Fundamentals

Sybase Unwired Platform 2.0

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Contents

CHAPTER 1 Sybase Unwired Platform Fundamentals

Sybase® Unwired Platform provides an integrated platform solution to extend your enterprise applications to mobile workers in the field.

Sybase Unwired Platform Fundamentals is designed to help developers, administrators and stakeholders understand this platform solution, from integration with the back-end enterprise information systems (EIS) to the functionality that appears on a mobile device. This guide provides:

- Product overview with an introduction to mobility concepts
- High-level view of the solution landscape
- Descriptions of solution components with pointers to more detailed documentation
- Overview of the system and development lifecycles

This document is targeted for organizations with enterprise-level applications who want to develop and manage multiple mobile applications that securely connect a variety of back-end data sources to all major device types. It covers:

- *Enterprise Mobility*

  Extending your enterprise business processes, data, and information away from the office entails many technical challenges.
- *Product Overview*

  As a platform solution, Sybase Unwired Platform provides end-to-end facilitation of enterprise mobilization—providing standards-based access to data sources, building heterogeneous device applications with reusable object-oriented frameworks, supporting end-to-end security, and managing deployment, devices, users, and applications.
- *Solution Architecture*

  Unwired Platform provides a solution architecture that extends the reach of your enterprise systems. The key elements of the solution architecture are mobile business objects, device applications, synchronization paradigms, security, and application deployment.
- *Sybase Unwired Platform System Life Cycle*

  The "system life cycle" takes administrators through the process of planning and installing Unwired Platform, and integrating it with your enterprise environment; determining software deployment requirements; and setting up the Unwired Platform production environment. Understanding the system lifecycle helps establish best practices for managing and monitoring Sybase Unwired Platform.

- *Sybase Unwired Platform Development Life Cycle*

  The "development life cycle" takes developers through the process of designing, developing, testing, deploying and maintaining mobile business objects, device applications, and workflow packages. Understanding the development lifecycle helps establish best practices for deploying updated MBOs and device applications.
- *Documentation Roadmap*

  Use the documentation roadmap to review the documentation available for Sybase® Unwired Platform and determine where to start based on your role.

CHAPTER 2 Enterprise Mobility

Extending your enterprise business processes, data, and information away from the office entails many technical challenges.

Mobilizing your enterprise applications and data presents complexity to the IT organization. These complexities may include, but not be limited to, for example, lack of integrated solutions, heavy upfront costs for large-scale customization requirements, and the lack of repeatable development and deployment models.

- **Device heterogeneity –** Supporting the rapidly expanding and changing selection of devices and device operating systems on the market.
- **Data partitioning for mobile applications –** Separating and securing data storage from the applications running on the device.
- **Data transport and application security –** Securing data while in transport and while accessed by the application.
- **Bandwidth, latency, and connectivity issues –** Managing multiple connections, coordinating synchronization and caching of data between the EIS and devices, and allowing field workers to work in always connected, occasionally connected, or sometimes connected environments
- **Device management devices, and the application life cycle –** Managing device and application life cycles, including device upgrades and turnover, deployment of application updates and new applications, with limited interruption to productivity

Enterprise mobile application development is often perceived as an endeavor requiring the enterprise to master complex technical details for multiple and disparate technologies. Technical challenges include:

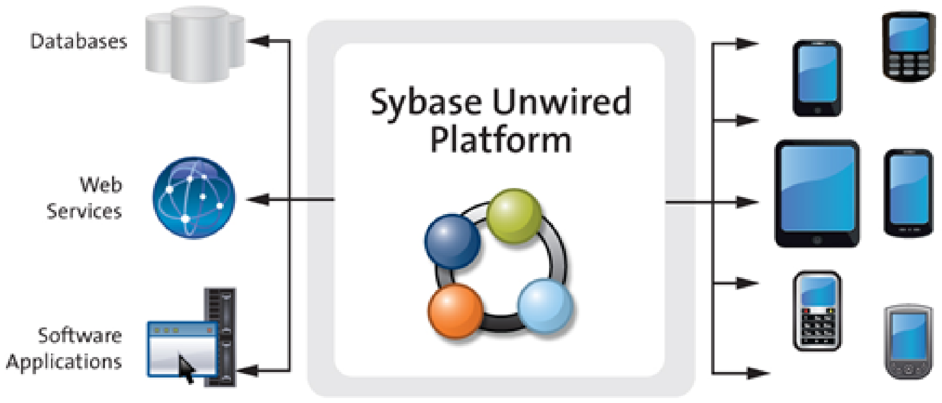
- Connecting and interacting with various enterprise information systems and applications that exist in any large or medium size corporate IT infrastructure that supports customers, employees, sales, partners, suppliers, and executives.
- Implementing a data model that fits the application requirements and physical restrictions and capabilities of the mobile device, such as network bandwidth, storage capacity, connectivity, security, and availability of consistent data.
- Reliably propagating user transactions initiated on a device that may or may not have network connectivity.
- Ensuring secure access to data and application functionality that is available only to authorized mobile users.

Sybase Unwired Platform meets those challenges by hiding complexity while efficiently and flexibly handling the mentioned complex mobility issues. Unwired Platform provides productivity gains through a well-defined life cycle, repeatable use of existing investments, and mobility knowledge.

CHAPTER 3 Product Overview

As a platform solution, Sybase Unwired Platform provides end-to-end facilitation of enterprise mobilization—providing standards-based access to data sources, building heterogeneous device applications with reusable object-oriented frameworks, supporting end-to-end security, and managing deployment, devices, users, and applications.

Sybase Unwired Platform acts as the hub that connects the back-end enterprise systems and data sources to mobile devices. Features for mobile application development, deployment, security, and ongoing device and application management provides a complete end-to-end solution.



- *Platform Components*

  The components of the platform allow mobility developers and administrators to connect, create, consume, and control aspects of the end-to-end mobility solution.
- *Unwired Platform Architecture*

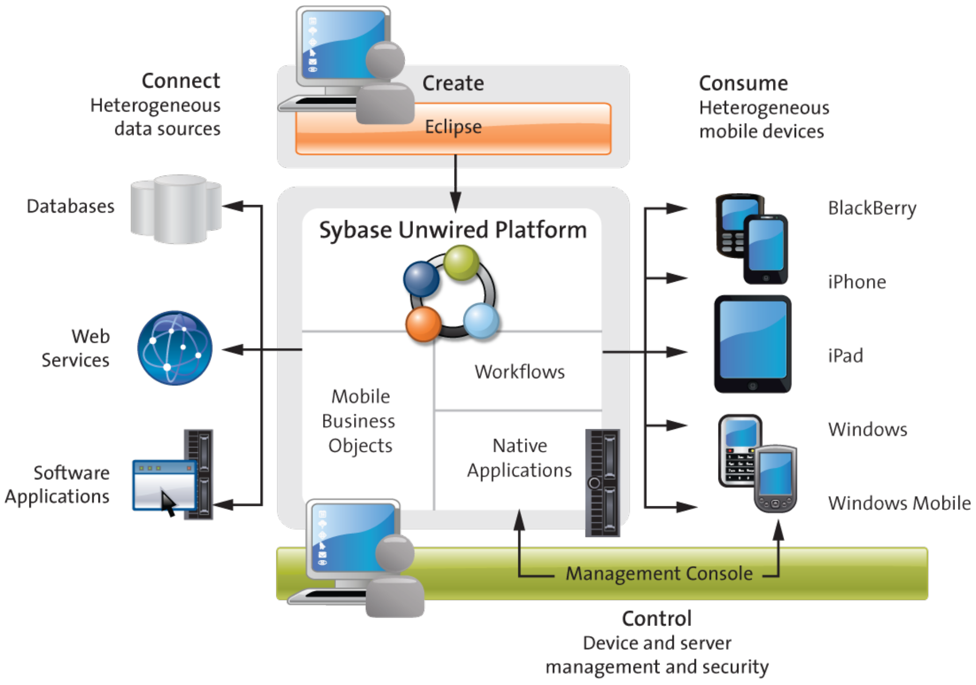
  The Unwired Platform architecture includes several major components associated with tiers: server tier, data tier, and client tier.
- *Core Features*

  Unwired Platform addresses the complex issues present in mobilizing applications to heterogeneous devices and networks.
- *Licensing Options*

  Sybase Unwired Platform licensing options include fixed-price and subscription-based for device clients. You can add functionality through licensing options.

Platform Components

The components of the platform allow mobility developers and administrators to connect, create, consume, and control aspects of the end-to-end mobility solution.



- *Unwired Server*

  As the runtime server, Unwired Server handles enterprise data source and application access, communication between the backend data source and the mobile device, security, transaction processing, and scheduling.
- *System Management Tools*

  Unwired Platform uses a Web-based administrative console to manage and administer Unwired Servers, device application deployment, and mobile devices running across the corporate network.
- *Development Environment*

  Unwired Platform incorporates the Eclipse-based Sybase Unwired WorkSpace development environment, which provides an extensive set of tools that simplifies and abstracts back-end system connections, and provides a uniform view of transactional objects.

Unwired Server

As the runtime server, Unwired Server handles enterprise data source and application access, communication between the backend data source and the mobile device, security, transaction processing, and scheduling.

Unwired Server supports:

- Optimized access to back-end systems, messaging, security services, multitenancy capabilities, and monitoring and development activities.
- Data delivery to and from device applications by applying transactions to the consolidated database (cache), and propagating transactions to back-end systems respectively.

After developing and packaging a mobile application or workflow, the package is deployed to Unwired Server. From Unwired Server, the device application can then be deployed to a mobile device, or provisioned to multiple devices using Afaria Frontline Management, available as a separately licensed and installed product.

The Unwired Server Customization and Managment APIs support advanced requirements of complex data handling, transaction execution, security customization, exception handling, and systems management automation, all of which are intrinsic to complex corporate and multitenant-based mobile application deployment environments.

System Management Tools

Unwired Platform uses a Web-based administrative console to manage and administer Unwired Servers, device application deployment, and mobile devices running across the corporate network.

The administration console, Sybase Control Center, allows administrators to centrally manage, secure, and deploy servers, data applications and devices.

This systems management command and control functionality provides:

- **Server configuration –** Configure server parameters including performance, network ports, messaging, SSL security, and log levels among others.
- **Cluster management –** Register and monitor clusters to ensure that Unwired Server clusters and servers work smoothly, and scale over time.
- **Device registration and security –** Control and monitor devices registered. Registration, activation, and provisioning of devices allows device users to access applications and to be tracked and managed by the system.
- **Subscription management –** Configure, manage, and monitor subscriptions related to MBO packages and device user profiles. Subscriptions define what subset of data the device user wants to receive when the device is synchronized with the server.
- **Security configuration, administration, and application –** Configure and manage permissions that allow execution of operations on registered servers.

- **Device application deployment –** Manage and monitor device applications deployed to Unwired Server. Afaria Frontline Management is required.
- **Monitoring –** View historical application usage data, view performance statistics, and manage monitoring data.
- **Multitenancy management –** Deploy a single production environment to service multiple client organizations, known as Tenants. Administrators can view domains that are created to support the tenancy strategy.
- **Log viewing –** Review logs directly from the console.
- **Troubleshooting –** Use information gathered by monitoring Sybase Unwired Platform components to identify and troubleshoot issues.

