

Natural under IMS/TM - Special Functions

This document describes the use of special functions available with the Natural IMS Interface. The following topics are covered:

- Prerequisites
- Accounting
- Monitoring
- Broadcasting
- Multi-Session Feature
- Server Environment

Additional Information

- **Natural IMS/TM Error Codes** - for a list of the error codes and messages that may be issued by the Natural IMS Interface (NII) refer to Natural IMS/TM Error Codes in the Natural Messages and Codes documentation.
- **Installation** - refer to Installing the Natural IMS Interface in the Natural Installation Guide for Mainframes.
- **Further information** - refer to the following topics:
Environments | Components | Configuration Macros | Service Programs | Service Modules | User Exits | Recovery Handling

Prerequisites

Some of these functions require the Authorized Services Manager (ASM).

- If the ASM is required, it must have been started before the function is used.
- The Natural subsystem used by the ASM must be the same as the one used by the Natural session.
- For accounting and monitoring, the SIP server must have been enabled in addition.

Accounting

The accounting function is only available in dialog-oriented environments. It is activated by setting the environment table parameter ACTACTV to "YES".

With each terminal I/O, information about the specific Natural session is written to the IMS log or to SMF, depending on the setting of the Natural IMS parameter ACTLOG.

- If the ACTLOG parameter is set to "CMD", a /LOG command is issued that writes the accounting record to the IMS/TM log. All transaction codes must therefore be allowed to use the /LOG command. At the beginning of each record an 8-byte header is inserted. This header helps to easily select the accounting records using the IMS utility DFSERA10. The header string is defined by the environment table parameter ACTAHDR.
- If the ACTLOG parameter is set to "LOG", the accounting record is written to the IMS/TM log using the LOG call. With the Natural IMS parameter ACTARID, you specify the log code to be used.
- If the ACTLOG parameter is set to "SMF", the accounting record is written to SMF using the Authorized Services Manager. With the Natural IMS parameter ACTARID, you specify the SMF record type to be used.

The following information about each Natural user session is stored with each terminal I/O:

- IMS ID of the IMS system in which the user is active,
- LTERM name of the IMS terminal on which the session was started,
- user ID of the user of the Natural session (taken from the IOPCB),

- number of dialog steps currently performed,
- currently active transaction code,
- currently active PSB name,
- current Natural library name to which the user is logged on,
- currently active Natural program name,
- non-Natural transaction code to which the session is possibly suspended to,
- time and date when the session was started,
- time and date of the last ENTER operation,
- DBID and FNR of the Natural system file (FNAT) for this session,
- DBID and FNR of the Natural user file (FUSER) for this session,
- DBID and FNR of the Natural dictionary file (FDIC) for this session,
- DBID and FNR of the Natural Security system file (FSEC) for this session,
- DBID and FNR of the Natural spool file (FSPOOL) for this session,
- DBID and FNR of the Super Natural system file for this session,
- last encountered Natural error number,
- compressed thread length of the last terminal output.

The information is mapped by the DSECT NIMACTR. There are two areas for storing the DBID and FNR of the Natural system files used. In the first area, one byte is used for each DBID and FNR; this is supported for compatibility reasons. In the second area, a fullword is used for each DBID and FNR to support Adabas Version 6. The accounting record is prefixed with a length and version field.

Before the accounting record is written to the IMS/TM log, respectively to SMF, the user exit NIIXACCT is called. You can use this user exit to tailor the accounting record to your requirements. You may also append information to the accounting record. In this case, you must set the length field to the new length.

Since the accounting record is built in the command buffer, the total length must not exceed the value specified with the Natural IMS parameter CMBSIZE minus 17 bytes. The maximum length allowed is passed as parameter.

If NIIXACCT returns with a non-zero value in register 15, no accounting record is written.

Monitoring

The monitoring function is only available in dialog-oriented environments. It is activated by setting the environment table parameter MONACTV to "YES" and uses the SIP function of the Authorized Services Manager. The Natural subsystem must be the same as the one used by the Natural session to be monitored.

You can follow the ongoing activity of all Natural sessions which use the same Natural subsystem by using the Monitoring (M) function of the SYSTP utility. For more information on the SYSTP utility, see SYSTP in the section Debugging and Monitoring. The SYSTP session must also use the same Natural subsystem.

Broadcasting

The broadcasting function is only available in dialog-oriented environments. It is activated by setting the environment table parameter BROACTV to "YES" and uses the SIP function of the Authorized Services Manager.

