TIBCO ActiveMatrix® Adapter for Amdocs CRM

Concepts

Software Release 5.5
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Important Information

Contents

Figures

Preface

TIBCO ActiveMatrix Adapter for Amdocs CRM serves as a bi-directional gateway between a Amdocs CRM system and applications configured for the TIBCO environment.

Topics

Changes from the Previous Release of this Guide

This section itemizes the major changes from the previous release of this guide.

Renaming TIBCO Adapter for ClarifyCRM

The adapter is renamed to TIBCO ActiveMatrix Adapter for Amdocs CRM

Separating from TIBCO Adapter for ClarifyCRM User's Guide

TIBCO ActiveMatrix Adapter for Amdocs CRM Concepts is separated from TIBCO Adapter for ClarifyCRM User's Guide version 5.4.0.

Adding Introduction to Adapter

A chapter is added to introduce basic adapter concepts. See Chapter 1, Introduction to Adapter, on page 1 for more information.

Adding Introduction to TIBCO Infrastructure Tools

A chapter is added to introduce the required and optional TIBCO infrastructure tools that work with adapters. See Chapter 3, Adapter Infrastructure Tools, on page 25 for more information.

Related Documentation

This section lists documentation resources you may find useful.

TIBCO ActiveMatrix Adapter for Amdocs CRM Documentation

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

- *TIBCO ActiveMatrix Adapter for Amdocs CRM Concepts* Read this manual to gain an understanding of the product that you can apply to the various tasks you may undertake.
- *TIBCO ActiveMatrix Adapter for Amdocs CRM Installation* Read this manual for instructions on site preparation and installation.
- *TIBCO ActiveMatrix Adapter for Amdocs CRM Configuration and Deployment* Read this manual for instructions on creating, configuring, and deploying adapter projects.
- *TIBCO ActiveMatrix Adapter for Amdocs CRM Examples* Read this manual to work through the examples provided with the adapter.
- *TIBCO ActiveMatrix Adapter for Amdocs CRM Release Notes* Read the release notes for a list of new and changed features. This document also contains lists of known issues and closed issues for this release.

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 Rendezvous®
- TIBCO Enterprise Message Service™
- TIBCO Hawk®
- TIBCO® Adapter SDK
- TIBCO Runtime Agent™

Typographical Conventions

The following typographical conventions are used in this manual.

Table 1 General Typographical Conventions

Convention	Use
ENV_NAME *TIBCO_HOME*	TIBCO products are installed into an installation environment. A product installed into an installation environment does not access components in other installation environments. Incompatible products and multiple instances of the same product must be installed into different installation environments. An installation environment consists of the following properties: • **Name** Identifies the installation environment. This name is referenced in documentation as *ENV_NAME*. On Microsoft Windows, the name is appended to the name of Windows services created by the installer and is a component of the path to the product shortcut in the Windows Start > All Programs menu. • **Path** The folder into which the product is installed. This folder is referenced in documentation as *TIBCO_HOME*.
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.

Connecting with TIBCO Resources

How to Join TIBCOmmunity

TIBCOmmunity is an online destination for TIBCO customers, partners, and resident experts; a place to share and access the collective experience of the TIBCO community. TIBCOmmunity offers forums, blogs, and access to a variety of resources. To register, go to http://www.tibcommunity.com.

How to Access TIBCO Documentation

You can access TIBCO documentation here:

http://docs.tibco.com

How to Contact TIBCO Support

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

- 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 username and password. If you do not have a username, you can request one.

Chapter 1 Introduction to Adapter

This chapter introduces basic adapters concepts.

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 the next diagram, adapters allow data to be exchanged among different technologies.

- 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 companies' business applications and databases.
- Adapters can also enable integration with component or object development models and other messaging technologies.

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 via TIBCO Designer.
- A *project* is a collection of all 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.
- An *.ear* of an application contains global variables with values set at design time by the standalone adapter. The global variables can be changed at deployment at the application level, service level, or service instance level.

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:

General Adapter Services

This section lists four kinds of services which can be found in most of TIBCO adapter products. Not all adapters provide all these services and some adapters may provide services not listed here.

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

Adapter Services Summary

The next table summarizes the services introduced in this section.