In addition to the console, the systems management framework can integrate with Simple Network Management Protocol (SNMP) management tools to monitor specific server events. You can use the Unwired Server management API to automate and extend administration, management, and monitoring features.

Development Environment

Unwired Platform incorporates the Eclipse-based Sybase Unwired WorkSpace development environment, which provides an extensive set of tools that simplifies and abstracts back-end system connections, and provides a uniform view of transactional objects.

Unwired WorkSpace facilitates back-end data source connection, mobile business object development, and Workflow application development. In addition, the Unwired WorkSpace development environment supports code generation from the mobile data models in device-specific languages (Objective-C for iOS, Java for BlackBerry, and such) which is then used to build the device application in the respective platform provided IDE. The generated code is built upon the Unwired client libraries integrated part of the server, which combine to support reliable transmission of data and transactions, security of data while in transit or on device, sending notifications when data changes occur in the backend application, consistent interface on all platforms, all of which abstract developers from forementioned mobility related complexities.

Back-end Data Source Connections

From the development environment, connect to heterogeneous enterprise data sources, such as SAP JCo, JDBC, RESTful Web services, and Web services, then use the connections to discover and model the data and transactions. The connections visible in the development environment streamline development by simplifying and abstracting back-end system connections, providing a uniform view of transactional objects.

Mobile Business Object (MBO) Development

Based on the connections to the back-end systems, developers create mobile business objects (MBOs) to model the back-end business data. An MBO defines object data models with the back-end EIS connections and includes attributes, operations and relationships that allow filtered data sets to be synchronized to the mobile device.

Developers perform MBO code generation and use this MBO model code along with the user interface code that users write in a native integrated development environment (IDE). This makes the code available to transition from the Unwired WorkSpace MBO development tool to the fully extensible and open development environment provided for device platforms from third-party vendors. Device applications are more complex than workflows and require larger data sets that need to be synchronized with and managed on the device.

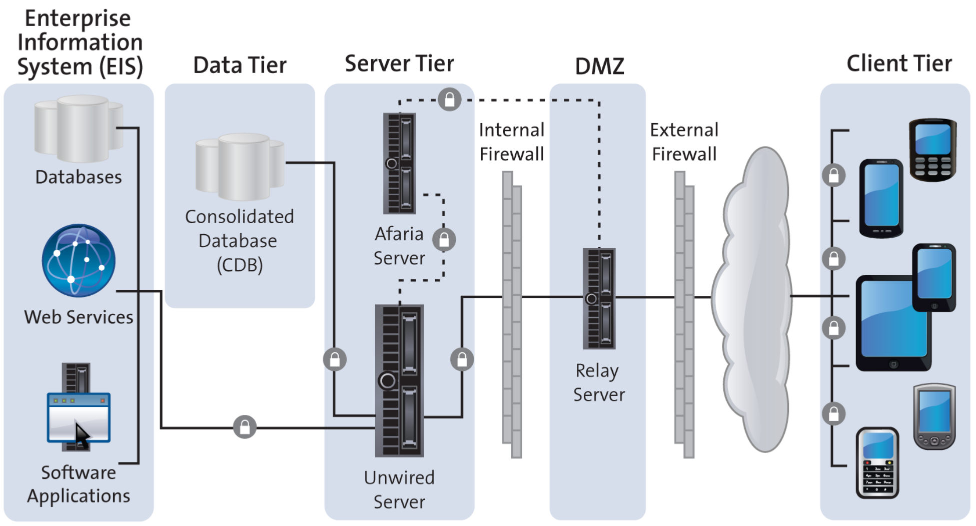
Workflow Package Development

Developers use the Mobile Workflow Forms Editor to develop mobile workflow packages using a Hybrid Web container development strategy. From the development interface, generate the workflow package that contains the workflows and container files.

Mobile workflow development takes a simple business process such as a sales order or vacation request, and breaks it down to decision points. A workflow form is developed for each decision point. The forms are generated as a workflow package that is deployed to Unwired Server and the container on the mobile device. Mobile device users can enter the decision point response, such as "approved" or "not approved," and the response is transported to the back-end data source, allowing the business process to continue or complete.

Unwired Platform Architecture

The Unwired Platform architecture includes several major components associated with tiers: server tier, data tier, and client tier.



- **Server tier –** Integrates the server components with back-end enterprise systems, data access and transaction services, device and application deployment, and system management functionality.

- **Data tier –** Stores data retrieved from the backend data sources and other runtime related metadata.
- **Client tier –** Consists of device applications built on top of the Unwired Platform client runtime.

You can employ different secure application communication styles—replication and messaging—between the client and the server tiers.

Relay Server

Relay Server enables secure, load-balanced communication between mobile devices and the Unwired Server cluster. Across-the-firewall deployment occurs without opening any internal firewall ports for enterprise mobilization and ensures that data is secure while in transit.

Unwired Platform uses a relay server as a component of the enterprise demilitarized zone (DMZ), to securely integrate mobile devices into your system landscape. You need not install any Unwired Platform components on the carrier network or outside your firewall; they can all be installed and controlled within your corporate networks.

Relay Server:

- Accepts and forwards requests from remote clients to Unwired Platform components.
- Is implemented as a pair of Web extensions that run in a Web server. Relay Server supports two Web servers: IIS on Windows and Apache on Linux.
- Integrates with existing security for Web and enterprise infrastructure, eliminating the need for changes to existing corporate firewalls and IT policies.

Unwired Platform synchronization uses Relay Server end-to-end encryption and HTTPS to secure communication. Devices synchronize with Unwired Platform securely on the device client side.

Afaria Server

As a separately licensed and installed component, Afaria Server provides enterprise level device application deployment and device management. Integrated with Unwired Server, the solution supports end-to-end management and security of devices, and over-the-air and push-based deployment of device applications.

Afaria extends Unwired Platform functionality by providing additional device client management features for remote and mobile computing devices, including laptops, desktops, and handheld devices. When Afaria is licensed and implemented with Sybase Unwired Platform, the Afaria management console is launched from the Sybase Control Center console.

Use the Afaria tools to:

- **Deploy client and runtime infrastructure components –** Using OTA and push-based deployment, mobile devices automatically receive notifications, application updates, etc. Afaria administrators can add, update or remove applications, data and content without the

users' involvement and can ensure mobile workers have the correct software and data in the field. Users can be confident that the data on their devices is up-to-date and reliable.
- **Track assets –** Identify and track assets being used by your mobile workforce. Afaria Administrators have full control of the range of devices and applications deployed and can view information from a single console.
- **Secure devices and data –** Data and content is backed up and can be deleted if a device is lost or stolen.

Core Features

Unwired Platform addresses the complex issues present in mobilizing applications to heterogeneous devices and networks.

Features that address these challenges include:

- Reliable communication between devices and the server runtime to support guaranteed delivery of and offline access to data and transactions, without imposing any developer or management requirements.
- Integrated support for messaging-based and replication-based synchronization paradigms for varying network and application requirements.
- Normalized data model for a variety of back-end data sources, including databases, SOAP and REST Web services, and SAP® ERP Central Component® (ECC) via JCo and DOE.
- Reusable, and elegant mobile business objects that capture device application data and transaction requirements.
- Integrated end-to-end security, using Secure Sockets Layer (SSL) and Transport Layer Security (TLS), for both over-the-air and data at rest.
- System security using common security providers including LDAP, Active Directory, single sign-on, and the operating system.
- Full development support for Eclipse development communities, and uniform development paradigm across all device platforms.
- Object APIs that support consistency and abstraction from inherent technical aspects of communication between the server and devices.
- Freedom from the underlying complexity of back-end systems protocols and interaction details.
- Seamless development of applications across heterogeneous device platforms.

Licensing Options

Sybase Unwired Platform licensing options include fixed-price and subscription-based for device clients. You can add functionality through licensing options.

Sybase Unwired Platform Licenses

Sybase Unwired Platform is available in three editions.

Edition	Summary
Personal Developer Edition	• Includes Unwired Server, data tier, and Sybase Unwired WorkSpace development tools. • Allows use in development systems and development-test systems only; not for use in production systems. • Requires all Unwired Platform components to be installed on the same host. • Allows a maximum of five client devices.
Enterprise Developer Edition	• Includes Unwired Server, data tier, and Sybase Unwired WorkSpace development tools. • Allows use in development systems and development-test systems only; not for use in production systems. • Allows each installable component to be located on a separate host. • Allows clustered systems. • Allows a maximum of 20 client devices.
Enterprise Edition	• Includes Unwired Server and data tier components only. • Allows use in production systems and production-test systems only; not for use in development systems. • Allows each installable component to be located on a separate host. • Allows clustered systems. • Requires separate license for client devices.

Afaria License Option

The Afaria license option lets you provision users, devices, and applications.

CHAPTER 4 Solution Architecture

Unwired Platform provides a solution architecture that extends the reach of your enterprise systems. The key elements of the solution architecture are mobile business objects, device applications, synchronization paradigms, security, and application deployment.

- *Mobile Business Objects*

  The cornerstone of the solution architecture is the concept of the mobile business object (MBO). Mobile business objects help form the business logic for mobile applications and mobile workflows by defining the data you want to use from your backend system and to expose through your mobile application or workflow.
- *Device Applications*

  The building blocks of the device application include the user interface (UI) layer, business logic layer, Unwired Server client object APIs for retrieving data and executing operations, frameworks for passing data and handling events, and device platform and third-party component APIs.
- *Synchronization Methods*

  Developers can use either replication-based or message-based synchronization to move data and transactions between device application clients and Unwired Server.
- *Security*

  End-to-end security is an important feature of the Unwired Platform solution architecture. Security comprises multiple layers, including system security to control access to data and transactions, transport security for over-the-air and network level data protection, local data security for protecting enterprise data on the device, and device security to protect devices in case of loss or theft.
- *Application Deployment*

  During development the developer tests the device application by deploying mobile business object (MBO) packages to Unwired Server, and device application binaries and their dependencies to emulators or actual devices. Deployment to devices can be achieved by physically connecting the device to the developer's machine, and copying binaries using device-supported tools. Applications should also be tested in a test environment that emulates the production environment for complete end-to-end testing.
- *System Management*

  The Unwired Platform management console offers integrated, Web-based access to all Unwired Servers running in the corporate network.

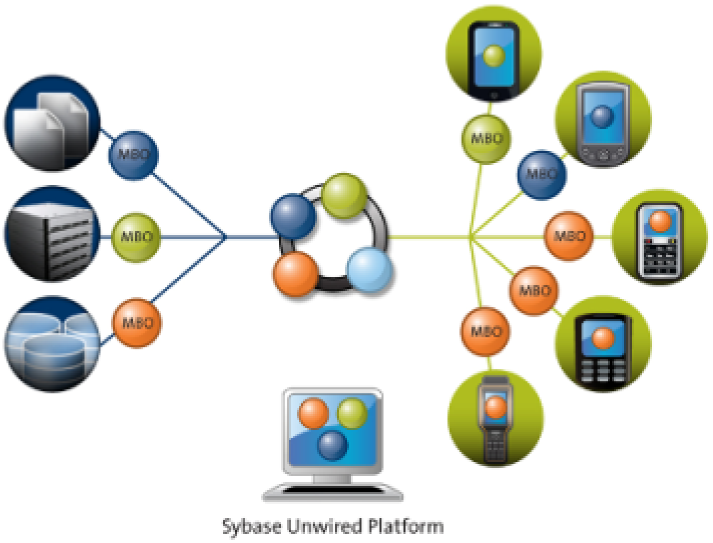
Mobile Business Objects

The cornerstone of the solution architecture is the concept of the mobile business object (MBO). Mobile business objects help form the business logic for mobile applications and mobile workflows by defining the data you want to use from your backend system and to expose through your mobile application or workflow.

