



SIEBEL⁷
eBusiness

OVERVIEW:
SIEBEL eBUSINESS APPLICATION INTEGRATION
VOLUME I

VERSION 7.5, REV. A

12-EDWR6R

JANUARY 2003

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Introduction

This guide describes the integration solution provided by Siebel Systems and how to use these solutions to integrate, share, and replicate data between Siebel eBusiness Applications and external applications.

Although job titles and duties at your company may differ from those listed in the following table, the audience for this guide consists primarily of employees in these categories:

Business Analysts	Persons responsible for analyzing application integration challenges and planning integration solutions at an enterprise.
Database Administrators	Persons who administer the database system, including data loading, system monitoring, backup and recovery, space allocation and sizing, and user account management.
Siebel Application Administrators	Persons responsible for planning, setting up, and maintaining Siebel applications.
Siebel Application Developers	Persons who plan, implement, and configure Siebel applications, possibly adding new functionality.
Siebel Integration Developers	Persons responsible for analyzing a business situation or using the analysis of a business analyst to build the integration solution at an enterprise for Siebel applications.
Siebel System Administrators	Persons responsible for the whole system, including installing, maintaining, and upgrading Siebel applications.
System Integrators	Persons responsible for analyzing a business situation or using an analysis to build the integration solution at an enterprise for specific applications or to develop custom solutions.

The audience for this book also needs to have experience in data integration, data transformation (data mapping), scripting or programming, and XML.

How This Guide Is Organized

This guide discusses best practices for designing and implementing integration solutions—solutions that are the best fit for your company and your current needs. As you use more technologies, such as different or additional transports, connectors, and so on, you can use the integration solutions from Siebel Systems and our partners.

Here are list of other Siebel integration solution guides for your reference:

- *Architecture Guide: Universal Application Network Volume 1*
- *Implementation and Configuration Guide: Universal Application Network Volume 2*
- *Integration Business Process Guide: Universal Application Network Volume 3*
- *Common Object Model Guide: Universal Application Network Volume 4*
- *Application Services Interface Reference*
- *Integration Platform Technologies: Siebel eBusiness Application Integration Volume II*
- *Transports and Interfaces: Siebel eBusiness Application Integration Volume III*
- *Business Processes and Rules: Siebel eBusiness Application Integration Volume IV*
- *XML Reference: Siebel eBusiness Application Integration Volume V*

The Connector books provide specifics on each of the associated connectors.

Additional Resources

The product documentation set for Siebel eBusiness Applications is provided on the *Siebel Bookshelf* CD-ROM or in *Siebel Online Help*. The following are the integration-related books and online help that describe the tools required to implement integration:

- *Siebel Tools Online Help*.
- *Siebel Tools Reference*.
- *Siebel Business Process Designer Administration Guide*.
- *Siebel Enterprise Integration Manager Administration Guide* if you perform bulk loading or unloading of data.

Revision History

eAI Volume I: Overview, Version 7.5, Rev. A

January 2003 Bookshelf

Table 1. Changes Made in Rev. A for January 2003 Bookshelf

Topic	Revision
“Universal Application Network Overview” on page 12	New content throughout the book.
“Application Services Interfaces Overview” on page 14	New content in Chapter 1, “Overview.”
“Siebel Adapter for BizTalk”	Removed this section because we are not discussing individual adapters or transports. “Preconfigured Integration Solutions” on page 33.
“Application Services Interfaces” on page 35	Updated the illustration of Inbound and Outbound ASI in Chapter 1, “Overview.”
“ERP Integration”	Removed this section because Siebel Systems now offers UAN. Chapter 4, “Custom Business Scenarios.”
“Connectors to Other Applications”	Removed this section because Siebel Systems now offers UAN. “Preconfigured Integration Solutions” on page 33.
“HTTP Inbound Transport Performance” on page 66	New content about SessPerSisnConn in Appendix A, “Scalability and Performance.”
“Caching Parameter” on page 69	Updated the default number for cache size in Appendix A, “Scalability and Performance.”
“OLE DB Provider” on page 84	Added this section to complete the list. Appendix B, “Error Messages and Troubleshooting Tips.”

Additional Changes

- Changed MQ Series to MQSeries throughout the book.
- Changed codepage to code page throughout the book.

Organizations need to integrate business processes across a large number of disparate applications in order to drive revenue growth, increase productivity, and gain visibility into business performance. The velocity of business is accelerating and only by integrating and streamlining their business processes can organizations achieve the agility to respond to fast-changing customer and market demands in real time. The integration imperative is even more pressing as supply and demand chains have become increasingly interdependent, requiring organizations to integrate the extended enterprise to make sure the viability of their entire partner ecosystems.

To meet these requirements, Siebel Systems has pioneered Universal Application Network. To integrate Siebel eBusiness Applications into the Universal Application Network, Siebel Systems continues to enhance the integration tool set within Siebel applications—Siebel eBusiness Application Integration (Siebel eAI).

Universal Application Network Overview

Universal Application Network (UAN) is an integration solution that provides a rich library of prepackaged, industry-specific business processes that span multiple applications within and across the enterprise. These processes are primarily focused on customer interactions and reflect industry best practices. Siebel Systems uses its domain expertise and deployment expertise of its leading system integrator partners to build business processes that reflect best practices used in the industry. UAN is built based on open industry standards such as Extensible Markup Language (XML) and Web Services-enabling enterprises.

Siebel eAI Overview

Siebel eAI provides components for integrating Siebel eBusiness Applications with external applications and technologies within your company and is designed to work with third-party solutions such as those from IBM, CrossWorlds, TIBCO, Vitria, SeeBeyond, webMethods, and others.

Siebel eAI provides bidirectional real-time and batch solutions for integrating Siebel applications with other applications as well as the tools for cross application integration through UAN.

Siebel eAI is designed as a set of interfaces that interact with each other and with other components within Siebel application. These interfaces:

- Allow a flexible service-based architecture, built on top of configurable messages using XML and other formats.
- Are compatible with IBM MQSeries; Microsoft MSMQ, BizTalk, and OLE DB; Sun Microsystems Java and J2EE; XML, and HTTP, and many other standards.
- Expose internal Siebel Objects to external applications.
- Take advantage of prebuilt adapters and enterprise connectors, and are compatible with third-party adapters and connectors.
- Allow for data transformation.
- Integrate external data through Virtual Business Components (VBCs).
- Provide a graphical business process designer, programmatic interfaces, and a high-volume batch interface.

Application Services Interfaces Overview

Siebel Application Services Interfaces (ASIs) are prebuilt interfaces to Siebel business processes. These interfaces expose Siebel functionality as services to the application environment, as well as allow Siebel business processes to use services provided by external applications. Siebel ASIs are designed for ease of maintenance and can be configured by an administrator using Web Services Administration screens without requiring in depth knowledge of Siebel eAI.

ASIs provide a release-independent integration interface. The integration interface to the Siebel application remains unchanged with each upgrade to new releases. ASIs are extensible and are accessible as Web Services or through any third-party Enterprise Application Integration (EAI) solution. These benefits mean easier integration between Siebel application and external systems with significant reduction in integration, maintenance, and upgrade costs.

Unicode Support and Siebel eAI

Before Siebel 7.5, Siebel eBusiness Applications required a single Siebel Server for each code page that was used in the integration environment. For example, if you wanted to implement Siebel eBusiness Applications using code pages 1252, 936, and 952, you then had to have three instances of Siebel eBusiness Applications implemented. Each one only integrated with an external system with a compatible code page.

However, in Siebel 7.5, by enabling Unicode, a single instance of Siebel eBusiness Applications can be used for global deployment. This allows a global company, with divisions in different countries with different languages, to deploy only a single instance of Siebel 7.5. This provides unique integration challenges since the other systems in their global IT landscape may or may not be Unicode enabled. Siebel 7.5 addresses this issue by providing two Unicode deployment modes:

- Unicode Siebel Server with Unicode database.
- Unicode Siebel Server with traditional code page database.

For both of these deployment modes, integration of Siebel eBusiness Applications with external applications may involve data replication or data sharing or both. If the code page database is used, then data replication should be allowed only if the code page of the external system matches that of the Siebel Database.

When data is exchanged between applications using different code pages, each character's code point (numeric representation) must be converted from the standard used by the source code page into the equivalent used by the destination code page. This is true when characters are converted from:

- Unicode to a traditional code page, for example UTF-16 to Shift-JS.
- A traditional code page to Unicode, for example Shift-JS to UTF-8.
- One type of Unicode to another type of Unicode, for example UTF-8 to UCS-2.

When there is no equivalent character in the destination code page and the conversion cannot be performed, then a conversion error is generated. Depending on the configuration, the conversion errors may either terminate the current transaction or proceed with the transaction by substituting replacement characters as necessary and ignoring the conversion error.

For details on conversion error handling, see *Transports and Interfaces: Siebel eBusiness Application Integration Volume III*.

As illustrated in [Figure 1](#), Siebel eAI supports different adapters such as COM, CORBA, and MQSeries to integrate with external applications. Each of these adapters has to have the ability to:

- Be able to work with the character encoding as specified in the picklist.
- Do conversion to or from the external encoding.
- Handle conversion errors.

NOTE: COM, CORBA, and Java Bean are Unicode protocols. The sender and the recipient are responsible for conversion of the character sets. For example, Siebel application interfaces automatically take care of the conversion so these protocols do not need to do any conversion. Error handling is also handled differently by these protocols compared to the other adapters.

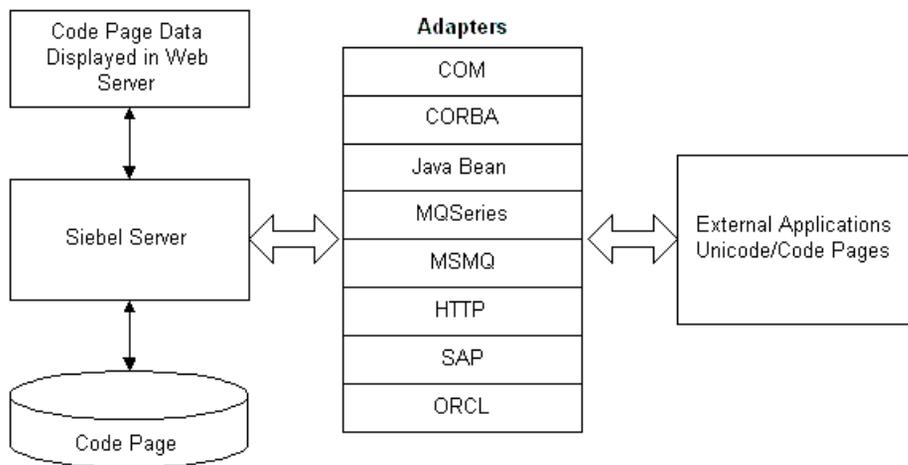


Figure 1. Unicode Conversion

Siebel eAI components and adapters have been enhanced to support code page conversion and to allow you to specify how to handle the conversion errors. The Character Set Conversion for Text Data argument is available in a number of business services such as EAI MQSeries Server Transport, EAI DLL Transport, EAI File Transport, EAI HTTP Transport, EAI MSMQ Transport, EAI XML Converter, or Transcode. When these business services are invoked from a workflow process the valid set of encodings is controlled by a picklist, but if they are invoked through scripting or similar mechanisms, the character set name is supplied textually. For example, if the Siebel application is communicating with an external system through EAI MQSeries Server Transport, the invocation of the EAI MQSeries Server Transport business service to send or receive a message would also specify the character set the external system sends or expects to receive.

Target character encoding choices are:

- None
- Unicode (UTF-8, UTF-16)
- Traditional Code page

NOTE: For more information on Unicode support and a list of Siebel Character Set Encoding Names, see *Global Deployment Guide*.

Inbound and Outbound Unicode Scenarios

Because the Siebel application's memory format is Unicode, when sending and receiving XML messages the message has to be converted to the Siebel format or the external system character set. This conversion only needs to be done once for each communication.

The conversion can be done in one of the following ways:

- Using the EAI XML Converter business service in your workflow process.
- Using the mechanism in the transport business service.
- Using the Transcode business service when neither of the above is available.

