

Enhance and Extend SAP Solutions with Best-in-Class IBM Enterprise Software

IBM Redbooks Solution Guide

SAP is a well-established leader in the packaged applications market. The term *packaged application* typically refers to upscale enterprise software suites, such as ERP or CRM. In most cases, organizations that adopt SAP software remain heterogeneous enterprises. In heterogeneous enterprises, most SAP implementations must be integrated with various non-SAP enterprise systems, portals, messaging infrastructure, security, systems of record, systems of engagement, and so on.

Organizations can enhance and extend pre-built capabilities in SAP software with best-in-class IBM enterprise software to maximize ROI in their SAP investment and achieve a balanced enterprise architecture approach. From an architecture perspective, the IBM strategy revolves around three types of systems as shown in Figure 1: Systems of record, systems of engagement, and systems of interaction.

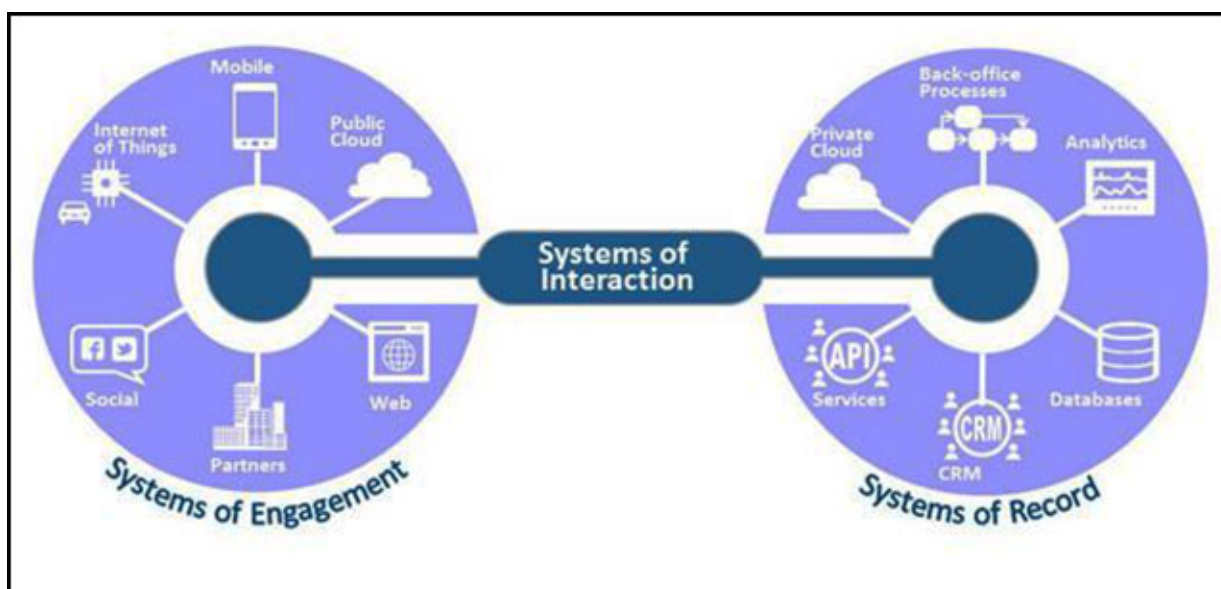


Figure 1. Systems of engagement, interaction, and record (Logical view)

Did you know?

SAP software, although ready-made, rarely comes ready to run. SAP adoption typically becomes an enterprise business transformation program. The SAP adoption typically takes six months to 10 years, and the average life span is five to 15 years.

At some point after the initial implementation, the packaged applications need to be upgraded either for new functionality, or continuity of support. If the packaged application is heavily modified to meet the specific functional requirements of the organization, upgrade costs can be more than the initial

implementation, making it a challenge to ever achieve a return on the investment.

Business value

SAP is a market leader in packaged applications. IBM is a market leader in enterprise software. IBM is also a market leader in the delivery of SAP projects. IBM enterprise software extends and increases the value of SAP-centric business transformation programs in multiple ways:

- Achieve better business metrics
A global, cross-industry study of over 20,000 production SAP environments found that organizations consistently achieved better business results when they combined IBM and SAP solutions together. The following business metrics were measured in detail, and organizations who used the capabilities of both IBM and SAP achieved better results in every category:
 - Acquisition and merger sublimation speed
 - Agility (time-to-market)
 - Budget to actual expenditure compliance
 - Customer satisfaction
 - IT stability and reliability
 - Operational cost
 - Organizational viability
 - Overall expenses
 - Recoverability
 - Staffing level reduction
 - Strategic decision speed and management control

IBM enterprise software perfectly balances SAP applications, and SAP applications perfectly balance IBM enterprise software solutions. By combining IBM and SAP capabilities, organizations can maximize their investment in SAP solutions while also ensuring flexibility and reliability at the same time. It is a proven model of efficiency that avoids many common interoperability and change challenges experienced through one or many other vendors.

