SAP Integration and Certification Centers

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Integration Guide - Technologies

Ver. 2.2, 2/18/2003

SAP endorsed integration technologies for certification of third-party

- Interface software
- ABAP Add-Ons
- Java applications

Original Document

The original version of this document is stored as ICC_INTEGRATION_GUIDE_2.2.doc in \\pal100010\icc\SharedFiles.

Purpose of this Document

This document should help software vendors with their decisions on choosing the proper technology for their software integration with the mySAP Business Suite. It documents which SAP integration technologies are eligible for interface certification. The interface certification contract will explicitly refer to this document which is currently available online at
http://www.sap.com/icc

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History

Version 0.9	....Preliminary	03/29/01
Version 0.91	.....Feedback	04/06/01
Version 1.00	.....Additional technology	06/21/01
Version 2.0	.....Adjustments – Validation/Certification	01/23/02
Version 2.1	.....Add Performance section	03/07/02
Version 2.2	.....Additional technologies: .NET Connector, SOAP Processor, etc. New template	01/30/03

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CONTENT

1 Usage of SAP Endorsed Integration Technologies

In order to develop an interface-product eligible for SAP Interface Certification by the SAP Integration and Certification Centers (ICCs), third-party software vendors are required to use SAP endorsed integration technologies. It is important to use these technologies because they are release stable and release supported. Using these technologies to integrate a third-party product with the mySAP Business Suite, will reduce the initial implementation time of such integrations for the customers and will also ensure smoother release upgrades.

SAP endorsed integration technologies include:

- SAP BAPIs (Business Application Programming Interfaces)
- Remote callable function modules (RFMs) that have been released for customer/external use
- IDocs (Intermediate Documents) provided by SAP, that are sent or received by mySAP Business Suite components
- Data Transfer Programs provided by SAP

In addition to the above listed SAP endorsed integration technologies, SAP reserves the right to evaluate and approve other integration technologies not included in this document, if a thorough check and subsequent test determine that this is in the best interest of all involved parties and does not pose any risk to the integrity of the SAP system.

In addition SAP also offers certifications for the following third-party products which may or may not integrate directly with a backend mySAP Business Suite component:

- iViews for mySAP Enterprise Portal
- ABAP Add-ons starting with SAP R/3 Basis Release 4.6
- J2EE applications for SAP Web Application Server

1.1 Business Application Programming Interfaces

Business Application Programming Interfaces (BAPIs) are standard SAP interfaces that enable software vendors to integrate their software into the mySAP Business Suite. BAPIs are technically implemented using RFC (Remote Function Call) enabled function modules inside SAP systems.

BAPIs are defined in the Business Object Repository (BOR) as methods of to SAP business objects that perform specific business tasks. They allow integration at business level, not technical level. This makes it much easier to find suitable BAPIs compared to non-BAPI based function modules.

Once SAP has released a BAPI, its interface definitions and parameters will remain stable in the long term, which means third-party application programs will not be affected by changes to the underlying SAP software or data. If upward-compatible enhancements are made to the BAPIs, the integration of the existing applications is not affected. If incompatible changes to the BAPI become necessary, SAP will create a new BAPI and mark the old BAPI as “obsolete”. Obsolete BAPIs are guaranteed to work at least in two subsequent functional releases, starting with the one in which they are declared obsolete. This gives developers approximately two years, depending on SAPs release cycle, to change their existing integration from using the obsolete BAPI to the usage of the new BAPI.

The SAP Interface Repository (http://ifr.sap.com) contains up-to-date information of all BAPIs.

The BAPI Explorer is available as of SAP Basis Release 4.6A and can be used to get an overview of BAPIs in the BOR. To call the BAPI Explorer in the SAP system, choose *Tools → Business Framework → BAPI Explorer* (transaction ***BAPI***).

1.2 Remote Function Call

The SAP development environment supports several ways of structuring software. ABAP function modules are equivalent to what most programming languages call “functions”. The SAP system contains thousands of function modules - for example more than 110,000 in SAP R/3 release 4.6C.