Table 2 Adapter Services Summary

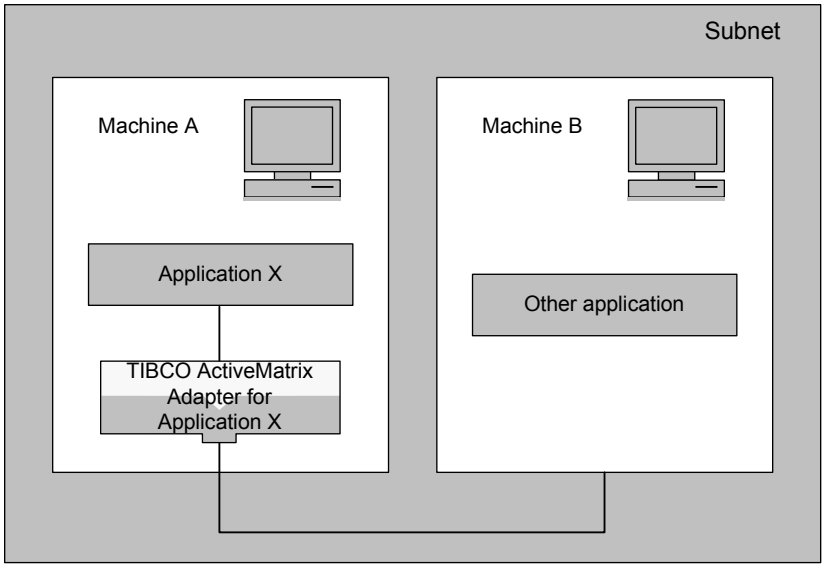
Service	Initiator	Target	Event Mode
Publishing service (sends to target)	Vendor application	TIBCO infrastructure	Asynchronous
Subscribing service (gets from initiator)	TIBCO infrastructure	Vendor application	Asynchronous
Request-response service (gets from initiator, waits for response then sends response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

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:

Figure 1 A Business Integration Scenario



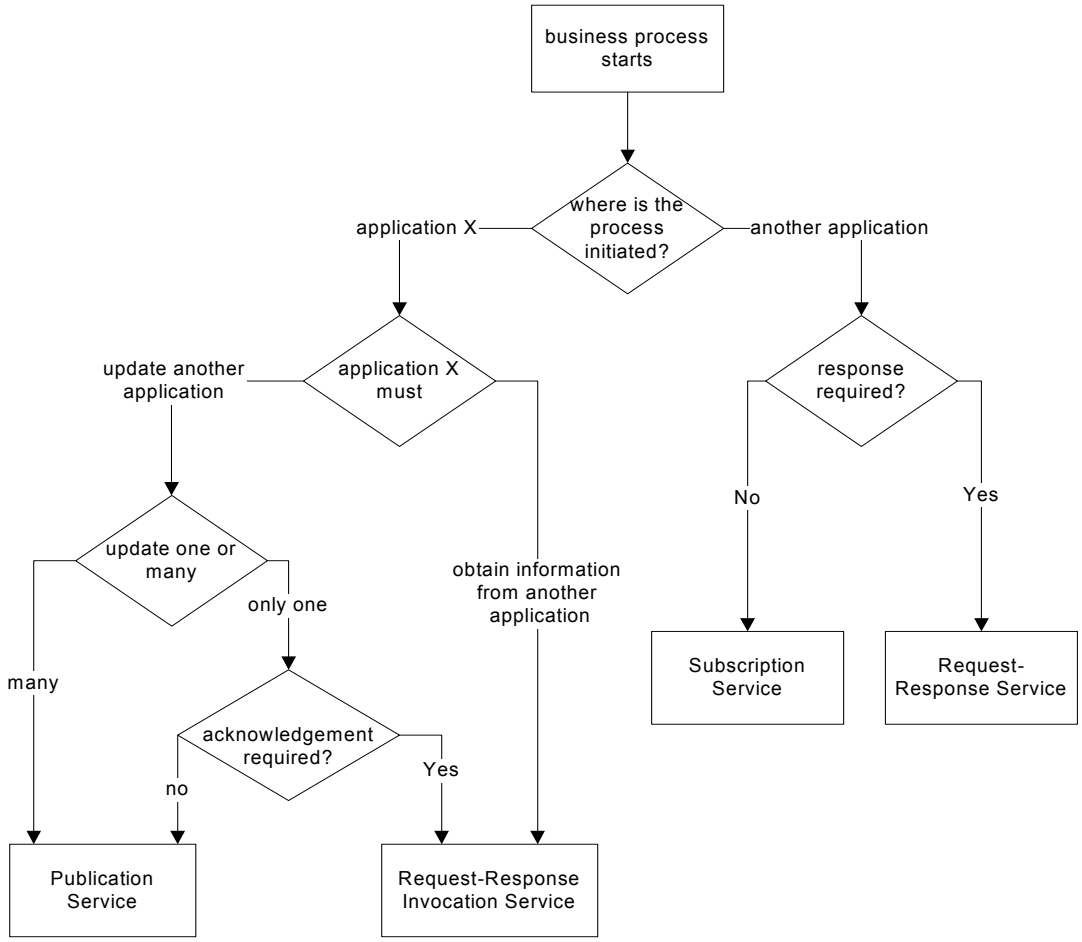
In this scenario, data must be exchanged between the application X and another application. The other application could be a customer management system, such as another TIBCO application or TIBCO ActiveMatrix BusinessWorks.

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 2:

Figure 2 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.

Deployment

An adapter instance created by TIBCO Designer can be deployed using TIBCO 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
- the TIBCO Hawk microagents

Chapter 2 TIBCO ActiveMatrix Adapter for Amdocs CRM

This chapter provides background information on product elements in TIBCO ActiveMatrix Adapter for Amdocs CRM. It also describes the adapter's interaction with Amdocs CRM.