NOTE: Do not convert your data more than once per communication. Double conversion corrupts your data. If you have an EAI XML Converter in your workflow process, make sure your transport business service is set to ignore conversion.

Transcode Business Service

In addition to the improvements to the current Siebel eAI components and adapters, Siebel eBusiness Applications offer the Transcode business service. When non-XML data is exchanged, you can use the Transcode business service in your workflow processes to validate or convert data from one encoding to another. You can do this for both inbound and outbound communication.

Outbound communication. In an outbound communication between a Unicode Siebel application and a non-Unicode external system, using a Unicode communication channel such as XML, you can use the Validate method of the Transcode business service to take preemptive action to avoid character conversion failures on the external system. You can also use the Validate method to log character conversion errors that occur on the external system, or use the Convert method of the Transcode business service to use a substitute character to avoid errors on the external system.

Inbound communication. In an inbound communication between a non-Unicode Siebel Database and a Unicode external system, using a Unicode communication channel such as XML, you can use the Validate method to check that the data being sent to the Siebel Database is stored without a character conversion error. If there are character conversion errors, use the Convert method to use substitute characters when appropriate.

NOTE: For details on the Transcode business service and its methods, see *Global Deployment Guide*.

Legacy Encapsulation

In an encapsulated environment, multiple similar legacy applications are rationalized through the construction of high-level APIs that hide underlying complexity. As illustrated in Figure 2, message-oriented middleware such as IBM MQSeries Queue Manager and MQSeries Integrator or Enterprise Java Bean (EJB)-based custom development environments such as IBM WebSphere, help businesses perform transaction decomposition, data mapping, legacy sequencing, and result aggregation. With Siebel eAI, the Siebel eBusiness platform generates and processes the high-level request and response messages expected by the encapsulated environment.

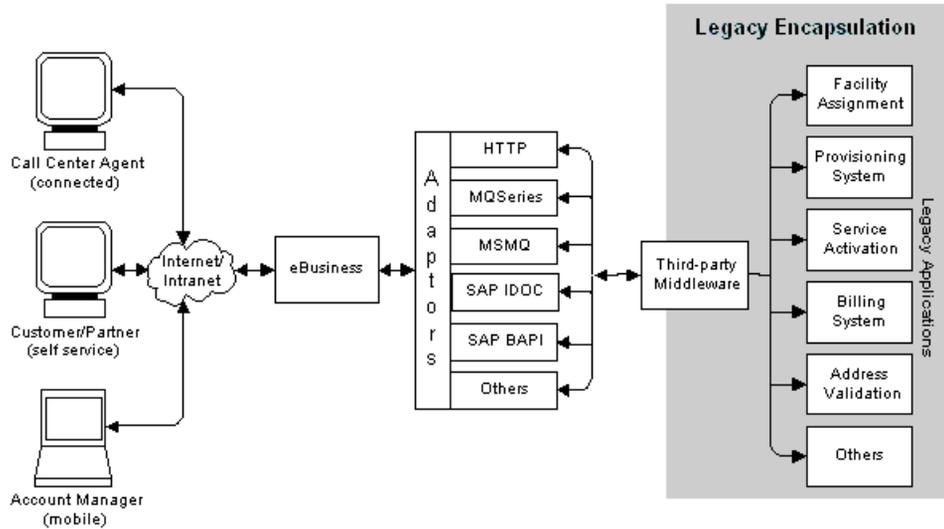


Figure 2. Legacy Encapsulation

Peer-to-Peer Integration

In peer-to-peer integration, as shown in [Figure 3](#), multiple applications interact with each other through a central software bus. The software bus provides a uniform interface to each application, as well as a number of services. These services range from simple data transformation to publish-and-subscribe schemes. The latter technology allows a set of applications to automatically receive copies of events of interest to them, keeping them in sync with the rest of the organization. Siebel eAI supports the services that the software bus expects from each participating application.

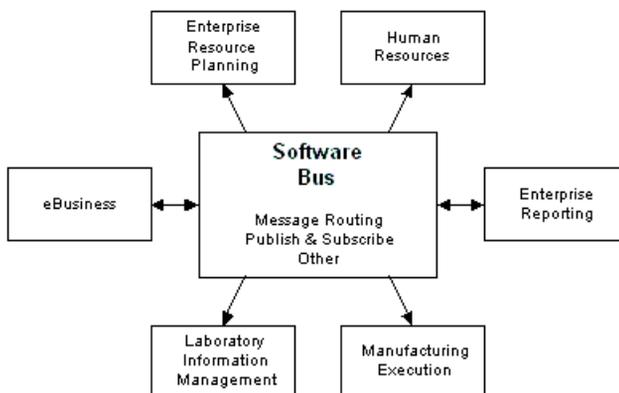


Figure 3. Peer-to-Peer Integration

Many enterprises adopt a software bus strategy for application integration. Master data is partitioned across systems, and the software bus middleware implements a messaging architecture for application data exchange. The messaging functionality ranges from simple message routing, in batch or real time, to a publish-and-subscribe scheme.

NOTE: Siebel eAI supports both batch and real-time integration. Batch integration optimizes interactions for high throughput and therefore uses computing resources more efficiently. By contrast, real-time integration optimizes response time.

Integration Servers

Another approach to integration is to connect applications using integration servers, which provide an information bus or a hub-and-spoke architecture to tie disparate applications together. The benefit of using integration servers is that they reduce the number of physical connections required to Order N . As illustrated in Figure 4, each application only needs to connect once through an adapter to the integration server. The integration servers also provide a scalable and reliable integration infrastructure, which is successfully implemented in large and critical deployments.

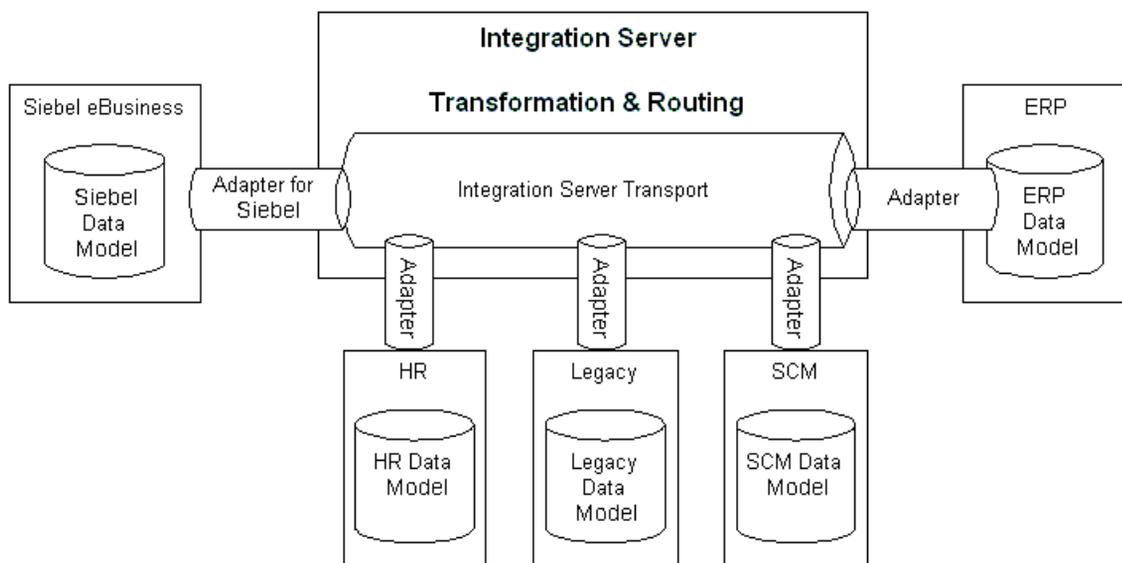


Figure 4. Integration Server

Siebel applications can integrate with an integration server using adapters provided by vendors such as IBM/CrossWorlds, SeeBeyond, TIBCO, Vitria, and webMethods. These adapters are validated by Siebel Systems.

To find a list of validated adapters for Siebel applications

- 1** Log in to <http://www.siebel.com>.
- 2** From the list of hyperlinks on the left hand side of the screen, select Alliances.
- 3** Select Find A Partner.
- 4** Select Directory.

This opens up a page to search partners.

- 5** Search using the following values:
 - Software/Content Partners (box #1): Solution Type
 - Software/Content Partners (box #2): EAI (Enterprise Application Integration)

This shows a list of partners who provide solutions in the area you selected in [Step 5](#). Partners with validated adapters have Siebel Validated XX listed against their names.

- 6** Click on a partner's name to find more details about that partner and its validated adapters.

Other Integration Strategies

Other integration strategies are applicable as well. These include master data partitioning, data sharing, presentation layer integration (screen scraping), and others.

- **Cross-Application Process Integration.** Successful eBusiness demands business processes that span across multiple applications—for example, a quote to cash business process spans across credit check, inventory management, billing, shipping and many other application services. Siebel eAI facilitates such cross-application business processes.
- **Master Data Partitioning.** Master data refers to the set of data required by a community of applications. Master data is partitioned between applications; each piece of data is owned by one and only one application, but the community imposes rules for the creation and update of master data.
- **Data Sharing.** Siebel eAI allows Siebel eBusiness Applications to access external data in real time without having to maintain a local duplicate copy. This is a common requirement in the financial services industry, where the customer information file typically resides on a mainframe.
- **Presentation Layer Integration.** Siebel eAI supports client-side integration in a Web client environment. Client-side integration consists of integrating applications at the user interface level, either by juxtaposing the screens within a portal and coordinating the content, or by *screen scraping* the content of one into the other.
- **Data Mapping and Transformation.** Data shared between applications might not be structured or encoded in the same way. To facilitate integration of nonidentical data structures, Siebel eAI specifies mapping and transformation rules, including filtering and structural changes.
- **Centralized Application Administration.** Siebel eBusiness Applications participate in an application management framework, which facilitates overall administration of all applications.
- **Upgradeable Integration.** The Siebel eBusiness platform is designed so that integration points can be migrated to a new release of Siebel eBusiness Applications and adapted to new releases of external application packages. This capability means organizations can use prior investments in their integrations when upgrading to new versions of Siebel applications or third-party applications.

Components of Siebel eAI

Legacy applications that have been deployed for various purposes—including purchasing, accounting, and ERP—contain critical information that needs to coexist and be integrated with Siebel applications. In addition, B2B (business-to-business) interaction necessitates the sharing of customer, order, and account information with partners across the firewall. Siebel eAI provides various components that can be used individually or together with an EAI vendor's toolkit, including XML support in Siebel eAI adapters and connectors, VBCs, and Java Beans.

XML and Siebel eAI

XML is increasingly the format of choice for data exchange between applications and partner organizations. The metadata definition for XML is in the form of XML Schema Definitions (XSD) or Document Types Definitions (DTDs). Siebel Integration objects can be represented as XSD or DTDs. This allows other applications to capture metadata from Siebel applications and understand how to format an XML document that needs to be sent to Siebel applications. Any data in Siebel applications can be represented as XML and sent over a standard protocol such as HTTP. Siebel eAI provides components that allow bidirectional exchange of XML documents over the firewall using the HTTP protocol. This exchange can be made secure at the transport layer by using the HTTPS protocol.

Siebel eAI supports XML for outgoing and incoming messages. Siebel eAI can be configured to use externally specified XSD or DTDs for defining external integration objects. Siebel Tools includes an Integration Object Wizard for importing and processing external XSD or DTDs and generating these external integration objects that represent the XSD or the DTDs.

In addition, the Siebel eBusiness platform includes a business service to dynamically dispatch incoming XML requests for processing by the appropriate workflow or Siebel business service. The dispatch rules are defined using a subset of XPATH using the Integration Administration screens.

All transport adapters, whether built by Siebel Systems or built by partners, can use this business service to dynamically look up the content in an XML document or other format documents and route the message based on this content to a workflow or other business services within a Siebel application.

Siebel eAI Adapters and Connectors

Siebel eAI provides adapters and connectors to help create integrations between Siebel applications and external applications. There are also additional connectors developed by Siebel eBusiness Applications partners.

