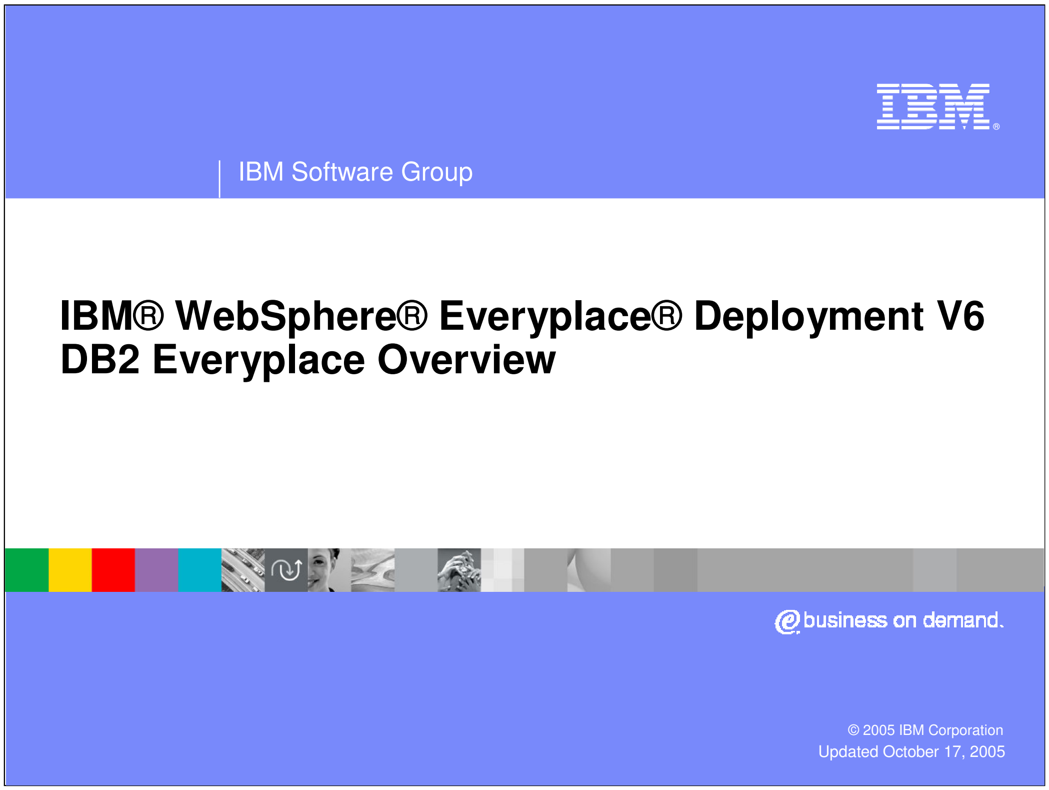
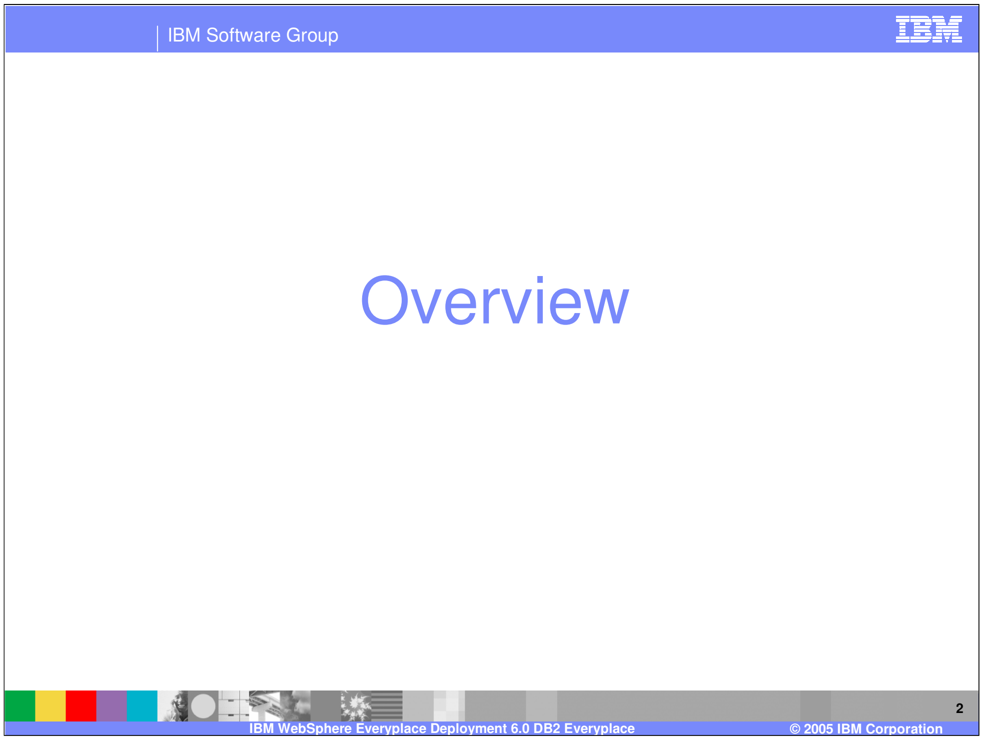


