Integrating SAP solutions with IBM WebSphere products

An interoperability survey

April 14, 2005

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Executive Summary

SAP®, one of the leading providers of global Enterprise Resource Planning (ERP) systems and IBM®, providing the leading software platform for e-business on demand, are cooperating to offer joint capabilities that permit seamless access to SAP® applications and resources from portals, mobile applications, other SAP systems, and a variety of enterprise applications.

This paper describes how the IBM WebSphere® family of products can be used in an SAP environment. It contains a brief survey of WebSphere products, highlighting how each product interoperates with SAP software. This interoperability begins with solid compliance and mutual support of open standards by both WebSphere and the SAP NetWeaver™ platform. It then extends to different levels of interoperability, from SAP-specific business integration adapters and portlets (available "out of the box"), to development tools that allow you to build applications that easily access your SAP resources, to complementary capabilities that allow you to build customized solutions. SAP and IBM products can be used together to address a variety of interoperability challenges related to mobile communication, e-commerce, and customer or B2B portals. This paper describes a) the levels of interoperability, b) sample integration scenarios, and c) possible scenarios that can be explored.

For example, SAP and IBM products can be used to:

Develop and deliver seamless access to SAP applications from within business portals. The WebSphere Portal and Lotus Workplace catalog offers packaged industry applications from various ERP vendors, including SAP. This allows portal users to access a variety of SAP applications, including displaying HTML pages from the SAP Internet Transaction Server, enterprise data from the SAP Business Information Warehouse component, and iViews from the SAP Enterprise Portal component.

Business users can quickly create business portals that access and manipulate data in SAP backend systems using a variety of tools such as WebSphere Portal Application Integrator and Bowstreet™ Portlet Factory for WebSphere. See WebSphere Portal – Lotus Workplace.

Link SAP backend systems with enterprise applications. The IBM WebSphere Business Integration family includes numerous ready-to-use application and technology adapters. These adapters can be used with all IBM integration brokers. The adapters that access SAP backend systems are WebSphere Business Integration Adapter for mySAP.com and WebSphere Business Integration Adapter for SAP Exchange Infrastructure. See WebSphere Business Integration.

Extend the capability of development tools to link to ERP systems. Developers can use IBM WebSphere Adapters for mySAP.com within the WebSphere Studio Application Developer Integration Edition to establish connectivity to SAP backend systems and to develop custom business applications. See WebSphere Studio.

Connect mobile workers with enterprise applications. IBM WebSphere EveryPlace Access, WebSphere Connection Manager, and the SAP Mobile Infrastructure (MI) architecture share common approaches and are built on the same standards. As a result, solutions can be built that expand or extend the capabilities present in each. For example, the SAP MI client can use IBM DB2® Everyplace as the standard database for storing persistent data on the mobile device. For other complementary scenarios and a description of the many features of IBM EveryPlace and

Connection Manager (such as the enterprise-level security offered by Connection Manager) see WebSphere Everyplace.

Developing and delivering e-Commerce front-ends to SAP systems. WebSphere Commerce is a flexible, standards-based e-Commerce platform that enables customers to run large high-volume B2B and B2C Web sites for global on demand businesses. WebSphere Commerce can act as an e-Commerce front-end to one or more backend systems including SAP applications like the mySAP™ ERP solution. WebSphere Commerce supports synchronous as well as asynchronous incorporation of multiple, different backend systems to ensure the implementation of a flexible and efficient Internet Sales channel. See WebSphere Commerce Suite.

Synchronize product information across multiple ERPs. WebSphere Product Center provides retailers and manufacturers with a comprehensive management solution for creating, managing and linking items, location, trading-partner, organization, and terms of trade information. Product information residing in multiple SAP applications like mySAP ERP can be synchronized and managed centrally using WebSphere BI to link enterprise data from the various sources. See WebSphere Product Center.

This paper demonstrates the value of IBM WebSphere in an SAP environment. It is written for IBM and SAP technical sales personnel, customers, and partners. The paper assumes that readers have a working knowledge of SAP software, and basic familiarity with WebSphere. For additional information on IBM WebSphere and SAP software, see Appendix A - Resources.

1 Overview of architectures: IBM Business Integration and the SAP NetWeaver platform

1.1 IBM Business Integration Reference Architecture outline

The IBM Business Integration Reference Architecture shows the key areas of integration capability that are required for comprehensive, enterprise-wide strategies and solutions.

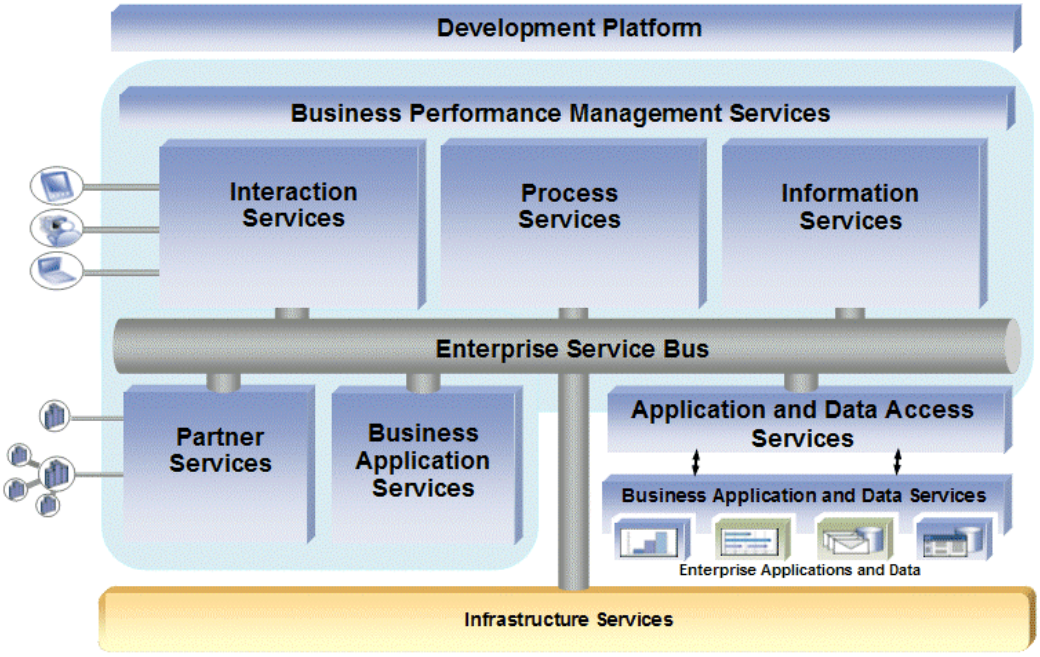


Figure 1-1 IBM Business Integration Reference Architecture

Tools are an essential component of any comprehensive integration architecture. The Business Integration Reference Architecture includes development tools, used to implement custom artifacts that leverage the infrastructure capabilities, and business performance management tools, used to monitor and manage the runtime implementations at both the IT and business process levels.

One key feature of the IBM Business Integration Reference Architecture is the link between the Development Platform and the Business Performance Management Services. The ability to deliver runtime data and statistics into the development environment allows analyses to be completed that drive iterative process re-engineering through a continuous business process improvement cycle.

At the core of the IBM Business Integration Reference Architecture is the Enterprise Service Bus. This architectural construct delivers all the inter-connectivity capabilities required to leverage and use services implemented across the entire architecture. Transport services, event services, and mediation services are all provided through the ESB. The ESB is a key factor in enabling the service orientation of the Business Integration Reference Architecture to be leveraged in

implementing service-oriented solutions. It can be implemented today to meet the quality of service requirements of any integration solution.

The IBM Business Integration Reference Architecture also contains a set of services that are oriented toward the integration of people, processes, and information. These services control the flow of interactions and data among people and automated application services in ways appropriate to the realization of a business process:

- **Interaction Services** provide the capabilities required to deliver IT functions and data to end users, meeting the end-user's specific usage preferences.
- **Process Services** provide the control services required to manage the flow and interactions of multiple services in ways that implement business processes.
- **Information Services** provide the capabilities required to federate, replicate, and transform data sources that may be implemented in a variety of ways.

Automated application services, implementations of business logic in automated systems, are a critical part of any integration architecture or solution. Existing enterprise applications and enterprise data are accessible from the ESB through a set of access services. These access services provide the bridging capabilities between legacy applications, pre-packaged applications, enterprise data stores (including relational, hierarchical and nontraditional, unstructured sources such as XML and Text), and the ESB. Using a consistent approach, these access services expose the data and functions of the existing enterprise applications, allowing them to be fully re-used and incorporated into functional flows that represent business processes.

The IBM Business Integration Reference Architecture also contains a set of Business Application Services that provide runtime services required for new application components to be included in the integrated system. These application components provide new business logic required to adapt existing business processes to meet changing competitive and customer demands of the enterprise.

In many enterprise scenarios, business processes involve interactions with outside partners and suppliers. Integrating the systems of the partners and suppliers with those of the enterprise improves efficiency of the overall value chain. Partner Services provide the document, protocol, and partner management services required for efficient implementation of business-to-business processes and interactions.

Underlying all these capabilities is a set of infrastructure services that provide security, directory, IT system management, and virtualization functions.

The IBM Business Integration Reference Architecture is a complete and comprehensive architecture that covers all the integration needs of an enterprise. Its services are well integrated and are delivered in a modular way, allowing integration implementations to start at a small project level. As each additional project is addressed, new integration functions can be easily added, incrementally enhancing the scope of integration across the enterprise. The architecture also supports Service Oriented Architecture strategies and solutions, given that the middleware architecture itself is designed using principles of service orientation and function isolation.

1.2 SAP NetWeaver outline

SAP NetWeaver is the technical foundation for all future SAP solutions like the mySAP Business Suite solution and the SAP® xApps™ packaged composite application. It is the consequent rearrangement and consolidation of basic functional and business-specific components to support cross-functional business processes on all relevant levels. SAP NetWeaver is built on service-oriented architecture paradigms and therefore has much in common with the IBM on demand business strategy. In SAP terminology the business applications packaged in the mySAP Business Suite and composed in SAP xApps composite applications are mostly referenced as applications that fit into an Enterprise Service Architecture.

As shown Figure 1-2, the SAP NetWeaver technology stack can be divided into six core building blocks.

- People integration
- Information integration
- Process integration
- Application platform
- Composite application framework
- Life-cycle management

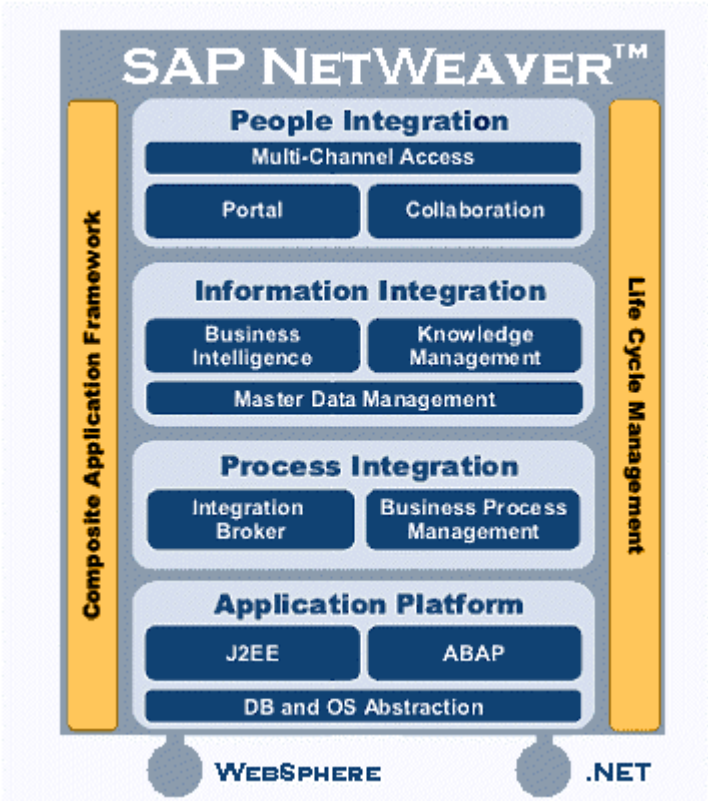


Figure 1-2 SAP NetWeaver - Overview

People Integration within SAP NetWeaver is responsible for providing users with the requested functionality and accurate information. Both internal and external users get a uniform user experience regardless of how many systems are involved in fulfilling the particular user request.

Information integration includes products that are responsible for making structured and unstructured information available in the enterprise in a consistent and accessible manner. For the information-consuming user or system, the access methods are transparent regardless of where the information is originally stored. SAP Business Intelligence combines important corporate information from various data sources to enable the enterprise to manage and analyze every single business aspect in a granular manner.

Process integration enables business processes to spread across system boundaries and execute across heterogeneous IT landscapes. This includes integration between SAP-specific components like in the mySAP Business Suite as well as components of third party ERP providers.

The Application platform of SAP NetWeaver is the SAP Web Application Server (SAP Web AS). It provides the complete infrastructure to develop, deploy and run all SAP NetWeaver applications. The key capability of SAP Web AS is its full support for both the proven ABAP and the innovative open source J2EE technology.

Composite application framework (CAF) includes the methodology, tools, and runtime environment to develop and run composite applications, called SAP xApps composite applications. SAP CAF leverages the service-based architecture to compose new business applications from reusable patterns.

Life-cycle management addresses special requirements for heterogeneous enterprise system landscapes (ABAP and Java) to ensure the operation of such complex environments with the requested quality of service.

This division supports the delivery of business integration capabilities of different levels. The fact that both WebSphere and .Net are mentioned in the official SAP NetWeaver overview chart emphasizes that NetWeaver is designed to interoperate with this primary market technology. This interoperability can be pictured as the use of well-defined APIs and common standards to offer SAP customers who implement SAP NetWeaver reliable bridges between the technology stacks.

2 WebSphere Business Integration Server Foundation

WebSphere Business Integration Server Foundation builds on the WebSphere Application Server to provide a premier Java™ 2 Enterprise Edition (J2EE) and Web services technology-based application platform for deploying enterprise Web services solutions for dynamic e-business on demand.

