

Natural

Natural Release Notes for Mainframes

Version 8.2.6

April 2017

This document applies to Natural Version 8.2.6 and all subsequent releases.

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

Copyright © 1979-2017 Software AG, Darmstadt, Germany and/or Software AG USA, Inc., Reston, VA, USA, and/or its subsidiaries and/or its affiliates and/or their licensors.

The name Software AG and all Software AG product names are either trademarks or registered trademarks of Software AG and/or Software AG USA, Inc. and/or its subsidiaries and/or its affiliates and/or their licensors. Other company and product names mentioned herein may be trademarks of their respective owners.

Detailed information on trademarks and patents owned by Software AG and/or its subsidiaries is located at <http://softwareag.com/licenses>.

Use of this software is subject to adherence to Software AG's licensing conditions and terms. These terms are part of the product documentation, located at <http://softwareag.com/licenses/> and/or in the root installation directory of the licensed product(s).

This software may include portions of third-party products. For third-party copyright notices, license terms, additional rights or restrictions, please refer to "License Texts, Copyright Notices and Disclaimers of Third-Party Products". For certain specific third-party license restrictions, please refer to section E of the Legal Notices available under "License Terms and Conditions for Use of Software AG Products / Copyright and Trademark Notices of Software AG Products". These documents are part of the product documentation, located at <http://softwareag.com/licenses> and/or in the root installation directory of the licensed product(s).

Use, reproduction, transfer, publication or disclosure is prohibited except as specifically provided for in your License Agreement with Software AG.

Document ID: NATMF-RELNOTES-826-20170418

Table of Contents

Preface	v
1 Supported Environments	1
Operating Systems	2
TP Monitors/Online Interfaces	2
Database Management Systems	3
Authorized Services Manager and Roll Server	3
Assemblers	3
2 Available and Required Software AG Product Versions	5
Product Availability and End of Maintenance	6
Overview of New Natural Add-On Product Versions	6
Software AG Product Versions Required with Natural	8
3 Installation and Compatibility	11
License File	12
Changes to Installation	12
Compatibility	14
4 New and Changed Features of Base Natural	17
Customer Feature Requests for Base Natural	18
Operations and Performance	19
Unicode and Code Page Support	20
Programming Language	21
System Commands	21
Editors	22
Utilities	22
Profile Parameters	24
Application Programming Interfaces	25
5 New and Changed Features of Natural Add-On Products	29
Customer Feature Requests for Natural Add-On Products	30
NaturalONE	30
Natural RPC (Remote Procedure Call)	31
Natural SAF Security	32
Natural Security	32
zIIP Enabler for Natural	34
6 New and Changed Features of Most Recent Natural Add-On Products	35
Natural Com-plete/SMARTS Interface Version 8.3.4	36
Natural CICS Interface Version 8.3.3 for z/OS	37
Natural Development Server Version 8.3.3	40
Natural for DB2 Version 8.4.1	41
Natural for DB2 Version 8.3.3	43
Natural Optimizer Compiler Version 8.3.4	43
Natural Web I/O Interface Server Version 8.3.3	44

Preface

This document provides a brief summary of the changes and enhancements that have been introduced in Natural Version 8.2.6 for Mainframes and the Natural add-on products released with this version. Revised and updated documentation sets are available with this version.

Update Information, April 2017:

The following modifications and/or amendments to this document have been done after the release of Natural Version 8.2.6 for Mainframes:

- The section *TP Monitors/Online Interfaces* has been modified.
- New versions have been added to the section *Overview of New Natural Add-On Product Versions*.
- Several product versions have been modified in *Software AG Product Versions Required with Natural*.
- The section *Installation and Compatibility* has been modified:
 - *zIIP Enabler for Natural CICS Interface on z/OS* has been added.
 - *zIIP Enabler for Natural under Com-plete* has been modified.
- The section *New and Changed Features of Base Natural* has been modified:
 - The `COMPOPT` system command has been added.
 - The `CMPO` **profile parameter** has been added.
- The section *New and Changed Features of Natural Add-On Products* has been modified for
 - *zIIP Enabler for Natural*.
- The section *Natural Com-plete/SMARTS Interface Version 8.3.3* has been replaced by *Natural Com-plete/SMARTS Interface Version 8.3.4*.
- The section *Natural CICS Interface Version 8.3.3 for z/OS* has been added.
- The section *Natural Development Server Version 8.3.3* has been modified:
 - *Installation Changes for z/VSE*
 - *Attached Debugging Supported for BS2000/OSD* has been added
- The section *Natural for DB2 Version 8.4.1* has been added.
- The section *Natural Optimizer Compiler Version 8.3.3* has been replaced by *Natural Optimizer Compiler Version 8.3.4*.

Update Information, November 2016:

- The section *TP Monitors/Online Interfaces* has been modified.

<p>Supported Environments</p>	<p>Operating Systems TP Monitors/Online Interfaces Database Management Systems Authorized Services Manager and Roll Server Assemblers</p>
<p>Available and Required Software AG Product Versions</p>	<p>Product Availability and End of Maintenance Overview of New Natural Add-On Product Versions Software AG Product Versions Required with Natural</p>
<p>Installation and Compatibility</p>	<p>Changes to Installation Compatibility</p>
<p>New and Changed Features of Base Natural</p>	<p>Customer Feature Requests for Base Natural Operations and Performance Unicode and Code Page Support Programming Language System Commands Editors Utilities Profile Parameters Application Programming Interfaces</p>
<p>New and Changed Features of Natural Add-On Products</p>	<p>Customer Feature Requests for Natural Add-On Products NaturalONE Natural RPC (Remote Procedure Call) Natural SAF Security Natural Security zIIP Enabler for Natural</p>
<p>New and Changed Features of Most Recent Natural Add-On Products</p>	<p>Natural Com-plete/SMARTS Interface Version 8.3.4 Natural CICS Interface Version 8.3.3 for z/OS Natural Development Server Version 8.3.3 Natural for DB2 Version 8.4.1 Natural for DB2 Version 8.3.3 Natural Optimizer Compiler Version 8.3.4 Natural Web I/O Interface Server Version 8.3.3</p>

1 Supported Environments

- Operating Systems 2
- TP Monitors/Online Interfaces 2
- Database Management Systems 3
- Authorized Services Manager and Roll Server 3
- Assemblers 3

Software AG provides Natural support for the versions of the operating systems, TP monitors, database management systems and assemblers supported by their respective manufacturers. In general, when the provider of an operating system, TP monitor, database management or assembler system stops supporting a version of an operating system, TP monitor, database management system or assembler, Software AG will stop supporting that version of the operating system, TP monitor, database management system or assembler.



Note: For information regarding Software AG product compatibility with IBM platforms and any IBM requirements for Software AG products, please review the *Product Compatibility for IBM Platforms* web page at <http://www.softwareag.com/>.

Operating Systems

Software AG provides Natural support for the operating systems and versions listed in the **Product Version Availability** section of Software AG's Empower web site at <https://empower.software-ag.com/> (see also *Product Availability and End of Maintenance*).