MBO development involves defining object data models with back-end EIS connections, attributes, operations, and relationships that allow filtered data sets to be synchronized to mobile devices. MBOs are built by developers familiar with the data and transactional requirements of the mobile application, and how that connects to the existing EIS data sources.

A mobile business object (MBO) is derived from a data source (such as a database server, Web service, or SAP® server). MBOs are deployed to Unwired Server, and accessed from mobile device application clients. MBOs are:

- Created using the Unwired WorkSpace graphical tools.
- Reusable, allowing you to leverage business logic or processes across multiple device types.
- Future-proofing your application; when new device types are added, the same MBO can be used.



MBOs are developed to include:

- Implementation-level details – metadata columns that include information about the data from a data source.

- Abstract-level details – attributes that correspond to instance-level properties of a programmable object in the mobile client, and map to data source output columns. Parameters correspond to synchronization parameters on the mobile client, and map to data source arguments. For example, output of a SQL SELECT query are mapped as attributes, and the arguments in the WHERE clause are mapped as synchronization parameters, so that the client can pass input to the query.

  MBO operations include parameters that map to data source input arguments. Operation parameters determine information a client passes to the enterprise information system (EIS).
- Relationships – defined between MBOs by linking attributes and parameters in one MBO, to attributes and parameters in another MBO.

Developers define MBOs using either a top-down approach—first designing attributes and parameters, then binding them to a data source; or a bottom-up approach—first specifying a data source, then automatically generating attributes and parameters from it.

A mobile application package includes MBOs, roles, and data source connection mappings, and other artifacts that are delivered to the Unwired Server during package deployment.

Data and Transaction Models

Mobile business objects (MBOs) implement both a data model and a transaction model.

- Data model – attributes provide the abstract model that describes how data is represented and accessed in Unwired Platform. The goal is secure access to enterprise information system (EIS) data from the mobile application.
- Transaction model – operations provide the abstract model for data transactions. The goal is to deliver updated data from mobile devices to the EIS.

Attributes

Attributes define the structure for the data associated with the MBO instance on the mobile device.

Metadata describes the arguments that are passed to the back-end data source operations, which retrieve the data set for the MBO. Attributes correspond to the class-level properties on the mobile client object. Arguments are known as load parameters for the MBO, and can be optionally mapped to synchronization parameters for the mobile object. Default values are used when no argument values are sent from the device application, or if the argument need not be exposed to the device application. Arguments can also be bound to personalization keys to automatically populate individual user preferences.

Unwired Platform comprises both server-side and client-side components. Server-side components address the interaction between the enterprise information system (EIS) data source and the consolidated database (also referred to as the cache), while client-side components address the interaction between the consolidated database and the mobile device data store. Unwired Server brokers data synchronization and transaction processing between the server and the client.

Attributes define the scope of the device-side data store. Attributes and parameters in an MBO define the server cache. The server cache and device data store are populated by reading data from the EIS, such as a SQL select statement for a database data source.

Attributes also have additional metadata, such as specification of a synchronization parameter option that can be used to provision user-specific data. For example, a sales representative in the Eastern region may be interested only in seeing data for that region. Developers can build the application to map those preferences to MBOs to drive the data filtering specific to the user. The same data obtained from the EIS is then further partitioned and used to serve all users, thereby optimizing requests for data to the EIS and improving performance of the mobile application.

Mobility Patterns

Key data mobility patterns supported by Unwired Platform include data virtualization, publication, subscription, and operation replay.

- Virtualization – normalizes the data and semantics for interacting with different enterprise information systems (EISs), each with its own set of connection interface, data, operation, and type structures.
- Publication – data is synchronized between EIS data stores and the Unwired Server cache, to ensure that the content is consistent between systems.
- Subscription – links the client with a publication and allows the data described by the publication to be transferred to the device.
- Operation replay – supports execution of the client-initiated transactions that result in data changes on the EIS.

Operations

Mobile business objects (MBOs) may incorporate operations that change the data retrieved from the enterprise information system (EIS).

- Create, Update, Delete operations – an operation definition contains parameters that map to the arguments of the EIS operation, and can create, update, or delete data. These operations cause state change.
- Other operation – an operation definition for operations other than create, update, or delete. These operations do not cause state change.

The operation definition supports validation and error handling.

Relationships

Relationships define the data association between two MBOs by linking attributes and parameters in one MBO to attributes and parameters in another MBO.

Relationships help provision related data as one unit, and properly sequence the operations on the related MBOs based on real-time detection of the object instances used. Relationships can be one-to-many, many-to-one, or one-to-one.

From an attribute standpoint, bidirectional relationships are supported; and from an operation execution standpoint, composite relationships are supported.

Cache Groups and Synchronization Groups

Cache groups and synchronization groups are part of the MBO package definition and define how data is preserved in CDB and updated in the mobile application..

A cache group is a collection of mobile business objects (MBOs) that share the same cache policy, which defines how the data in the Unwired Server cache is refreshed and validated for related MBOs. A cache group specifies the data refresh behavior for every mobile business object (MBO) within that group.

During development, MBOs are grouped based on their data refresh requirements.

- **Cache group –** includes a cache policy and the MBOs that share that policy.
- **Cache –** MBO data in the Unwired Server cache (also called the consolidated database, or CDB) can be refreshed according to a cache policy, along with other mechanisms, such as data change notification (DCN).
- **Cache policy –** defines the cache refresh behavior and properties for the MBOs within the cache group based on the policy:
  - **On demand –** the cache expires after a certain period of time such as 10 minutes. The cache is not updated until a request is made of the cache and the cache has expired. If a request is made of the cache and it is expired, there may be a delay responding to the request while the cache is refreshed.
  - **Scheduled –** the cache is refreshed according to a schedule such as 7:00 am, 1:00 pm, or 6:00 pm.
  - **DCN –** the cache never expires. Data refresh is triggered by an enterprise information system (EIS) Data Change Notification.
  - **Online –** only used with mobile workflow applications, data is not cached and a no cache policy is assigned. EIS data is essentially accessed real-time.

A synchronization group is also a collection of MBOs that defines a unit of synchronization so that data and changes are transmitted as a unit to and from the device. Synchronization determines the amount of data (filter), and under what conditions (timing and triggers), mobile business objects (MBOs) upload data to and download data from Unwired Server.

Roles

To secure access to an MBO and its operations, developers can assign logical roles, which, together with the physical role (which exists on the underlying security provider repository), helps Unwired Server perform real-time authorization checks against the user identity before allowing the request to go to the enterprise information system (EIS).

Data Sources

A data source is the enterprise information system (EIS) where data is retrieved from and transactions are executed. A connection profile is a design-time connection to a data source.

Connection profiles are created to specific data sources by providing connection information such as host, port, login, and password among others. The connection profiles are used to define MBOs and operations, and mapped to existing, or used to create new, server connections when the package is deployed to Unwired Server.

Unwired Platform hides the interaction complexity with datasource-specific protocols, such as JDBC™ for database and SOAP for Web services.

Unwired Platform currently supports multiple EIS connection types. See *Supported Third-Party Software and Hardware* for information.

Data Caching

Data caching is initial loading (or filling) the consolidated database (CDB, or Unwired Server cache) with enterprise information system (EIS) data, then continuing to refresh the consolidated database with changes from the EIS or mobile device on an ongoing basis.

Since continual synchronization of the data between the EIS and device puts a load on the EIS, Unwired Platform provides several options for loading and refreshing the data cache.

Options include narrowing the EIS data search so that only specific data is retrieved, identifying effective policies for handling data updates once operations are performed, scheduling periodic updates to occur when system usage is low, updating only changed data in the consolidated database, and so forth.

You can use multiple options to load and refresh the right data at the right time, and to deliver the smallest, most focused payload to the mobile device.

See *System Administration* for data management information.

Data Caching Options

Data caching options include both bulk and on-demand loading schemes. There are many refinements and variations within these high-level schemes.

The primary loading schemes provide a trade-off between time and storage space.

- Bulk loading – data for all users is loaded in bulk.
- Partitioning data loading – only user relevant data, or partition, is loaded.
- On-demand loading – data is not filled, until the client performs synchronization.
- Scheduled loading – data is filled periodically according to a schedule you set.

Each option has its merits, depending on your goals. Bulk loading takes more time because data is loaded for all users, but once loaded, the data can be shared between users.

Partitioning data loading takes less time because only data the user requires is loaded. Partitioning takes more time to set up from a development standpoint, but may result in a smaller, more focused and up-to-date data load.

On demand loading delays the data loading until it is needed, similar to lazy loading, but may result in a slight delay for the user whose synchronization triggers the load.

Scheduled loading gives you control over when filling takes place.

EIS to Server Cache Integration

You can use multiple mechanisms to update the data in the Unwired Server cache.

The cache can be refreshed using the apply results cache policy (cached data corresponding to operation results is updated immediately based on data from the device, without invalidating the cache). Other cache policies include the invalidate cache policy (a restrictive policy that only updates specific cache partitions), and the no cache update policy (an operation has no effect on the consolidated database).

Developer and application administrators can also either define cache updates based on a schedule that can be set using an interval, or more granularly by setting days, dates, and specific times for refresh.

Also, for cases where the cache refresh may be expensive due to volume, you can use the data change notification (DCN) option to propagate changes from the back-end enterprise information system (EIS) to the Unwired Server or HTTP/HTTPS interface for any MBO. If you use DCN, you should not use a scheduled refresh. The DCN mechanism can also used to initiate a server-initiated workflow.

The DCN payload containing changed data is applied to the cache and the change gets published to subscribing device users based on a change detection interval time. This option is the least intrusive and most optimal for addressing high-load environments and optimizing the load on the EIS data sources to keep the Unwired Server cache consistent.

Other Key Concepts

Other key concepts for understanding mobility include object queries, synchronization parameters, result set filters, result checkers, and personalization keys.

- Object queries – a SQL statement associated with a mobile business object (MBO) that runs on the client against data that was previously downloaded to the device. The object query returns a filtered result set (such as a single row of a table). Object queries enable discrete data handling.
- Synchronization parameters – metadata that defines how the values provided by the device application client are used to filter data, which is downloaded to the device, to provide data of interest to the user. Synchronization parameters may be used to filter the cached data, or mapped to load parameters to filter the data that is cached for the MBO and then served to the client application.
- Result-set filters – a Java API used to customize the data returned by an enterprise information system (EIS) operation. Developers can use result-set filters to alter or manipulate returned data and its structure before it is placed in the server's cache.
- Result checkers – a Java API that implements operation execution checks, and error handling logic for the MBO operation. Developers can use result set checkers to

implement customized error checking for MBOs, since not all MBOs use a standard error reporting technique.