Siebel Adapters

An adapter is a Siebel eAI component that provides the low-level interface mechanism to allow one application to talk to another. In Siebel eAI, there are two kinds of adapters: the EAI Siebel Adapter and the Transport Adapters.

- The EAI Siebel Adapter is specifically designed to interact with the Siebel business object layer. It is a business service in Siebel applications that can take as input an XML document or a property set that conforms to an integration object definition in the Siebel system. EAI Siebel Adapter can then query, insert or update, delete, or synchronize data with the Siebel business object layer.
- Transport adapters are business services within Siebel eAI that are designed to communicate with other protocols and technologies outside of Siebel applications to transport data from the Siebel system to another system. The HTTP transport in Siebel eAI allows Siebel applications to communicate over the HTTP protocol. The MQSeries adapter allows Siebel applications to communicate with the IBM MQSeries messaging system. The MSMQ adapter allows Siebel applications to communicate with the Microsoft MQ messaging system.

Siebel Connectors

Siebel eAI connectors provide low-level connectivity to other back-office applications such as SAP, Oracle, and PeopleSoft, but also include the business processes used for connecting to the external application. For example, Siebel Connector for SAP R/3 provides connectivity using BAPI and IDOC transport adapters, as well as predefined business processes. Using the connectors, you can exchange customer, order, and product information between Siebel applications and SAP.

Third-Party Connectors

Your organization may have a need to integrate multiple applications, such as Siebel applications, SAP, Oracle, I2, and so on, with one another. If so, you might need an EAI solution from one of the EAI vendors. These vendors work closely with Siebel Systems to develop adapters to Siebel applications using Siebel eAI. Siebel Systems has a validation program to make sure that these adapters work according to Siebel Systems standards.

Siebel Virtual Business Components

Virtual business components (or VBCs) are mechanisms in Siebel eAI by which data from an external system can be viewed in Siebel applications without having to replicate that data within the Siebel Database. For example, your users could access detailed credit card information from a mainframe system for a given customer account and see it displayed in the Siebel application interface. In this case, the basic customer account data, such as account number, name, and so on, is stored in Siebel applications while the detailed transaction information on that customer's credit card account is stored in an external database. The detailed transaction information for a given account can be retrieved from the external system on demand without replicating that information in the Siebel applications.

Virtual Business Components are configured in Siebel Tools and use Business Services to access data from an external system. VBCs can use standard transports like MQSeries, HTTP, and MSMQ, along with the XML Gateway Service, to query, insert, and update data.

Siebel eAI and Java/J2EE

Siebel eBusiness Applications provide standards-based technologies that allow you to access J2EE components from Siebel applications and support the creation of Java/J2EE components to access Siebel objects.

Accessing Java/J2EE Components from Siebel Applications

Siebel eBusiness Applications provide two mechanisms for invoking Java/J2EE components (JSP, Servlets, or EJBs):

- Web Services
- The Outbound HTTP adapter

When interacting with J2EE components published as a Web Service, Siebel applications can consume the WSDL (Web Service Description Language) document describing the service and operations, and generate a proxy Business Service allowing the Siebel eBusiness Application to invoke the Web Services just like a local object. When the Business Service is invoked, the Object Manager detects that the Business Service is a proxy to a Web Service and generates the appropriate SOAP (Simple Object Access Protocol) message and dispatches the request using a configured transport such as HTTP.

Additionally, Siebel eAI allows you to interact with J2EE components using the Outbound HTTP transport adapter. You can use this when including external content within the Siebel user interface, or when the component you need to interact with does not support a Web Service (SOAP or WSDL) interface.

Accessing Siebel Applications from a Java/J2EE Component

Java/J2EE components can request information from Siebel applications using a variety of methods including:

- Siebel Java Data Bean
- Siebel Resource Adapter
- Web Services

The Java Data Bean is a collection of Java classes that allow developers to interact with a variety of Siebel objects such as business objects, business components, and so on. Using this interface, you can develop Java/J2EE components that interact with Siebel applications.

The Siebel Resource Adapter plays a central role in the integration and connectivity between Siebel applications and a Java application server. It serves as the point of contact between application components, application servers and enterprise information systems. A resource adapter, along with the other components, must communicate with each other based on well-defined contracts that are specified by the J2EE Connector Architecture.

Web Services are emerging as an important technology for exposing application functionality independent of the underlying technology used to provide that functionality. Release 6.x introduced the notion of Business Services that could be invoked through XML over HTTP and MQSeries. This functionality is now the basis for supporting Web Services. Siebel eBusiness Applications provide support for Simple Object Access Protocol (SOAP) and Web Services Definition Language (WSDL). These two standards provide the basis for Web Services and allow for interoperability between .NET, J2EE, and leading packaged applications such as Siebel eBusiness Applications.

Object Interfaces

Siebel applications support several programmatic interfaces to facilitate communication between external applications and Siebel applications. These interfaces include:

- COM Data Control
- Java Data Bean
- CORBA Object Manager
- Web Client Automation Server
- Mobile Web Client Automation Server
- COM Data Server

NOTE: For details on J2EE, see *Transports and Interfaces: Siebel eBusiness Application Integration Volume III*.

Details of Siebel eAI

The Siebel eBusiness Platform includes a set of tools, technologies, and prebuilt functional integrations that facilitate application integration. This set of products is referred to as Siebel eBusiness Application Integration (Siebel eAI).

Configurable and Upgradeable Integration

As shown in [Figure 5 on page 31](#), Siebel eAI supports message-based integration with external applications where Siebel application is the initiator of the request or the receiver. The contents of the messages exchanged are called *integration objects*. Integration objects are defined in Siebel Tools.

There are two types of integration objects:

- **Siebel integration objects.** Data to be loaded into or read from a Siebel Business Object.
- **External integration objects.** Data received from or sent to the external application.

A configuration engine provides configurable data transformation for matching the difference in entities representations, while integration objects represent the information exchanged.

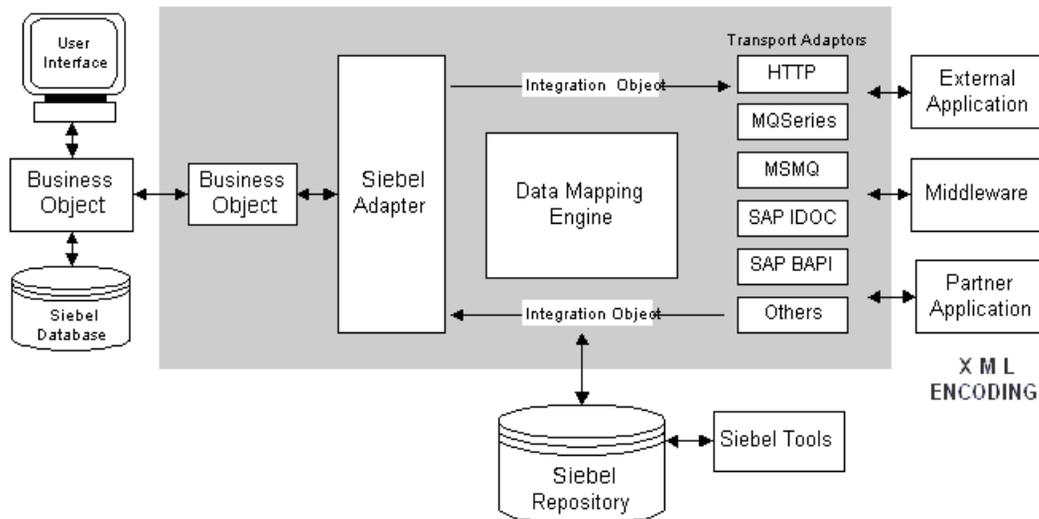


Figure 5. Configurable and Upgradeable Integration

Declarative Integration

A Siebel integration object is defined as a subset of a Siebel business object, and the map between an integration object and the business object is maintained in the Siebel Repository. A predefined business service called the EAI Siebel Adapter takes a Siebel integration as input and calls the appropriate business object APIs to operate on the object invoked. External integration objects are based on external metadata. This metadata can be in the form of XML Schema Definitions (XSD), Document Type Definitions (DTDs), External Data Representations (XDRs), SAP BAPIs and SAP IDOCs, as well as Oracle application metadata. Siebel Tools provides wizards to access this metadata from the external application and create external integration objects based on that metadata within the Siebel repository.

Data Transformation

Siebel eAI provides a declarative data mapper (Siebel Data Mapper) to transform the data expected by Siebel applications (the internal integration object) to the data expected from the external system (the external integration object). A run-time engine called the EAI Data Mapping Engine implements complex domain and structure mapping.

Cross-Application Process Integration

To achieve process-level integration between Siebel applications and external applications, the Siebel eBusiness platform supports workflow control. You define the integration process using the Siebel Business Process Designer, which is executed by the Siebel Workflow Engine. The Siebel Workflow Engine is an environment that allows you to define and manage complex integrations. A business service can be a prebuilt component, such as a transport adapter and the Siebel Data Transformation Engine, or can be custom-developed at design time or run time using one of the Siebel Scripting languages.

Preconfigured Integration Solutions

Recognizing the importance of preconfigured integration to cut down the costs associated with Integration, Siebel Systems offers a broad array of preconfigured integration solutions. These solutions can be extended and customized to match your specific requirements.

Universal Application Network

Universal Application Network (UAN) business processes are architected to be application independent and allowing organizations to use their existing investments. Organizations have the flexibility to select from any vendor's offering and support their customers through best-in-class solutions. UAN solves the semantic problem through the use of common objects and prebuilt transformations to popular applications. UAN is built based on open industry standards, such as Extensible Markup Language (XML) and Web Services-enabling enterprises to avoid limiting your vendor choices and ensuring interoperability with other solutions. UAN also uses the infrastructure developed by integration server vendors.

Siebel eAI Connectors

Siebel Systems and its partners provide prebuilt, end-to-end, functional integration for major packaged applications. These connectors use data and cross-application process integration services provided by the Siebel eBusiness platform (see [“Details of Siebel eAI” on page 30](#)). For each supported business process, the connectors include built-in data mapping between the exchanged entities, as well as sequencing and error handling.

Siebel-to-Siebel Connector

The Siebel-to-Siebel Connector is designed to replicate data between two or more Siebel applications. Data is replicated in a master/slave relationship. This connector is intended for situations where a small amount of data, such as global accounts, needs to be shared in real time among a number of Siebel instances. These instances can be running the same or different Siebel applications and may be geographically distributed.

The Siebel-to-Siebel Connector also provides the ability to publish and receive changes. Any changes to such marked global data is sent to subscribing nodes. Subscribing nodes receive the data that is published by the master nodes. There can be only one master node for each data element. The connector provides the maximum flexibility when used with an asynchronous transport mechanism (for example, MSMQ or MQSeries) to connect different instances together.

Siebel Connector for SAP R/3

Siebel Connector for SAP R/3 allows integration between Siebel applications and SAP R/3. The Siebel Connector for SAP R/3 provides an infrastructure that allows Siebel eBusiness Applications to interact with SAP R/3 through standard SAP R/3 technologies. It virtually eliminates the need to code components for transforming and routing data between Siebel applications and SAP R/3. The connector supports both SAP's Business APIs (BAPIs) for real-time interaction and Application Link Enabling (ALE/IDOC) for asynchronous integration.

Siebel Connector for Oracle Applications

Siebel Connector for Oracle Applications provides for integration between Siebel applications and Oracle applications. Your IT department may standardize on the Siebel eBusiness Platform for sales, service and marketing and on Oracle applications for their back office operations. The Siebel Connector for Oracle Applications offers an infrastructure that allows Siebel applications to interact with Oracle applications through native Oracle applications interfaces. It eliminates the need to code components for routing data between Siebel applications and Oracle applications. The connector supports both the traditional Oracle Open Interface and the new APIs in Oracle Applications R11i.

Siebel Connector for PeopleSoft

Siebel Connector for PeopleSoft provides integration between Siebel applications and PeopleSoft. The connector is configurable and upgradeable using Siebel Tools, and supports integration of Siebel eBusiness Applications with PeopleSoft. The Siebel Connector for PeopleSoft uses the Siebel eBusiness platform, including Siebel Remote and the built-in technologies for data synchronization. This makes sure there is consistent back-office information across all Siebel clients, including mobile and wireless Web clients.