Topics

Overview of Amdocs CRM

Amdocs CRM provides customer asset management systems that are typically used in call centers. Amdocs CRM automates front-office functions such as help desk support, customer sales and service.

Amdocs CRM delivers two relationship management solutions:

- Amdocs eFrontOffice (CeFO) integrates a company's web site, e-mail, and phone systems to enhance customer support. By maintaining a database of all interactions the company has had with a client, Amdocs CRM can help manage sales leads, route customer calls and offer self-service over the web. The main components of CeFO are Amdocs database, Amdocs server, Amdocs Client, and the Amdocs Web Client.
  - Amdocs database is a relational database that contains customer data (information about the user's activities, contacts, and so on).
  - Amdocs server hosts the Amdocs database.
  - Amdocs Client is the user interface used to input and retrieve information from the Amdocs server.
  - Amdocs Web Client is a web application that helps to interact with customers as well as business partners.
- Amdocs CRM eBusiness Framework is an eBusiness Web application that helps in interaction with customers and business partners. The main components of Amdocs CRM eBusiness Framework are CBOs and CBO Data Service.
  - Amdocs CRM Business Objects (CBOs) are part of the Amdocs CRM eBusiness Framework that are used for developing applications for the CeFO database. CBOs consist of Java Beans and ActiveX controls that provide an API to perform create and update operations in the CeFO database. A CBO implements the Amdocs data model and encapsulates the application logic by providing methods and properties that can be used to query or update the CeFO database. For example, the Case business object provides access to case-related data and includes methods for finding, updating, and dispatching cases. CBOs also support eBusiness applications for online sales and service. Examples of eBusiness applications are Amdocs eOrders and Amdocs eSupport.

  CBOs can be used in any Java application including Java Server Pages or ActiveX container (such as Visual Basic or Active Server Pages). For example, the Java Server Pages in Amdocs CRM eSupport and Amdocs CRM eOrder use CBOs to create new cases and orders.
  - CBO Data Service manages a connection pool. A CBO uses CBO Data Services to query and update the Amdocs database.

Overview of Adapter

TIBCO ActiveMatrix Adapter for Amdocs CRM provides seamless connectivity from the TIBCO environment to the Amdocs CRM system, allows events to be propagated from the Amdocs CRM system to the TIBCO environment and vice versa.

The adapter exports data from and imports data into a Amdocs CRM system in an event-driven fashion. Data is sent out to the TIBCO environment when changes are made in the Amdocs CRM System. When the adapter receives a message containing data to import, the adapter parses the data and inserts it into the Amdocs CRM database.

For a general introduction to adapters and the services they provide, see Introduction to Adapter on page 1 for more information.

Components

The adapter has three main components: adapter configuration palette, design-time adapter, and the runtime adapter.

The adapter palette comprises an adapter-specific GUI that seamlessly integrates with TIBCO Designer. It allows you to configure the adapter, and stores the configuration in persistent storage. (You will require TIBCO Designer for this, which is installed as part of the TIBCO Runtime Agent installation. TIBCO Runtime Agent must be installed before installing the adapter). The runtime adapter uses this configuration to pass and convert data to and from the applications.

- Adapter Configuration Palette—When you install the adapter, a palette containing the configuration resources for the adapter is automatically loaded in TIBCO Designer.

  The adapter configuration palette provides an easy-to-use graphic user interface. It allows you to configure adapter services, download CBO schema directly from the Amdocs CRM database, and save resulting configuration in a project.

- Design-time Adapter (DTA)—The design-time adapter runs in the background during your configuration session. The design-time adapter acts as a service, taking requests from TIBCO Designer to connect to an Amdocs CRM system, fetch data schemas from the Amdocs CRM system and send the to the palette.

- Runtime Component—Runtime components deliver the core functionality of the adapter. They use configuration information and metadata to exchange messages between Amdocs CRM and applications in the TIBCO environment.

Services

The adapter functions as an agent to export and import data into the Amdocs CRM system in an event-driven fashion and provides the following services:

- Publication Service—This service is used to publish data from Amdocs CRM to the TIBCO environment.
- Subscription Service—This service is used to subscribe to messages from the TIBCO environment and post them into the Amdocs CRM database.
- Request-Response Invocation Service—This service is used to request data from external applications through the TIBCO environment.
- Request-Response Service—This service is used to provide response data by executing query, workflow and customized operations in the Amdocs CRM database using CBOs.

For more information about adapter services, see Adapter Services on page 15.

Adapter Capabilities

This section describes in detail how TIBCO ActiveMatrix Adapter for Amdocs CRM handles each of the following:

- Multithreading
- Connection Management
- Password Handling

Multithreading

Multithreaded instance of an adapter will generate additional threads to dispatch events. The number of additional threads to be created for a given instance can be specified at design time and these are created at startup of the adapter.