- Personalization keys – metadata that enables users to store their search preferences on the client, the server, or by session. The preferences narrow the focus of data retrieved by the mobile device (also known as the filtering of data between client and Unwired Server).

  Often personalization keys are used to hold backend system credentials, so that they can be propagated to the EIS. To use a personalization key for filtering, it must be mapped to a synchronization parameter.

  The developer can also define personalization keys for the application, and can use built-in personalization keys available in Unwired Server. Two key built-in personalization keys —username and password—can be used to perform single sign-on from the device application to the Unwired Server, authentication and authorization on Unwired Server, as well as connecting to the back-end EIS using the same set of credentials. The password is never saved on the server.

Object Code Generation

To access and integrate MBOs in a device application, developers generate object code for the target device platform, and then use their IDE of choice to build the native device application. The object code generation step is the bridge from the Unwired Server server-side development (MBOs) to client-side development (device applications).

The generated object code for each MBO follows a standard pattern of properties for attributes, operations, and abstractions. Object code generation is supported in the native language for each target platform. Unwired Server client libraries complement and are required for the generated object code, which together are used in the device application.

Code generation is supported for these platforms: BlackBerry (Java), iOS (Objective-C), Windows Mobile (C#), and Windows (C#). See *Sybase Unwired Platform Installation Guide* for supported versions.

Deployment

The last step of mobile business object (MBO) development is to deploy the MBO definitions to Unwired Server as a deployment unit generated from a design-time deployment package using Sybase Unwired WorkSpace.

When you deploy MBOs to the Unwired Server, you are deploying:

- MBO definitions including attributes, operations, connections, role mappings, schedule groups, cache groups as defined in the package.
- MBO custom code related to object filters, result-set filters, and result checkers.
- Appropriate generated server-side artifacts that support the interaction with the EIS back-ends and device application.
- Other functionality captured in the MBO model.

MBOs are deployed using a deployment wizard through which you can make the choices that are appropriate for application requirements. Developers use Unwired WorkSpace to deploy a package.

The production administrator can deploy from a wizard using the web-based management console, or from the command line. Deployment-time tasks include choosing:

- Target domain – logical container for packages.
- Security configuration – used for authentication and authorization of users accessing the package.
- Role-mappings – to map logical roles to the physical roles of the back-end repository.
- Server connections mapping – to bind MBOs design-time data sources to production data sources.

Device Applications

The building blocks of the device application include the user interface (UI) layer, business logic layer, Unwired Server client object APIs for retrieving data and executing operations, frameworks for passing data and handling events, and device platform and third-party component APIs.

Unwired Platform offers these options for developing device applications:

- Object code generation – enables you to generate object code for a device platform, then use the code in the native IDE—such as JDE for BlackBerry, and Visual Studio for Windows Mobile—to build an application. This option is suitable for developers with advanced knowledge of the target device platform development.
- Mobile Workflow Forms Editor – enables you to create a simple business workflow type of application.

Device Application Types

Sybase Unwired Platform supports two choices for application type: native application and Hybrid Web Container-based mobile workflow.

Native Application

The native application model enables the developer to write custom code (C#, Java, or Objective-C, depending on the platform) to create a device application. In native application development, the application is based on compiled code that is specific to a particular mobile operating system. Native application development provides the most flexibility in terms of leveraging the device services, but each application must be provisioned individually after being compiled, even for minor changes or updates. Native applications support offline capabilities, leveraging synchronization.

Hybrid Web container-based mobile workflow

The Hybrid Web Container offers a fast and simple way to build applications that support business processes, such as approvals and requests. With the Hybrid Web Container-based development, the server-side of the application is metadata-driven and the client-side of the application is a fully generated Web application package. This mobile workflow package of platform-independent HTML, JavaScript and CSS resources can be deployed automatically to the Container, a native application on the device, without writing any code. The Hybrid Web Container hosts an embedded browser and launches the individual mobile workflow applications. The workflows are assigned to users by administrators. Once assigned, those workflows can be initiated by the user (client-initiated) or automatically triggered as a result of a back-end event that is sent to the Unwired Server as a data change notification request (server-initiated).

Application Components

The device application components you select depend on the functionality you require in your application.

Data Access

Data access refers to both enterprise information system (EIS) data, and any local device data storage.

EIS data access requirements are fulfilled by mobile business object (MBO) definitions. This data access method is typically used in all applications.

You can also use local data access and store, which does not originate in the EIS and does not get propagated to any EIS, but is defined and captured as a local (or client-only) MBO. Local MBO objects provide object-based access and storage of application data in a device's local database. Local MBOs typically are not used to store business critical data because code to migrate the data must be written into the device application source code whenever the device application is upgraded or a new version is introduced.

Transactions

Transactions are the operations executed from the device application, and the processing logic for the operation. This is typically used in most applications.

The client object API provides access to the operation execution log, which provides support for viewing pending operations, setting unfinished activity as pending operations, reviewing operation execution status, and revisiting previously failed transactions.

Notifications

Unwired Server uses notifications to inform clients that subscribe to data whenever a change to the data is detected, or to send the data to the client database without application or user intervention.

Notification mechanisms, vary depending on the synchronization method. You can optimize notifications by fine-tuning the properties of the synchronization group and subscriptions properties.

User Interface

The user interface (UI) refers to the application screens that users use to view data and submit operations to the Unwired Server.

The user interface includes screens for viewing business data, submitting data changes or transactions, pending activities (operations), operation logs (submitted transactions), synchronization screens (to update data on-demand), and implementation logic to show or hide certain application functionality based on the user or data.

User-interface design includes choosing visualization controls, screen layout and flow design, methods of data validation, event processing and business logic, and interaction with third-party controls and APIs.

Client Object APIs

The Unwired Server client object APIs form the core building block of device applications and provide the common set of APIs for consistency across platforms, thus following the "design once and deploy anywhere" paradigm of building applications.

Client object API categories include:

- Mobile business object (MBO) object APIs – are available with each MBO and support access to MBOs attributes, operation execution, retrieving data, state information, and so forth. The APIs offer abstraction for accessing data from the EIS, sending operation executions to the EIS, updating and deleting data, and accessing persistent store in the object-oriented paradigm, among other things.
- Unwired client runtime APIs – offer consistent access to functionality across all device platforms. The APIs provide abstraction for the complex technical details of reliable communication between the device and Unwired Server. This includes a variety of network conditions for optimal transmission of data and state information, connection APIs to the back-end infrastructure, secure access to the Unwired Server data, publishing of data notifications and processing of such notifications, data protection, and access to UI management APIs and custom UI controls, such as signature control, among other things.

Synchronization Methods

Developers can use either replication-based or message-based synchronization to move data and transactions between device application clients and Unwired Server.

The choice depends on the target device platform, application requirements, target platform, and the nature of data changes and activity between Unwired Server and clients.

Unwired Server manages and maintains data freshness between multiple data sources and device application clients through synchronization.

Replication-Based Synchronization

The replication-based synchronization model uses relational database replication, and is session-based to reduce the overhead required to maintain a continual connection. During the session, the clients submit pending operations and obtain the latest changes.

The Unwired Server can send out-of-bound device notifications to the subscribing clients; that client can then initiate a request to get the changed data.

Typically, replication-based synchronization is used in an occasionally connected or occasionally disconnected environment. Replication-based synchronization works well in situations where a large amount of data is stored on the device, continuous access to that data is required, and the data changes in bursts that require periodic synchronization between the client and server. This paradigm is supported on Windows, Windows Mobile, and BlackBerry device platforms.

Message-Based Synchronization

The message-based synchronization model is inherently asynchronous. The interaction, however, can either be synchronous, or asynchronous for messaging-based synchronization. During transmission, the client and server submit pending operations and obtain the latest changes.

Inherently asynchronous, data changes from the server to client are automatically sent and applied to client’s local data store, and, similarly, operation executions from the client to server are sent in the background without requiring explicit action from device application. The developer can choose to keep transactions from being uploaded to the server by manipulating state of the submission (as pending).

Message-based services support a mobile application class that consumes message events for data and notifications or actions, and generates events to propagate changes in an always-on network availability scenario.

Message-based synchronization works well in situations that require functionality to send updates to the client intermittently with small data payload. As with replication-based synchronization, message-based synchronization can also store large amounts of data on the device, and data exchange may be more transient, mobile workflow-related, and occurs continuously throughout the life cycle of the application. This paradigm is supported on the iOS device platform.

Security

End-to-end security is an important feature of the Unwired Platform solution architecture. Security comprises multiple layers, including system security to control access to data and transactions, transport security for over-the-air and network level data protection, local data security for protecting enterprise data on the device, and device security to protect devices in case of loss or theft.

System Security

System security is built using a component-based extensible model of common security infrastructure that allows for pluggable mechanism to integrate Unwired Server with security providers including the most common LDAP providers— Active Directory, Windows OS, and others—for authentication and authorization.

In addition, the common security infrastructure supports advanced scenarios such as authentication of back-end system interactions, and auditing of security events. Out of the box, Sybase Unwired Platform offers file-based auditing support. If a provider is not supported out of the box, a developer can write a custom provider adapter to plug in to the Unwired Server security layer.

Authentication

Unwired Server authenticates users accessing packages using the security provider of the mapped security configuration.

Role-Based Access Control

Access to mobile business objects (MBOs) and operations that are mapped to logical roles is authorized by delegating authorization checks to mapped security provider for the package. The given user's principal is checked for its membership in the corresponding physical role that is mapped to the logical role assigned to the MBO or operation.

Client Credential Propagation

Access to an enterprise information system (EIS) can be granted either by using a fixed set of credentials for all users, or by passing in the client user credentials.

The former is achieved by creating an Unwired Server connection, which has a fixed user and password for server connections. At deployment, the administrator maps mobile business objects (MBOs) and operations to the server connection.

Unwired Server also supports propagating the client user name and password to establish connection to the back-end using a built-in personalization key for the user name and password.

Transport Security

End-to-end data encryption support is based on Transport Layer Security (TLS) and Secure Sockets Layer (SSL), which secures client/server communication using digital certificates and public-key cryptography.

Unwired Server synchronization protocols are supported over HTTPS (replication-based synchronization) and HTTP with proprietary encryption protocol (messaging-based synchronization).

The communication between the device client and Unwired Server can be set up through Apache or Microsoft IIS server secure ports using relay server plug-ins, which in turn communicate with Unwired Server. The connection between Unwired Server and the relay server is set up between your intranet to a DMZ server (IIS port) and thus does not require opening any internal firewall ports.

Application Security

Application security is based mainly on the mapping of a mobile business object (MBO) package to a security configuration.

A security configuration defines the authentication, authorization, attribution, and auditing security provider for an application package's access control and activities. For example, for an application, an administrator may create a security configuration that points to the LDAP server for authentication and authorization, and does not associate any provider for attribution and auditing.

Single sign-on (SSO) security providers provide an alternative to user name and password authentication. These security providers add support for token and certificate-based authentication, such as X.509 certificates. SSO enables mobile device application users to enter credentials only once to gain access to all resources, including servers, packages, and data sources related to that application.

Device Security

Unwired Platform supports Afaria device management and security functionality, which includes features such as remote device locking, remote data cleanup, data fading (a feature that enables the IT administrator to lock, wipe, or reset a device that has not communicated with the corporate network or Afaria server after a predetermined number of days), and password expiration management. Even without Afaria, the Unwired Server administrator can lock or unlock devices from accessing applications deployed to the server.