Application Services Interfaces

An Application Services Interface (ASI) is a release-independent interface published by Siebel Systems that allows you to integrate Siebel applications with external applications. ASIs are published in a standard metadata format, such as Extensible Markup Language Document Type Definitions (XML DTD) and Web Services Descriptive Language/XML Schemas (WSDL/XSD) and are built using the ASI Framework.

There are two types of ASIs, Inbound ASIs and Outbound ASIs. Inbound ASI is used to accept data into Siebel applications from an external system using Siebel workflows, Siebel Business Services, and Siebel Data Synchronization services through the Siebel Object Manager as illustrated in [Figure 6](#).

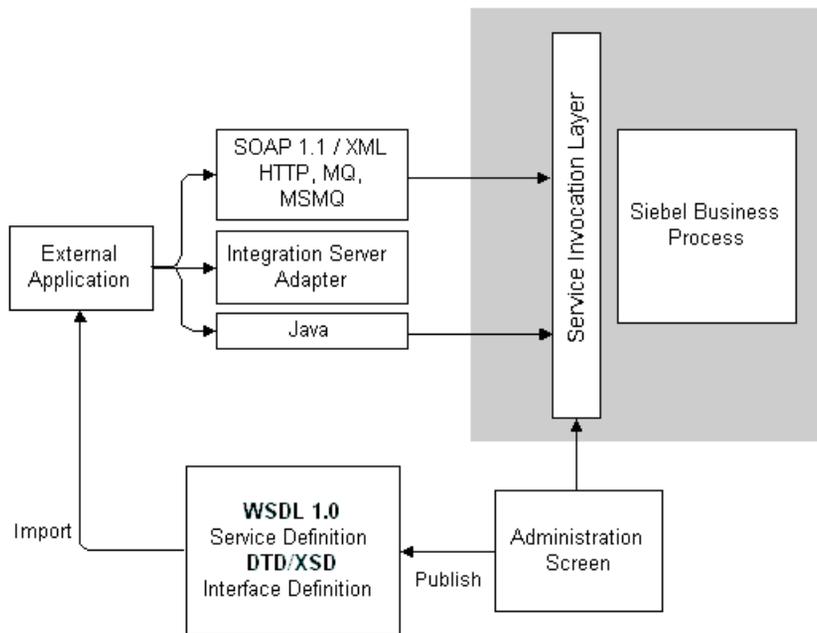


Figure 6. Inbound ASIs

And Outbound ASI is used to send data out based on a UI event or a trigger in your Siebel workflow as illustrated in [Figure 7](#).

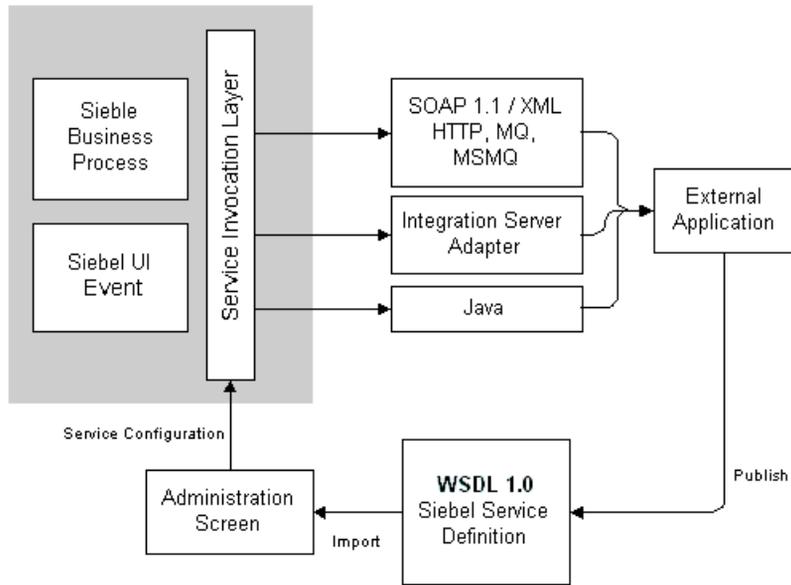


Figure 7. Outbound ASIs

NOTE: For details on ASIs, see *Application Services Interface Reference*.

Web Services

A Web Service is programmable application logic that is accessible using standard Internet protocols. Web Services combine component-based development and the Internet and can be reused regardless of how the service is implemented. Web Services are accessed through information protocols (such as HTTP) and data formats (such as XML).

Web Services are based on communication protocols that include HTTP, XML, Simple Object Application Protocol (SOAP), and Web Services Description Language (WSDL). A Web Service can be developed on any computer platform and in any development environment as long as it can communicate with other Web Services using these common protocols.

NOTE: For more details on Web Services, see *Integration Platform Technologies: Siebel eBusiness Application Integration Volume II*.

Overview

Web Services

Before you begin an integration project, identify your integration needs. Siebel eBusiness Applications need to interact with external systems to provide an integrated view of your information. You may have data in a variety of applications, such as back-office solutions for order fulfillment, manufacturing, or accounting; e-commerce applications such as Web storefronts; and help desk applications.

There are several ways you can approach your integration, depending on your needs. You can connect Siebel applications and your back office or eCommerce system using prebuilt Siebel eAI connectors. You can connect Siebel applications and an external application using Siebel eAI custom-built connectors. You can integrate Siebel applications with middleware solutions. Or you can integrate Siebel applications with external applications using a third-party EAI product.

Siebel eBusiness Applications provide solutions for each element of the EAI planning process.

- Programmatic interfaces, such as COM, CORBA, and Siebel Java Beans provide a tightly-coupled integration for real-time data exchange.
- Adapters, such as MQSeries and the HTTP adapters provide a loosely-coupled mechanism for real-time integration. This means that one system needs to be aware of implementation details for the other system's integration mechanisms. A message or a document is exchanged between these systems.
- For high-volume batch integrations, Siebel eBusiness Applications provide you with Siebel Enterprise Integration Manager (EIM). EIM can replicate data between Siebel applications and other systems at the database layer and provides high performance for importing or exporting large volumes of data.

Design Decisions

There are three main questions you must answer as part of the planning phase for any application integration project:

- How do I need to share my organization's data?
- Which access mechanism makes the most sense for my situation?
- Which preexisting connector best applies to my situation?

It is important to identify your need before designing the integration. Your design choice could be based on the following categories:

- **Data Transformation.** Data transformation between two systems is an important part of any integration project. You may want to implement this data transformation using the Siebel-provided data transformation functions or, if your organization has already standardized on a data transformation tool, you might choose to model the integration flow so that it uses the external tool for data transformation.
- **Data Sharing.** If you need to view data from an external source within your Siebel applications and do not need or want to replicate the data, you might use a specific set of objects and tools designed explicitly for this purpose. For example, you might want to view credit card transaction details from within Siebel applications while credit card transaction details are stored on a mainframe system.
- **Real-Time or Batch.** You should consider the type of integration you need: real-time or batch mode. For example, you might want to publish new opportunities created in Siebel applications to an external system as soon as the opportunities occur. Or you may want to exchange information in batch mode when you want to aggregate product catalog information from your suppliers.

Once you have designed your integration needs for each business process flow, you can apply the different components of Siebel eAI to implement a solution. Figure 8 illustrates the different types of applications that Siebel eBusiness Applications can integrate with.

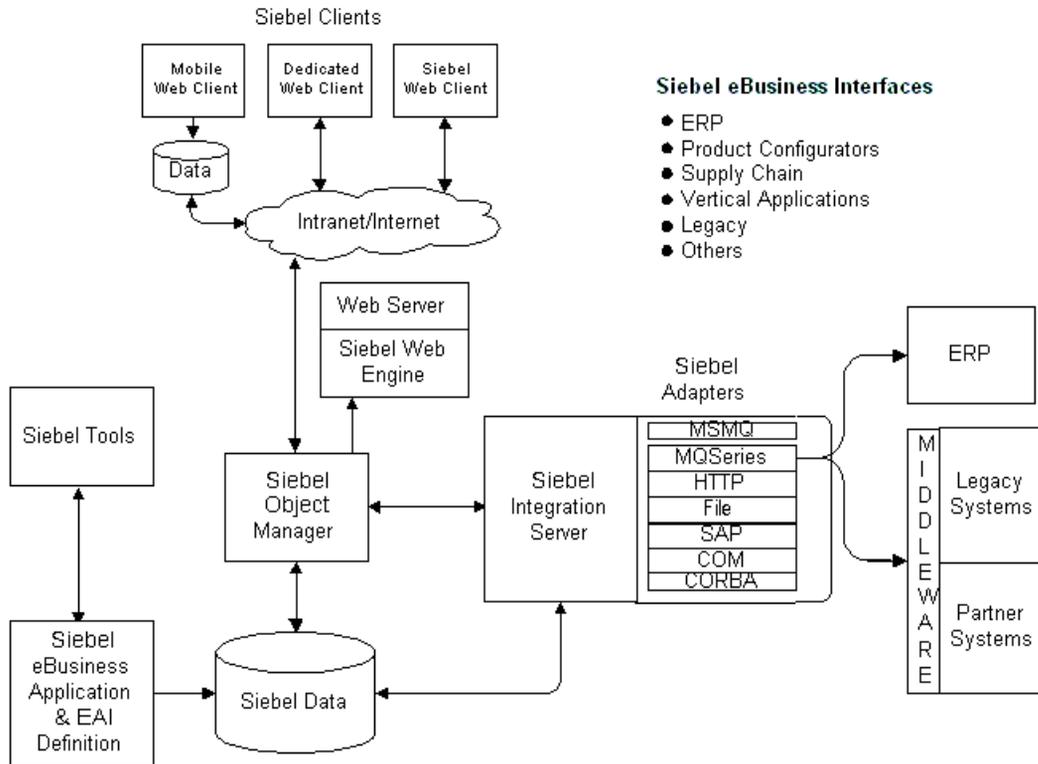


Figure 8. Siebel eBusiness Interfaces

Usage Models

When looking at your requirements, you should understand how you intend to use Siebel eAI's integration capabilities. You need to determine how the integration will behave and under what circumstances. In other words, in what way are you planning to use this integration? This is referred to as the *usage model*.

As shown in [Figure 9](#), there are two basic usage models, real-time and batch. Batch mode has a single mode, and real-time has two modes, either tightly-coupled or loosely-coupled. To help you determine the appropriate usage model, ask yourself the following questions:

- How do I plan to integrate Siebel applications with other applications?
- Do I want to integrate in real-time or in batch mode?
- If I want to integrate in real-time, do I want the solution to be tightly-coupled or loosely-coupled?

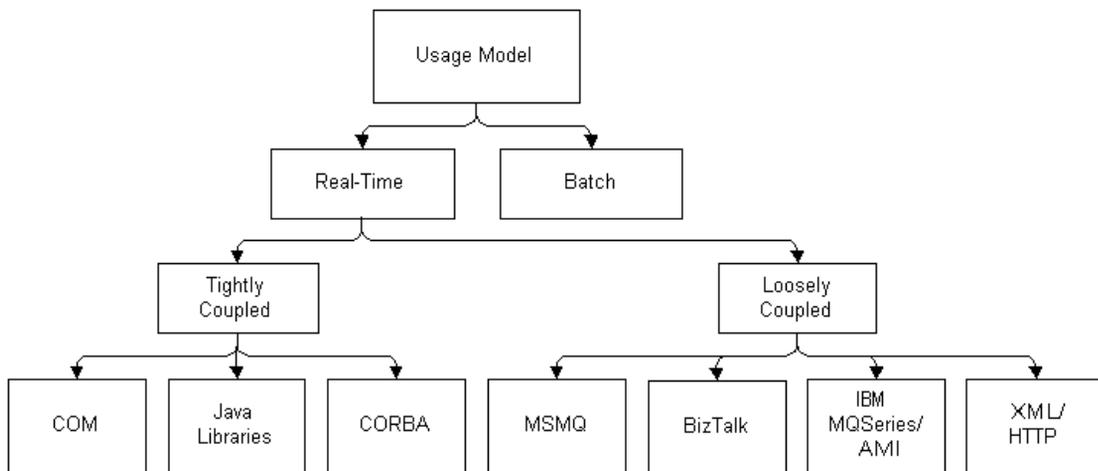


Figure 9. Integration Usage Model

Real-Time

With a real-time model, you may choose to deploy Siebel applications as a client or as a service. As a client, Siebel applications access another program or initiate a transaction on an external system. As a service, Siebel applications are accessed by an external program to query, insert, update, or delete data without any initiation from the Siebel application.