TP Monitors/Online Interfaces

Natural Version 8.2.6 supports the versions of the TP monitors/online interfaces listed below:

Product	Version
Com-plete	See <i>Software AG Product Versions Required with Natural</i>
CICS TS for z/OS	4.1, 4.2, 5.1, 5.2, 5.3 for Natural CICS Interface Version 8.2.6 4.2, 5.1, 5.2, 5.3 for Natural CICS Interface Version 8.3.3
CICS TS for VSE/ESA	1.1.1, 2.1
IMS TM	12.1, 13.1, 14.1
openUTM	6.1, 6.2, 6.3, 6.4
TIAM	13.1, 13.2

Database Management Systems

Natural Version 8.2.6 supports the versions of the database management systems listed below:

Product	Version
Adabas	See <i>Software AG Product Versions Required with Natural</i>
DB2 for z/OS	10.1, 11.1
DB2 Server for VSE & VM	7.3, 7.4, 7.5
DL/I	As delivered with the TP monitor IMS TM
VSAM	As delivered with the operating system
DFSMSStvs	As delivered for the respective VSAM version if transactional VSAM is to be used with Natural for VSAM

Authorized Services Manager and Roll Server

The Authorized Services Manager (NATASM82) and the Natural Roll Server (NATRSM82 and NATRSM83) supplied with Natural Version 8.2 employ machine instructions from the IBM General Instructions Extension Facility. They will not execute successfully on machines for which IBM does not supply this extension facility.

Assemblers

Natural Version 8.2.6 requires one of the following assemblers for the assembly of its source modules:

- “HL” Assembler Version 1.6 (z/OS and z/VSE operating systems),
- “Assembh” Assembler (BS2000/OSD operating systems).



Note: It may be possible to assemble source modules with older assemblers; however, Software AG cannot guarantee this.

2 Available and Required Software AG Product Versions

- Product Availability and End of Maintenance 6
- Overview of New Natural Add-On Product Versions 6
- Software AG Product Versions Required with Natural 8

Product Availability and End of Maintenance

You can view all available Software AG product versions and check the dates when their maintenance ends by visiting Software AG's Empower web site at <https://empower.softwareag.com/>:

1. Log in to Empower.
2. Expand **Products** in the left menu of the page and select **Product Version Availability**:

Product Version Availability

General Availability (GA), Platform retirement, End of Maintenance (EOM), and End of Sustained Support (EOSS) dates for your products. [View a description of these terms in our Maintenance Policy.](#)

Product Line: [-] OR Product Family: [-]

Product Name: [-]

Product Version: [-]

Operating System: [-] Operating System Version: [-]

Show prior Product Versions:

Sort by Product Version: Descending Ascending

Rows per Page: [100]

[SEARCH] [CANCEL]

Rows 1 - 100 of 6022 | Rows per page: 100 | Click for Printable Version of below Table:

Product Line Product - Product Version	Version Lifecycle Milestone			
	GA	OS Retirement	EOM	EOSS
Operating System and Hardware *				

3. Select the required filter criteria from the drop-down list boxes and click on the **SEARCH** button.

A list of supported Software AG products that meet the filter criteria is shown. In addition, the end-of-standard-maintenance dates are indicated in the **EOM** column.

If you mark **Show prior Product Versions**, only product versions that are out of maintenance are listed.

Overview of New Natural Add-On Product Versions

This release of Natural provides new versions of the Natural add-on products (or subcomponents) listed in the following table. These versions contain

- all Zaps,
- INPL updates,
- early warnings and

■ source changes

applied to their respective predecessor versions as error corrections.

Product Name	Product Code	Version
Natural Advanced Facilities	NAF	8.2.6
Natural CICS Interface (*)	NCI	8.2.6
		8.3.3
Natural Com-plete/SMARTS Interface (*)	NCF	8.2.6
		8.3.4
Natural Connection	NTC	8.2.6
Natural Development Server (*)	NDV	8.2.6
		8.3.3 CF05
Natural for DB2	NDB	8.2.6
		8.3.3
Natural for DL/I	NDL	8.2.6
Natural for SQL/DS	NSQ	8.2.6
Natural for VSAM	NVS	8.2.6
Natural IMS TM Interface	NII	8.2.6
Natural ISPF	ISP	8.2.6
Natural Japanese Language Pack	NCJ	8.2.6
Natural <i>open</i> UTM Interface	NUT	8.2.6
Natural Optimizer Compiler (*)	NOC	8.2.6
		8.3.4
Natural Review	RNM	8.2.6
Natural RPC (*)	RPC	8.2.6 (RPC is a separate subcomponent of Natural)
Natural SAF Security	NSF	8.2.6
Natural Security (*)	NSC	8.2.6
Natural SQL Gateway	NSB	8.2.6
Natural TIAM Interface	NRT	8.2.6
Natural TSO Interface	NTI	8.2.6
Natural Web I/O Interface	NWO	8.2.6 (server)
		8.3.3 (server)
Super Natural	NSN	8.2.6
zIIP Enabler for Natural (*)	NAZ	8.2.6

* Product-specific changes and/or enhancements are described in *New and Changed Features of Natural Add-On Products*.

Software AG Product Versions Required with Natural

The following minimum product versions/fixes (or higher) are required to use Natural Version 8.2.6 and the add-on products released with this version with the Software AG products listed below:

Product Name	Product Code	Minimum Version
Adabas	ADA	8.3 8.3.4 with Zap AO834004 (ADALCO) if zIIP Enabler for Natural is installed under Com-plete
Adabas CICS Interface	ACI	8.3 8.4.1 LX if zIIP Enabler for Natural is installed under CICS
Adabas IMS/TM Interface	AII	8.3
Adabas Online System	AOS	8.3
Adabas Review	REV	4.7.2
Adabas Text Retrieval	TRS	2.1.4
Com-plete	COM	6.8.1 Cumulative Fix 10 with SMARTS Version 3.3.1 Cumulative Fix 25
Con-form	CMF	3.4.3
Con-nect	CNT	3.4.3
ConnecX SQL Engine	CXX	12.0.1
Entire Connection	PCC	4.5.3
Entire Event Management	NCL	2.2.1 (2.1.2 for z/VSE)
Entire Net-Work	WCP	6.3.2 (This product is required if you are using Natural Security in a heterogeneous environment.)
Entire Operations	NOP	5.4.3
Entire Output Management	NOM	3.4.3
Entire System Server	NPR	3.6.1
Entire Transaction Propagator	ETP	1.5.2 Apply Zaps ET52001 and ET52003 (for ETP) to use ETP with Adabas Version 8. If you are also using the additional Entire Transaction Propagator CICS Interface (ETC), in addition, apply Zap EZ52005 (for ETC).

International Components for Unicode for Software AG	ICS	1.4.2 or 2.1.1 Apply 1.4.2 Load Fix 2 or 2.1.1 Load Fix 3, respectively, to use Natural CICS Interface Version 8.3.3.
Mainframe License Check	MLC	1.3.1 Apply Load Fix 1 to use Natural CICS Interface Version 8.3.3. or Natural Complete/SMARTS Interface Version 8.3.4.
Natural Business Services	NBS	8.2.2
Natural Construct	CST	8.2.2
Natural Document Management	NDM	1.6.3 with Service Pack I001 applied
Natural Engineer	NEE	8.3.2
Natural Web I/O Interface	NWO	1.3.18 (client)
Predict	PRD	8.2.3
Predict Application Control	PAC	2.6.1
SMARTS	APS	2.7.2 Cumulative Fix 20 for BS2000/OSD 3.3.1 Cumulative Fix 25 for z/OS and z/VSE
System Automation Tools	SAT	3.4.3
System Maintenance Aid	SMA	2.1.2 Cumulative Fix 4
webMethods EntireX (before: EntireX Communicator)	EXX	9.5.1 for z/OS 9.6.0 for z/VSE 8.1.1 for BS2000/OSD

Although it may be technically possible to run versions of other Software AG products which are older than the ones listed above with a new version of Natural, this is not recommended because, for legal reasons, Software AG cannot continue to support such combinations and cannot make any statements about whether it is technically possible to run a new version of Natural with versions of other Software AG products which are older than the ones listed above.

