TIBCO ActiveMatrix® Adapter for PeopleSoft

Concepts

Software Release 6.0
December 2009

Important Information

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Preface

This document explains in detail the concepts and features of the adapter.

Topics

Related Documentation

This section lists documentation resources.

TIBCO Product Documentation

The following documents form the TIBCO ActiveMatrix Adapter for PeopleSoft documentation set:

- *TIBCO ActiveMatrix Adapter for PeopleSoft Concepts* Read this manual to familiarize yourself with the product and its uses.
- *TIBCO ActiveMatrix Adapter for PeopleSoft Installation* Read this manual to learn how to install TIBCO ActiveMatrix Adapter for PeopleSoft.
- *TIBCO ActiveMatrix Adapter for PeopleSoft Configuration and Deployment* Read this manual for instructions on how to create, configure, and deploy adapter projects.
- *TIBCO ActiveMatrix Adapter for PeopleSoft Examples* Read this manual to work through the examples provided with the adapter.
- *TIBCO ActiveMatrix Adapter for PeopleSoft Release Notes* Read this document for information about new features, deprecated features, and known and closed issues.

The following documents form the TIBCO ActiveMatrix Adapter Service Engine for PeopleSoft documentation set:

- *TIBCO ActiveMatrix Adapter Service Engine for PeopleSoft Installation* Read this manual to learn how to install TIBCO ActiveMatrix Adapter Service Engine for PeopleSoft.
- *TIBCO ActiveMatrix Adapter Service Engine for PeopleSoft Configuration and Deployment* Read this manual for instructions on how to create, configure and deploy adapter projects.
- *TIBCO ActiveMatrix Adapter Service Engine for PeopleSoft Examples* Read this manual to work through the examples provided with the adapter.
- *TIBCO ActiveMatrix Adapter Service Engine for PeopleSoft Release Notes* Read this document for information about new features, deprecated features, and known and closed issues.

Other TIBCO Product Documentation

You may find it useful to read the documentation for the following TIBCO products:

- TIBCO Designer™
- TIBCO Administrator™
- TIBCO ActiveMatrix BusinessWorks™
- TIBCO ActiveMatrix BusinessWorks™ Service Engine
- TIBCO Rendezvous®
- TIBCO Enterprise Message Service™
- TIBCO Hawk®
- TIBCO Adapter™ SDK
- TIBCO Runtime Agent™
- TIBCO ActiveMatrix® Service Grid
- TIBCO ActiveMatrix® Service Bus
- TIBCO Business Studio™

Third-Party Documentation

You may also find it useful to read the following documentation:

- “Integration Tools: PeopleSoft Component Interfaces” in the *PeopleTools PeopleBook.* Topics include an explanation of Component Interfaces, how to create them, how to test them using PeopleTools, and how to validate that a Component Interface is compatible with the underlying component.
- "PeopleSoft Integration Broker" in the *PeopleTools PeopleBook*. Topics include an explanation of Integration Broker, the components involved, and how to use the components in Application Messaging.
- “PeopleSoft Platforms”, a link from the PeopleSoft Customer Connection Website (see http://www.peoplesoft.com), for the versions of the databases supported by PeopleSoft.
- “PeopleSoft Internet Architecture Administrating”, a link from the Peoplebook- PeopleTools-Administration Tools website (see http://www.peoplesoft.com), for information on configuring a JOLT Listener port.

Typographical Conventions

The following typographical conventions are used in this manual.

Table 1 General Typographical Conventions

Convention	Use
TIBCO_HOME *ENV_HOME*	Many TIBCO products must be installed within the same home directory. This directory is referenced in documentation as *TIBCO_HOME*. The value of *TIBCO_HOME* depends on the operating system. For example, on Windows systems, the default value is `C:\tibco`. Other TIBCO products are installed into an installation environment. Incompatible products and multiple instances of the same product are installed into different installation environments. The directory into which such products are installed is referenced in documentation as *ENV_HOME*. The value of *ENV_HOME* depends on the operating system. For example, on Windows systems the default value is `C:\tibco`.
`code font`	Code font identifies commands, code examples, filenames, pathnames, and output displayed in a command window. For example: Use `MyCommand` to start the foo process.
`bold code font`	Bold code font is used in the following ways: • In procedures, to indicate what a user types. For example: Type **`admin`**. • In large code samples, to indicate the parts of the sample that are of particular interest. • In command syntax, to indicate the default parameter for a command. For example, if no parameter is specified, `MyCommand` is enabled: `MyCommand [`**`enable`**` | disable]`
italic font	Italic font is used in the following ways: • To indicate a document title. For example: See *TIBCO ActiveMatrix BusinessWorks Concepts*. • To introduce new terms For example: A portal page may contain several portlets. *Portlets* are mini-applications that run in a portal. • To indicate a variable in a command or code syntax that you must replace. For example: `MyCommand` *PathName*

Table 1 General Typographical Conventions (Cont'd)

Convention	Use
Key combinations	Key name separated by a plus sign indicate keys pressed simultaneously. For example: Ctrl+C. Key names separated by a comma and space indicate keys pressed one after the other. For example: Esc, Ctrl+Q.
	The note icon indicates information that is of special interest or importance, for example, an additional action required only in certain circumstances.
	The tip icon indicates an idea that could be useful, for example, a way to apply the information provided in the current section to achieve a specific result.
	The warning icon indicates the potential for a damaging situation, for example, data loss or corruption if certain steps are taken or not taken.

How to Contact TIBCO Support

For comments or problems with this manual or the software it addresses, please contact TIBCO Support.

- For an overview of TIBCO Support, and information about getting started with TIBCO Support, visit this site:

  http://www.tibco.com/services/support

- If you already have a valid maintenance or support contract, visit this site:

  https://support.tibco.com

  Entry to this site requires a user name and password. If you do not have a user name, you can request one at the site.

Chapter 1 Introduction

This chapter introduces adapters by explaining adapter key features, services, and functionality.

Topics

What is an Adapter?

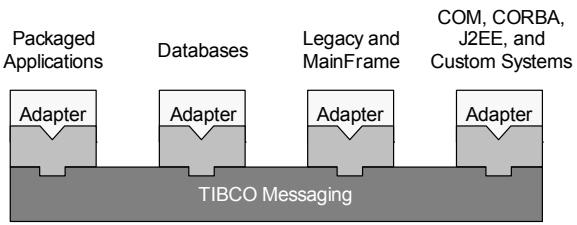
To deploy the best solution for each aspect of your business, you usually have to purchase applications from several different application vendors. Unfortunately, vendors typically have their own way to format and expose data. Therefore integrating the various applications across your enterprise poses significant challenges.

An adapter provides a bridge between an application and your TIBCO integration environment. Using a no-coding approach to integration, TIBCO Adapters enable packaged applications, databases, and other technologies to become active participants in the enterprise information flow, regardless of their data formats or communication protocols. Integration of new applications does not require programming skills and does not interfere with existing infrastructure.

Adapters isolate the application from more complex actions. Message transformation and business process automation can be handled once the data is published to the TIBCO infrastructure.

As shown in Figure 1, adapters allow data to be exchanged among different technologies.

Figure 1 Adapters Provide a Bridge for Data



- Adapters are available for off-the-shelf applications from leading vendors. Each adapter integrates with at least one, and usually several, of the interfaces exposed by the vendor application.
- Database adapters enable an enterprise's database to initiate important business processes based on exception data they identify. Database adapters also make data available to the enterprise.
- Mainframe adapters enable real-time two way communication between them and the rest of a company's business applications and databases.
- Adapters can also enable integration with component or object development models and other messaging technologies.

Adapter Components

The adapter can run either as a standalone process or as a service. When run as a service, the adapter participates in the Service Oriented Architecture (SOA) environment.

The adapter components are:

- Standalone

  Using this component you create adapter projects which run as a standalone process. This adapter component is referred to as the *standalone adapter*.

  Standalone adapter projects are created and configured using TIBCO Designer and deployed using TIBCO Administrator.

- Adapter Service Engine

  Using this component you create and configure adapter projects that can be deployed as a service in the TIBCO ActiveMatrix environment. This adapter component is referred to as the *adapter service engine*.

  Adapter service engine projects are created using TIBCO Business Studio and deployed using TIBCO ActiveMatrix Administrator.

  The adapter component is wired with other composite elements in the ActiveMatrix SOA Project.

  Existing standalone adapter configurations can also be deployed as services.

Throughout this book, references to an adapter include both the standalone and adapter service engine components.

Adapter Key Terms

The following key terms are used when describing adapter interactions in this manual.

- A *palette* is a standalone adapter component that contains the screens used to gather input at design-time when configuring an adapter with a service. The palette is accessed through TIBCO Designer.
- A *project* is a collection of configured adapter resources. A *project* contains configuration information for one or more adapter instances. A local project is typically used at design-time for testing adapter instances. For production, a project is typically managed by an administration server which is provided by TIBCO Administrator for the standalone adapter and by TIBCO ActiveMatrix Administrator for the adapter service engine.
- An *.ear* of an application contains global variables with values set at design-time by the standalone adapter. The global variables can be changed during deployment at the application level, the service level, or the service instance level.
- *Service Oriented Architecture (SOA)* is a software architecture in which applications and data are decomposed into discrete, operationally independent services, which can be executed in a highly distributed manner.
- A *business object* is the representation of the data model of the entities that the adapter service engine connects to. The business objects are downloaded during the design phase and are used by the adapter services.
- A *container* is an ActiveMatrix runtime entity that hosts component implementations and service bindings.
- A *service assembly* is an ActiveMatrix deployment package. It contains service units and a descriptor that indicates the container into which each service unit is to be deployed. The suffix of a service assembly file is `.saf`.
- The ActiveMatrix services are described in documents expressed in *Web Services Description Language (*WSDL). The WSDL documents specify the messages that are required to access a service.
- During any service interaction, each service will adopt one of two roles: provider or consumer. A service *provider* publishes a WSDL document that describes the services it offers. A service *consumer* uses the WSDL document to determine the available services and the messages required to access the services.

