SPC203

Integration Between Heterogeneous SAP Unicode and Third Party Systems
Contributing Speakers

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Globalization Services, SAP AG
Learning Objectives

As a result of this workshop, you will be able to:

- Understand the challenge of communication between SAP Unicode and external third party systems
- Understand the architecture of Unicode and non-Unicode in SAP systems
- Get the basics of communication between SAP and external Unicode and non-Unicode systems
- Get a methodology for interface solutions
- See some integration examples
Introduction and Challenge

Basics of Communication

SAP Connectors and Unicode

Communication Examples
Who Needs Unicode?

Acting in global business requires support of a Global Character Set!

- Companies running global business processes like Global HR Systems or Global Master Data Management
- Companies offering Web Services to their customers: Global Master Data containing multiple local language characters!
- Companies using Open Standards: J2EE and .NET integration (JAVA speaks Unicode only!)
- Collaborative Business: Integration of Third Party Products that run on different code pages
Solution: Unicode, One Code Page For All Scripts

And more languages can be supported easily without the need for new code pages or other new methods.
Solution: Unicode Characters

ASCII
General Scripts
Symbols

CJK Ideographs
65,000 characters

Hangul

Compatibility

Surrogate Area
Additional 1,000,000 characters
SAP NetWeaver™ The Integration Platform?

Evolution of mySAP Technology

Unifies and aligns people, information and business processes

- Integrates across technologies and organizational boundaries
- A safe choice with full .NET and J2EE interoperability

The business foundation for SAP and partners

- Powers business-ready solutions that reduce custom integration
- Its Enterprise Services Architecture increases business process flexibility

<table>
<thead>
<tr>
<th>Composite Application Framework</th>
<th>SAP NetWeaver™</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PEOPLE INTEGRATION</strong></td>
<td></td>
</tr>
<tr>
<td>Multi channel access</td>
<td></td>
</tr>
<tr>
<td>Portal</td>
<td>Collaboration</td>
</tr>
<tr>
<td><strong>INFORMATION INTEGRATION</strong></td>
<td></td>
</tr>
<tr>
<td>Bus. Intelligence</td>
<td>Knowledge Mgmt</td>
</tr>
<tr>
<td>Master Data Mgmt</td>
<td></td>
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<tr>
<td><strong>PROCESS INTEGRATION</strong></td>
<td></td>
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<tr>
<td>Integration Broker</td>
<td>Business Process Mgmt</td>
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<tr>
<td><strong>APPLICATION PLATFORM</strong></td>
<td></td>
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<td>J2EE</td>
<td>ABAP</td>
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<tr>
<td>DB and OS Abstraction</td>
<td></td>
</tr>
<tr>
<td>Life-Cycle Mgmt</td>
<td></td>
</tr>
</tbody>
</table>
SAP NetWeaver™ With Non-Unicode ABAP Stack Limited

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SAP NetWeaver™

- People Integration
  - Multi-Channel Access
  - Portal
  - Collaboration
- Information Integration
  - Business Intelligence
  - Knowledge Management
  - Master Data Management
- Process Integration
  - Integration Broker
  - Business Process Management
- Application Platform
  - J2EE
  - non-Unicode ABAP
  - DB and OS Abstraction

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Only Solution For Full Integration With Unicode

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Impact of Combined ABAP and JAVA Stack instance on language architecture:

- ABAP and JAVA stack running on one instance
- Common Database, different ABAP and J2EE table schema
- Communication between ABAP and JAVA through fast JAVA connector (JCo)
- JAVA runs on Unicode only
- If ABAP stack runs in non-Unicode conversion from/to Unicode and non-Unicode required! Can lead to data loss!
- Full language data consistency only with both ABAP and JAVA stack in Unicode
Open Integration And Connection SAP/non-SAP Everywhere
The ideal Picture: only Unicode components

- Ideal: Large IT system landscape with Unicode systems only
- Conversions are done algorithmically (1:1 relation)
- No data misinterpretation
- No data loss
- All business relevant characters available at the same time
- ...