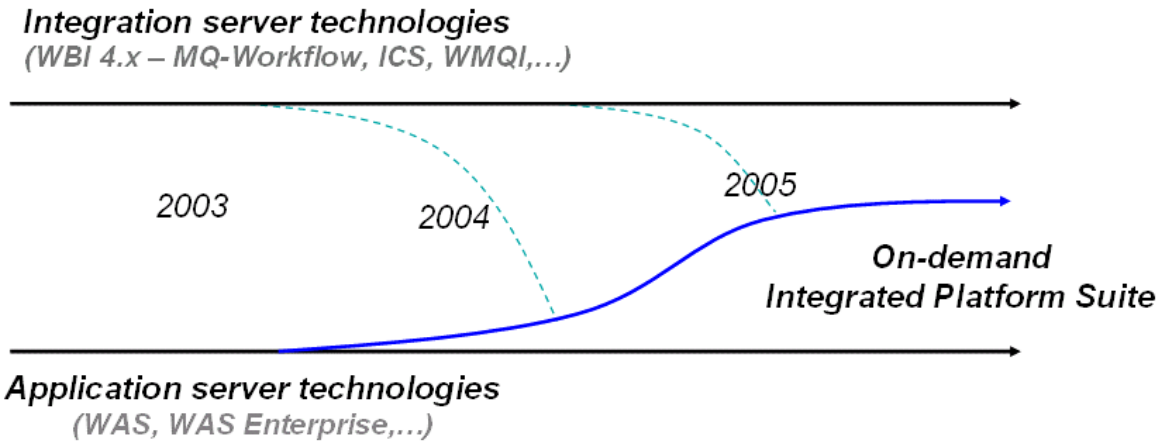


Figure 2-1 - On-demand Integrated Platform Suite

It represents IBM's approach to building and deploying SOA-based applications that can adapt quickly and easily to change. It is designed to support the creation of reusable services - either new ones or those based on existing services, back-end systems, Java assets, and packaged applications. Services can then be combined to form both composite applications and business processes, which can further leverage business rules to make these applications and business processes "adaptable".

WebSphere Business Integration Server Foundation brings several Programming Model Extensions (PMEs) to the application server to increase the added value for customers using this application server. The extensions are delivered in different forms, including services, APIs, wizards for development, and deployment extensions.

- **Activity Sessions**: Offers long-running transactions semantics without requiring XA support for all the resources involved in the unit of work.
- **Business Rule Beans**: Extends the scope of the WebSphere Application Server to support business applications that externalize their business rules.
- **Common Event Infrastructure**: The Common Event Infrastructure provides the runtime environment to persistently store and retrieve events from many different programming environments.
- **Container Managed Persistence over Anything**: Expands container-managed persistence to include the capability of persisting data to any back-end.
- **Extended Messaging**: Enhances standard J2EE Messaging by providing support for all types of messaging patterns, container support for these patterns, and code simplification.

- **Internationalization**: Enables business applications to automatically recognize the calling client's time zone and location information so your application can act appropriately. This technology allows you to deliver to each user, around the world, the right date and time information, the appropriate currencies and languages, and the correct date and decimal formats.
- **Scheduler service**: Allows J2EE-based business applications to schedule the execution of tasks in the future.
- **Shared work area**: Shared Work Areas provide a solution to pass and propagate contextual information between application components.

WebSphere Business Integration Server Foundation is optimized for building and deploying composite applications that extend and integrate existing IT assets. Key enablers for these trend-setting enterprise features are the out of the box support for

- Business Process Execution Language for Web Services (BPEL4WS)
- Human Workflow Support
- Enterprise Information System (EIS) connectivity

2.1 Business Process Execution Language for Web Services (BPEL4WS)

It defines a model and a grammar for describing the behavior of a business process based on interactions between the process and its partners. Support for BPEL4WS includes:

- Application assembly, deployment, and runtime support for BPEL4WS-based business processes
- Intuitive drag-and-drop tools to visually define the sequence and flow of BPEL4WS business processes
- A visual business process debugger to step through and debug BPEL4WS business processes
- Compensation support to provide transaction rollback-like support for loosely coupled business processes that cannot be undone automatically by the application server
- Flexibility to develop processes using a top-down, bottom-up, or meet-in-the-middle approach
- A standards-based XML Path Language (XPATH) / Extensible Stylesheet Transformation (XSLT) transformation wizard to map data between nodes in a process
- Integrated fault handling to provide an easy and integrated means of performing in-flow exception handling
- A visual condition builder allowing you to easily direct the execution of BPEL4WS processes
- Support for including Java snippets and artifacts as part of a business process

2.2 Human Workflow Support

Human workflow support expands the reach of BPEL4WS to include activities that require human interaction as steps in an automated business process. Business processes involving human interaction are interruptible and persistent and resume when the person completes the task. Human workflow support includes:

- Staff activity nodes to represent a step in a business process that is performed manually
- Ability to assign people (for example, your direct reports) to specific instances of a process via staff queries that are resolved at runtime using an existing enterprise directory
- Graphical browser-based interface for querying, claiming, working with, completing, and transferring work items to another user

- Work item management support for managing the creation, transfer and deletion of work items
- Dynamic setting of duration and calendar attributes for staff activities
- Dynamic setting of staff assignment via custom attributes

2.3 Enterprise Information System (EIS) connectivity

Support for building Web applications and BPEL4WS business processes that integrate with back-end systems including:

- Integrated tool support for using J2EE Connector Architecture (JCA) 1.0 resource adapters to access back-end systems
- Enhanced tool integration for JCA adapters with tool plug-in extensions (available from IBM and business partners)
- Easy to use tools for creating services out of JCA resource adapters and including those services as part of a BPEL4WS business process
- Enhanced JCA 1.0 resource adapters included for CICS®, IBM Host On-Demand and IBM IMS® (for development use only)
- Sophisticated wizards to manage the low-level data handling requirements for JCA resource adapters
- Wizards to quickly and simply expose CICS or IMS programs as enterprise services including the ability to import definitions from COBOL, C structures, CICS basic mapping support (BMS), and IMS Message Format Service (MFS) definitions
- Support for the entire suite of WebSphere Business Integration Adapters

The fact that both companies undertake the commitment to support open standards in their product suites is the foundation for the interoperability between the different components across vendor and system boundaries. WebSphere Business Integration Server Foundation can use SAP interfaces that comply with these standards. Figure 2-2 lists examples of standards that are supported by the SAP NetWeaver technology platform and can therefore be used by IBM components.

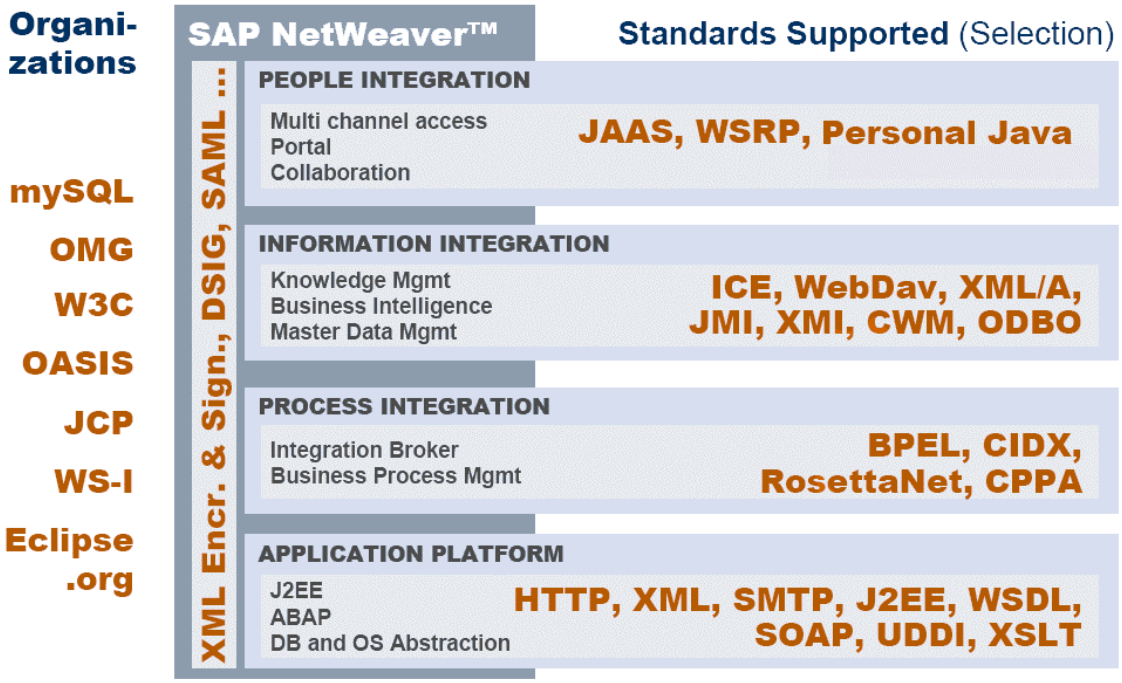


Figure 2-2 – SAP and IBM standards support

3 WebSphere Studio

IBM WebSphere Studio offers the best solution for accelerating team application development. Whether you need to build on demand applications or are just getting started, WebSphere Studio provides an open, comprehensive development environment that tightly integrates with Ready for WebSphere Studio Partner plug-ins and third party Eclipse-based offerings. Founded on open technologies and built on Eclipse, WebSphere Studio provides a flexible, portal-like integration of multi-language, multi-platform and multi-device application development tools for building, testing and deploying dynamic applications.

3.1 Product packaging and transition

WebSphere Studio is available in various editions for different audiences and is transitioning to the Rational brand naming conventions.

- **WebSphere Studio Homepage Builder**

  An entry level Web authoring tool for creating and publishing Web sites. Provides an easy-to-use interface, templates and wizards.

- **WebSphere Studio Site Developer**

  An easy-to-use integrated development environment with high productivity RAD tools for building and maintaining dynamic Web applications, Web services and Java applications.

  - **Rational Web Developer for WebSphere Software**

    The newest version of Site Developer. Build, test and deploy Web, Web services and Java applications with an Eclipse-based IDE that is easy to learn and use.

- **WebSphere Studio Application Developer**

  A comprehensive integrated development environment with high productivity tools for building and maintaining Web services, portals and J2EE applications.

  - **Rational Application Developer for WebSphere Software**

    The newest version of Application Developer. Quickly design, develop, analyze, test, profile and deploy Web, Web services, Java, J2EE and Portal applications with a comprehensive Eclipse-based IDE.

- **WebSphere Studio Application Developer Integration Edition**

  A build to integrate solution for accelerated development and integration of complex applications.

- **WebSphere Studio Enterprise Developer**

  Brings the power of J2EE, COBOL, PL/I, and rapid application development to diverse enterprise environments.

- **WebSphere Studio Device Developer**

  A comprehensive Java™ 2 Micro Edition (J2ME) application development environment that can be used to extend existing e-business applications to PDAs, cellular telephone and pervasive devices.

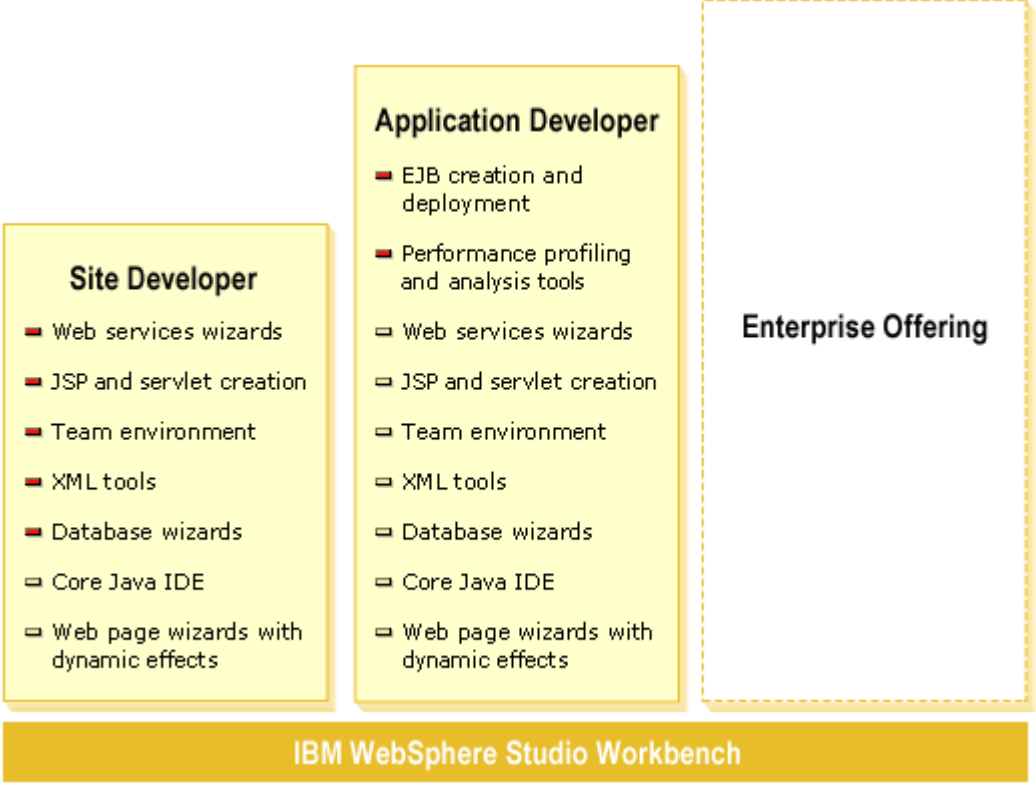


Figure 3-1 WebSphere Studio packaging

IBM WebSphere Studio Application Developer-Integration Edition (WSAD-IE) leverages a service-oriented architecture to build modular applications that are designed to adapt quickly to change. This is done by creating easily reusable services out of your Web services, Java assets, backend systems, packaged applications, people, and processes. WSAD-IE is able to use the IBM WebSphere Business Integration Adapter for SAP as well as the IBM WebSphere Adapter for mySAP.com to establish connectivity to SAP backend systems.

IBM WSAD-IE allows customers to visually develop business processes and uses a new business process designer and debugger that support the creation of process flows that conform to the BPEL 1.1 standard. The product also includes a new editor for the Web Services Description Language (WSDL) that simplifies user interaction with the product and adds visual clarity to how the various components interact.

In summary, the major new features in WSAD-IE are as follows:

- Business process designer for creating BPEL for Web Services 1.1 (BPEL4WS) process flows
- Integrated visual BPEL debugger
- Enhanced performance for installing and debugging, including support for J9 Hot Swap
- New visual condition builder to direct the execution of BPEL processes
- Automated migration of process flows from Flow Definition Markup Language (FDML) to BPEL

3.2 WebSphere Studio Plug-in Central

WebSphere Studio Plug-in Central is a directory of qualified WebSphere Studio plug-ins that have been validated as "Ready for WebSphere Studio Software". IBM grants this validation to specific vendor plug-ins that meet WebSphere Studio integration criteria. Vendors who have software that integrates with the Eclipse-based WebSphere Studio family can get it validated as a "Ready for WebSphere Studio Software" plug-in. This certification allows them to use the "Ready for WebSphere Studio Software" emblem in the product advertising, and the plug-in is

listed in the WebSphere Studio Plug-in Central directory. The list of available tools is growing continuously, which shows the commitment of our business partners and their contribution to the WebSphere Studio product family.

SAP supports a similar certification approach for the SAP NetWeaver Developer Studio, which is SAP's Eclipse-based Java development platform. Because the development environments run on the same Eclipse core technology, business partners can earn certifications by both SAP and IBM. Another feasible scenario is for IBM and SAP to choose parts of their plug-in portfolio and certify these pieces to run in the other development environments.