Adapter Services

Adapters are responsible for making information from different applications available to other applications across an enterprise. To do so, an adapter is configured to provide one or more of the following services:

- Publication Service, page 5
- Subscription Service, page 6
- Request-Response Service, page 6
- Request-Response Invocation Service, page 6

Table 2 summarizes the services introduced in this section.

Table 2 Adapter Services Summary

Service	Initiator	Target	Event Mode
Publishing service (sends to target)	Vendor application	TIBCO infrastructure	Asynchronous
Subscribing service (gets from initiator)	TIBCO infrastructure	Vendor application	Asynchronous
Request-response service (gets from initiator, waits for response then sends response to target)	TIBCO infrastructure	Vendor application	Synchronous
Request-response invocation service (sends to target, waits for response, then sends response to initiator)	Vendor application	TIBCO infrastructure	Synchronous

Publication Service

An adapter *publication service* recognizes when business events happen in a vendor application, and asynchronously sends out the event data in realtime to interested systems in the TIBCO environment.

For example, an adapter can publish an event each time a new customer account is added to an application. Other applications that receive the event can then update their records just as the original application did.

Subscription Service

An adapter *subscription service* asynchronously performs an action, such as updating business objects or invoking native APIs, on a vendor application. The adapter service listens to external business events, which trigger the appropriate action.

Referring to the previous example, an adapter subscription service can listen for customer record creation events (happening in an application and published to the TIBCO infrastructure) and update another application.

Request-Response Service

In addition to asynchronously publishing and subscribing to events, an adapter can be used for synchronously retrieving data from or executing transactions within a vendor application. After the action is performed in the vendor application, the adapter service sends a response back to the requester with either the results of the action or a confirmation that the action occurred. This entire process is called *request-response*, and it is useful for actions such as adding or deleting business objects.

In the next example, an adapter receives a request message from the TIBCO infrastructure and sends it to an application. The adapter gets a response from the application and returns it.

Request-Response Invocation Service

An adapter *request-response invocation* service is similar to the request-response service, except that the roles are reversed. The vendor application is now the requester or initiator of the service, instead of the provider of the service. The adapter service acts as a proxy, giving the vendor application the ability to invoke synchronously functionality on an external system.

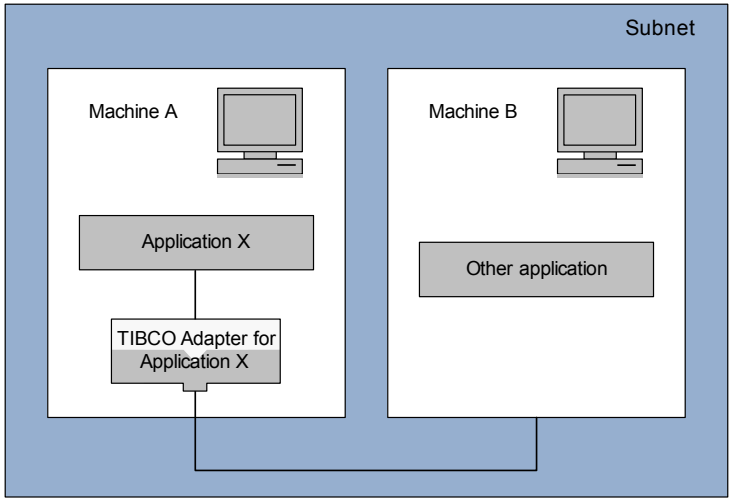
For example, the adapter can send a request message from application Y to application X. After application X processes the message, it is returned to the adapter, which sends the response back to application Y.

Choosing an Adapter Service

A business integration scenario drives the choice of one adapter service or another. This section provides a simple flow chart that helps you to choose the service to use. Not all adapters provide all services and some adapters may provide additional services not listed here. See your adapter user's guide for details.

Consider the following environment that involves application X, an adapter, and another application, as shown in Figure 2.

Figure 2 A Business Integration Scenario



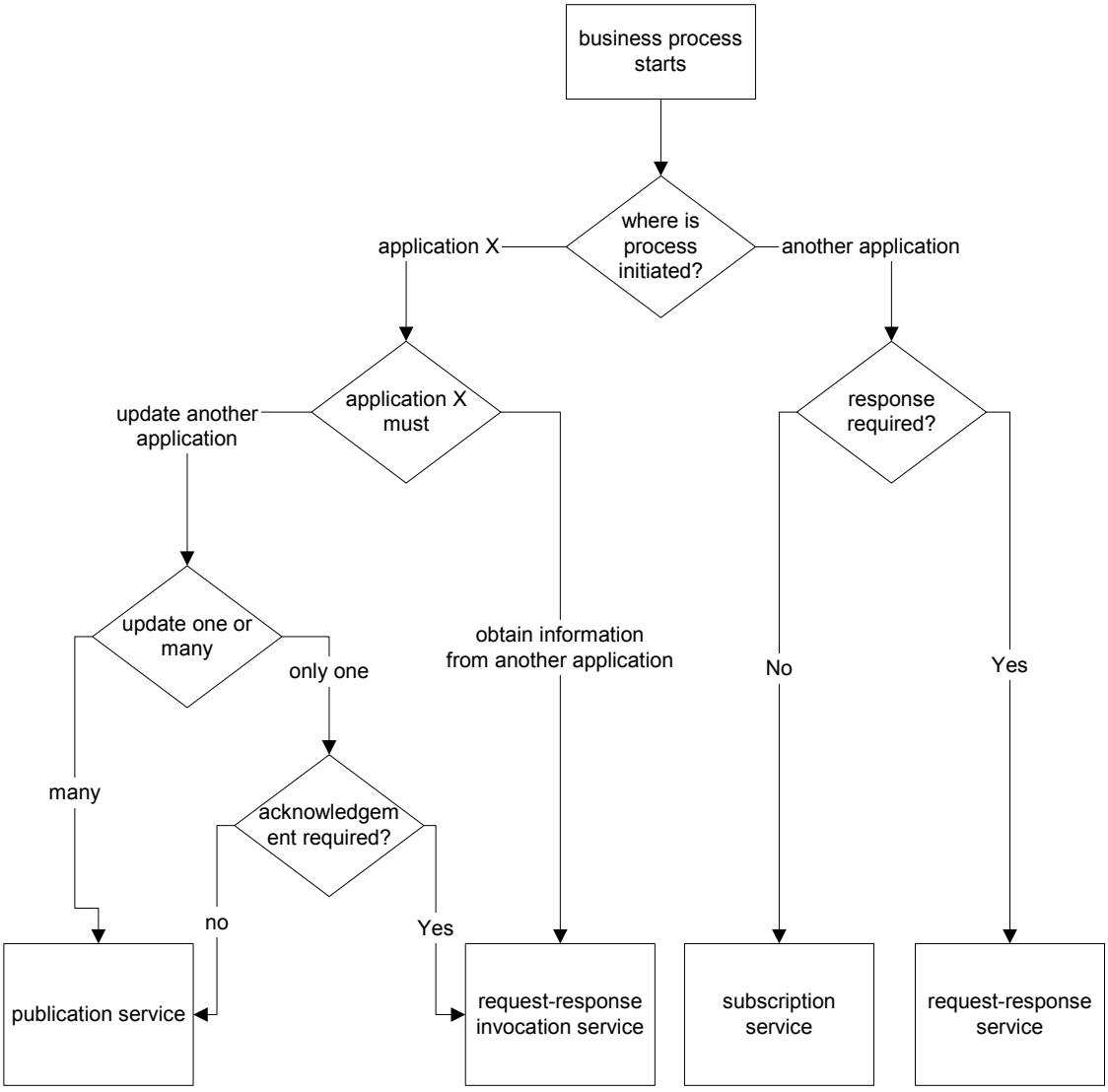
In this scenario, data must be exchanged between the application X and another application. The other application could be a customer management system, such as PeopleSoft, or another TIBCO application, such as TIBCO ActiveMatrix BusinessWorks.

To decide the adapter service to configure in the adapter, start by finding out where the scenario begins, what triggers it. Is the scenario triggered by an event inside the application X, or inside the other application?

For example, when a new customer account is created in application X, must the account information also be propagated via the adapter to the other application? Or does a batch business process in TIBCO ActiveMatrix BusinessWorks need information from application X to generate some report?

This question is the starting point of the decision chart provided in Figure 3.

Figure 3 Choosing an Adapter Service



Working through the decision chart, if the business process is the creation of a customer record in application X and if many other applications need to be updated when the event occurs, but no acknowledgements are required, the adapter's publication service should be used.

Adapter Life Cycle

In general, the life cycle of an adapter includes four stages: installation, configuration, deployment, and monitoring.

