# Natural 4.2 – Installation & Administration

**Hans-Georg Saftig**
**Release & Delivery Mainframe**

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- Natural System Files
- Natural Nucleus
- Natural Profile Parameters
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# Natural 4.2.2 Package

- Natural
  - NAT 4.2.2 (Natural for Mainframes)
- Natural Security
  - NSC 4.2.2 (Security for Mainframes)
  - NSF 4.2.2 (SAF Security)
- TP Monitor Interfaces
  - NCF 4.2.2 (Com-plete/SMARTS)
  - NCI 4.2.2 (CICS)
  - NII 4.2.2 (IMS/TM)
  - NTI 4.2.2 (TSO)
  - NRT 4.2.2 (TIAM)
  - NUT 4.2.2 (openUTM)

# Natural 4.2.2 Package

- Database Management System Interfaces

| | | |
|---|---|---|
| NDB | 4.2.2 | (DB2) |
| NDL | 4.2.2 | (DL/I) |
| NSQ | 4.2.2 | (SQL/DS) |
| NVS | 4.2.2 | (VSAM) |

- Miscellaneous Products

| | | |
|---|---|---|
| NAF | 4.2.2 | (Natural Advanced Facilties) |
| NOC | 4.2.2 | (Natural Optimizer Compiler) |
| NTC | 4.2.2 | (Natural Connection) |
| NDV | 2.2.2 | (Natural Development Server) |
| NWO | 1.1.1 | (Natural Web I/O Interface Server) |
| ISP | 2.6.2 | (Natural ISPF) |
| RNM | 4.2.2 | (Review Natural Monitor) |
| NSN | 3.5.2 | (Super Natural) |

# Discontinued Functionality

- Applications Cataloged with Natural Version 2.2
    - All applications cataloged with Natural Version 2.2 have to be recataloged before execution with Natural Version 4.2.
- Utilities SYSTRANS and NATUNLD/NATLOAD
    - The utilities SYSTRANS and NATUNLD/NATLOAD are available with Natural Version 4.2 for compatibility purposes only.
      The utilities will be discontinued with the next version following Natural Version 4.2.

natural

# System Files
# Nucleus
# Profile Parameters

# Natural System Files

- **FNAT**
  - Natural 4.2 can be installed on an existing 4.1 FNAT system file.
  - This eliminates the necessity of having to re-install all Natural related subproducts.
  - However, only defined product combinations for Natural 4.2 are allowed. For example, when upgrading a secured Natural Version 4.1 FNAT system file to Version 4.2, Natural Security Version 4.2 must be installed as well.
  - Before you load the NAT422.INPL file it is necessary to INPL the dataset NAT422.LDEL. This dataset contains instructions to delete NAT41 objects.
  - If Natural Security is installed on your FNAT file then the dataset NSC422.LDEL must be INPLed additionally.
  - This is also necessary for the product NDB and RNM.

# Natural System Files

- **FSEC**
  - An existing FSEC system file created with Natural Security Version 2.2, 2.3, 3.1 or 4.1 may be used with Natural Security Version 4.2 without migration. However, any changes to the FSEC system file should only be performed using Natural Security Version 4.2.

# Natural System Files

- **FUSER**
  - The FUSER file can be shared by Natural Versions 4.1 and 4.2.
    - Natural 4.1 must be upgraded to Version 4.1.4 Service Pack 3.
    - This Service Pack contains all the necessary Version 4.1 based solutions for Natural Version 4.2.
      - Natural Version 4.2 features (such as Unicode format and X-arrays) cannot be processed by the Natural Version 4.1 editors and utilities. These features need to be properly rejected or ignored by Natural Version 4.1 editors and utilities.
      - In addition, the increased number of header records for Natural source objects has required adaptations of Natural Version 4.1 utilities.
  - It is possible to store Natural PROFILEs in the FUSER instead of the FNAT system file.