4 WebSphere Business Integration

IBM WebSphere Business Integration is a set of products and offerings that help companies connect applications and share information. These products and offerings include tools and process templates to improve business operations. You can use these tools and process templates to model, automate, and monitor processes involving people and heterogeneous systems, both inside and outside of the enterprise. WebSphere Business Integration products and offerings also help to make your revised business operations scalable, reliable, and efficient. WebSphere Business Integration introduces a highly manageable and efficient architecture for business integration by including a central integration broker and Enterprise Information System (EIS) specific-adapters.

4.1 WebSphere Business Integration architecture

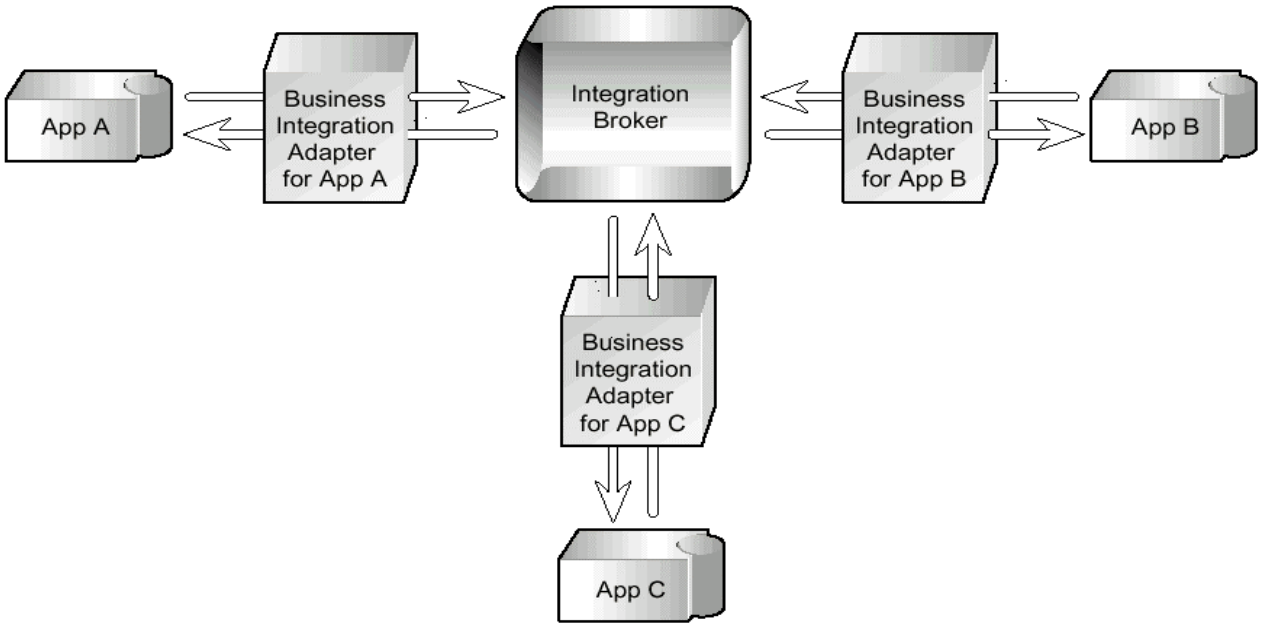


Figure 4-1 – Central Integration broker and EIS specific adapter

The WebSphere Business Integration broker is responsible for routing data between participating EIS, and performing transformations (such as parsing, mapping or aggregation) on the received data before it is forwarded. In addition, the WebSphere Business Integration broker may process business logic between connected EIS, for instance synchronizing data from various resources or executing short-term or long-term business processes.

Each EIS is connected to the central WebSphere Business Integration broker using a dedicated adapter. WebSphere Business Integration adapters are built to present a common client interface

to each EIS in a common development tooling. The use of pre-built adapters provides rapid deployment and reduces risk. WebSphere Business Integration Adapters are runtime components integrated with the business integration system. WebSphere Business Integration Adapters span a wide range of applications and technologies.

All the adapters have two components. The first part of the adapter is its application-facing component. This is the part of the adapter that has explicit internal coding and knowledge of how to interact with the application or technology. This part may support several access mechanisms such as synchron or asynchron using different backend interfaces. This multi interface support enables the adapter to provide different Quality of Service (QoS) levels, because each interface has typical QoS characteristics. For example, an SAP adapter contains Business Application Programming Interface (BAPI®) calls to access the SAP system. The adapter's application-specific components are different for each different type of adapter.

The second part of the adapter is the broker-facing component. This component interacts with the broker by forming communication links to send and receive the adapter's data. This component is identical in all adapters. It has the in-built capability to transform the application-originated or -destined data to and from a common data representation for transmission to the broker. The data content that is sent to and from the broker is the IBM Business Object. The use of pre-built WebSphere Business Integration Adapters with a Common Business Object Model ensures data consistency across all participating applications. Adapters are available for a broad range of prepackaged application vendors such as SAP, Siebel and i2 as well as for typical integration technologies such as Java Messaging Service (JMS), Java Database Connectivity (JDBC) and Web Services. Pre-built adapters offer the following benefits:

- Reduce effort
- Reduce project times
- Simplify integration work
- Minimize risk

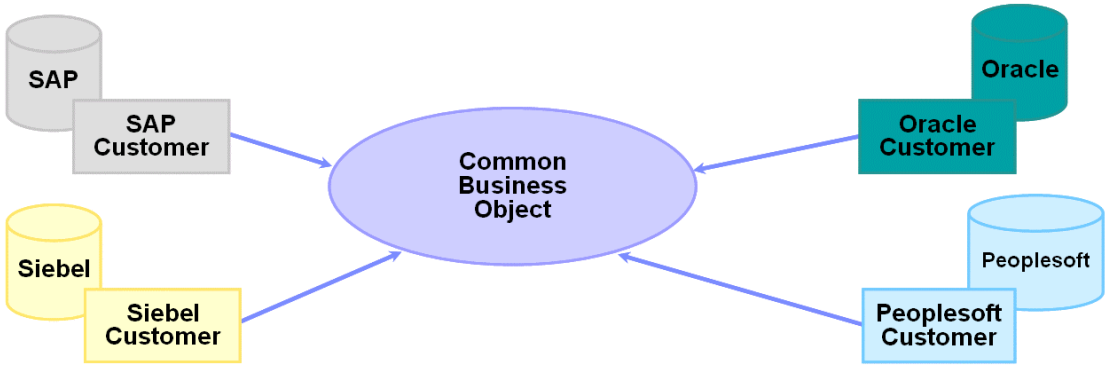


Figure 4-2 – Common Business Object

IBM offers an integrated portfolio of products to deliver all six integration capabilities and the core service-oriented infrastructure:

- Model - Design, simulate and plan business processes.
- Transform - Create new business value from existing IT systems.
- Integrate - Link people, processes, applications, systems and data.
- Interact - Provide secure, single point of interaction with people, data, applications and processes accessed by any device, anywhere, anytime.
- Manage - Optimize performance against business measures.
- Accelerate - Deploy pre-built intelligent business processes.

The WebSphere Business Integration Modeler contains tools to help you to model, transfer and manage complex business scenarios quickly and effectively before they are implemented. Based on Eclipse, it delivers new open-systems availability to the modeling world and can generate comprehensive business processes following the BPEL notation.

The integration pillar is responsible for integrating all required resources on a common infrastructure, for maximum efficiency. The basic concept is to have a central integration broker and backend-specific adapters. The integration broker is responsible for coordinating the interaction of all enterprise components. These components can be highly sophisticated ERP systems or native data sources. The adapters are responsible for transforming the backend-specific data into a common format that is agreed upon with the integration broker. Available integration brokers are:

- WebSphere Business Integration Server Foundation (WBISF)
- WebSphere InterChange Server (ICS)
- WebSphere Business Integration Message Broker

The following table illustrates the strengths of the different integration servers and can be used to make a decision for a particular integration requirement.

Characteristic	WBISF	WICS	WBIMB
MQSeries prevalent environment	o	o	+
Java oriented environment	+	+	o
Next generation platform	+	o	o
Make use of pre-build collaborations	o	+	o
Business process integration/modeling	+	+	o
Standards based solutions	+	o	o
Web Services based solutions	+	+	o
Human interaction	+	o	o
High availability	+	+	+
High volume message exchange	o	o	+
Dynamic message routing	o	o	+
Platform availability			
Unix	+	+	+
Linux	+	o	+
zOS	+	o	+

Legend:
o - neutral
+ - strength

4.2 SAP-specific WebSphere Business Integration Adapters

The IBM WebSphere Business Integration family includes numerous ready-to-use application and technology adapters. These adapters can be used with all IBM integration brokers. The adapters that access SAP backend systems are:

- WebSphere Business Integration Adapter for mySAP.com
- WebSphere Business Integration Adapter for SAP Exchange Infrastructure

4.2.1 WebSphere Business Integration Adapter for mySAP.com

WebSphere Business Integration Adapter for mySAP.com provides bi-directional, multi-threaded, real-time integration with SAP backend systems. The adapter uses SAP's native SAP Java Connector to access the backend and supports following access paradigms:

- RFC Server module
- BAPI/RFC calls
- ALE module
- ABAP Extension modules
- Hierarchical Data Retrieval

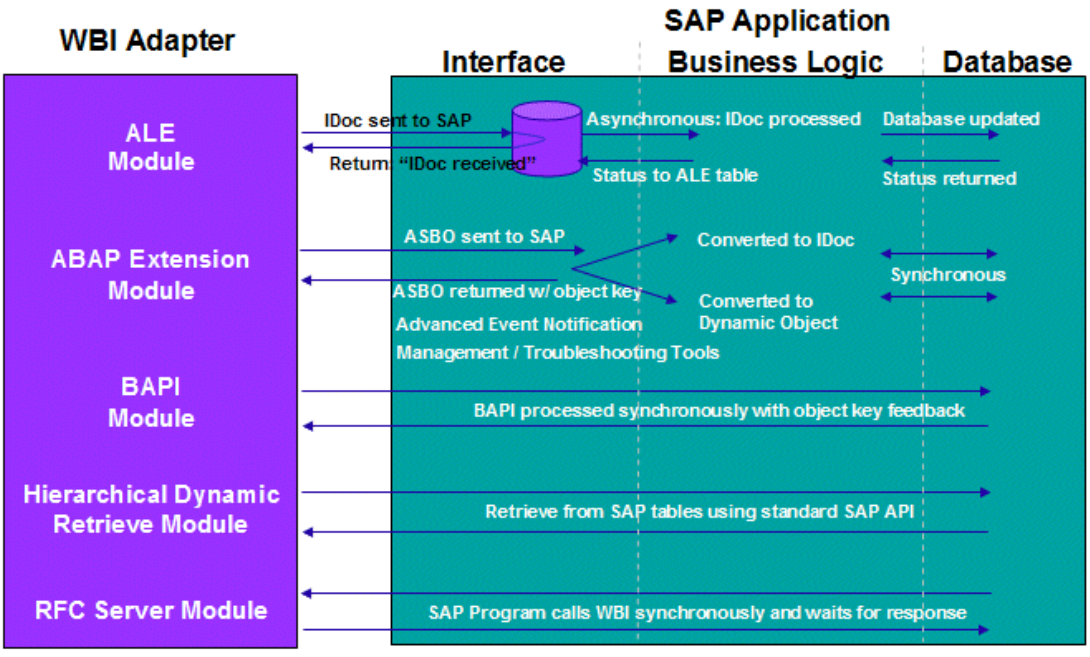


Figure 4-3 - Modules of the WBI Adapter for mySAP.com

4.2.2 WebSphere Business Integration Adapter for SAP Exchange Infrastructure

WebSphere Business Integration Adapter for SAP Exchange Infrastructure supports both request and event processing and is capable of both listening for messages from SAP XI and sending messages to SAP XI from any IBM integration broker. It provides out-of-the-box technical

interoperability between both integration solutions on the message level and supports various Quality of Service levels such as one-time delivery.

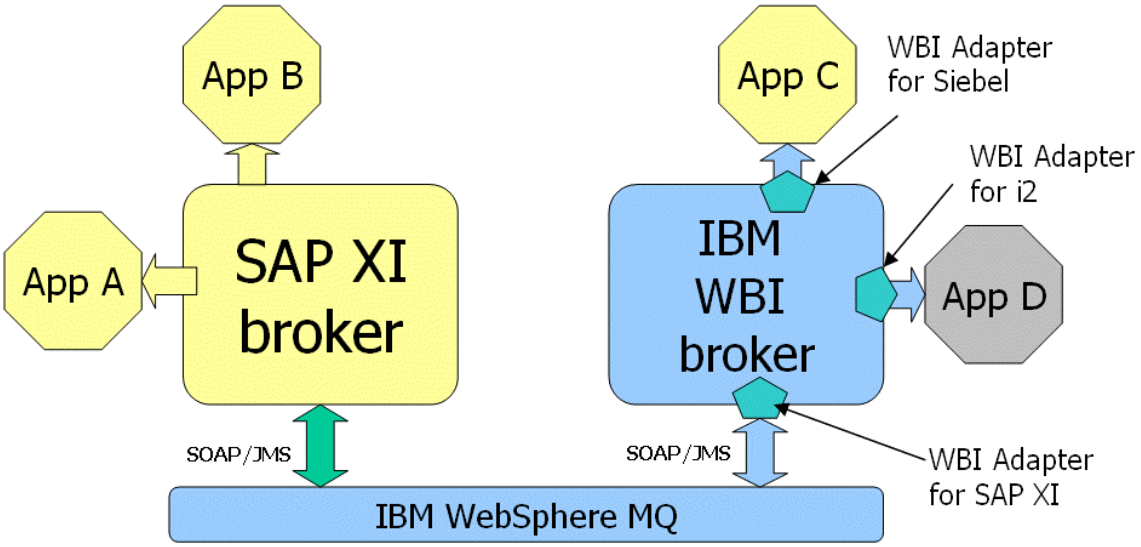


Figure 4-4 - WebSphere Business Integration and SAP Exchange Infrastructure

IBM and SAP currently work to further standards that ease business integration activities and make integration across vendor boundaries feasible. The Java Connector Architecture (JCA) and the BPEL4WS are perfect examples of standards that are driven and supported by both companies. SAP and IBM support these key integration standards off-the-shelf in their business integration product suites. This will give customers the opportunity to use JCA-compliant adapters in their adapter framework regardless of which vendor provides the adapter. Business processes defined in BPEL4WS become much more exchangeable and can be imported and exported in different modeling environments. This eases interoperability between WebSphere Business Integration and SAP Exchange Infrastructure.

5 WebSphere Portal – Lotus Workplace

IBM Lotus Workplace delivers a single, universal point of access that is integrated, highly customizable, extensible and scalable to interact with key applications, content, people and business processes.