Installation

The installation stage includes installing the vendor application to which the adapter connects and other software from TIBCO on which the adapter depends.

For many adapters, the adapter and vendor application need not be installed on the same machine, while the TIBCO Runtime Agent software must be installed on each computer that runs the adapter.

Configuration

In the configuration stage, an adapter instance can be created and configured with a design-time tool. The configuration information is required for a runtime adapter to interact with the vendor application and other applications.

The standalone adapter uses TIBCO Designer as its design-time tool, while the adapter Service Engine uses TIBCO Business Studio.

Deployment

An adapter instance created by TIBCO Designer can be deployed using TIBCO Administrator or TIBCO ActiveMatrix Administrator. In the latter case, you must first import the Designer project into TIBCO Business Studio or convert the EAR file to a service assembly.

An adapter instance created by TIBCO Business Studio can only be deployed using TIBCO ActiveMatrix Administrator.

Monitoring

In this stage, use one of the following tools to manage and monitor the adapter:

- the built-in monitoring tools provided by TIBCO Administrator or TIBCO ActiveMatrix Administrator
- the TIBCO Hawk microagents

Chapter 2 Adapter Infrastructure Tools

This chapter introduces the required and optional TIBCO infrastructure tools that work with an adapter.

Topics

TIBCO Runtime Agent

The TIBCO Run-time Agent (TRA) provides basic connectivity between the adapter and other TIBCO infrastructure tools. The TRA is required on any machine on which an adapter is installed. The TRA runs on each machine on which an adapter runs and executes scripts, sends alerts, and performs recovery as specified.

The TRA has two main functions:

- Supplies an agent that runs in the background on each machine.
  - The agent is responsible for starting and stopping processes that run on a machine according to the deployment information.
  - The agent monitors the machine. That information is then visible via the TIBCO Administrator GUI.
- Supplies the run-time environment, that is, all shared libraries including third-party libraries required by the adapter.

TIBCO Domain Utility

The TRA contains the TIBCO Domain Utility, which is used to manage the components available on a TIBCO administration domain. The utility allows you to:

- Add or remove a machine to a TIBCO administration domain.
- Add or remove the TIBCO Enterprise Message Service server plug-in to a TIBCO administration domain.
- Change TIBCO Rendezvous parameters. Changing TIBCO Rendezvous parameters is an advanced option performed only by users familiar with TIBCO Rendezvous. If you perform this task, you must perform it on each machine in the TIBCO administration domain, then restart the TIBCO Administration Server.
- Change TIBCO administration domain credentials. Changing domain credentials is an advanced option. You must perform it on the machine where the TIBCO Administration Server is installed.
- Remove a secondary TIBCO Administration Server.
- Enable TIBCO administration domain and security management on a machine where TIBCO Administrator has been installed.
- Migrate previous TIBCO Administrator installations.

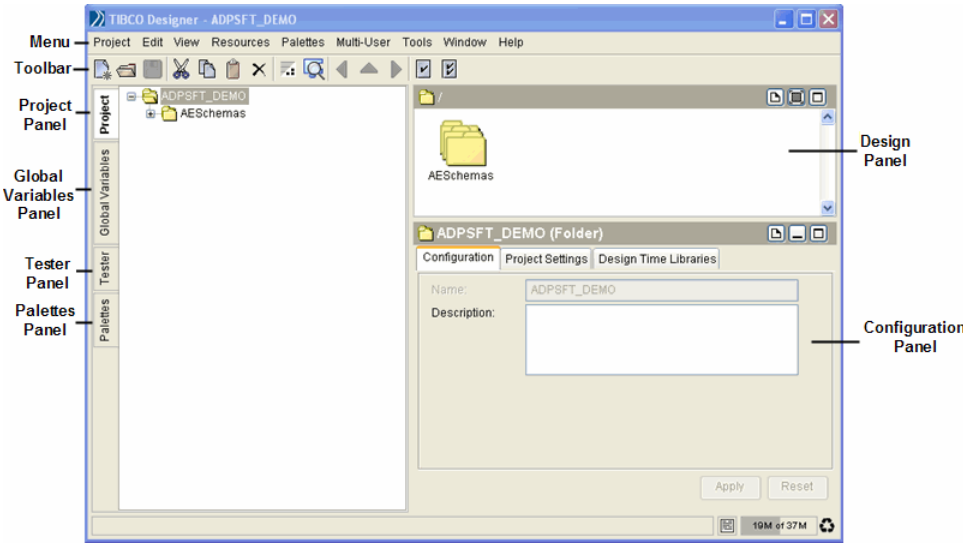
TIBCO Designer

TIBCO Designer provides the design-time environment for configuring a standalone adapter project, as shown in Figure 4. Using TIBCO Designer, you can create a project, add adapter services to it with a simple drag-and-drop interface, and specify the configuration information for each adapter service.

Before using TIBCO Designer, make sure you read the TIBCO Designer documentation. The documentation can be accessed via TIBCO Designer **Help > Designer Help** from the menu bar. The next diagram shows the TIBCO Designer interface.

The standalone adapter adds a palette to the TIBCO Designer environment which provides the adapter specific resources.

Figure 4 TIBCO Designer Main Window



TIBCO Administrator

TIBCO Administrator provides user, resource, and application management modules for adapters.

- **User Management**

  This module allows you to set permissions for adapter users. You define authentication, users and groups, and assign access control lists to users. This includes security for server-based projects at design-time and for deployed applications at runtime.

- **Resource Management**

  This module allows you to monitor machines and all running applications in a TIBCO administration domain. Alerts can be created, for example, to notify an administrator if the number of processes or disk usage exceed a certain number.

- **Application Management**

  This module allows you to upload Enterprise Archive (EAR) files, and create, configure, and deploy adapters. This console is also used to start and stop adapters.

- **Load Balancing**

  An adapter can be served by a primary and secondary TIBCO Administration Server. The primary server allows read and write operations, while the secondary server supports read operations. Load balancing is implemented through the use of the TIBCO Rendezvous distributed queue protocol (RVDQ) and therefore not available for HTTP.

  To get the load balancing benefit with HTTP, you must either use an IP redirector or explicitly point to a backup server to be used when a server fails. See your IP Redirector or HTTP Server documentation for information on how to do this.

- **Failure Recovery**

  You can use a load-balanced TIBCO Administration Server for failure recovery. In a completely trusted environment, you can also use a database back-end for your server and use checkpoints in the database for failure recovery.

TIBCO Administration Domain

A TIBCO administration domain is installed only if you have also installed the User Management module.

A *TIBCO administration domain* is a collection of users, machines, and components that an administration server manages. There is only one Administration Server for each administration domain. Components within an administration domain can communicate with systems outside of the domain, but the domain is the administrative boundary of your enterprise integration project.

Each TIBCO administration domain contains one or more machines. By default, all machines within an administration domain are expected to be in the same network subnet. You can, however, set up your system to use TIBCO Rendezvous rvrd and can then use the components across subnets. See the *TIBCO Administrator Server Configuration Guide* for details.

Each machine can belong to only one TIBCO administration domain. This is similar to a Microsoft Windows network domain where your machine can also belong to only one network domain.

TIBCO Administration Server

The TIBCO Administrator Server provides a central storage and distribution point for configuration data and schema data needed by an adapter. The server is included in both Administrator editions.

Each administration domain has one and only one TIBCO Administration Server. The *TIBCO Administration Server* is the machine process that handles the stored projects and requests used to manage the TIBCO administration domain.

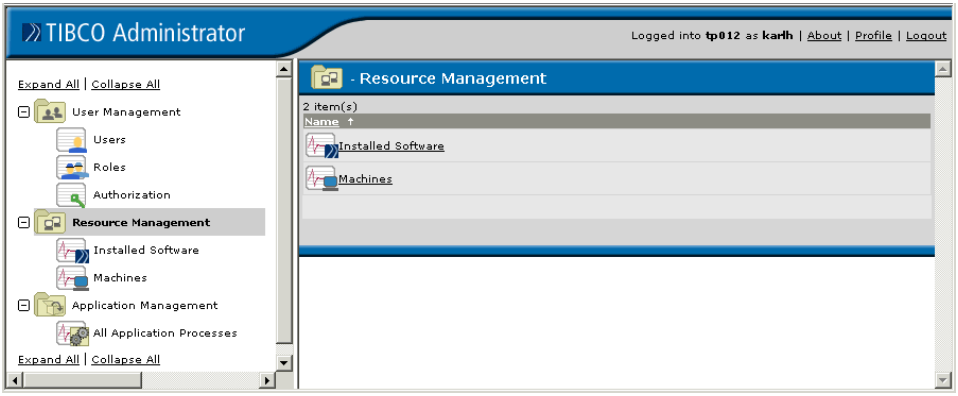
The TIBCO Administrator Server contains its own web server (Apache Tomcat) that can be accessed via the TIBCO Administrator GUI for configuration and monitoring information.

The TIBCO Administration Server supports centralized authentication and authorization. Using the TIBCO Administrator GUI, users with full administrative privileges can define who has access to projects that are managed by the repository server.

TIBCO Administrator GUI

You can access the TIBCO Administration Server using the web-based TIBCO Administrator GUI. The GUI allows you to create user profiles and assign access to projects managed by the Administration Server. You can invoke the GUI from any machine in a TIBCO administration domain. The next diagram shows the GUI.

