoked when PAC finds a duplicate object. The duplication is determined by comparing the date-time stamp of the development version with the most recent PAC version of the object.

Normally, PAC ignores duplicate versions of text and copy code object types only. The reason for this is that, while the saved objects may be identical, the cataloged objects may be different. The difference is caused by the external objects (data areas, copy code, views, and rules) used by the compiled object. Since the cataloged and saved objects must always be in sync, a new version must be created. PAC does not check the status of an object's external objects; therefore, it must create a new version of all objects except copy code and text.

The user may override PAC's decision by setting RESP-CODE as follows:

- If RESP-CODE is set to zero, PAC processes the duplicate object;
- If RESP-CODE is set to a non-zero value, PAC ignores the duplicate object.

The user is at the End Transaction (ET) status on entry to the routine. Control must be returned to PAC when the exit terminates.

The following is the table of corresponding values for object types used by PAC. The value passed by PAC is the short text.

Code	Short Text	Long Text
C	Copycd	Copycode
T	Text	Text
G	Global	Global
L	Local	Local
A	Param	Parameter
P	Progrm	Program
S	Subrtn	Subroutine
N	Subpgm	Subprogram
H	Help	Helproutine
M	Map	Map
Z	Record	Recording
Y	XpertM	Xpert Model

Possible Use

Possible uses for this exit are as follows:

- Override PAC to ignore or not ignore the creation of a new version of a particular object;
- Establish different rules of duplication for each application according to object naming conventions, or the type of origin status.

Parameters

Parameter	Format	Description
PAC-STATUS	A1	Not modifiable; origin status type: D development M maintenance
PAC-APPLICATION	A32	Not modifiable; application for the migration
OBJECT	A8	Not modifiable; object being processed
OBJ-TYPE	A15	Not modifiable; object type
OBJECT-DATE	T	Not modifiable; save date of the object
RESP-CODE	N4	Modifiable; response code

PACEX010 - Object List Verification

This user exit is invoked during object list processing whenever an entry is processed from the object list of the event. This user exit is valid for all migrations.

As each entry in the object list is passed to the exit, the user has the option to disallow that entry by moving a non-zero response code to the RESP-CODE field. An entry is allowed with a zero response code. Control must be restored to PAC at the termination of the exit.

Possible Use

PACEX010 is called during the actual reading of the object list before PAC processes each entry on the list; for example:

```
SUBRTN1 , S ,
HELP* , M , PRODUCTION
```

This allows the user to verify the following:

- Use of range notation;
- Use of references (version or status); these may be disallowed or restricted;
- Use of certain types of objects (perhaps for exclusion);
- Use of itemized objects to ensure that standards are satisfied with naming conventions; that is, that *, <, and > have not been specified for range notations;
- Use of other external subsystems;
- Secure the definition of which objects belong to which applications.

Parameters

Parameter	Format	Description
APPLICATION	A32	Not modifiable; application name
FM-STATUS	A32	Not modifiable; origin status name
TO-STATUS	A32	Not modifiable; destination status name
EVENT	A32	Not modifiable; migration event name
OBJECT	A32	Not modifiable; object name
OBJ-TYPE	A15	Not modifiable; object type text
STAT-VER	A37	Not modifiable; status/version reference
EXIT-AREA	A20	Not modifiable
REDEFINE EXIT-AREA		
LIBRARY	A8	Not modifiable; library of the From/To status (see note below)
DBID	N5	Not modifiable; DBnr of the From/To status
FNR	N5	Not modifiable; Fnr of the From/To status
RESERVED	A4	Not used
FROM-STAT	A1	Not modifiable; From status type
TO-STAT	A1	Not modifiable; To status type
RESP-CODE	N4	Modifiable; response code

Note:

LIBRARY will contain the value of the library for the application status link of either the origin or destination status. If the object is being migrated into PAC, then this will be the library of the development, maintenance, or incorporation status. If the object is being migrated out of PAC, then it will be the library of the destination status.

PACEX011 - Job Validation

This user exit is called when a job maintenance subfunction is invoked to perform updates or access jobs defined to PAC.