- Reduce business and I/T risk
Successful SAP adopters reduce business and I/T risk by combining the value of pre-built SAP integration within the SAP domain based on SAP middleware (*integration you buy*), also known as *Inner Ring*, with best-in-class IBM enterprise middleware for custom integration in the enterprise that needs to be developed for an SAP-centric transformation program (*integration you build*), also known as *Outer Ring*.
- Accelerate SAP integration into a heterogeneous enterprise
IBM software provides a powerful set of pre-built enterprise-level capabilities that are pre-integrated with SAP systems, but are also integrated with non-SAP systems in the enterprise landscape, including systems built on open standards, cloud-based offerings, non-SAP packaged applications, and internally developed existing systems. Examples of this extensive set of IBM software capabilities include areas such as mobile technologies, smarter process, decision management, Enterprise Content Management (ECM), business analytics (BA), portal, master data management (MDM), application lifecycle management, security, and systems management. Pairing these IBM software capabilities with SAP solutions in large-scale enterprise transformations, allows customers to accelerate the integration of SAP solutions into the heterogeneous enterprise environments and build an enterprise approach that is not restricted exclusively to SAP software.
- Achieve business agility
SAP is rarely implemented with business agility in mind. Often the opposite takes place. Business agility allows organizations to implement frequent changes in business processes or business rules without changing the SAP solution and implement business processes underpinned by SAP data, but

which are only partially met by the SAP solution or not realizable in the SAP system without extensive customization coding.

- **Reduce cost**
IBM software reduces the cost of SAP-centric enterprise transformation by using the best-in-class tools depending on the type of optimization needed. For example, running a robust IBM application integration middleware system with market leading performance characteristics can lead to substantial cost savings by requiring less CPU and RAM resources to handle enterprise scale workloads when compared to less optimized middleware that might require more hardware resources.

Solution overview

The solution described in this IBM Redbooks Solution Guide is captured in the form of the IBM Reference Architecture for SAP. It provides a set of predefined architectures or patterns that are designed and proven for use in particular business and technical contexts. The overall goal of the IBM Reference Architecture for SAP is to establish a prescriptive blueprint that can be used as a template when designing solutions that include IBM software and SAP systems. It informs and guides technical professionals, architects, and decision makers who are responsible for designing solutions that include IBM software that must co-exist with SAP systems. The following are the key architectural goals:

- **Use standard, non-customized SAP applications**
One of the primary business drivers for adopting a packaged ERP solution such as SAP is the business value achieved from using pre-built, ready for use components. Configuration changes can be made with minimal effort and in a version-safe manner. However, custom development can require more effort and takes away from the value provided from a packaged application. Even modest customizations can lead to a chain of dependencies that inhibit taking advantage of new features and functions in SAP software, or upgrading SAP software cost effectively in the future.
- **Reuse pre-built SAP integration**
Even organizations with significant alignment with SAP rarely use SAP for more than 60% of their total business automation needs, according to IBM practitioners with extensive experience in SAP projects. This fact makes the enterprise integration of large-scale SAP implementations a key success factor of the overall SAP transformation program. The goal of the reference architecture is to provide a blueprint for using market-leading IBM technology for large-scale SAP integration into the enterprise.
- **Use best-in-class technologies when extending beyond the SAP domain**
In cases where data or processes need to extend outside of SAP, use industry-leading, application-independent software technology. IBM software portfolio is unique in the industry when it comes to providing a comprehensive selection of middleware system technology to complement SAP systems in heterogeneous environments. IBM software provides organizations with consistency, scalability, reliability, flexibility, and asset reuse for the application software infrastructure needs across all application domains throughout the enterprise.
- **Use open, well-established standards**
Standards-based implementation of integration logic greatly reduces the chance of vendor lock-in. It also increases the availability of tools that easily connect with the solution and provide support for development, monitoring, and testing.
- **Use pre-built software capabilities provided by IBM**
In many cases, IBM software provides enterprise capabilities that are more robust than the corresponding capabilities in SAP software, such as Business Process Management, MobileFirst, Enterprise Integration, DevOps, and Enterprise Content Management. IBM Software enables organizations to enhance and extend existing SAP capabilities into a heterogeneous enterprise environment, such as Business Analytics and Cognitive Computing. In other cases, IBM Software

capabilities do not exist in SAP systems. A key point is that IBM Software excels when adding SAP systems to a heterogeneous enterprise as another service provider.

Solution architecture

Figure 2 shows a services view of the IBM Reference Architecture for SAP.