Publication, Subscription, Request-Response and Request-Response Invocation services configured in an adapter instance can be multithreaded by specifying the required number of additional threads at the instance level. Publication service uses Java threads for dispatching events whereas Subscription, Request-Response and Request Response Invocation services use SDK dispatcher threads for processing events.

The adapter needs to create a connection with the target application for performing CBO operations for Subscription and Request-Response services. The real advantage of parallel processing in multithreaded mode can be achieved only when multiple connections are created with the target application.

Connection Management

This section describes connection pooling and reconnection mechanism.

Connection Pooling

There is a one-to-one mapping between the threads and the Amdocs connection. This means that the number of connections to Amdocs is the same as the number of threads. Once a connection is associated with a thread, the same connection is used by that thread till it terminates.

The adapter creates a static pool of connections with Amdocs on startup. The number of connections is equal to the number of threads. Upon receiving a request, the adapter thread picks up a connection from the pool and uses it for processing. Once a thread picks up a connection, it remains dedicated to that thread till the connection terminates.

Reconnection Mechanism

The adapter uses a reconnection mechanism to handle the network glitches. You can configure the number of times the adapter will attempt to connect to the Amdocs database.

Reconnection mechanism starts whenever the adapter faces a Amdocs application error while processing an event. It performs a dummy operation to check whether the connection is valid or not. If this connection check is successful, the adapter displays an error for that event with the proper error message. The adapter does not attempt to re-create the connection pool. If the operation is unsuccessful, the adapter activates the reconnection mechanism.

The adapter tries to reconnect to the Amdocs database as many times as you have configured it to retry. If it exceeds the parameter Number of Reconnect Attempts Before Suspending Impacted Service(s), the adapter suspends the Subscription Services. Thereafter, the adapter will continue with the reconnection attempts till it crosses the parameter configured for Maximum Number of Reconnect Attempts. If the adapter is still not able to reconnect, it stops.

If the adapter is able to reconnect, it drops all the existing connections from the pool and creates the complete connection pool. While re-creating the connection pool, the adapter exits if it fails to establish the first connection. But, if the adapter is able to create one or more connections, it waits for the events.

Password Handling

At design time, the adapter uses a password to connect to the backend application and fetch metadata. At runtime, the adapter uses a password to connect to the backend application and interoperate with it.

If you plan to run the adapter locally, define the runtime password value to be a global variable. Before starting the adapter, include the runtime password as client variable in the adapter's .tra file and obfuscate it using obfuscate tool. For example, if the password value is defined as myPassword, create a global variable named myPassword in the global variables section without value and include the following entry in the adapter's .tra file:

```
tibco.clientVar.myPassword
```

If you plan to deploy the adapter using TIBCO Administrator Enterprise Edition, checkmark the Service property of the global variable in the global variables section. Before deploying the adapter, go to the Advanced tab of the adapter archive and set the password value under the Run-Time Variables section.

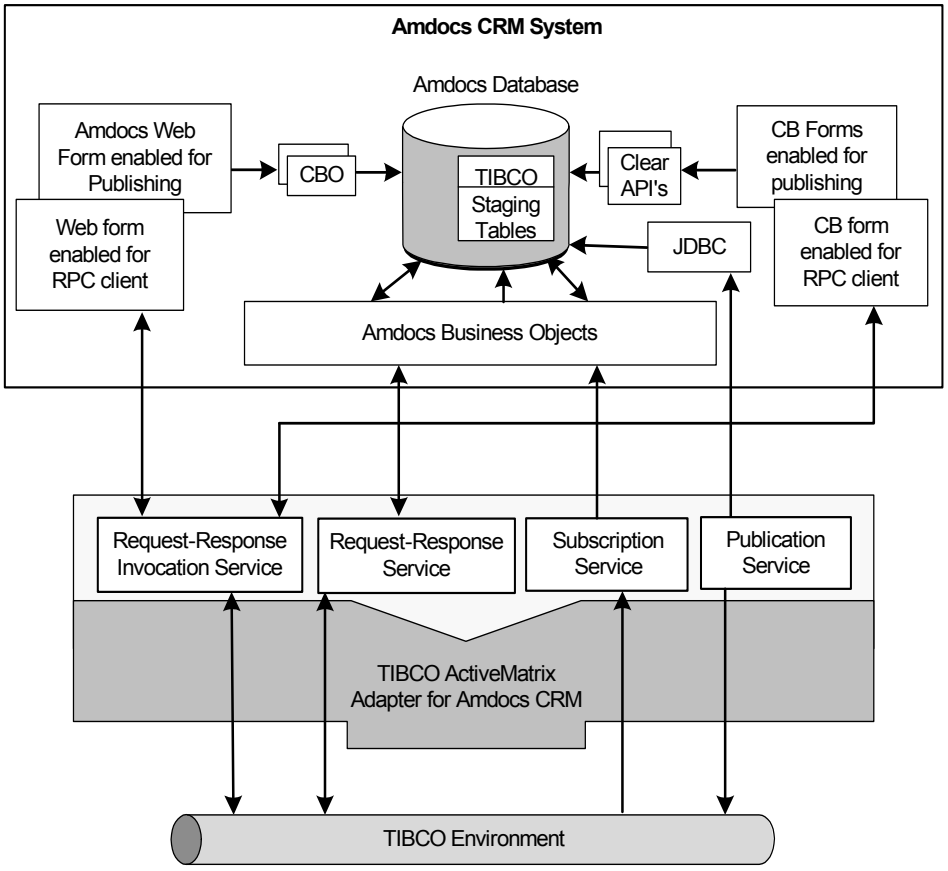
Do not set the password to type Password in the global variables section for Version AE Version 4.0 or AE Version 5.0 or any intermediate version.