Only a subset of those can be called from external systems using a protocol called Remote Function Call (RFC). RFC allows for remote calls between two SAP systems (for example SAP R/3 and SAP BW) or between an SAP system and a non-SAP system. These remotely callable functions are called RFC-enabled function modules or RFMs in short. SAP R/3 release 4.6 C for example contains more than 10,000 RFMs. They can have import and export parameters to send and receive data between systems.

Only RFMs with a ‘released for customer/released for external use’ status will remain stable in long term. Only these should be used for third-party integration projects and are eligible for interface certification. As the special set of RFMs that are linked as methods of the business objects in the SAP systems, BAPIs are explicitly released for customer usage.

Software vendors can search the Function Builder for existing released RFC-enabled function modules. To call the function builder in the SAP system, choose *Tools → ABAP Workbench → Development → Function Builder* (transaction ***SE37***).

The SAP Interface Repository (http://ifr.sap.com) contains information on selected RFMs for specific integration scenarios that are published by SAP as certifiable interfaces (for example all RFMs used for certifiable interface *Quality Inspections* (QM-IDI).

1.3 Intermediate Documents

Intermediate documents (IDocs) were originally invented by SAP to support Electronic Data Interchange (EDI) in a generic fashion. Later, IDocs were also used in the SAP Application Link Enabling (ALE) technology as data containers, which allow exchange of business information between an SAP system and other SAP or non-SAP systems.

IDocs are based on a hierarchical, tree-like segment structure. The syntax for each IDoc type is defined in the SAP system (transactions ***WE30/WE31***).

IDocs can be used in the following business scenarios:

- Application Link Enabling (ALE): Communication between logical systems (intra-company relations). Logical systems can be either SAP systems or non-SAP systems. ALE distribution models are based on message types and BAPIs that indicate the appropriate IDoc types.
- Electronic Data Interchange (EDI): Communication between SAP systems and the 3rd party EDI subsystem which is typically connected to an EDI VAN (inter-company relation).

IDocs are created when message types and (object) methods are distributed. The message type is the semantic information which identifies the usage of business data. The IDoc type defines the syntactical format in which the data for a specific business process is transferred.

The SAP Interface Repository (http://ifr.sap.com) contains up-to-date information about all SAP IDocs and message types.
To gain an overview of all message types defined in an SAP system, choose *Tools → Business Communication → IDoc-Basis → Development → Message types* (transaction ***WE81***).
To see the IDoc types related to a message type, choose *Tools → Business Communication → IDoc-Basis → Development → IDoc type / message* (transaction ***WE82***).
To display the documentation for a particular IDoc type, choose *Tools → Business Communication → IDoc-Basis → Documentation → IDoc types* (transaction ***WE60***).

1.4 Data Transfer Programs

Some SAP applications provide data transfer programs that can be used to transfer data into or out of SAP systems. The Data Transfer Workbench is a tool that supports the transfer of data into the SAP system with these data transfer programs. The Data Transfer Workbench is particularly useful for business objects with large data volumes. It guarantees that data is transferred efficiently and ensures that data in the SAP system remains consistent. The data transfer is performed in a batch-like fashion.

To call the data transfer workbench choose *Tools → Data Transfer Workbench* (transaction ***SXDA***). Information of the data transfer programs and the transactions are listed in the relevant, application specific parts of the SAP Library, which can be accessed at http://help.sap.com.

2 Usage of SAP Integration Tools

The Integration and Certification Centers (ICCs) offer software vendors remote access to various pre-configured SAP systems for integration testing as well as the latest SAP integration tools/Software Development Kits (SDKs). This system access and the necessary tools are offered via the so-called SAP Developer Package (DPA) and are available for a annual fee.
The SDKs include SAP GUI Presentation CD, SAP Online Documentation CD, SAP Gateway, RFC-SDK, SAP Java Connector, SAP .NET Connector and more.