Possible Use

This exit can be used to implement tracing and customized audit security.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; the type of entity: "J" job
ENTITY-NAME	A32	Not modifiable; name of the job being processed
ENTITY-IDENTIFIER	A32	Not modifiable; name of new job when ENTITY-FUNCTION is "C" or "R"
ENTITY-FUNCTION	A2	Not modifiable; requested function: "A" add job "C" copy job "D" display job "E" edit JCL "M" modify job "R" rename job "S" select job "U" submit a job
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the job currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the job currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX012 - Job Submission Verification

This user exit is invoked during JCL submission, and provides the first 10 lines of JCL so that the user may examine them and make any desired changes prior to job submission.

If job processing is to be terminated, then a non-zero response must be returned to PAC.

Possible Use

This exit can be used to enforce site-specified standards for performing various substitutions (for example, with jobs cards, account information).

Parameters

Parameter	Format	Description
USER-AREA	A50	Modifiable; area for user to use
EVENT-NAME	A32	Not modifiable; name of the event. This name is available when submitting JCL with the migration event Submit function
JCL	A72/1:10	Modifiable; I/O JCL cards to be examined and optionally modified
ERROR-MSG	A78	Modifiable; user message to be displayed when disallowing the Submit function for the job currently being processed
ERROR-NUM	P5	Modifiable; return code. A non-zero value disallows the Submit function for the job currently being processed

PACEX013 - Migration Event Validation

This user exit is invoked whenever any option on the Migration Event Maintenance subfunction is invoked.

Possible Use

This exit can be used to implement audits and security.

Parameters

Note:

The ENTITY-FUNCTION (R), refresh event, cannot be used as an input parameter but if this is set when the "refresh" command is used, then the exit will be invoked.

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; type of entity "E" migration event
ENTITY-NAME	A32	Modifiable; migration event name
ENTITY-IDENTIFIER	A32	Modifiable; new migration event name
ENTITY-FUNCTION	A2	Not modifiable; requested function: "A" add an event "C" copy an event "D" display an event "M" modify an event "R" refresh an event "S" select an event "U" submit an event
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the migration event currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the migration event currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX014 - Status Validation

This user exit is invoked when any option on the Status Maintenance subfunction is invoked.

Possible Use

This exit can be used to implement audits and security.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; type of entity "S" status
ENTITY-NAME	A32	Not modifiable; status name
ENTITY-IDENTIFIER	A32	Not used
ENTITY-FUNCTION	A2	Not modifiable; requested function: "A" add a status definition "D" display a status definition "L" link status to applications "M" modify status definition "S" select status
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the status currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the status currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX015 - Application Validation

This user exit is invoked when an Application Maintenance subfunction is invoked to perform updates or access applications defined to PAC.

Possible Use

This exit can be used to implement tracing and customized audits and security.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; the type of entity: "A" application
ENTITY-NAME	A32	Not modifiable; the name of the application being processed
ENTITY-IDENTIFIER	A32	Not modifiable; new application name when ENTITY-FUNCTION is C
ENTITY-FUNCTION	A2	Not modifiable; the requested function: "A" add application "C" copy application "D" display application "L" link application to a status "M" modify application "S" select application
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the application currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the application currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX016 - File Translation Table Validation

This user exit is invoked whenever any option on the FTT Maintenance subfunction is invoked.

Possible Use

This allows the user to implement audits and security.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; the type of entity: "F" file translation table
ENTITY-NAME	A32	Not modifiable; FTT name
ENTITY-IDENTIFIER	A32	Not modifiable; new FTT name when ENTITY-FUNCTION is C
ENTITY-FUNCTION	A2	Not modifiable; the requested function: "A" add FTT "C" copy FTT "D" display FTT "M" modify FTT "S" select FTT
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the FTT currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the FTT currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX017 - Application Status Link Validation

This user exit is invoked whenever any option on the Migration Paths subfunction is invoked.

Possible Use

This exit can be used to implement audits and security.

Parameters

Parameter	Format	Description
APPLICATION	A32	Not modifiable; the application name
FM-STATUS	A32	Not modifiable; origin status name
TO-STATUS	A32	Not modifiable; destination status name
FUNCTION	A2	Not modifiable; the requested function: "A" add migration path "D" display migration path "M" modify migration path "S" select migration path
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the migration path currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the migration path currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX018 - Object Version Reporting

This user exit is invoked whenever any option on the Versioned Objects Reporting subfunction is invoked.