Adapter Services

In TIBCO terminology, an adapter offers services between the host application and the TIBCO environment. A service broadly encapsulates routing rules for messages handled by the service and also custom configuration information.

This section describes the Publication, Subscription, Request-Response, and Request-Response Invocation services of the adapter in more detail. Figure 3 shows the adapter services in relation to other components in an Amdocs CRM system.

Figure 3 Adapter Services and Components



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

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

Publication Service

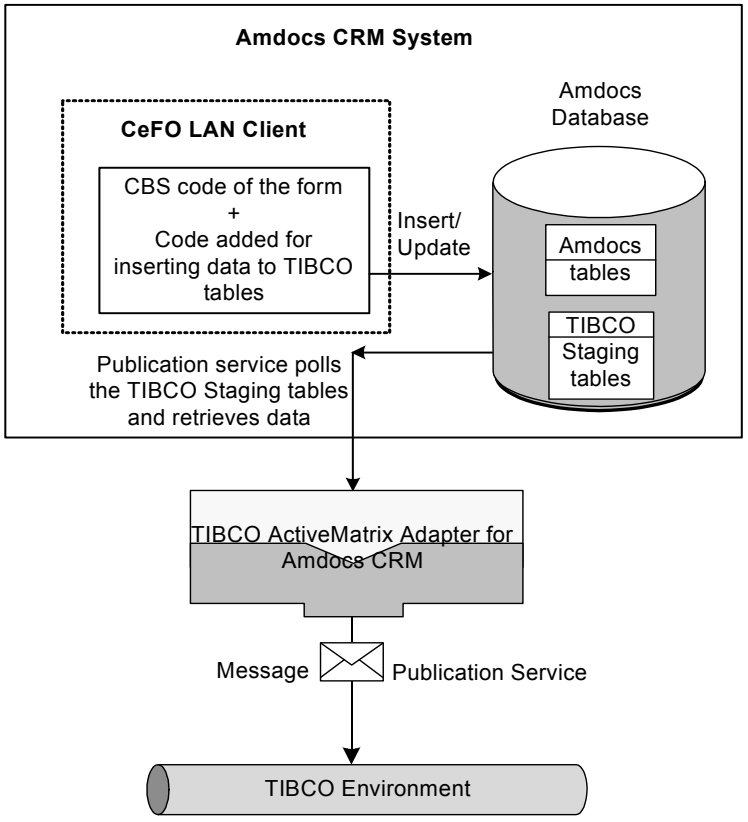
The Publication Service consists of three components:

- TIBCO Staging tables
- ClearBasic (CBS) code for ClearBasic forms or JSP code for web forms
- a polling process

TIBCO Staging tables are extended into the Amdocs CRM system schema for holding publishing information. The ClearBasic code attached to an Amdocs CRM form or the JSP code for a web form updates the TIBCO Staging tables. The polling process polls the TIBCO Staging tables and publishes Amdocs data in the TIBCO environment.

After successfully publishing the message, the Publication Service process deletes the message or updates the status in the message queue depending on the user configuration. For details, see *TIBCO ActiveMatrix Adapter for Amdocs CRM Configuration and Deployment.*

Figure 4 Typical Publication Service Flow



Publication Service Example

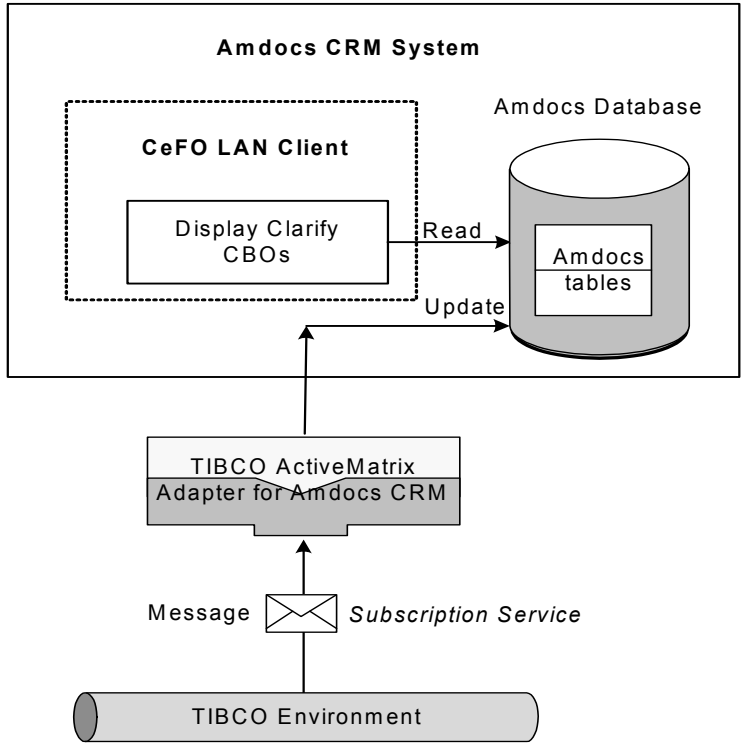
In the Amdocs CRM system, Parts at a site are typically associated with attributes like quantity, status, warranty end dates, and so on. To update the status or quantity for an external application like an order management system, the adapter can be configured to publish this data on to the TIBCO environment.

