



Natural

Release Notes for Mainframes

Version 3.1.2

NATURAL

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This document applies to Natural Version 3.1.2 and to all subsequent releases.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

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Natural Version 3.1.2 Release Notes for Mainframes

This document is organized in the following sections:

- General Information contains introductory notes and information on prerequisites, compatibility, migration, Natural system files, other Software AG products with Natural 3.1, and documentation.
- Programming Language informs you about new or enhanced statements, new system variables, and new SQL-specific features.
- System Commands and Utilities contains information on new, enhanced or removed system commands, utility-specific features and enhancements to the Data Editor.
- Database Interfaces informs you about enhancements to and compatibility with the various Natural database interfaces.
- Operating System and Teleprocessing Interfaces contains information on changes/enhancements to the roll server, global buffer pool, Natural as a server, and the various TP monitor interfaces supported by Natural.
- Miscellaneous contains information on miscellaneous topics, such as Year 2000, Natural RPC, size limit for data elements, parameter module, user exits, Natural Advanced Facilities, Natural Optimizer Compiler, Natural Connection, Natural Web Interface and an overview of Change/Enhancements Requests implemented.
- Natural Security informs you about changes/enhancements to Natural Security.
- New Natural-Related Products informs you about new product enhancements, such as the support of DCOM (NaturalX).

This document is supplemented by the following earlier release notes:

- Natural Version 2.3.3 Release Notes for Mainframes
- Natural Version 2.3.4 Release Notes for Mainframes



Release Notes of earlier Natural versions are provided **for background information only!**

General Information

This section covers the following topics:

- Introduction
 - Prerequisites
 - Compatibility
 - Migration
 - Other Software AG Products
 - Announcements
 - Documentation
-

Introduction

These Release Notes inform you of the enhancements and new features that are provided with Natural Version 3.1.2 as compared with Version 2.3.

Of course, all those extensions and enhancements that were introduced with Version 2.3 as compared with Version 2.2.8 have also been incorporated into Version 3.1. For further information, you should also read the **Natural Version 2.3.3 and Version 2.3.4 Release Notes for Mainframes** which are delivered with Version 3.1.2 on the Natural for Mainframes documentation CD-ROM and in printed form.

All enhancements and new features described in these Release Notes are fully documented in the Natural Version 3.1 documentation set. In the present Release Notes, references are made to the detailed descriptions thereof.

In addition to providing the enhancements and new features described in these Release Notes, Natural Version 3.1.2 also consolidates all error corrections, modifications and enhancements provided with the previous system maintenance (SM) releases of Version 2.3.

Natural Version 3.1 is fully compatible with Natural Version 2.3 (refer to Compatibility). No internal structural changes were made, large areas remained untouched as compared with Version 2.3. Natural Version 3.1 includes all error corrections up to the release of Natural Version 2.3.4 inclusive.

All those customers who currently are not yet using Natural Version 2.3 are strongly recommended to use Natural Version 3.1 as successor version for Natural Version 2.2.8. These customers are urgently advised to migrate direct from Natural Version 2.2.8 to Natural Version 3.1. This migration path has been chosen by one of our big customers and has stood the test in a pilot project.

As a prerequisite for migrating direct from Natural Version 2.2.8 to Version 3.1, you should also read the Natural Version 2.3.3 Release Notes for Mainframes and Natural Version 2.3.4 Release Notes for Mainframes. The Natural Version 3.1 Release Notes include an overview of the most important information and hints to additional information that will enable you to complete the migration successfully; see also the sections Compatibility and Migration.

Prerequisites

Operating/Teleprocessing Systems Required

Natural Version 3.1 requires the following versions of the following operating/teleprocessing systems:

Product	Version
BS2000 OSD	2 or above
OS/390	2.4 or above, for NaturalX: OS/390 Version 2.6 (or above) and OS/390 Unix Services with access to the OS/390 HFS (hierarchical file system)
VSE/ESA	1.4.4 or above
VM/ESA	2.1 or above
Com-plete	5.1.3 or above
CICS/ESA	4.1 or above
CICS/VSE	2.3 or above
IMS/TM	3.1 or above
VM/ESA	2.1 or above
UTM	3.0 or above
TIAM	all versions available with OSD Version 2

Assemblers Required

Natural Version 3.1 requires one of the following assemblers for the assembly of its source modules:

- "HL" assembler (IBM),
- "Assembh" assembler (Siemens).

It may well be possible that the source modules can be assembled with older assembler versions; however, Software AG cannot guarantee this.

Compatibility

Compatibility between Versions 2.3 and 3.1

Applications that were created with Natural Version 2.3 can be executed with Version 3.1 without any conversion procedure being required, and without your having to make any adjustments to the programs.

List of Special-Purpose Zaps Replaced by Version 3.1 Enhancements

Zap	Description	Version 3.1 Solution
NA32185	Suppress IPC message call.	New profile parameter ADAMODE - Adabas Interface Mode (described in the Natural Operations for Mainframes documentation).
NA32289	Limit DATSIZE.	Enhancement of profile parameter DATSIZE - Size of Buffer for Local Data (described in the Natural Operations for Mainframes documentation).
NA33020	Profile settings for work file and print file settings override JCL settings (this is different from Version 2.2). Give JCL definitions priority over profile settings.	New NETWORK and NTPRINT subparameter FAMSTD (described in the Natural Operations for Mainframes documentation).
NA33124	The number of I/O buffers was set to 1. This may cause performance degradation. If the DCB=BUFNO parameter is not set by JCL, the BUFNO value is set to zero by this ZAP, i.e. default: five I/O buffers. You can modify this to change the BUFNO value, e.g. to 9214 for 20 buffers.	New NETWORK and NTPRINT subparameter BUFNO (see Parameter Modules in the Natural Operations for Mainframes documentation).
NA33172	Do not request a confirmation and shut down the global buffer pool unconditionally.	Enhanced function FSHUT (see Global Buffer Pool in the Natural Operations for Mainframes documentation).
NA33255	The Natural buffer usage statistics does not show any information about the size of allocated storage outside the thread.	Enhanced function Natural Thread Usage Statistics in the SYSTP utility (see Show Physical GETMAIN Statistics in the Natural Utilities for Mainframe documentation).

Zap	Description	Version 3.1 Solution
NA33257	If a print or work file record to be written from a Natural program is larger than the LRECL definition in the DCB, then error NAT1512 occurs if the parameter TRUNC=OFF is set or the record will be truncated.	New NETWORK and NTPRINT subparameter VMAX (see Parameter Modules in the Natural Operations for Mainframes documentation).
NA33258	In Natural Version 2.2, RECFM=FB or RECFM=VB was automatically changed to RECFM=FBA or RECFM=VBA for print files. This has been changed with Natural Version 2.3.	New NETWORK and NTPRINT subparameter ASA (described in the Natural Operations for Mainframes documentation).
NA33270	Incompatibility between Natural Version 2.2 and Version 2.3 when opening work files. In Version 2.2, WFOPFA=OFF caused the opening of a work file during object start on Program Level 1 only.	New value for subparameter OPEN of macro NETWORK and NTPRINT (see Parameter Modules in the Natural Operations for Mainframes documentation).
NA34029	Correction of NA33270.	New value for subparameter OPEN of macro NETWORK and NTPRINT (see Parameter Modules in the Natural Operations for Mainframes documentation).
NA34054	Starting with Natural Version 2.2, the RPC server receive-buffer length (RPC parameter MAXBUFF) is no longer specified in bytes, but in KB. The receive-buffer length can therefore no longer be set to the maximum value of 32000 as it was possible under Natural Version 2.2, but only to 31 KB (32 KB is not accepted by the EntireX Broker stub NATETB23). This may lead to problems if the customer is migrating from Natural Version 2.2 and was using the value of 32000 before.	Increased RPC buffer sizes (see MAXBUFF in the Natural Operations documentation for Mainframes and the Remote Procedure Call documentation).

List of special-purpose ZAPs for which a Version 3.1 special-purpose ZAP will be available at the release of Natural Version 3.1.2

For all other special-purpose ZAPs, the corresponding Natural Version 3.1 ZAP has to be requested.