3 Installation and Compatibility

- License File 12
- Changes to Installation 12
- Compatibility 14

License File

A product license file for Natural is required. In addition, a license file is required for the zIIP Enabler for Natural, if installed.

For information on Software AG's mainframe product licensing, see the *Software AG Mainframe Product Licensing* documentation.

Changes to Installation

This section describes the changes in the installation process of base Natural and the Natural add-on products released with this Natural version.

The sections indicated for more information are contained in the Natural *Installation* documentation, unless otherwise noted.

- [System Maintenance Aid: Readme File](#)
- [Selectable Unit for New Roll Server Feature on z/OS](#)
- [zIIP Enabler for Natural CICS Interface on z/OS](#)
- [zIIP Enabler for Natural under Com-plete](#)
- [New ICU Data Libraries](#)
- [Natural for DL/I: New Build Step for Bootstrap on z/OS](#)

System Maintenance Aid: Readme File

For installation guidance and information on new or changed System Maintenance Aid (SMA) parameters and Natural features, you can view the product-specific Readme files by using the appropriate SMA function.

➤ To view a product-specific Readme

- From the product list on an SMA **Maintenance** screen, execute the RM (**Show Readme File**) command for the required product(s).

Selectable Unit for New Roll Server Feature on z/OS

A new NATSUPGM load module now supports Natural selectable units. The load module delivered with this Natural version contains the new Natural Roll Server feature on z/OS announced in [Thread Compression/Decompression Moved to Natural Roll Server](#).

For the changes in installation, see *Link Natural Modules to an APF Library (Step 1220: Natural Roll Server)* in *Installing Natural on z/OS* in the *Installation for z/OS* documentation. If you want to use selectable units under CICS TS, you need to perform an extra step to implement NATSUPGM during installation: see *Selectable Units Module NATSUPGM* in *Installing Natural CICS Interface on z/OS*.

See also *Selectable Units for New Natural Features* in the *Operations* documentation.

zIIP Enabler for Natural CICS Interface on z/OS

zIIP Enabler for Natural can now also be used in a CICS environment on z/OS if Natural CICS Interface Version 8.3.3 is installed. See also [Natural CICS Interface Version 8.3.3](#).

The zIIP Enabler for Natural supports use of IBM's System z Integrated Information Processor (zIIP). The zIIP is a specialty engine designed to offload eligible workload from a general central processor. For more information, see the *zIIP Enabler for Natural* documentation. Note that zIIP Enabler for Natural requires a [license file](#).

 **Important:** See [Load Fix Required for License Utility](#).

zIIP Enabler for Natural under Com-plete

zIIP Enabler for Natural can be used in a Com-plete environment since Natural Com-plete/SMARTS Interface Version 8.3.3.

Beginning with Natural Com-plete/SMARTS Interface Version 8.3.4, zIIP Enabler for Natural can be used **without the requirements** described in the section *Natural Com-plete/SMARTS Interface Version 8.3.4*.

The zIIP Enabler for Natural supports use of IBM's System z Integrated Information Processor (zIIP). The zIIP is a specialty engine designed to offload eligible workload from a general central processor. For more information, see the *zIIP Enabler for Natural* documentation. Note that zIIP Enabler for Natural requires a [license file](#).

 **Important:** See [Load Fix Required for License Utility](#).

New ICU Data Libraries

The ICU data libraries provided as Natural load modules with ICS (International Components for Unicode for Software AG) have changed due to the new ICU version (see also *ICU Version Upgrade*):

Old Library Name	New Library Name
ICS53E	ICS54E
ICS53J	ICS54J
ICS53X (not for z/VSE)	ICS54X (not for z/VSE)

The ICS54J data library contains the same code pages and locales as ICS54E plus all Japanese code pages. For more information, see *ICU Data Libraries* in the *Unicode and Code Page Support* documentation.

For the resulting changes in installation steps, see the *Installation Procedure* for z/OS, z/VSE and BS2000/OSD in *Installing International Components for Unicode for Software AG* in the *Installation* documentation.

Natural for DL/I: New Build Step for Bootstrap on z/OS

The NDLSINIB bootstrap module is no longer contained on the NAT_{vrs}.LOAD data set supplied with Natural for DL/I on z/OS for legal reasons. The NDLSINIB bootstrap is now build during installation as described in the *Build the DL/I Bootstrap Module* in *Installing Natural for DL/I on z/OS* in the *Installation for z/OS* documentation.

Compatibility

This section provides the latest information for this Natural release regarding compatibility with earlier versions of Natural for Mainframes as well as with Natural on other platforms.



Note: For information regarding Software AG product compatibility with IBM platforms and any IBM requirements for Software AG products, please review the *Product Compatibility for IBM Platforms* web page at <http://www.softwareag.com/>.

Special-Purpose Zaps

The following table lists Natural Version 8.2.6 Zaps and the special purposes they support:

Zap	Special Purpose	
NA93189	Suppress NAT3145 error information	<p>Suppress extra L2 calls to Adabas after a NAT3145 error has occurred.</p> <p>If this Zap is applied, the application programming interface USR8202N no longer provides extended information on the NAT3145 error message.</p>
NA93228	Migrate old maps	Provide option to migrate Natural Version 4 maps that contain erroneous numeric field definitions to Natural Version 8.2.
NA95017, NA95018, NA95019, NA95020, NA95021 and NA95022	Support for the Arabic shaped format	Keeps the shaped format of Arabic characters produced in a previous Natural version.
NA95038	Resolve problems (RSP=46) during Natural mainframe calls to Adabas LUW	Resolve problems that can arise when Natural calls Adabas on Linux, UNIX or Windows from a mainframe platform: an unexpected RSP=46 can occur if a READ loop at the level 1 (*LEVEL=1) ends with an End-of-File (RSP=3) and is executed multiple times. This occurs because Natural on the mainframe does not send a final RC command to release the Adabas Format Buffer if the READ receives RSP=3.

4 New and Changed Features of Base Natural

- Customer Feature Requests for Base Natural 18
- Operations and Performance 19
- Unicode and Code Page Support 20
- Programming Language 21
- System Commands 21
- Editors 22
- Utilities 22
- Profile Parameters 24
- Application Programming Interfaces 25



Note: The SYSEXV utility gives you access to examples of new features available in the current and in some earlier versions of Natural. SYSEXV is described in the *Utilities* documentation.

Customer Feature Requests for Base Natural

This is an overview of the customer feature requests submitted in the **Brainstorm** portal of Software AG's Empower web site at <https://empower.softwareag.com/> and the enhancement proposals that have been implemented in base Natural:

Request Number	Feature Request
00459	Enhance the Service Directory Maintenance function of the SYSRPC utility to improve migration with NATCLTGS.
00905, 1036158	Provide API that supports ACBX: see the new API USR8219N in Application Programming Interfaces .
00104	Enhance the description of the DS profiler parameter to estimate the initial buffer size required to store all entries in the fast locate table: see the updated description of the FLTUSER subparameter in <i>Table of Buffer Sizes</i> in the <i>Parameter Reference</i> documentation.
01273	Route zIIP statistics generated with the ZIIP profile parameter to a particular print file: see the new PNR option of the ZIIP profile parameter in Changed/Enhanced Profile Parameters .
01277	Provide option to check whether Natural Security is installed in the current Natural environment: see the new API USR8215N in Application Programming Interfaces .
01317	Provide name of Predict file in data area: see the section Data Area Editor .
02673	Increase limit of 65535 records in the TEST DBLOG output (see <i>DBLOG Trace Screen</i> in the <i>Utilities</i> documentation).
02850	Enhance API USR8205N to check subroutines: see Application Programming Interfaces .