## Natural Nucleus

- New Modules

| | |
|---|---|
| NATICU<br>NATICUCV<br>NATICUXL | International Components for Unicode |
| NATCPTAB | Code Page Character Translation Tables |
| NATSCTU | Scanner Character Table for Unicode |
| NATXML | Support of REQUEST DOCUMENT and PARSE statement |
| NATWEB | Natural Terminal Driver for Web I/O |
| NATRPC62 | Replacement of NATRPC or NTRPC61 |

- Deleted Modules

| | |
|---|---|
| NATGWSTG | Integrated in module Natural |
| NATSWPMG | Integrated in module Natural |

# Natural Profile Parameters

- New
  - Code Page Support
    - CP, CPCVERR, CPPRINT, CPOBJIN, CPSYNIN, SRETAIN
  - Unicode Support
    - CFICU
  - Support of REQUEST DOCUMENT and PARSE Statement
    - XML
  - Miscellaneous

| | |
|---|---|
| SLOCK | Source Locking |
| DBGERR | Automatic Start of Debugger at Runtime Error |
| THSEP | Dynamic Thousands Separator |
| THSEPCH | Thousands Separator Character |

- Enhanced/Changed
  - CMPO, ETIO, OPRB, PRINT, RPC, SORT

# Unicode and Code Page Support

# Unicode and Code Page Support
# The Natural Nucleus

- International Components for Unicode
  - **NATICU**
    - Reduced set of code pages and locale IDs for English, German, French and Spanish language areas.
    - Size:  ca. 4.5 MB
  - **NATICUCV**
    - Same as NATICU but without collation services.
    - Size:  ca. 3 MB
  - **NATICUXL**
    - All code pages and locale IDs provided by ICU 3.4.
    - Size: ca. 12 MB
- Code Page Character Translation Tables
  - **NATCPTAB**
- Scanner Character Table for Unicode
  - **NATSCTU**

# Unicode and Code Page Support
# Natural Profile Parameters

| Parameter | Function |
|---|---|
| CFICU | Unicode Support |
| CP | Default Code Page Name |
| CPCVERR | Code Page Conversion Error |
| CPOBJIN | Code Page of Batch Input File |
| CPPRINT | Code Page of Batch Output File |
| CPSYSNIN | Code Page of Batch Input File for Commands |
| SRETAIN | Retain Source Format |

# Unicode and Code Page Support
# Natural Profile Parameters

| Parameter | Sub-parameter | Function |
|---|---|---|
| PRINT | CP | Code Page for Print Output |
| CMPO | CPAGE | Option to activate a conversion routine which translates all alpha strings (from the code page that was active at compilation time into the code page that is active at runtime) when the object is started at runtime. |
| OPRB | ACODE / WCODE | Option to define the user encoding if the used Adabas database is enabled for UES (universal encoding support) |

# Unicode and Code Page Support
# Session Modes

| CFICU | CP | Description |
|---|---|---|
| OFF | OFF | Compatibility mode. |
| ON | OFF | For new applications that are using Unicode but not code page support. |
| OFF | ON | This combination is possible, but CP=ON needs ICU services for conversion. |
| ON | ON | For new applications that are using Unicode as well as code page support. |

# Unicode and Code Page Support
# Parameter CFICU

| Parameter | Description |
|---|---|
| ON | Use Locale Id and ICU‘s collation services |
| OFF | Use ICU‘s simple Unicode compare |
| LOCALE | Locale ID |
| COLLATE | Collation services |
| COLNORM | Normalization check of collation services |
| CNVNORM | Perform Normalization before Conversion |
| CPOPT | Fast code page conversion |
| DATFILE | Additional Data Files |

The Natural profile CFICU corresponds to the NTCFICU macro in the parameter module NATPARM.

# Unicode and Code Page Support
# Subparameter of CFICU

## Locale ID

The Locale ID is used by ICU's Collation Service to consider language and even region-dependent features of collation.