Figure 5 TIBCO Administrator GUI



TIBCO ActiveMatrix BusinessWorks

TIBCO ActiveMatrix BusinessWorks is a scalable, extensible, and easy to use integration platform that allows you to develop integration projects. TIBCO ActiveMatrix BusinessWorks includes a graphical user interface for defining business processes and an engine that executes the process.

In TIBCO ActiveMatrix BusinessWorks, adapter services are responsible for publishing or subscribing to business data in a decoupled yet reliable manner. The business process receives data from an adapter service and routes data to an adapter service.

TIBCO ActiveMatrix BusinessWorks provides the following activities for use with adapters:

- **Publish to Adapter**

  Publishes data from the process to an adapter, which subscribes to data coming from the process and passes the data to the target application.

- **Adapter Subscriber**

  Subscribes to incoming data published by the adapter.

- **Invoke an Adapter Request-Response Service**

  Communicates (as a client) with an adapter request-response service.

- **Adapter Request-Response Server**

  Starts a process based on the receipt of a request from an adapter.

- **Respond to Adapter Request**

  Sends a response to an adapter for a previously received request.

- **Wait for Adapter Message**

  Waits for the receipt of a message from the publication service of the specified adapter.

- **Wait for Adapter Request**

  Waits for the receipt of a request from a request-response invocation service.

See the TIBCO ActiveMatrix BusinessWorks documentation for more information.

TIBCO ActiveMatrix BusinessWorks Service Engine

The product provides an ActiveMatrix container to deploy ActiveMatrix BusinessWorks projects using TIBCO ActiveMatrix Administrator. TIBCO ActiveMatrix BusinessWorks supports service oriented processing with the use of service resources, partners, and partner bindings.

See the TIBCO ActiveMatrix BusinessWorks Service Engine documentation for more information.

TIBCO Hawk

TIBCO Hawk monitors and manages distributed applications and systems throughout the enterprise. System administrators can monitor application parameters, behavior, and loading activities for all nodes in a local or wide-area network and take action when pre-defined conditions occur. In many cases, run-time failures or slowdowns can be repaired automatically within seconds of their discovery, reducing unscheduled outages, and slowdowns of critical business systems.

TIBCO Hawk features include:

- Extensive monitoring capabilities at the operating system and application levels including process data, disk, and CPU utilization, network statistics, log, and system files
- Built-in routines within other TIBCO ActiveEnterprise components allow for proactive management. Problems can be found and fixed before failure occurs.
- Hawk Application Management Interface (AMI) routines can be embedded within custom adapters, allowing active management of those adapters by the Hawk micro-agent
- Distributed micro-agents support autonomous network behavior so local management and problem resolution can continue during an outage
- Fault-tolerance is achieved through the independent operation of Hawk agents, which continue to perform local tasks even in the event of network failure

TIBCO Hawk consists of several components: a console display, a central repository for storage of configuration objects, agents, and microagents whose monitoring duties are defined by the rule bases.

- Agents monitor local conditions and take action or publish alert information that appears in the TIBCO Hawk display.
- Microagents act as an interface to the managed objects and are invoked through their supported methods.

Adapter Microagents

Each adapter includes a standard and custom microagent. The microagents provide:

- Business level statistics — statistics that report the progress of the adapter as it interacts with the vendor application. For example, in a database adapter such

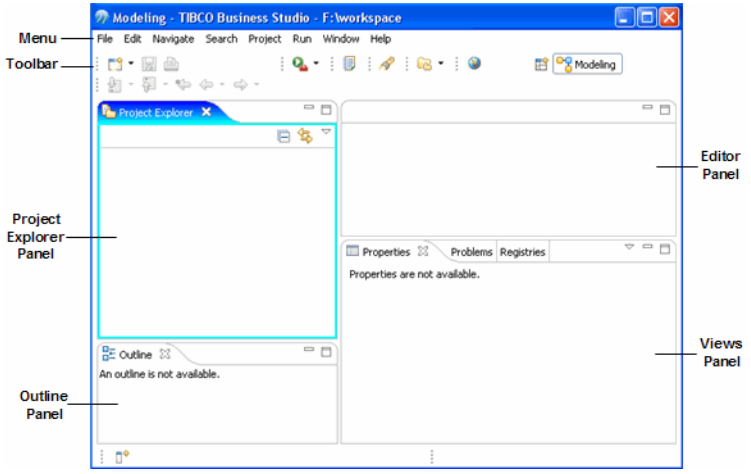
statistics might indicate whether objects were successfully or unsuccessfully inserted, updated, or deleted in the database.

- Queries that return information about the state of the adapter. This can be an important tool for seeing the internals of an adapter and debugging it if something appears wrong. For example, specific queries can return information about threads, internal queues, or connections to the target system. Using these queries, one might be able to identify certain bottlenecks or gauge how successfully an adapter is scaling with respect to the current environment.
- Updates to the adapter runtime parameters. This includes retrieving the current runtime parameters and setting new runtime parameters without restarting the adapter. An example of this is getting and setting the polling interval. Updating a runtime parameter through the Hawk microagent only affects the settings of the instance that is running.

TIBCO Business Studio

The TIBCO ActiveMatrix development tools consist of TIBCO Business Studio and a set of ActiveMatrix plug-ins. For an introduction to TIBCO Business Studio, refer to the *Workbench User Guide* in TIBCO Business Studio help. To view help, select **Help > Help Contents** on the Menu.

Figure 6 TIBCO Business Studio Main Window



The Workbench window contains the following areas: Menu, Toolbar, Project Explorer Panel, Outline Panel, Editor Panel, and Views Panel.

- **Menu**

  Contains menu items such us File, Edit, Navigate, Project, Run, Window, and Help.

- **Toolbar**

  Contains buttons for the most frequently used commands.

- **Project Explorer Panel**

  Displays a tree containing all the project resources such as project folders, shared resource definition files, WSDL files, composite files, service assembly files, and so on.

- **Editor Panel**

  Displays editors for the objects currently being edited. You can switch between editors by clicking the tabs at the top of the Editor area. The Composite Editor contains a canvas on which you can drop elements and a

palette that organizes the elements that you added to the composite. Other editors allow you to configure shared resources and service assemblies.

- **Outline Panel**

  Provides an overview of the Composite Editor canvas, allowing to easily navigate from one part of a composite to another.

  The Outline view also displays a content tree that contains the composite elements inside the composite. In this view you can delete the contents of the composite. When you select a composite element in the Outline tree, the corresponding elements are selected in the composite as well.

- **Views Panel**

  Appears under the Editor Area and contains the following views by default:

  — Properties

  Displays property sheets for editing composites and composite elements. When you select a composite or composite element in the Composite Editor canvas, this view shows the properties of the selected object in a vertical tabbed notebook.

  — Problems

  Displays validation and other errors.

  — Registries

  Lists UDDI registries and the WSDL files returned from searching a registry.

  To open a view, select **Window > Show View > View**.

ActiveMatrix Resource Wizard

The starting point for creating all types of ActiveMatrix projects and assets is the ActiveMatrix Resource Wizard. The resource wizard allows you to select wizards to create:

- Adapter service engine projects
- ActiveMatrix sample projects
- ActiveMatrix SOA projects
- Composites
- Mediation flows
- Service assemblies

Composite Element Editors

Composite elements are configured in property sheets accessed through the Properties view.

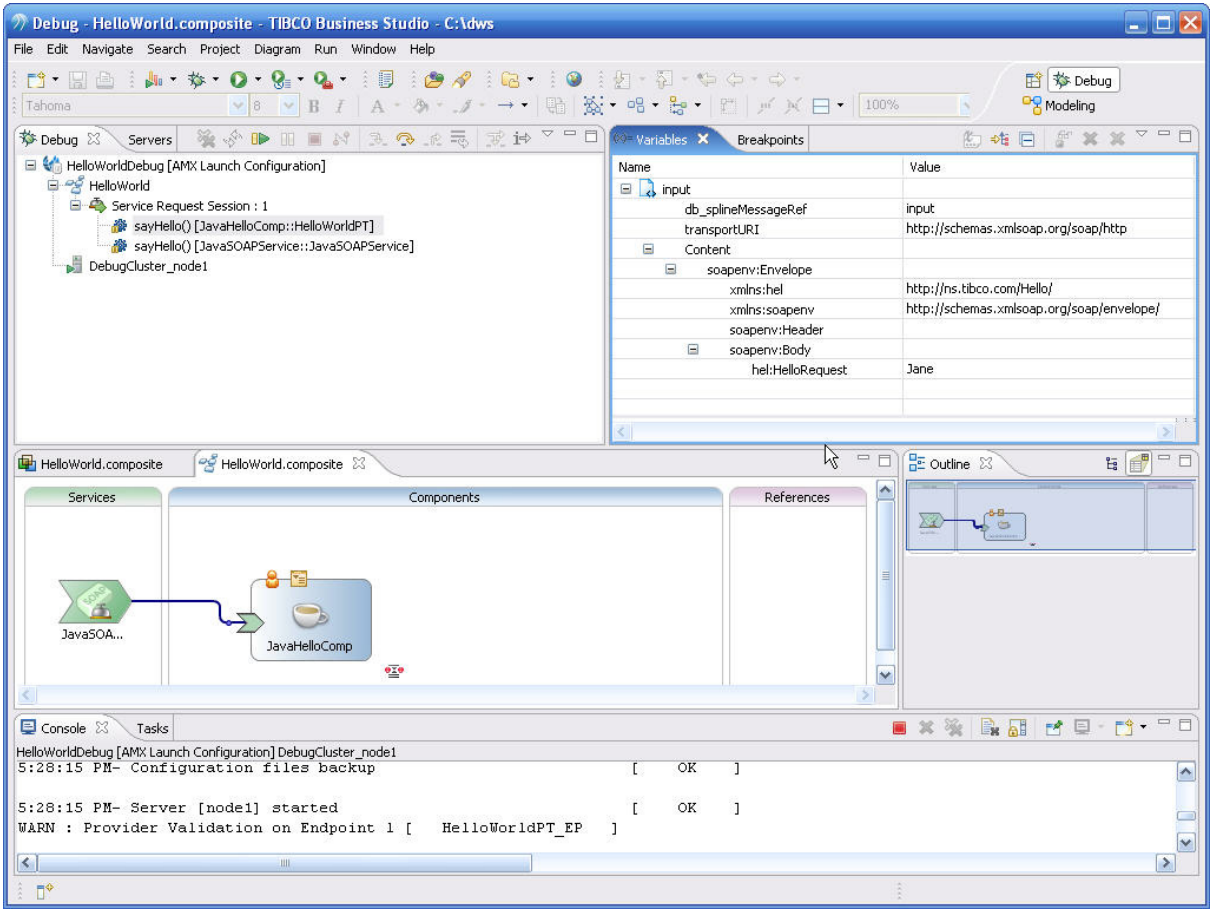
Figure 7 shows an example of the Properties view.