See also [Customer Feature Requests for Natural Add-On Products](#).

Operations and Performance

Thread Compression/Decompression Moved to Natural Roll Server

The new Natural Roll Server module NATRSM83 takes over the task of compressing and decompressing the Natural thread during roll-out and roll-in operations. This reduces CPU usage by the Natural nucleus, and thus CPU consumption of the hosting TP system (CICS or IMS TM) or the Natural server (Natural RPC server or Natural Development Server). The compression routines of the Natural Roll Server run on an IBM System z Integrated Information Processor (zIIP), if available, improving overall performance of Natural.

The module NATRSM83 is an optional replacement for the module NATRSM82 which performs as before. For the changes in installation, see *Create and Start the Natural Roll Server* in *Installing Natural on z/OS* in the *Installation for z/OS* documentation.

You can exploit the new functionality after activating the Natural selectable units module with the profile parameter setting `SELUNIT=(U1=ON)` (see the *Parameter Reference* documentation). See also [Selectable Units Available for New Roll Server Feature on z/OS](#).

Handling of Storage Key Enhanced under Com-plete

The Natural buffer pool is now allocated either in a system key (only possible for global buffer pools on z/OS) or in the storage key 9. Therefore, it is no longer required to start Natural with profile parameter `SKEY=ON` (see the *Parameter Reference* documentation) set for performance reasons if the storage threads used by Natural are allocated in a storage key other than the storage key used by Com-plete or the storage key 9.



Notes:

1. If you use local buffer pools, you must ensure that the first Natural session referencing a local buffer pool runs with Natural under Com-plete Version 8.2.6 or higher.
2. If your Natural application uses the editor buffer pool, Zap NA96025 must be applied in your environment.

Unicode and Code Page Support

- [ICU Version Upgrade](#)
- [Caution with Old ICU Data Items](#)

ICU Version Upgrade

The ICU (International Components for Unicode) version has been upgraded to ICU Version 54.1 which supports Unicode Version 7.0.

ICU Version 54.1 enhancements include increased thread safeness and improved efficiency for the collation service through a new universal cache.

For a summary of all changes in ICU Version 54.1 and Unicode Version 7.0, see the Download ICU 54 website at <http://site.icu-project.org/download/54> and the Unicode 7.0.0 website at <http://www.unicode.org/versions/Unicode7.0.0/>, respectively.

See also [New ICU Data Modules](#).

Caution with Old ICU Data Items

ICS (International Components for Unicode for Software AG) Version supports dynamic loading of single ICU data items during runtime.

Since some code pages have been added or removed in ICU Version 54.1, make sure to use a data set with ICU data item modules delivered with ICS Version 2.1.1. Using a data set with data item modules of an older ICS version can lead to unpredictable results during code page conversion.

For more information, see *ICU Data Items* in the *Unicode and Code Page Support* documentation.

Programming Language

- [Statements](#)

Statements

REQUEST DOCUMENT

The `HEADER/VALUE` option of the `RETURN` clause now also supports arrays in addition to scalar values. Arrays are required if more than one occurrence of the same header is returned by the HTTP server.

For more information, see the *header-value-in* operand of the *return-clause* described in the *Statements* documentation.

System Commands

- [COMPOPT System Command](#)
- [LIST System Command](#)



Note: The sections indicated for more information are contained in the *System Commands* documentation, unless otherwise noted.

COMPOPT System Command

Under Natural for DB2 Version 8.4.1, the `COMPOPT` system command provides the new `DB2PKYU` compiler option: see [New Compiler Option for Update of DB2 Primary Keys](#).

LIST System Command

Architecture Level Now Shown for Cataloged Objects

The `LIST` system command now displays the IBM architecture level used when cataloging Natural sources with the `ARCH` option of Natural Optimizer Compiler (see the *Natural Optimizer Compiler* documentation). Prerequisite is Natural Optimizer Compiler Version 8.3.3 or above.

The architecture level is displayed in the object directory and in a new column of the object list. You can also use the new `ARCHLEVEL` option of the `LIST range-clause` to list objects for a specific level or a range of levels.

Optimized Code Now also Shown in Object List

The size of code generated with the Natural Optimizer Compiler (if used) is now also displayed in a column of the object list.

CODE-PAGE Options no longer Supported

- The `DISPLAY-CODE-PAGE-IN-LIST` parameter of the `LIST` profile is no longer supported. As a result, this parameter will be removed from your `LIST` profile the next time you execute the `UPDATE` function of the `LIST` profile maintenance (invoked with the `LIST` subcommand `LISTPROF`).
- The `LIST` subcommands `CODE-PAGE ON|OFF` and `CP ON|OFF` are no longer supported. Code-page information is always shown in the object directory or object list.

Editors



Note: The sections indicated for more information are contained in the *Editors* documentation, unless otherwise noted.

Data Area Editor

The data area editor has been enhanced. When a Predict file is included into a data area, the name of that file is written into a field of the **Miscellaneous** column of the data area editor. This allows identifying the origin of the imported fields.

Utilities

- [DBLOG Utility](#)
- [Profiler Utility](#)
- [SYSRDC Utility](#)
- [SYSRPC Utility](#)



Note: The sections indicated for more information are contained in the *Utilities* documentation, unless otherwise noted.

DBLOG Utility

The `DBLOG` utility has been enhanced to report more than 65535 records in the output produced by `TEST DBLOG` system command: see *DBLOG Trace Screen*.

Profiler Utility

Additional Statistics in Batch

In batch mode, the Profiler utility now provides additional statistics on a running Natural batch application: the code page used by the application, the libraries and programs opened/executed first during the session, and the highest level of an object invoked during program execution.

For detailed information, see *Profiler Statistics* in the section *Natural Profiler*.

Enhanced Event Data Processing in Batch

The Profiler utility can now also be used to read the event data from the Profiler resource files and process it further.

The Profiler utility provides new functions for data consolidation (aggregation), event tracing and program tracing. It also provides a program summary and displays the Profiler properties and statistics. The resulting data can be exported in text or CSV (comma-separated values) format, or in the format expected by the Natural Profiler MashApp (see the following section).

For detailed information, see *Using the Profiler Utility in Batch Mode* in the section *Natural Profiler*.

Presentation of Profiler Data on an Interactive Dashboard

The new Natural Profiler MashApp is used to evaluate Profiler event data with MashZone.

MashZone is a browser-based application from Software AG which is used to visualize data on a graphical, interactive dashboard.

For detailed information, see *Natural Profiler MashApp* in the section *Natural Profiler*.

SYSRDC Utility

A Natural RPC server that waits for the next client request is now recorded as a separate event of the new type `RW` (wait for RPC client request). Before, it was recorded as an event of the type `R0` (outbound RPC message).

SYSRPC Utility

The SYSRPC utility is a subcomponent of Natural RPC: see [SYSRPC Utility](#) in the section *Natural RPC*.

Profile Parameters

- Changed/Enhanced Profile Parameters



Note: The sections indicated for more information are contained in the *Parameter Reference* documentation, unless otherwise noted.