Subscription Service

The Subscription Service receives a message from external applications through the TIBCO environment, processes it and based on the message fields performs the requested operation.

The Subscription Service parses the message, inserts or updates the data in the Amdocs CRM database using CBOs and Wrapper classes. The Subscription Service can be used to invoke a Custom JavaBean method. For details, see *TIBCO ActiveMatrix Adapter for Amdocs CRM Configuration and Deployment.*

Figure 5 Typical Subscription Service Flow



Subscription Service Example

In the Amdocs CRM system, a site is associated with a primary address, a ship-to address, and a bill-to address for every customer. If an external billing system makes changes to the bill-to address of a particular customer, then the changed billing information for that customer needs to be updated in the Amdocs CRM system. The Subscription Service can be configured to receive this updated site information published by the external billing system.

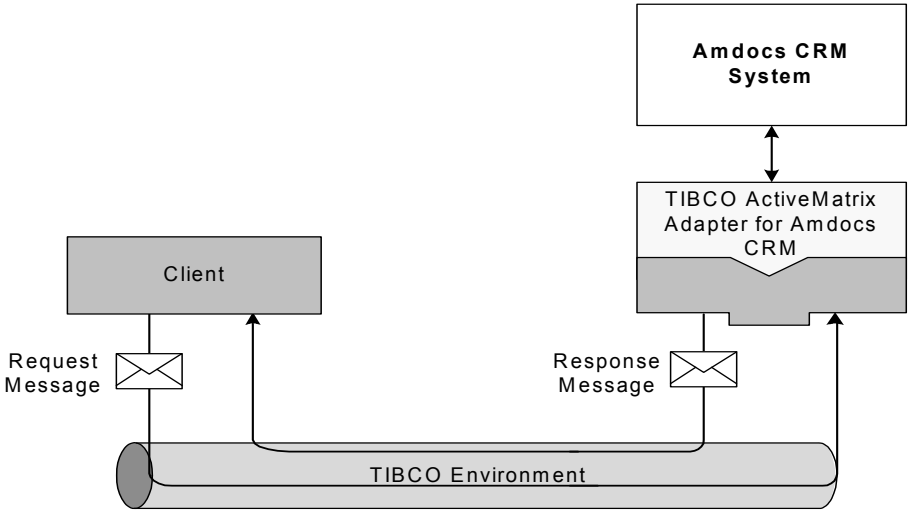
Request-Response Service

The Request-Response Service supports three operations (QUERY, WORKFLOW and CUSTOMIZED) and uses incoming request names to determine the operation type.

1. The adapter receives a request from the TIBCO environment and sends the request to the Amdocs CRM system.
2. When a response is returned to the adapter from the Amdocs CRM system, the adapter sends the response to the TIBCO environment.

The adapter supports request-response scenarios with a Remote Procedural Call (RPC) server. When the adapter receives a request, it takes the requested data, converts it into a formatted Amdocs CRM schema, and sends it to Amdocs CRM by using CBOs. The adapter then returns the response to the client or an external application. For details, see *TIBCO ActiveMatrix Adapter for Amdocs CRM Configuration and Deployment*.

Figure 6 Typical Request-Response Service Flow



Request-Response Service Examples

In case of a workflow operation, a request is made to the Amdocs CRM system. The adapter creates an object of the specified CBO using the record identifier and executes the workflow operation on that object. A reply containing the status of the workflow operation is sent out to the client.

- WORKFLOW operation example—A case registered in an existing Call Support Center can be assigned or forwarded to a Call Service Representative, Sales Representative or Field engineer depending on the nature of the case logged.
- QUERY operation example—QUERY operation can be used to retrieve all cases related to a particular site.