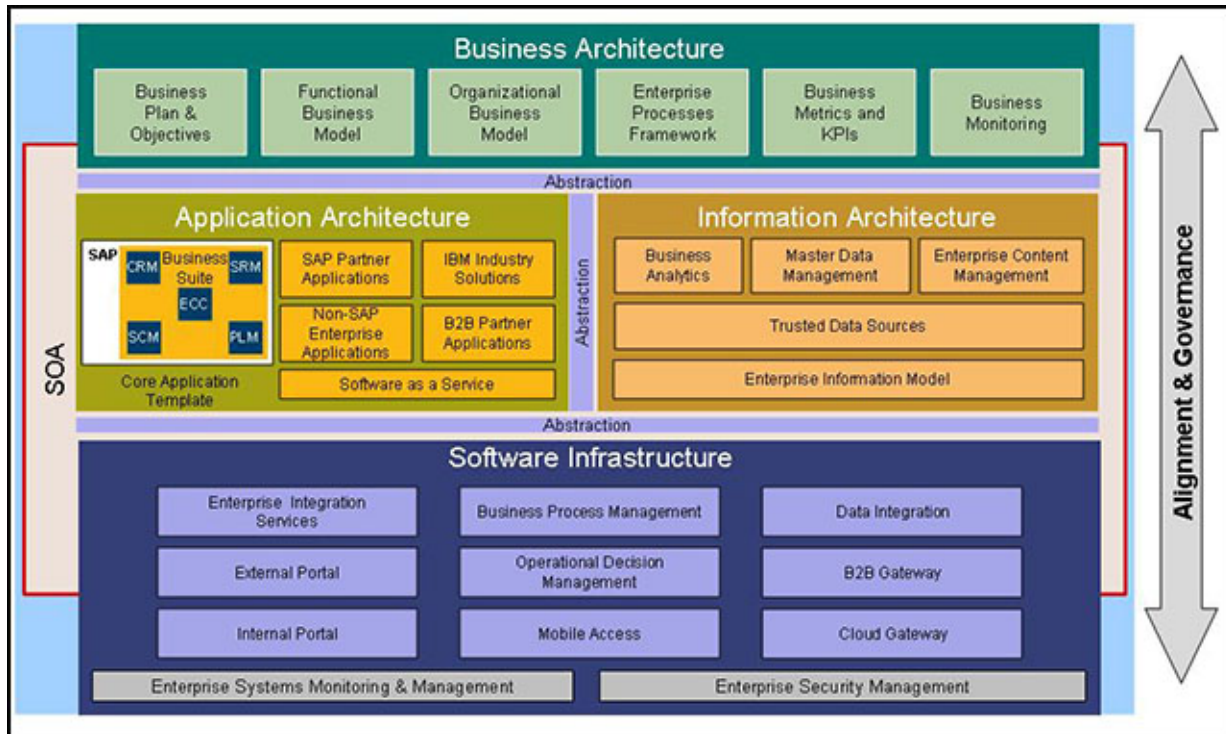


Figure 2. IBM Reference Architecture for SAP (Services view)

- *Business architecture* is the primary link between business and IT. Business architecture defines artifacts, standards, and principles that are used as a trusted source by executives, architects, and developers to align enterprise initiatives and solution content with business strategy.
- *Information architecture* provides guidance, templates, and reusable artifacts and information services from which to build information deliverables for a specific enterprise solution. The information architecture is composed of enterprise information model, trusted data sources, and enterprise information services, including Master Data Management, Enterprise Content Management, and Business Analytics. It defines the business objects, processes, and data, and establishes their inter-relationships at different abstraction levels.
- *Application architecture*: The heterogeneous enterprise includes SAP and different types of non-SAP applications.

Figure 3 shows an application integration view of the IBM Reference Architecture for SAP based on two federated technology domains, also known as *rings*.