Changed/Enhanced Profile Parameters

Parameter	Corresponding Macro	Task	Change/Enhancement
CMPO	NTCMPO		<p>DB2PKYU – Place Primary Key Fields into the Natural DML UPDATE Statement</p> <p>The new DB2PKYU option is provided for Natural for DB2 Version 8.4.1: see New Compiler Option for Update of DB2 Primary Keys.</p>
RPC	NTRPC	Remote-Procedure-Call Settings	<p>Translate Subprogram Name into Upper Case</p> <p>The default setting of the RPCUCT keyword subparameter has changed from OFF to ON.</p> <p>This corresponds to the default upper case translation Natural performs on UNIX and Windows platforms.</p> <p>DFS - Specify RPC Client's Default Server Address</p> <p>The maximum possible value for a node name specified with the DFS keyword subparameter has increased to 192 characters.</p> <p>SRVNODE - Name of Node</p> <p>The maximum possible value for a node name specified with the SRVNODE keyword subparameter has increased to 192 characters.</p>
ZIIP	NTZIIP	zIIP Processing (z/OS Only)	<p>Route zIIP Processing Information to Print File</p> <p>The new PNR keyword subparameter determines the print file to be used for the zIIP processing information output with the PRINT keyword subparameter of ZIIP.</p> <p>Issue Natural zIIP Support Message</p> <p>The new IMSG keyword subparameter determines whether a Natural system message is issued when Natural zIIP support is provided at session start.</p>

Application Programming Interfaces

The following Natural application programming interfaces (APIs) are new in the SYSEXT system library or have changed:

API	Task	Enhancement
USR1009N	Convert store clock to microseconds.	Performance of these APIs has been improved: see Improved Performance of Time Conversion APIs .
USR1023N	Convert date and time format.	
USR2036N	Convert binary variable (B8) to numeric variable (P20). Can be used to convert the system variable *TIMESTAMP to a numeric variable.	
USR8205N	Get called subprograms and subroutines with parameters.	This API now also returns the names and parameters of the called external subroutines of a cataloged Natural object.
USR8215N	Get the Natural and NSC versions.	This new API returns the Natural and Natural Security versions installed at your site.
USR8216N	Maintain the RPC service directory.	This new API retrieves a Natural RPC service directory and creates, changes and deletes the node and server definitions in the directory.
USR8217N	Search execution library for a Natural object.	This new API searches in the Natural search path the execution library for a given object. If the object name is not specified, the name of the calling program is used.
USR8218N	Get all databases accessed by Natural.	This new API returns the versions, types and options of all databases accessed during a Natural session.
USR8219N	Perform Adabas direct calls with ACBX interface.	This new API enables you to issue Adabas direct calls by using the extended Adabas control block (ACBX) interface. All Adabas buffers you can specify with this API are defined as dynamic variables of the format A.
USR8220N	Trigger termination of current RPC server.	This new API causes an active RPC server to terminate if it is called by a Natural RPC server subprogram. Explicit server termination through this API is useful when severe errors occur.

See also the changes to [Natural RPC-specific APIs](#) and [Natural Security APIs](#).

Improved Performance of Time Conversion APIs

Performance of the time conversion APIs USR1009N, USR1023N and USR2036N has been improved significantly. We recommend that you replace any previous versions of these APIs with the new API versions supplied with this Natural release.

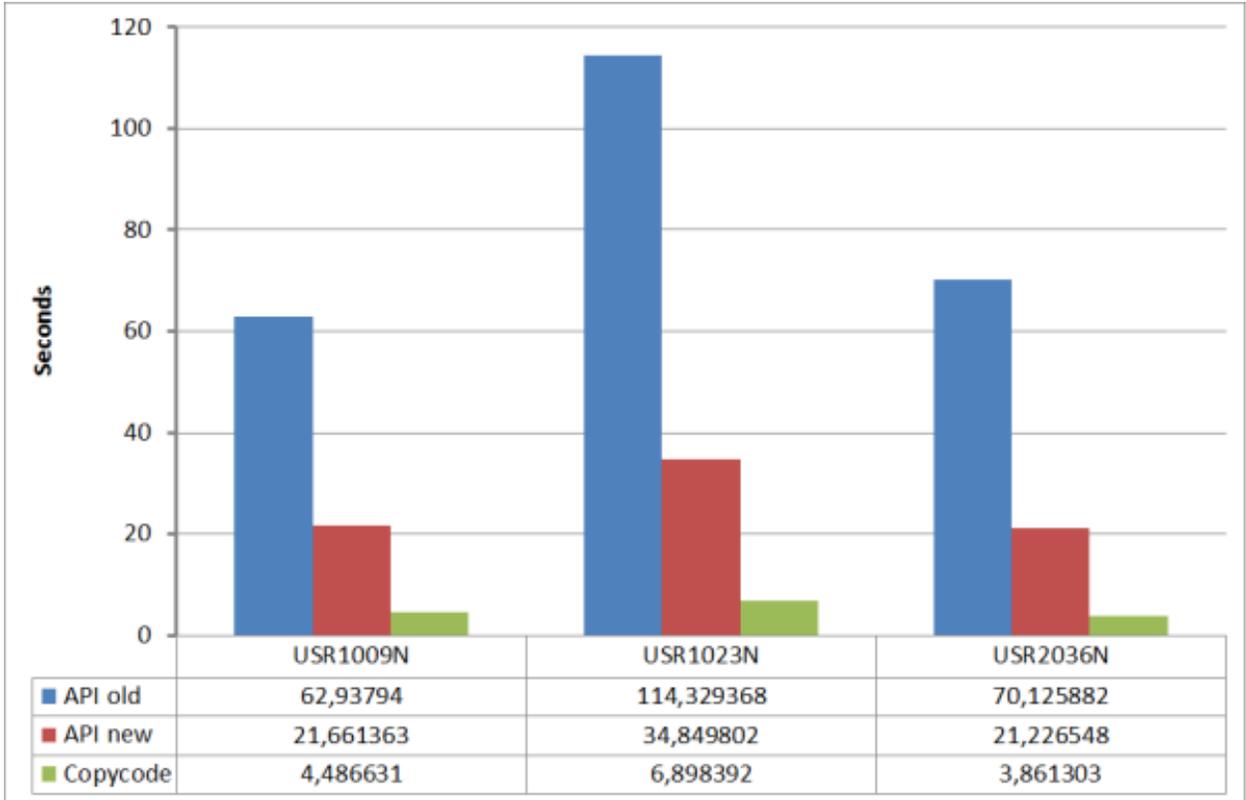
For USR1023N and USR2036N, in addition to the usual example programs (USRnnnnP) and text objects (USRnnnnT), the following new copycode objects are supplied to further improve conversion performance for time-related values:

Copycode	Task
USR1023W	Convert microseconds to a store clock value.
USR1023X	Convert microseconds to Natural time.
USR1023Y	Convert a store clock value (such as *TIMESTAMP) to microseconds.
USR1023Z	Convert Natural time to microseconds.
USR2036Z	Convert a binary variable of the Natural format/length B8 to a numeric variable of the Natural format/length P20. This copycode can be used to convert the system variable *TIMESTAMP to a numeric variable.

For instructions on implementing the copycodes, see *Using a Natural API* in the *SYSEXT Utility* section of the *Utilities* documentation.

The following graphic illustrates a performance comparison between the old and new versions of the APIs tested with a Natural program that converts the following one million times:

- Converts a store clock value to microseconds by using the old USR1009N API, compared with the corresponding new API and its related USR1023Y copycode.
- Converts a store clock value to microseconds and Natural time by using the old USR1023N API and the function S, compared with the corresponding new API and its related copycodes USR1023Y and USR1023X.
- Converts a store clock value to a numeric variable (P20) by using the old USR2036N API, compared with the corresponding new API and its related copycode USR2036Z.



The new versions of the time conversion APIs perform about three times faster than the old ones. The new copycodes are about 16 times faster than the old APIs.