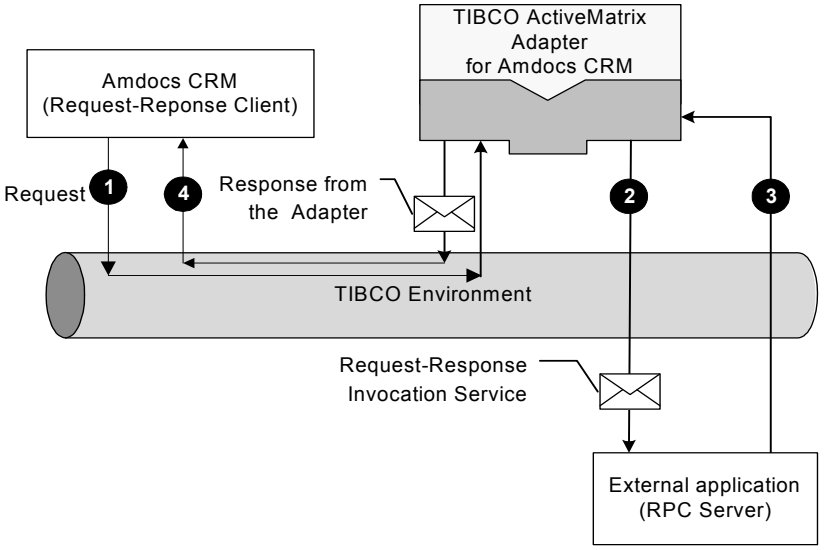
Request-Response Invocation Service

Request-Response Invocation service receives requests from and sends responses to the Amdocs CRM system.

1. The adapter receives a request from the Amdocs CRM system (acting as a Request-Response client).
2. The request is sent to an external application (acting as an RPC server) via the TIBCO environment.
3. When a response is returned to the adapter from the external application, the adapter sends the response back to the Amdocs CRM system.
4. The requesting client receives the response from the TIBCO environment.

The Request-Response Invocation service supports the Flexible and Non-Flexible approaches. For details, see *TIBCO ActiveMatrix Adapter for Amdocs CRM Configuration and Deployment.*

Figure 7 Typical Request-Response Invocation Service Flow



Request-Response Invocation Service Example

The Amdocs CRM system can query an external application for information such as SiteID or associated subcases for a queue.

Adapter and Amdocs CRM Interaction

The adapter is a bi-directional gateway between the Amdocs CRM system and external applications via the TIBCO environment.

The adapter extracts and stores CBO definitions from the Amdocs CRM system into a project at design time. Each adapter service can be associated with a single main Amdocs CRM object and multiple contained Amdocs CRM objects. The contained objects are used for look-up, query or creation of the main Amdocs CRM object.

The adapter uses wrappers written for CBOs to perform the above-mentioned operations. A Wrapper class provides more functionality than its underlying business object. It encapsulates business logic, which helps in creating or updating a business object. Wrappers for most of the standard CBOs are packaged and provided with the adapter. For further details on how to write wrappers, see *TIBCO ActiveMatrix Adapter for Amdocs CRM Configuration and Deployment*.

Examples of how CBOs can be used with the adapter are given next:

- Create Amdocs objects in the Amdocs CRM system using the Subscription Service of the adapter.

  Example: Create a site in the Amdocs CRM System. A site is associated with address information of the customer. Typically this address could be associated with primary, shipping or the billing address of the customer. If the billing address is changed in an existing billing application, it is critical that corresponding changes be made in the respective Amdocs CRM system. The subscription service of the adapter can be used to achieve this.

- Update Amdocs objects in the Amdocs CRM system.

  Example: A Contact in the Amdocs CRM system could be a person associated with the customer or any other third party vendor. Each customer can have a single or multiple sites created depending on the business needs. For example, you can have a site for production unit, one for development unit, one for research and development, and so on. Most of the time it could be a single person associated with all the sites. The QUERY operation could be used to list the sites associated with a particular contact and update the information.

- Query a Amdocs object using the Request-Response Service of the adapter.

  Example: A Case in an Amdocs CRM system is typically used in call centers. The Case contains information about the nature of the call, solution provisioned and the information of the person who has logged the call. You can query and update contact information associated with a case.

- Perform workflow operations provided in the Amdocs CRM system.

Example: A Workflow operation example would be, a case registered in an existing Call Support Center that can be assigned or forwarded to a Call Service Representative, Sales Representative or Field engineer depending on the nature of the call.

- Perform customized operations that a particular Amdocs CRM system may need.

  Example: In the example provided with the adapter, the required fields from a business object can be updated in a custom table. See *TIBCO ActiveMatrix Adapter for Amdocs CRM Configuration and Deployment* for a detailed description.

Chapter 3 Adapter Infrastructure Tools

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

Topics

TIBCO Runtime Agent

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

TIBCO Runtime Agent 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 runtime environment, that is, all shared libraries including third-party libraries required by the adapter.

TIBCO Domain Utility

TIBCO Runtime Agent contains 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.