Device Data Security

Optionally you can encrypt device data so that data at rest is always encrypted and available only after users have been successfully authenticated. The Client Object API is available to encrypt the device database and to protect the encryption key. The key can be secured in a secure store and only accessible using the device PIN.

Application Deployment

During development the developer tests the device application by deploying mobile business object (MBO) packages to Unwired Server, and device application binaries and their dependencies to emulators or actual devices. Deployment to devices can be achieved by physically connecting the device to the developer's machine, and copying binaries using device-supported tools. Applications should also be tested in a test environment that emulates the production environment for complete end-to-end testing.

In a production environment, device application deployment can be achieved by using Afaria or similar third-party product. Afaria offers enterprise-class device application deployment and management features.

Device Testing

Device applications are typically tested by developers in an emulator environment. All target platforms provide emulator support from their native IDE, which enables deployment and execution of the application to the emulator.

Large-Scale Device Deployment

Some device platforms require signing the binaries before they can be deployed. For production scale deployment, application deployment is done using proven products such as Afaria.

Device Registration

Application users and their devices are registered in Unwired Server for licensing and monitoring.

Replication-based application user devices are automatically registered after the initial successful authentication with a security configuration.

Messaging-based application user devices must be registered manually. Use predefined templates to register messaging devices. Optionally, you can use Afaria to automate device registration.

System Management

The Unwired Platform management console offers integrated, Web-based access to all Unwired Servers running in the corporate network.

This enables you to view server status; perform start, stop, restart operations; configure server settings; deploy packages; configure package settings (including cache group schedule, and synchronization settings); subscriptions management (including unsubscribe, recover, suspend, and resume); push notification settings; perform role mapping; cluster management tasks; and device lifecycle and licensing tasks (including registration, unregistration, locking, unlocking, among others).

In addition, the Web console is designed for multi-tenancy in mind to support two views:

- Platform administrator view – for the administrator managing the whole environment.
- Domain administrator view – for the customers of the Unwired Server hosting provider where they can perform package management, subscription management, log viewing, role mapping and server connections management operations in one or more domains assigned to them. The domain forms the logical container and unit of separation of the artifacts contained in it. The Unwired Server administrator manages the lifecycle of the domains including users who have access to it.

Extending the operational and multi-tenancy capabilities of the platform is the monitoring component of the management console where the platform administrator can view synchronization activities, user access activities, key performance indicators for various activities in the server, cache performance, and other data being gathered. The administrator can set the monitoring configuration to enable/disable monitoring on selected domains and packages, and also perform monitoring data cleanup and export it to share with others for reporting and auditing purposes.

CHAPTER 5 Sybase Unwired Platform System Life Cycle

The "system life cycle" takes administrators through the process of planning and installing Unwired Platform, and integrating it with your enterprise environment; determining software deployment requirements; and setting up the Unwired Platform production environment. Understanding the system lifecycle helps establish best practices for managing and monitoring Sybase Unwired Platform.

The *System Administration* guide has detailed information about these activities.

In addition to learning about the system lifecycle, administrators should also understand the development life cycle. The knowledge about the interaction between the two lifecycles helps establish best practices for managing and monitoring Sybase Unwired Platform.

Planning

The planning phase includes analyzing system requirements, and creating a high-level design for your system topology and production systems.

See also

- *Installing* on page 30
- *Deploying Software on the Network* on page 30
- *Ongoing Operations* on page 31
- *Upgrades and Patches* on page 31

Requirements Analysis

Analyze your requirements before designing your Sybase Unwired Platform system.

Considerations include identifying data sources, security and access policies, data concurrency, scalability and availability, number of current and projected users, device platforms, device connectivity, provisioning, and service-level agreements.

System Topology Design

Analyze requirements to plan the system topology required to support security, failover, high availability, system load, load balancing, and database access.

Requirements information helps identify the number and specifications for machines. Sizing the system and system load enables you to determine requirements for the number of Unwired

Server nodes or farms, Relay Server nodes or farms, data-tier nodes, and Afaria nodes integration.

Include a test environment in your design that emulates the production environment as closely as possible, including components such as SCC, Afaria if used, Relay Servers, clusters, network communications and protocols, security. This enables you to test data flow for MBOs and applications through the system, and communication between EIS, Unwired Server, and devices.

See *Sybase Unwired Platform System Administration* for additional information and examples of topology and deployment design.

Production Design

As part of system planning, you must also consider how to manage the production system. Some of these considerations may influence your initial ideas about system design and topology.

Considerations include device provisioning, how to manage users and devices, the manual or automated processes that are required, how to implement layers of security, and how to monitor and ensure system health.

See *Sybase Unwired Platform System Administration*.

Installing

The installation phase of the system life cycle includes installing and configuring both Sybase Unwired Platform and the system topology.

See *System Administration* and the *Installation Guide*.

See also

- *Planning* on page 29
- *Deploying Software on the Network* on page 30
- *Ongoing Operations* on page 31
- *Upgrades and Patches* on page 31

Deploying Software on the Network

Deploying new or updated software—including new or updated mobile applications and mobile workflow packages, and software upgrades and patches—is an ongoing part of the system lifecycle.

See *System Administration*.

See also

- *Planning* on page 29
- *Installing* on page 30
- *Ongoing Operations* on page 31
- *Upgrades and Patches* on page 31

Ongoing Operations

An ongoing part of the system lifecycle is to develop operations, administration, and maintenance (OAM) processes that keeps Sybase Unwired Platform running smoothly.

- System monitoring – develop processes to monitor Sybase Unwired Platform using the Sybase Control Center, error messages, log files, and server up and down states; third-party tools; and operating system commands.
- Device provisioning – develop processes for handling existing and new users, device changes, and mobile application or mobile workflow package upgrades.
- Data subscriptions – create subscriptions, synchronization groups (messaging and replication), and device notifications (replication) to customize how updated data in the cache is delivered to the device user.
- Disaster recovery plan – develop troubleshooting processes, and solutions for routine problems. Develop a full disaster recovery plan for more serious situations.
- Backup schedule – develop a comprehensive plan for backing up the system and databases, and restoring them in case of disaster.
- Publications – develop publication subscriptions.

See *System Administration* and *Troubleshooting*.

See also

- *Planning* on page 29
- *Installing* on page 30
- *Deploying Software on the Network* on page 30
- *Upgrades and Patches* on page 31

Upgrades and Patches

Ongoing maintenance of Sybase Unwired Platform includes upgrading the software, and applying patches.

Unwired Platform is continuously under development, with new features being added and existing features being improved. Sybase recommends that you routinely apply upgrades and keep current with the latest software version.

Periodically, Sybase issues software patches to fix problems or improve performance. These patches are posted on the Sybase download Web site.

See also

- *Planning* on page 29
- *Installing* on page 30
- *Deploying Software on the Network* on page 30
- *Ongoing Operations* on page 31

CHAPTER 6 Sybase Unwired Platform Development Life Cycle

The "development life cycle" takes developers through the process of designing, developing, testing, deploying and maintaining mobile business objects, device applications, and workflow packages. Understanding the development lifecycle helps establish best practices for deploying updated MBOs and device applications.

In addition to learning about the development lifecycle, developers should also understand the system life cycle. The knowledge about the interaction between the two lifecycles helps establish best practices for developing MBOs, device applications, and workflow packages and deploying them within Sybase Unwired Platform.

Designing

Design mobile business objects, the client user interface, and notification processing.

See also

- *Developing* on page 36
- *Testing* on page 38
- *Deploying* on page 39
- *Maintaining* on page 41

Design Requirements

Use your requirements analysis to design applications to meet your business goals.

See *Sybase Unwired WorkSpace – Mobile Business Object Development*, *Sybase Unwired WorkSpace – Mobile Workflow Package Development* and the *Developer Guide* for your target mobile platform for information to help with the design. See *Sybase Unwired Platform System Administration* for information about data management and the role of Unwired Server.

Application Type

Sybase Unwired Platform enables you to develop two basic types of applications: native applications and container-based mobile workflow packages.

If the goal of your application is to maintain the relational state between the device and the enterprise data source, and the device is occasionally connected, develop a native application using replication-based synchronization.

If the goal of your application is to keep data current between the device and Unwired Server, operations and updates can be handled as asynchronous messages, and the device is occasionally disconnected, develop a mobile workflow package, or develop a native application using message-based synchronization.

Mobile Data Requirements

Mobile data requirements include identifying the data needed and when, how current it needs to be, and which of your users can access it.

These requirements help drive update, synchronization, and access decisions. For example, if data rarely changes, synchronization is required only occasionally; if data is very volatile, a comprehensive strategy is required to ensure data is kept current on the device.

If system processing load is a concern, reduce the frequency that data is updated or accessed in the consolidated database (cache), or filter out unneeded data using system features such as SQL data queries. For data that are only used on the device to persist data across application launches, local caching or temporary usage, a local MBO can be defined.

Application Transaction Requirements

Application transaction refers to how data modifications are made on the device, and how they are propagated from the device to the data source.

These requirements determine the construction of the application. For example, you may need an application with create, read, update, and delete operations, or you may need only a subset of operations.

Device Platform Support Requirements

Device platform support requirements include identifying the device platforms on which the mobile application will run, and what common or native features can be implemented for each platform.

Device platforms may dictate the type of applications you can develop. Some features may not be available in all platforms, or may be implemented differently. The device platforms may influence the tools you use to create device applications.

Not all devices are supported for each synchronization type.

Device	Replication-based synchronization	Message-based synchronization
BlackBerry	Supported	Not supported
Windows Mobile	Supported	Not supported
Windows	Supported	Not supported
iPhone	Not supported	Supported

Data Source Requirements

Identify which enterprise information system (EIS) data source needed.

Consider the synchronization method, how to reduce load on both the EIS and Unwired Platform, and how to trap error messages from the EIS. You may need to write custom code to access legacy systems, filter out unwanted data, identify specific data needed for a mobile business object, and report EIS errors. The propagation of changes and events from the back-end to the consolidated database needs to be considered for applications using the synchronization approach (native applications) and workflow applications to trigger specific workflows.

Development Tool Requirements

Identify the development tools to use to create your mobile applications, including Sybase Unwired WorkSpace and custom coding options.

Mobile Business Object Design

Design the mobile business objects (MBOs) to connect to a data source, and to implement business logic.

A major consideration for designing MBOs is how to get data out of the enterprise information system (EIS) that is specific enough for the mobile device application or workflow package. Strategies include:

- Loading schemes to populate MBOs.
- Cache update policies to keep the MBO current.
- SQL-based object queries to filter out unneeded data.
- Application-side personalization keys to narrow the search.
- Object queries to access the local device database, as well as the back-end system, when Unwired Server is not available on demand.

More advanced strategies may implement the result-set filter and result checker APIs and coding to fine-tune processing.

Also consider how to perform back-end EIS operations (such as creating, editing, and deleting data), process transactions between the EIS and the mobile device, keep data up-to-date without putting undue load on system processing, and establish relationships between MBOs. You may also need to consider role mapping, logical roles, and security access in your design.

Sybase Unwired WorkSpace provides the development tools for creating MBOs that can meet these needs.