...
The reality: Unicode and non-Unicode components

- Large IT landscape with mixed SAP and non-SAP systems
- Typical Unicode and non-Unicode systems
- Systems with old releases
- Conversions between incompatible code pages everywhere
- Only common subset exchangeable
- Special rules have to be obeyed to make communication possible
- ...

...charset=iso-8859-1” > ...
...charset=windows-1257” > ...
...charset=Shift_JIS” > ...
...charset=utf-8” > ...

External RFC Client (char)
SAP_CODEPAGE = 1100

3rd Party EBCDIC

mySAP BW ISO8859-1

mySAP ERP

JAVA Application (Portal)

R/3 46C MDMP ISO8859-1 SJIS

Internet

Files
Communication Challenges in Large System Landscapes

The main interface challenges

- Many SAP systems in Unicode and non-Unicode Single Codepage and MDMP exist
- Many interfaces to non-SAP systems exist
- No or incomplete list of all main interfaces is available, no or incomplete information which interfaces exchange business text data in which languages
- Even if it is planned to convert all SAP systems to Unicode, it is mostly only possible to convert one SAP system only at one time
- During an Unicode conversion the effort for interface testing and adjustment is often underestimated
- Partner systems or their interfaces to SAP are often old, sometimes even no more supported. When re-connecting such an interface to an Unicode converted SAP system, often even technical connections are no more possible
- If add-on software or non-SAP interface is not Unicode enabled an early discussion with and solution from vendor is required
Complete lists of all interfaces required for efficient work

- **Interface list for SAP – SAP system connections**
  - SAP Component / Release / Support Package
  - Additional installed software, add-ons, IS-solutions, etc. and information if Unicode enabled
  - Codepage and language configuration
  - Interface language critical yes/no – which languages exchanged

- **Interface list for critical non-SAP system connections**
  - Name and vendor of interface
  - Technical information about interface
  - Codepage and Unicode information
  - Interface language critical yes/no
## Example List of SAP – SAP Interfaces at a Customer

<table>
<thead>
<tr>
<th>SAP Component</th>
<th>Release</th>
<th>SP Level</th>
<th>Code Page</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>R/3</td>
<td>4.7x110</td>
<td>39 / 20 / 28</td>
<td>Unicode</td>
<td></td>
</tr>
<tr>
<td>SAPGUI</td>
<td>6.20 / 6.40</td>
<td>&gt; 40 / ...</td>
<td>All</td>
<td>6.40 for Asia required</td>
</tr>
<tr>
<td>SRM</td>
<td>3.0</td>
<td>40 / 5</td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td>R/3</td>
<td>4.7 x 110</td>
<td>28 / 14 / 17</td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td>BW</td>
<td>3.1</td>
<td>(missing)</td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td>SEM</td>
<td>3.5</td>
<td>(missing)</td>
<td>1100</td>
<td>With BW</td>
</tr>
<tr>
<td>APO</td>
<td>3.0</td>
<td></td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td>CRM</td>
<td>4.0</td>
<td></td>
<td>Unicode</td>
<td>Unicode since 10/03</td>
</tr>
<tr>
<td>EP</td>
<td>6.0</td>
<td>SP2</td>
<td>Unicode</td>
<td></td>
</tr>
</tbody>
</table>

**Issue: SAP Unicode – Unicode and Unicode – Single Codepage Communication**
### Example List of SAP – non-SAP Interfaces at a Customer

<table>
<thead>
<tr>
<th>Adapter / Product/ Component</th>
<th>Version</th>
<th>Language critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEBMETHODS / SAP JCo</td>
<td>6.1 / 2.1.3</td>
<td>X</td>
</tr>
<tr>
<td>Websphere Application Server</td>
<td>5.0.2</td>
<td>X</td>
</tr>
<tr>
<td>MS Active Directory Server</td>
<td>AD2003</td>
<td>-</td>
</tr>
<tr>
<td>Vignette (Portal)</td>
<td>7.3</td>
<td>X</td>
</tr>
<tr>
<td>IBM WEB Server</td>
<td>1.3.29</td>
<td>X</td>
</tr>
<tr>
<td>Lotus QuickPlace</td>
<td>...</td>
<td>?</td>
</tr>
<tr>
<td>Global Passport (GP)</td>
<td>...</td>
<td>Supports LATIN-1 only Language Requirements unclear</td>
</tr>
</tbody>
</table>