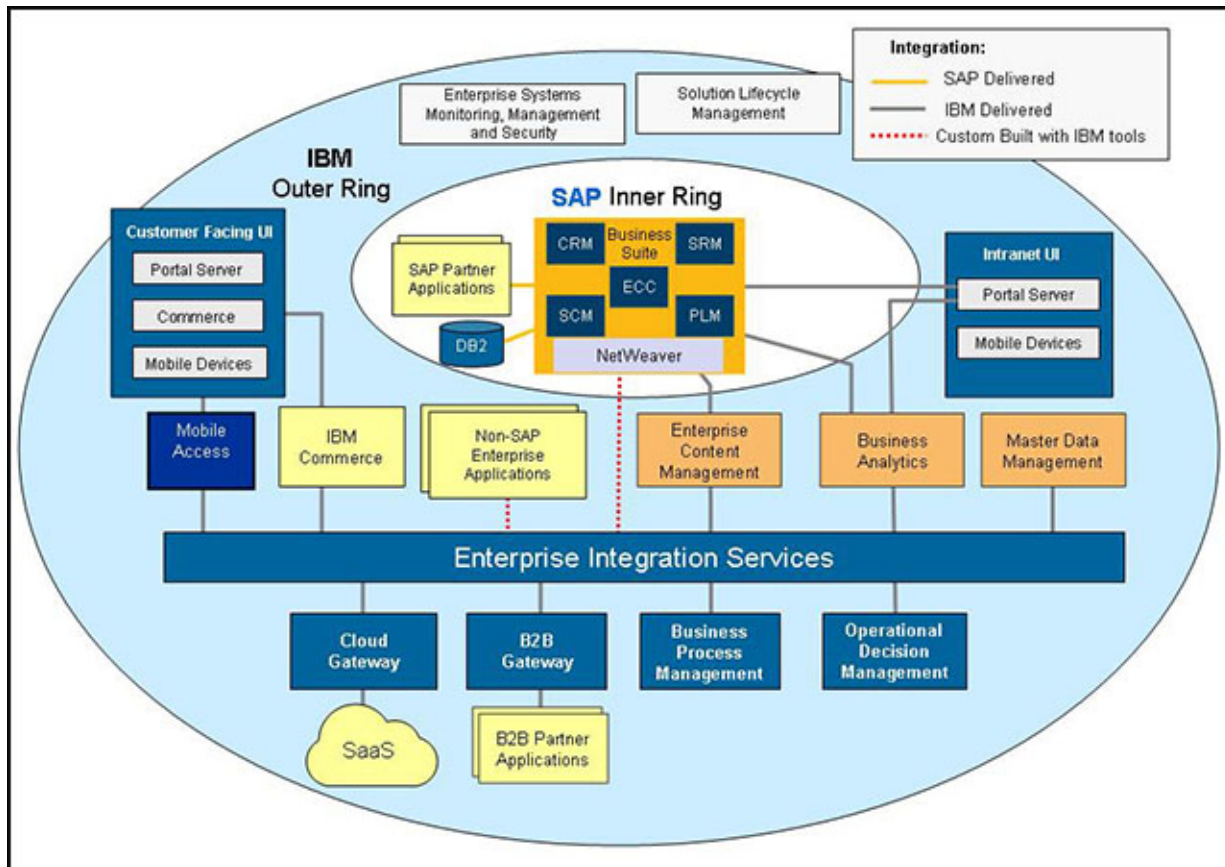


Figure 3. IBM Reference Architecture for SAP - Inner Ring/Outer Ring Architecture

The *Inner Ring* is the SAP technology domain and includes applications, technology, and integration purchased from SAP and SAP business partners. The Reference Architecture is designed to encourage the use of SAP middleware tools and technology within the Inner Ring, but use robust application-independent technology whenever data or processes move into the Outer Ring. In this way, SAP customers can achieve optimal efficiency, maximum flexibility, high reliability, and the least amount of risk during large-scale transformation projects.

The *Outer Ring* represents the entire technology domain outside the cluster of SAP applications. The Outer Ring includes older applications, packaged applications from software vendors other than SAP, non-SAP applications hosted in the cloud, and all other shared software infrastructure system technology.

The key to the Outer Ring is the reuse of common, enterprise-class, application-independent, software infrastructure across the heterogeneous IT landscape. IBM provides the best channel to building this layer of consistency, resiliency, and flexibility of software infrastructure, rather than acquiring the various software components from different vendors, and dealing with incompatibility issues.

Usage scenarios

Many usage scenarios demonstrate the value of extending SAP core business functionality with IBM software. For a representative list of usage scenarios, see IBM Software for SAP Solutions at <http://www.redbooks.ibm.com/abstracts/sg248230.html>. This section provides only one example based on SAP archiving and IBM Enterprise Content Management for SAP.

The core use case for ECM is a document-centric view on information, focused on the need for unified and immediate access to all information relating to business transactions that are represented in the SAP system. IBM extends the core capabilities of SAP to handle documents through their ArchiveLink and Content Server interfaces. This extension provides significant extra business value, with a strong focus on information integration between SAP and non-SAP systems in typical heterogeneous IT landscapes. This information comes in a wide variety of forms of documents, and originates from various sources within and outside of the SAP system.

Along the dimension of the information source, documents can be classified as:

- *Inbound* documents, referring to all documents that originate from outside the SAP system, such as purchase orders, invoices, and all kinds of written inbound correspondence, resumés, and legal documents.
- *Outbound* documents such as business reports, outgoing correspondence, and pay slips.