IBM Software Group

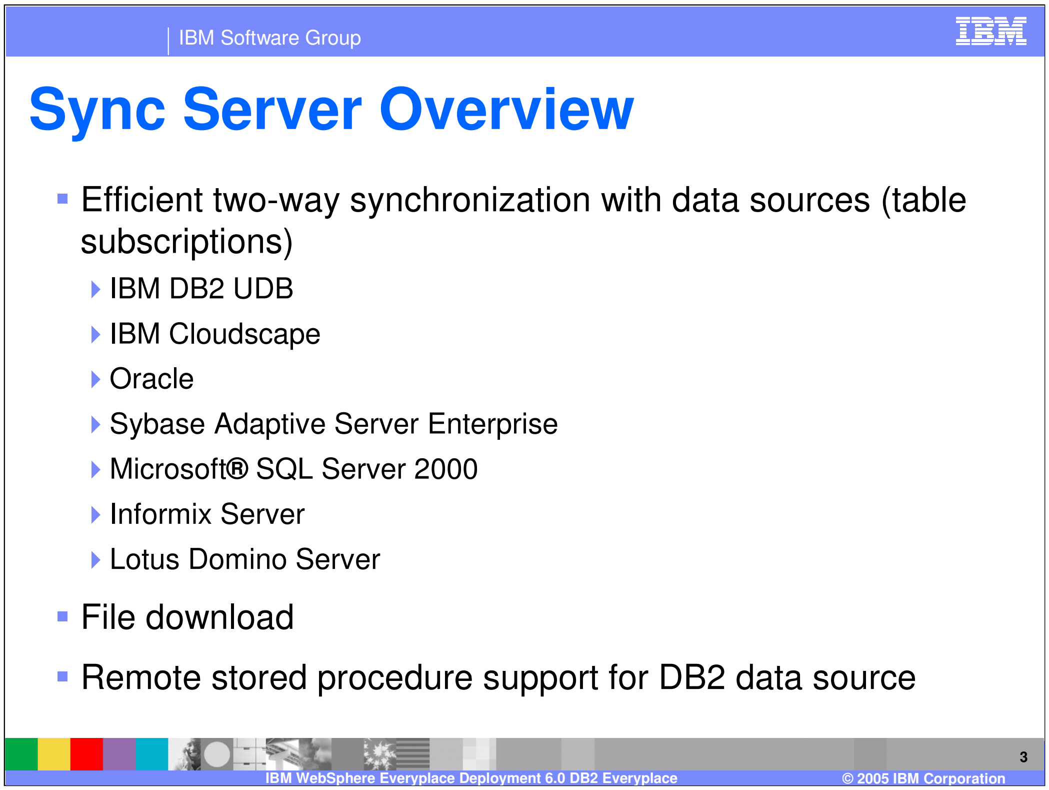
IBM® WebSphere® Everyplace® Deployment V6 DB2 Everyplace Overview

business on demand.

Updated October 17, 2005



Overview



IBM Software Group

Sync Server Overview

- Efficient two-way synchronization with data sources (table subscriptions)
  - IBM DB2 UDB
  - IBM Cloudscape
  - Oracle
  - Sybase Adaptive Server Enterprise
  - Microsoft® SQL Server 2000
  - Informix Server
  - Lotus Domino Server
- File download
- Remote stored procedure support for DB2 data source