**Critical Interfaces, since not Unicode compliant:**

<table>
<thead>
<tr>
<th>Adapter / Product/ Component</th>
<th>Version</th>
<th>Action Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readsoft Datamail Scanner</td>
<td>...</td>
<td>Not UC compliant, check with (vendor)</td>
</tr>
<tr>
<td>BMC</td>
<td>...</td>
<td>Not UC compliant check/discuss with (vendor)</td>
</tr>
</tbody>
</table>

**Issue:**
- Most interfaces language critical
- Issue: 2 interfaces not Unicode compliant, action needed
Introduction and Challenge

Basics of Communication

SAP Connectors and Unicode

Communication Examples
RFC is the most used technology for the connection with SAP systems.

SAP Unicode – Unicode or SAP non-Unicode – non-Unicode connections are called “homogenous”, mixed connections SAP Unicode – non-Unicode or vice versa are called “inhomogeneous”.

RFC automatically converts between Unicode and non-Unicode, in case of an inhomogeneous connection always on the Unicode system.

For the Unicode – non-Unicode single codepage conversion a communication codepage (connection codepage) is determined during the connection, which is determined according to several rules.

A special RFC function is available between a SAP Unicode – SAP MDMP ABAP based connection only, which, however, requires special interface development in most scenarios. In all other cases one separate connection (“channel”) per codepage between a non-ABAP Unicode and SAP MDMP system is needed.
The communication between SAP and non-SAP systems is often done through special connectors and adapters which have been developed by SAP or partners for the dedicated connection. The connectors are often using the RFC technology with basically the same conversion rules as SAP-SAP in case of an inhomogeneous connection between Unicode and non-Unicode. The connectors usually support Unicode and single codepage partners, however supported versions and newest patch levels are required.

The proper RFC Unicode related settings for a SAP – non-SAP connection (SAP caller, non-SAP caller) are crucial and should be analyzed and checked carefully.

If an external RFC client/server program (e.g. written in C or C++) is used, it should be clarified if it shall support single code page only or Unicode. In case of Unicode support the external C-program must be adjusted for Unicode.
# Representation of Unicode Characters

**UTF-16 – Unicode Transformation Format, 16 bit encoding**
- Fixed length, 1 character = 2 bytes (surrogate pairs = 2 + 2 bytes)
- Platform-dependent byte order (big/little endian)
- 2 byte alignment restriction

**UTF-8 – Unicode Transformation Format, 8 bit encoding**
- Variable length, 1 character = 1...4 bytes
- Platform independent
- no alignment restriction
- 7 bit US ASCII compatible

<table>
<thead>
<tr>
<th>Character</th>
<th>Unicode scalar value</th>
<th>UTF-16 big endian</th>
<th>UTF-16 little endian</th>
<th>UTF-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>U+0061</td>
<td>00 61</td>
<td>61 00</td>
<td>61</td>
</tr>
<tr>
<td>ä</td>
<td>U+00E4</td>
<td>00 E4</td>
<td>E4 00</td>
<td>C3 A4</td>
</tr>
<tr>
<td>α</td>
<td>U+03B1</td>
<td>03 B1</td>
<td>B1 03</td>
<td>CE B1</td>
</tr>
<tr>
<td>會</td>
<td>U+3479</td>
<td>34 79</td>
<td>79 34</td>
<td>E3 91 B9</td>
</tr>
</tbody>
</table>
## Conversion Example: Unicode to/from Single Code Page