Typical scenarios involving Siebel application as a client include:

- Replicating data such as maintaining the SAP order number in the Siebel application, so users can relate Siebel orders to SAP orders.
- Accessing a mainframe system to retrieve customer account information in real time and display it within the Siebel application's interface.
- Sending sales opportunities to trading partners over your corporate firewall without compromising system security.
- Accessing an external system's function to check inventory and then displaying the results in a Siebel application.

Typical scenarios involving Siebel applications as a service include:

- An external Web application accessing a Siebel application to retrieve contact information.
- Call center software extracting service request information from a Siebel application.

Batch

Batch processing typically is used for periodic uploads or downloads of large amounts of information into the Siebel Database. Typical batch scenarios involving Siebel applications include:

- Uploading a batch of product catalog and item information into a Siebel application from an external system.
- Downloading a batch of opportunities from Siebel applications to another database.

Access Mechanisms

When your business problem is accessing other applications from Siebel applications or accessing Siebel applications from other applications, you need to ask: Exactly what kind of data exchange do I require?

- **Data Sharing.** You may need to share data that exists outside of the Siebel eBusiness Application. For example, you may have several legacy mainframe systems that you need to access with Siebel Call Center in order to provide customers with information on their accounts. You might not want to replicate this information in Siebel eBusiness Applications, but may want to dynamically share this mainframe data as needed and display it within a Siebel application. For data sharing, use Siebel's Virtual Business Components (VBCs).
- **Replication.** Replication of data is often useful. For example, you might want to integrate data in SAP with data in Siebel applications, keeping order status information in both systems. For mass replication of the order status information in Siebel applications, use Siebel Enterprise Integration Manager (EIM).
- **Presentation Layer (UI) Integration.** Integration at the presentation layer is useful in cases where you only need to look at the other application's user interface (UI). The data itself does not need to be retrieved to the Siebel applications. In these cases, you would capture just the screen from the external system using ActiveX Data Controls (ADCs) and represent it natively within a Siebel application. This is the least expensive form of integrating two applications, but it is the least flexible as well.

These Siebel solutions can be either real-time or batch. Figure 10 shows the various access mechanism options and where they fit into the integration process.

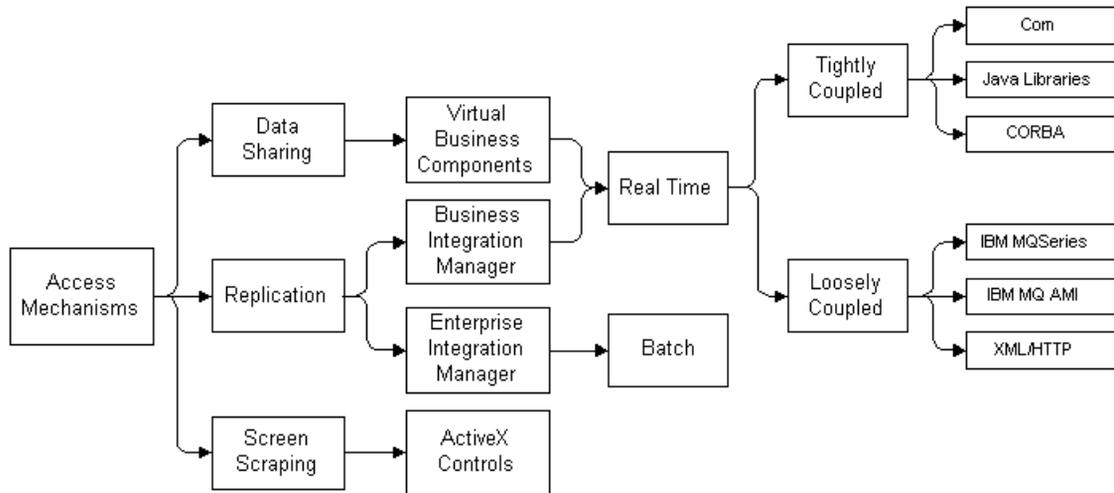


Figure 10. Siebel Solutions

Application Connectors

Application connectors allow for the deployment of a point-to-point connection between Siebel applications and other applications. As it is shown in [Figure 11](#), these applications include back office financial systems ERP systems, such as SAP and JD Edwards, or eCommerce applications, such as those from Broadvision and Ariba. Siebel Systems provides solutions for prepackaged connectors either directly or through partners and third-party developers.

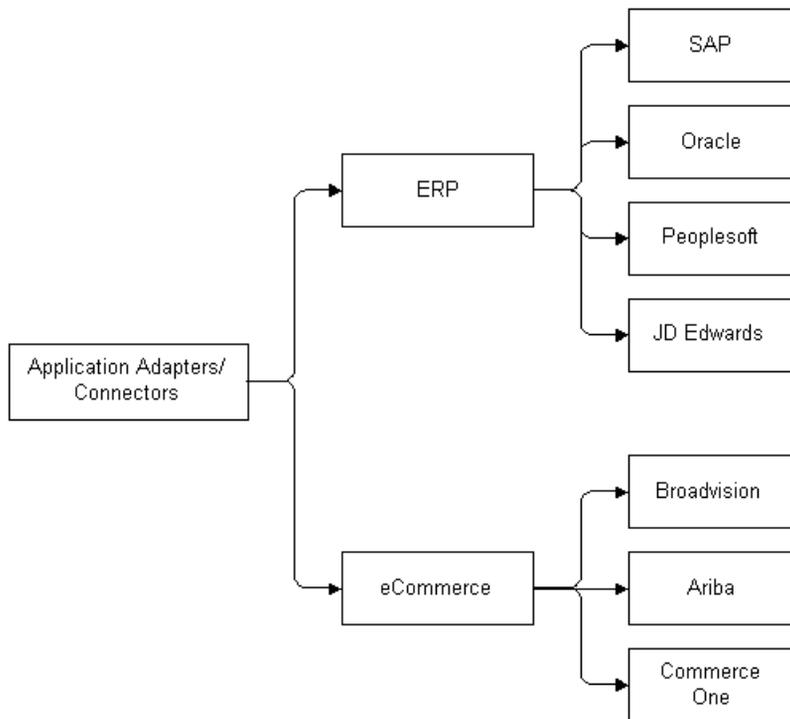


Figure 11. ERP and eCommerce Connectors

As it is shown in [Figure 12](#), Siebel eAI architecture consists of the EAI Siebel Adapter, the EAI Data Mapping Engine, and multiple transports that can facilitate data integration with different external systems.

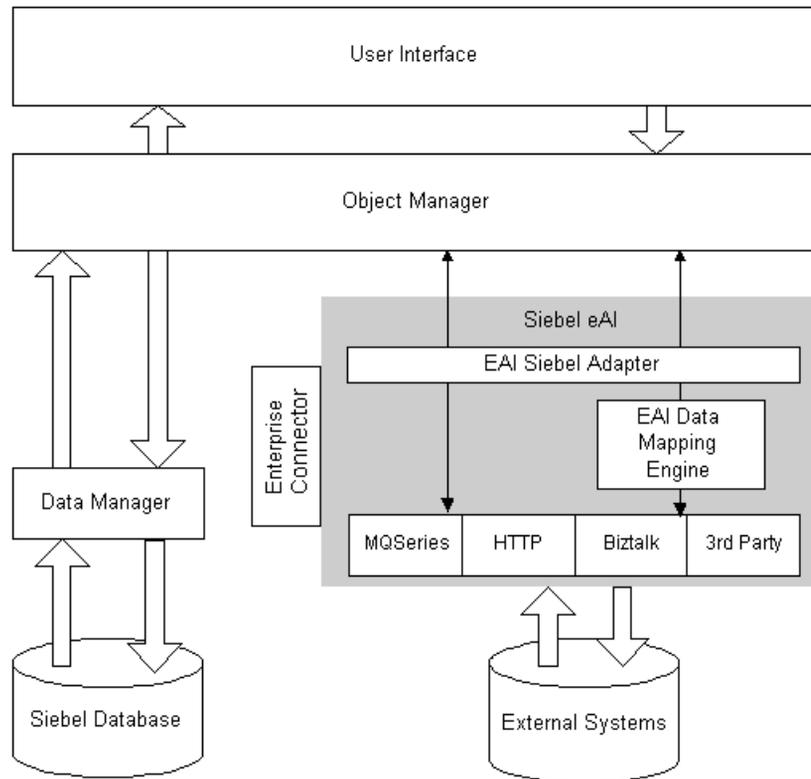


Figure 12. Siebel eAI Architecture

The abstraction of data management functions to an object layer allows for a declarative, as opposed to a procedural model. This improves and simplifies configuration tasks while lowering maintenance costs.

Integration Requirements and Siebel eAI

Table 2 maps real-world data and application integration requirements with their corresponding Siebel eAI features.

Table 2. Integration Requirements and How They Relate to Siebel eAI Features

Integration Requirements	Siebel eAI Features or Components	Notes
Metadata Definition XML Metadata External application metadata (from SAP applications, Oracle applications, and so on)	<ul style="list-style-type: none"> ■ Integration objects based on Siebel business objects ■ Integration objects based on external metadata ■ Integration Object Wizard 	In any integration project, you need a way to supply data about data, called metadata. Siebel applications provide XML as the common format for representing external application data. In addition, Siebel applications provide an object type in Siebel Tools called the Integration Object, as well as an Integration Object Wizard, which automates the task of creating integration objects.
Data Transformation Declarative data transformation mapping High-performance transformation engine	<ul style="list-style-type: none"> ■ Siebel Data Mapper 	Siebel eAI allows you to define what type of data to be exchanged, and allows you to export an XSD or a DTD for a Siebel integration object.
Business Process Coordination	<ul style="list-style-type: none"> ■ Siebel Business Process Designer ■ Workflow Process Manager 	See Business Process Coordination Using Workflows on page 49 .
Transport Mechanisms (for interfacing with other technologies)	Transport Adapters: <ul style="list-style-type: none"> ■ IBM MQSeries ■ Microsoft MSMQ ■ HTTP 	See Transport Mechanisms on page 50 .
High Volume Data Exchange	<ul style="list-style-type: none"> ■ EIM (Enterprise Integration Manager) 	See High-Volume Data Exchange on page 51 .
Standards-based Integration Mechanisms	<ul style="list-style-type: none"> ■ XML as a format for data exchange ■ COM, CORBA and Java-based programmatic interfaces ■ HTTP as a transport protocol 	

Business Process Coordination Using Workflows

Business process coordination means that every system in an enterprise sees the same up-to-date information. For example, when you need to change a customer address, the change must be reflected in every system that stores the address. Siebel Business Process Designer have been developed to help you define your data integration business process flows.

The application of Siebel's Workflow architecture within Siebel eAI is an important component in the design and deployment of any effective data integration solution. [Figure 13](#) shows how workflows respond to event triggers or time-based triggers to call transports, scripts, or object interfaces to communicate with external applications.