Zap	Description	Version 3.1 Zap
NA32015	In case of syntax error, the fifth parameter of the error transaction (level number) is filled with the error position within the line. This ZAP is used only by Natural Construct users.	NA42001
NA32052	Suppress error NAT0460 on READ/WRITE WORK FILE initiated by Entire DB. This ZAP is used only by Entire DB users.	NA42002
NA32105 NA33228	If, with Natural Version 2.2, an unpacked source variable is assigned to an unpacked variable of the same length and precision (for example, MOVE N2 TO N2), the contents of the source variable is copied unchanged. With Natural Version 2.3, the zone bits are normalized. In addition, a data exception may occur if the source variable contains garbage. This affects also MOVE BY NAME statements, especially if the unpacked variable is part of a redefinition.	NA42003

Compatibility between Versions 2.2.8 and 3.1

Applications that were created with Natural Version 2.2.8 can be executed with Version 3.1 without any conversion procedure being required.

The incompatibilities that exist between Version 2.2.8 and Version 3.1 are the same as those between Version 2.2.8 and Version 2.3.3.

Intentional Incompatibilities

The following list provides an overview of the intentional incompatibilities introduced with Version 2.3 (for details, go to the topics indicated in the Natural Version 2.3.3 Release Notes for Mainframes).

When a Version 2.2 application is executed with Version 3.1, these incompatibilities will cause the application to produce "better", but slightly different, results. If in these cases you wish to get the same results as with Version 2.2, you have to adjust your applications accordingly.

- Redefinition of Database Arrays - a variable index range can no longer be specified in the redefinition of a periodic-group field or multiple-value field (see the Natural Version 2.3.3 Release Notes for Mainframes).
- DEFINE WINDOW - the specification of too small a window size leads to a compilation error (see the Natural Version 2.3.3 Release Notes for Mainframes).
- DIVIDE - with both GIVING and REMAINDER, different results for the REMAINDER field may occur (see the Natural Version 2.3.3 Release Notes for Mainframes).
- FIND - the comparison logic for multiple-value fields in the WITH clause has been changed (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Incomplete Statement Blocks - no longer allowed (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Assignment of Numeric Value to Alphanumeric Field - only H'F0' truncated (see the Natural

Version 2.3.3 Release Notes for Mainframes).

- No Upper-Case Translation for System Variable *COM - AD=T for a *COM field will lead to a compilation error (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Computation of Floating-Point Exponentiation Corrected (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Results for SIN COS and TAN Functions (see the Natural Version 2.3.3 Release Notes for Mainframes).
- More Precise Results for SQRT Function (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Assignment of Numbers with Decimal Digits to Time Corrected (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Assignment of Negative Numbers to Date and Time Intercepted.
- More Precise Results for Arithmetic Expressions with Floating-Point Operands (see the Natural Version 2.3.3 Release Notes for Mainframes).
- More Precise Results for Floating-Point Conversions (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Sign of Packed Numbers in Assignments - different handling (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Assignments Between Numeric Variables of the Same Length - different internal handling (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Interception of Mismatching Array Ranges - incorrect results will lead to runtime error (see the Natural Version 2.3.3 Release Notes for Mainframes).
- Comparison and Assignment of Variable Array Ranges - no longer allowed if an array range is actually a scalar (see the Natural Version 2.3.3 Release Notes for Mainframes).
- The error messages NAT1117 and NAT0924 were replaced by NAT0082 (see the Natural Version 2.3.3 Release Notes for Mainframes).
- The error messages NAT9000, NAT9100, NAT9101 and NAT9200 have become obsolete.
- TPSYS under TIAM/UTM see *TPSYS and SYSTP Utility (see the Natural Version 2.3.3 Release Notes for Mainframes).
- The NATPARM definitions of Print/Load files have priority over the JCL definitions (special purpose ZAP NA32116).
- NATPARM specifications for ENTIRE DB have been changed (see Database Specification for ENTIRE DB in the Natural Version 2.3.3 Release Notes for Mainframes).
- User exit modules USR****N copied from library SYSEXT.
In general, the user exits (USR****N) located on FUSER (NATURAL Version 2.2) have to be replaced with the corresponding module from library SYSEXT on the FNAT of Version 2.3.
- The loading of datasets into the NATURAL system file with the INPL utility is restricted to datasets that are identified as official Software AG INPL system datasets (see Loading Old Software AG Datasets in the Natural Version 2.3.3 Release Notes for Mainframes).
- When a program is cataloged with Natural Optimizer Compiler (NOC) of Version 2.3, the generated code includes additional instructions only to be used for debugging purposes with the NATURAL Debugger. If you do not need the Debugger, you should suppress the generation of this overhead coding by setting NODBG=ON in the NOC parameters. For details of this option, see Optimizer Options in the Natural Optimizer Compiler documentation.

Migration

As a prerequisite for all migration paths discussed in the following paragraphs, at least Natural Version 2.2.8 must be installed. We strongly advise you against performing a direct migration to Version 3.1 from an earlier version than Version 2.2.8, particularly since earlier versions are no longer supported.

You can obtain the latest migration information if you have access to SAGnet.

Migration from Version 2.2.8 to Version 3.1

The incompatibilities between Version 2.2.8 and Version 3.1 are the same as those that exist between Version 2.2.8 and Version 2.3.4.

For your applications, no specific migration procedure is required. However, the intentional incompatibilities between Version 2.3 and Version 2.2.8 could have an impact on your applications, see Compatibility.

Either you can use a new FUSER system file for Version 3.1, and transfer your existing Natural applications to this new system file with the SYSMAIN utility; or you can use an existing FUSER system file to be shared by Versions 2.2.8 and 3.1; see General Installation Information, Using a Version 2.2 FUSER File for Natural Versions 2.2 and 3.1 in the Natural Installation Guide for Mainframes.

The migration from Version 2.2.8 to Version 3.1 requires some changes concerning the work and print file parameters. For those who have access to SAGnet, these topics and further migration-relevant topics are discussed on that site. Go to the site and choose Product Migration from the menu (SAGnet-ID and password required).

Migration from Version 2.3 to Version 3.1

No migration procedure is required. Either you can use a new FUSER system file for Version 3.1, and transfer your existing Natural applications to this new system file with the SYSMAIN utility; or you can use an existing FUSER system file to be shared by Versions 2.3 and 3.1; see General Installation Information, Using a Version 2.2 FUSER File for Natural Versions 2.2 and 3.1 in the Natural Installation Guide for Mainframes.

Changes in relation to Version 2.3:

- The default value of the Natural Subsystem ID (profile parameter SUBSID, startup parameter of the global buffer pool, Roll Server, Authorised Services Manager) was changed from NAT2 to NAT3.
- The layout of the Version 3.1 roll files has changed. Therefore, the roll files have to be reformatted if they are to be used by the Version 3.1 Roll Server. Please note, that the Version 3.1 Roll Server may be used in a Version 2.3 environment as well.

Other Software AG Products

To use the following Software AG products in conjunction with Natural Version 3.1, the following product versions (or above) are required:

Product	Version
Adabas	6.2.1
Adabas Online Services	6.2.1
Adabas SQL Server	1.3.3
Adabas Stored Procedures And Triggers	6.2.2
Adabas Text Retrieval System	2.1.4
Com-plete	5.1.3 or above For Com-plete Version 5.1.3, the ZAPs CP51413 and CP51414 must be applied.
Con-nect	3.2.3
Entire Broker stub	5.1.1 For support of ACI Version 4, Entire Broker stub Version 5.2.1 is required.
Entire Event Management	2.1.2
Entire Network	5.3.1 with ZAP WX53052 and above (This product is required if you are using Natural Security in a heterogeneous environment.)
Entire Operations	3.1.1 Update 4
Entire Output Management	1.4.1 Update 1
Entire Review Natural Monitor	3.5.3
Entire System Server	2.1.4
Entire System Server Interface	See Entire System Server Interface.
Entire Transaction Propagator	1.4.1
EntireX DCOM	5.2.1 Patch Level 4 (required for NaturalX only)
Natural Advanced Facilities	2.3.4
Natural CICS interface	2.3.4
Natural CMS interface	2.3.4
Natural Connection	3.1.2
Natural Construct	4.2.1
Natural Document Management	1.6.3
Natural for DB2	3.1.2

Product	Version
Natural for DL/I	2.3.4
Natural for SQL/DS	3.1.2
Natural for VSAM	2.4.4
Natural IMS/TM interface	2.3.4
Natural ISPF	2.4.1
Natural Optimizer Compiler	2.3.4
Natural Security for Mainframes	3.1.2
Natural TIAM interface	3.1.2
Natural TSO interface	3.1.2
Natural UTM interface	3.1.2
NaturalX	3.1.2
Predict	3.4.2
Predict Application Control	2.1.4
Predict Case	2.5.2
Super Natural	3.2.1

Announcements

End of Maintenance for Natural Versions

Software AG's maintenance of all Natural Versions 2.3.x for mainframes will end on 30 June of 2000.