Possible Use

This exit allows the user to implement audits and security. For example, access to certain objects belonging to certain applications may be restricted to specific users.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; the type of entity: "V" object version
ENTITY-NAME	A32	Not modifiable; application name
ENTITY-IDENTIFIER	A32	Not modifiable; object name
ENTITY-FUNCTION	A2	Not modifiable; the requested function: "D" display versioned object "H" hardcopy versioned object "S" select versioned object "U" list versioned objects with no application status "V" display versioned object history data
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the object version currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the object version currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX019 - Maintenance Request Validation

This user exit is invoked whenever ENTER is pressed when using a Maintenance Request subfunction.

Possible Use

This exit can be used as follows:

- To move objects in and out of PAC;
- To automate modifications to the maintenance request;
- To retrieve information from an external problem-tracking system;
- To perform audits or any automated processing, especially with an external problem-tracking system.

Parameters

Parameter	Format	Description
REQUEST-ID	A32	Not modifiable; the maintenance request ID
REQUEST-ID-2	A32	Not modifiable; the new maintenance request ID when the FUNCTION is C (copy)
FUNCTION	A1	Not modifiable; the requested function: "A" add request ID "C" copy request ID "D" display request ID "L" list by request ID "M" modify request ID "S" select request ID
PROBLEM-SUBJECT	A60	Modifiable; subject of the problem
PROBLEM-TYPE	A8	Modifiable; type of the problem
PRIORITY	N3	Modifiable; priority
STATUS	A12	Modifiable; status defined to PAC using Table Maintenance in administrator functions
ACTION	A12	Modifiable; action defined to PAC using Table Maintenance in administrator functions
CONTACT-NAME	A32	Modifiable; name of the contact person who reported or is responsible for the maintenance request
CONTACT-TEL	A20	Modifiable; telephone number of the contact person
ERROR-NUM	P5	Input; return code. A non-zero code disallows the requested function for the maintenance request currently being processed.
MSG	A78	Input; user message to be displayed when disallowing the requested function for the maintenance request currently being processed
USER-AREA	A50	Modifiable; area for user to use as set up by the PAC initialization exit

PACEX020 - Maintenance Request Processing Validation

This user exit is invoked when a Maintenance Request subfunction is invoked.

Possible Use

This exit can be used to implement tracing, audits, and/or customized security.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; the type of entity: "M" maintenance request
ENTITY-NAME	A32	Not modifiable; the name (ID) of the maintenance request being processed. The first 20 characters are valid.
ENTITY-IDENTIFIER	A32	Not modifiable; the new maintenance request name (ID) when ENTITY-FUNCTION is C. The first 20 characters are valid.
ENTITY-FUNCTION	A2	Not modifiable; the requested function: "A" add request ID "C" copy request ID "D" display request ID "L" list by request ID "M" modify request ID "S" select request ID
RESP	P5	Input; return code. A non-zero code disallows the requested function for the maintenance request currently being processed.
MSG	A78	Input; user message to be displayed when disallowing the requested function for the maintenance request currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX021 - Maintenance Request Name Verification

This user exit is invoked whenever any modification of the Maintenance Request name is performed during migration event maintenance.

Possible Use

This exit allows the user to implement audits and security. It can be used to ensure the specification of a maintenance request whenever a migration event is created.

Parameters

Parameter	Format	Description
MAINTENANCE-REQUEST	A32	Modifiable; name (ID) of the maintenance request
EVENT	A32	Input; name of the migration event
APPLICATION	A32	Input; name of the event's application
ORIGIN-STATUS	A32	Input; name or the event's origin (From) status
DESTINATION-STATUS	A32	Input; name of the event's destination (To) status
RESP	P5	Input; return code. A non-zero code disallows the requested function for the maintenance request currently being processed
MSG	A78	Input; user message to be displayed when disallowing the requested function for the maintenance request currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX022 - Object Version Used-By-List Reporting

This user exit is invoked whenever subordinates (maps, data areas, or copy code) in use by another object(s) are migrated from development or maintenance status types.