Figure 7 Component Property Sheet

Debugger

The TIBCO Business Studio debugger provides a testing environment for stepping through composite elements and determining the sources of errors. Figure 8 shows the debugger in the process of debugging a sample HelloWorld composite. Breakpoints have been set before and after the Java component executes, and the debugger is stopped at the breakpoint. In the Variables view on the top-right, the value of the request is being examined.

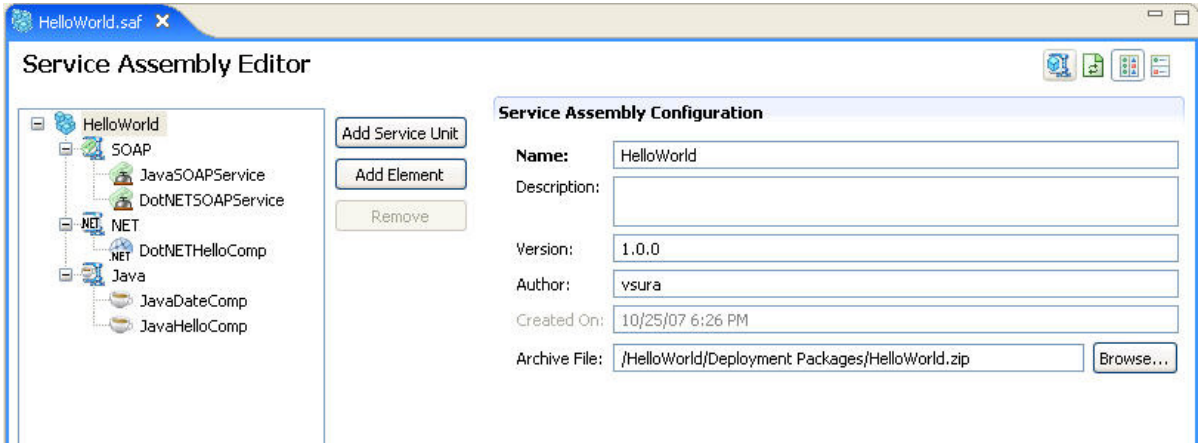
Figure 8 Debugger



Service Assembly Editor

In order to be deployed, composites must be transformed into service units and service assemblies. Figure 9 shows a sample service assembly editor view.

Figure 9 Service Assembly Editor



TIBCO ActiveMatrix Administrator

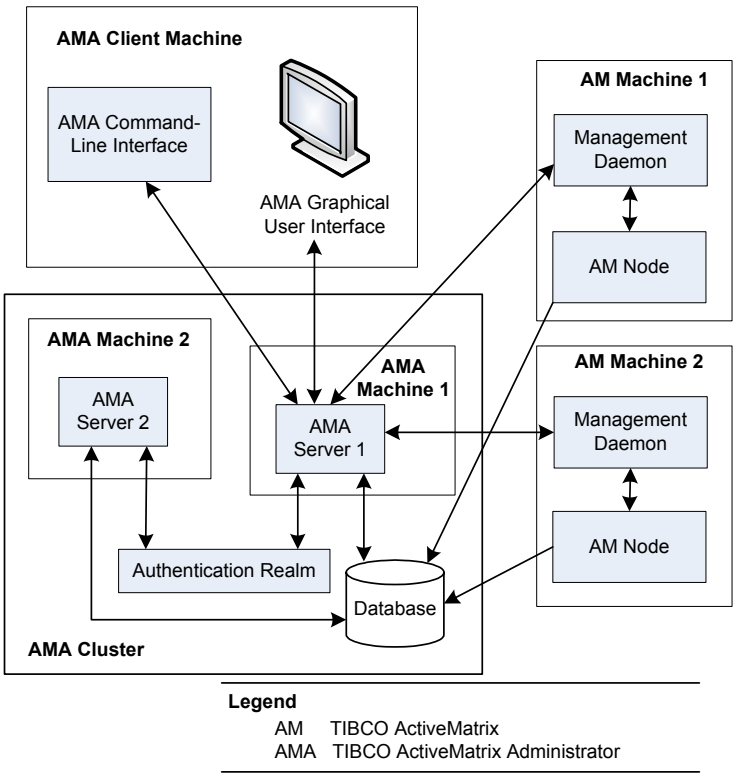
ActiveMatrix includes TIBCO ActiveMatrix Administrator which can be used for enterprise, environment, and service management. ActiveMatrix Administrator supports both graphical and command-line interfaces.

The following sections provide an overview of TIBCO ActiveMatrix Administrator. To get a quick introduction on the use of the administration tools, see *TIBCO ActiveMatrix Service Grid Getting Started*. For detailed information about the administration tools, see *TIBCO Hawk Administrator's Guide*.

TIBCO ActiveMatrix Administrator Architecture

Figure 10 shows ActiveMatrix Administrator components, and the relationship between ActiveMatrix Administrator, other servers, and ActiveMatrix machines and nodes.

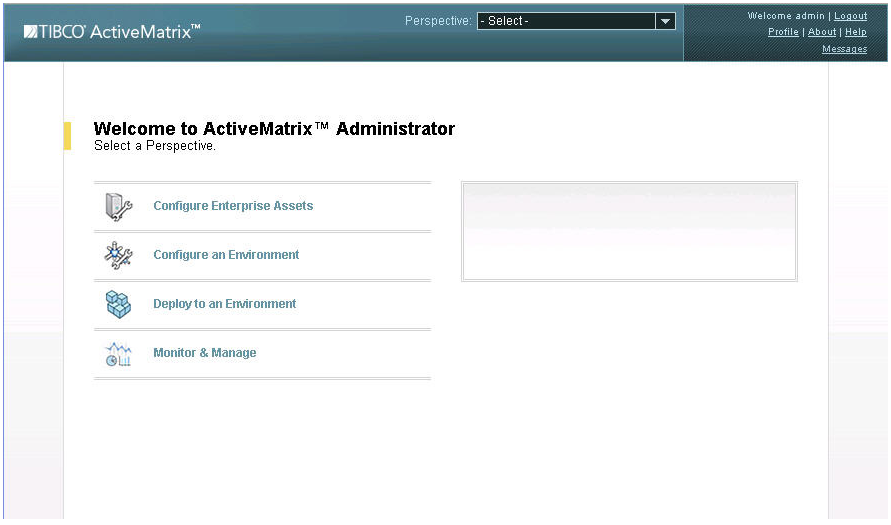
Figure 10 TIBCO ActiveMatrix Administration Architecture



The TIBCO ActiveMatrix Administrator administration architecture consists of the following components:

- **TIBCO ActiveMatrix Administrator Server** Gathers management data from nodes, responds to requests from the ActiveMatrix Administrator graphical and command-line UIs, interacts with the authentication realm server to authenticate users, and interacts with TIBCO Management Daemon to manage nodes.
- **TIBCO ActiveMatrix Administrator Cluster** Groups one or more ActiveMatrix Administrator servers together. ActiveMatrix Administrator servers within a cluster share a database and authentication realm and are kept synchronized.
- **ActiveMatrix Database** Stores ActiveMatrix administration data.
- **Authentication Realm** Manages user authentication data. The authentication realm can be provided either by TIBCO Administrator or by another server or a file.
- **ActiveMatrix Administrator Graphical UI** Displays the ActiveMatrix Administrator user interface. Figure 11 shows the ActiveMatrix Administrator graphical UI welcome page. In ActiveMatrix Administrator, functionality is divided into perspectives. A *perspective* is a set of controls used to carry out a category of administration tasks.
- **ActiveMatrix Administrator Command-Line Interface** Provides a script-based interface for ActiveMatrix Administrator functions.
- **Management Daemon** Gathers installation information and displays ActiveMatrix node life cycle operations.