According to the special contract rules for a controlled release, Software AG's maintenance of Natural Version 3.1.1 for mainframes will end immediately with the availability of Natural Version 3.1.2 for mainframes.

End of Adastar Support

A future version of Natural for mainframes will no longer support Adastar.

Documentation

New Documentation Approach

With Natural Version 3.1.2 for Mainframes, we decided to break away from the conventional desk-top publishing method and to switch over to an advanced HTML-based approach. The purpose of this change was to make the documentation easier to use and maintain.

This step will enable us to respond in a flexible way to the necessity of changes, corrections and updates between the individual releases.

- All documents are available in HTML format for electronic distribution on CD-ROM and via SAGnet.
- The documents are also available as PDF files so you can print them, if you wish.
- Additional copies of the documents (manuals) derived from the PDF files can be ordered from our Logistics Center.

Structural Changes

The major structural changes of the documentation set are:

- The Installation and Operations Manual, which with previous Natural versions (prior to Version 2.3.3) consisted of two volumes, has been restructured; it now consists of five separate documents: Installation Guide, Operations, Teleprocessing Interfaces, Remote Procedure Call, Messages and Codes.
- The Natural/CMS interface description, which was in a manual of its own with Natural Version 2.3, has been incorporated into the Natural Teleprocessing Interfaces documentation.
- The Master Index is no longer available, because the online documentation provides you with a full-text search facility and because the index feature is not supported by the PDF sources.

Basic Documentation Set

Now, the **basic** Natural Version 3.1.2 documentation set for mainframe computers consists of the following documents:

- Natural Installation Guide for Mainframes
- Natural Operations for Mainframes
- Natural TP Monitor Interfaces
- Natural User's Guide for Mainframes
- Natural Programming Guide (*)
- Natural Reference documentation (*)
- Natural Statements (*)
- Natural Utilities for Mainframes
- Natural RPC (*)
- NaturalX (*)
- Natural Web Interface (*)
- Messages and Codes

(*) These manuals also apply to Version 4.1.1 of Natural on Windows NT, OpenVMS and UNIX platforms.

The contents of each manual is summarized in its overview page.

Reference Material

For additional information and for reference purposes, a number of related documents (Database Interfaces, Add-on Products, earlier release notes, etc.) which are not part of the basic Natural Version 3.1.2 documentation set for mainframe computers has been added and linked to the online documentation.

Programming Language

This section covers the following topics:

- New Statements
 - New System Variables
 - Enhanced Statements
 - SQL
-

New Statements

DEFINE WORK FILE

The statement DEFINE WORK FILE, which has already been available with Natural on other platforms, is now also available with Natural on mainframe computers.

It is used to assign a file name to a Natural work-file number within a Natural application. This allows you to make or change work-file assignments dynamically within a Natural session or overwrite work-file assignments made at another level.

Statements for Component Technology

The new statements listed below, enhance Natural to use the latest technology for the development of component-based applications basing upon Microsoft's component object model.

- **CREATE OBJECT**
- **DEFINE CLASS**
- **INTERFACE**
- **METHOD**
- **PROPERTY**
- **SEND METHOD**

For information on NaturalX, see NaturalX - Overview.

New System Variables

The following new system variables are available:

Variable	Function
*NET-USER	contains the complete user ID (including domain name) of an authenticated client request to a NaturalX server.
*OCCURRENCE	contains, at runtime, the actual number of occurrences of an array defined with a variable index range "(1:V)" in a parameter data area.
*SCREEN-IO	indicates whether a screen I/O is possible or not.
*SERVER-TYPE	indicates the server type Natural has been started as.
*THIS-OBJECT	is a handle to the object on which a method is being executed (only relevant with NaturalX; see the NaturalX documentation).

Enhanced Statements

DEFINE PRINTER

Under OS/390, for a printer number that is defined with access method AM=STD (standard batch), the DEFINE PRINTER statement allows you to specify a logical or a physical dataset name to be assigned to that printer number. You can specify one of the following:

- a logical dataset name (DD name);
- a physical dataset name of a cataloged dataset, or a physical dataset member name;
- a path and member name of an HFS file in an MVS UNIX Services environment;
- a JES spool file class;
- "NULLFILE" (to indicate a dummy dataset).

When the DEFINE PRINTER statement is executed and a physical dataset name, HFS file, spool file class or dummy dataset has been specified, the corresponding dataset is allocated dynamically. In addition, an existing dataset allocated with the same current DD name is automatically de-allocated before the new dataset is allocated.

For the dynamic allocation and de-allocation of datasets, the user exit USR2021 in library SYSEXT is provided.

For details, see the DEFINE PRINTER statement in the **Natural Statements documentation**.

If the printer option CLOSE=FIN is defined for a printer, the execution of a DEFINE PRINTER statement referencing this printer may now lead to the error NAT1513 - instead of the error NAT1520, as was the case with Natural Version 2.3.

Password Length (Various Statements)

With Version 2.3 and previous versions, the following applies:

- A password specified in a PASSW statement, as well as a password specified as a *constant* in the PASSWORD clause of another statement (for example, FIND and READ), can be **up to 8** characters long.
- A password specified as a **variable** in a PASSWORD clause must be **exactly 8** characters long.

With Version 3.1, this inconsistency has been removed: A password specified in any statement can be **up to 8** characters long, but may be shorter. This applies regardless of whether the password is specified as a variable or a constant.

SQL

New Statement CALLDBPROC

The new Natural SQL statement CALLDBPROC enables you to invoke a stored procedure of the SQL database system to which Natural is connected.

The stored procedure can be either a Natural subprogram or a program written in another programming language.

In addition to the passing of parameters between the invoking object and the stored procedure, CALLDBPROC supports "result sets"; these make it possible to return a larger amount of data from the stored procedure to the invoking object than would be possible via parameters.

The result sets are "temporary result tables" which are created by the stored procedure and which can be read and processed by the invoking object using a READ RESULT SET statement.

New Statement READ RESULT

The new Natural SQL statement READ RESULT SET allows you to read a result set which was created by a stored procedure that was invoked by a previous CALLDBPROC statement.

New Clause WITH RETURN in SELECT Statement

The SELECT statement provides a new clause, WITH RETURN, as part of the Extended Set (for DB2 databases only). Within a program which operates as a stored procedure, this clause is used to create result sets.

New Factor *case-expression*

Within scalar expressions, the new factor case-expression is now available as part of the Natural SQL Extended Set (for DB2 databases only).

The general syntax of a case-expression is:

$\text{CASE } \left\{ \begin{array}{l} \text{searched-when-clause...} \\ \text{simple-when-clause} \end{array} \right\} \left[\text{ELSE } \left\{ \begin{array}{l} \text{NULL} \\ \text{scalar-expression} \end{array} \right\} \right] \text{END}$

New Scalar Function NULLIF

The new scalar-function NULLIF is now available as part of the Natural SQL Extended Set (for DB2 databases only).