See *Sybase Unwired WorkSpace – Mobile Business Object Development* for information about developing and working with MBOs.

See *Developer Guide for Unwired Server* for API information.

User Interface Design

Design user interfaces for viewing and interacting with data and operations on the mobile device.

Consider what data and how much to present on the device (within memory limitations and other device constraints), and how to create data subsets for limited resources on the device. Remember that each device platform has different controls and physical forms that determine presentation and how the user interacts with the data.

Use storyboards to plan the screen flow and decision points. Create "mockup" screen designs that specify placement of controls, logic, and validation logic. Determine what changes may be needed to adapt the design for specific device types. Identify any customization that may be needed.

See *Sybase Unwired WorkSpace – Mobile Workflow Package Development* for information about tools for developing a Workflow user interface.

See the *Developer Guide* for the target device platform for information about developing a device application user interface.

Data Consistency Design

Keep data consistent between the data source and the device.

Consider whether to refresh data on devices on a scheduled basis or on request, and the impact of the decision on system load. Strategies include:

- Cache design – design the consolidated database (cache) to refresh client application data on-demand.
- Synchronization groups – identify the mobile business objects (MBO) that are to synchronized as a group.
- Cache groups – specifies data refresh behavior for every MBO in the group.
- Data change notifications (DCNs) – define how often to update data in the cache after data changes in the source.

See *Sybase Unwired Platform – Mobile Business Object Development* for information mobile business object mobility properties (such as synchronization, load parameters, cache groups, cache update policies, object queries, and result-set filters). See *Sybase Unwired Platform System Administration* for information about data management concepts.

Developing

Develop mobile business objects and the device client user interface.

See also

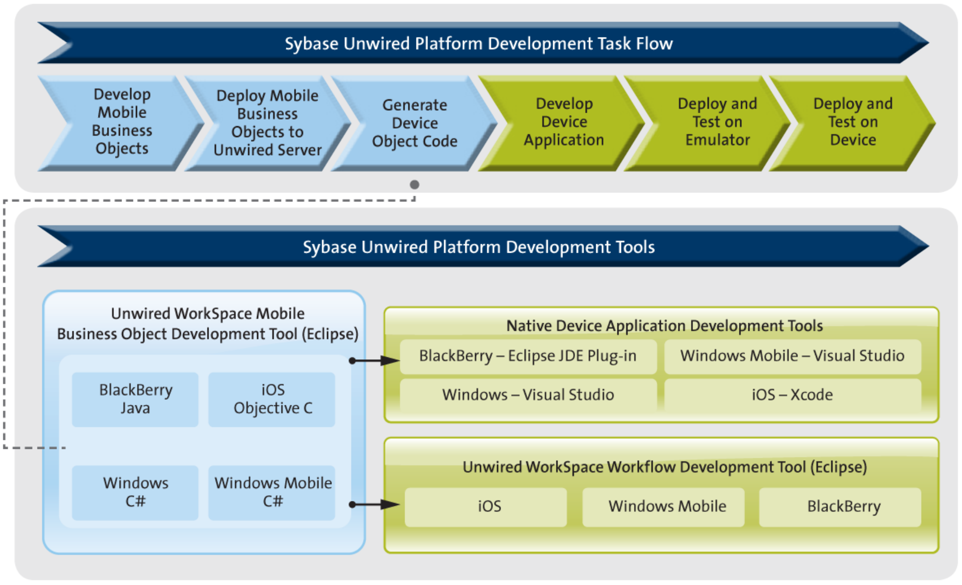
- *Designing* on page 33
- *Testing* on page 38
- *Deploying* on page 39
- *Maintaining* on page 41

Development Task Flow

Describes the high-level steps to create device applications.

1. Develop a project and mobile business objects.
2. Deploy mobile business objects to Unwired Server.
3. Generate device object code.
4. Develop the device application.
5. Test the device application on an emulator or a physical device.
6. Test the device or mobile workflow application in a test environment for end-to-end processing flow.

Figure 1: Device application development life cycle and tools


Sybase Unwired Platform Development Task Flow
Develop Mobile Business Objects
Deploy Mobile Business Objects to Unwired Server
Generate Device Object Code
Develop Device Application
Deploy and Test on Emulator
Deploy and Test on Device
Sybase Unwired Platform Development Tools
Unwired WorkSpace Mobile Business Object Development Tool (Eclipse)
BlackBerry Java
iOS Objective C
Windows C#
Windows Mobile C#
Native Device Application Development Tools
BlackBerry – Eclipse JDE Plug-in
Windows Mobile – Visual Studio
Windows – Visual Studio
iOS – Xcode
Unwired WorkSpace Workflow Development Tool (Eclipse)
iOS
Windows Mobile
BlackBerry

Mobile Business Object Development

Develop mobile business objects using Sybase Unwired WorkSpace.

Create a project, and then define one or more mobile business objects (MBOs), using the Sybase Unwired WorkSpace wizards, tools, and utilities. Creating MBOs includes connecting to a data source, setting parameters for interacting with the data, mapping data attributes, creating operations, assigning roles, and defining relationships between MBOs.

You can use replication-based synchronization or message-based synchronization for MBOs. The synchronization mode is fixed at package deployment time. A special case MBO can be used on the device to interact with a device client database. Multiple developers can collaborate on a project and do MBO development.

Once the MBOs are developed, deploy the deployment package to Unwired Server. This makes the objects ready and Unwired Server capable of servicing requests from the device application.

See *Sybase Unwired WorkSpace - Mobile Business Object Development* for information about developing and working with MBOs.

Device Application Development

Developers can use the tool best suited to develop device applications.

For the most creativity and control, you can use Sybase Unwired WorkSpace wizards to generate mobile business object code for one or more device platforms (such as BlackBerry, Windows, Windows Mobile, and iOS). Then use the generated code as a base in a native integrated development environment (IDE), such as JDE, Eclipse JDE, Mac Xcode, and Microsoft Visual Studio, to create a customized device application. You can then use client object APIs to extend and fine-tune functionality.

For mobile workflows, you can use the Mobile Workflow Forms Editor to develop mobile workflow forms without device-side coding.

See the *Developer Guides* for information about using the client object APIs on specific platforms to develop device applications. See *Sybase Unwired WorkSpace – Mobile Workflow Package Development* for information about developing mobile workflows using the Mobile Workflow Forms Editor.

See *Sybase Unwired Platform Installation Guide* for supported versions.

Testing

Two types of testing are required before deploying device applications and workflow packages to the production system. Test each device application and workflow package on a simulator or emulator, and make adjustments. Then, test in a test environment that emulates the production environment for complete end-to-end testing.

Download emulators for devices such as Windows Mobile, and use them from the Sybase Unwired WorkSpace development environment. Alternatively, you can use Active Sync to connect the device to your development computer, and deploy and test the application on the device.

Download simulators for devices such as BlackBerry and iOS:

- For BlackBerry, device simulators and the BlackBerry Email and MDS Services Simulator Package are available.
- For iOS, download the iOS simulator environment.

After testing is complete on simulators or emulators, work with administrators to complete end-to-end testing in an environment that emulates the production environment.

See also

- *Designing* on page 33
- *Developing* on page 36
- *Deploying* on page 39
- *Maintaining* on page 41

Deploying

Deploy mobile business objects, projects, device applications, and device clients to make them available to the system administrator to provision and manage in the production environment.

See also

- *Designing* on page 33
- *Developing* on page 36
- *Testing* on page 38
- *Maintaining* on page 41

Application Deployment

Developers deploy mobile business object definitions to Unwired Server as a deployment package.

The system administrator configures and deploys the packages to a domain, and deploys application binaries to mobile devices. The system administrator manages packages depending on their type:

- Replication-based synchronization MBO packages – use an application layer service that synchronously pulls data changes from Unwired Server. Package data is stored on the device, and can be synchronized through a server-initiated push notification transmitted at defined intervals, or based upon the occurrence of a synchronization event. Data updates occur in bursts because of periodic synchronization between the client and server.

  The administrator configures cache groups, synchronization groups, and subscription templates to preset settings for push notifications. On a routine basis, the administrator checks the cache status, client log, and error history for the MBO and operations, among other things.

- Message-based synchronization MBO packages – create a device service that uses a dedicated channel that is always open to asynchronously push data changes, requests, and notifications between client and server.

  The administrator configures cache groups and synchronization groups, registers devices for application users, and configures templates or individual device settings, among other things. On a routine basis, the administrator manages subscriptions, and checks the cache status, client log, and error history for the MBO and operations, among other things.
- Mobile workflow packages – create a mobile workflow with the Mobile Workflow Forms Editor. This tool allows the developer to design mobile workflow screens that implement create, update, and delete operations, and object queries, for a mobile business object.

  The administrator configures cache group, synchronization group, and registers devices for application users, and configures templates or individual device settings, among other things. In addition, the administrator deploys mobile workflow packages and configures their parameters (such as context variables and matching rules) and assigns the workflow to users' devices. On a routine basis, the administrator checks the queue status and error history for the MBO package and workflow package.

See *Sybase Unwired Workspace – Mobile Business Object Development* for information about deploying packages; see *System Administration* for information about package administration.

Device Client Runtime Component Deployment

Some devices require a client runtime component to be deployed in addition to the device client application.

One or more of the following device runtime components would need to be deployed, depending on the choice of deployment method and the type of the application:

- Afaria clients for Windows, Windows Mobile, and BlackBerry devices.
- Device runtime for replication-based applications (if using notifications), or messaging-based synchronization binaries for Windows, Windows Mobile, and BlackBerry devices.
- Client container for workflow packages.

No separate client runtime component is required for iOS devices. The deployed application includes the necessary runtime.

Device Client Application Deployment

A device client application refers to an application running on a remote device. The device client application can be deployed using Afaria or any third-party product. The client application then accesses enterprise resources remotely.

Device Provisioning and Management

Provisioning devices enables the devices to install or update the device application and to interact with the Unwired Platform environment. The provisioning process differs, depending on the device and synchronization type, and is generally managed by the system administrator.

- Device provisioning options include cradles with desktop device managers, Afaria over-the-air (OTA), and iTunes (for iPhone only).
- Devices used exclusively with replication-based synchronization (RBS) mobile business objects are automatically registered when they initially synchronize with Unwired Server.
- Devices used with message-based (MBS) synchronizations mobile business objects or workflow packages require manual device registration and activation to make the device and its associated user part of the Unwired Platform mobility system. This can be done either by the user as part of the registration process, or by the system administrator.

Optionally, you can use Afaria to extend Unwired Platform functionality by providing additional device client management features such as deploying client and runtime infrastructure components over-the-air, tracking assets, and securing devices and data.

Maintaining

Maintaining mobile business objects and device applications is an ongoing activity. Package and application versioning, and upgrading Sybase Unwired Platform and its components is part of the development life cycle.

See also
- *Designing* on page 33
- *Developing* on page 36
- *Testing* on page 38
- *Deploying* on page 39

Package Versioning

Packages deployed to Unwired Server are identified with a unique version.

Multiple versions of the same package can be running simultaneously, which means the consolidated database (or cache) includes multiple copies of the same data until all mobile applications have been switched to a new version. As a caution, there is always a consistency issue between multiple copies of the data.