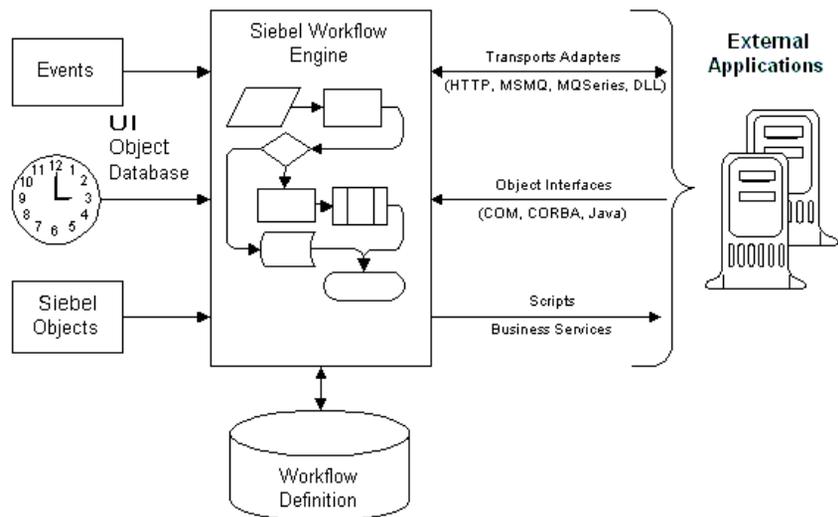


Figure 13. Siebel Workflow Architecture for Siebel eAI

Transport Mechanisms

Many companies have standardized on transport solutions, such as MQSeries from IBM or MSMQ from Microsoft. These transports allow the transportation of messages between systems. Siebel Systems conforms to this standard by allowing you to plug Siebel applications into these environments through Siebel eAI set of adapters, which include the MQSeries adapter, the MSMQ adapter, the HTTP adapter, and technologies which support BizTalk.

Transport adapters developed by Siebel Systems and Siebel-certified partners allow diverse applications to communicate with Siebel applications across virtually any operating system, network, and database. Figure 14 shows the various available transports to and from Siebel applications as a new order is processed. Any one or any combination of these transports could be used in an integration solution, depending upon existing applications and other factors. These transports can also be configured as a Siebel Server Receiver to receive messages, as for example, the MQSeries Server Receiver. For more details on using these transports, see *Transports and Interfaces: Siebel eBusiness Application Integration Volume III*.

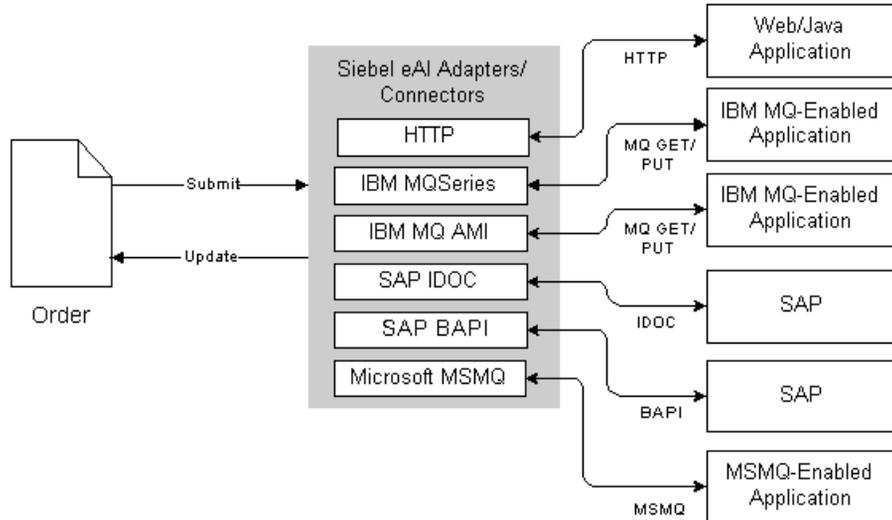


Figure 14. Order Entry Cycle Showing Transport Adapters

High-Volume Data Exchange

Most organizations require a mechanism to schedule high-volume integrations at a specific time, typically at night, to avoid network slowdowns or interference with other applications. Such integrations typically involve the updating of hundreds of millions of customer records. This type of activity requires a batch mechanism capable of processing such large amounts of data in a timely manner. Siebel Enterprise Integration Manager (EIM) allows you to schedule high-volume data exchanges between Siebel applications and other applications whenever needed, at whatever frequency required (twice a day, nightly, weekly, and so on).

Enterprise Integration Manager

EIM acts as a high-volume batch interface. With EIM, you can import and export data from the Siebel Database to other corporate databases. [Figure 15](#) shows the EIM batch data process. EIM includes database profiling that improves performance by supporting index specialization in Relational Database Management Systems (RDBMS).

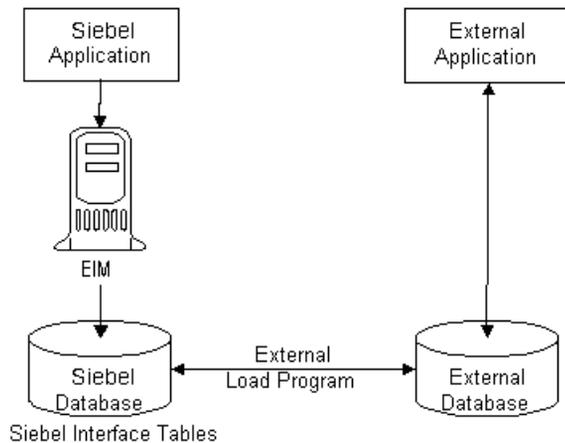


Figure 15. Siebel Enterprise Integration Manager at Work for EAI

Sometimes the best way to determine your integration needs is to study examples of similar problems faced by other organizations. This chapter presents three scenario categories, each with a number of permutations. The categories are:

- [Data Access and Replication on page 56](#)
- [Data Across the Enterprise on page 59](#)
- [Data Transformation on page 61](#)

The first step in getting started on an integration project is to identify your integration needs. Siebel eBusiness Applications provide solutions for a variety of eBusiness needs. They play a key role in the application environment, in which you might use other applications such as back-office solutions for order fulfillment, manufacturing, or accounting; e-commerce applications such as Web storefronts; help desk applications; and mainframe-based applications that store millions of customer transactions.

As customer applications, Siebel eBusiness Applications need to interact with these external systems to provide an integrated view of your information. Siebel eAI provides the tools as well as prebuilt components that you can use to create this integration. There are several ways in which you can approach integration, depending on your needs:

- You can connect Siebel applications and your back office or e-commerce system, using prebuilt eAI connectors.
- You can integrate Siebel applications with middleware solutions.
- You can integrate Siebel applications with external applications, using a third-party EAI product.

Common Integration Scenarios

The common integration scenarios listed here apply to many of the integration requirements you face. Siebel eAI allows you to accomplish integrations within the scope of these scenarios, but is not limited to the scenarios described here.

Outbound Message to a File

In this scenario, you create a Siebel workflow process to create a unique file every time a support representative closes a service request. The file is then sent to a central directory on a network server, where at midnight it is bundled automatically into an Adobe .pdf file along with other closed service requests for that day.

Round Trip Message from a File to Siebel Applications and Back

In this scenario, you want service requests entered from your Web site to be entered as service requests in Siebel Service. You also want to pull an automatically-generated service request number from Siebel Service, add it to the service request, and generate a file that is attached to a confirmation email message to the service requestor's email address.

Round Trip Message from an External Application

In this scenario, whenever your back-office Enterprise Resource Planning (ERP) system recognizes a reorder point on a popular inventory item, it sends a message to your Siebel application to notify salespeople that a popular item is about to be reordered. If the salespeople want to order from the remaining supply at the current price, they can respond to the message.

Round Trip Message to an External Application with a Different Code Page

In this scenario, your salespeople want to be able to send an order from Siebel applications to your back-office ERP system that is using Japanese 932, while the code page used by the Siebel application is UTF-8. Your salespeople want to receive a confirmation with an order number generated by the ERP system.

Inbound Message from an External Application

In this scenario, whenever product information in your SAP R/3 system is updated, you want the system to send an updated IDOC to your Siebel system and have the product information updated in the Siebel Product business object.

Outbound Message to an External Application

In this scenario, you want to update account information in your SAP R/3 IDOC from Siebel eBusiness Applications.

Data Access and Replication

Often, it is not sufficient to just bring everything to the same screen. Many business processes require access to particular data in order to accomplish a given task. This section describes four examples: “[Contact Information](#)” and “[Company Catalog](#)” on page 57, “[Siebel Java Beans](#)” on page 57, and “[Customer History Information](#)” on page 58.

Contact Information

Consider a scenario in which you want to send changes to contact information in the Siebel Database to an external mainframe system through the EAI MQSeries transport mechanism. Your first step is to define and configure the message that needs to be exchanged. In the Siebel Database, the Contact business object contains several business components, and each business component has several fields. You do not want to send all of this information to the external system. You want to choose only a subset of this information.

Use Siebel Tools to define the integration object for the contact message you want to exchange. Siebel Tools provides an Integration Object Builder that walks you through the process of defining your integration object. Once you have defined the message, define what to do with this message. The contact message needs to be sent to the external system using EAI MQSeries AMI Transport. You can use the Siebel Workflow Process Manager to model this integration message flow and to send the message. An integration message flow is a sequence of business services that are connected. [Table 3](#) details the requirements for exporting contact information from Siebel applications to a mainframe system.

Table 3. Customer Data Export Integration Requirements

Business Requirement	Technological Requirement	Siebel's eAI Solution
To access the Siebel Database	Business service to query the integration object	EAI Siebel Adapter
To convert an internal Siebel message format into XML	Siebel message-to-XML conversion technology	EAI XML Converter
To place the converted XML document in the destination queue	IBM MQSeries compatibility	EAI MQSeries AMI Transport

Company Catalog

In this scenario, you need to provide your salespeople access to a product catalog while they are on the road. So, you need to import the catalog information into Siebel applications so that Siebel Remote can take care of the mobile replication. Siebel Enterprise Integration Manager (EIM) imports this information. [Table 4](#) details the requirement for importing a company's catalog for mobile replication.

Table 4. Company Catalog Replication Integration Requirement

Business Requirement	Technological Requirement	Siebel's eAI Solution
To import the company's product catalog	High-volume batch replications	Siebel Enterprise Integration Manager (EIM)

Siebel Java Beans

In this scenario, you have a customer service Web application written using J2EE Server Pages (JSPs). To pass this data into Siebel applications so that account records can be updated, you invoke the Siebel Object Interface, Siebel Java Data Beans. Now, your Customer Service representatives can use the information from the Web application JSPs while serving the customer.

[Table 5](#) details the requirement for updating the Siebel Database using JSP technology.

Table 5. Siebel Update Integration Requirement

Business Requirement	Technological Requirement	Siebel's eAI Solution
To update Siebel account data from a J2EE Server Page (JSP)-enabled application	Programmatic interaction	Siebel Java Data Beans Object Interfaces

Customer History Information

In this scenario, your company is part of the financial industry. Financial service institutions are typically cautious in the way they treat customer data, so they want to provide access to data while replicating as few times as possible, if at all. Your customer service agents need to know the transaction history of your customers in order to provide the best service. This information is typically stored in Customer Information files (CIFs) on mainframe computers.

[Table 6](#) details the requirement for integrating customer transaction history information into Siebel applications.

Table 6. Customer Data Access Integration Requirement

Business Requirement	Technological Requirement	Siebel's eAI Solution
To provide access to the Customer Information Files (CIFs) stored on a mainframe and display this information in the customer portal	Access to non-Siebel data without replication	Siebel Virtual Business Components (VBCs)

Siebel Virtual Business Components (VBCs) are built to handle this business need. VBCs abstract external data and present it to Siebel applications as part of the Siebel data model. Siebel business logic and user interface components process Virtual Business Components in the same way that they process Siebel application's regular business components.

Data Across the Enterprise

Business processes often need to cross departmental or even enterprise boundaries. Because different organizations may be using different applications, you need a way to make sure one application can hand off the execution of a business process to the next application. This section describes two examples: “[B2B Integration](#)” and “[Legacy Data Integration](#).”

B2B Integration

Business-to-business integration allows partner companies to work together to satisfy customer demands. Since B2B is fundamentally about carrying out transactions over the Internet, the technology must work over the Internet infrastructure. To meet this demand, Siebel eAI provides the EAI HTTP adapter and BIM (which is used to model and execute business processes) to handle the task.

[Table 7](#) details the requirement and the solution for a successful B2B integration.