- LOCALE = *lll_RRR*

*lll* is a 2- or 3-byte language code of lower-case characters (ISO639).
*RRR* is a 2- or 3-byte region code of upper-case characters to classify the language (ISO 3166).

| | | |
|---|---|---|
| **Examples:** | ■ LOCALE = en_US | English language (United States) |
| | ■ LOCALE = en_UK | English language (United Kingdom) |
| | ■ LOCALE = de_DE | German language (Germany) |
| | ■ LOCALE = de_AT | German language (Austria) |
| | ■ LOCALE = SV_SE | Scandinavian (Sweden) |

# Unicode and Code Page Support
# Subparameter of CFICU

## COLLATE - Collation Services

Collation is the process of ordering units of textual information (alphabetic sorting). Collation is usually specific to a particular language.

Example:
The character ‘Ä’ is sorted in german locale between ‘A’ and ‘B’, but in swedish locale it is sorted after ‘Z’.

- COLLATE = ON ➔ Use the ICU collation services to compare Unicode strings.
- COLLATE = OFF ➔ Use ICU‘s simple Unicode compare (binary compare).

# Unicode and Code Page Support
# Subparameter of CFICU

## COLNORM - Normalization Check of Collation Services

Normalization is the process of removing alternate representations of equivalent sequences from textual data, to convert the data into a form that can be binary-compared for equivalence.

- COLNORM = ON → Check for un-normilized text.
- COLNORM = OFF → Disable check for un-normalized text.

This parameter is honored only if COLLATE = ON is set.

# Unicode and Code Page Support
# Subparameter of CFICU

## CNVNORM - Perform Normalization before Conversion

- CNVNORM = OFF ➔ Do not perform normalization before conversion.
- CNVNORM = ON ➔ Perform normalization before conversion.

**Example:**

```
MOVE UH'00610308' TO #A1(A1)  (a + ¨)
MOVE UH'00E4'     TO #A2(A1)  (ä)
DISPLAY #A1 #A2
```

**CFICU=(CNVNORM=OFF)** ➔

```
#A1  #A2
---  ---
a    ä
```

**CFICU=(CNVNORM=ON)** ➔

```
#A1  #A2
---  ---
ä    ä
```

# Unicode and Code Page Support
# Subparameter of CFICU

## CPOPT - Fast Code Page Conversion

By default, a conversion from alpha to Unicode and vice versa is performed by calling ICU functions. Certain code pages are mapping characters to Unicode with 1:1 relationship. In this case, the conversion performance can be increased by using translation tables rather than ICU functions.
The following code pages are supported by the delivered NATCPTAB:
IBM01140, IBM01141, IBM01145, IBM01146, IBM01147, ASCII

- CPOPT=ON → Use translation tables instead of functions.
- CPOPT=OFF → Use ICU functions.

# Unicode and Code Page Support
# Subparameter of CFICU

## DATFILE - Additional Data Files

Optional data file name. It must be loadable by using RCA technique. The data file contains the converter mapping tables, collation rules, break iterator rules and other locale data. The ICU development kit provides tools to build data files that comply with particular requirements. Refer to the chapter Data Management of the ICU User Guide for more information.

- DATFILE = *name* → The specified data files are used.
- DATFILE = OFF → Removes any data files definded.
- DATFILE = *none* → No additional data files are defined.

# Unicode and Code Page Support
## Code Page Definitions

All code pages to be used during a Natural session must be predefined in the Natural Configuration Module NATCONFG.

Each code page is defined by macro **NTCPAGE**.

| Parameter | Function |
|---|---|
| IANA | The standard name of the code page. |
| CCSID | Coded Character Set Identification (IBM).<br>A numeric value with up to 5 digits, e.g. 1141 (German EBCDIC code page). |
| CCSN | Coded Character Set Name (BS2000/OSD).<br>An alphanumeric string of up to 8 characters, e.g. EDF041 (latin code page for Western Europe). |
| ALIAS | Alias code page name. |
| PHC | Place holder character. |