Recommended SAP Integration Tools for third-party software vendors are:

- SAP Java Connector (JCo), which enables Java programs to access SAP BAPIs, IDocs, and released RFMs.
- SAP .NET Connector, which enables .NET applications to access SAP BAPIs, IDocs, and released RFMs.
- SAP RFC Library, which enables C programs to access SAP BAPIs, IDocs, and released RFMs.
- SAP Business Connector, which enables XML-enabled applications to access SAP BAPIs, IDocs, and released RFMs.
- SAP SOAP Processor released within SAP Web AS 6.20, which enables external programs use WSDL/SOAP-based approach to access SAP BAPIs and released RFMs.
- Flat file-based data transfer as used by SAP data transfer programs, SAP delivered standard ABAP reports

Additional information about SAP connectors can be found on the SAP Service Marketplace under http://service.sap.com/connectors. Read access to these SAP Service Marketplace Web pages requires a SAPNet user, which is provided to software vendors as part of the DPA.

The SAP ICCs offer workshops specially tailored for software vendors, on these SAP integration technologies and tools. Please check http://www.sap.com/icc for workshop descriptions, locations and schedules. In addition, the following knowledge tools are also available from SAP.

Knowledge Tools

SAP Internet Adviser

The SAP Internet Adviser (http://service.sap.com/internetadviser) is a central pool of information, which displays the whole structure of the mySAP Business Suites. The adviser explains the technology upon which the SAP architecture is based. It also describes the individual mySAP Business Suite component and demonstrates some common e-business scenarios in an SAP environment.
The tool provides help for decision makers as well as for consultants and developers when implementing business scenarios. Additionally, it shows necessary customizing steps for involved mySAP Business Suite component and their integration with each other and the external systems. It also gives an introduction to the relevant Internet technology and standards.

SAP R/3 Interface Adviser

The SAP R/3 Interface Adviser (http://service.sap.com/int-adviser) represents a centralized pool of information for designing and implementing permanent interfaces between SAP R/3 and external systems. Its purpose is to reduce the effort required to define and implement distributed business processes and their interfaces as well as to avoid faulty interface designs and the associated problems in performance, data consistency, and handling.

2.1 SAP Java Connector

The SAP Java Connector (JCo) is a toolkit that allows Java applications to communicate with SAP systems. JCo is a high-performance encapsulation of the RFC Library that supports all features of RFC. It combines an easy to use API with unprecedented flexibility and performance. The package supports both Java to SAP system as well as SAP system to Java calls. It can be used to implement BAPI/RFM/IDoc based integrations.

As part of the DPA service, the SAP Java Connector can be downloaded by DPA subscribers at http://service.sap.com/connectors.

2.2 SAP .NET Connector

SAP offers the SAP .NET Connector, which provides developers the possibility to expose BAPIs and RFMs to any .NET application. At design-time the Proxy Wizard for Visual Studio .NET will interactively generate proxy classes in C# and add them to a .NET project. Developers can then access all properties, methods and even table structures from a .NET application independently of the preferred .NET language (C#, VB.NET or any other supported language). At run-time the SAP .NET Connector will perform and manage all necessary communication between the .NET application and the SAP server.
The SAP .NET Connector also provides classes which can be used by .NET applications to post the IDocs to the target SAP system, as well as receive the IDocs from the SAP system.

With the release of the SAP .NET Connector, the SAP DCOM Connector will be set end-of-life. There will be no further development of the coding of the SAP DCOM Connector. Support and maintenance for the SAP DCOM Connector will cease end of 2004.

Third party vendors are encouraged to start all new development in Microsoft environment using the SAP .NET Connector. All products and components that are already developed using the SAP DCOM Connector must become independent of the SAP DCOM Connector by Dec. 31st, 2003, or with Release SAP Web AS 6.30.

As part of the DPA service, the SAP Java Connector can be downloaded by DPA subscribers at http://service.sap.com/connectors.