5

New and Changed Features of Natural Add-On Products

- Customer Feature Requests for Natural Add-On Products 30
- NaturalONE 30
- Natural RPC (Remote Procedure Call) 31
- Natural SAF Security 32
- Natural Security 32
- zIIP Enabler for Natural 34



Note: For an overview of all Natural add-on products and the new product versions available, see [Overview of New Natural Add-On Product Versions](#).

Customer Feature Requests for Natural Add-On Products

This is an overview of the customer feature requests submitted in the **Brainstorm** portal of Software AG's Empower web site at <https://empower.softwareag.com/> that have been implemented in the following Natural add-on products released with Natural Version 8.2.6:

Product	Request Number	Feature Request
Natural RPC	01187	Provide API to stop an RPC server after a Natural error: see the new API USR8220N in Application Programming Interfaces .
Natural Security	00618, 01580	Allow FDIC specifications for library and special-link profiles: see Administrator Services , Library Profiles and the API NSCXR in the section <i>Natural Security</i> .
Natural Security	02133	Enhance API NSCADM to unlock a locked user in online or batch mode: see NSCADM in the section <i>Natural Security</i> .
Natural Security	02692	Provide option for user of type Administrator to use SYSMAIN regardless of any library definitions: see Utility Profiles in the section <i>Natural Security</i> .
Natural SAF Security	02385	Provide option to specify alternative default user groups in Natural SAF Security: see General Group ID for Multiple Default Groups in the section <i>Natural SAF Security</i> .

See also [Customer Feature Requests for Base Natural](#).

NaturalONE

For information on changes, enhancements and new features available with NaturalONE, see the *Release Notes* in the *NaturalONE* documentation in the **Documentation** section of Software AG's Empower web site at <https://empower.softwareag.com/>.

Natural RPC (Remote Procedure Call)

With Natural Version 8.2.6, an enhanced Natural RPC Version 8.2.6 is delivered which introduces the following changes and enhancements:

- Encryption
- Application Programming Interfaces (APIs)
- Changed RPC Parameter Settings
- SYSRPC Utility

Encryption

The encryption/decryption mechanism provided by EntireX Security is deprecated.

For encrypted transport, Software AG strongly recommends that you use the Secure Sockets Layer/Transport Layer Security protocol. All references regarding encryption have been removed from the *Natural RPC* documentation accordingly.

Applications that execute with EntireX Encryption are still supported for compatibility reasons.

For more information, see *SSL/TLS and Certificates with EntireX* in the *EntireX* documentation.

Application Programming Interfaces (APIs)

The following Natural RPC-specific APIs are new in the SYSEXT system library or have changed:

API	Task
USR2007N	<p>Get or set data for RPC default server</p> <p>The Natural format/length of the NODE parameter (<i>nodename</i>) has changed from A32 to A192.</p> <p>For more information, see <i>Specifying RPC Server Addresses</i> in the <i>Natural RPC</i> documentation.</p>
USR2071N	<p>Support EntireX Security on client side</p> <p>The Natural format/length of the BROKER_ID parameter (<i>broker-id</i>) has changed from A32 to A192.</p> <p>For more information, see <i>EntireX Security on the Client Side</i> in the <i>Natural RPC</i> documentation.</p>
USR8220N	<p>Trigger termination of current RPC server</p> <p>This new API causes an active RPC server to terminate if a Natural error is returned from the client.</p>

Changed RPC Parameter Settings

For changes of Natural RPC-specific parameter settings, see the [RPC](#) profile parameter described in [Changed/Enhanced Profile Parameters](#).

SYSRPC Utility

Support for Long Natural RPC Node Names

The **Service Directory Maintenance** function of the SYSRPC utility now supports node names of up to 192 characters, which is particularly useful when referencing Internet Protocol Version 6 (IPv6) names. If you press PF2 on the **Service Directory** screen, a window opens where you can enter a long node name. See also *Service Directory Maintenance* in *SYSRPC Utility* in the *Utilities* documentation.

API for Natural RPC Service Directory Maintenance

The new API `USR8216N` provides the option to retrieve a Natural RPC service directory and create, change and delete the node and server definitions in the directory.

Natural SAF Security

The following enhancement is provided with Natural SAF Security Version 8.2.6:

General Group ID for Multiple Default Groups

In the external security system, users may be in multiple default groups. Instead of having to define all these groups in Natural Security, a new option allows you to define a single group to be used for the Natural logon of *all* users defined in the external security system. The ID of this group is specified in the new general Natural SAF Security option **General Group ID** (in **Administrator Services > General NSF Options 1**) described in the *Natural SAF Security* documentation.

Natural Security

The following enhancements are provided with Natural Security Version 8.2.6:

- [Administrator Services](#)
- [Library Profiles](#)
- [Utility Profiles](#)
- [Application Programming Interfaces \(APIs\)](#)



Note: The sections indicated for more information are contained in the *Natural Security* documentation, unless otherwise noted.

Administrator Services

Library FDIC Assignment Enabled

A new option **Library FDIC Assignment Enabled** is available under **Library and User Preset Values** to enable the new settings described under *Assigning FDIC and FUSER* below.

Library Profiles

Assigning FDIC and FUSER

With previous versions, the following applied:

- You could not make FDIC specifications in library or special-link profiles. The Natural profile parameter `FDIC` (see the *Parameter Reference* documentation) set at the start of the Natural session determined which FDIC system file was used for all libraries.
- You could make FUSER specifications in library profiles, but not in special-link profiles.
- You could set the **Cross-reference** option in library profiles, but not in special-link profiles.

As of this version, the following applies:

- You can make FDIC specifications in both library profiles and special-link profiles.
- You can make FUSER specifications in both library profiles and special-link profiles.
- You can set the **Cross-reference** option in both library profiles and special-link profiles.

This feature is activated by the new Administrator Services option **Library FDIC Assignment Enabled** (see above).

The usual logic applies, that is: The settings at library level take precedence over those which apply at session start; and the settings at special-link level take precedence over those at library level.

Utility Profiles

SYSMAIN

A new option **Enable Unrestricted Use of Libraries** is available in the SYSMAIN default utility profile (under **Additional Options > Session Options**). It can be used to allow users of type Administrator unrestricted use of libraries with SYSMAIN. They may then use SYSMAIN functions to process the contents of all libraries defined in Natural Security - regardless of any access restrictions that may exist for these libraries. For an Administrator to be able to do so, another new option **Process All Libraries** has to be set in his/her user-specific SYSMAIN utility profile.

Application Programming Interfaces (APIs)

NSCADM

The API NSCADM has been enhanced: It allows you to unlock users. For details, see the example program PGMADM06 and the text member TXTADM06 in the library SYSSEC.

NSCXR

The API NSCXR has been enhanced: It allows you to list all library profiles in which an FDIC and/or FUSER specification is made. For details, see the example program PGMXR021 and the text member TXTXR021 in the library SYSSEC.

zIIP Enabler for Natural

zIIP Enabler for Natural can now be used in a CICS environment on z/OS if Natural CICS Interface Version 8.3.3 is installed. See also [Natural CICS Interface Version 8.3.3 for z/OS](#).

zIIP Enabler for Natural can be used in a Com-plete environment if Natural Com-plete/SMARTS Interface Version 8.3 is installed. See also [Natural Com-plete/SMARTS Interface Version 8.3.4](#).

Prerequisite for using the zIIP Enabler for Natural under CICS or Complete is a separate license with the product code NAZCI or NAZCO, respectively.