Figure 11 TIBCO ActiveMatrix Administrator



Enterprise and Environment Administration

ActiveMatrix Administrator graphical and command-line interfaces permit you to administer ActiveMatrix enterprises and environments, shared resource configurations, nodes, containers, and managed resources.

In the graphical interface, enterprise and environment administration is carried out in the Configure Enterprise Assets and Configure an Environment perspectives.

Service Administration

ActiveMatrix Administrator graphical and command-line interfaces permit you to administer ActiveMatrix services. Service administration consists of deployment tasks and monitoring and management tasks. In the graphical interface, these tasks are carried out in the Deploy to an Environment and Monitor & Manage perspectives.

Service Deployment

The first phase of service administration is deployment. During deployment, the service units within a service assembly are mapped and then deployed into their respective containers, the services provided by the service units are registered with the ActiveMatrix container, and the service endpoints are activated.

The choice of how to distribute services across nodes is determined by the desired level of service performance and availability. Service performance and availability can be enhanced if you deploy a service unit across multiple nodes, which allows Messaging Bus to distribute requests between the service instances.

Load Balanced Services

The Mediation Bus enables load balancing at the container level by defining a container group. A *container group* is defined as a group containing one or more container instances of the same container type. When a service unit is deployed to a container group, a copy of the service unit is deployed into each container in the group.

Highly Available Services

Services deployed on multiple containers are *highly available*; if one container fails, service requests will be handled by one of the remaining containers. No configuration is required to make services highly available. Messaging Bus automatically routes to any available service instance identified in the message exchange.

Load Balanced Services

Requests to services deployed on multiple containers are *load balanced* between the available providers. No configuration is required to load balance between services. Messaging Bus uses a round robin algorithm for routing requests to service instances.

Service Monitoring and Management

TIBCO ActiveMatrix Administrator not only allows you to configure and deploy services, but also lets you monitor and manage the deployed services. Monitoring the system performance is not a one time activity but needs to be performed on a day-to-day basis. The Monitor & Manage perspective of TIBCO ActiveMatrix Administrator keeps track of system health without much overhead.

In the Monitor & Manage perspective you can monitor the overall health and performance of the grid infrastructure, applications, and services. You can monitor performance at various levels such as environment, machine, node, container, service assembly, and service unit.

The monitoring subsystem uses content-based metrics to measure the service performance, availability of services, service usage, and the ratio of successful to faulty service responses. These metrics provide real-time values by fetching data every minute and updating the values of the metrics. The real-time data is then displayed in a web-based dashboard provided with pre-defined views and visual alerts.

Chapter 3 TIBCO ActiveMatrix Adapter for PeopleSoft

This chapter provides background information on features and product elements in TIBCO ActiveMatrix Adapter for PeopleSoft. It also describes the adapter's integration with the PeopleSoft application.

Topics

An Introduction to PeopleSoft

PeopleSoft is a leading provider of ERP software solutions that meet the changing business needs of enterprises worldwide. It offers a complete suite of enterprise solutions for accounting, material management, distribution, manufacturing, and human resources.

PeopleSoft supports powerful functionality for internet access, integration of external applications with PeopleSoft applications, and the integration of both into the enterprise.

One aspect of PeopleSoft integration technology is Component Interfaces. Component Interfaces are a set of JAVA-based objects that allow external applications to invoke PeopleSoft business logic. In addition, Component Interfaces are ideal for use in PeopleSoft environments that require tightly coupled integration, where data must be transmitted in real time.

In addition to Component Interfaces, PeopleSoft permits integration through the Integration Broker. The Integration Broker utilizes PeopleSoft's Application Messaging technology to permit integration with third party applications.

PeopleSoft Interfaces

TIBCO ActiveMatrix Adapter for PeopleSoft supports integration with PeopleSoft through Component Interfaces and Integration Broker.

They are described below. A basic understanding of these two integration mechanisms helps you appreciate the capabilities of the adapter.

PeopleSoft Component Interfaces

A PeopleSoft *Component Interface* consists of format rules, content rules, and associated Application Programming Interfaces (APIs) that govern the structure of a business object (component) and how it is processed. A Component Interface represents a recognizable PeopleSoft entity from the business world, such as a customer, sales order, invoice, or employee. Component Interface APIs enable external programs to gain access to PeopleSoft data by referring to these recognizable business entities, completely independent of the physical layout of any page. The Component Interface APIs can be invoked by external programs using the PeopleSoft client library (`PSJOA.JAR`). Component Interfaces in PeopleSoft replace the Message Agent of earlier PeopleSoft versions. A PeopleSoft Component Interface structure is read from the PeopleSoft server and represented as a schema in TIBCO Designer.

PeopleSoft Component Interfaces operate as an interface between the adapter and a PeopleSoft application. They execute PeopleSoft formatting rules and other business logic contained in the API on data that the adapter passes between a PeopleSoft application and the TIBCO environment.

Here are some examples of Component Interfaces and what they do:

- **Sales Order Status** Integrates Sales Order Header, Line Item and Scheduled Shipment Status.
- **Expense Sheet** Allows the adapter to access expense sheet data within PeopleSoft Expenses.

PeopleSoft Integration Broker

PeopleSoft Integration Broker is a middleware technology that facilitates synchronous and asynchronous messaging among internal systems and trading partners. It manages message structure, message format, and transport disparities. Because of its modular design, many of the elements you develop for an integration can be reused in other integrations.

PeopleSoft Integration Broker is based on the PeopleSoft Application Messaging technology from PeopleTools 8.1x.

The basic development elements to be defined using the PeopleSoft Application Designer are:

- Message definition
- Publishing PeopleCode

The basic administrative elements that describe the messaging environment to be defined using the PeopleSoft Internet Architecture (PIA) are:

- Gateway definition
- Node definition
- Message definition
- Queue definition
- Service definition
- Service operation definition
- Routing definition

Adapter Overview

TIBCO ActiveMatrix Adapter for PeopleSoft enables real-time exchange of business data between PeopleSoft applications and other applications or external business partners. The adapter uses PeopleSoft Component Interface and Integration Broker technologies.

Features

The following features are described in detail in *TIBCO ActiveMatrix Adapter for PeopleSoft Configuration and Deployment*.

- **Support for TIBCO ActiveMatrix BusinessWorks** TIBCO ActiveMatrix BusinessWorks is a scalable, extensible, and easy to use integration platform that allows you to develop, deploy, and run integration projects. A TIBCO ActiveMatrix BusinessWorks project along with TIBCO adapters integrates enterprise applications with TIBCO adapters and automates business processes.
- **Support for PeopleTools Versions** The adapter supports PeopleTools versions 8.46, 8.47, 8.48, and 8.49.
- **Provides Inbound and Outbound services to and from the PeopleSoft system** The adapter supports Publication, Subscription, Request-Response, and Request-Response Invocation services.
- **Uses PeopleSoft Component Interfaces** The adapter uses Component Interfaces as a synchronous way to call up PeopleSoft components and enter data into the system just as an online user would.
- **Uses PeopleSoft Integration Broker** The adapter uses the Application Messaging technology of PeopleSoft Integration Broker, in addition to Component Interface technology, to publish data out of PeopleSoft.
- **Creates schemas from PeopleSoft Component Interfaces and Messages** Extracts the structure of PeopleSoft Component Interfaces and Messages and stores them as schemas in the TIBCO environment.
- **An easy-to-use GUI** TIBCO Designer GUI and TIBCO Business Studio GUI are used to configure and maintain the adapter. You can easily specify operational parameters and change them as needed.
- **Support for JMS at Design-time** JMS transport enables communication between the palette and the design-time adapter.
- **Multi-threading** The adapter maintains a pool of threads allowing it to respond to and process multiple events simultaneously, thereby improving its

performance. One thread pool is maintained for an adapter configuration. Publication, Subscription and Request-Response services use the same thread pool.

- **Enables Capture of Operation Code for Publication Service** The adapter, running as a Publication Service, can capture the mode of operation of an outbound transaction and publish it as part of the outgoing message.
- **Support for Publishing Current Records** For effective dated records, the adapter provides an option to publish only the current record.
- **Atomicity** Data is not committed (inbound) or published (outbound) unless the entire business event successfully passes PeopleSoft's business logic and validation.

How The Adapter Works With PeopleSoft Interfaces

TIBCO ActiveMatrix Adapter for PeopleSoft can work with the most common PeopleSoft integration interfaces - Component Interfaces and Integration Broker.

Component Interfaces (CIs)

The adapter extracts and stores Component Interface schema definitions from the PeopleSoft system in the project at design-time. Both standard and custom Component Interfaces can be downloaded and used in the adapter. To use customized Component Interfaces, you need create them in PeopleTools Application Designer first and reference them using the adapter just like any other Component Interface.

When you choose a Component Interface and apply it to one of the adapter's services in TIBCO Designer, the following happens:

- That adapter service is transformed into a representation of the Component Interface.
- The name of the adapter service is automatically changed to the name of the Component Interface.

For example, if you want the adapter to publish salary grade status reports from an application configured for the TIBCO Environment to a PeopleSoft application, choose a PeopleSoft Component Interface called `SALARY_GRADE` and apply it to the adapter's Publication Service. The adapter renames Publication Service to `SALARY_GRADE`. The transformed adapter service will report salary grade status.