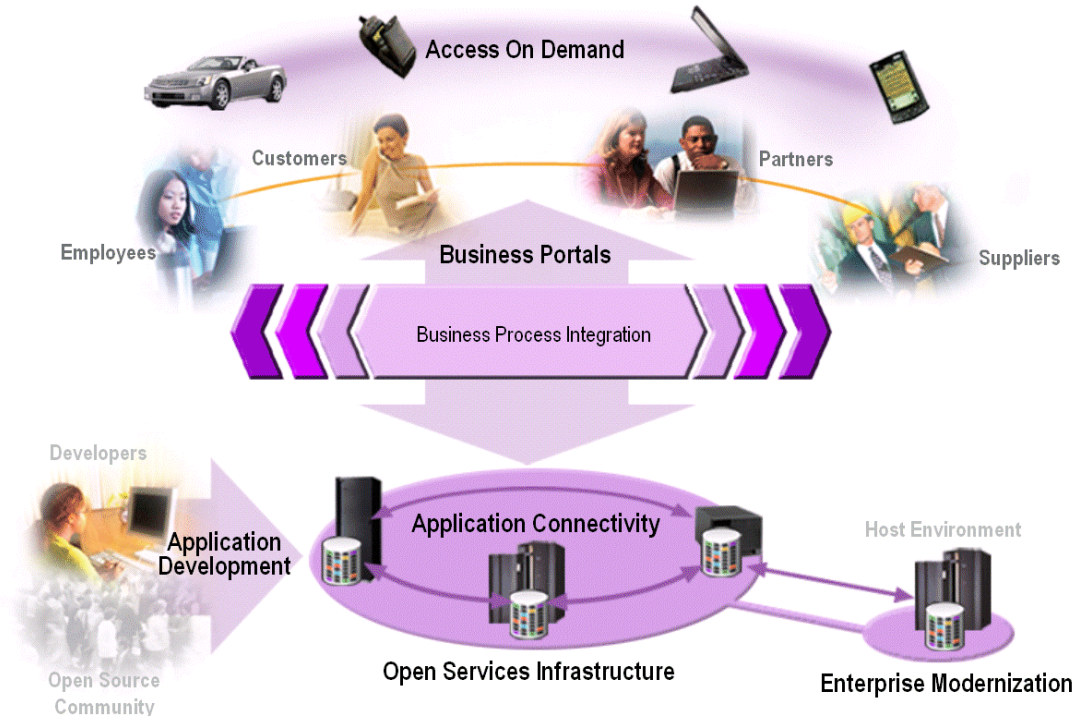


Figure 5-1 Business Portals

It provides powerful collaboration by sharing, organizing and creating transactions, information, business processes and applications with other portal users. It gives users a content publishing, document management and personalization interface that lets them create and target portal content in one step. The Lotus Workplace is built on a sound foundation, the award-winning IBM WebSphere Application Server, an open, cross-platform, J2EE-based solution.

Together with this robust enterprise portal framework, IBM provides business partners with ready-to-use assets for integrating existing enterprise components rapidly into a real portal experience. The WebSphere Portal and Lotus Workplace catalog offers numerous portlets for e-mail, calendars, syndicated news and packaged industry applications from various ERP vendors like SAP.

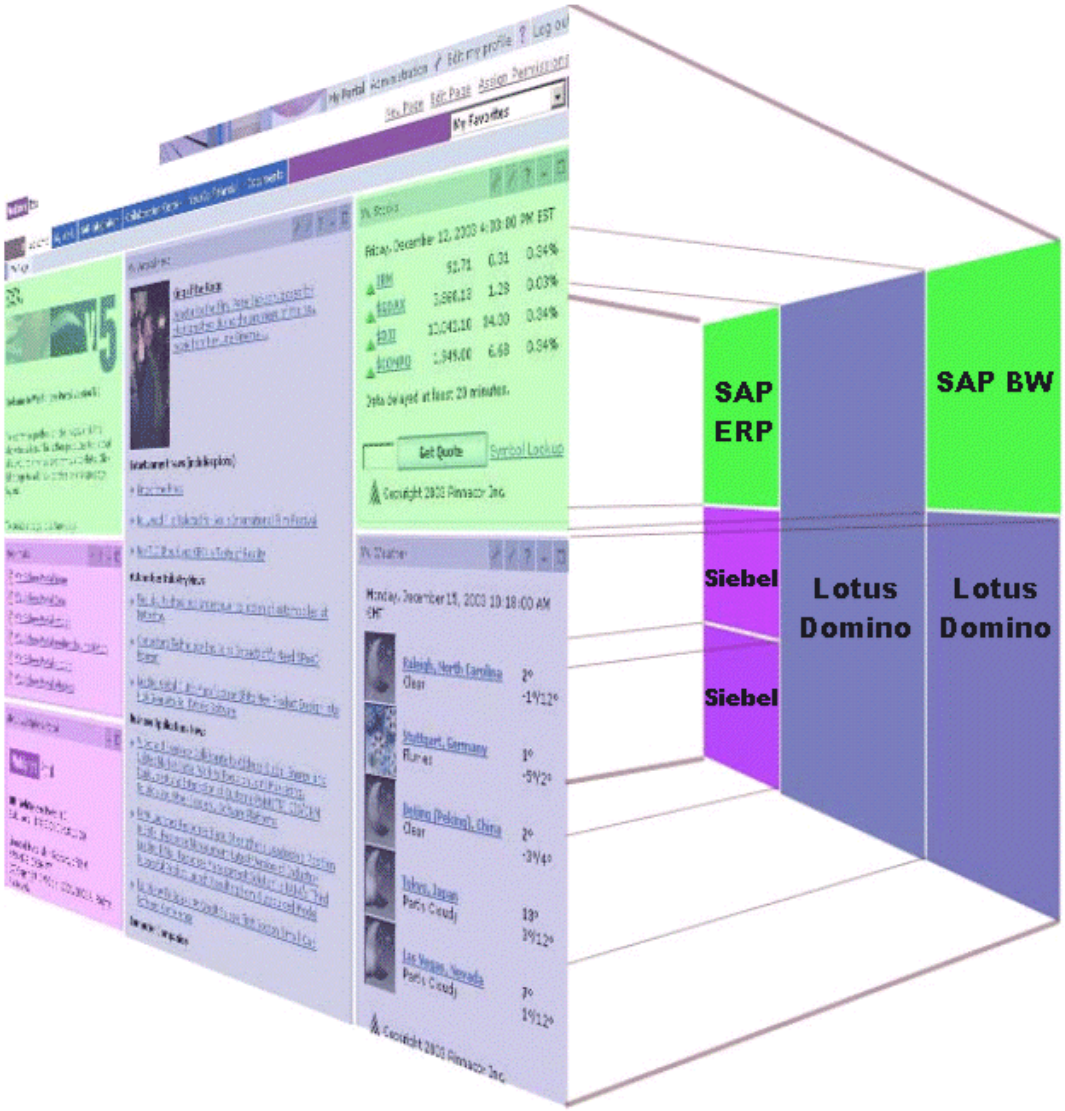


Figure 5-2 Meta portal scenario

5.1 SAP HTML GUI

The HTML GUI portlet is used to integrate the SAP Internet Transaction Server (ITS) based SAP HTML GUI. The HTML pages are requested from the SAP ITS system and displayed via an Iframe within a WebSphere Portal Server (WPS) page. Single Sign On (SSO) is achieved by

storing the SAP UserID of the particular WPS user in a dedicated Credential Vault slot. The first portlet access passes the credentials to the SAP ITS system, which issues a SAP Logon ticket. This ticket is reused for subsequent requests.

The WPS administrator and user have several configuration options for customizing the portlet, such as adjusting the display size or defining a start transaction. Users can also open a separate browser window instead of displaying the SAP content within the WPS page.

5.2 SAP Business Information Warehouse

5.2.1 SAP BW portlet

The BW portlet can integrate SAP Business Information Warehouse enterprise data into the WebSphere Portal Server. This specific portlet uses the SAP BW Business Explorer Web API to request HTML-based markup, which is displayed using a standard Iframe. SSO is achieved by storing the SAP UserID of the particular WPS user in a dedicated Credential Vault slot. The first portlet access passes the credentials to the SAP BW system, which issues a SAP Logon ticket. This ticket is reused for subsequent requests. The portlet also provides a link to the respective Help page of the query.

The HTML pages are created by the SAP system and displayed via an IFrame. SSO is done by using the Portal Credential Vault. The credentials are passed with the first request. After that, the SAP Logon ticket is stored as cookie in the browser. The portlet can also display charts and graphics that are rendered by a connected SAP Internet Graphics Server (IGS).

5.2.2 XML for Analysis

The SAP Business Information Warehouse offers additional interfaces for reporting and analysis. The XML for Analysis (XMLA) interface can be used to access the SAP BW enterprise data using a state-of-the-art Web-Service-style interface. The XMLA interface offers secure and fine-grained access to enterprise data. The communication is done via SOAP over HTTP calls and the interface is described using a standardized WSDL notation. The XML-based response from the SAP Business Information Warehouse can be transformed using the built-in XSL stylesheet processor Xalan before the data is presented to the end user.

5.2.3 OLAP BAPIs

Like any SAP backend system, SAP Business Information Warehouse provides certain BAPIs to retrieve specific enterprise data. These BAPIs are unique for SAP BW systems and use the integrated online analytical processing (OLAP).

5.3 iView consumption

The WPAI iView Builder can integrate iViews provided by the SAP Enterprise Portal. The entire administration and runtime is on the SAP Enterprise Portal and only the front end is integrated into the IBM WebSphere Portal Server

The HTML for the iViews is created by the SAP system and displayed via an IFrame. SSO is done by using the Portal Credential Vault. The login is done by passing the userid and password with the first request. After that, the SAP Logon ticket is stored as cookie in the browser.

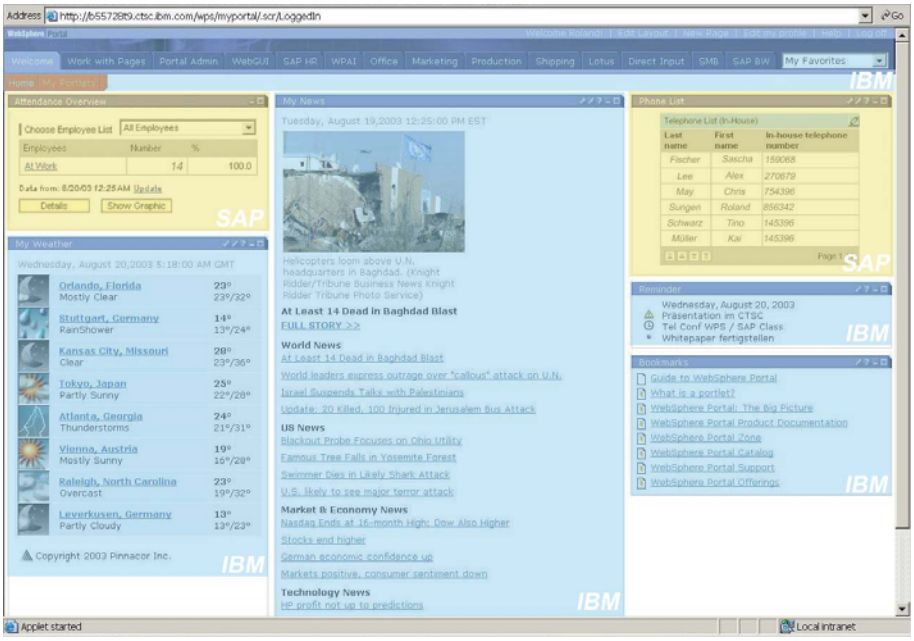


Figure 5-3 Seamless portal integration

5.4 WebSphere Portal Application Integrator

The WebSphere Portal Application Integrator (WPAI) is a component of the WebSphere Portal Server that enables the rapid creation of customized business portlets. The WPAI implements a highly flexible architecture to enable the created business portlets to consume and process business data residing on various EIS. Using a builder approach, it abstracts EIS-specific behavior in a single subcomponent--the respective WPAI builders. WPAI includes a wide range of builders out of the box. These builders can access full EIS or use a special API to access a standard information source. Supported systems are:

- SAP ERP
- Siebel®
- PeopleSoft®
- Oracle®
- Lotus Domino
- WebSphere Portal Content Publishing
- Relational Databases

The SAP-specific WPAI portlet builder enables dedicated business users to create, on the fly, portlets that access and manipulate data in an SAP backend. No programming knowledge is required. By selecting business objects available from the enterprise application, users can specify which data fields should be displayed in the portlet and which actions can be executed. After the creation process is finished, the portlet can be made available to portal end users. Technically the WPAI portlet builder for SAP is a portlet itself, which increases the usability significantly. With the intuitive builder, there is no need become familiar with a new development environment.

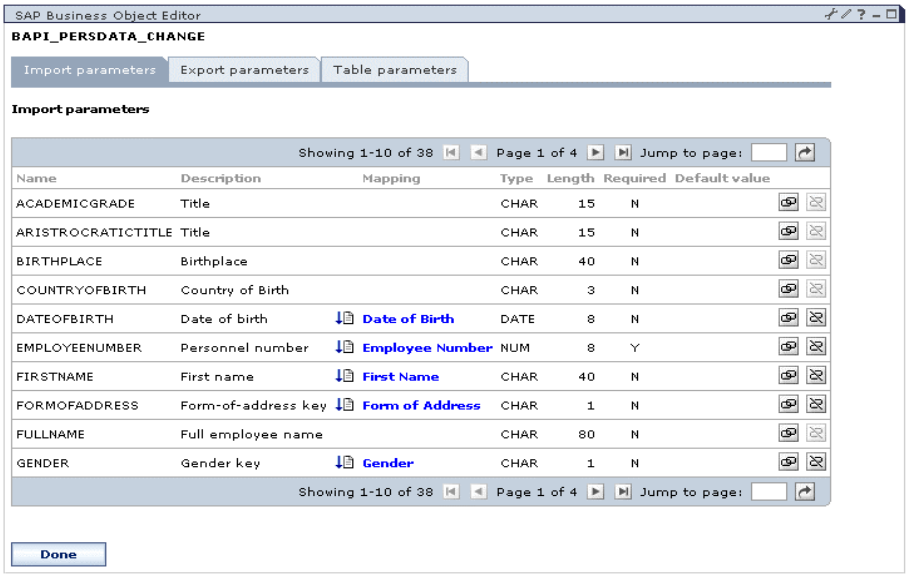


Figure 5-4 SAP Business Object Builder portlet

Business portlets created with WPAI can also make use of WebSphere Portal features such as Click2Action and People Awareness. Click2Action allows WPAI power users to easily enable their business portlets to participate in the built-in message distribution framework as message consumer or message producer. People Awareness permits the users of WPAI business portlets to use instant messaging features ad-hoc without programming of low-level functions. Finally all WPAI business portlets are by default accessible via pervasive devices and not limited to standard browsers. This offers another level of flexibility and extensibility.