<table>
<thead>
<tr>
<th>Language</th>
<th>Word</th>
<th>UTF-16 Big Endian</th>
<th>UTF-8</th>
<th>ISO</th>
<th>Windows</th>
</tr>
</thead>
<tbody>
<tr>
<td>(same word)</td>
<td>2 Byte per Character</td>
<td>1 Byte: asc 2 Byte: nas 3 Byte: as</td>
<td>1 Byte nas 2 Byte: as</td>
<td>1 Byte nas 2 Byte: as</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>Alex</td>
<td>0041 006C 0065 0078</td>
<td>41 6C 65 78</td>
<td>41 6C 65 78</td>
<td>41 6C 65 78</td>
</tr>
<tr>
<td>Russian</td>
<td>Алекс</td>
<td>0410 043B 0435 043A 0441</td>
<td>D090 D0BB D0B5 D0BA D181</td>
<td>B0 DB D5 DA E1</td>
<td>C0 EB E5 EA F1</td>
</tr>
<tr>
<td>Japanese</td>
<td>アレックス</td>
<td>30A2 30EC 30b3 30AF 30B9</td>
<td>E382A2 E383AC E38383 E382AF E382B9</td>
<td>8341 838C 8362 834E 8358</td>
<td>8341 838C 8362 834E 8358</td>
</tr>
<tr>
<td>Thai</td>
<td>อเล็กซ์</td>
<td>0E2D 0E40 0E25 0E01 0E0B</td>
<td>E0B8AD E0B980 E0B8A5 E0B881 E0B88B</td>
<td>CD E0 C5 A1 AB</td>
<td>CD E0 C5 A1 AB</td>
</tr>
</tbody>
</table>

Legend: asc = ASCII, as = Asian, nas = non-Asian

*Conversion between Unicode and non-Unicode in particular difficult for Asian languages*
In case of an Unicode ↔ Unicode combination RFC passes all character data without code page conversion or merely with adaptation of the endianness.

- UTF-16 big endian = SAP code page 4102
- UTF-16 little endian = SAP code page 4103

Information about the destination is maintained in SM59 ➔ special options ➔ character width in target system

- 1 Byte = non-Unicode
- 2 Byte = Unicode
In case of an Unicode ↔ non-Unicode single code page combination
RFC passes all character data with code page conversion between
Unicode and the single code page.

As Unicode is a true superset of any old standard codepage not all
Unicode characters can be transferred to the non-Unicode system.
If the partner is an external single code page system the same conversion
rules between Unicode and single code page apply.

Unicode to Single Codepage only allows valid characters
for target codepage.

Invalid characters in ISO-8859-1 / MS 1252 system
In case of a Unicode ↔ non-Unicode MDMP combination RFC passes all character data with code page conversion between Unicode and the different old code pages if RFC transfer structure contains a language key.

Which of the MDMP code pages is chosen depends on the language:

- Ä ← DE → Ä
- ß ← DE → ß
- あ ← JA → あ
- 東 ← JA → 東
- 한 → #
- 월 → #

Unicast to MDMP only allows valid characters of configured codepages

Mixed codepage payload communication between SAP MDMP and 3rd party system NOT supported!
Codepage Conversion in RFC Communication

Conversion always on Unicode server

4102: Big Endian Unicode
4103: Little Endian Unicode
8000: Japanese SJIS Non-Unicode
The RFC connection to an external (Type T) Unicode system is marked with character width Unicode. The Unicode test can be used to verify.
The registered external program should be Unicode enabled.
SM59: SAP Unicode Calls External Non-Unicode

Conversion code page
SAP Unicode - external non-Unicode derived form logon Language, here EN: Unicode → LATIN-1

external program is non-Unicode
External Program Calls SAP Unicode Via RFC Library

RFC Client/Caller External Program Unicode / non-Unicode

RFC Call to SAP

Conversion required if external caller is single code page, no conversion if Unicode

mySAP ERP Unicode

Many SAP connectors and other certified interfaces use RFC libraries to connect to SAP systems
Determination of RFC Communication Code Page

External Program is Unicode:
- Homogenous communication, no data loss
- Automatic recognition of Big and Little Endian

External Program is non-Unicode (Single Code Page):
RFC determines communication code page and converts between this code page and Unicode