All these types of documents are typically a part of SAP workflows, where transparent access to the documents for decision making, approval processes, and other core business tasks is needed. At the same time, many of these documents also play an important role in non-SAP contexts, and a federated view of them is a core requirement. Most of these documents are also subject to strict rules and regulations regarding their lifecycle, ensuring auditability of all business processes and the fulfillment of information requests during litigation. For both these reasons, the document-centric view on enterprise information requires that information is integrated and federated between SAP-centric information and information originating and residing elsewhere in the enterprise IT landscape. This federation and integration aspect extends significantly beyond the core capabilities of SAP document archiving. The IBM Enterprise Content Management product portfolio supports complex scenarios from end-to-end starting with capture and following through the entire lifecycle with these solution elements, among others:

- Capturing of inbound documents that arrive in paper, multi-function device (MFD), email, and fax form is handled by IBM Datacap Taskmaster Capture, equipped with state-of-the-art adaptive document recognition technology. The ability to efficiently turn paper records into digital form by scanning and making them available to SAP systems as an incoming document is a key ingredient in any initiative for reducing manual paper processing. IBM Datacap captures, manages, and integrates enterprise content while extracting critical business content such as invoice line items, bypassing costly and error-prone manual data entry. IBM Datacap offerings include easy to use customization with high-volume document capture.
- Linking the captured documents, and archiving them through the SAP ArchiveLink interface is handled by IBM Content Collector for SAP Applications. The documents are stored securely in the IBM ECM content repositories such as IBM FileNet Content Manager, IBM Content Manager Enterprise Edition, or IBM Content Manager OnDemand. Outbound documents, such as business reports and payroll information, are handled in the same manner and archived for future reference. The content repositories have powerful capabilities that can handle high volumes of documents efficiently, organize them in hierarchical structures that match business organization hierarchies, support document versioning and annotations as well as complex metadata from SAP and other sources, and allow for powerful search capabilities.
- The content repositories such as IBM FileNet Content Manager also supply powerful and flexible mechanisms for handling document retention and legal holds, covering the crucial lifecycle management needs of the organization. These cover both the SAP and the non-SAP environments with common sets of rules.
- Flexible and efficient access to documents in the archives is provided by the IBM ECM integration platform of IBM Content Navigator, a ready-to-use, modern, standards-based user interface that supports all content management use cases, including flexible viewing technology for a various document formats, collaborative document management, production imaging, and report management. IBM Content Navigator is also a flexible and powerful user platform for building custom ECM applications by using open web-based standards.

Application Example 1

An Accounts Payable solution can serve as a comprehensive example for the combination of most of the capabilities in the IBM ECM portfolio, as illustrated in Figure 4:

1. IBM Datacap captures invoice data, and automatically reconciles it against purchase order data already in the SAP system.
2. IBM Content Collector for SAP Applications processes the captured documents, stores them in the content repository, such as IBM FileNet Content Manager, and ensures linking to the relevant SAP business objects using SAP ArchiveLink protocol.
3. Viewing requests for the archived documents during the approval process for the invoice can either be serviced within the SAP GUI or by using the IBM Content Navigator web UI.