For objects compiled with the steplib option, this user exit identifies the application to which the object belongs so that when the subordinate changes, you can obtain a complete list across all applications of all objects that use that subordinate.

Possible Use

With Natural, objects using subordinates need not be recompiled until the objects affected by the subordinate change; this user exit can be used to warn the user that this change has taken place.

It can be used as well to write the list of affected objects to a work file for use in the generation of a subsequent migration event, thus automating the change to all objects using a particular subordinate. The work file dataset created by this exit can be used as input to the Generate function that creates another migration event, or it can be used to create the object list for an existing event.

Alternatively, the exit may be used to write the list of affected objects to a print file so that reports can be created that satisfy user requirements.

Parameters

Parameter	Format	Description
EVENT	A32	Input; name of the migration event
APPLICATION	A32	Input; name of the object's application
ORIGIN-STATUS	A32	Input; name of the event's origin status
DESTINATION-STATUS	A32	Input; name of the event's destination status
OBJECT	A32	Input; name of the object
TYPE	A4	Input; object type
VERSION	N4	Input; object version
USED-BY-OBJECT	A32	Input; name of the used-by object; that is, the object that uses the OBJECT as a subordinate object
USED-BY-TYPE	A4	Input; object type of the used-by object
USED-BY-VERSION	N4	Input; object version of the used-by object
USED-BY-APPLICATION	A32	Input; application of the used-by object
USER-AREA	A50	Modifiable; area for user to use

PACEX023 - Object Verification for Autoexpand

This user exit is called before a particular object is expanded. PAC passes the object name, type, version, and the Expand option to the exit.

Possible Use

The user may change the expand option for the particular object by modifying the Expand option value; or suppress the expansion of the object by returning a non-zero value in the return code field.

Parameters

Parameter	Format	Description
EVENT	A32	Input; name of the migration event
APPLICATION	A32	Input; name of the application
ORIGIN-STATUS	A32	Input; name of the origin status
DESTINATION-STATUS	A32	Input; name of the destination status
OBJECT	A32	Input; name of the object
TYPE	A4	Input; object type as specified in the object list
VERSION	N4	Input; object version
EXPAND-OPTION	A1	Modifiable; "C" subordinate objects (compile time) "E" subordinate and referenced objects "N" no expansion "R" referenced objects (run time) "U" used-by objects
RETURN-CODE	P5	Modifiable; "zero" expand object "non-zero" do not expand
USER-AREA	A50	Modifiable; area for user to use

PACEX025 - Migration Event Names

This user exit allows the user to implement the routines for generating and verifying event names. It is invoked when function code A (Add) or C (Copy) is selected from the Migration Event Maintenance menu before the event name (entered by the user) is verified by PAC.

Since this exit is called before validation of the migration event name, the user may optionally leave the Event or the New Event field blank.

Possible Use

This user exit allows the user to implement the routines for automatically generating and verifying event names. It may be used to perform audit or security functions on existing events or it may be used to restrict the creation of an event.

Parameters

Parameter	Format	Description
ENTITY-TYPE	A1	Not modifiable; the type of entity "E" migration event
ENTITY-NAME	A32	Modifiable; name of the migration event.
ENTITY-IDENTIFIER	A32	Modifiable; new name of the migration event when the ENTITY-FUNCTION is C
ENTITY-FUNCTION	A2	Not modifiable; requested function: "A" add an event "C" copy an event
RESP	P5	Modifiable; return code. A non-zero value disallows the requested function for the migration event currently being processed
MSG	A78	Modifiable; user message to be displayed when disallowing the requested function for the migration event currently being processed
USER-AREA	A50	Modifiable; area for user to use

PACEX026 - Object List Selection for Archiving

This user exit interface provides criteria for selecting objects to be archived. The selected objects are added to the object list of an existing migration event. Only the selection criteria for archiving objects for a particular application are identified. User routine UMENARCH verifies the actual objects selected.

The exit is invoked using the ARCEVENT or Generate Archive List functions.

Note:

If an event is used, it must be an existing event; it must have a migration path Control to Archive; it must be in a pending or validated state; and its object list will be deleted.

Possible Use

This exist may be used to set up or override the archive selection criteria parameter values.