Table 7. B2B Integration Requirement

Business Requirement	Technological Requirement	Siebel's eAI Solution
To create a business-to-business integration to send an order directly to a partner over the Internet for fulfillment	XML messaging over HTTP	<ul style="list-style-type: none"> ■ Siebel Workflow Process Manager ■ EAI HTTP Transport adapter

Legacy Data Integration

Interfacing with a custom legacy application presents similar challenges to those faced in the B2B scenario. On the Internet, HTTP is the standard protocol for exchanging data. In a mainframe environment, IBM MQSeries is the most common application messaging transport. Therefore, you can replace the HTTP protocol in this solution with MQSeries and still carry out the transaction.

[Table 8](#) details the requirement and the solution for a successful integration of legacy data existing on a mainframe.

Table 8. Legacy Data Integration Requirement

Business Requirement	Technological Requirement	Siebel's eAI Solution
To create an order against a mainframe system	Cross-application business process management	<ul style="list-style-type: none">■ Siebel Workflow Process Manager■ EAI MQSeries Transport

Data Transformation

When performing data transformation within the Siebel environment, you use two types of integration objects:

- Internal integration objects mirror the data structure of a Siebel business object and contain a subset of business components and fields.
- External integration objects mirror the data structure of an external system.

You define integration objects of both types in Siebel Tools.

The EAI Siebel Adapter performs the same function whether the data transformation is performed inside or outside the Siebel environment. The XML Converter and the transports also perform the same function, whether they are used within the Siebel environment or outside the Siebel environment.

The only difference is that when used outside the Siebel environment, both of these business services perform operations on external integration object instances, as opposed to performing operations on internal integration object instances when used within the Siebel environment.

You define data mapping and data transformation rules using business services. In the prebuilt external adapters, Siebel eAI has provided many mappings and transformation rules.

NOTE: Business services provide a flexible scripting environment for mapping data from the Siebel data structure to an external data structure. Within a business service, Siebel applications provide a set of methods that allow you to perform operations on integration object instances.

Order Integration Scenario

In this scenario, an order is created in Siebel eBusiness Applications and is then passed to an external application. The external application returns the order status and an order number. [Table 9](#) details the requirements for data transformation integration.

Table 9. Data Transformation Integration Requirements

Business Requirement	Technological Requirement	Siebel's eAI Solution
To create a new internal Integration Object	Integration object tool or wizard	Siebel Integration Object Wizard
To create a new external Integration Object	Integration object tool or wizard	Siebel Integration Object Wizard
To create a new business flow	Workflow technology	Siebel Business Process Designer

For this task, identify the Siebel business object that you would want to update. For that business object, identify the components and fields that you expect to update. Next, identify the object in the external system with which you want to integrate. Then, determine the mapping between the Siebel business object and the external object.

In Siebel Tools, create a new internal integration object using the Integration Object Wizard. Select only the components and fields that you want to update. Then, in Siebel Tools, create a new external integration object. Then, either in Siebel Tools or in the Siebel client, define the data mapping and data transformation using business services.

In the Siebel client, define an integration workflow process and add any exception handling to the integration workflow process. Test the integration workflow process using the process simulator. Finally, add a mechanism for invoking the integration workflow process from Siebel applications.

There are four main areas to be aware of to improve overall performance for data integration and throughput of Siebel eBusiness Applications. Specifically, you should:

- Try to minimize round trips between systems. For example, if an integration needs to request three pieces of data, do not send one request. Wait for the response, and then send the next request. If you need multiple pieces of data, gather the data in a single request.
- Try to keep processing in a single session wherever possible, to avoid having to make calls between server components.
- Within a session, try to minimize the nesting of calls between components such as workflow, scripting, and the EAI Siebel Adapter. For example, use a workflow process to sequence the calling of business services and keep scripting code in self-contained steps. Workflow subprocesses can be used to package together commonly called sequences of services. Also, avoid scripting events on business components used by the EAI Siebel Adapter. Perform any scripting task either before or after the EAI Siebel Adapter call, rather than within it.
- Try to represent the incoming external data in the same code page and encoding that Siebel application uses internally (UCS-2). This eliminates the need to use Transcode business service in your workflow process which enhances the performance.

The remainder of this chapter discusses specific technologies and what you can do to improve performance in each area.

MQSeries Transport Performance

The performance of an MQSeries queue is highly dependent on the disk performance of the queue manager machine and the layout of the queue's files on the disk. You should test your queue with stand-alone utilities so that you have an upper boundary for the performance that can be expected in a live application.

To achieve higher throughput, you should:

- Run many MQ Receivers in parallel on the same machine or across several machines.
- Set the Maximum Number of Channels parameter in the MQSeries Queue Manager to be greater than or equal to the maximum number of simultaneous clients you have running.

In addition, there are specific actions you can take to improve MQSeries Transport performance for outbound and inbound transports, as detailed in the following section.

Inbound Messages

For inbound MQSeries messages, run multiple MQ Receivers in parallel to increase throughput.

Outbound Messages (SendReceive)

Caching of the MQSeries Transport business services can improve outbound performance by eliminating the need to connect to the queue for each message. Caching is disabled by default because it is not usable in every situation. Follow these tips to enable caching:

- Only cache in client sessions. Do not use caching if your transport will be called within the Workflow Process Manager server component. The threading model of these components is not compatible with the MQSeries APIs.
- To enable caching, turn on the Service Cache flag in Siebel Tools and then recompile the .srf file.
- If you need to call the MQSeries transport in Workflow Process Manager and in a client session, make a separate copy of the service (one cached and one uncached) for each situation.
- Caching occurs on a per-queue basis and only one connection is kept open at a time. If a single session is going to talk to multiple queues, consider making a copy of the transport for each outbound queue.

NOTE: See your IBM MQSeries documentation for performance and sizing guidelines.

Performance Events

You can get detailed performance tracing of the MQSeries transport by setting the event TransportPerf to level 5.

This event is new for Siebel 7. In Siebel 6.x, there was an event EAITransport that provided performance data when set to level 5. Note that these events probably introduce some overhead and degrade overall performance, so use them only when analyzing performance issues. In particular, the EAITransport event generates a large amount of trace data.

HTTP Inbound Transport Performance

The HTTP Inbound Transport supports two modes, Session mode and Sessionless mode. In Session mode, the session stays live until a logoff call is made. For Sessionless mode, login and logoff occur automatically for each request. You should use Session mode whenever possible because the time required to log in to the application is usually significantly longer than the time required to process an average request.

You can also use the `SessPerSisnConn` component parameter to control the number of sessions sharing the same physical connection between the Web Server and the Object Manager. Setting this parameter to 1 will provide a dedicated physical connection for each Siebel session. The default value is 20 to allow up to 20 sessions to share the same physical connection. For usage patterns involving a large number of sessions, the default value should be sufficient. For usage patterns where the number of simultaneous sessions is small, you can lower this value to make a better use of your system resources. You can change this parameter using `srvrmgr` at the Enterprise or Server level. For example, to set the parameter at the Enterprise level for the EAI Object Manager, you enter the following command:

```
change param SessPerSisnConn=1 for compdef eaiobjmgr_enu
```

EAI Siebel Adapter Performance

There are four common techniques to improve the EAI Siebel Adapter performance and throughput:

- Minimize the size of integration object definitions to reduce the amount of work done by the EAI Siebel Adapter for each operation.
- Analyze the SQL that the EAI Siebel Adapter generates.
- Run multiple instances of the EAI Siebel Adapter in parallel.
- Fine-tune the caching parameters on the EAI Siebel Adapter.

Disable Logging

You should disable logging for performance-critical processes that are functioning correctly to gain about 10% faster performance. Logging can be disabled by setting the BypassHandler server parameter to TRUE.

Integration Object Size

The size of an integration object and its underlying business components can have an impact on the performance of the EAI Siebel Adapter. To minimize this impact, you can:

- Inactivate unnecessary fields and components in your integration objects.
- Inactivate force active fields under each business component.

This prevents the EAI Siebel Adapter from processing these fields. If you do not inactivate these fields, the EAI Siebel Adapter processes them even though they are not included in the integration object.

SQL Produced by the EAI Siebel Adapter

Requests to the EAI Siebel Adapter eventually generate SQL to be executed against the relational database storing the Siebel Server's data. By setting the event *SQL* to level 4 in the component running in the EAI Siebel Adapter, you can get a trace of the SQLs being executed along with timings for each statement. You can get timings for each of the EAI Siebel Adapter operations by setting the event *EAI SiebAdptPerf* to 4. This can be used to correlate the EAI Siebel Adapter calls with their associated SQL.

After you have this information, look through the logs to find any SQL statements taking significantly longer than average. To improve the performance of such statements, look at the *BusComp* definition (perhaps eliminating unnecessary joins and fields) or at the physical database schema (perhaps adding indexes).

EAI Siebel Adapter in Parallel

A common technique to improve throughput is to run multiple instances of the EAI Siebel Adapter in parallel. For the MQ Receiver, you do this by running multiple receiver tasks. For the EAI Object Manager, you do this by starting multiple simultaneous HTTP sessions. There is little interaction between each instance of the EAI Siebel Adapter. If the database server is large enough, almost linear scalability of the EAI Siebel Adapter is possible until either the limits of the CPU or the memory limits of the Siebel Server are reached.

CAUTION: If two sessions attempt to simultaneously update or insert the same record, one will succeed and one will produce an error. Therefore, when running the EAI Siebel Adapters in parallel, you need to prevent the simultaneous update of the same record in multiple sessions. You can prevent this by either partitioning your data or retrying the EAI Siebel Adapter operation in the event that the error occurs.

Caching Parameter

The EAI Siebel Adapter caches business objects by default. The default cache size is five objects. Using caching, subsequent runs on the adapter are significantly faster because the business objects do not need to be recreated for each run.

You use the `BusObjCacheSize` parameter to change the size of the cache, if required. However, the ten-object cache size is enough for most purposes. Making this number too large creates an unnecessarily large memory footprint.

Workflow Process Manager

Workflow Process Manager is a task-based server component. A new thread is created for each request. However, Object Manager sessions are cached and reused for subsequent requests. When sizing a system, you need to look at the maximum number of workflow tasks you expect to have active at a given time. This determines the maximum number of Object Manager sessions Siebel applications create.

NOTE: Starting with Siebel 7.0, Business Integration Manager and Business Integration Batch Manager have been deprecated, so if you were using either one in your business processes you need to replace them with Workflow Process Manager or Workflow Process Batch Manager respectively. For details on Workflow Process Manager and Workflow Process Batch Manager, see *Siebel Business Process Designer Administration Guide*.

The exact CPU and memory consumption of each task depends on the actions performed in your workflow processes. To estimate CPU and memory consumption in your production environment, run a single task, measure its resource consumption, and make an estimation based on your maximum concurrent sessions. (Be sure to take into account session caching when making these measurements.)

If you need a large number of sessions, you may want to run Workflow Process Manager on multiple Siebel Server machines. You can then use Resonate to load-balance requests across the Siebel Servers. If you plan to run a significant number of tasks per server (such as 100 or more), you may also want to run multiple MT (multithreaded) server processes.

If you are going to run several different types of workflows, you should run each type in a separate process. This makes it easier to monitor the overall CPU and memory usage of each process type.

The number of MT server processes and the number of tasks per process are controlled through these parameters:

- Min MT Servers
- Maximum MT Servers
- Maximum Tasks

NOTE: These parameters are per Siebel Server. For example, Max MT Servers refers to how many server processes to run on each Siebel Server machine. For details, see *Siebel Server Administration Guide*.

Performance Events

You can get performance tracing of workflows by setting the event WfPerf for the component in which your workflow is running. Setting the event to level 4 gives timing for the execution of the overall process. Setting the event to level 5 provides timing for each step as well. These events can be useful not just for measuring workflow performance but also for measuring the performance of business services executed within these workflows.

Virtual Business Component Performance

Because users are waiting for the Virtual Business Component (VBC) response to display the GUI component for the integration on their screens, this type of integration is especially sensitive to latency.

To improve VBC performance when your integration has multiple requests, put the requests for a given system in a single batch.