Once broadcasting is active, it is possible to send broadcast messages to targeted users of a given Natural subsystem. Such users can be:

- all users of the Natural subsystem to which the sender is connected;
- all users of the Natural subsystem within the same IMS system as the sender of the message;
- all users of the Natural subsystem within the same IMS system as the sender of the message, but additionally restricted to a given transaction code;
- all users of the Natural subsystem within the same IMS system as the sender of the message, but additionally

restricted to a Natural application;

- all users of the Natural subsystem within the same IMS system as the sender of the message, but additionally restricted to a Natural application and to a given FUSER system file.

When a session comes to a terminal output, a check is made to see whether the session has to receive a message or not. If not, the normal Natural output is sent. If yes, the message is sent instead of the normal output and, when pressing ENTER, the Natural nucleus is instructed to re-send the last screen. In this way, you first see the message and afterwards receive the normal Natural output screen.

If more than one broadcast message is available, the messages are displayed one after the other until the last message has been shown. Afterwards, the normal Natural output screen is displayed.

A broadcast message will be displayed only if its expiration time specified in the message creation procedure has not been exceeded.

When a broadcast message is sent, you must press RESET before you can press ENTER again. All possible attention IDs have the same effect as pressing ENTER.

The utility SYSTP can be used to create broadcast messages and to display the contents of all active messages together with the LTERM/IMSID of the sender. The text of a message is limited to 72 bytes.

Messages to be broadcast are saved in a pool maintained by the SIP server. They remain there until you delete them using the SYSTP utility or until you shut down the Authorized Services Manager.



When a broadcast message is deleted or created, all expired messages are deleted as well.

Multi-Session Feature

Functionality of the Multi-Session Feature

The multi-session feature is only available in dialog-oriented environments. It is activated by setting the Natural IMS parameter MSACTV to "YES" and allows to run up to nine simultaneous Natural sessions on the same logical terminal.

With the Natural IMS Interface Version 2.3, new sessions are created and suspended sessions are resumed in a different way as with Natural IMS Interface Version 2.2. The Natural IMS Interface Version 2.2 mode is still supported for compatibility reasons, but is no longer documented. The old Version 2.2 mode is activated by setting the Natural IMS parameter MSCMPTB to "YES".

With the Natural IMS Interface Version 2.3, creating and resuming Natural sessions is controlled using PF keys. The Natural IMS parameters MSCRKEY and MSRSKEY define the create and resume keys.

- If the create key is pressed, the current Natural session is suspended and a new Natural session is created.
- If the resume key is pressed, any input field may contain the string x , with x between 1 and MSSESMX. In this case, the currently active session is suspended and the specified session is resumed. If x is greater than MSSESMX, the input is passed to the active application.
- If the resume key is entered without any input, the next suspended session is resumed in a wrap-around manner. If, for example, the active session is session number 4, the next suspended session in the range 5 through MSSESMX or 1 through 3 is resumed. If there is no suspended session, the input is passed to the active application.
- If the session to be resumed is using a different transaction code than the current session, an implicit program-to-program switch is done in order to resume the suspended session with the correct transaction code.
- If conversational and non-conversational environments are used in parallel, the modnames NIIMODNC and NIIMODMS are used for switching between the environments. The format definitions are delivered in the source modules NIIMODMS and NIIMODNC and have to be defined to MFS using MFSUTL.
- If the active session is terminated, the next suspended session (if there is any) is resumed in the same order as with the resume key.
- If the Natural IMS parameter MSMAX is set to "2" (two parallel sessions are allowed), the create key must be identical with the resume key. In this case, pressing the create key creates a second session if only one session is active, if not, it switches the session.

Session ID

The session ID is the internally used unique identification of a session. It has the form `XXXXXXxY`, where `XXXXXXx` is the prefix and `Y` is the session number in the form of a numeric digit in the range of 1 to 9.

The session prefix is built by compressing the logical terminal name into a 6-byte binary number `XXXXXX` and by setting `x` to binary zero.

If the compression algorithm is not suitable for the LTERM names used (error 3635 is issued in this case), the user exit NIIXMSSP must be used in order to build a unique 7-byte prefix of the session ID.

Multi-Session Database

The multi-session database is a HDAM root-only database which contains the Natural-reserved area of the SPA for each suspended session.

The model DBD for the description of the multi-session database is delivered in the source module NIIMSDBD and must be defined to IMS/TM.