Parameters

Parameter	Format	Description
FUNC	A1	Not modifiable; indicates when to select objects to be archived: "A" after the exit is invoked "B" before the exit is invoked
REDEFINE-OPTS	A8	Options for archive processing
1. DEF-TYPE	A1	Modifiable; when FUNC is B (before), PAC can use either: "A" the archive selection criteria defaults from the application "U" the parameter defaults passed by the user exit
2. SHOW-MAP	A1	Modifiable; show map for input (Y) or get parameters from exit (N): "Y" show an input map to use when overriding parameter values passed by the exit "N" do not show an input map
3. ARCEVENT	A1	Modifiable; A = invoked by Archive; R = invoked by Retire Event
TO-STATUS	A1	Modifiable; A = Archive; R = Retire
APPLICATION	A32	Name of application to be processed
EVENT	A32	Name of migration event to be used if the object list must be created
MIN-VERSION	P2	Number of valid versions to be exempted from archiving; number begins with most recent; default is 3; minimum of three objects must remain.
RETENT-DAYS	P3	Age of object, in days, before it can be selected for Archiving/Retiring; Zero (0) indicates no data checking
STATUS-CHECK	A1	Modifiable; used in conjunction with STATUS-LIST when an object in a status is selected: "Y" the default; ignore the selection of an object for archiving in a STATUS-LIST status "N" archive the selected object
STATUS-LIST	A6	Modifiable; if STATUS-CHECK is Y, this parameter contains the list of status types in which an object selected for archiving is ignored. The default list is as follows: "P" production (any object in a production status is ignored) "M" maintenance "T" test "A" Archive; that is, objects not yet purged
RESP-CODE	N4	Not used

PACEX027 - User Substitution Parameter Verification

This user exit is called whenever a batch job with user substitution parameters is submitted from PAC.

Possible Use

PAC jobs may contain substitution parameters. This exit may be called before and after the substitution parameters are specified; thus the exit may be used to specify the default substitution parameters. These parameters will then be displayed to the user according to normal job substitution functionality; the user may then change them. Once the user has made the substitutions, the parameters may once again be passed to the exit for validation.

The user may need to perform additional processing (such as additional database calls or input parameters) within this exit to derive the values for the substitution parameters.

Parameters

Parameter	Format	Description
FUNC	A1	Not modifiable; select objects to be archived before (B) or after (A) the exit is invoked
SUBS-CHAR	A1	Not modifiable; JCL substitution character
SUBS-PARM	A32/1:10	Not modifiable; names of substitution variables
SUBS-VALU	A32/1:10	Modifiable; values of substitution variables
SUB1	P3	Input; parameter in error
USER-AREA	A50	Modifiable; area for user to use
RESP	P5	Input; error code
MSG	A78	Input; error message

PACEX028 - Audit Report Message Verification

This user exit is invoked during migration event processing, usually when a message is being written to the audit report. This exit returns a non-zero response so that the user may optionally suppress the writing of an audit message to the audit report.

Any required processing may be performed in this routine; however, because the user may not be at ET status, control must always be returned to PAC to complete any internal processing.

Note:

The user should not write to the Natural work source area. That is, do not use the DEFINE PRINTER OUTPUT 'SOURCE' option.

Possible Use

In most cases, the messages written by the migration process invoke PACEX028 before they are written either to the audit report or to the printer. This allows the user to perform the following:

- Instruct PAC to suppress the writing of the message to the audit report;
- Print for the migration message, including headings;
- Write additional messages to the report listing (not the actual audit report);
- Change a message before it is written to the audit report;
- Check for errors (E), cautions (C), and warnings (W); and optionally write these to an exception report, for example, CMPRT01;
- Change the attributes of the message (for example, color, format).