3

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

© 2005 IBM Corporation

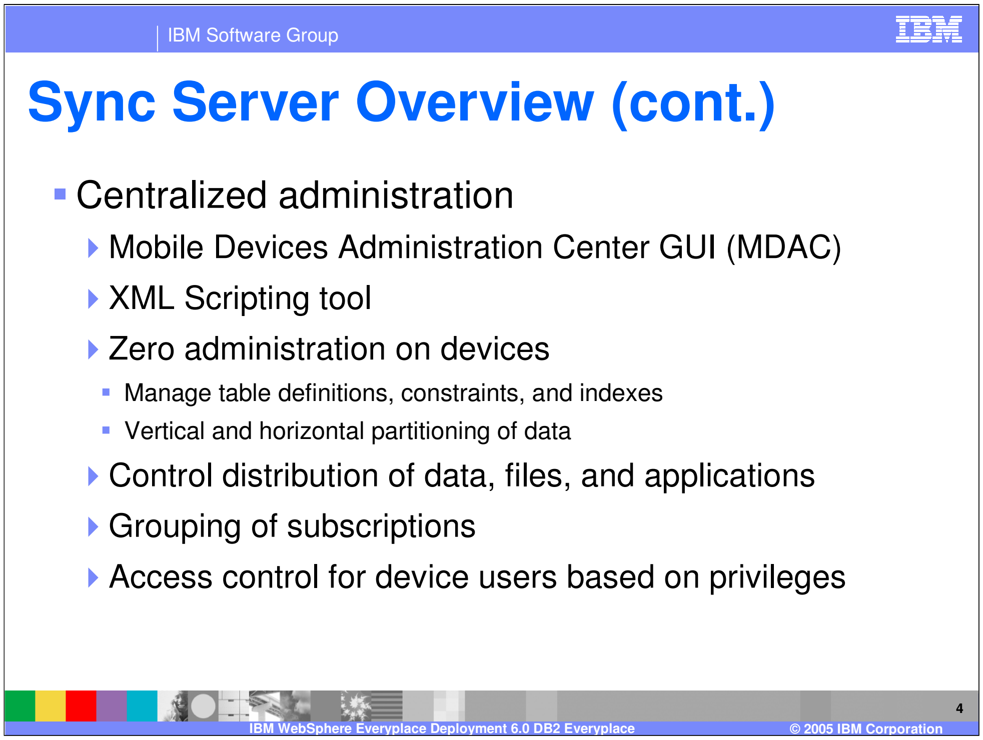
•The DB2 Everyplace synchronization server manages two-way data synchronization between a data source and a target database. The synchronization server acts as an intermediary between the synchronization client software in the WebSphere Everyplace Deployment client and the DB2 UDB database or the JDBC database on the source server.

•You define data from the source server to be accessed by each group of users. Mobile workers use the WebSphere Everyplace Deployment application that incorporates the DB2 Everyplace Sync Client’s API to connect to the server and copy source data to their mobile devices. They modify this data using these applications and then synchronize their changes with the source database.

•JDBC subscriptions provide users with access to data in source tables on a data source with a JDBC interface, including Oracle, DB2, Microsoft® SQL Server, Informix®, Sybase, and Lotus® Domino®.

•File subscriptions allow replication of any type of file stored at the source server and are not bi-directional. They are from the Sync Server to the mobile device. File subscriptions can be created as a convenient way to distribute and update mobile applications and other data to the devices.

•The remote stored procedure support allows the Everyplace Deployment client to execute stored procedures on a remote database for real-time query or transaction. The result set stored locally in a temporary DB2 Everyplace table.



IBM Software Group

Sync Server Overview (cont.)

- Centralized administration
  - Mobile Devices Administration Center GUI (MDAC)
  - XML Scripting tool
  - Zero administration on devices
    - Manage table definitions, constraints, and indexes
    - Vertical and horizontal partitioning of data
  - Control distribution of data, files, and applications
  - Grouping of subscriptions
  - Access control for device users based on privileges