System Commands and Utilities

This section covers the following topics:

- New System Commands
 - Enhanced System Commands
 - System Command Removed
 - INPL Utility
 - SYSBPM Utility
 - SYSMAIN Utility
 - SYSTP Utility
 - SYSTRANS Utility
 - SYSUNLD Utilities NATUNLD and NATLOAD
 - Debugging Utility
 - Call Statistics Utility
 - Data Area Editor
-

New System Commands

The following new system commands are used in conjunction with NaturalX:

- DCOMPARM
- REGISTER
- UNREGISTER

For further information, refer to the NaturalX documentation.

Enhanced System Commands

CATALL

With Version 2.3, objects of the types copycode and text are saved when the CATALL function "Catalog" is executed.

With Version 3.1, copycodes and texts are not affected by the "Catalog" function.

With Version 3.1, the map used to issue a CATALL command has been changed. As a result, the sequence of parameters has changed. This applies when the map is filled direct e.g. in Batch mode. We recommend to use the CATALL direct command; see the system command CATALL in the Natural User's Guide for Mainframes.

COMPOPT

The new compilation option LOWSRCE has been introduced into the system command COMPOPT in order to support the use of lower or mixed-case program sources on mainframe platforms. This measure facilitates the transfer of programs written in mixed/lower-case characters from other platforms to a mainframe environment; see the system command COMPOPT in the Natural User's Guide for Mainframes.

DUMP

The DUMP command now also supports alternative screen sizes (Model 3, 4 and 5); see the system command DUMP in the Natural User's Guide for Mainframes.

LIST

The LIST command provides the following enhancements:

- On the selection list of objects, you can now enter the following special values in the Date field: YESTERDAY, TODAY, MONTH and YEAR; this will list only objects which were saved/cataloged yesterday, today, in the current month or current year respectively.
- The new function LIST EXTENDED enables you to list external subroutines and classes by their 32-character subroutine names and long names respectively (instead of their object names).
- On the selection list of objects, you can now mark an object of type subroutine with "LN" to display its subroutine name.
- Source-code lines can now be displayed of up a length of 244 characters (except when the current content of the source work area is listed); previously, a maximum of 80 characters could be displayed.
- The performance of the subcommands FIND, SCAN and REF has been improved.

For further information, see the system command LIST in the Natural User's Guide for Mainframes.

STRUCT

With Version 2.3, the STRUCT command indents a subordinate SELECT statement within a SELECT statement block if the subordinate SELECT begins on a new source-code line.

With Version 3.1, no such indentation is performed.

TECH

The TECH command provides the following enhancements:

- The new user exit USR2026 in library SYSEXT allows you to access the information provided by the TECH command from within your Natural application.
- For each programming object, TECH now displays the line number of the statement which invokes the next subordinate programming object.

For further information, see the system command TECH in the Natural User's Guide for Mainframes.

System Command Removed

SYSBUS

The system command SYSBUS (which had the same function as the system command BUS) was available with Version 2.3 for Software-AG-internal testing purposes. With Version 3.1, this command is no longer available.

INPL Utility

The INPL utility function INPL A (Adjust System Environment) is no longer available. It is obsolete, because with Natural Version 2.3 and higher the database ID and the file number are no longer contained in the FNAT control record.

SYSBPM Utility

The SYSBPM utility now supports DCOM as follows:

- All SYSBPM functions can also be applied to DCOM buffer pools (see also New Macro NTDCOM).
- With the functions Select Buffer Pool and Display Buffer Pools (direct commands SE BP and DI BP respectively), you can ascertain whether a DCOM buffer pool is defined/active.
- The server/instance IDs of objects in a DCOM buffer pool can be used as selection criteria in SYSBPM functions.

SYSMAIN Utility

The SYSMAIN utility provides the following enhancement:

- During online processing of the FIND function, SYSMAIN now displays a window showing the library currently being searched.
- A new user exit (MAINEX11, source SM-UX-11) is provided, see MAINEX11 - User Exit for Setting Special Flags to SYSMAIN in the Natural Utilities for Mainframes documentation.

SYSTP Utility

- The function Natural Thread Usage Statistics has been extended by the function Show Physical GETMAIN Statistics; for details refer to the Natural Utilities for Mainframes documentation.
- The user interface of the functions Natural Monitoring (SYSMON) and Natural Swap Information has been revised to comply with Software AG standards.
- The function Roll Server Statistics has been enhanced and is now called Natural Subsystems and Roll Server Information. When you invoke the function, a list of all Natural subsystems is displayed. On the list, you can then mark a subsystem with a function code to perform one of the following functions for that subsystem:
 - display buffer pool information,
 - display/reset roll file directory entries,
 - display roll server statistics,
 - display ZAPs applied per roll server,
 - display ZAPs applied per authorized services manager.

SYSTRANS Utility

The SYSTRANS utility provides the following enhancements:

- With Version 2.3, records written to Work File 1 were written with a fixed length of 96 bytes. With Version 3.1, they are written with a variable length of 12 to 96 bytes. This will reduce the size of the work file by approximately 50 %. On mainframes, writing with variable length requires that datasets are allocated with record format "VB".
- Due to an improvement in SYSTRANS's internal processing, Work File 3 is now used only if "Selection List = Y" is specified online.
- A new parameter Use Entire Connection Work File is provided. If it is set to "Y", Work File 7 (instead of Work File 1) will be used (in this case, Work File 7 must be an Entire Connection work file).
- The user exit TRA-E1-S (TRA-EX-1) has been expanded; for details, see the source of TRA-E1-S.

SYSUNLD Utilities NATUNLD and NATLOAD

Enhancements

The SYSUNLD utilities NATUNLD and NATLOAD provide the following enhancements:

- A new set of functions is provided for unloading, loading and scanning error messages.
- With Version 2.3, records written to Work File 1 were written with a length of 250 bytes. With Version 3.1, they are written with a variable length of 63, 126, 189 or 252 bytes. This will reduce the size of the work file by approximately 30 %.
- In the Date From/To fields, you can now enter the following special values: YESTERDAY, TODAY, MONTH, YEAR (the last two meaning the first day of the current month or year respectively).
- Online, after PF3, PF12 or CLR has been pressed on the report screen, NATUNLD now returns to the NATUNLD Menu instead of terminating.
- Online, after the loading/scanning has been performed, NATLOAD now returns to the NATLOAD Menu instead of terminating.
- On the NATLOAD report, the save/catalog times are now displayed in minutes and seconds; previously, they were only displayed in minutes.
- The user exit LOADEX01 (which is invoked if NATLOAD in batch mode terminates with a condition code other than "0") is now also invoked in the case of duplicate class names/GUIDs.

New User Exit LOADEX02

NATLOAD provides a new user exit, LOADEX02 (source name L-S-EX02), which enables you to stop processing when a Natural Security error occurs during the processing of the Load function.

Debugging Utility

New Function "Statement Execution Statistics"

The Debugging utility provides a new function "Statement Execution Statistics". With this function, you can obtain statistical information about which statement lines of invoked programming objects were executed - and how often - during the execution of an application,

Statement execution statistics can be used to:

- detect "dead" or untested code in an application,
- estimate the coverage of an application test (how many statement lines have not been executed for testing),
- locate frequently executed code segments that could have an impact on the application's performance.

Call Statistics Utility

DISPLAY/PRINT FULL Commands Renamed

In the Call Statistics utility, the direct commands DISPLAY FULL and PRINT FULL, which are used to display and print the "Call Statistics" screen, have been renamed and are now called DISPLAY OBJECT and PRINT OBJECT respectively.

Data Area Editor

The Data Area Editor provides the following enhancements:

- You can now define fields of type "handle of object" in a data area.
- You can now define globally unique IDs (GUIDs) in a data area (GUIDs are used in conjunction with NaturalX).
- The new editor command SET PREFIX allows you to specify a prefix for field names. This prefix is then automatically placed before the names entered in the Name column for all fields subsequently defined. This allows you to easily define multiple fields with similar names.