# Unicode and Code Page Support
# NATCPTAB

## NATCPTAB – Code Page Character Translation Tables.

```
NATCPTAB NAMINIT ,,'CODE PAGE CHARACTER TRANSLATION TABLES',BB=NO
************************************************************************
**       AUTOMATIC GENERATED BY NATICU.
**       GENERATION DATE   WED NOV 09 10:41:18 2005
**       ICU VERSION       3.2
**       UNICODE STANDARD  4.0.1
************************************************************************
         NTCPCNV FROM=IBM01140,TO=IBM01141
         DC    X'000102030405060708090A0B0C0D0E0F'   000-015  00-0F
         DC    X'101112131415161718191A1B1C1D1E1F'   016-031  10-1F
         DC    X'202122232425262728292A2B2C2D2E2F'   032-047  20-2F
         DC    X'303132333435363738393A3B3C3D3E3F'   048-063  30-3F
         DC    X'404142C0444546474849B04B4C4D4EBB'   064-079  40-4F
         DC    X'505152535455565758A14F5B5C5D5EBA'   080-095  50-5F
         DC    X'6061624A646566676869CC6B6C6D6E6F'   096-111  60-6F
         DC    X'707172737475767778797A7BB57D7E7F'   112-127  70-7F
         DC    X'808182838485868788898A8B8C8D8E8F'   128-143  80-8F
         ...
```

# Unicode and Code Page Support

## NATSCTU – Scanner Character Table for Unicode

Required scanner table for Unicode characters. It maps the properties of Unicode characters of Unicode version 4.0.1 to be used by the Natural nucleus. This table must never be changed.

```
NATSCTU  NAMINIT ,,'SCANNER CHARACTER TABLE FOR UNICODE',BB=NO
***********************************************************************
**       AUTOMATIC GENERATED BY NATICU.
**       GENERATION DATE   MON SEP 19 15:56:16 2005
**       ICU VERSION       3.2
**       UNICODE STANDARD  4.0.1
***********************************************************************
CMSCTU   DC     65536X'00'
* SPACE
         NTSCTU 0020,ALFANUM
* EXCLAMATION MARK
         NTSCTU 0021,SPECIAL
* QUOTATION MARK
         NTSCTU 0022,SPECIAL ...
```

# SYSCP Utility - Code Page Administration

- Code Page Maintenance of Sources
  - List code page information of sources
  - Check conversion of unassigned sources
  - Assign code page information to sources
  - Check conversion of assigned sources
  - Convert to different code page
- All Code Pages
  - N - Show all names of code page (IANA, CCSID and alias names).
  - C - Show code points of code page.
  - T - Test conversion from code page to Unicode and vice versa.
- Unicode Properties
  - Shows the Unicode properties of an entered character of the current code page or of an entered Unicode code point.

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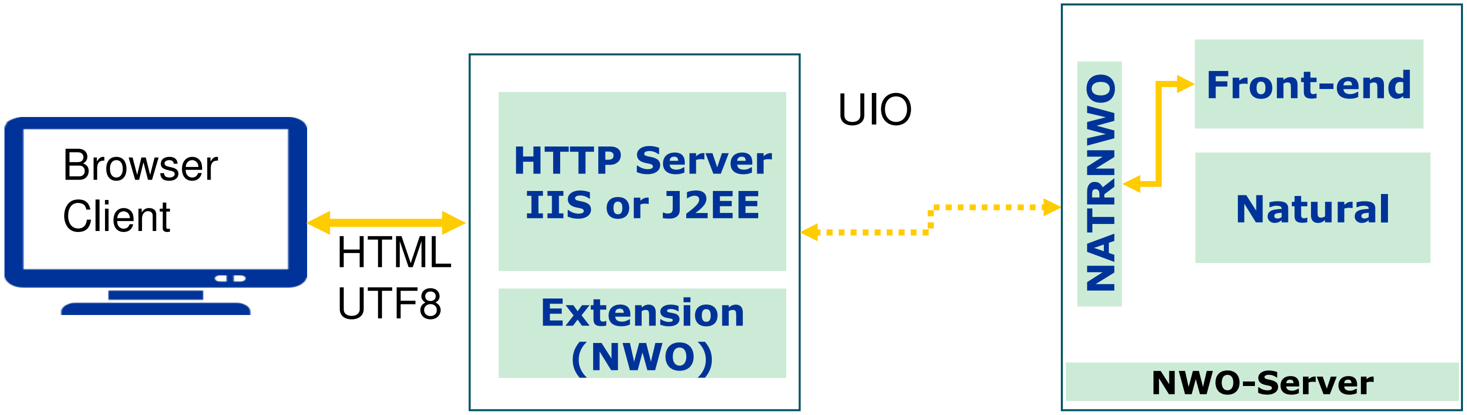
# Web I/O Interface Server (NWO)