4

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

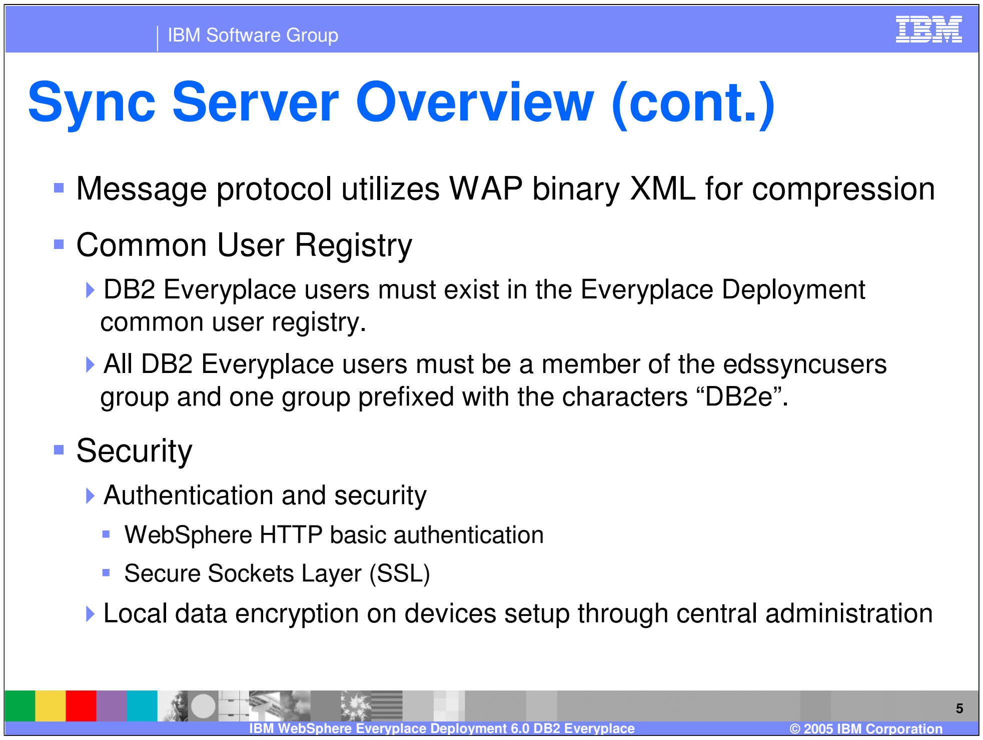
© 2005 IBM Corporation

•The DB2 Everyplace Sync Server provides an administration tool that helps you manage and deliver synchronization services to groups of users with similar data synchronization needs. The Mobile Devices Administration Center, a graphical administration tool for the Sync Server, allows you to define subsets of data and files to be accessed by groups of users. The Sync Server accesses this administration information each time a user requests data synchronization.

•In the Mobile Devices Administration Center, you administer synchronization processes through a set of synchronization objects, including users, groups, subscriptions, and subscription sets. When you create, edit, or delete synchronization objects, the Mobile Devices Administration Center records this administration information in the DB2 Everyplace control database (DSYCTLDB).

•The XML Scripting tool automates tasks otherwise performed using the Mobile Devices Administration Center. You can also use the XML Scripting tool to copy or move metadata information such as subscriptions, subscription sets, users, groups from one server to several other servers. The XML Scripting tool allows you to export information from the control database into an XML script file and edit it for bulk processing or automation.

•DB2 Everyplace requires zero administration on the WebSphere Everyplace Deployment client; all administration is done through either the XML Scripting tool or the Mobile Devices Administration Center (MDAC). Access control for client users is handled via table definitions, constraints, and indexes defined in the subscription.



IBM Software Group

Sync Server Overview (cont.)

- Message protocol utilizes WAP binary XML for compression
- Common User Registry
  - DB2 Everyplace users must exist in the Everyplace Deployment common user registry.
  - All DB2 Everyplace users must be a member of the edssyncusers group and one group prefixed with the characters “DB2e”.
- Security
  - Authentication and security
    - WebSphere HTTP basic authentication
    - Secure Sockets Layer (SSL)
  - Local data encryption on devices setup through central administration

5

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

© 2005 IBM Corporation

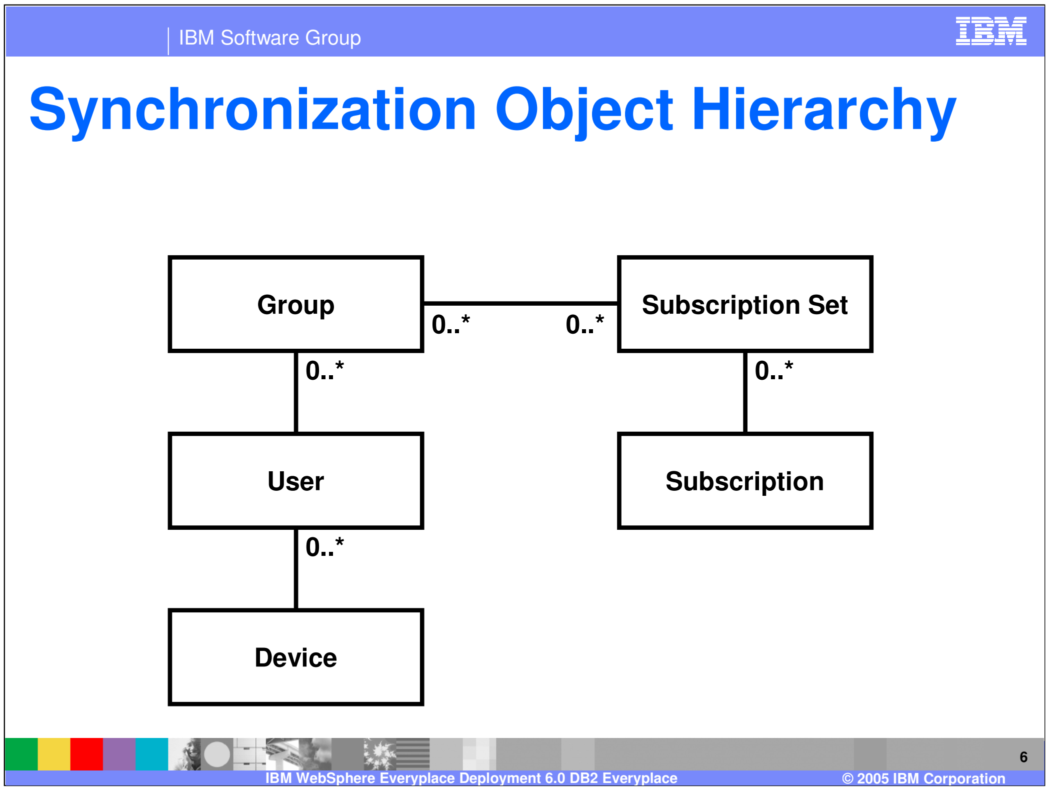
•Data synchronization can be bi-directional or uni-directional. Data can be updated at the DB2 Everyplace mobile device or the enterprise database. For example, users could download a subset of data from a DB2 for an Oracle database to a DB2 Everyplace database on the mobile device, view the data, make changes to the data, and then synchronize the changed data back to the Oracle database server. The DB2 Everyplace Sync Server also provides a mechanism for conflict resolution.