Database Interfaces

This section covers the following topics:

- DB2
 - SQL/DS
 - DL/I
 - VSAM
-

DB2

The following DB2-related enhancements are provided with Natural Version 3.1:

- several SQL statement enhancements; see SQL in the section Programming Language;
- DB2 stored procedures can now be written in Natural;
- the procedure maintenance functionality for DB2 stored procedures has been enhanced to comply with DB2 Version 5;
- DB2 commands can be issued from within Natural.

Together with Version 3.1.2 of Natural, Version 3.1.2 of Natural for DB2 is released.

SQL/DS

Together with Version 3.1.2 of Natural, Version 3.1.2 of Natural for SQL/DS is released.

Natural for SQL/DS Version 3.1.2 contains no new functionality. The new version is only released for the sake of consistency with Version 3.1.2 of Natural for DB2.

In order to support decimal (packed) host variables with even precision during static generation, decimal (packed) host variables are now generated in the format Name DS P'decimal constant' in contrast to earlier releases of Natural for SQL/DS where those variables were generated as Name DS PLn'decimal constant'.

This change complies with SQL/DS V3R5 and following versions, but might cause problems for earlier versions of SQL/DS as the PLn notation was required.

DL/I

No new version of Natural for DL/I is released with Natural Version 3.1.

Natural 3.1 is fully compatible with Natural for DL/I Version 2.3.4.

VSAM

No new version of Natural for VSAM is released with Natural Version 3.1.

Natural 3.1 is fully compatible with Natural for VSAM Version 2.4.4.

Operating System and Teleprocessing Interfaces

This section covers the following topics:

- Roll Server
 - Global Buffer Pool
 - Natural under OS/390
 - Natural under BS2000/OSD
 - Authorized Services Manager
 - Natural as a Server
 - Com-plete
 - CICS
 - CMS
 - IMS/TM
 - TIAM
 - TSO
 - UTM
-

Roll Server

Roll-File Layout Changed

As the Roll-Server User ID (the ID which identifies the Natural session to the Roll Server) has been increased from 8 to 16 bytes, the layout of the roll file had to be changed. A Version 3.1 Roll Server requires roll files which were formatted with Version 3.1 of the roll-file formatting routine NATRSRFI. A Version 3.1 Roll Server also supports Natural Version 2.3 environments.

Roll-Server ZAPs

A separate list of applied Roll-Server ZAPs can be obtained by using the new SYSTP function "Natural Subsystem and Roll Server Information"; refer to the Natural Utilities for Mainframes documentation. At Roll-Server startup, the list of applied ZAPs is written to the message log.

Subsystem ID

The default value of the Roll-Server startup parameter **subsystem-id** is now "NAT3".

For further Roll Server details, refer to Roll Server in the Natural Operations for Mainframes documentation.

Authorized Services Manager

ZAPs applied to the Authorized Services Manager

A separate list of ZAPs applied to the Authorized Services Manager can be obtained by using the new SYSTP function Natural Subsystems and Roll Server Information described in the Natural Utilities for Mainframes documentation. At startup of the Authorized Services Manager, the list of applied ZAPs is written to the message log.

New Parameter FORCE

The new parameter FORCE enables the forced restart of the Authorized Services Manager after it has been cancelled.

Subsystem ID

The default value of the Authorized Services Manager startup parameter *subsystem-id* is now "NAT3".

Global Buffer Pool

Shut-Down Confirmation

With Version 2.3, the operator is automatically prompted to confirm the shut-down of the global buffer pool if there are still active objects in the buffer pool.

With Version 3.1, the FSHUT function provides the new parameter CONFIRM=Y/N, which enables you to specify whether the operator is to be prompted or whether the shut-down is to be forced without operator interaction.

For further details, refer to Natural Global Buffer Pool in the Natural Operations for Mainframes documentation.

Natural under OS/390

The following enhancements are provided with Natural Version 3.1:

- With the external trace function, which is controlled by the profile parameter ETRACE (see ETRACE - External Trace Function), you can now write trace records direct to the General Trace Facility (GTF).
- Under OS/390 in batch mode, Natural can now be used as a server.

For further details, refer to Natural as a Server (under OS/390) in the Natural Operations for Mainframes documentation, section Operating Natural - Environment-specific Information.

Natural under BS2000/OSD

New Common Memory Pool Types

The following new common memory pool type has been added:

- SRT - NATURAL SORT Pool

This common memory pool can be started with the program CMPSTART as a global Common Memory Pool or with the macro BS2STUB (ADDON) as a local Common Memory Pool.

Refresh of a Global Natural Load Pool

With the program PREFRESH, a new Natural nucleus can be loaded in the Natural Load Pool during active TIAM or UTM applications.

For further details, refer to Natural under BS2000/OSD in the Natural Operations for Mainframes documentation.

Natural as a Server

It is possible to use Natural as a server in a client/server environment. As a server, Natural can provide services, such as the execution of subprograms. The services are requested from outside, typically non-terminal-oriented. There are many underlying protocols for the client/server communication, for example, the execution of stored procedures for DB2, remote procedure calls and DCOM requests.

Typically, the execution of a specific object is requested by several clients simultaneously. In order to save system resources, these simultaneous requests are to be handled by the same server process. In Natural terminology, this means that one process (that is, an operating-system task) has to serve multiple Natural user sessions in parallel.

For some objects, it is necessary that their context (e.g. local variables) is retained between two calls from the same client; at the same time, the virtual storage in which the context is held has to be released between the two calls so as to avoid storage bottlenecks.

Other objects lose their context entirely after each execution (this is usually the case with DB2 stored procedures); however, the Natural session is not to be re-initialized entirely for each new call, as this would use up a considerable amount of system resources.

Both the above conditions are met by a new mechanism called "Natural as a server". This mechanism is a prerequisite for NaturalX and for the execution of DB2 stored procedures written in Natural. Natural as a server is available under OS/390 in batch mode, MVS Unix Services and TSO.

For further details, refer to Natural as a Server (under OS/390) in the Natural Operations for Mainframes documentation, section Operating Natural - Environment-specific Information.

Com-plete

Natural Version 3.1 requires Com-plete Version 5.1.3 or above. For Com-plete Version 5.1.3, the ZAPs CP51413 and CP51414 are required.

The following enhancements are provided with Natural Version 3.1:

- The Natural/Com-pleteabend/dump handling has been enhanced and now works like other Natural front-end drivers, e.g. with DU=ON the dump now contains the current information of the time when theabend occurred.
- For better performance, the Storage Protection Override facility for thread keys = 9 is supported as part of the new front-end driver for Com-plete Version 5.1.3.
- The linkage structure of the front-end driver has been changed. As a result, the Natural/Com-plete access methods module NCFAM (previous name: NATCMPL) is no longer part of the TP driver module NCFNUC; instead, it has to be linked to the front-end driver.
- The module NCF\$CALL is no longer delivered, but the module TLOPUSER contained in the Com-plete delivery library is used instead.
- The driver supports a user exit to set user-specific information during the session initialization.
- The driver supports different messages types using the message switching facility for asynchronous Natural transactions.
- The driver supports the lower case or upper case translation of input characters entered from a terminal.

For details, refer to Natural under Com-plete in the Natural TP Monitor Interfaces documentation.

CICS

No new Natural/CICS interface is delivered with Natural Version 3.1.

The existing Version 2.3.4 Natural/CICS interface can be used with Natural 3.1.

For details, refer to Natural under CICS in the Natural TP Monitor Interfaces documentation.

CMS

No new Natural/CMS interface is delivered with Natural Version 3.1.

The existing Version 2.3.4 Natural/CMS interface can be used with Natural 3.1.

For details, refer to Natural under CMS in the Natural TP Monitor Interfaces documentation.

IMS/TM

No new Natural/IMS/TM interface is delivered with Natural Version 3.1.

The existing Version 2.3.4 Natural/IMS/TM interface can be used with Natural 3.1.

For details, refer to Natural under IMS/TM in the Natural TP Monitor Interfaces documentation.

TIAM

- Support of the new common memory pool type SRT.
- With the program PREFRESH, a new Natural nucleus can be loaded in the Natural load pool while a TIAM application is active.

For details, refer to Natural under TIAM in the Natural TP Monitor Interfaces documentation.