2.3 SAP RFC Library

The SAP RFC Library provides a set of C-language routines that enables the third-party software vendors to develop C programs accessing SAP BAPIs, IDocs and released RFMs. It provides maximum functionality, maximum performance, and maximum flexibility.

The RFC Library is available on all SAP-supported platforms including Windows, different types of UNIX, etc. For each supported platform, the C header files and some sample RFC programs are also provided.

As part of the DPA service, the SAP Java Connector is shipped automatically to all DPA subscribers.

2.4 SAP Business Connector

The SAP Business Connector (SAP BC) is a middleware component. It allows integration with the mySAP Business Suite via open and non-proprietary technology. SAP BC uses the Internet protocols like HTTP/HTTPS for communication, and XML as the data format. Thus, it seamlessly integrates different IT architectures with mySAP Business Suite components.

As part of the DPA service, software vendors can access the SAP-hosted Business Connectors through the Internet. Software vendors who want to install the SAP Business Connector in their own environment need to register directly with their regional SAP ICC to receive the appropriate license key.

For software vendors who integrate their software with SAP solutions using BAPIs/RFMs/IDocs, the SAP BC can be used in lieu of the SAP connectors (Java connector, .NET connector), to invoke BAPIs/RFMs or exchange IDocs with the SAP system. In addition, external middleware providers can also pursue certification of their XML compatibility with SAP BC against the XML Communication Interface (CA-XML). For more information, check out the XML Communication Interface (CA-XML) description under http://www.sap.com/icc/scenarios/technology/ca-xml.asp .

2.5 SAP SOAP Processor

The SAP SOAP Processor within the SAP Web AS 6.20 contains the following components, among others:

- Web Service Browser
  Browser for searching and generating WSDL 1.1 compatible descriptions for RFC-enabled function modules in the system.
- SOAP Server for RFMs
  Support synchronous calls that conform to SOAP 1.1, of the RFC-enabled function modules.

When integrating with SAP Web AS 6.20 based mySAP Business Suite components (e.g. SAP R/3 Enterprise 4.7), third party software vendors can use the industry-standard WSDL/SOAP-based approach to invoke the RFC-enabled function modules in the SAP system, without using additional SAP connector software. Since BAPIs are special RFMs that are linked as methods of the business objects, BAPIs can also be invoked through the SAP SOAP Processor.

2.6 Flat File-Based Integration

In some cases SAP applications can also use flat files to import and export data. For example the SAP EDI integration is mostly based on a file interface that exchanges IDocs and status records via operating system files with the third-party EDI subsystems. Separately, with Data Transfer Programs provided by SAP, flat files are also used to transfer data into the SAP system. The files need to be created in specific formats and delivered to the file system of the SAP servers. Also standard ABAP reports provided by SAP can sometimes be used to generate flat files containing data extracted from the SAP system.

In general, SAP encourages third party vendors to use BAPIs, released-RFMs, and IDocs whenever possible. Flat file-based approach should only be considered when these other means are not available. In such cases, the flat file-based approach must be used with the SAP-delivered standard programs — and custom developed ABAP programs may not be used.

2.7 Obsolete RFC-based Middleware Products

SAP has put a lot of efforts in making the mySAP Business Suite as open as possible. But some of the middleware components released in the past have been set to End-of-Maintenance and should no longer be used. SAP Note 0423522 lists all these obsolete middleware components and the suggested replacements. Third-party integration projects must no longer use these obsolete middleware components .

3 mySAP Enterprise Portal iView Certification

mySAP Enterprise Portal is the leading enterprise portal solution in the market. mySAP Enterprise Portal provides a single Web portal which includes unified information from enterprise applications, data warehouses, unstructured document collections, and the Internet. With the mySAP Enterprise Portal, users can easily access, share, analyze, and act on relevant information from any data source - dramatically accelerating event resolution and increasing business insight.

iViews allow the integration of information and functions from a wide range of sources within a mySAP Enterprise Portal. For example, an iView can present information from a Web site, integrate functions from business software, or provide search functions. iViews are typically lightweight and can be developed quickly. iViews can be implemented on both the .NET and the Java platforms. For more information about developing iViews, and to download the Portal Development Kit, please visit http://www.iviewstudio.com .