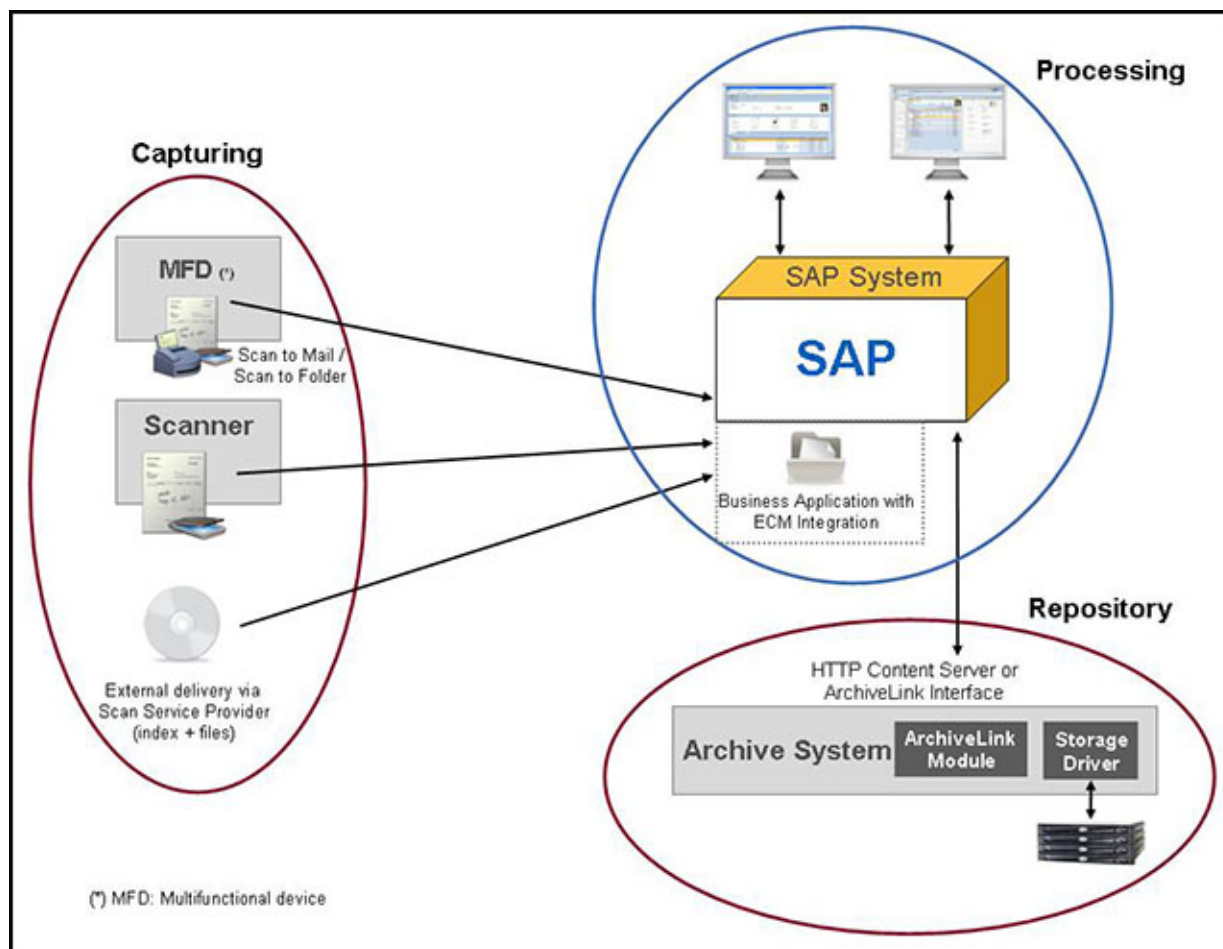


Figure 4. Generic components of an integrated process management

Application Example 2

An integrated SAP Human Resources solution can also use IBM Datacap for capturing all relevant documents, such as application letters, resumés, social security documents, and work contracts, and store them in the required hierarchical folder structure inside SAP. This folder structure can then be mirrored in a corresponding, automatically synchronized folder structure on the content repository side. HR personnel can then operate inside the SAP system through the SAP GUI, or outside using IBM Content Navigator to run document search and retrieval as well as triggering of HR-related workflows. In

all cases, a unified common view on the complete HR information is maintained.

Integration

Figure 5 shows an architecture overview of the enterprise integration services components.