TSO

The following enhancements are provided with Natural Version 3.1:

- With the external trace function, which is controlled by the profile parameter ETRACE (see ETRACE - External Trace Function), you can now write trace records directly to the General Trace Facility (GTF).
- Under TSO, Natural can now be used as a server; refer to Natural as a Server (under OS/390) in the Natural Operations for Mainframes documentation, section Operating Natural - Environment-specific Information.

For details, refer to Natural under TSO in the Natural TP Monitor Interfaces documentation.

UTM

- Support of the new common memory pool type SRT.
- With the program PREFRESH, a new Natural nucleus can be loaded in the Natural load pool while a TIAM application is active.
- A new keyword parameter **INITPRG** is provided in macro NATUTM. This parameter defines the value for the Natural variable *INIT-PROGRAM.

For details, refer to Natural under UTM in the Natural TP Monitor Interfaces documentation.

Miscellaneous

This section covers the following topics:

- Year 2000
 - Storage Management
 - Size Limit for Data Elements
 - Parameter Module
 - User Exits
 - Natural Advanced Facilities
 - Natural Connection
 - Natural Optimizer Compiler
 - Natural Remote Procedure Call (RPC)
 - Natural Web Interface
 - Entire System Server Interface
 - Change/Enhancement Requests - Overview
-

Year 2000

Date Format for Default Page Title - the DFTITLE Parameter

The new session/profile parameter DFTITLE allows you to control the format in which the date values is output in Natural default report page titles as produced by DISPLAY, WRITE or PRINT statements. The date format can be:

- with a 2-digit year component and delimiters,
- with a 4-digit year component and delimiters,
- with a 4-digit year component and no delimiters.

The DFTITLE parameter can be set in the Natural parameter module, dynamically when Natural is invoked, or with the system command GLOBALS. It is evaluated at runtime.

4-Digit Year Display in Natural User Interface

The Natural user interface has been enhanced so that the current date shown on Natural screens is now displayed with a 4-digit year.

Example DDMs, Example Programs and Example Files Revised

Within the example DDMs EMPLOYEES and VEHICLES, several fields which contain date information were changed to accommodate 4-digit year information. For example, the format of the field BIRTH in EMPLOYEES was changed from N6 to D. Moreover, a null-indicator field, N\$BIRTH, was added to EMPLOYEES.

At the same time, several programs in the example libraries SYSEXPB and SYSEXRM which deal with date information were revised, too.

In the course of this revision, some of the data contained in the example files EMPLOYEES and VEHICLES were also revised.

The revised DDMs and example libraries are delivered with Natural Version 3.1.
The revised example files will be delivered with Adabas Version 7.1.1.

Storage Management

The usage of free space in the Natural thread is now markedly improved so that, at a given thread size, the number of physical GETMAINS outside the Natural thread is smaller as compared with Natural Version 2.3, or the number of the physical GETMAINS can be reduced by enlarging the Natural thread. See the function Show Physical GETMAIN Statistics in the Natural Utilities for Mainframes documentation.

Size Limit for Data Elements

Although the size of a global or local data area can be up to 16 MB, the maximum possible size of a single data element (array or indexed group) within a global/local data area is 32 KB. If any data element exceeds this size, error NAT0476 will be issued at compilation.

This is true as of Version 2.3.4 and continues to apply with Version 3.1. Thus Natural 3.1 for mainframe computers differs from Natural 3.1 for other platforms: the size restriction for data elements does not exist with Natural 3.1 on non-mainframe platforms, where single data elements can be larger than 32 KB.

Parameter Module

New Profile Parameters

The following new profile parameters are available:

Profile Parameter	Function
ADAMODE	<p>This parameter controls the behaviour of Natural in relation to Adabas:</p> <ul style="list-style-type: none"> ● Adaplex support with two Adabas user queue elements per Natural session (as with Natural Version 2.3), or ● Adaplex support with one Adabas user queue element per Natural session, or ● no Adaplex support (as with Natural Version 2.2). <p>For details, refer to ADAMODE - Adabas Interface Mode in the Natural Operations for Mainframes documentation.</p>
CP	<p>This parameter specifies the code page to be used in conjunction with Natural RPC; see Support of Code-Page Functionality.</p> <p>For further details, refer to CP - Code Page in the Natural Operations for Mainframes documentation.</p>
DCOM	<p>This parameter sets parameters necessary to support NaturalX. It corresponds to the new macro NTDCOM.</p> <p>For details, refer to New Macro NTDCOM).</p>
DFTITLE	<p>This parameter controls the format of date values in default report page titles; it is used in conjunction with Year 2000.</p> <p>For details, refer to Date Format for Default Page Title - the DFTITLE Parameter.</p>
RDCEXIT	<p>This parameter is used to define user exits for the SYSRDC utility (and, optionally, work area sizes for these user exits).</p> <p>For details, refer to RDCEXIT - Define Natural Data Collector User Exits.</p>

Enhanced Profile Parameters

The following enhanced profile parameters are available:

Profile Parameter	Enhancement
BPI	Enhanced in the same way as the NTBPI macro (see NTBPI).
DATSIZE	<p>With Version 2.3, the DATSIZE parameter enables you to specify a minimum size for the DATSIZE buffer, and the actual size of the buffer is increased automatically as needed.</p> <p>With Version 3.1, the DATSIZE parameter enables to also specify a maximum size for the DATSIZE buffer. If the specified maximum is exceeded, Natural will issue a corresponding error message.</p> <p>By default, the maximum is "0", which means there is no upper limit for the buffer size.</p>
ETID	<p>The new parameter value ETID=OFF is provided for use in conjunction with Natural Security to prevent Natural batch jobs that are sent at the same time from causing duplicate user ID values in an Adabas open call during the initialization phase.</p> <p>If ETID=OFF is specified, Natural does not issue any Adabas open and close commands at the beginning of the Natural session; for further information on this parameter, see ETID - Adabas User Identification</p>
ETRACE	The ETRACE parameter, which controls the external trace function, now enables you to write trace records direct to the General Trace Facility (GTF). This is possible under OS/390 and TSO.
PRINT	Enhanced in the same way as the NTPRINT macro (see NTPRINT and NETWORK).
RPC	Enhanced in the same way as the NTRPC macro (see NTRPC).
WORK	Enhanced in the same way as the NETWORK macro (see NTPRINT and NETWORK).

New Macro NTDCOM

The new NTDCOM macro allows you to set parameters necessary to support NaturalX.

With the NTDCOM macro, you can:

- define the default activation policy for NaturalX (DCOM) classes;
- determine whether or not Natural classes are to be registered as NaturalX (DCOM) classes each time they are cataloged;
- specify the server name to be used by NaturalX.

Instead of the NTDCOM macro, you can also use the new dynamic profile parameter DCOM.

Note:

With Natural on other (that is, non-mainframe) platforms, the functionality of the NTDCOM macro and DCOM parameter is provided by the three parameters ACTPOLICY, AUTOREGISTER and COMSERVERID.

Enhanced Macros

The following enhanced macros are provided:

Macro	Enhancement
NTBPI	<p>With the NTBPI macro, you can now define a separate buffer pool for DCOM objects. It is defined with TYPE=DCOM. If no separate buffer pool is defined, DCOM objects will be held in the Natural buffer pool (TYPE=NAT).</p>
NTCMPO	<p>With the new subparameter LOWSRCE, you can specify whether Natural source code has to be in upper case (default) or whether it can be in mixed lower/upper case.</p>
NTRPC	<ul style="list-style-type: none"> ● The new subparameter ACIVERS has been added to the NTRPC macro (see Support of EntireX Broker ACI Version 4). ● With the subparameter TRANSP, additional options can be specified (see Specifying the ACI Transport Method). ● For reasons of compatibility with Natural RPC on UNIX and Windows NT, the subparameters AUTO and SIZE have been renamed to AUTORPC and RPCSIZE respectively. The old names can still be used, but will no longer be valid with the next Natural version.
NTPRINT and NETWORK	<ul style="list-style-type: none"> ● For the subparameter CLOSE, the new value USER can be specified: a print/work file is then closed only if it is open and either a CLOSE PRINTER/WORK FILE statement or a DEFINE PRINTER/WORK FILE statement is issued. ● The new subparameter BUFNO determines the number of I/O buffers to be used, which has a considerable impact on performance. BUFNO is only valid for access method AM=STD in OS/390 environments. ● In order to be compatible with Natural Version 2.2 the following subparameters or subparameter settings have been introduced: <ul style="list-style-type: none"> ○ OPEN=OBJ1 ○ FAMSTD ○ ASA ○ VMAX <p>We recommend you to use these subparameters or subparameter settings for compatibility reasons only; refer to NTPRINT Macro and NETWORK Macro in the Natural Operations for Mainframes documentation.</p>

User Exits

User Exit USR0210

The user exit USR0210 in the library SYSEXT, which allows you to save, catalog or stow a programming object, has been enhanced: With Version 2.3, it could only be applied to objects in the current library. With Version 3.1 - except under Natural Security - it can also be applied to objects in other libraries. Please note, however, that this does not mean the object can be copied into another library; that is, the object must already be present (at least in source form) in the respective library.