Message-based synchronization uses subscription information to determine if there are any outstanding mobile applications that still subscribe to a particular version of the package.

Replication-based synchronization has no such information to reliably determine if there are still referencing mobile applications. Sybase suggests that you set up best practices for modifying and deploying new versions of mobile business objects and packages.

Application Versioning

If you have make a change to device application, you must redeploy the application binaries to the device. Such application upgrades need to be carefully planned so that currently pending operations on the device are sent to the backend before the application is upgraded.

Upgrades and Patches

Ongoing maintenance of Sybase Unwired Platform includes upgrading the software, and applying patches.

Unwired Platform is continuously under development, with new features being added and existing features being improved. Sybase recommends that you routinely apply upgrades and keep current with the latest software version.

Periodically, Sybase issues software patches to fix problems or improve performance. These patches are posted on the Sybase download Web site.

See also

- *Planning* on page 29
- *Installing* on page 30
- *Deploying Software on the Network* on page 30
- *Ongoing Operations* on page 31

CHAPTER 7 Documentation Roadmap

Use the documentation roadmap to review the documentation available for Sybase® Unwired Platform and determine where to start based on your role.

Bookmark *Sybase Unwired Platform Product Documentation* to quickly access the complete set of online documentation.

- *Documentation for Developers*

  If you are a developer, identify documentation based on your development focus.
- *Documentation for Administrators*

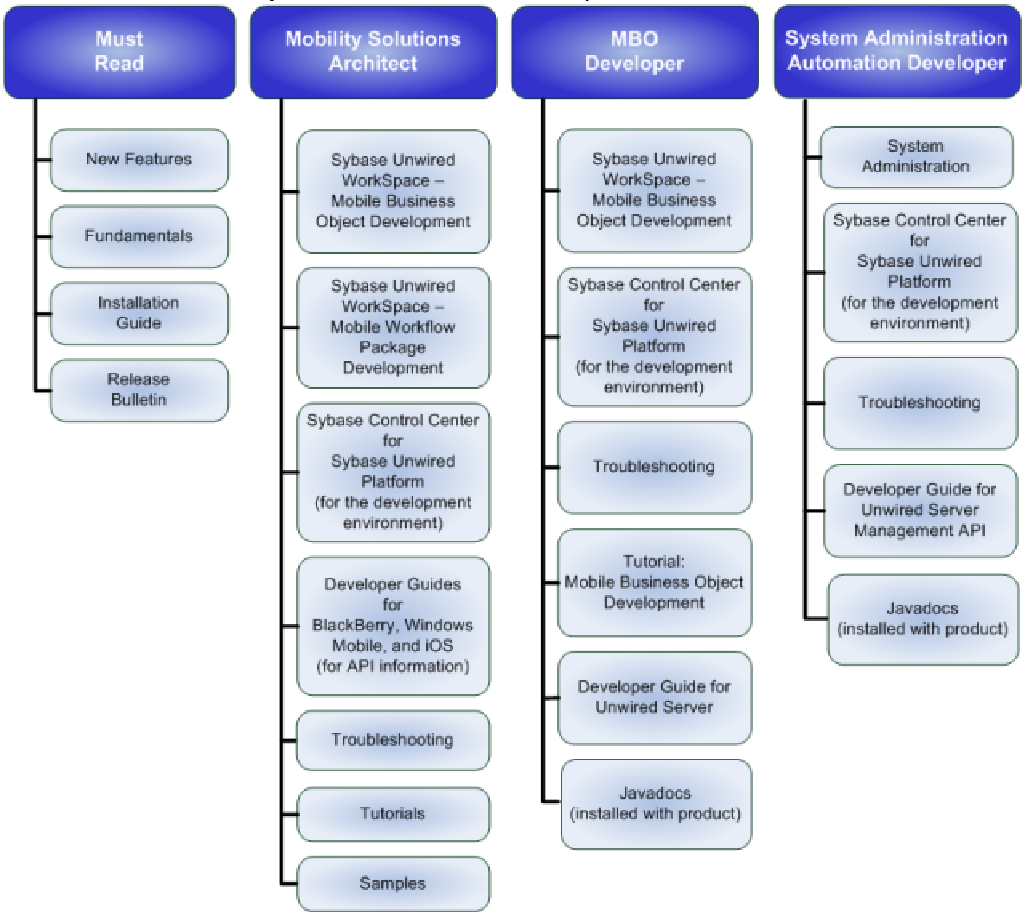
  If you are an administrator, identify documentation based on your administrative focus.
- *Documentation Roadmap for Unwired Platform*

  Learn more about Sybase® Unwired Platform documentation.

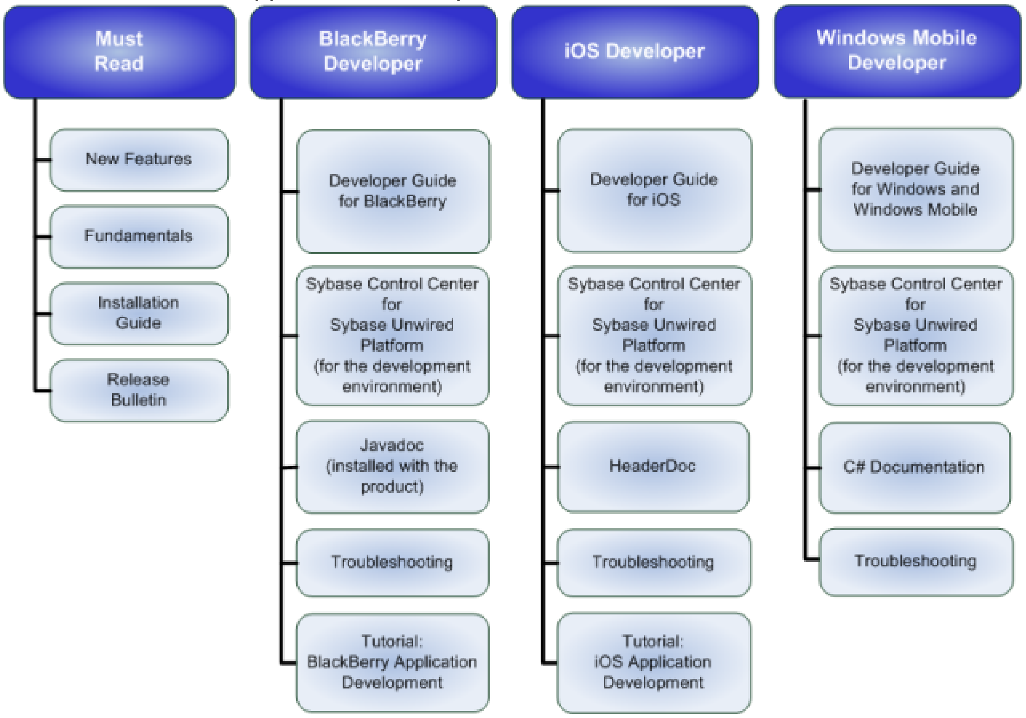
Documentation for Developers

If you are a developer, identify documentation based on your development focus.

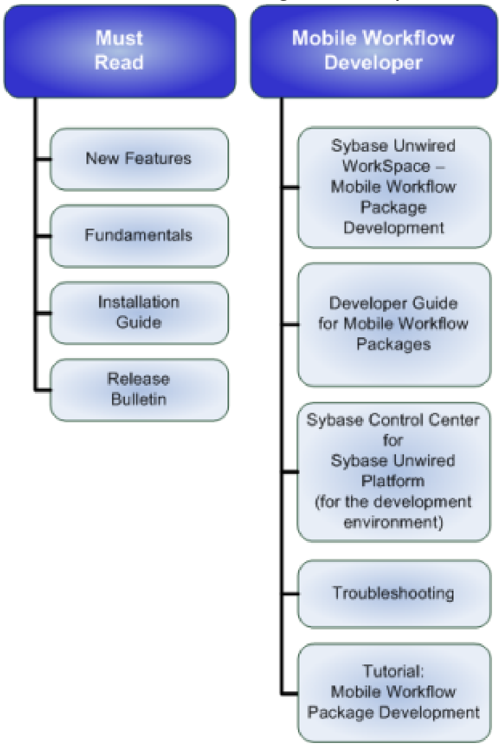
EIS, MBO, and Systems Automation Development


Must Read
New Features
Fundamentals
Installation Guide
Release Bulletin
Mobility Solutions Architect
Sybase Unwired WorkSpace – Mobile Business Object Development
Sybase Unwired WorkSpace – Mobile Workflow Package Development
Sybase Control Center for Sybase Unwired Platform (for the development environment)
Developer Guides for BlackBerry, Windows Mobile, and iOS (for API information)
Troubleshooting
Tutorials
Samples
MBO Developer
Sybase Unwired WorkSpace – Mobile Business Object Development
Sybase Control Center for Sybase Unwired Platform (for the development environment)
Troubleshooting
Tutorial: Mobile Business Object Development
Developer Guide for Unwired Server
Javadocs (installed with product)
System Administration Automation Developer
System Administration
Sybase Control Center for Sybase Unwired Platform (for the development environment)
Troubleshooting
Developer Guide for Unwired Server Management API
Javadocs (installed with product)

Native Mobile Application Development


Must Read
New Features
Fundamentals
Installation Guide
Release Bulletin
BlackBerry Developer
Developer Guide for BlackBerry
Sybase Control Center for Sybase Unwired Platform (for the development environment)
Javadoc (installed with the product)
Troubleshooting
Tutorial: BlackBerry Application Development
iOS Developer
Developer Guide for iOS
Sybase Control Center for Sybase Unwired Platform (for the development environment)
HeaderDoc
Troubleshooting
Tutorial: iOS Application Development
Windows Mobile Developer
Developer Guide for Windows and Windows Mobile
Sybase Control Center for Sybase Unwired Platform (for the development environment)
C# Documentation
Troubleshooting

Mobile Workflow Package Development


Must Read
New Features
Fundamentals
Installation Guide
Release Bulletin
Mobile Workflow Developer
Sybase Unwired WorkSpace – Mobile Workflow Package Development
Developer Guide for Mobile Workflow Packages
Sybase Control Center for Sybase Unwired Platform (for the development environment)
Troubleshooting
Tutorial: Mobile Workflow Package Development

Documentation Roadmap for Development Roles

Review documentation available for your Sybase Unwired Platform developer role.