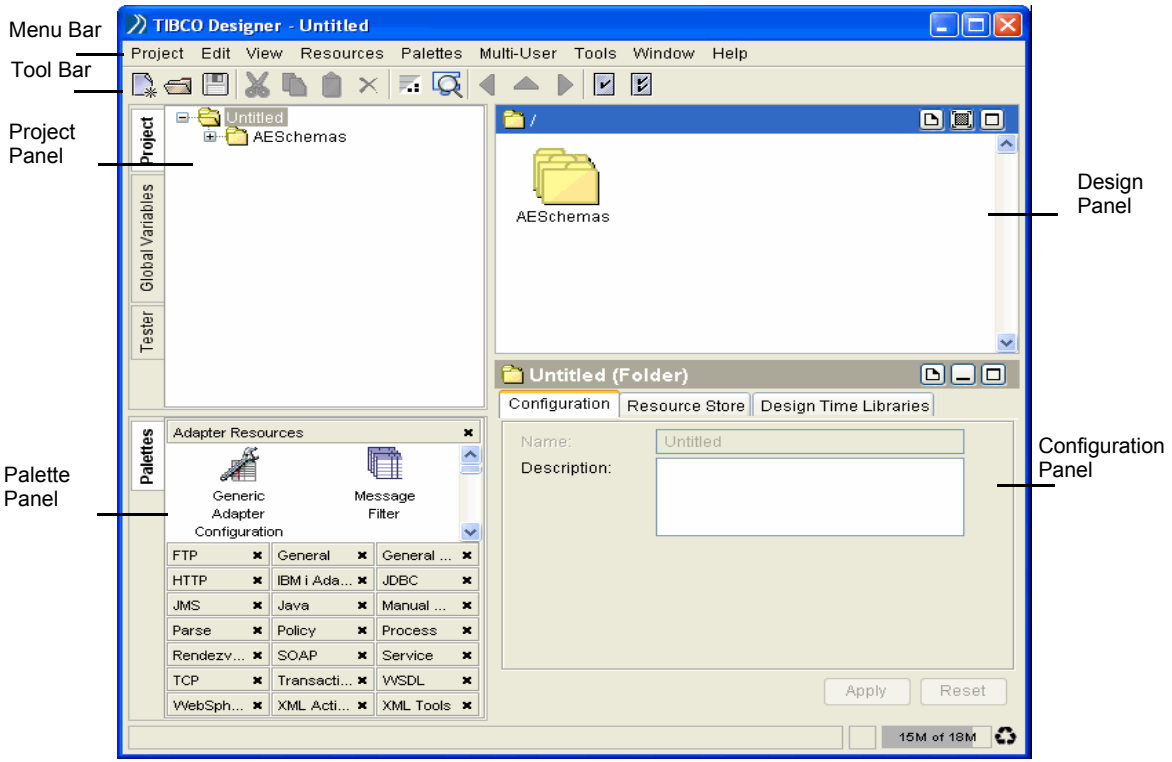
TIBCO Designer

TIBCO Designer provides the design-time environment for configuring a standalone adapter project. Using Designer, you 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*. The documentation can be accessed via the 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 8 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 (RVDQ) protocol 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 instead 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 *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

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. *TIBCO Administration Server* is the machine process that handles the stored project and requests to manage the TIBCO administration domain.

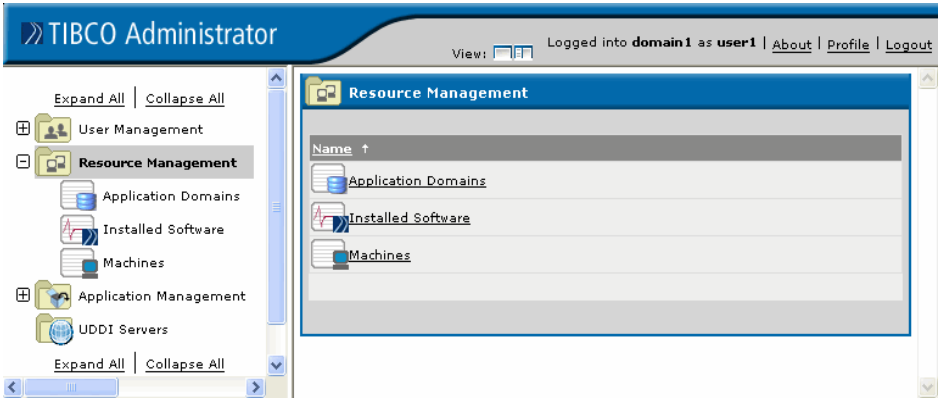
TIBCO Administrator Server contains its own web server (Apache Tomcat) that can be accessed via TIBCO Administrator GUI for configuration and monitoring information.

TIBCO Administration Server supports centralized authentication and authorization. Using 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 TIBCO Administration Server using the web-based TIBCO Administrator GUI. The GUI allows you to create users 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 9 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 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, runtime 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 to be found and fixed before failure can occur.
- 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, methods can return information about threads, internal queues, or connections to the target system. Using these methods, one might be able to identify certain bottlenecks or gauge how successfully an adapter is scaling with respect to the current environment.
- Updates of 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 setting of the instance that is running.

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