User Exits USR1054, USR1055 and USR1057

The user exits USR1054, USR1055 and USR1057 in the library SYSEXT have been enhanced: With Version 2.3, they could only access the current FNAT or FUSER system file. With Version 3.1, they allow you to specify a database ID and file number and thus access any Natural system file.

User Exit USR2021

With the new user exit USR2021 in the library SYSEXT, you can allocate/de-allocate work files dynamically (see also DEFINE PRINTER).

Natural Advanced Facilities

With Natural 3.1, there will be no new version of Natural Advanced Facilities.

Natural 3.1 is fully compatible with Natural Advanced Facilities Version 2.3.4.

Natural Connection

With Natural 3.1, there will be no new version of Natural Connection.

Natural 3.1 is fully compatible with Natural Connection Version 2.3.4.

Natural Optimizer Compiler

With Natural 3.1, there will be no new version of Natural Optimizer Compiler.

Natural 3.1 is fully compatible with Natural Optimizer Compiler Version 2.3.4.

Natural Remote Procedure Call (RPC)

See also the Remote Procedure Call (RPC) documentation.

Announcement: End of CSCI Support

As of Natural Version 3.1, Natural RPC communication via CSCI is no longer supported. This is due to the fact that EntireX's support of CSCI ended with EntireX Version 4.1.1. Please be prepared to make the necessary adjustments.

Support of EntireX Broker ACI Version 4

The support of EntireX Broker ACI Version 4 (Entire Broker Version 5.2) is required to activate the security exits and the code-page support of the EntireX Broker.

Due to non-numeric conversation IDs on the client side (which were introduced with EntireX Broker ACI Version 3), EntireX Broker ACI Version 3 and above on the client side are not compatible with RPC servers of previous Natural versions (Version 2.3 on mainframe computers, Version 3.1 on other platforms).

As the RPC on the client side does not know the ACI version used by the RPC server, the new subparameter ACIVERS has been added to the NTRPC macro of the Natural parameter module. With ACIVERS, you specify the version to be used.

Support of Code-Page Functionality

RPC servers and clients may specify the code page used in their local environment, for example, the client located on a UNIX computer may use an ASCII code page and the client on a mainframe computer may use an EBCDIC code page. The translation from one code page to the other is done by EntireX Broker.

The code page to be used by the RPC server or client is specified with the new Natural profile parameter CP.

The code-page functionality requires EntireX Broker ACI Version 4. For information on the code-page functionality, please refer to the EntireX Broker ACI documentation

Support of EntireX Broker Functions LOGON and LOGOFF in RPC Servers

The support of the EntireX Broker functions LOGON and LOGOFF is required to comply with the EntireX Broker.

With the support of LOGOFF, EntireX Broker will release internal data structures on request and not based on a time-out mechanism. In addition, this support will enable the EntireX Broker to run with the AUTOLOGON attribute set to OFF.

Support of Non-Numeric Conversation IDs

If the client which opens a conversation sets the EntireX Broker ACI version to 3 or above (with the ACIVERS subparameter of the NTRPC macro, see above), the EntireX Broker may generate a non-numeric conversation ID (format/length A16).

Thus, any attribute settings which had to be made to avoid the generation of non-numeric conversation IDs in the EntireX Broker attribute file are now obsolete.

Authentication of the RPC Server

In Natural Security environments, the user ID and password are passed to the EntireX Broker if the subparameter SRVUSER of the NTRPC macro is set to "*NSC".

Buffer Sizes

The maximum size of the send/receive buffer has been increased from 32 KB to 16 MB - 4 KB.

The maximum size of the Natural RPC buffer (subparameter RPCSIZE of the NTRPC macro) has been increased from 128 KB to 16 MB.

Specifying the ACI Transport Method

On mainframe computers, the preferred transport method is ADALNK. As a result, each EntireX Broker call is first sent to Adabas before TCP/IP is used.

For better performance, the specification of a transport method is provided to overwrite the default transport method used by the EntireX Broker stub. For servers, the transport method may be specified using the subparameter TRANSP of the NTRPC macro. With the TRANSP subparameter, it is now possible to specify additional options for EntireX Broker ACI.

RPC Trace under CICS

Under CICS, the RPC trace records are written to work file 10 (CMWKF10) if no printer with Printer Number 10 is defined. Thus it is not necessary to use Natural Advanced Facilities for trace purposes.

Future Restrictions of Statement Usage with RPC

The use of the following statements in conjunction with RPC is theoretically possible, but not recommended, as it causes undesired effects:

- **TERMINATE** - The server is terminated, regardless of conversations that may still be open.
- **FETCH, RUN, STOP** - The CALLNAT context is lost. (This does not apply to FETCH RETURN.)
- **INPUT** - Input values are unpredictable when the input data are read from a file (and not from the stack).

In the case of a FETCH, RUN or STOP statement, the server detects that it has lost its CALLNAT context and returns a corresponding Natural error message to the client; at that time, however, the statement has already been executed by the server.

With Version 3.1, FETCH, INPUT, RUN, STOP and TERMINATE can still be used with RPC. As of the next Natural version, however, the use of these statements will be restricted so that it will no longer be possible to use them in conjunction with RPC.

Natural Web Interface

The Natural Web Interface is a link between a Web Server (more precisely: HTTP server) and your Natural environment, offering you a comfortable web enabling of your existing Natural applications. With Natural 3.1 and the Natural Web Interface, you can create web pages via a Natural subprogram.

This enables you to:

- return dynamic web pages generated by Natural subprograms,
- access the HTTP interface of your HTTP server (cookies),
- return different kinds of documents containing alphanumeric data,
- use predefined programs for HTML generation.

Natural provides three new libraries containing the Natural Web Interface, which is called by the EntireX web adapter.

For details, please refer to the Web Interface documentation.

Entire System Server Interface

As of Natural 3.1, the Entire System Server Interface needs no longer be ordered and linked as a separate product but is delivered as part of Natural (included on the Natural installation tape). The interface is needed in conjunction with Entire System Server and Natural ISPF and is documented there.

If you install Entire Server and/or Natural ISPF, please refer to Entire System Server Interface (ESX) in the Natural Version 2.3.4 Release Notes for Mainframes for further information.

Change/Enhancement Requests - Overview

The following change/enhancement requests have been implemented with Natural Version 3.1:

Request Number	Change/Enhancement	Details
3340	SYSTRANS utility: use of work file 7 for writing to PC with Entire Connection.	See SYSTRANS Utility.
4192	CATALL command: copycodes and texts not saved by Catalog function.	See CATALL.
4262	SYSTRANS utility: writing with variable record length.	See SYSTRANS Utility.
6818	New system variable *OCCURRENCE.	See New System Variables.
7161	User exits USR1054, USR1055, USR1057: specification of DBID/FNR.	See User Exits.
7177	STRUCT command: No indentation of SELECT within SELECT.	See STRUCT.
7188	User exit USR0210: save/catalog/stow object in another library.	See User Exits.
7403	NATLOAD utility: save/catalog times shown in minutes <i>and</i> seconds.	See SYSUNLD Utilities NATUNLD and NATLOAD.
7453	NATUNLD utility: records written to work file with variable length.	See SYSUNLD Utilities NATUNLD and NATLOAD.
8050	Documentation of BS2000/OSD shared nucleus reentrant part.	See Natural Shared Nucleus (BS2000/OSD only).