•The DB2e message protocol utilizes WAP binary XML for compression of the synchronization message.

•DB2 Everyplace users must be members of the WebSphere Everyplace Deployment common user registry. They must belong to the edssyncusers group and also be a member of one, and only one, group that is prefixed with the characters “DB2e”.

•The WebSphere Everyplace Deployment client authenticates to the DB2 Everyplace server using WebSphere HTTP basic authentication.

•Secure Sockets Layer security can be configured between the Everyplace Deployment client and server. In addition, local data encryption can be setup through central administration.



IBM Software Group

Synchronization Object Hierarchy

6

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

© 2005 IBM Corporation

•In the Mobile Devices Administrator you can administer synchronization processes through a set of *synchronization objects*. A synchronization object contains information about aspects of the synchronization process in your organization. You can create and edit groups, subscriptions, subscription sets, and users to handle your organization's synchronization requirements.

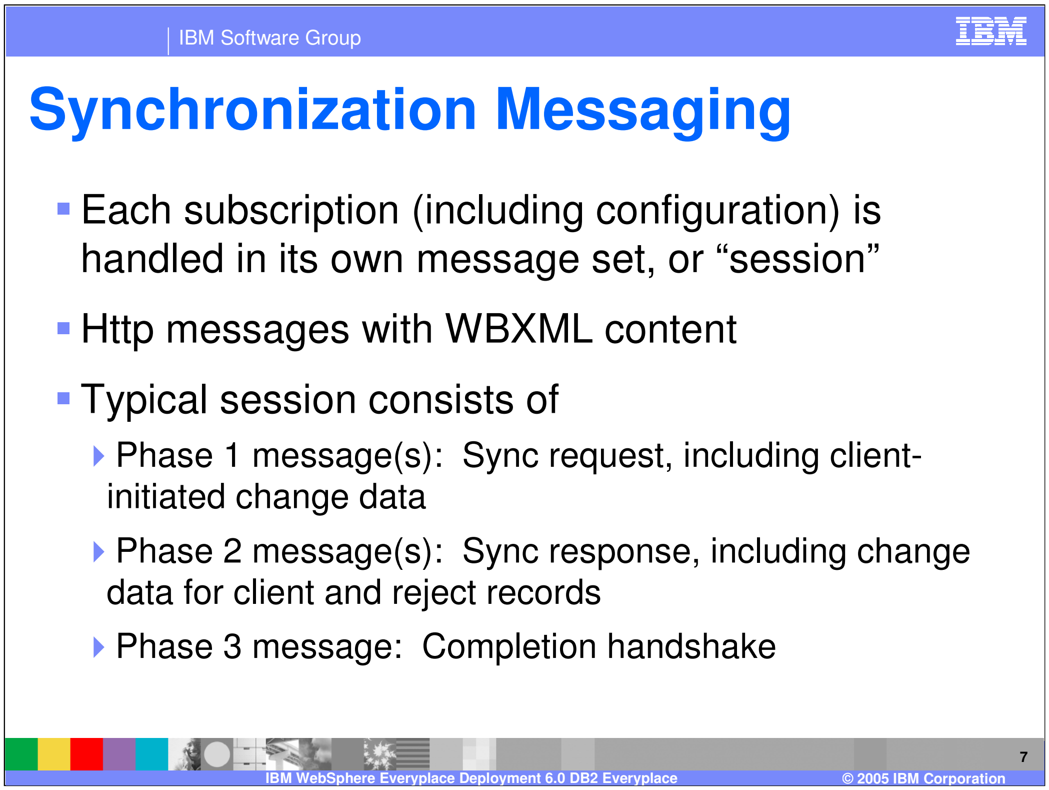
•**Group** A group of users with similar mobile data synchronization needs. You define synchronization characteristics for each group, such as which applications the users in the group need to access to perform their jobs and what subsets of enterprise data they need to access.

• **User** A user who uses the DB2 Everyplace Sync Server to synchronize data between a source (the enterprise system) and a target (the mobile device). You assign a user to a group to provide access to the subscriptions defined in the group's subscription sets.

•**Device** The WebSphere Everyplace Deployment for Windows and Linux client associated with the user.

•**Subscription** A specification for what information in a source database or server is to be replicated to a target database (the DB2 Everyplace mobile database on the client). Like a magazine subscription where you choose the types of information you want to see on a periodic basis, a subscription allows you to define which subsets of your enterprise's data and files the group members are allowed to access. Members can then access and synchronize just this subset of data and files, improving both security and performance. You can create two types of subscriptions: file subscriptions for files stored at the source server, and table subscriptions in the source database using either IBM DataPropagator™ or JDBC subscriptions.