- Default code page
  - Environment parameter SAP_CODEPAGE
    Example in UNIX: `setenv SAP_CODEPAGE 8000`
  - RFC API RfcSetSystemCodepage

- Explicit code page
  - RfcOpenEx at connection time
    Example: `RfcOpenEx (… CODEPAGE=8000 …, …)`
  - RfcSetCodepage at runtime
    Example: `RfcSetCodepage (handle, “8000”);`
Java App e.g. SAP EP or external applications, JAVA always Unicode

Connects the ABAP and JAVA world

Local Code Page

SAP Backend non-Unicode

Dataflow from Java application to SAP backend system
1. Conversion from UTF-16 (JAVA) into local Code Page (CP)
2. Conversion from local CP into one SAP CP, controlled by JCo logon language

Dataflow from SAP backend system to Java application
3. Conversion from one SAP CP into local CP, controlled by Backend logon language
4. Conversion from local CP into UTF-16 (JAVA)

Conversion only correct for one code page per connection!
With Unicode RFC / Unicode wdtU ocx no code page conversion needed
Standard Visual Basic UI controls do not support Unicode, MS Office controls do
Visual Basic .NET uses Unicode
Via .NET Connector communication with Unicode and non-Unicode partners possible
Data transfer is restricted to Windows default code page, to configure in Windows Control Panel → Regional and Language Options.

RFC partner code page must match to Windows default code page (e.g. LATIN-1 : MS 1252 : SAP Codepage 1160)
Integration of External Systems Through SAP XI / PI

SAP XI / PI runs on Unicode only
Huge Number of Adapters For Open Communication ...

The Adapter Engine hosts a set of adapters:

- **SAP Adapters**
  - File / FTP
  - JDBC (Database)
  - JMS (MQSeries, SonicMQ, ...)
  - RFC
  - SOAP
  - Mail
  - Business Connector (B2B protocol)
  - Marketplace Adapter
  - RosettaNet (RNIF 2.0) Adapter
  - CIDX (RNIF 1.1) Adapter

- **3rd Party Adapters**
  - iWay: UCCnet, more to come ... (Peoplesoft-, Siebel-, Oracle, UCCnet-, Transora- and AS2- adapters already certified for SAP XI 3.0) ...
  - Seeburger: numerous EDI adapters: AS2, Generic EDI, OFTP, VAN Access, Payment, several Industry Specific Adapters (incl. mappings)
  - Optional: Adapters developed by partners, certificated by SAP
Permitted values for the file code page are the existing charsets of the Java runtime as e.g. US-ASCII, ISO-8859-1, UTF-8, UTF-16BE, ...

Example: XI File Adapter
## Code Page Information About XI Adapters

### Technical Adapters

<table>
<thead>
<tr>
<th>Message format or transport protocol supported by adapter</th>
<th>Name of adapter</th>
<th>Provided by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database systems</td>
<td>JDBC Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>File systems and FTP servers</td>
<td>File/FTP Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>HTTP protocol</td>
<td>Plain HTTP Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>Messaging systems</td>
<td>JMS (Java Messaging Service) Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>SOAP</td>
<td>SOAP Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>E-mail server</td>
<td>Mail Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>SAP Business Connector</td>
<td>SAP Business Connector Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>mySAP marketplaces</td>
<td>Marketplace Adapter</td>
<td>SAP</td>
</tr>
<tr>
<td>Cross Industry (Payment)</td>
<td>Cross Industry Payment Adapter</td>
<td>SEEBURGER</td>
</tr>
<tr>
<td>VAN</td>
<td>VAN Access Adapter</td>
<td>SEEBURGER</td>
</tr>
</tbody>
</table>

### Supported data transfer languages

(codepages of connected systems, Unicode, etc.)

Text files should be based on codepage UTF-8 in order to be processed by the Integration Engine.

Nevertheless, the file/FTP Adapter can:

- Use any codepage installed in the Java runtime environment (in the case of foreign character sets) to convert the files from any codepage sent by the Integration Server to any codepage.
- Convert files from any codepage to UTF-8 when sending to the Integration Server.