The DBD name must be specified in the Natural IMS parameter module using the parameter MSDBD. The PCB number must be specified in the transaction code table using the parameter MSPCB of macro NIMTRNTG.

Server Environment

The server environment allows 3GL applications to execute Natural programs using a call interface. It is available in all supported IMS/TM environments and consists of a special Natural IMS driver, NIISRVD, of the call interface NIIBOOTS and of the service API NIIPCOM.

NIISRVD and NIIBOOTS are delivered as source modules and must be assembled and link-edited on your site. For details, see Installing the Natural IMS Interface (in the Natural Installation Guide for Mainframes).

The server environment allows you to start a Natural session by calling NIIBOOTS from any 3GL program. After the Natural session has been started, it returns to the calling 3GL program and waits for further input. The input would normally be expected from CMSYNIN, which means that the 3GL program has to simulate Natural's primary input dataset.

It is strongly recommended to always put the server Natural on the NEXT line. This allows the next call to NIIBOOTS to either execute a Natural command or a Natural program. Otherwise, the next call to NIIBOOTS would be treated as input for a Natural program which had been started by a previous call to NIIBOOTS.

Similarly as with the message-oriented interface, all output normally written to CMPRINT is sent to the IMS/TM destination specified with the Natural profile parameter SENDER.



In an MPP Environment, the same server Natural will be used by all transactions scheduled in this region.

Call Interface NIIBOOTS

NIIBOOTS is the default name as used in the documentation and in the delivered sample programs. This default name can be changed during installation.

NIIBOOTS requires the following parameters:

- the PSB address (the address of the PCB address list),
- the command area,
- the reply area.

In the command area, the following may be passed:

- the startup parameters,
- any Natural command followed by its input data,
- the NIIBOOTS-specific commands, such as STAT and REFR (in combination with the startup parameters).

The startup parameters are passed in two contiguous 80-byte areas. The first area contains the name of the environment table to be used as follows:

```
ENV-TAB=environment-table-name
```

The second area contains the dynamic Natural parameters with which the Natural session is to be started.

The reply area is the area in which a reply is to be entered from the executed Natural program using the service API NIIPCOM.

Each time it is invoked, NIIBOOTS checks whether the server Natural has been initialized.

- If Natural has not been initialized, a new Natural session is started and the received command is passed to Natural as a dynamic parameter.
- If Natural has been initialized, the string received in the command area is passed to Natural as a Natural command or as a Natural program.

The NIIBOOTS-specific commands STAT and REFR do the following:

- STAT returns "COLD" in the reply area if Natural has not been initialized and "WARM" if it has been initialized.
- REFR forces the initialization/reinitialization of Natural, regardless of the current state of Natural.

ON ERROR Routine Recommended

It is highly recommended to use an ON ERROR routine in the executed Natural programs in order to give back to the calling 3GL program some information in the reply area using NIIPCOM.

Return Codes

NIIBOOTS passes the return code provided by Natural on the termination of Natural.

Sample Programs

To illustrate usage of NIIBOOTS and NIIPCOM, the sample programs NIPBOOTS and NIPPCOM are provided. NIPBOOTS plays the role of the calling 3GL program, NIPPCOM is a sample Natural program executed in the server environment and writes the string "NIPSRVR" into the reply area. The ON ERROR routine places the Natural error number in the reply area.

With the sample programs, you can go through the following scenario:

1. Pass the command STAT. The string "COLD" is returned to the reply area.
2. Pass the command: STACK=(LOGON SYSEXTP),SENDER=S0201
S0201 is the LTERM name of the assigned printer device in the server Natural.
Natural will be initialized and will be ready to receive a Natural command in library SYSEXTP.
The successful logon message is issued on the assigned printer. Nothing is returned in the reply area.
3. Pass the command STAT. The string "WARM" is returned to the reply area.
4. Pass the command NIPPCOM. Program NIPPCOM is executed and the string "NIPSRVR" is returned to the reply area. Natural is ready to accept the next command in library SYSEXTP.
5. Pass the command: REFR STACK=(LOGON SYSEXTP;NIPPCOM),SENDER=S0201
Natural is reinitialized and program NIPPCOM in library SYSEXTP is executed. The reply area contains the string "NIPSRVR".
6. Pass the command FIN.
Natural is terminated and no information is passed to the reply area. The return code will contain the return code of the Natural termination. The Natural termination message is issued on the assigned printer device.
7. Pass the command STAT. The string "COLD" is returned to the reply area.