Schemas applied to an adapter service in TIBCO Designer can be changed only by changing the corresponding PeopleSoft Component Interface in the PeopleTools8 Application Designer. The changed Component Interface needs to be downloaded again to the adapter service. It will override the existing schema and refreshes it with the new image.

These schemas are used by the adapter at runtime to create and publish messages to the TIBCO environment.

For more details on preparing the PeopleSoft system for a Component Interface based Publication Service, see *TIBCO ActiveMatrix Adapter for PeopleSoft Configuration and Deployment*.

Integration Broker

The adapter extracts and stores Message schema definitions from the PeopleSoft system in the project at design-time. Both standard and custom Messages can be downloaded and used in the adapter. You need to have access to messaging elements or be able to create them using PeopleTools8 Application Designer.

When you choose a message definition and apply it to one of the adapter's services in TIBCO Designer, the following happens:

- That adapter service is transformed into a representation of the message definition.
- The name of the adapter service is automatically changed to the message definition's name.

For example, if you want the adapter to publish sales order status reports from an application configured for TIBCO Environment to a PeopleSoft application, choose a PeopleSoft message definition called `SALES_ORDER_STATUS` and apply it to the adapter's Publication Service. The adapter renames Publication Service to `SALES_ORDER_STATUS`. The transformed adapter service will report sales order status.

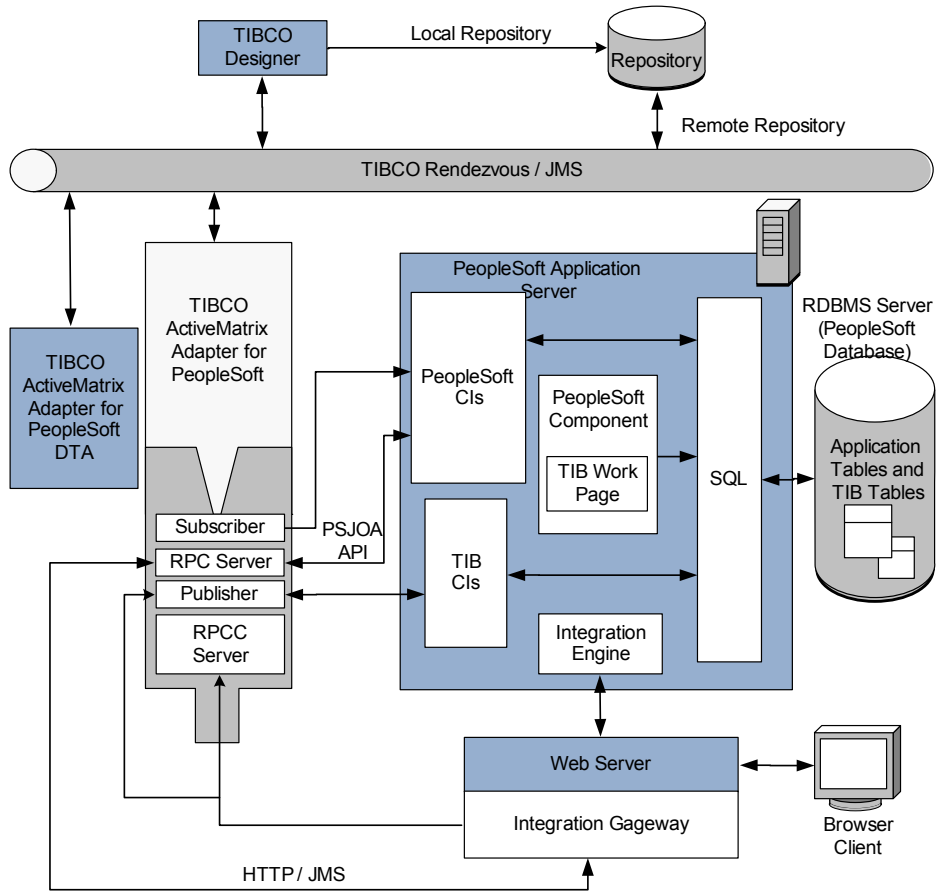
Schemas applied to an adapter service in TIBCO Designer can be changed only by changing the corresponding PeopleSoft message definition in the PeopleTools Application Designer. The changed message definition needs to be downloaded again to the adapter service. It will override the existing schema and refresh it with the new image.

These schemas are used by the adapter at runtime to create and publish messages to the TIBCO environment.

For more details on preparing the PeopleSoft system for Application Messaging, see *TIBCO ActiveMatrix Adapter for PeopleSoft Configuration and Deployment*.

The high-level view of the adapter's interaction with the PeopleSoft application and the TIBCO environment is shown in Figure 12.

Figure 12 TIBCO ActiveMatrix Adapter for PeopleSoft Interaction with the PeopleSoft Application.



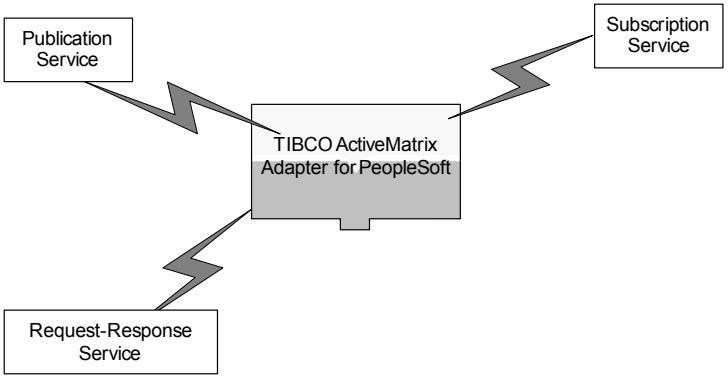
Adapter Services

TIBCO ActiveMatrix Adapter for PeopleSoft provides the following services:

- Publication Service
  - Component Interface-based Messaging
  - Application Messaging
- Subscription Service
  - Component Interface-based Messaging
  - Application Messaging
- Request-Response Service
  - Component Interface-based Messaging
- Request-Response Invocation Service
  - Application Messaging

The features described in Adapter Overview on page 34 are available in these services.

Figure 13 Services of the Adapter



Communication parameters, database connectivity parameters, polling rate, and many other parameters can be configured for these adapter services using TIBCO Designer.

Adapter services require certain TIBCO specific objects to be embedded in the PeopleSoft system at design time. These objects enable the design-time adapter (DTA) to capture the PeopleSoft Component Interfaces and Application Messages as schemas. These schemas are used by the adapter at runtime.

The following sections describe how these adapter services interact with the PeopleSoft environment to provide message connectivity.

Publication Service

A Publication Service detects changes to data in the PeopleSoft application and exports these changes to the TIBCO environment.

You can configure a Publication Service to publish data from the PeopleSoft application to applications that are configured to work within the TIBCO environment. Multiple Publication Services can be configured. You can give each Publication Service a unique name to distinguish among them when they are serving different PeopleSoft components.

The adapter gives you an option to choose a Publication Service based on two technologies: Component Interfaces and Application Messaging, which allow for CI Publication Services and Message Publication Services.

CI Publication Service

If you apply a Component Interface to the adapter's Publication Service, the Component Interface determines which records and fields are published from PeopleSoft. It establishes the format of the outgoing message.

The publishing capability of the adapter enables it to capture user-entered data through a PeopleSoft Windows client and through a web browser.

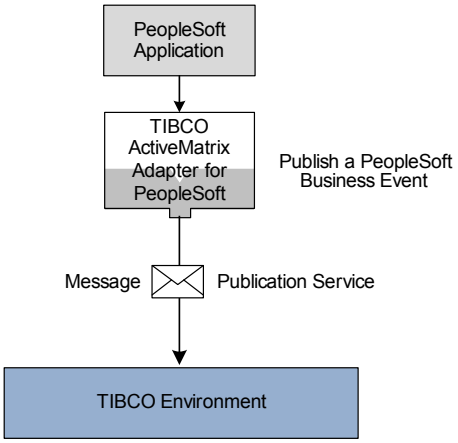
If a Publication Service is using Component Interfaces (CI Publication Service), data capture at runtime requires the TIB Work Page to be inserted in the required component. The TIB Work Page must be inserted at design-time. TIB Work Page enables data capture from the component at runtime. This data is written to a staging table, which is polled by the runtime adapter. The runtime adapter picks up the data and publishes it to the TIBCO environment.

TIB Work Page is bundled with the `TIB_PS8_ADAPTER` project. It implements the logic for capturing fields for publication at runtime.

Message Publication Service

When running as a Message Publication Service, the adapter uses PeopleCode provided with the adapter to capture data from PeopleSoft in a PeopleSoft message and send it over HTTP to the adapter. The runtime Message Publication Service receives the message, processes it and publishes it to the TIBCO environment. It then sends back an acknowledgement to the PeopleSoft system.

Figure 14 Typical Publication Service Flow



Subscription Service

A Subscription Service inserts inbound data from the TIBCO environment into the PeopleSoft database. You can configure multiple Subscription Services. You can give each Subscription Service a unique name to distinguish between them when they are serving different PeopleSoft components.

The adapter subscribes to messages, maps them to PeopleSoft schemas and inserts data into the PeopleSoft database using a Component Interface.

The adapter gives you an option to choose a Subscription Service based on two different technologies: Component Interfaces and Application Messaging, which allow for CI Subscription Services and Message Subscription Services.