# Natural Web I/O Interface Server Concept



- Browser client connects to the http server
- Session will be started after authorization
- Browser displays Unicode output

# Natural Web I/O Interface Server
# Concept

The Natural Web I/O Interface server architecture basically consists of:

- **Front-end stub NATRNWO**

  The stub NATRNWO is launched to initialize a Natural Web I/O Interface server. It listens for incoming connection requests and launches a Natural session for executing the application.

- **Front-end**

  The front-end is called (together with the Natural runtime system) by the front-end stub for session initialization/termination, application execution and session roll-in/roll-out.

- **Server monitor**

  A monitor task allows the administrator to control the server activities, to cancel particular user sessions or to terminate the entire server, etc.

This architecture is similar to the architecture of the NDV server on mainframe.
The NWO servers for z/VSE, z/VM and BS2000/OSD are implemented using SMARTS.

# Natural Web I/O Interface Server under z/OS Installation

- Create a Web I/O Interface server configuration file (NWOCONFG).

Example:

```
SESSION_PARAMETER = ‘NUCNAME=NAT422RE’
THREAD_NUMBER = 8
THREAD_SIZE = 1200
FRONTEND_NAME = NWOSRV1
PORT_NUMBER = 4811
```

- Assemble NATOS with LE370=YES.
- Create NATPARM.
- Link the NWO server front-end module.
- Create server startup JCL.
- Link the module NATWEB to the Natural nucleus.

# Natural Web I/O Interface Server under z/OS
# Data Sets

- STGCONFG Configuration parameters
- STGSTDO Standard output, e.g. the configuration parameters are written to this data set during initialization
- STGSTDE Error output
- STGTRACE Trace output
- SYSOUT Default output dataset for LE370 runtime messages

Example:

```
//          PROC
//NWOSRV1   EXEC PGM=NATRNWO,...
//STEPLIB   DD DISP=SHR,DSN=NWOvrs.LOAD
//...
//STGCONFG DD   DISP=SHR,NWOvrs.JOBS(NWOCONFG)
//STGSTDO   DD   SYSOUT=X
//STGSTDE   DD   SYSOUT=X
//STGTRACE DD   SYSOUT=X
//...
```

# REQUEST DOCUMENT and PARSE Statement Support

# REQUEST DOCUMENT and PARSE Statement Support

The following platforms are supported:

- z/OS
  - Batch, TSO, Com-plete, CICS and IMS/TM (*)
- z/VSE or VSE/ESA
  - Batch, Com-plete, CICS
- BS2000/OSD
  - Batch and TIAM
- VM/CMS

(*) The PARSE statement is not supported on IMS/TM.

# REQUEST DOCUMENT and PARSE Statement Support

- Prerequisites
  - A TCP/IP stack and DNS services must be available.
  - Natural Unicode support must be installed.
- Components
  - Module NATXML
  - Modules NAT2TCP and NAT2LE
  - Parameter XML (macro NTXML)

# REQUEST DOCUMENT and PARSE Statement Support

- **NATXML**
  - NATXML is the runtime module which execute these statements.
  - It has to be linked to the Natural Nucleus.
- **NAT2TCP**
  - NAT2TCP is the TCP/IP protocol handler.
  - It requires a IBM Language Environment (LE) or CRTE for BS2000.
  - It has to be linked to the Natural front-end module.
  - Under CICS for z/OS the name of the module is **NCI2TCP.**
  - Under Com-plete the name of this module is **NCFTCP42** and it is loaded dynamically (DLL).
- **NAT2LE**
  - NAT2LE is the gateway module for LE and has to be linked to the Natural front-end module.