•**Subscription set** A collection of subscriptions. To provide group members with access to the data and files defined in subscriptions, you collect the subscriptions together in a container called an *subscription set*, then assign this container object to the group. This two–step process of enabling members of a group to access the information that they need makes administration easier because you can bundle a set of subscriptions and assign that bundle to multiple groups if necessary.

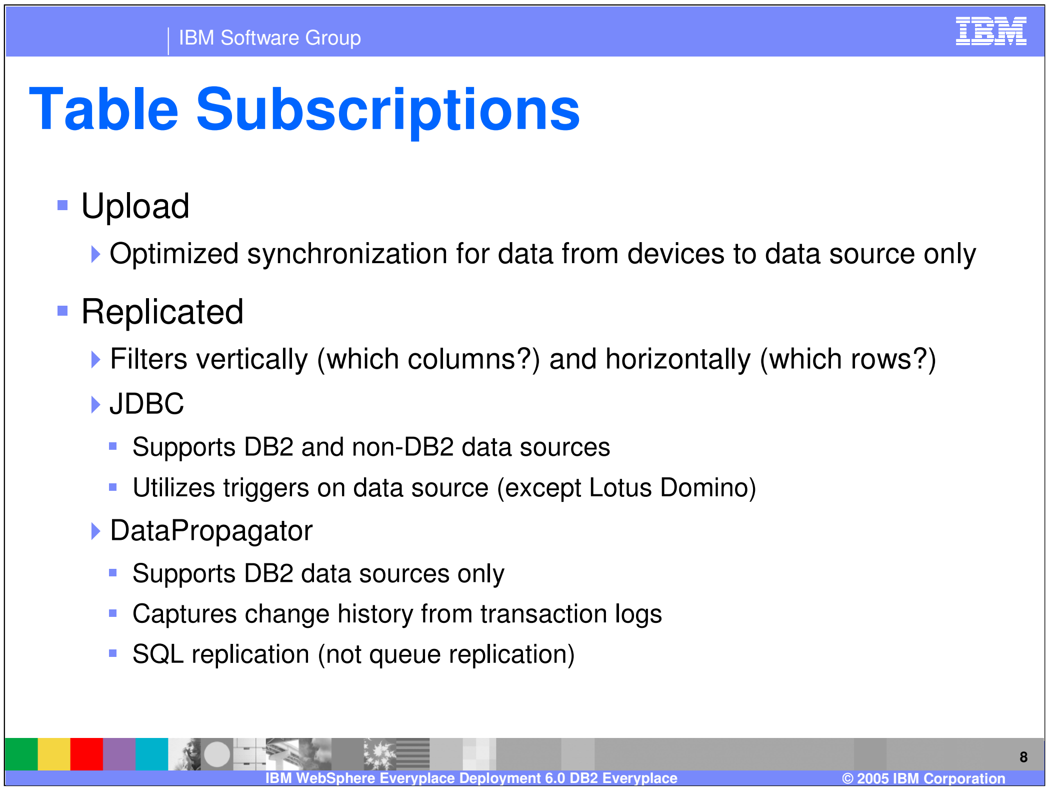


Synchronization Messaging

- Each subscription (including configuration) is handled in its own message set, or “session”
- Http messages with WBXML content
- Typical session consists of
  - Phase 1 message(s): Sync request, including client-initiated change data
  - Phase 2 message(s): Sync response, including change data for client and reject records
  - Phase 3 message: Completion handshake

Each DB2 Everyplace subscription is synchronized in its own message set or session. A typical session consists of 3 messages: (1)the synchronization request, (2)the synchronization response including changed data, and (3)the synchronization completion handshake.

Phase 1 messages consist of the synchronization request which includes the client-initiated change data. The Phase 2 message consists of the synchronization response with changes from the server that must be applied to the client and rejection records for changes that could not be made on the server.   The Phase 3 message is the completion handshake.



IBM Software Group

Table Subscriptions

- Upload
  - Optimized synchronization for data from devices to data source only
- Replicated
  - Filters vertically (which columns?) and horizontally (which rows?)
  - JDBC
    - Supports DB2 and non-DB2 data sources
    - Utilizes triggers on data source (except Lotus Domino)
  - DataPropagator
    - Supports DB2 data sources only
    - Captures change history from transaction logs
    - SQL replication (not queue replication)