Table 3 Comparison Between Component Interface (CI) and Integration Broker (IB)

CI Based Publication Service	IB Based Publication Service
TIB tables need to be created in the PeopleSoft database for the adapter to function.	No TIB tables need to be created in the database for the adapter to function.
TIB Work Page needs to be attached to the component from which data is to be captured.	TIB Work Page need not be attached to the component. Instead a small piece of PeopleCode needs to be pasted in one of the events of the Component.
The data to be published is stored in a TIB table in the PeopleSoft database. The runtime adapter polls this table for data.	The data to be published is sent to the adapter by the PeopleSoft system over HTTP/JMS.

Table 3 Comparison Between Component Interface (CI) and Integration Broker (IB)

CI Based Publication Service	IB Based Publication Service
Uses native API calls, hence faster.	Uses HTTP/JMS, network issues might hamper performance.
PeopleSoft client library (`PSJOA.JAR`) required since the adapter makes native API calls.	Uses HTTP/JMS. PeopleSoft client library not required.

CI Subscription Service

The CI Subscription Service uses Component Interface with the Subscription Service. In this case, the service determines which records and fields must be inserted into PeopleSoft. Because Component Interfaces have an associated component, all necessary business logic and validations are triggered. Only when the Component Interface parses the business logic and validations is the data committed to the PeopleSoft database.

Message Subscription Service

A Message Subscription Service inserts inbound message data from the TIBCO environment into the PeopleSoft database. The adapter subscribes for a message from the TIBCO Environment and builds an IB message. It, then, sends the message over JMS/HTTP to the respective Listener Connector. The Message Subscription Service supports two types of Listener Connectors: JMS Listener Connector and HTTP Listener Connector.

The JMS Listener Connector subscribes for the configured Topic/Queue. When a message is received, the connector calls the Subscriber PeopleCode for the configured message.

The HTTP Listener Connector waits for a message to be written on it. On receiving the message, the HTTP Listener Connector calls the Subscriber PeopleCode for the configured message.

The Subscriber PeopleCode has the logic to build the RecordSet from the Message received from the adapter.

Figure 15 Typical Subscription Service Flow

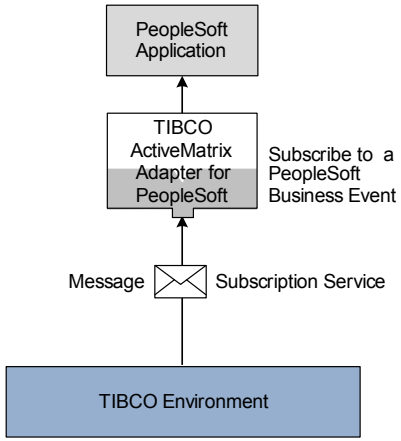


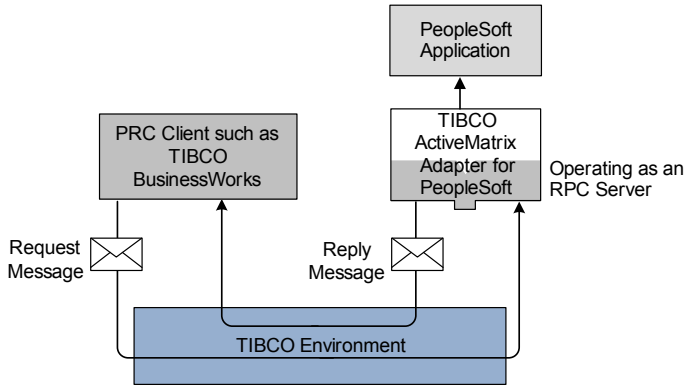
Table 4 Comparison Between Component Interface (CI) and Integration Broker (IB)

CI Based Subscription Service	IB Based Subscription Service
Suitable for batch publishing as well as real-time publishing.	Not suitable for batch publishing.
Uses native API calls, hence faster.	Uses HTTP/JMS, network issues might hamper performance.
PeopleSoft client library (`PSJOA.JAR`) required since the adapter makes native API calls.	Uses HTTP/JMS. PeopleSoft client library not required.

Request-Response Service

A Request-Response Service receives requests from the TIBCO environment and sends the requests to a PeopleSoft system. When a response is returned to the adapter from the PeopleSoft system, the adapter sends the response to the TIBCO environment.

Figure 16 Typical Request-Response Service Flow



The adapter supports request-response scenarios with the Request-Response Service. When the adapter receives a request, it takes the requested data, converts it into a formatted PeopleSoft schema, and sends it to PeopleSoft using a Component Interface. The adapter then returns the response. A Request-Response Services can also be used to insert data into the PeopleSoft database depending on the incoming request (whether it is a query, insert, or an update).

Request Response Invocation Service

A Request-Response Invocation Service receives requests from and sends responses to PeopleSoft system. The adapter receives a request from the PeopleSoft system (acting as a Request-Response client). The request is sent to an external application (acting as an RPC server) via the TIBCO environment. When a response is returned to the adapter from the external application, the adapter sends the response back to the PeopleSoft system.

Request-Response Invocation Service Using Target Connectors (TIBCO JMS/HTTP)

The Target Connectors, TIBCO JMS Connector and TIBCO HTTP Connector, are used to communicate with the PeopleSoft Adapter. The adapter uses the Target Connectors to invoke a Request-Response Invocation Service.

Whenever there is an addition or a modification to a given component, PeopleSoft invokes the appropriate PeopleCode (savePreChange or savePostChange) to handle the change. The PeopleCode helps create a message and sets XML data from the Resultset. It also makes a synchronous call to the Target Connector (TIBCO JMS/HTTP). The Target Connector (TIBCO JMS/HTTP) reads the reply message and sends it to the calling PeopleCode.

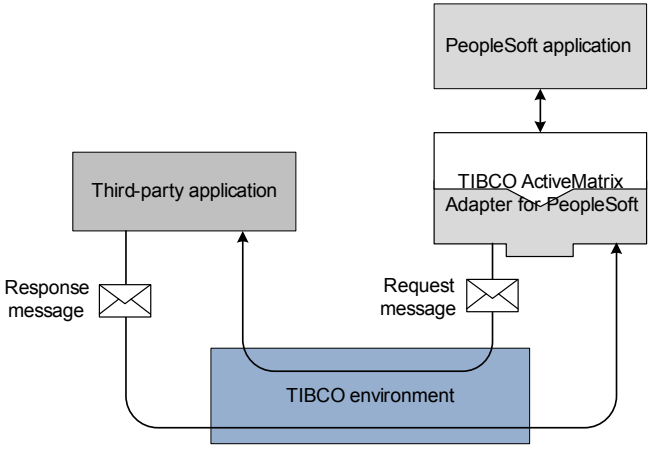
JMS-Based Communication

The JMS-Based TIBCO Target Connector receives a request from the PeopleSoft System as XML message data. The connector constructs a TIBCO JMS message and sends it as a Topic/Queue request to the adapter. The adapter converts the message to the configured schema and sends a request to an external RPC server. On receiving a reply from the external RPC server, the adapter sends the reply to the TIBCO Target Connector, which then sends the reply back to PeopleSoft. In case the adapter instance is not running, it returns an operation timed out error and throws out an invalid message exception.

HTTP Based Communication

TIBCO ActiveMatrix Adapter for PeopleSoft acts as an HTTP server that listens on a configured port. The HTTP Target Connector sends a request to the adapter as an IB message. The adapter converts the message to the configured schema and sends a request to an external RPC Server. On receiving a reply from the external RPC server, the adapter writes the reply back to the HTTP Target Connector.

Figure 17 Typical Request Response Invocation Service Flow



Example Scenario

The PeopleSoft system can be configured to retrieve the Currency data from an external system by passing a Country Code to the external system. The PeopleSoft system invokes the adapter, which sends out a request and receives a reply from the external system. The adapter then sends the reply to the PeopleSoft system.

Schema Support

TIBCO ActiveMatrix Adapter for PeopleSoft uses a schema (PeopleSoft Component Interface or Message definition) to describe the data received from or sent to the TIBCO environment.

Schemas are useful in a variety of situations. For example:

- Where several developers collaborate on an adapter application, a specification document normally defines the data model for several related adapter applications. Inside the TIBCO framework, you can instead define a schema to serve as the data model and update it when you need to.
- When the data model of the adapter changes, developers do not have to redesign the business process.
- Using Schemas in conjunction with various mapping tools available in the TIBCO environment, you can transfer data across applications with incompatible data formats.

TIBCO Designer allows you to fetch PeopleSoft schemas (Component Interfaces or Message definitions) that you can apply to an adapter service during adapter configuration. The adapter adds that Component Interface or Message definition as a PeopleSoft schema class.

Once saved into a project, PeopleSoft schemas can be transferred across projects by exporting or importing the schemas from or to a project in XML format.

Monitoring the Adapter

The adapter supports several different methods of monitoring: You can use basic logging to report trace messages, use log sinks to gain enhanced reporting of adapter events, use TIBCO Hawk microagents, or a combination of these methods.

Trace messages are the chief aids to monitor the adapter. You can specify the levels (roles) of trace messages to be reported as well as the type of message output. You can also specify that trace messages be written to a log file, to a TIBCO Rendezvous or JMS message, to a workstation display, or to TIBCO Hawk if it is installed. If trace messages are written to a log file, for example, you can print them for reviewing. For more information about configuring these actions, see related sections in *TIBCO ActiveMatrix Adapter for PeopleSoft Configuration and Deployment*.

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