Role	Description	Guides
Mobility Architect	Uses the Unwired WorkSpace tools to model the interaction between the mobile applications and existing EIS, services, and applications. Understands mobility concepts.	• *Fundamentals* • *Sybase Unwired WorkSpace – Mobile Business Object Development* • *Sybase Unwired WorkSpace – Mobile Workflow Package Development* • *Sybase Control Center for Sybase Unwired Platform* (for the development environment) • *Developer Guides for BlackBerry, Windows Mobile, and iOS (for API information)* • *Developer Guide for Mobile Workflow Packages* • Samples, projects, and tutorials

Role	Description	Guides
MBO Developer	Develops mobile business objects using Unwired WorkSpace, and the Unwired Server API. Generates native application code for BlackBerry, Windows Mobile, and iOS.	Novice users: • *Fundamentals* • *Sybase Unwired WorkSpace – Mobile Business Object Development* • *Sybase Control Center for Sybase Unwired Platform* (for the development environment) • *Troubleshooting* • *Tutorial: Mobile Business Object Development* Advanced users: • *Developer Guide for Unwired Server* • Javadoc (installed with the product)
Mobile Workflow Developer	Develops mobile workflow applications.	• *Fundamentals* • *Sybase Unwired WorkSpace – Mobile Workflow Package Development* • *Sybase Control Center for Sybase Unwired Platform* (for the development environment) • *Developer Guide for Mobile Workflow Packages* • *Troubleshooting* • *Tutorial: Mobile Workflow Package Development*

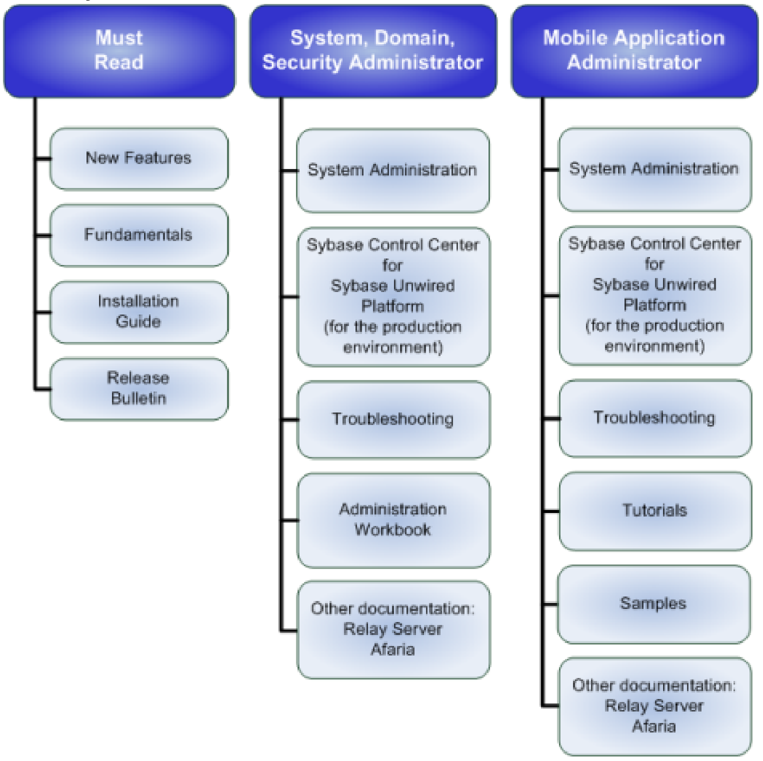
Role	Description	Guides
BlackBerry Mobile Application Developer	Develops mobile applications for BlackBerry.	• *Fundamentals* • *Sybase Control Center for Sybase Unwired Platform* (for the development environment) • *Developer Guide for BlackBerry* • Javadoc (installed with the product) • *Troubleshooting* • *Tutorial: BlackBerry Application Development*
iOS Mobile Application Developer	Develops mobile applications for iOS devices.	• *Fundamentals* • *Sybase Control Center for Sybase Unwired Platform* (for the development environment) • *Developer Guide for iOS* • HeaderDoc • *Troubleshooting* • *Tutorial: iOS Application Development*
Windows Mobile Mobile Application Developer	Develops mobile applications for Windows Mobile devices.	• *Fundamentals* • *Sybase Control Center for Sybase Unwired Platform* (for the development environment) • *Developer Guide for Windows and Windows Mobile* • C# Documentation • *Troubleshooting*

Role	Description	Guides
System Administration Automation Developer	Automates system administration tasks through custom coding using the administration API.	Advanced users: • *System Administration* • *Sybase Control Center for Sybase Unwired Platform* (for the production environment) • *Troubleshooting* • *Developer Guide for Unwired Server Management API* • Javadoc (installed with the product)

Documentation for Administrators

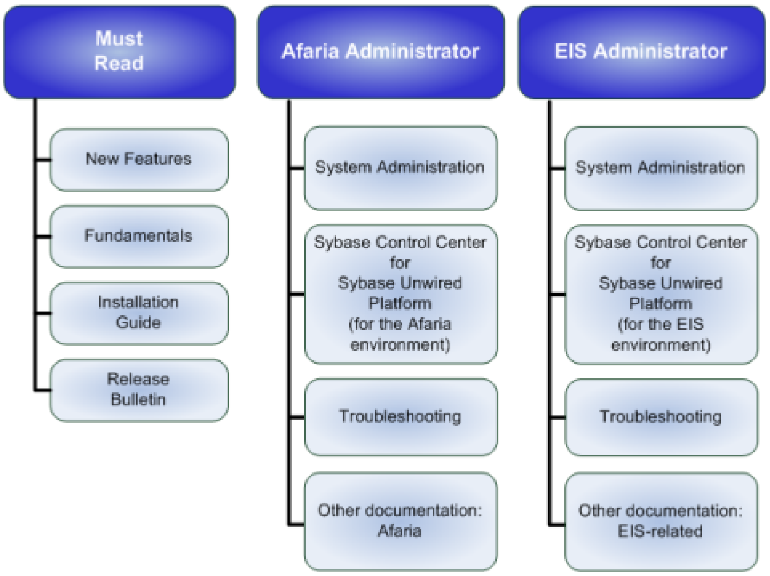
If you are an administrator, identify documentation based on your administrative focus.

Sybase Unwired Platform Administration


Must Read
New Features
Fundamentals
Installation Guide
Release Bulletin
System, Domain, Security Administrator
System Administration
Sybase Control Center for Sybase Unwired Platform (for the production environment)
Troubleshooting
Administration Workbook
Other documentation: Relay Server Afaria
Mobile Application Administrator
System Administration
Sybase Control Center for Sybase Unwired Platform (for the production environment)
Troubleshooting
Tutorials
Samples
Other documentation: Relay Server Afaria

External Systems Administration

Administrators for systems external to Sybase Unwired Platform need to understand aspects of how their systems specialty integrates with Sybase Unwired Platform.


Must Read
New Features
Fundamentals
Installation Guide
Release Bulletin
Afaria Administrator
System Administration
Sybase Control Center for Sybase Unwired Platform (for the Afaria environment)
Troubleshooting
Other documentation: Afaria
EIS Administrator
System Administration
Sybase Control Center for Sybase Unwired Platform (for the EIS environment)
Troubleshooting
Other documentation: EIS-related

Documentation Roadmap for System Administrator Roles

Review documentation available for your Sybase Unwired Platform system administrator role.

Role	Description	Guides
System Administrator Domain Administrator Security Administrator	These responsibilities may be carried out by one or more individuals, depending on the size and complexity of the enterprise: • Plans deployment of production system, and monitors and maintains system health. Understands system configuration. • Plans, creates, configures, and administers one or more hosted domain. Each domain may have multiple tenants. • Plans and implements enterprise level security – access, roles, policies.	• *Fundamentals* • *System Administration* • *Sybase Control Center for Sybase Unwired Platform (for the production environment)* • *Troubleshooting* • *Administration Workbook* • External Relay Server documentation, bundled with System Administration online help

Role	Description	Guides
Mobile Application Administrator	Responsible for operation of the mobile applications running inside the system, and in the field. Understands mobility concepts.	• *Fundamentals* • *System Administration* • *Sybase Control Center for Sybase Unwired Platform (for the production environment)* • *Troubleshooting* • *Samples, projects, and tutorials*
Afaria Administrator	Provisions applications for devices, using Afaria. This role is external to Sybase Unwired Platform (coordination required).	External documentation, tools, and processes
EIS Database Administrator	Manages the EIS database. This role is external to Sybase Unwired Platform (coordination required).	External documentation, tools, and processes

Documentation Roadmap for Unwired Platform

Learn more about Sybase® Unwired Platform documentation.

Table 1. Sybase Unwired Platform Documentation

Document	Description
Sybase Unwired Platform Installation Guide	Describes how to install or upgrade Sybase Unwired Platform. Check the *Sybase Unwired Platform Release Bulletin* for additional information and corrections. Audience: IT installation team, training team, system administrators involved in planning, and any user installing the system. Use: during the planning and installation phase.

Document	Description
Sybase Unwired Platform Release Bulletin	Provides information about known issues, and updates. The document is updated periodically. Audience: IT installation team, training team, system administrators involved in planning, and any user who needs up-to-date information. Use: during the planning and installation phase, and throughout the product life cycle.
New Features	Describes new or updated features. Audience: all users. Use: any time to learn what is available.
Fundamentals	Describes basic mobility concepts and how Sybase Unwired Platform enables you design mobility solutions. Audience: all users. Use: during the planning and installation phase, or any time for reference.
System Administration	Describes how to plan, configure, manage, and monitor Sybase Unwired Platform. Use with the *Sybase Control Center for Sybase Unwired Platform* online documentation. Audience: installation team, test team, system administrators responsible for managing and monitoring Sybase Unwired Platform, and for provisioning device clients. Use: during the installation phase, implementation phase, and for ongoing operation, maintenance, and administration of Sybase Unwired Platform.

Document	Description
Sybase Control Center for Sybase Unwired Platform	Describes how to use the Sybase Control Center administration console to configure, manage and monitor Sybase Unwired Platform. The online documentation is available when you launch the console (**Start > Programs > Sybase > Sybase Control Center**, and select the question mark symbol in the top right quadrant of the screen). Audience: system administrators responsible for managing and monitoring Sybase Unwired Platform, and system administrators responsible for provisioning device clients. Use: for ongoing operation, administration, and maintenance of the system.
Troubleshooting	Provides information for troubleshooting, solving, or reporting problems. Audience: IT staff responsible for keeping Sybase Unwired Platform running, developers, and system administrators. Use: during installation and implementation, development and deployment, and ongoing maintenance.
Tutorials	Tutorials for trying out basic development functionality. Audience: new developers, or any interested user. Use: after installation. • Learn mobile business object (MBO) basics, and create a mobile device application: • *Tutorial: Mobile Business Object Development* • Create native mobile device applications: • *Tutorial: BlackBerry Application Development* • *Tutorial: iOS Application Development* • Create a mobile workflow package: • *Tutorial: Mobile Workflow Package Development*
Sybase Unwired WorkSpace – Mobile Business Object Development	Online help for developing MBOs. Audience: new and experienced developers. Use: after system installation.

Document	Description
Sybase Unwired WorkSpace – Mobile Workflow Package Development	Online help for developing mobile workflow applications. Audience: new and experienced developers. Use: after system installation.
Developer guides for device application customization	Information for client-side custom coding using the Client Object API. Audience: experienced developers. Use: to custom code client-side applications. • *Developer Guide for BlackBerry* • *Developer Guide for iOS* • *Developer Guide for Mobile Workflow Packages* • *Developer Guide for Windows and Windows Mobile*
Developer guide for Unwired Server side customization – *Developer Guide for Unwired Server*	Information for custom coding using the Server API. Audience: experienced developers. Use: to customize and automate server-side implementations for device applications, and administration, such as data handling. Dependencies: Use with *Fundamentals* and *Sybase Unwired WorkSpace – Mobile Business Object Development*.
Developer guide for system administration customization – *Developer Guide for Unwired Server Management API*	Information for custom coding using administration APIs. Audience: experienced developers. Use: to customize and automate administration at a coding level. Dependencies: Use with *Fundamentals* and *System Administration*.

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