Third-party software vendors can design iViews to expose the information and functionality of their product to the mySAP Enterprise Portal. SAP now offers iView certification for these third-party iViews, details can be found at http://www.sap.com/icc/scenarios/enterpriseportals/ep-ivw.asp

4 ABAP Development and ABAP Add-on Certification

For the interface certification of non-SAP products, a software vendor is generally not allowed to develop code in ABAP - SAPs own programming language. This is because only the use of SAP endorsed integration technologies listed in Section 1 and 2 above ensures that SAP customers will have a smooth upgrade, since only SAP endorsed technologies are kept compatible with future SAP product releases.

However, for third-party products developed as ABAP Add-Ons to SAP standard functionality, SAP offers a separate ABAP certification process with different requirements.

More information is currently available at:
http://www.sap.com/icc/scenarios/abap/

5 Certification of J2EE applications' Installation/Deployment on SAP Web AS

SAP Web Application Server (SAP Web AS) is the application server running all SAP solutions. It has both an ABAP stack and a J2EE™ stack. The J2EE stack – also referred to as the J2EE Engine – is fully J2EE standard compatible, as certified by SUN Microsystems, Inc. (http://java.sun.com/j2ee). Many SAP customers are not only running their SAP solutions on SAP Web AS, they are also running third-party and custom developed J2EE applications on SAP Web AS to achieve a streamlined infrastructure and lower TCO.

To further improve the customer's experience of running third-party J2EE applications on SAP Web AS, SAP has introduced a certification program that tests the installation and deployment of third-party J2EE applications on SAP Web AS.

The test ensures that the J2EE application can be installed / deployed on the SAP J2EE Engine, and that any additional configurations required for the installation are documented and performed correctly. The SAP ICC will also execute test scripts - provided by the J2EE application vendor – against the core functionalities of the J2EE application to verify that it does not pose any risk to the overall health of the SAP system environment.

6 Performance Considerations

Performance is a major consideration in all phases of the software lifecycle. It is the responsibility of the software vendors to ensure that their application delivers both the correct business functionality and the satisfactory level of performance and scalability. Performance is not merely a characteristic of a particular program but rather of a business process put into practice with the help of programs. The smooth running of a business process in a scenario reflecting a real world, i.e., computers with varying and unpredictable load as well as varying and unpredictable data volumes, can only be ensured when the programs show good linearity and scalability starting from a reasonable runtime for basic test cases.

Performance Programs

Writing performance programs implies programs which:

- Can complete a business process in a reasonable amount of time (as measure in straight forward performance analysis)
- Show linear runtimes (with logarithmic correlation at most) with increasing amount of data being processed (this would require measurement with varying amounts of data)
- Show no dependency (or logarithmic dependency at most) on data already having been processed or stored in the database.
- Are scalable when run in a multiprocessor and/or multi-computer environment (this would require tests in comparable environments)
- Can run with minimum resource available.

Data

- Loading and formatting data consumes CPU time and time on the application server and database server. Therefore, it is better to load detail data at a later stage if required rather than causing long delays in the initial display.
- Data processing time can be reduced if a suitable filter was selected in an appropriate order. Use filter criteria whenever possible to avoid superfluous data.
- Data should be read once only and shared in the business process.
- Read data when it is requested and do not prepare too much data.

Analyzing Tools

SAP solutions provide various tools for performance analysis, such as:

- ST05 - Trace Request (RFC Trace)
- SM50 - Process Overview
- SMGW - Gateway Monitor
- SM51 - SAP Servers

7 Appendix

As a starting point, the ICC homepage http://www.sap.com/icc
contains a well-rounded description of the complete SAP integration and certification program.

The regional SAP Integration and Certification Center can be contacted via email to:

ICC Americas	**icc-americas@sap.com**
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