# REQUEST DOCUMENT and PARSE Statement Support

The macro **NTXML** is used to configure the support of the PARSE and REQUEST DOCUMENT statement. It corresponds to the parameter **XML**.

| Parameter | Function |
|---|---|
| ON | Activate the XML Interface |
| OFF | Deactivate the XML Interface |
| RDOC | Support of REQUEST DOCUMENT Statement |
| PARSE | Support of PARSE Statement |
| RDCP | Name of the Default HTML/XML Code Page |
| RDP | URL of Proxy Server |
| RDPPORT | Proxy Port Number |
| RDNOP | Name of Local Domain |

# REQUEST DOCUMENT and PARSE Statement Support

## Example of NTXML Macro

```
*       +---------------------------------------------------+
*       I Example of NTXML                                  I
*       +---------------------------------------------------+
        NTXML  ON,                                           -
              RDOC=ON,                                       -
              PARSE=ON,                                      -
              RDP='HTTPPROXY.MYCOMPANY.COM',                 -
              RDPPORT=80,                                    -
              RDPNOP='*. MYCOMPANY.COM'
```

# REQUEST DOCUMENT and PARSE Statement Support

## IBM Language Environment (LE) under CICS

- **CICS/TS Version 3.1 or above (for z/OS)**
  - The Natural CICS interface can be made LE compliant by setting the CICS translator option **LEASM** for the Natural CICS interface starter module **NCISTART**.
- **Versions prior to CICS/TS 3.1**
  - The Natural CICS interface is not LE compliant, however, it provides the same LE functionality when it is invoked by a LE compliant 3GL front-end program.
  - Sample front-end programs are provided in library NCI422.SRCE for COBOL, C and PL/I.
  - Alternatively, LE compliance can be achieved by linking a delivered LE compliant front-end stub to the Natural CICS interface.
    These stubs are delivered in library NCI422.OBJS.

# REQUEST DOCUMENT and PARSE Statement Support

## Example: Natural under CICS Versions prior to CICS/TS 3.1

- The CICS-supplied EXEC interface stub DFHELII has to be used, rather than the DFHEAI stub module.
- The module EZACIC17 has to be included.
- Following additional SYSLIB definitions are necessary:
  - CEE.SCEELKED
  - TCPIP.SEZATCP
  - TCPIP.SEZACMTX
- The Natural CICS interface has to be linked with AUTOLINK function, this is do not specify the NCAL option.

### Natural CICS Interface

```
DFHELII
NCILEFC
NCILESTB
NCISTART
NCIROOT
DFHEAI0
NCIPARM
NCINUC
NCI2TCP
EZACIC17
NAT2LE
NATPARM
```

### Natural Nucleus

```
NATSTUB
NATURAL
NATCONFG
. . .
NATXML
NATICU
NATCPTAB
NATSCTU
. . .


NATLAST
```

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# Memory Considerations

# Memory Considerations

- The use of several new features requires additional working storage. In order to use these features, it might be necessary to increase the size the threads.