Error Messages and Troubleshooting Tips

B

This appendix describes the error messages you might receive while using the EAI technologies.

EAI Siebel Adapter

Error Error invoking service 'EAI Siebel Adapter', method 'Upsert' at step 'XXX'.
Unable to perform Upsert corresponding to the integration object < IntObjName >
Insert.
Error processing business component < Business Component Name >
Operation: NewRecord
Number of records processed: 1
Business component name: Service Request
Operation: Execute
Number of records processed: 0
Business component name: PickList Generic
Cannot find an entry in the bounded picklist PickList Generic, that corresponds to the field(s) 'Value'.

Cause An upsert was attempted on the business component where one of the fields is based on a Bounded Picklist. However the incoming value for that field does not exist in the picklist.

Resolution Check the data in the incoming XML file for any unacceptable values. Verify the value already exists in the picklist.

Error The same values for 'Value Name' already exist. If you would like to enter a new record, please make sure that the field values are unique.

Cause The same record existed in the database. Though the error showed in the EAI Siebel Adapter layer, the real error has occurred in the Object Manager layer.

Resolution

- 1 Check the data for any duplicates in both the input XML file and in the database.
- 2 Make sure that the user key values are unique.

- Error** No valid user key found for the integration component instance 'Component Name'. (Error Symbol: IDS_EAI_ERR_SA_NO_USERKEY).
- Cause** The user key of the integration component is not configured properly.
- Resolution** Check the user key properties to make sure they are active. If not, activate the user key.
- Error** The ability to insert records is not available in this screen or applet.
- Cause** The No Insert and No Update properties are set to TRUE at the business component and the applet level.
- Resolution**
- 1 Log in to Tools.
 - 2 Find the business component and change the values for No Insert and No Update to FALSE to allow insert and update to the business component through an applet.
 - 3 Compile the changes into your .srf.
- Error** The selected record has been modified by another user since it was retrieved. Please continue.
- Cause** The two EAI interfaces were writing to the same record concurrently.
- Resolution**
- 1 If multiple EAI processes update the same data, try to partition the tasks such that the same process handles all updates to the same object.
 - 2 Modify your workflow or script to perform better error handling.
- Error** The default Organization from S_ORG_INT is used as the organization for the incoming product records.
- Cause** An organization is not defined on the incoming record, so the EAI Siebel Adapter pulls the default organization from the S_ORG_INT table.
- Resolution** Use either eScript or the Siebel Data Mapper to set the value of the Organization field on the incoming integration object.

MQ Transports

Error Required property 'MqPhysicalQueueName' is not set for Business Service 'EAI MQSeries Server Transport.

Cause Input property is not correct.

Resolution Set the Physical Queue Name you are using in the input arguments of this business service.

Error Unable to connect to MQSeries Queue Manager '%1'\r\nMQSeries Error Code: %2\r\nCheck the MQSeries configuration and verify that the queue manager is running. (Error Symbol: IDS_EAI_ERR_TRANS_MQ_CONNECT).

Cause Possible causes may be:

- The Queue Manager name was incorrect.
- The Queue Manager was not running.
- MQSeries Server was not configured properly.

Resolution

- 1 Verify the name of the queue manager and that it is running.
- 2 Run dspmqcsv from the MQ installation \bin directory (should show 'MQSeries Command Server Status: Running').
- 3 Review MQSeries Server trace files for the relevant queue from \log directory under MQ installation.
- 4 Start the queue manager or correct the configuration problems. Consult IBM MQSeries manuals for detailed installation and configuration information.

Error Unable to open MQSeries Queue '%1'\r\nMQSeries Error Code: %2\r\nCheck the MQSeries configuration and verify that the specified queue exists. (Error Symbol: IDS_EAI_ERR_TRANS_MQ_OPEN).

Cause The same error could be due to one of the following conditions:

- The Queue Manager name was incorrect.
- The Queue Manager was not running.
- MQSeries Server was not configured properly.

Resolution

- 1** Verify the name of the queue manager and that it is running.
- 2** Run dspmqcsv from the MQ installation \bin directory (should show 'MQSeries Command Server Status: Running').
- 3** Review MQSeries Server trace files for the relevant queue from \log directory under MQ installation.
- 4** Start the queue manager or correct the configuration problems. Consult IBM MQSeries manuals for detailed installation and configuration information.

HTTP Transport

Error XML conversion error, creating a dump file containing source XML document.

Cause The same error could be due to one of the following conditions:

- XML tag not present
- Unable to interpret XML tag
- Invalid value in bounded picklist
- Invalid length or data for column
- Application Server too busy to service request
- Application Server not running
- Could not reach the Siebel Application Server due to network problems

Resolution Depends on the cause.

Error Error invoking service 'EAI HTTP Transport', method 'Send' at step 'Send HTTP Call to Credit Score'. HTTP Internet Exception during 'Send request': 'The operation timed out', code: '12002'.

Cause The EAI HTTP Transport timed out while connecting to the external Web Server. The external Web Server might be down, or not reachable.

Resolution

- 1** Verify the requested URL can be reached from the machine from where the EAI HTTP Transport is invoked.
- 2** Increase the SleepTime parameter under Business Service User Prop of the EAI HTTP Transport business service. The SleepTime parameter is the timeout interval on login, send, and receive requests in seconds.
- 3** Compile the new .srf file and copy it to the Client and the Server.

XML Converter

- Error** EAI XML Converter error - empty input message, expecting an XML document in < Value > of input arguments.
- Cause** The message from the EAI receiver is not included in the input arguments of the EAI XML converter.
- Resolution** Create a new process property < Value > in the workflow to hold the message obtained from EAI receiver, then add < value > into the input argument of the EAI XML Converter business service.
- Error** EAI XML Converter error - empty input message, expecting an XML document in < Value > of input arguments.
- Cause** No XML document was passed as an input to the Siebel XML converter. The XML document should be passed in as the < Value > (Message Text) input argument.
- Resolution** If you are calling the XML Converter from workflow, then:
- 1 Verify that the Message Text input argument is correctly mapped to a process property.
 - 2 Verify that any previous steps are populating the process property with the XML document.
- If the XML document is generated from a transport, such as MQSeries or HTTP and dispatched to a workflow, then:
- 1 Verify that the process property that contains the document has a default value of < Value > .
 - 2 Verify that the external application providing the XML document is not sending an empty message.
- Error** Error invoking 'EAI XML Converter', method 'XMLToPropsSet' at step 'convert to internal'.

Cause The wrong XML format caused the error.

Resolution Check the format of the XML message and make sure it is correct. Some common problems include:

- An XML open element tag such as `<SiebelMessage>` does not have a corresponding close tag such as `</SiebelMessage>`.
- An XML tag (element or attribute) contains invalid characters such as a space.

XML Gateway

- Error** The 'Service Name' User Property is not defined in the virtual BusComp '%1'. (Error Symbol: IDS_ERR_BCXMEXT_MISSING_SERVICE_NAME).
- Cause** Did not set the Service Name user property in VBC.
- Resolution** Find the VBC and set the Service Name. For detail information, see *Integration Platform Technologies: Siebel eBusiness Application Integration Volume II*.
- Error** The external application returned an invalid Siebel XML format for '%1' method. (Error Symbol: IDS_ERR_BCXMEXT_INVALID_XML_RETURNED).
- Cause** Invalid Siebel XML format was passed to the method.
- Resolution** Verify the XML document format. For detail information o, see *Integration Platform Technologies: Siebel eBusiness Application Integration Volume II*.

XML File

Error Fatal Error in XML Parser at line 1, column 935: The input ended before all started tags were ended. Last tag started was 'StreetAddress'.

Cause Special characters < , > and & are included directly in the XML document data part.

- Resolution**
- The special characters > , < and & can be handled by using the &value or their hexadecimal representation. For example, the &value for the above characters are > , < and &, respectively.
 - XML does not distinguish between CR and LF. The character representation of either one is .

Workflow Process

Error 'Field Property Name' is a required field. Please be sure all required fields are completed before continuing.

Cause The required field is missing.

Resolution Add the field property.

OLE DB Provider

Please see *Transports and Interfaces: Siebel eBusiness Application Integration Volume III*.

Siebel Data Mapper

- Error** The input does not contain an Integration Message.
- Cause** Calling a DTE Business Service with no input property set (the Business Service may not need one).
- Resolution** Specify the InputType or OutputType as ServiceArguments. In this case, the business service property set arguments are passed directly to the map function. The standard property set functions can be used to access them.
- Error** Data Transform Error. XPSGetRootElement: Input Property Set does not have an 'XML Document', a Child Property Set with type 'XMLHierarchy'.
- Cause** The XML Hierarchy Converter Business Service converts incoming XML into a XMLHierarchy PropertySet. Data transformation functions in script exist to convert this into a standard Siebel Integration object Hierarchy property set. These functions expect to find a child PropertySet with type = XMLHierarchy.
- Resolution** When calling the transformation function, check the contents of the Input PropertySet and the Type of its Child PropertySet. Make sure the Child PropertySet type of the Inputs PropertySet is XMLHierarchy.
- Error** "Service Method arguments property set has no children, should have one child of type 'siebel message', error invoking service 'EAI Data Transformation Engine', method 'Execute' at step 'Transform Contact Data'".
- Cause** You have not specified Siebel Message as the EAI Data Transformation Engine business service method argument. When calling a EAI Data Transformation Engine business service, a check is made to see if the Input PropertySet contains a Siebel Message.
- Resolution** If you want to map one integration object to another, you should specify Siebel Message as the EAI Data Transformation Engine business service method argument.

Siebel Server

Error Could not find 'Class' named 'Class Name'.

Cause A process accessed a business service definition, which was not available in either the .srf file or in the database that the process pointed to. This could happen in a script or in a workflow process.

Resolution

- If the business service is created in the repository, make sure that the appropriate projects have been compiled and that the .srf file has been placed in the objects directory of either the client or the server. If the process runs from a server task, you should have the .srf placed in the server objects directory.
- If the business service is created in the client through the business service Administration screens, make sure that both the client and the server use the same database.

Error The SISNAPI connection was closed by the peer.

Cause This error could happen in any Siebel Server component such as MQ or Remote Synchronization, due to incorrect installation or a time out condition.

Resolution

- 1 Check whether this error happens for multiple clients on different machines or for multiple server components. Determine the steps that lead up to the error and determine if a long period of waiting or network interruption coincides with the error.
- 2 Depending on the likely cause, verify the installation requirements or verify network connectivity and reattempt operation.

Error Unable to perform Query corresponding to the integration object.

Cause Possible causes for this error are:

- UI specific script ran on the Siebel Server.
- The Siebel Server did not have the old repository.

Resolution

- 1** Make sure that the UI specific methods like `ActiveBusObject`, `ActiveBusComp`, `ActiveApplet`, and `MsgBox` are not in the business service.
- 2** Make sure that the `.srf` file is the latest `.srf` file on both the client and the server.

Integration Object Configuration

Error Integration component type ' ' is not a valid child type for component type '%2'.

Cause The integration object and components were not configured properly. Specifically, the integration components might be deactivated.

Resolution Check that the integration object and its components are correctly configured. Re-activate the integration component.

Error Could not find 'Integration Object' named 'Integration Object Name'.

Cause The .srf file under *SIEBSRVR_ROOT*\Objects directory did not contain the integration object definition.

Resolution

- 1 Open Siebel Tools.
- 2 Search for the Integration Object and make sure the object is defined.
- 3 Compile a new .srf file from Tools.
- 4 Copy the new .srf to both the *SIEBEL_CLIENT_ROOT*\Objects and *SIEBSRVR_ROOT*\Objects directories.

Error Integration Object instance 'Integration Object Name' not found in the database.

Cause The .srf file under *SIEBSRVR_ROOT*\Objects directory did not contain the integration object definition.

Resolution

- 1 Open Siebel Tools.
- 2 Search for the Integration Object and make sure the object is defined.
- 3 Compile a new .srf file from Tools.
- 4 Copy the new .srf to the *SIEBEL_CLIENT_ROOT*\Objects and *SIEBSRVR_ROOT*\Objects directories.

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