8

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

© 2005 IBM Corporation

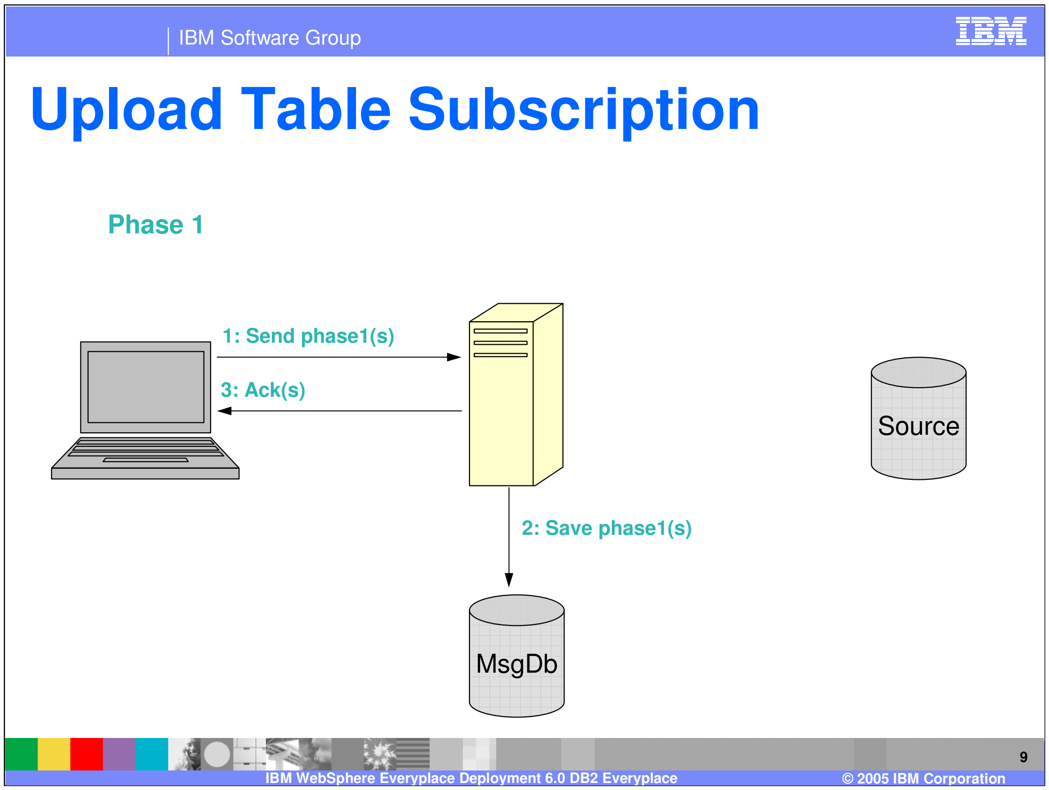
•You can define several types of subscriptions in DB2 Everyplace.

•Upload subscriptions are uni-directional, they only allow the user to directly insert rows into a table on a source database. The source table may reside on any database that supports JDBC. Related tables on the mobile devices are not refreshed during synchronization.

•Replicated subscriptions define two-directional synchronization where changes may occur on both the client and server. Through the subscription you can choose to filter on database table columns, or on table rows.

•JDBC subscriptions support both DB2 and non-DB2 data sources and can utilize triggers in the data source.

•DataPropagator subscriptions support DB2 UDB sources only and capture change history from DB2 UDB transaction logs.