| | |
|---|---|
| NATICU | ca. 205 KB |
| NATXML | ca. 75 KB minimum |

- The size of the modules

| | |
|---|---|
| NATICU | ca. 5 MB |
| NATICUCV | ca. 3 MB |
| NATICUXL | ca. 12 MB |
| NATXML | ca.  1 MB |

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# License Key

# Why does Software AG introduce a license check for Natural on the Mainframe?

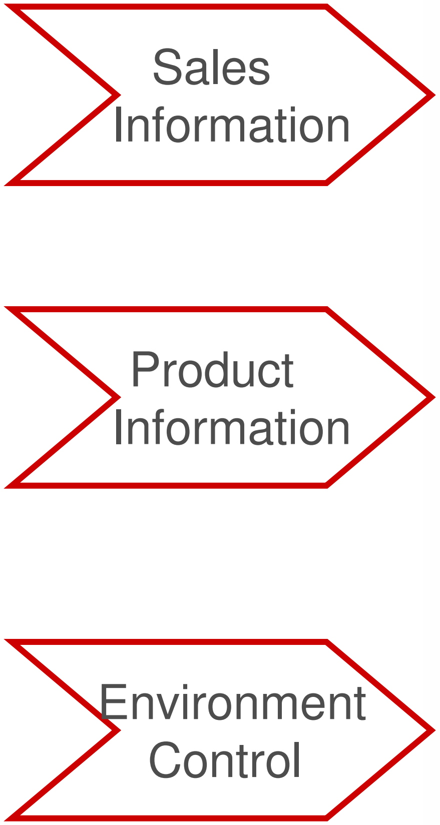
- Software AG's goal is to support simple, straight-forward licensing models
- Enables flexibility for future licensing models
  - Capacity on demand
  - Sub-capacity
- Flexibility requires monitoring mechanisms

***License Keys are an Industry Best Practice***

Software AG currently provides license keys for:

- All Open Systems products
- EntireX on the Mainframe

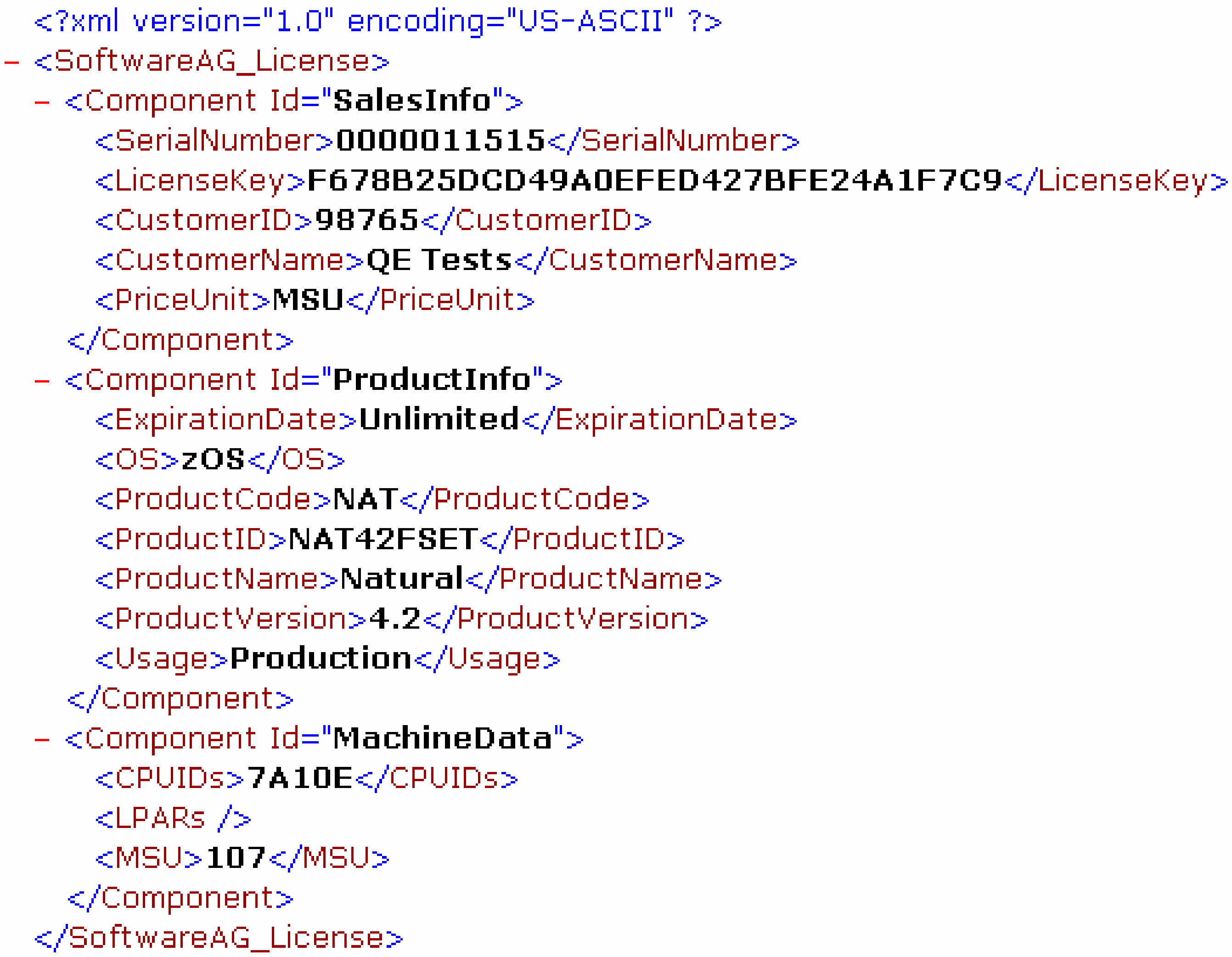
# Which information is contained in a product license?