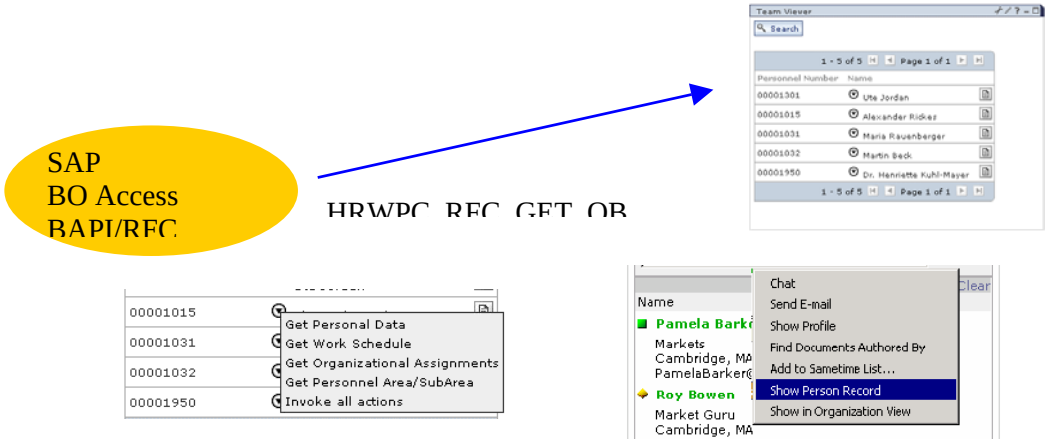


Figure 5-5 Built in Click2Action and Sametime support

WPAI comes with a large set of predefined business portlets in the SAP area. These portlets can be used out of the box, and they cover portal-based activities in following business areas:

- Financing
- Sales and Distribution
- Controlling
- Material Management
- Internal Order Monitoring
- Human Resources – Employee Self Service
- Human Resources – Manager Self Service

5.5 Bowstreet Portlet Factory for WebSphere

The Bowstreet Portlet Factory for WebSphere is a rapid application development tool based on the Eclipse framework. The many available Builders make the development of portlets easy. If a portlet needs to be further enhanced, developers can add their own J2EE code. The Portlet Factory could be used to create custom SAP Portlets for deployment directly into the WebSphere environment.

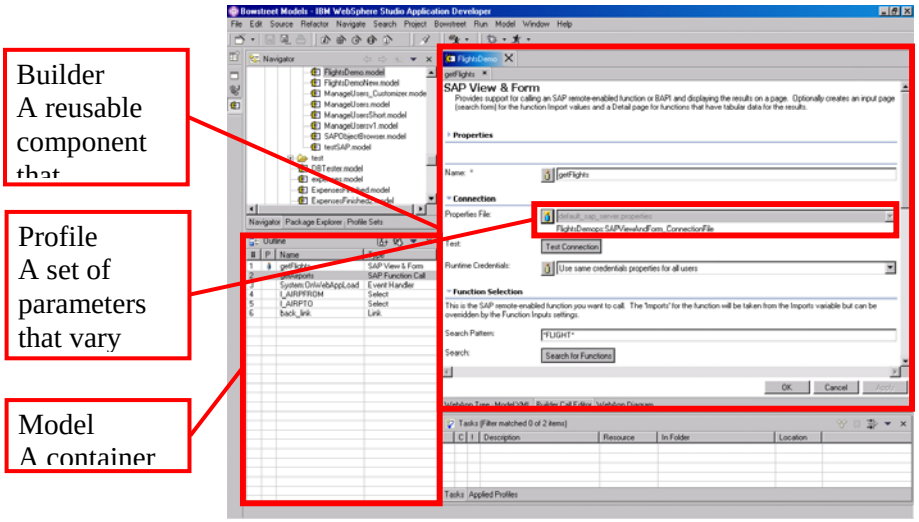


Figure 5-6 Bowstreet development environment

It is also possible to integrate BW content with the Bowstreet Portlet Factory for WebSphere.

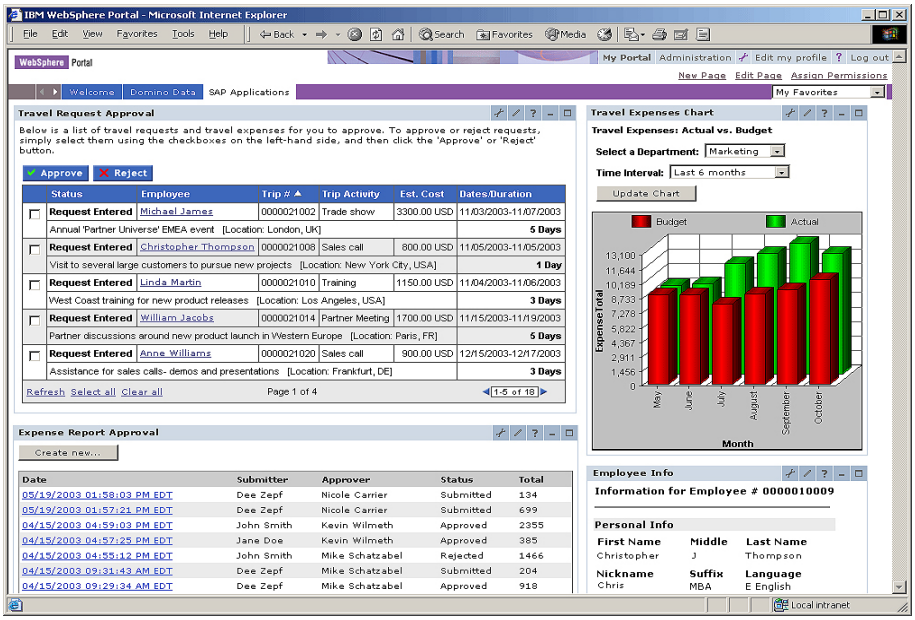


Figure 5-7 SAP Business Warehouse integration using Bowstreet

5.6 Tivoli® Access Manager for Single Sign-On

IBM Tivoli Access Manager is a policy-based access control solution for e-business and enterprise applications. It allows users to manage growth and complexity, control escalating management costs and address the difficulties of implementing security policies across a wide range of Web and application resources.

It delivers a secure, unified and personalized e-business experience out of the box by providing authentication and authorization APIs and integration with application platforms of different vendors such as IBM and SAP. Tivoli Access Manager secures access to business-critical applications and data spread across the extended enterprise.

Web-based single sign-on (SSO) can span multiple sites or domains by exploiting Access Manager cross-domain SSO technology or by using Security Assurance Markup Language (SAML) and other token-passing protocols. This technology can be used to establish a SSO scenario between the IBM WebSphere Portal Server and the SAP Enterprise Portal as illustrated in Figure 5-8.

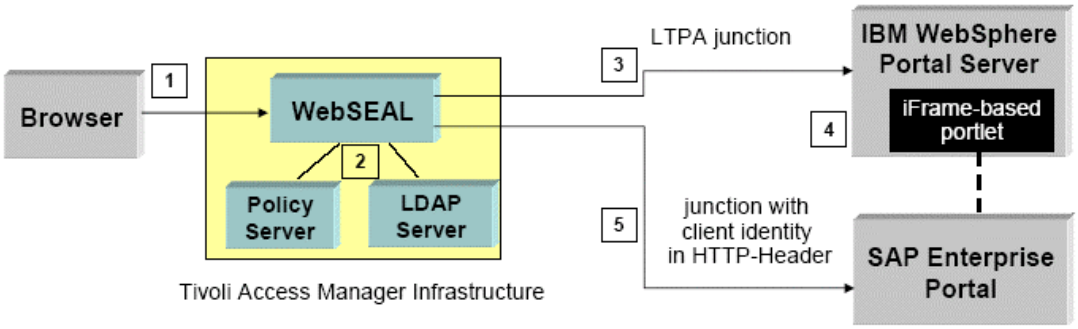


Figure 5-8 SSO using Tivoli Access Manager

5.7 Interoperability based on open standards

5.7.1 Web Services for Remote Portals

Web Services for Remote Portals (WSRP) are visual, user-facing web-services-centric components that plug-and-play with portals, or with other intermediary web applications that aggregate content or applications from different sources. They are designed to enable businesses to provide content or applications in a form that does not require any manual content- or application-specific adaptation by consuming intermediary applications.

Because WSRP includes presentation, service providers determine how their content and applications are visualized for end-users and to what degree adaptation, transcoding, and translation is allowed.

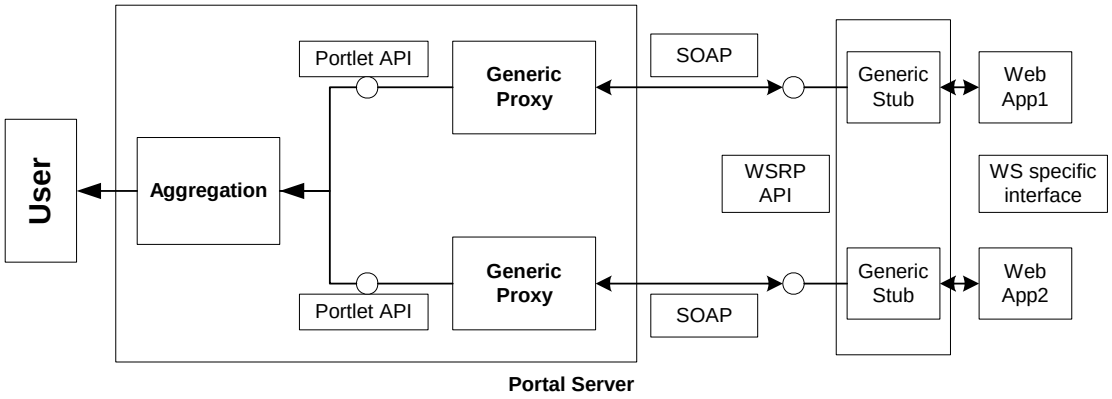


Figure 5-9 General WSRP architecture

WSRP services can be published into public or corporate service directories, such as Universal Description, Discovery, and Integration (UDDI), where they can easily be found by intermediary applications that want to display their content. Web application deployment vendors can wrap and adapt their middleware for use in WSRP-compliant services. Vendors of intermediary applications can enable their products for consuming WSRP. Using WSRP, portals can easily integrate content and applications from many internal and external content providers. The portal administrator simply chooses the desired services from a list and integrates them; no programming is required to tie new content and applications into the portal.

The WSRP standard defines a web services interface description using WSDL, as well as all the semantics and behavior that web services and consuming applications must comply with in order to be pluggable. It also defines the meta-information that must be provided when publishing WSRP services into UDDI directories. The standard allows WSRP services to be implemented in very different ways, for example, as a Java/J2EE-based web service, a web service implemented on the Microsoft® .NET platform, or a portlet published as a WSRP Service by a portal. The standard enables the use of generic adapter code to plug any WSRP service into intermediary applications rather than requiring specific proxy code.

WSRP services are WSIA component services built on standard technologies including SOAP, UDDI, and WSDL. WSRP adds several context elements including user profiles, and information about the client device, locale and desired markup language. These context elements are passed to them in SOAP requests. A set of operations and contracts are defined that enable WSRP plug-and-play.

By using WSRP all remote connections share a unified API, so a generic proxy could be generated automatically. The portlet provider handles the graphical representation, and the consumer need not update anything in the portal when the WSRP portlet changes.

WebSphere Portal Server supports both the consumer and producer parts of the WSRP standard. SAP plans to support WSRP in its upcoming SAP NetWeaver software stack. The support of the complete WSRP standard by SAP would be a significant enhancement to portal interoperability, as would deployed portlets and iViews that produce WSRP-compliant markups that can be distributed and consumed via WSRP standards. In practice, each individual IBM portlet application and SAP business package must provide a certain compliance statement to ensure interoperability.

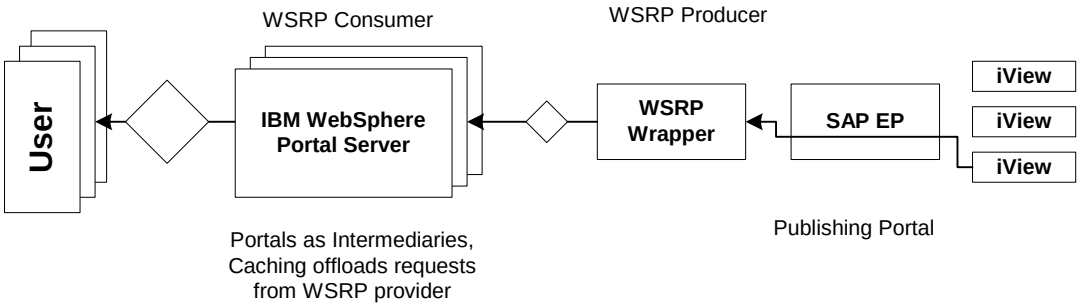


Figure 5-10 Portal Interoperability using WSRP

5.7.2 Portlet Specification - JSR168

JSR168 is a specification that defines a set of APIs to enable interoperability between portlets and portals, addressing the areas of aggregation, personalization, presentation, and security. JSR168 defines following behaviors:

- The portlet API (Portlet container), which provides a runtime environment to invoke portlets
- A URL-rewriting mechanism for creating user interaction within a portlet container
- Security and personalization of portlets

The current release of IBM WebSphere Portal Server supports the JSR 168 standard completely. This means that any JSR168-compliant portlet-based business application can be deployed and executed on IBM WebSphere Portal Server.

SAP plans to support JSR 168 in its upcoming SAP NetWeaver software stack. This would enhance the interoperability between both portal platforms. Both portal frameworks would be able to run JSR168-compliant portlet-based business applications. Because this standard is new, there are only a few JSR168-compliant portlet-based business applications available in the market. However, this number will increase significantly in the future.

Two possible scenarios are:

- IBM provides JSR168-compliant assets on the IBM WebSphere Portal and Workplace Catalog, which are hosted on the SAP Enterprise Portal.
- Future SAP business packages comply with the JSR168 standard and execute on the IBM WebSphere Portal Server platform. This would result in a high degree of interoperability and offer significant benefits for any customer hosting a heterogeneous portal environment.

6 WebSphere Everyplace

As the popularity of mobile computing grows, mobile workers are realizing the value of having access to information and resources held by the enterprise. Access to this information and the enterprise resources allows them to work more effectively and stay current with changing events and new information while away from the office. Giving mobile employees access to enterprise applications and information can deliver a critical business advantage for today's on demand enterprises. The WebSphere Everyplace family is IBM's mobile enablement platform that provides end-to-end coverage for enterprise mobile computing needs. In this document we will discuss only two members of this family:

- WebSphere Everyplace Access (WEA). WEA extends the capabilities of WebSphere Portal Server to mobile devices by building on the services provided by both WebSphere Application Server and WebSphere Portal technology, and providing the additional services needed for mobile computing solutions.
- WebSphere Everyplace Connection Manager (WECM). WECM is a smart Virtual Private Networking (VPN) solution to securely connect mobile devices to the corporate network. It is designed with the special circumstances in the mobile environment in mind, such as low bandwidth and network interceptions.

6.1 WebSphere Everyplace Access - Brief overview

WebSphere Everyplace Access is designed to address the complexity and diversity of providing and managing mobile computing solutions for the enterprise. WebSphere Everyplace Access is middleware that enables the enterprise and business partners to create robust mobile computing solutions that extend enterprise resources such as business applications, business data and business information to the mobile worker.