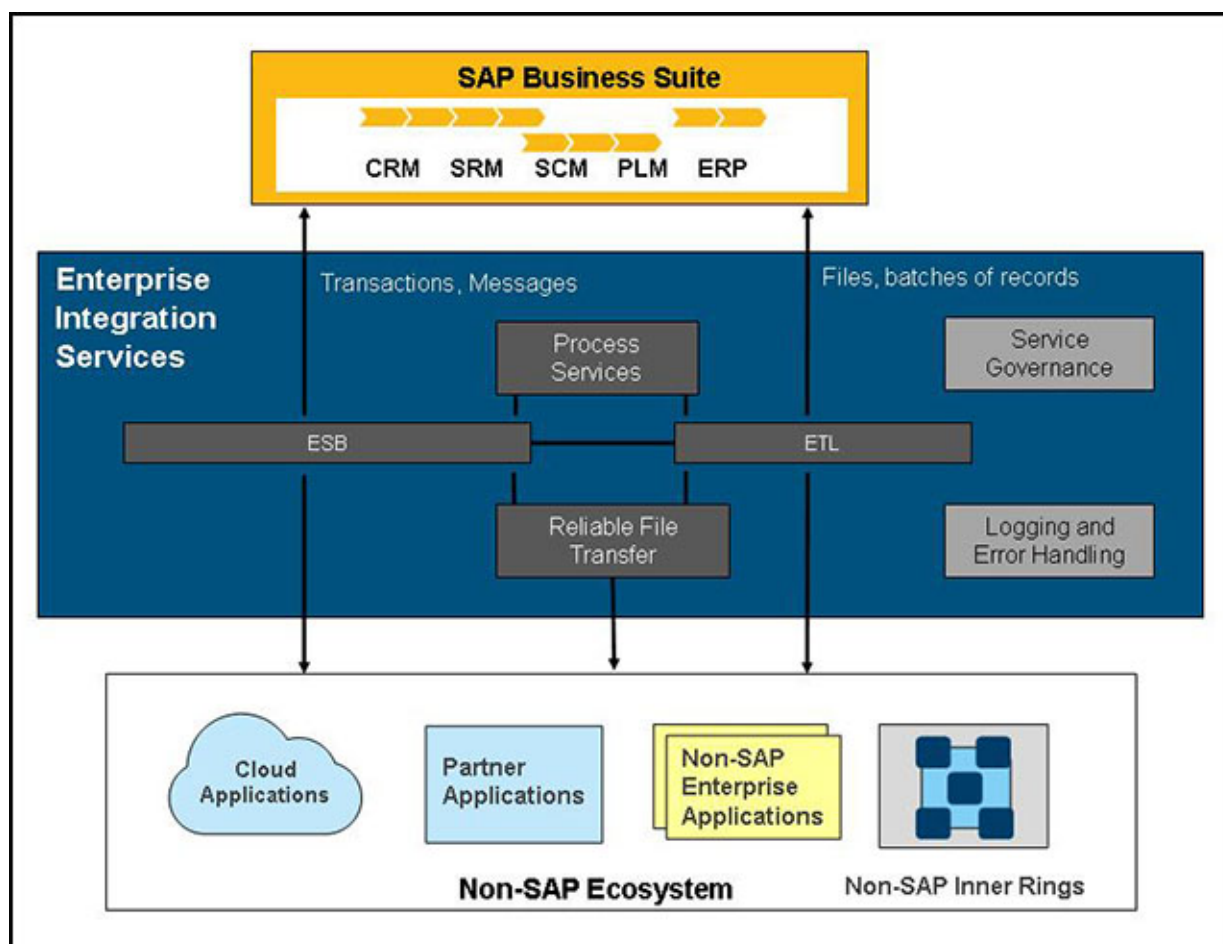


Figure 5. Enterprise integration reference architecture

Several components make up the enterprise integration services architecture:

- Enterprise service bus (ESB)
- Extract, transform, and load (ETL)
- Service governance
- Reliable File Transfer (RFT)
- Process services
- Logging and error handling

These components work together to provide the capabilities required to connect SAP with non-SAP applications within the enterprise, business partners, and cloud-based applications.

The ESB component is responsible for providing connectivity and integration logic for transactional interfaces. The primary function of the ESB is to decouple and isolate the application end-points from one another, increasing the flexibility of the system and reducing the overall cost of integration.

ETL is a term used broadly to refer to the activities required to move large volumes of data between systems in batches. In the context of enterprise integration services, the ETL component is responsible for providing connectivity and integration logic for batch-oriented interfaces for ongoing integration (as opposed to initial data load or conversion activities). ETL technologies are built to efficiently process very large sets of data with internal staging of the data and parallel processing.

Service governance includes two major aspects: Service lifecycle management and service run time.

RFT technology provides central configuration and setup, centralized logging and monitoring of all file transfers, and a standard solution with established quality of service (QoS) characteristics for implementing file transfers within the enterprise.

Process services are technical integration processes that provide advanced integration logic beyond the typical mediation that is provided by ESB components. Process services are typically implemented on a Business Process Management system.

Related information

For more information, see the following documents:

- IBM Redbooks: *IBM Software for SAP Solutions*, SG24-8230
<http://www.redbooks.ibm.com/abstracts/sg248230.html>
- IBM Redbooks: *Using the IBM Security Framework and IBM Security Blueprint to Realize Business-Driven Security*, SG24-8100-00
<http://www.redbooks.ibm.com/abstracts/sg248100.html>
- IBM Redbooks: *Integrating IBM Security and SAP Solutions*, SG24-8015
<http://www.redbooks.ibm.com/abstracts/sg248015.html>
- IBM InfoSphere Information Server Pack for SAP BW
<http://www.ibm.com/software/products/en/infosphere-information-server-pack-sap-bw>
- IBM InfoSphere Information Server Pack for SAP Applications
<http://www-03.ibm.com/software/products/en/infosphere-information-server-pack-sap-applications>
- IBM InfoSphere Information Server Family
http://www.ibm.com/software/data/integration/info_server/
- IBM WebSphere Adapter for SAP Software
<http://www.ibm.com/software/products/en/websphere-adapter-mysap>
- IBM WebSphere Transformation Extender
<http://www.ibm.com/software/products/en/wdatastagetx>
- IBM WebSphere DataPower SOA Appliances
<http://www.ibm.com/software/products/en/datapower>
- IBM WebSphere Cast Iron Cloud Integration
<http://www.ibm.com/software/products/en/castiron-cloud-integration>
- IBM InfoSphere DataStage
<http://www-03.ibm.com/software/products/en/ibminfodata>
- Integrate SAP Processes with IBM BPM
<http://www.ibm.com/software/integration/business-process-manager/sap-integration/>
- IBM Business Process Manager
<http://www.ibm.com/software/products/en/business-process-manager-family>