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[http://service.sap.com/xi](http://service.sap.com/xi) --> XI in Detail ➔ Connectivity
Example: Connecting WebMethods to SAP Unicode System

The webMethods for SAP solution extends the benefits of the SAP Netweaver architecture and avoids time-consuming and costly recoding by delivering powerful new functionality, including (see www.webmethods.com for information):

- An out of the box graphic mapping tool
- Strong support for XSLT, FLOW and Java mappings
- Integration to heterogeneous operating environments
- Improved multi-enterprise, multi-application functionality
- Best-of-breed trading partner management
- Automated message delivery and system of record management
- Communication with Unicode Systems

How to configure the SAP Unicode – webMethods connection?
Connecting WebMethods to a SAP Unicode System

STEP1:
- Check and verify that SAP webMethods Adapter supports Unicode.

STEP2:
- Use webMethods latest SAP Adapter to connect to the Unicode SAP System. The newest version of SAP webMethods supports an Unicode SAP System. Use latest Jco archives to connect with the SAP system.

STEP3:
- In SAP System configure RFC Destination with Character Width / Communication Type in Target System as Unicode.

STEP4:
- RFC Listener should be configured with Unicode in webMethods SAP Adapter improved multi-enterprise, multi-application functionality.
Configure RFC Destination with Communication Type Unicode
Configure webMethods SAP RFC Listener with Unicode Option
How to manage in SAP to upload/download Excel files with Turkish texts (LATIN-5 character set?)

1614: Windows CP Turkish (LATIN-5)
4102: Unicode UTF-16 BE

Abbreviations:
CP: Code Page
TR: Turkish
UC: Unicode

Example: Excel – Upload / Download of Turkish (TR) Files
SAPLogon Settings per system entry
(Upload/Download Encoding)

■ Can be changed by users and per SAPLogon entry
■ Independent of the Windows System Code Page
■ Windows System Code Page („Language for Non-Unicode Programs“)

Excel Code Page Handling

– Creation of new Excel sheets
  - Excel allows to use Unicode and Non-Unicode via “Font Switching” only (change
    font to e.g. Arial Unicode MS). This is done automatically if you insert special
    characters from different former code pages.
– XLS → CSV conversion
  - The “SAVE AS .CSV” function supports only the creation of Non-Unicode files. The
    code page of the CSV file is determined by the Windows System Code Page
    described above
– XLS → TXT
  - The SAVE AS function allows the creation of Unicode files. The encoding format is
    UTF-16 Little Endian.
SAPLogon 6.40 Settings

Encoding set used for Client - Backend Communication (e.g. Excel upload)
Windows XP System Code Page

- Start ➔ Control Panel ➔ Regional and Language Options ➔ tabstrip “Advanced” ➔ select the language you wish to work with.

“Language for non-Unicde programs”
- Also called “Default or system code page”
- Some SAPGUI components in Unicode still refer to this non-Unicde locale.
Summary

- Ideal integration and communication for Unicode based SAP and external systems only
- Have a complete list of all critical interfaces in the system landscape with information about communication technology and information if language relevant and which languages exchanged
- Check early with vendor of external system if Unicode enabled
- In case of inhomogeneous SAP Unicode to single codepage external system connection be aware of code page conversion
- SAP systems with ABAP and JAVA stack work ideally together in Unicode only
- Consider the deployment of SAP XI / PI to connect to external system
Further Information

Public Web:
http://www.service.sap.com/unicode  : Customer contact
http://www.service.sap.com/unicode@sap : Technology

Related SAP Education Training Opportunities
http://www.service.sap.com/globalization  → Service Offerings → Unicode

Related Workshops/Lectures at SAP TechEd 2005/2006
SPC200  Conversion of SAP Systems to Unicode, lecture
SPC251  Making Programs Unicode Enabled
SPC205  ASUG Influence Update: Computing Infrastructure
Available end October 2006 in German first, English follows

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Q & A
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Please complete your session evaluation.

Be courteous — deposit your trash, and do not take the handouts for the following session.

Thank You!