Parameters

Parameter	Format	Description
EVENT-NAME	A32	Not modifiable; migration event name
APPLICATION	A32	Not modifiable; application name
FROM-STATUS	A32	Not modifiable; origin status name
FROM-STATUS-CODE	A1	Not modifiable; origin status type
FROM-LIBRARY	A8	Not modifiable; origin status library name
FROM-DBID	N5	Not modifiable; origin status library database number
FROM-FNR	N5	Not modifiable; origin status library file number
TO-STATUS	A32	Not modifiable; destination status name
TO-STATUS-CODE	A1	Not modifiable; destination status type
TO-LIBRARY	A8	Not modifiable; destination status library name
TO-DBID	N5	Not modifiable; destination status library database number
TO-FNR	N5	Not modifiable; destination status library file number
PRINT-IT	A1	Modifiable; N Suppress = Print
ERROR-MSG	A78	Not modifiable; error message text
ERROR-NUM	P5	Modifiable; error message number

How to Use PACEX028

When the exit is invoked, do the following to suppress the message:

1. Perform any special validation (for example, batch versus online processing, application, migration path).
2. Set the response code ERROR-NUM to a non-zero value.
3. Override the message, replace the contents of the ERROR-MSG field.

The format of all PAC error messages is as follows:

PACnnnn: (t) message-text

where:

nnnn	is the message number
(t)	is the message type:
	E (errors)
	C (caution)
	W (warning)
	A (audit)
	I (information)
message-text	is the actual message

Note:

Users should not write to the Natural work source area; that is, do not use the DEFINE PRINTER OUTPUT 'SOURCE' option.

The user may or may not be at ET status and no ET or BT should be issued from the exit; PAC does this.

Creating an Exception Report

An exception report for all errors can be created as follows:

```

FORMAT (2) LS=80 PS=0
IF ERROR-MSG = MASK (.....'(E)' /* Is this an error message?
OR ERROR-MSG = MASK (.....'(C)' /* Is this a caution message?
      WRITE (2) ERROR-MSG /* Yes, write exception report to CMPRT02
END-IF

```

Color-Coded Reports

With color terminals, messages can be color-coded for reports of online migrations. For example:

Message Type	Color
Audit messages	Turquoise
Warnings	Highlighted turquoise
Cautions	Highlighted yellow
Errors	Highlighted red

Alternatively, dynamic variables can be used for color-coding the message. For example:

```

.
.
.
REDEFINE ERROR-MSG
  MSG-PREFIX (A8)
  MSG-DYN1 (A1)
  MSG-TYPE (A3)
  MSG-DYN2 (A1)
.
.
.
MOVE '|' TO MSG-DYN1
MOVE '→' TO MSG-DYN2
DECIDE ON FIRST VALUE OF MSG-TYPE
  VALUE '(A)' PRINT ERR-MSG (CD=TU DY=|TU→)
  VALUE '(W)' PRINT ERR-MSG (CD=TU DY=|TUI→)
  VALUE '(C)' PRINT ERR-MSG (CD=TU DY=|YEII→)
  VALUE '(E)' PRINT ERR-MSG (CD=TU DY=|REI→)
  ANY MOVE 4 TO ERR-NUM /*suppress message in PAC
  NONE PRINT ERR-MSG (CD=BL DY=|BLI→)

```

Note:

The PAC audit report stores only the first 72 bytes of any message.

PACEX030 - Event Authorization Verification

This user exit allows the user to implement additional controls for event authorization before it is actually authorized. The event is invoked before and after authorization begins. Any required processing may be performed in this routine. The user will be at End Transaction (ET) status on entry into the routine.

Possible Use

- Automatic override of parameters for certain authorizations;
- Additional audit of the security checking for authorizations;
- Set up of parameters not previously defined in the migration path.

Parameters

Parameter	Format	Description
FUNCTION	A1	Input; indicates when the exit is to be invoked: "A" after authorization begins "B" before authorization begins
EVENT	A32	Input; event name
APPLICATION	A32	Input; event's application name
FROM-STATUS	A32	Input; event's origin status name
TO-STATUS	A32	Input; event's destination status name
JOB	A32	Modifiable; job name for batch processing
EXPAND-OPT	A1	Modifiable; Expand option: "C" subordinate objects (compile time) "E" subordinate and referenced objects "N" no expansion "R" referenced objects (run time) "U" used-by objects
EXPAND-STATUS	A1	Modifiable; name of the status to be used as the reference of expanded objects
BATCH-ONLINE	A1	Modifiable; "B" run the migration event in batch "O" run the migration event online
COPY-MOVE	A1	Modifiable; "C" copy objects "I" include objects "M" move objects
WORKFILE-USAGE	A1	Modifiable; "Y" use work file "N" do not use work file
APPLYMODS	A50	Modifiable; applymod default settings (A/D/Y/N) are still enforced
SCHED-DATE	T	Modifiable; date/time the migration event is scheduled to run
TRANSLATION-TABLE	A32	Modifiable; name of the file translation table to be used for the migration event
MSG-NO	P5	Modifiable; error message number
MSG	A78	Modifiable; error message text
USER-AREA	A50	Modifiable; area for user to use