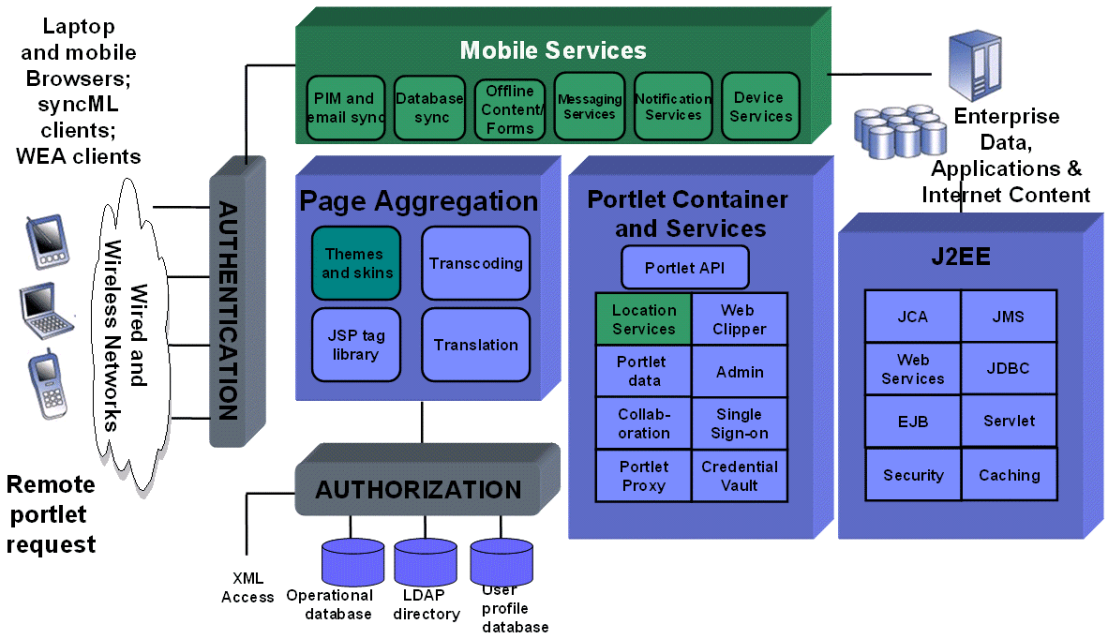


Figure 6-1 WebSphere Everyplace Access overview

6.2 WebSphere Everyplace Access - Features

WebSphere Everyplace Access comprises three major components necessary for delivering robust mobile computing solutions for the enterprise.
The three components are:

- **WebSphere Everyplace Access**: The server-based product that provides the infrastructure for interacting with the enterprise (from a mobile device) and the services that allow the enterprise to provide mobile solutions for mobile workers. It is the access point to the enterprise from the mobile device.
- **Everyplace Client**: An optional mobile client environment that runs on the mobile device (PDA class devices) and extends the capabilities of the device. Everyplace Client supports the mobile device when operating in a connected or occasionally connected mode.
- **Everyplace Toolkit**: An Eclipse plug-in for WebSphere Studio that provides the tools needed to create mobile solutions. Associated with the Everyplace Toolkit and WebSphere Studio is WebSphere Studio Device Developer, which provides the tools necessary to build a mobile device-based application.

These three components give Everyplace Access the ability to provide an end-to-end mobile computing solution environment – the runtime elements both at the server and at a mobile device (infrastructure), and the development tools necessary to create mobile solutions (services).

Administration
WebSphere Everyplace Access Administration provides centralized administration of information about the enterprise mobile environment. Administration is used to manage the overall environment, including users and groups, user customization, product administration, Portal

content (online and offline Portal pages), Portal settings, security and access control, Web Clipping and portlets. Administration provides user and group definitions that include portlets for users to register and manage their own account information. For example, a user must belong to a group with permission to perform data synchronization, in order to be authorized to use data synchronization on their PDA.

Personal Information Management and e-mail
WebSphere Everyplace Access supports both synchronization of PIM and e-mail information to PDAs and SyncML-based devices, and online (connected) viewing of e-mail and PIM information. The Everyplace Synchronization Service (ESS) supports the synchronization of e-mail data and PIM information, such as contacts, calendars, tasks, to-do lists, and memos with the IBM Everyplace Client and other SyncML clients. ESS adds various first-class features like attachment support, enhanced e-Mail filtering and invitation management. WebSphere Everyplace Access provides all the fundamental e-mail capabilities offline and online.

ESS relies on OMA DS (Open Mobile Alliance data synchronization, formerly known as SyncML DS), an XML-based protocol, which is the standard for synchronization of remote data and personal information across different networks, platforms and devices. Synchronization is profile-driven, that is, it allows users to have multiple unique profiles for each device they wish to synchronize to the mail server.

Data synchronization
Everyplace Access enables synchronization of JDBC-compliant database data to the DB2 Everyplace database, which is part of the Everyplace Client located on the mobile device. DB2 Everyplace has been incorporated into Everyplace Access.

Data synchronization supports WBXML, the DB2 Everyplace-defined XML-based representation of the data. The data can be compressed and encrypted before the data stream is transmitted between the mobile device and the server.

Intelligent Notification Services
Intelligent Notification Services (INS) are used to deliver urgent or late-breaking information to users on their preferred mobile device. This service allows the enterprise to proactively notify mobile workers (based on their subscription to particular notification applications) of important information and events. The notifications can be generated (when criteria is met) from a wide variety of sources such as e-mail, news feeds, data management events, and directly from business applications. There are two general types of notifications:

- Simple notifications - messages that originate from other users or that come directly from applications.
- Subscription-based notifications - messages that are triggered by events to which users subscribe.

Developers can extend the INS framework by adding more delivery channels and services.

Server-Initiated Actions
Server-Initiated Actions provide an easy way to send notifications to a device, causing the device to perform a specific action. This for example enables WEA to inform the client about new mails, so that the client connects to the server to receive the message. All these operations occur in the background without user interaction.

Location Aware Services

The Location Aware Services (LAS) enables the enterprise to take advantage of the location information provided by mobile devices and interpreted by the service provider of location information. This service consists of a set of mobile device-enabled portlets and a rich set of Java APIs for accessing location-based services from enterprise or business partner-written applications.

LAS enables dynamic balancing among several providers at runtime, helping to ensure the applications get the most accurate information available. Location awareness includes the ability to select the best-fit location provider at runtime based on the current situation, the ability to detect service availability, and the ability to roll over to another service provider if the primary provider fails. The service provides support for the leading worldwide service providers: Webraska, Go2map, Mapinfo, and Location Interoperability Forum (LIF).

Device Services
Device Services provide the ability to maintain and deploy the Everyplace Client and software to the device. This server-based function provides support for IBM Everyplace Client. Device Services provides off-the-shelf functionality for initial client deployment to automate the deployment of WebSphere Everyplace Client on mobile devices. It includes the following:

- Device configuration to maintain and manage the configurations of any mobile device in the WebSphere Everyplace environment.
- An enhanced software-distribution capability that ensures that the mobile device has the right level of the application code by managing the software inventory on the device and delivering any new versions.
- A dedicated inventory collection service that retrieves the current device inventory for review and reporting purposes.

WebSphere Everyplace Access device services can also be integrated with Tivoli Configuration Manager for an enterprise-wide management solution.

Offline Portal browsing and forms
WebSphere Everyplace Access provides the ability to preselect Web content provided by the Portal technology for download to the mobile device. The Web content can be viewed on the device while disconnected from the network. The Everyplace Access content adaptation capabilities can be used to dynamically adapt the selected content for the target device. The content associated with an offline Portal page is synchronized to the user's mobile device, where the user can perform offline viewing of the Web content and offline entry and submission of simple Web forms. Once the mobile device is connected to the server, the Web form data is sent to the server for processing by the server-based application.

6.3 WebSphere Everyplace Connection Manager - Brief overview

WebSphere Everyplace Connection Manager provides the capability to securely deliver existing enterprise data and applications to mobile workers over many different wireless and wireline networks in a contemporary and cost-efficient manner. WebSphere Everyplace Connection Manager creates a mobile VPN that encrypts data over Wireless LAN and WAN connections. It integrates standard IP and non-IP wireless bearer networks, server hardware, device operating systems and mobile security protocols. It also provides seamless roaming between wired and wireless networks.

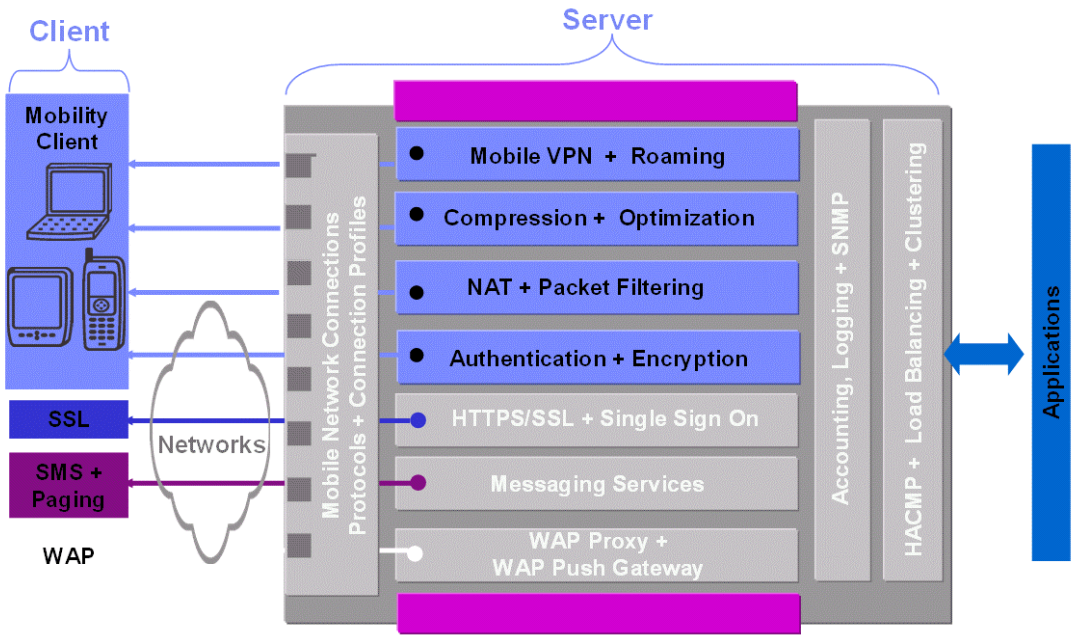


Figure 6-2 WebSphere Connection Manager overview

Some of the key functions provided by Connection Manager are:

- Provides enterprise-level security with authentication and encryption
- Runs all of your existing TCP/IP applications over wireless networks
- Supports devices that implement the Wireless Application Protocol (WAP) specification
- Supports WAP Push and SMS messaging through the messaging gateway
- Significantly improves wireless network performance while reducing costs through network optimization
- Allows configurable logging of comprehensive accounting information
- Supports clustering of Connection Manger for larger systems and backup
- Provides a worldwide wireless solution wherever you are through support of international wireless network technologies
- Supports, for a single WebSphere Everyplace Connection Manager, any combination of networks (both wired and wireless)

6.4 Mobile platform interoperability

SAP Mobile Infrastructure (MI) is the technology stack embedded in SAP NetWeaver. It enables enterprise applications to reach mobile users in both connected and disconnected environments.

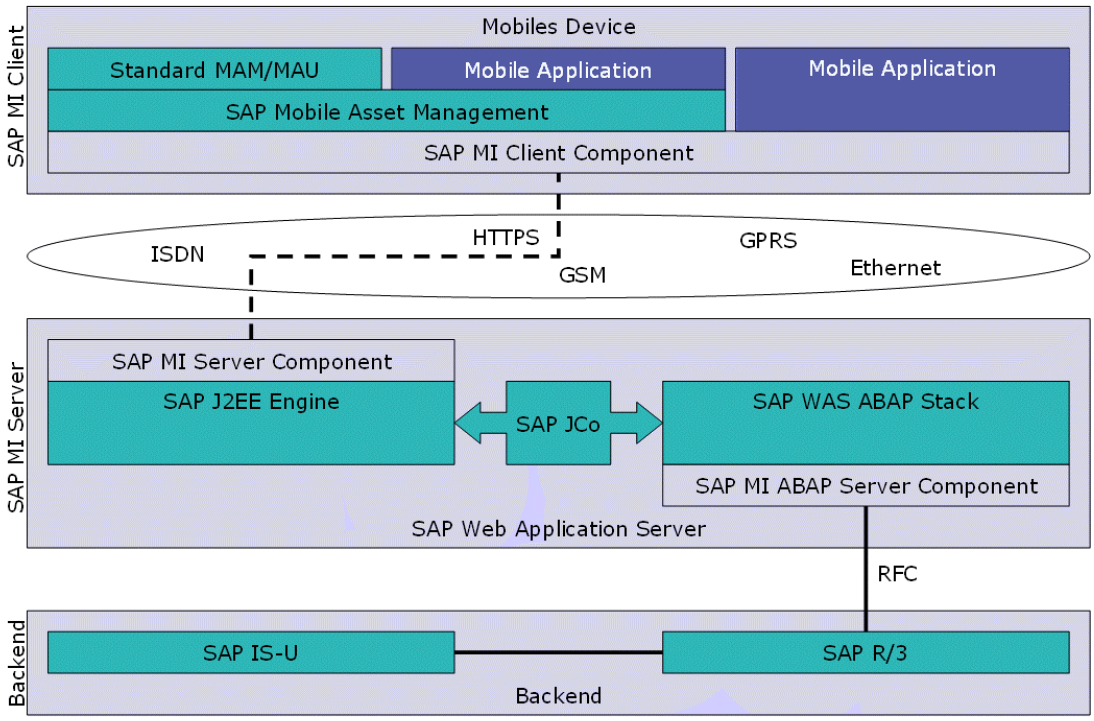


Figure 6-3 SAP Mobile Infrastructure architecture

SAP MI is tightly integrated into the SAP Web AS. All MI Server components are installed as part of the standard SAP Web AS and consist of the following:

Runtime: SAP MI offers a Java-based, platform-independent client runtime.

Synchronization: SAP MI provides a mechanism for data synchronization between mobile devices and backend systems regardless of SAP or non-SAP systems.

Administration: SAP MI provides a central administration and deployment tool for mobile applications.

Development: SAP MI provides a dedicated development environment for integrated mobile applications.

The technology platforms of IBM and SAP share many architectural ideas and approaches. They have a common goal of enabling mobile workers to seamlessly access enterprise application and information. In both software stacks, common industry standards are applied to gain a high level of flexibility and a wide range of platform support. This support of standards enables both mobile technology platforms to create customer-specific applications that consume enterprise data or trigger business processes regardless of where the original data is stored or where the process is executed.

6.4.1 Complementary mobile scenario A

The component-based architecture of both platforms enables much more comprehensive interoperability scenarios. Figure 6-4 illustrates how the SAP MI Client uses IBM DB2 Everyplace as the standard database for storing persistent data on the mobile device.