Sales Information

Product Information

Environment Control



```
  <?xml version="1.0" encoding="US-ASCII" ?>
- <SoftwareAG_License>
  - <Component Id="SalesInfo">
      <SerialNumber>0000011515</SerialNumber>
      <LicenseKey>F678B25DCD49A0EFED427BFE24A1F7C9</LicenseKey>
      <CustomerID>98765</CustomerID>
      <CustomerName>QE Tests</CustomerName>
      <PriceUnit>MSU</PriceUnit>
    </Component>
  - <Component Id="ProductInfo">
      <ExpirationDate>Unlimited</ExpirationDate>
      <OS>zOS</OS>
      <ProductCode>NAT</ProductCode>
      <ProductID>NAT42FSET</ProductID>
      <ProductName>Natural</ProductName>
      <ProductVersion>4.2</ProductVersion>
      <Usage>Production</Usage>
    </Component>
  - <Component Id="MachineData">
      <CPUIDs>7A10E</CPUIDs>
      <LPARs />
      <MSU>107</MSU>
    </Component>
  </SoftwareAG_License>
```

# What happens if the product license is incorrect, insufficient or not installed?

- **The session terminates currently in no case**!
- **The session starts but a warning message is issued** on the system console in one of the following cases:
  - The product license is missing or it has been modified.
  - The machine CPU ID is not defined in the license or the machine capacity is higher than the value specified in the product license,
  - Incorrect operating system, product code, product version.
  - The license expiration date has been reached.

  The warning message is not repeated on the system console for every Natural session. It is issued only once per Natural buffer pool per day.

# How is the Product License File Installed?

- The product license file NATvrs.LICS is supplied on the individual customer installation tape. (It can also be shipped by email, if desired.)
- Step 1: Convert the license file into a assembler source using the conversing program NATLICAM.
- Step 2: Assemble the source to get the object module SAGLIKEY.
- Step 3: Link the module SAGLIKEY to the Natural nucleus.

  Alternatively it is possible to link the license module as a separate load module and load it dynamically during Natural session start by means of the RCA and RCALIAS profile parameters.

# License Key Questions

- **Are there product licenses for Natural add-on products, e.g. for Natural for DB2?**
  No. The license file is for the base Natural product only.
- **How can I read the product license file?**
  - The product license file can be read on a PC (file type .xml)
  - The conversion program prints the license file.
  - Natural utility SYSTP (function „L“)
- **When is the product license checked?**
  The product license is checked during every Natural session initialization.
- **How can I get a new product license file if the delivered license file is insufficient for my environment?**
  Contact your Software AG sales representative.
- **How can I get the required machine data?**
  Use Natural program NATQVS (will be available with the next service packs for NAT 4.2.1 and NAT 4.1.4).

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