PACEX031 - Passing CATALL Parameters to PAC

This exit is invoked prior to CATALL during the migration of objects from development or maintenance. It allows you to pass CATALL parameters to PAC for use during the compile.

If "NOREN" is specified, the following CATALL will not renumber the lines of the sources which it compiles; it will renumber them if "NOREN" is not specified. If "NOSCROLL" is specified, the following CATALL will not scroll the list of compiled objects which it produces; it will scroll the list if "NOSCROLL" is not specified.

Parameter	Format	Description
APPLICATION	A32	Input; name of the application
FROM-STATUS	A32	Input; event's origin status name.
TO-STATUS	A32	Input; event's destination status name.
PARM	A50	Modifiable; "U" or "NOREN" or "NOSCROLL" or "NOREN,NOSROU"

PACEX032 - Rejecting Objects for Object List

This exist is invoked for each object selected by PAC during the selection of objects for the Object List from the Object List Editor. It is used to reject objects based on a moving non-zero value for the MSG-NO parameter (Natural Optimizer Compiler).

Parameter	Format	Description
EVENT	A32	Input; the name of the event.
APPL	A32	Input; the application of the event.
FM-STAT	A32	Input; the origin of the event.
TO-STAT	A32	Input; the destination of the event.
OBJ	A8	Input; the name of the object.
OBJ-TYPE	A4	Input; the type of the object.
OBJ-VERS	N4	Input; the object's version number if the object resides in CONTROL compartment, 0 otherwise.
DATASET	A54	Input; the name of the PDS from which the foreign object would be immigrated or deleted. Blank if the object is not foreign or the origin of the event is not of type incorporation, development, test, or maintenance or the event does not involve migration and is not of the type "retirement".
RESP	P5	Modifiable; if not equal to 0, the object is rejected.

PACEX034 - Direct Command User Exit

This exist is passed by the command line in chunks of alphanumeric 32 blocks. This exit is called before the validation of the command line. Any modifications to the commands will be validated.

Possible Use

PACEX0034 can be used to pass site-specific syntax to PAC, for example ADD EVENT my be entered as CREATE LIST.

Parameter	Format	Description
COMMAND	A32/36	Each command as entered.
MSG	A78	Message.
RESP	P5	Response code.

PACEX035 - SCANOBJ Utility

The scan utility exit, User Exit PACEX035, is invoked with the SCANOBJ utility for every object to be scanned in PAC.

Because SCANOBJ makes use of windows for online processing, caution should be used when issuing WRITE, PRINT, DISPLAY, or INPUT statements from within the user exit.

Possible Use

PACEX035 allows the user to perform security checking for each request and then for each object at the time the SCANOBJ utility is invoked.

Parameters

Parameter	Format	Description
FUNC	A1	Not modifiable; "I" the initial call for allowing a specific scan request "S" the scan call for a specific object being called
APPLIC	A32	Not modifiable; application name
OBJECT	A8	Not modifiable; Natural object name
STATUS	A32	Not modifiable; status name (set up by user). If empty, control will be used.
VERSION	N4	Not modifiable; object version number
OBJ-TYPE	A15	Not modifiable; object type
RESP	N4	Input. Response code. If set not equal to 0, the object will be skipped for FUNC "S", and the whole Scan request will be stopped for FUNC "I".

PACEX036 - Object Origin Deletion

This user exit is used in a migration to synchronize objects in the origin status with PAC by creating the input data to be used for the deletion of objects at the origin status.

During the processing of the event, the objects in the origin status may be on another CPU or database and inaccessible to PAC. To synchronize the objects in the origin status with PAC, a job may be run at the location of the origin status.