For more information on zIIP support, see the *zIIP Enabler for Natural* documentation.

Important: Load Fix Required for License Utility

If order to install zIIP Enabler for Natural with Natural CICS Version 8.3.3 or Natural Com-plete Version 8.3.4, Mainframe License Check (MLC) Version 1.3.1. Load Fix 1 is required to allow a five-character product identifier such as NAZCI or NAZCO.

Load Fix 1 is delivered with MLC Version 1.3.1.

6 New and Changed Features of Most Recent Natural Add-On

Products

▪ Natural Com-plete/SMARTS Interface Version 8.3.4	36
▪ Natural CICS Interface Version 8.3.3 for z/OS	37
▪ Natural Development Server Version 8.3.3	40
▪ Natural for DB2 Version 8.4.1	41
▪ Natural for DB2 Version 8.3.3	43
▪ Natural Optimizer Compiler Version 8.3.4	43
▪ Natural Web I/O Interface Server Version 8.3.3	44

Natural Com-plete/SMARTS Interface Version 8.3.4

Natural Com-plete/SMARTS Interface Version 8.3.4 is available from Natural Version 8.2.6 onwards.

This section describes the new features of Natural Com-plete/SMARTS Interface Version 8.3.4 including the features already introduced in Natural Com-plete/SMARTS Interface Version 8.3.3. (available from Natural Version 8.2.6 onwards).

Changes to Installation

Update Required for Base Natural

Before installing Natural Com-plete/SMARTS Interface Version 8.3.4, you need to implement the following update in base Natural:

- Apply the Zaps contained in the delivered NAT826.S002 data set. The #README file also contained in the source module provides further instructions.

Load Fix Required for zIIP Enabler for Natural

See [Load Fix Required for License Utility](#).

Fix Updates for Adabas and SMARTS

- If you want to install Natural Com-plete/SMARTS Interface Version 8.3.4 under SMARTS, you must upgrade to to Com-plete Version 6.8.1 CF10 with SMARTS Version 3.3.1 CF25.
- If you want to install Natural Com-plete/SMARTS Interface Version 8.3.4 under Adabas Version 8.3.4, you must apply the AO834004 fix update.

Support for zIIP Enabler for Natural under Com-plete

Natural Com-plete/SMARTS Interface supports zIIP Enabler for Natural in a Com-plete environment since Natural Com-plete/SMARTS Interface Version 8.3. 3.

No Special Requirements with Natural Com-plete/SMARTS Interface Version 8.3.4

Beginning with Natural Com-plete/SMARTS Interface Version 8.3.4, zIIP Enabler for Natural can be used without the following requirements:

- The Natural startup application must be cataloged with the Com-plete ULIB attributes PV (privileged) and AF (OS task affinity) specified. For more information, see the appropriate *Com-plete* documentation.
- The number of threads and tasks for zIIP processing should be increased with the Com-plete startup parameters THREAD-GROUP and TASK-GROUP to prevent Com-plete from dispatching bottlenecks. For more information, see the appropriate *Com-plete* documentation.

Specify the same number of threads and tasks for each group.

- The Natural session must run with the following profile parameter set:

```
SKEY=ON, RELO=OFF
```

Natural CICS Interface Version 8.3.3 for z/OS

Natural CICS Interface Version 8.3.3 for z/OS is available from Natural Version 8.2.6 onwards.

This section describes the new features of Natural CICS Interface Version 8.3.3 for z/OS.

- [Changes to Installation](#)
- [Support for zIIP Enabler for Natural on z/OS](#)
- [Adabas Support for zIIP Enabler for Natural for CICS on z/OS](#)
- [Adabas Add-On Support for zIIP Enabler for Natural for CICS on z/OS](#)
- [New MEMOBJR Parameter for Usage of CICS Memory Objects](#)
- [New TIOBSZ Parameter for Natural I/O Buffer](#)

Changes to Installation

This section describes the changes to the installation procedure for Natural CICS Interface Version 8.3.3 on z/OS.

For more information, see *Installing Natural CICS Interface Version 8.3.3 on z/OS* in the *Installation* documentation.

Updates Required for Base Natural

Before installing Natural CICS Interface Version 8.3.3, you need to implement the following updates in base Natural:

1. Copy the source modules contained in the delivered NAT826.S001 data set into your Natural source library.
2. Apply the Zaps contained in the NAT826.S002 data set. The #README file also contained in the source module provides further instructions.

Load Fix Required for zIIP Enabler for Natural

See [Load Fix Required for License Utility](#).

Fix Updates for Adabas

See [Adabas Support for zIIP Enabler for Natural for CICS on z/OS](#) and [Adabas Add-On Support for zIIP Enabler for Natural for CICS on z/OS](#).

NCIPARM Module Replaced by NTCICSP Macro

The NCIPARM Natural CICS parameter module including the NCPRM macro has been replaced by the new NTCICSP macro contained in the Natural parameter module. The NTCICSP macro contains all parameters specific to the Natural CICS Interface.

In principle, the parameters provided in the NTCICSP macro correspond to the parameters previously contained in the NCIPARM module. However, the following settings have changed for the following parameters:

Old Setting	New Setting
YES	ON
NO	OFF
Parameter	
BACKEND	
BACKOUT	
CHAP	
CNTCALL	
COMARET	
DUPTID	
FDTPIX	
MEMOBJR	
MSGPFX	
PSTRNID	
RCVASYN	
RESENDC	
RESENDS	
RJEUSER	
SLCALL	
SLNOHLD	
SNDLAST	
TRANCHK	
STORVIO	
TTYCNLS	
UCTRAN	
UNITID	
USERID	

For information on the NTCICSP macro, see in the *TP Monitor Interfaces* documentation.

New CICS Startup Parameters

The following modules are now used as CICS startup parameters for system initialization:

NCIXCALL, NCIXFATU, NCIZNEP and NCIRSFE.

The parameters of the NCIZNEP module were previously used as generation parameters.

For more information, see *CICS Startup Parameters* in *Installing Natural CICS Interface Version 8.3.3 on z/OS* in the *Installation* documentation.

Support for zIIP Enabler for Natural on z/OS

Natural CICS Interface Version 8.3.3 now also supports zIIP Enabler for Natural in a CICS environment on z/OS.

For more information on zIIP support, see the *zIIP Enabler for Natural* documentation.

Adabas Support for zIIP Enabler for Natural for CICS on z/OS

- zIIP enablement of the Adabas CICS Interface is provided by special-purpose libraries (`ACI841.MVSLXnn`) which are supplied upon request.
- For Adabas versions lower than Version 8.3.4, the fixes AO834009, AO833015 and AO832017 must be applied to the Adabas SVC.
- The Adabas LGBLSET parameter option UBTYPE must be set to `UBTYPE=POOL` (the default).

Adabas Add-On Support for zIIP Enabler for Natural for CICS on z/OS

zIIP enablement of the following Adabas add-on products requires installation of the following fix updates:

- If Adabas Review Version 4.8.2 is installed, you need to apply the fix RD482028.
- If Adabas System Coordinator Version 8.2.2 is installed, you need to apply the fixes MI822180 and MO822022.
- If Adabas System Coordinator Version 8.2.2 is used in a multi-TCB environment, CORS09 must be used instead of CORS07. CORS09 is supplied on request.
- If Adabas Fastpath Version 8.2.2 is installed, you need to apply the fix AW822049.

New MEMOBJR Parameter for Usage of CICS Memory Objects

Prerequisite: CICS TS Version 5.1 (and above)

If CICS TS Version 5.1 (and above) is installed at your site, you can use the new parameter `MEMOBJR` (activated by default) to allocate CICS memory objects for roll data instead of rolling data into and out of CICS main temporary storage. This avoids processing overhead since the amount of rolling commands is significantly reduced.