Natural Security

This section covers the following topics:

- Using Multiple Versions of Natural Security
 - Central Administration in a Heterogeneous Environment
 - General Options in Administrator Services
 - User Profiles
 - Library Profiles
 - Mailbox Profiles
 - Utility Profiles
 - User Interface
 - User Exits
 - Interface Subprograms
-

Using Multiple Versions of Natural Security

As stated under the heading FSEC in the section General Installation Information in the Natural Installation Guide for Mainframes, the Natural Security system file FSEC can be shared by Natural Security Versions 2.2.8, 2.3.3 and 3.1.2.

To ensure the consistency and completeness of the security data on a shared FSEC file, it is strongly recommended that you use only the highest Natural Security version for Natural Security maintenance.

If you use a shared FSEC file, it is **not** necessary to transfer any security data with SECULD/ SECLOAD.

Central Administration in a Heterogeneous Environment

With Natural Security, you can also control access to Natural in a heterogeneous environment, that is, an environment comprising Natural on a mainframe computer and Natural on various non-mainframe platforms (OpenVMS, UNIX, Windows NT, and Natural Lightstorm).

To make security administration in such a heterogeneous environment easier, Natural Security Version 3.1 for mainframes allows you to store all security data in a single mainframe FSEC system file, and maintain them centrally for all other platforms in the heterogeneous environment using Natural Security on the mainframe computer.

Thus, security administration can be simplified and standardized on a company-wide basis.

The security data on the mainframe FSEC file are accessible from the non-mainframe platforms via Entire Net-Work. With Natural Security installed on a non-mainframe platform, you can retrieve these central security data, but not maintain them.

To make this central administration possible, the following enhancements were also necessary to file maintenance and library maintenance respectively:

- **Add File Without DDM** - For the definition of a file security profile, Natural Security would normally require that a corresponding DDM exists. In a heterogeneous development environment, however, a DDM may exist not on the mainframe FDIC system file but in the file system on another platform; that is, Natural Security on the mainframe computer would not know of that DDM. For you to be able to define a file profile for a DDM stored on a non-mainframe platform within a heterogeneous environment, it is now possible to define file security profiles for DDMs which "do not exist". (The DDM must only be present in the file system when a program accessing it is compiled.)
- **Disallow/Allow "Non-Existent" Modules** - The Disallow/Allow Modules screen of a library profile displays a list of all modules contained in the respective library. In a heterogeneous production environment, however, the library may exist not on the mainframe FUSER system file but in the file system on another platform. If you defined a library profile for such a library, Natural Security on the mainframe computer would not know of that library, and the list of modules would therefore be empty. For you to be able to disallow/allow modules for a library on a non-mainframe platform within a heterogeneous environment, the Allow/Disallow Modules function provides a new subfunction (PF9 on the Allow/Disallow Modules screen). This subfunction enables you to manually enter the names of modules and allow/disallow them.

For further information, please refer to Natural Security in a Heterogeneous Environment in the section Introduction - Structure and Terminology in the Natural Security 3.1 for Mainframes documentation.

General Options in Administrator Services

Password History

With Version 2.3, the maximum number of stored passwords which cannot be used again by the user could only be set in steps of 10.

With Version 3.1, this number can be set to any value from 1 to 99.

Free Access to Functions via Interface Subprograms

You can specify the new value "R", which allows only the retrieval and display functions (but not the maintenance functions) to be accessed via interface subprograms by anybody who may use the subprograms.

Lock User Option

Besides "Y" and "N", you can specify the new value "F". This causes the user's Natural session to be terminated automatically when the user is locked after having entered too many invalid passwords.

User Profiles

Activation Dates for Group Profiles

The setting of an activation date in a user profile, which has already been possible for users of types ADMINISTRATOR, PERSON and MEMBER, is now also possible for users of type GROUP.

Library Profiles

Editing Restrictions

In the Editing Restrictions window, you can now also allow or disallow the editing of objects of type "class".

Mailbox Profiles

Activation Date for Mailbox Display

In addition to the expiration date, after which the mailbox is no longer displayed to users, you can now specify an activation date to determine when the display of the mailbox is to begin.

The format in which both dates are displayed is now dependent on the Natural profile parameter DTFORM.

Utility Profiles

Access to Disallowed Utilities Intercepted at Invoking

With Version 2.3, when a user invoked a utility which he/she is not allowed to use, he/she could still invoke the utility - and only received an error message when he/she tried to perform a function within that utility.

With Version 3.1, the user will already receive an error message (NAT0877) when he/she tries to invoke a utility he/she is not allowed to use.

SYSMAIN

In the utility profiles for SYSMAIN, you can now also allow/disallow the IMPORT function. This function is not available with SYSMAIN on mainframe computers, but it can be allowed/disallowed for use in a heterogeneous environment (for information on heterogeneous environments, see also Central Administration in a Heterogeneous Environment).

A new user exit (MAINEX11, source SM-UX-11) for setting special flags to SYSMAIN has been introduced; see MAINEX11 - User Exit for Setting Special Flags to SYSMAIN.

NATLOAD/NATUNLD

In the utility profiles for NATLOAD and NATUNLD, functions dealing with error messages can now also be allowed/disallowed.

PROFILE Command

The information displayed by the system command PROFILE now also contains information on the user's access rights to Natural utilities (PF5 on the first screen displayed by the PROFILE command).

User Interface

Date Display

Natural Security screens now display the current date with a 4-digit year component.

Error Message NAT0963

The error message NAT0963 (security violation during program execution) now also shows the name of the program in question.

User Exits

LOGONEX1

The logon user exit LOGONEX1 now provides a parameter (format L) which you can interrogate to determine whether a logon is an initial logon or a subsequent logon. For details, see the source code of the user exit.

Interface Subprograms

Creation/Modification Dates

With Version 2.3, the Natural Security interface subprograms supplied the dates of creation and last modification of a security profile in the format "YY-MM-DD".

With Version 3.1, these dates are supplied in the format "YYYYMMDD".

New Natural-Related Product

Together with Natural Version 3.1, a new Natural-related Software AG product is available:

- NaturalX
-

NaturalX (Support of DCOM)

With Natural 3.1 and NaturalX, you can write distributed object-based applications and distribute them with DCOM (distributed component object model).

This enables you to:

- allow your components to be accessed by other object-oriented components,
- execute these components on local or remote servers,
- access object-oriented components written in a variety of programming languages across process and machine boundaries from within Natural programs,
- wrap existing Natural applications into object-oriented components.

The following concepts have been introduced into Natural: classes, objects, interfaces, methods, and properties.

To integrate the new concepts smoothly into Natural, existing Natural concepts are used. Existing object types, like local data area and subprogram, are used in new contexts. A new Natural object type is introduced: the class.

The Natural programming language has been extended to include object-oriented instructions. For this purpose, the new statements CREATE OBJECT, DEFINE CLASS, SEND METHOD, INTERFACE, METHOD and PROPERTY as well as the new system variable *THIS-OBJECT are available.

The new system commands DCOMPARM, REGISTER and UNREGISTER, as well as the new profile parameter DCOM and corresponding macro NTDCOM are available in conjunction with NaturalX. In addition, a new format for the definition of user-defined variables, is provided: HANDLE OF OBJECT.

For details on NaturalX, please refer to the NaturalX documentation.

Restrictions

With Version 3.1.2 of Natural, the following NaturalX-related functions are not yet available:

The definition of object handles within a global data area or as an application-independent variable is not yet possible.

The profile parameter DCOM=(AUTOREG=ON) is not yet evaluated, but ignored. This means that a class is not automatically regeistered when stowed/cataloged, nor automatically unregistered when deleted.

With the next version, these functions will be available.