This routine creates the input data to be used for the deletion at the origin status. The input data may be used as input to either SYSMAN or NATUNLD. This exit is only invoked when the FROM-STATUS of the event is of type (T), and the TO-STATUS is either of type P, M or D.

Parameters

Parameter	Format	Description
REQUEST	A1	Modifiable; F: first (initial) call; N: normal call; L: last call
OBJECT-LIB	A8	Modifiable; name of the library in which the object resides
OBJECT-NAME	A32	Modifiable; name of the object (only if N - i.e., "Normal")
OBJECT-TYPE	A4	Modifiable; object type code (only if N - i.e., "Normal")
OBJECT-VER	P5	Modifiable; version of the object (only if N - i.e., "Normal")
OBJECT-STATUS	A32	Modifiable; origin status of the object
USER-AREA	A50	Modifiable; area for user to use
PAC-ERR	P5	Not modifiable; error message number

Example

```
SYSMAIN DELETE,STOWED,object-name IN LIBRARY object-library
```

PACEX037 - Predict Generation

This interface exit restricts the generation of DDMs/views or rules during Predict migrations and optionally verifies the database ID for files linked to multiple databases.

When each DDM/view to be generated is passed to this exit, the user may set the RESP code to a non-zero value to suppress the generation, and/or place a message in the MSG parameter for PAC to write into the audit report.

Additionally, in the case of files linked to multiple databases, the user may override the database ID for which the generation must be performed. PAC uses information from the generation defaults to determine which default database to use. This is only valid for files linked to multiple databases.

- If the Specification DB-ID is set to N, the database ID is not used.
- If the Specification DB-ID is set to Y and the database ID is set to blank, the Predict generation results in an error.

The user will be at End of Transaction (ET) status on entry into the routine. Control should be returned to PAC at termination of the routine.

Parameters

Parameter	Format	Description
FUNC	A1	Not modifiable
OBJECT	A32	Not modifiable; name of a view or rule
DATABASE-ID	A32	Modifiable
OBJ-TYPE	A15	Not modifiable; name of the object type
MSG	A78	Modifiable; error message text
RESP	N4	Modifiable; return doe number. If set to not equal to 0, the DDM will not be generated.

PACEX040 - Remote Node and Dataset Security Check

PACEX040 is called whenever the current user does not have logon access to the requested Entire System Server node. It allows you to specify a different user ID and/or password and the password for protected PDSs.

Using PACEX040, you can

- change the value of a USERID field and
- specify the value of a PASSWORD field.

The authorization of the resulting pair to access the node is checked by PAC.

Parameter	Format	Description
FUNCTION	A1	Input; constant "N".
NODE	N3	Input; the number of the node being accessed.
DATA-SET-NAME	A54	Input; the name of the dataset being accessed.
USERID	A8	Input/modifiable; the current value of *INIT-USER. The ID to be used at the authorization check.
PASSWORD	A8	Modifiable; the password for node access

MIGEX003 - File Security Check

Function

This exit is invoked whenever PAC needs to access a Natural or Predict file to retrieve or store Natural or Predict objects. This allows the user to establish the password and cipher code to be used when PAC accesses these files.

Remarks

Although this exit is defined as User Exit PACEX003, it is not invoked with this name; instead, exit MIGEX003 is invoked. This is because PAC comprises three subsystems loaded into libraries SYSPAC, SYSPAA and SYSTEM; and, in order to minimize the amount of maintenance, all three subsystems use exit MIGEX003 to obtain the password and cipher information needed to access the Natural/Predict system file.

Normally, when using Natural, passwords and cipher codes may be specified through the NATPARMS (for example, FNAT, FUSER, FDIC, NTFILE, SYSCIP, SYSPSW); however, depending on the user's security definition, this may not be adequate. MIGEX003 allows the user to provide the relevant password or cipher definitions for any and every file accessed by PAC. PAC passes the DBnr and Fnr of the file to be accessed so that the exit may return the corresponding password and cipher.

When the database and/or file number to be accessed by PAC must be translated to another database and/or file number, the exit may be used to perform the translation.

Parameters

Parameter	Format	Description
DBID	N5	Modifiable; database ID number
FNR	N5	Modifiable; file ID number
PSWD	A8	Modifiable; password
CIPH	A8	Modifiable; cipher