For more information, see `MEMOBJR` in *NTCICSP Macro Parameters* in the *TP Monitor Interfaces* documentation.

New TIOBSZ Parameter for Natural I/O Buffer

You can use the new parameter `TIOBSZ` to set the buffer size to be used for Natural terminal I/Os.

For more information, see `TIOBSZ` in *NTCICSP Macro Parameters* in the *TP Monitor Interfaces* documentation.

Natural Development Server Version 8.3.3

Natural Development Server Version 8.3.3 is available from Natural Version 8.2.6 onwards.

Natural Development Server Version 8.3.3 provides maintenance updates and program fixes.

Installation Changes for z/VSE

The installation procedure for z/VSE has been updated: see *Installing the Natural Development Server* in the *Natural Development Server* documentation in the **Documentation** section of Software AG's Empower web site at <https://empower.softwareag.com/>.

Attached Debugging Supported for BS2000/OSD

With Natural Development Server Version 8.3.3 CF05, attached debugging with the NaturalONE debugger can now also be performed in a BS2000/OSD environment.

Prerequisite: You must apply the Zaps NA96133 and NA96144.

Additional prerequisites required for attached debugging are described in *Preparing Natural for Attached Debugging* in the *Natural Debugger* documentation.

For information on the NaturalONE debugger, see the section *Using the Debugger* in the *NaturalONE* documentation in the **Documentation** section of Software AG's Empower web site at <https://empower.softwareag.com/>.

For the changes in installation, see *Installing the Natural Development Server* in the *Natural Development Server* documentation in the **Documentation** section of Software AG's Empower web site at <https://empower.softwareag.com/>.

Natural for DB2 Version 8.4.1

Natural for DB2 Version 8.4.1 is available from Natural Version 8.2.6 onwards.

This section describes the new features that have been implemented in the SQL statements of Natural for DB2 Version 8.4.1 in support of IBM DB2 Version 12. For details on the features mentioned in this section, see the IBM SQL Reference Guide.

- [Installation: Updates Required for Base Natural](#)
- [New Compiler Option for Update of DB2 Primary Keys](#)
- [MERGE for Source Tables](#)
- [New Scalar Functions](#)
- [New Aggregate Functions](#)
- [Row Count for Result Limit in SELECT and DELETE](#)

For the changes in installation, see *Installing Natural for DB2 Version 8.4.1* in the *Installation* documentation.

Installation: Updates Required for Base Natural

Before installing Natural for DB2 Version 8.4.1, you need to implement the following updates in base Natural:

1. Copy the source modules contained in the delivered NAT826.S001 data set into your Natural source library.
2. Copy the load modules contained in the delivered NAT826.L004 data set into your Natural load library.
3. Apply the Zaps contained in the NAT826.S002 data set. The #README file also contained in the source module provides further instructions.

New Compiler Option for Update of DB2 Primary Keys

With Natural for DB2 Version 8.4.1, the new DB2PKYU compiler option can be used to specify whether DB2 primary keys updated in a Natural DML UPDATE statement are placed into the resulting DB2 positioned UPDATE statement.

The DB2PKYU option can be set with the CMP0 profile parameter and the COMPOPT system command.

For more information, see DB2PKYU in COMPOPT in the *System Commands* documentation.

MERGE for Source Tables

With Natural for DB2 Version 8.4.1, the MERGE statement provides the option to merge an SQL source table into an SQL target table.

In addition, MERGE supports DELETE operations of target rows and SIGNAL operations on error conditions specified as MERGE actions.

For more information, see *MERGE under Natural for DB2 Version 8.4* in the *Database Management System Interfaces* documentation.

New Scalar Functions

Natural for DB2 Version 8.4.1 now also supports the following scalar functions:

- HASH functions (CRC32, MD5, SHA1 and SHA256),
- GENERATE_UNIQUE_BINARY,
- VARCHAR9 and
- VARCHAR_BIT_FORMAT.

See also *scalar-function* in the section *Using Natural Statements and System Variables under Natural for DB2 Version 8.4* in the *Database Management System Interfaces* documentation.

New Aggregate Functions

Natural for DB2 Version 8.4.1 now also supports the following aggregate functions:

- MEDIAN and
- PERCENTILE_CONT, PERCENTILE_DISC.

See also *column-function* in the section *Using Natural Statements and System Variables under Natural for DB2 Version 8.4* in the *Database Management System Interfaces* documentation.

Row Count for Result Limit in SELECT and DELETE

With Natural for DB2 Version 8.4.1, the FETCH FIRST clauses of the SELECT and DELETE statements provide the option to specify a numeric variable that limits the number of rows returned in a table.

In addition, the OFFSET clause of the SELECT statement can be used to specify the number of rows to be omitted before the next FETCH cycle.

See also *SELECT under Natural for DB2 Version 8.4* and *Searched DELETE under Natural for DB2 Version 8.4* in the *Database Management System Interfaces* documentation.

Natural for DB2 Version 8.3.3

Natural for DB2 Version 8.3.3 is available from Natural Version 8.2.6 onwards.

Natural for DB2 Version 8.3.3 provides maintenance updates and program fixes.

Natural Optimizer Compiler Version 8.3.4

Natural Optimizer Compiler Version 8.3.4 is available from Natural Version 8.2.6 onwards.

This section describes the new features of Natural Optimizer Compiler Version 8.3.4 including the features already introduced in Natural Optimizer Compiler Version 8.3.3. (available from Natural Version 8.2.6 onwards).

- [Support for BS2000/OSD](#)
- [Support for IBM Architecture Level 11](#)
- [Enhanced Arithmetic Operations for IBM Architecture Levels 10 and 11](#)

Support for BS2000/OSD

Natural Optimizer Compiler Version 8.3. is available on BS2000/OSD since Natural Optimizer Compiler Version 8.3.3.

For the changes in installation, see *Installing the Natural Optimizer Compiler Version 8.3.4 on BS2000/OSD* in the *Installation* documentation.

Support for IBM Architecture Level 11

Architecture levels are used to employ new instructions available with IBM hardware facilities in order to enhance the performance of generated code (see the related literature from IBM).

The `ARCH` option of Natural Optimizer Compiler Version 8.3. supports IBM Architecture Level 11 on z/OS and z/VSE platforms since Natural Optimizer Compiler Version 8.3.3.

When using Architecture Level 11, you can improve the performance of specific Natural statements with arithmetic variable operations.

For the requirements and restrictions that apply, see *Support for Architecture Level 11* in the section *ARCH Option in Natural Optimizer Compiler Version 8.3 - Documentation Updates (Natural Optimizer Compiler documentation)*.

Enhanced Arithmetic Operations for IBM Architecture Levels 10 and 11

With Natural Optimizer Compiler Version 8.3.4, the use of IBM Architecture Levels 10 and 11 benefits from an improved set of arithmetic operations calculated with decimal floating point (DFP) instructions which now also covers the following operations for packed numeric (format P) and numeric unpacked (format N) fields:

- DIVIDE operations such as `COMPUTE #P3 := 7 / 3,`
- Rounding operations such as `COMPUTE ROUNDED #P3 := 1.3 + 1.4.`

Natural Web I/O Interface Server Version 8.3.3

Natural Web I/O Interface Server Version 8.3.3 is available from Natural for Mainframes Version 8.2.6 onwards.

Natural Web I/O Interface Server Version 8.3.3 provides maintenance updates and program fixes.