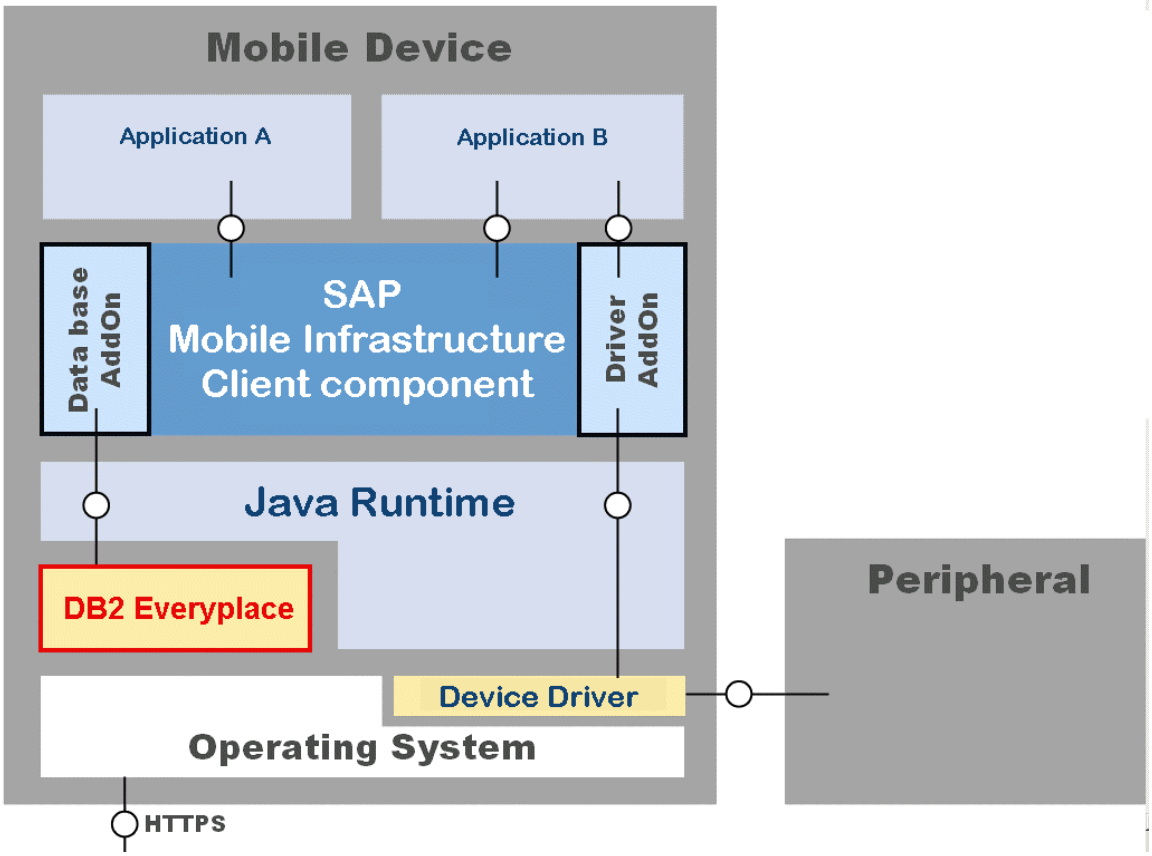


Figure 6-4 SAP MI Client using IBM DB2 Everyplace

6.4.2 Complementary mobile scenario B

Another common scenario would be to combine both architectures to gain additional quality of services such as strong encryption across a sensitive connection, as shown Figure 6-5.

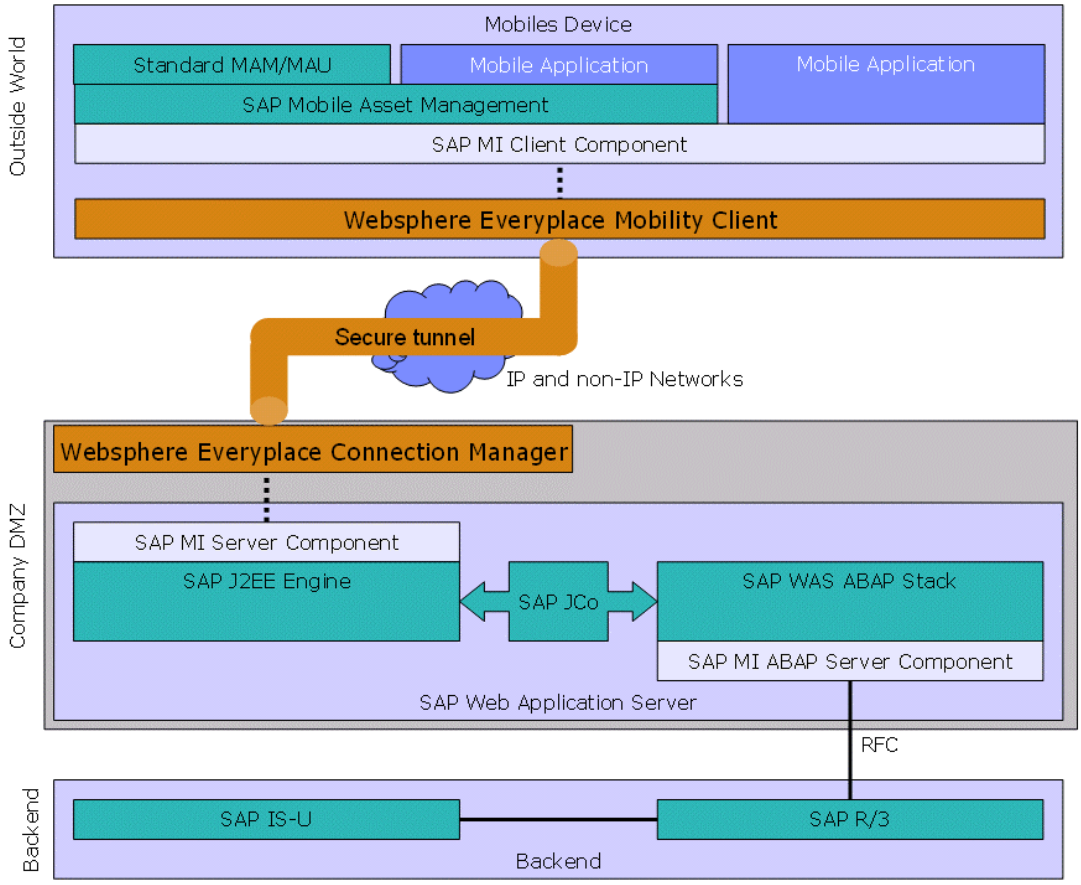


Figure 6-5 WebSphere Everyplace Connection Manager and SAP MI

WebSphere Everyplace Connection Manager can add its enterprise capabilities by establishing a secure VPN tunnel across IP and non-IP networks to allow a much more secure connectivity channel between the SAP MI client component and the SAP MI Server.

7 WebSphere Product Center

WebSphere Product Center provides retailers and manufacturers with the most comprehensive product information management solution to create, manage and link item, location, trading-partner, organization and terms-of-trade information. Some of the largest retailers and manufacturers worldwide have created a central source of item, location and trading-partner information with WebSphere Product Center to synchronize it internally across the enterprise and externally with trading partners.

Using WebSphere Product Center, manufacturers can consolidate item, price, location and customer information scattered across the enterprise in multiple ERP instances (such as SAP ERP), CRM as well as legacy item, location, price, and customer masters. Consumer products and consumer electronics manufacturers can also synchronize this information externally with leading retailers through data pools, such as Transora and UCCnet.

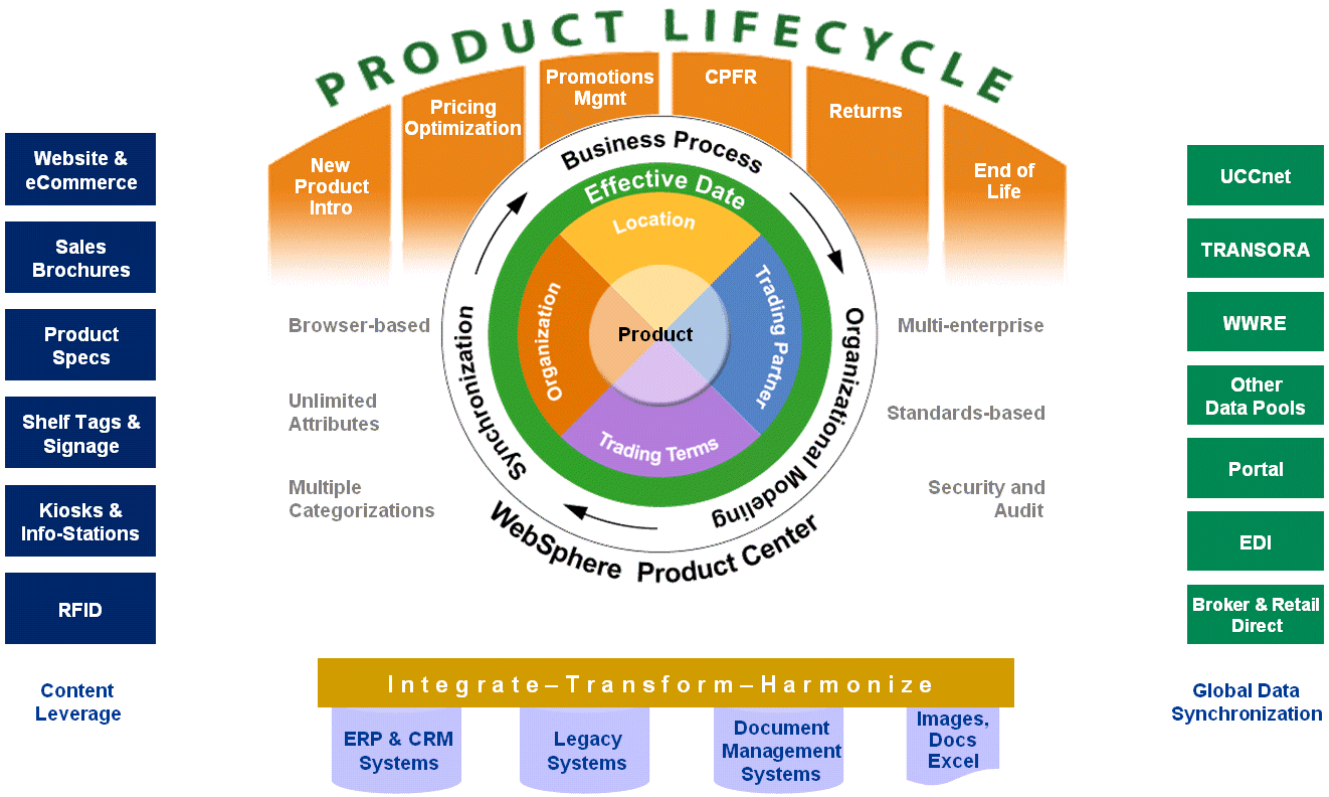


Figure 7-1 – Product LifeCycle

WebSphere Product Center provides a comprehensive picture of various dimensions of a product: from basic information such as net contents and dimensions, to complex information such as current and future promotions for the product, which can vary by customer and often by target markets and by store. WebSphere Product Center links the product to locations such as distribution centers that stock it, and target markets (and stores within the markets) where it is

sold. It also provides a superior framework for modeling the manufacturer's internal organization. This model associates a product with employees (from departments such as pricing, logistics and marketing) who create and modify relevant information. It also associates the product with sales representatives that sell the item in a given geography. Users from the retailer's organization can be linked in as well, with appropriate fine-grained, role-based security for access to relevant information. WebSphere Product Center supports extensive workflow functionality, to route various attributes of an item among departments based on user roles, and provides detailed audit trails to track changes made to each attribute or field.

Additionally WebSphere Product Center provides:

- A flexible, scalable repository managing and linking product, location, trading partner, organization, and terms of trade information
- Tools for modeling, managing, capturing and creating this information with high user productivity and high information quality
- Integrating and synchronizing this information internally with legacy systems, enterprise applications, repositories and masters
- Workflow for supporting multi-department and multi-enterprise business processes
- Exchanging and synchronizing this information externally with business partners
- Leveraging this information via many internal and external electronic and human touch points

WebSphere Product Center leverages the capabilities of existing EAI suites like WebSphere Business Integration to incorporate enterprise data from third-party ERP systems like SAP backend systems. WebSphere Business Integration provides, out of the box, a broad range of technology and application adapters that speed up the implementation time and reduce the integration efforts significantly.

Figure 7-2 presents a typical integration scenario for the Retail industry. WebSphere Product Center is the central Product information instance. It gives various global user groups granular access to consistent product data. Global systems that are typically implemented using different technologies and that are geographically distributed access this rich information set using the respective ready-to-use WebSphere Business Integration Adaptors. Finally, WebSphere Product Center is responsible for connecting to external entities like global registries or industry-leading data pools. This ensures the highest level of interoperability with other retailers and is a foundation for a successful on demand business.

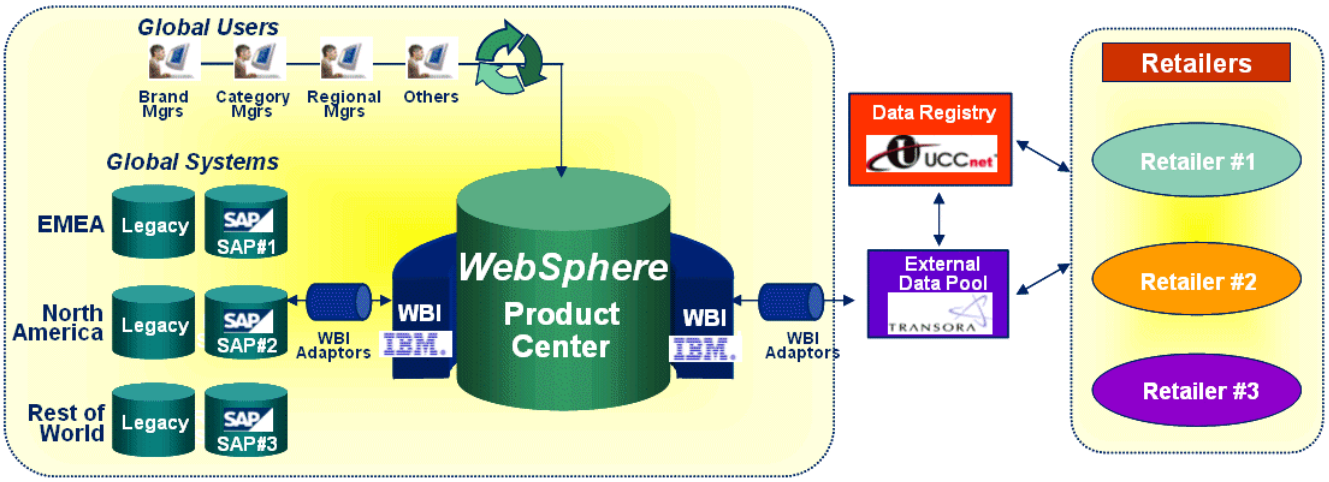


Figure 7-2 – Retail scenario

The major benefits of such a solution are:

- Faster time to market for new product introductions
- Elimination of manual process steps to create and update product information, resulting in fewer errors
- Fewer incorrect shipments and returns
- Faster invoice reconciliation and payments, fewer disputes
- Higher customer satisfaction through richer product information

WebSphere Product Center is complementary to enterprise SAP applications, such as mySAP CRM and SAP® R/3® Enterprise. Large manufacturers like Unilever have integrated product information across numerous SAP R/3 instances using WebSphere Product Center.