- IBM MobileFirst
<http://www.ibm.com/mobilefirst/us/en/offerings/>
- IBM Worklight Foundation
<http://www.ibm.com/software/products/en/worklight-foundation>
- WebSphere Cast Iron Cloud integration
<http://www.ibm.com/software/products/en/castiron-cloud-integration>
- IBM Cast Iron - Overview of the SAP connector
<http://ibm.co/1vRSDJn>
- IBM WebSphere Portal family
<http://www-03.ibm.com/software/products/en/websphere-portal-family>
- Interoperability of SAP NetWeaver Portal 7.3 and IBM WebSphere Portal
<http://scn.sap.com/docs/DOC-26539>
- IBM InfoSphere Master Data Management
<http://www-01.ibm.com/software/data/master-data-management/>
- Implementing a Transaction Hub MDM pattern using IBM InfoSphere Master Data Management Server
<http://www.ibm.com/developerworks/data/library/techarticle/dm-0803oberhofer/>
- Integrating MDM Server with Enterprise Information Systems using SAP as an example, Part 1: Delivering customer records to SAP
<http://www.ibm.com/developerworks/data/tutorials/dm-1108integratingmdmserver1/>
- Integrating MDM Server with Enterprise Information Systems using SAP as an example, Part 2: Enriching customer records with SAP specific information
<http://ibm.co/1w3RL47>
- IBM Enterprise Content Management
<http://www.ibm.com/software/products/en/category/enterprise-content-management>
- IBM information lifecycle governance solutions
<http://www.ibm.com/software/products/en/category/information-lifecycle-governance>
- IBM Value-based Archiving Solutions
<http://www.ibm.com/software/products/en/value-based-archiving>
- IBM Datacap
<http://www.ibm.com/software/info/datacap/>
- IBM Content Collector for SAP Applications Version 3.0 publication library
<http://www-01.ibm.com/support/docview.wss?uid=swg27036331>
- Content Collector for SAP Applications IBM Knowledge Center
http://www.ibm.com/support/knowledgecenter/SSRW2R_3.0.0/
- Sizing, configuration, and high availability for Content Collector for SAP
<http://www.ibm.com/support/docview.wss?uid=swg27036773>
- Predictive analytics on SAP with SPSS and InfoSphere Warehouse
<http://www.ibm.com/developerworks/data/library/techarticle/dm-1007predictiveanalyticssapsspss/>
- IBM Cognos Mobile
<http://www.ibm.com/software/products/en/cognos-mobile>
- IBM DB2 with BLU Acceleration speeds analytics
<http://www.ibm.com/software/data/db2/linux-unix-windows/db2-blu-acceleration/>

- InfoSphere Information Server Pack for SAP BW
<http://www-03.ibm.com/software/products/en/infosphere-information-server-pack-sap-bw>
- V9.1 IBM InfoSphere Information Server Integration Guide for Information Server Pack for SAP Applications (SC19-3876-00)
<http://ibm.co/1vRTnhu>
- IBM Cognos Proven Practices: IBM Cookbook for IBM Cognos 10 for use with SAP NetWeaver Business Warehouse
http://www.ibm.com/developerworks/data/library/cognos/infrastructure/cognos_specific/page551.html
- IBM InfoSphere Information Server
http://www-01.ibm.com/software/data/integration/info_server/
- IBM Rational solutions for SAP
<http://www-01.ibm.com/software/rational/solutions/sap/>
- Managing change in SAP: reducing cost and risk with IBM DevOps
<http://ibm.co/1neOv6A>
- IBM Tivoli Monitoring
<http://www.ibm.com/software/products/en/tivomoni/>
- IBM Tivoli Netcool/Impact
<http://www.ibm.com/software/products/en/tivonetc>
- IBM Tivoli Netcool/OMNIBus
<http://www.ibm.com/software/products/en/ibmtivolinetcoolomnibus>
- IBM SmartCloud Application Performance Management
<http://www.ibm.com/software/products/en/category/application-performance-management>
- IBM SmartCloud Monitoring
<http://www.ibm.com/software/products/en/ibmsmarmoni>
- IBM Tivoli Business Service Manager
<http://www.ibm.com/software/products/en/tivoli-business-service-manager>
- IBM Systems Director
<http://www.ibm.com/systems/director/>
- IBM Tivoli Data Warehouse
<http://www.ibm.com/software/tivoli/products/data-warehouse/>
- IBM Tivoli Application Dependency Discovery Manager
<http://www.ibm.com/software/products/en/tivoliapplicationdependencydiscoverymanager>
- IBM Offering Information page (announcement letters and sales manuals):
http://www.ibm.com/common/ssi/index.wss?request_locale=en

On this page, enter the IBM Software product of your interest, select the information type, and then click **Search**. On the next page, narrow your search results by geography and language.

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service. IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing, IBM Corporation, North Castle Drive, Armonk, NY 10504-1785 U.S.A.

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you. This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk. IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you. Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

© Copyright International Business Machines Corporation 2014. All rights reserved.

Note to U.S. Government Users Restricted Rights -- Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

This document was created or updated on October 10, 2014.

Send us your comments in one of the following ways:

- Use the online **Contact us** review form found at:
ibm.com/redbooks
- Send your comments in an e-mail to:
redbooks@us.ibm.com
- Mail your comments to:
IBM Corporation, International Technical Support Organization
Dept. HYTD Mail Station P099
2455 South Road
Poughkeepsie, NY 12601-5400 U.S.A.

This document is available online at <http://www.ibm.com/redbooks/abstracts/tips1218.html> .

Trademarks

IBM®

Redbooks (logo)®