8 WebSphere Commerce Suite

IBM WebSphere Commerce is a powerful, flexible and standards-based e-Commerce platform that enables customers to run large, high-volume B2B and B2C e-commerce Web sites for global on demand businesses. It consists of a set of integrated software components that enables enterprises to build and manage personalized e-commerce sites. WebSphere Commerce provides three editions: Express Edition, Professional Edition, and Business Edition.

Express Edition meets the needs of most SMB businesses. WebSphere Commerce Express provides full consumer direct support as well as simple business direct support.

Professional Edition meets the needs of most consumer direct businesses. In addition to the features included with WebSphere Commerce Express, WebSphere Commerce Professional includes features such as live customer care.

Business Edition is the appropriate platform for most B2B businesses. It offers easy-to-implement online commerce and collaboration with traditional and new customers and partners, through online trading relationship management. Business Edition also provides B2B commerce functions, including accounts, contracts, request for quotes, purchase orders, requisition lists, and approvals.

WebSphere Commerce is able to aggregate services and content from numerous business units and software applications into a single personalized point of contact. It offers customers and partners a unified point of interaction rich with information and business processes highly tailored to their specific needs and interests. It lets them find detailed and personalized product content, manage business contracts, view relevant warranty information, find local service and logistics partners, select shipping alternatives, track orders and request real time interactive customer service. All of these characteristics decouple the decision about which store front-end is used, as the customer-facing component is completely separate from the existing enterprise systems in the backend. It offers a degree of flexibility essential for any enterprise to be able to act as an on demand business.

WebSphere Commerce software uses an open architecture based on a Java™ programming model that allows developers to modify and add commands to customize the behavior of their sites. WebSphere Commerce is a complete commerce solution that leverages the power of WebSphere Application Server, DB2, WebSphere Commerce Payments, and HTTP server. Depending on the edition, WebSphere Commerce also provides additional software to support live customer care, collaboration, and advanced business analytics. WebSphere Commerce uses key integration standards like Java Messaging Service (JMS) and Java Connector Architecture (JCA) to interface to any Enterprise Information System (EIS) that supports this industry-wide, flexible, and scalable business integration approach.

Figure 8-1 shows the key components of the WebSphere Commerce solution.

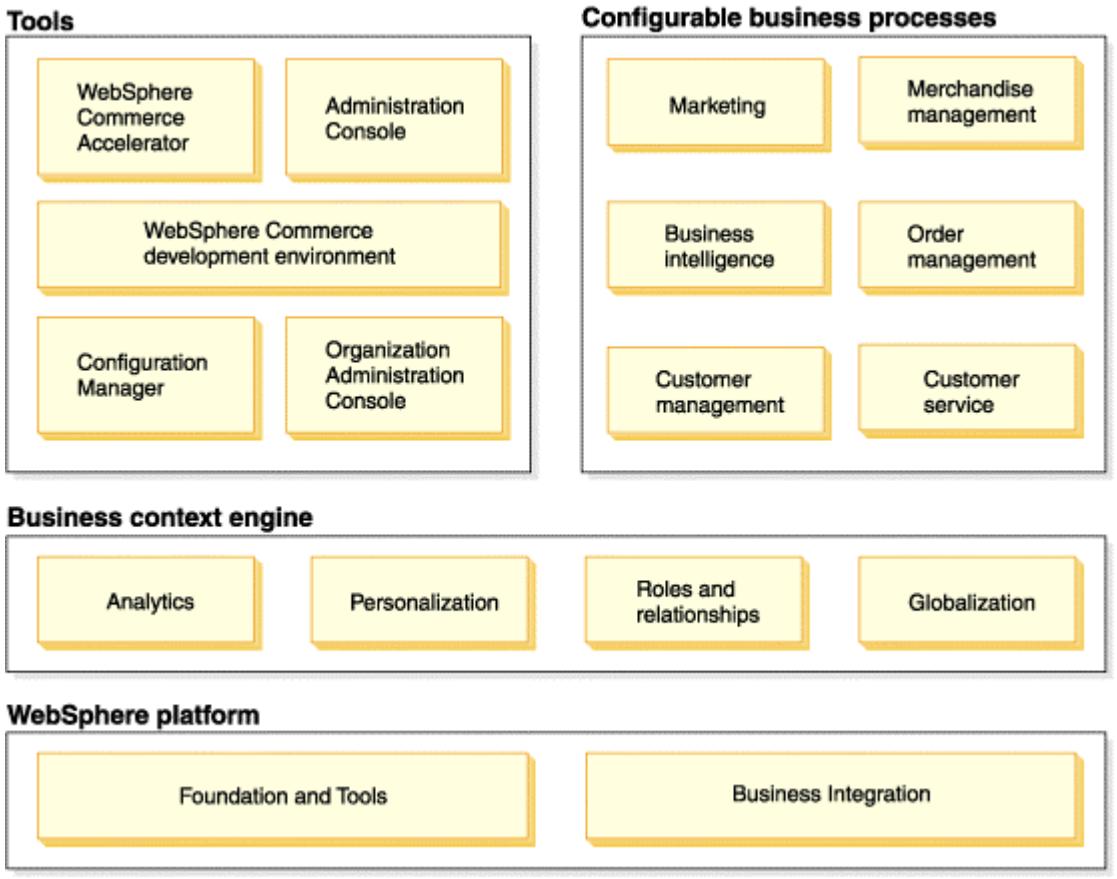


Figure 8-1 WebSphere Commerce components

The standards-based and extensible architecture of WebSphere Commerce makes the connectivity to EIS a very straightforward task. For this purpose, WebSphere Commerce provides different approaches that can be categorized based on the characteristics of each integration scenario as shown in the following table.

		Sync	Async	Direct	Indirect	Mapping & Routing
1	WebSphere Adapter for mySAP.com	X		X		
2a	MQSeries link for R/3		X		X	
2b	WebSphere MQ Integrator		X		X	X
3	WebSphere Business Integration broker		X		X	X

WebSphere Commerce supports following major interfaces used by the different integration approaches listed above:

Java Connector Architecture interface

The JCA defines a set of scaleable, secure, and transactional mechanisms that enable the integration of EIS with application servers and enterprise applications using the J2EE platform.

Java Messaging Service interface

The JavaJMS API standardizes the way that Java programs communicate with Enterprise messaging systems like WebSphere MQ. Instead of being bound to a specific messaging system a JMS client can generally take advantage of any messaging system that provides JMS support.

8.1 Scenarios

In the scenarios described below, WebSphere Commerce acts as an e-commerce front-end to one or more SAP R/3 systems. These scenarios highlight general integration paradigms and can also applied together to fulfill particular customer requirements.

8.1.1 Scenario 1

The IBM WebSphere Adapter for mySAP.com can be plugged into the WebSphere Commerce engine's JCA framework giving direct synchronous access to any SAP remote enable function module. The capability of the IBM WebSphere Adapter for mySAP.com to generate proxy objects out of the business objects in the SAP backend system makes the integration much more efficient and flexible. These generated proxy objects can be invoked within WebSphere Commerce commands to provide a customized and seamless integration.

8.1.2 Scenario 2a

WebSphere Commerce provides native JMS support. This creates the opportunity for the e-Commerce engine to exchange messages with any JMS-compliant Enterprise Messaging system like WebSphere MQ. IBM WebSphere Commerce can be configured to produce and to consume messages for certain business activities such as Customer creation, Order creation and Order status check. The messages are picked up by MQSeries link for R/3, which is the major connectivity component in this scenario, to connect WebSphere Commerce to any SAP backend system. MQSeries link for R/3 is a SAP-certified solution that enables the communication with SAP's proven Application Link Enabling (ALE) interface. MQSeries link for R/3 supports inbound as well as outbound communication and can be used to synchronize all e-Commerce relevant business data between WebSphere Commerce and the SAP backend.

8.1.3 Scenario 2b

Many customer integration scenarios require a certain kind of message routing and mapping capability. WebSphere MQ Integrator can enrich the scenario described above by offering these capabilities.

8.1.4 Scenario 3

In this scenario a central integration broker is responsible for connecting the WebSphere Commerce infrastructure with the applicable SAP backend systems. IBM offers a comprehensive family of WebSphere Business Integration products. See WebSphere Business Integration for details.

8.2 Commerce Enhancement Pack

IBM provides a Commerce Enhancement Pack that already includes detailed instructions on how to setup an asynchronous connectivity between WebSphere Commerce and SAP R/3 using WebSphere MQ Integrator. The Enhancement Pack also includes a set of generated proxy backend objects. This package can be used as a fast start and can be adjusted to special customer requirements.

Figure 8-2 illustrates how an inventory availability check against a traditional SAP R/3 ERP system can be implemented using WebSphere Commerce and WebSphere BI Server:

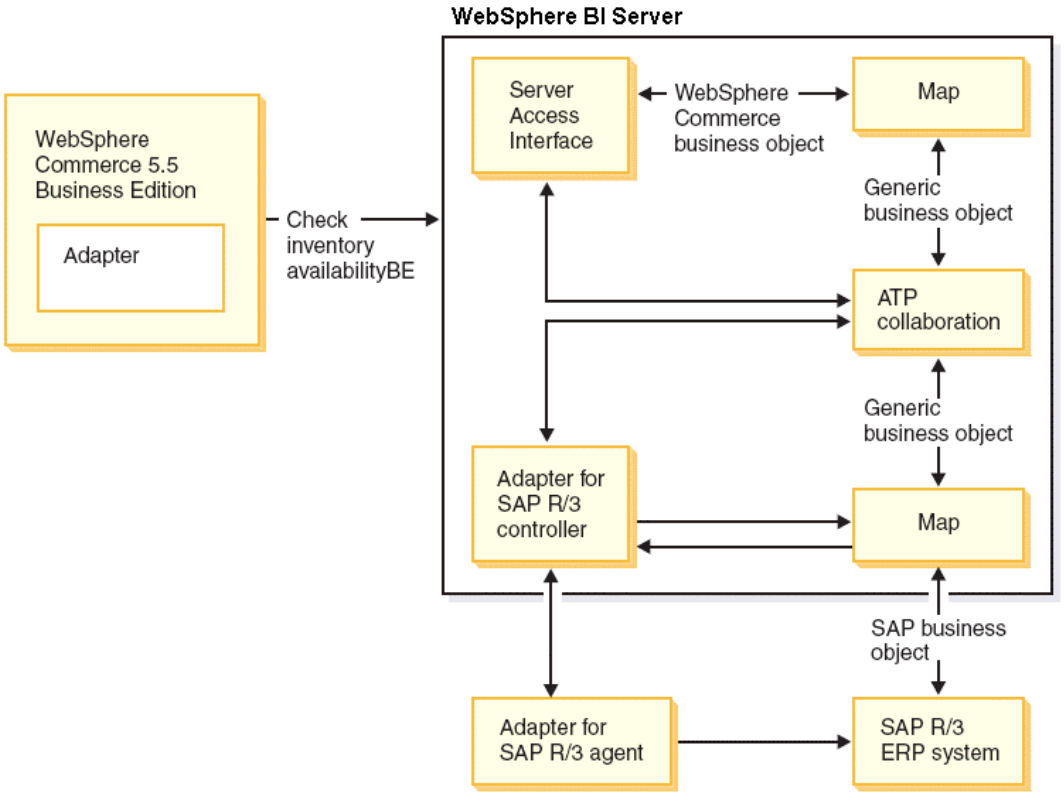
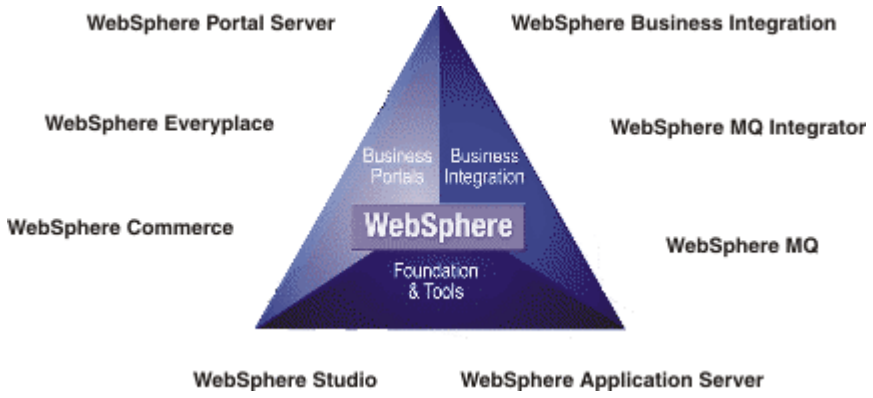


Figure 8-2 WebSphere Commerce and SAP R/3 connectivity

Appendix A - Resources



Foundation and tools

The following products collaborate to help you achieve scalability and productivity by growing and building e-business applications, rapidly and reliably:

WebSphere Application Server

The comprehensive and flexible packaging ensures full J2EE 1.4 compatibility across the board, from the base Express offering to the most robust Network Deployment, offering multiple deployment options from single-server to clustered, highly available, high-volume configurations. The product is available for several distributed operating systems, including iSeries and zSeries where platform-specific optimizations have been implemented. For more information, see **http://www.ibm.com/webservers/appserv/** .

WebSphere MQ

This software exchanges information among more than 35 platforms with assured delivery. For more information, see **http://www.ibm.com/software/ts/mqseries/** .

WebSphere Studio

These are e-business professional tools based on open standards and a common workbench technology. These tools enable exploitation of the WebSphere run-time environment. For more information, see **http://www.ibm.com/software/webservers/studio/** .

Business Portals

The following products collaborate to help you achieve customer loyalty by extending and personalizing user experiences.

WebSphere Portal

This software accesses widespread and diverse data sources from anywhere, anytime, by anyone you allow. For more information, see **http://www.ibm.com/software/webservers/portal/** .

WebSphere Everyplace

This is a software infrastructure that supports mobile solutions, addressing the challenge of extending e-business applications to mobile devices. For more information, see **http://www.ibm.com/software/pervasive/** .

WebSphere Commerce

These powerful solutions are designed to handle the broad range of challenges encountered when selling in B2B and B2C environments. For more information, see **http://www.ibm.com/software/webservers/commerce/** .

Business integration

The following products collaborate to help you achieve business agility by integrating applications and automating business processes.

WebSphere Business Integration

This software creates the nimble infrastructure needed to support the business imperatives of your dynamic enterprise. For more information, see **http://www.ibm.com/software/integration/** .

WebSphere MQ Integrator

This software helps you to flexibly connect and integrate your assets within the enterprise and with trading partners. For more information, see **http://www.ibm.com/software/integration/** .