IBM Software Group

Upload Table Subscription

Phase 1

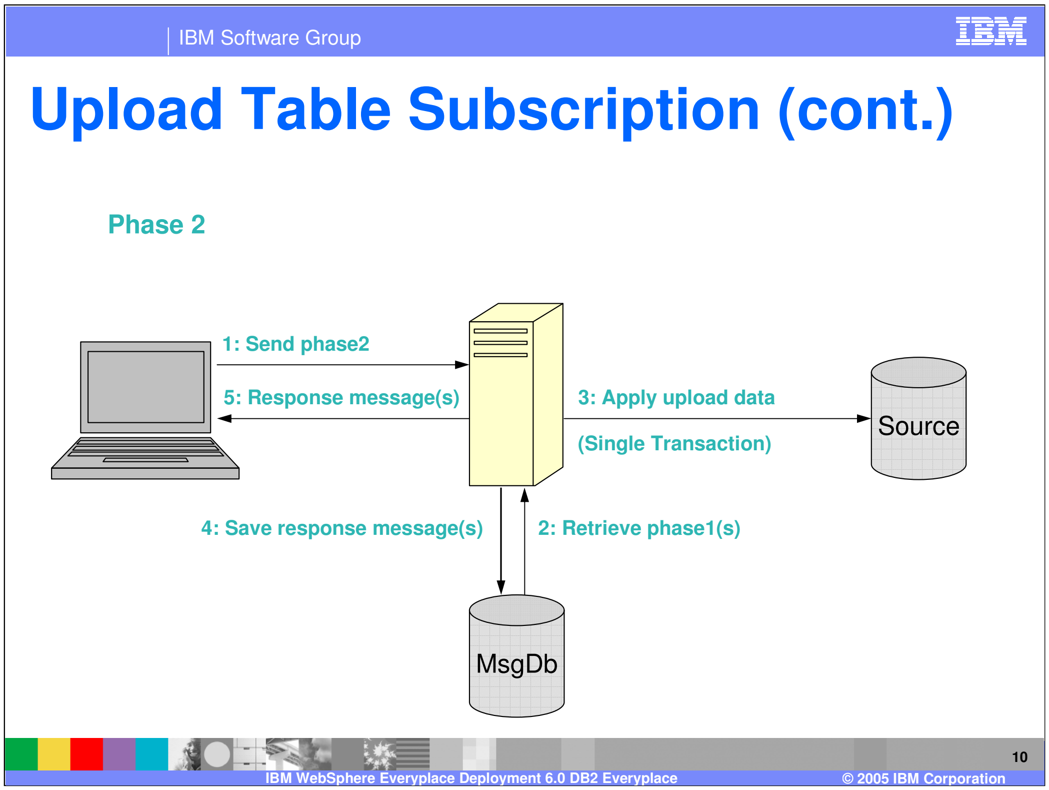
9

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

© 2005 IBM Corporation

This diagram illustrated the synchronization process for the uni-directional upload table subscription.

1. In Phase 1, the client sends the upload message, with the changed data, to the DB2 Everyplace synchronization server.
2. The sync server saves the request and updated data in the message database on the server.
3. The sync server then sends the completion handshake to the client.



IBM Software Group

Upload Table Subscription (cont.)

Phase 2

1: Send phase2

5: Response message(s)

3: Apply upload data

(Single Transaction)

Source

4: Save response message(s)

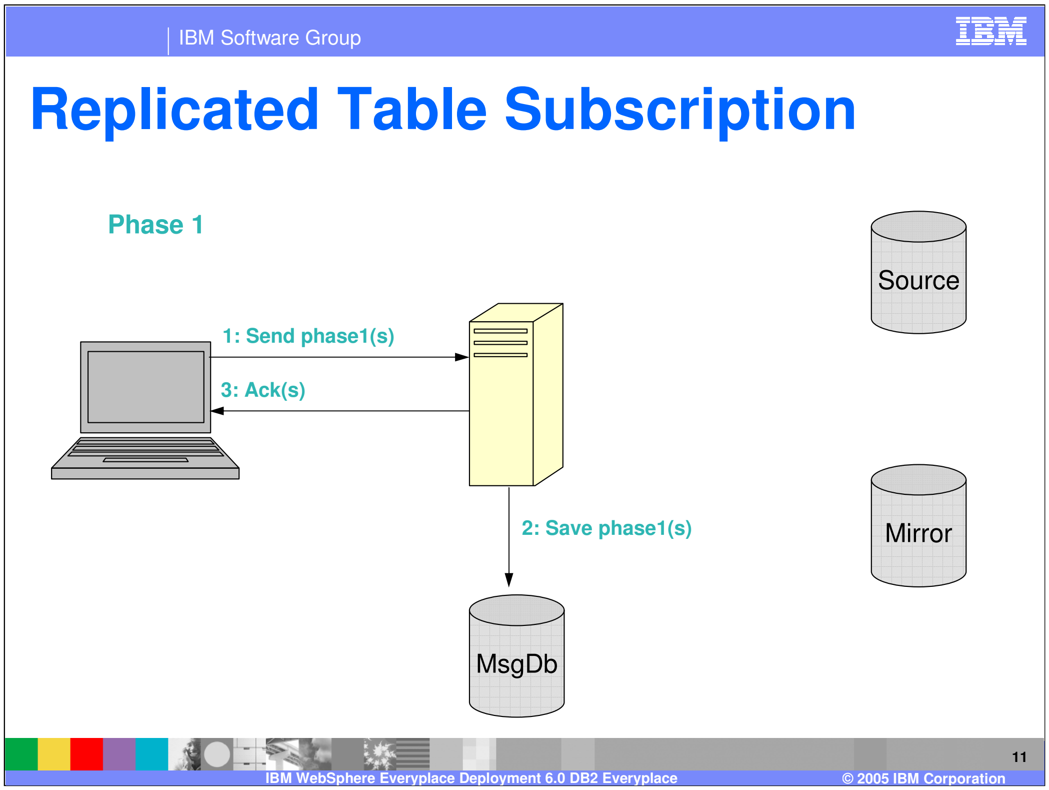
2: Retrieve phase1(s)

MsgDb

10

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

- This diagram illustrates the phase 2 processing of the upload table subscription.
  1. The client sends the phase 2 synchronization response message.
  2. The synchronization server retrieves the phase 1 client updates from the message database on the server.
  3. The synchronization server sends the uploaded data from the client to the source database.
  4. The response messages are stored in the message database.
  5. The response messages are sent to the DB2 Everyplace client.



IBM Software Group

Replicated Table Subscription

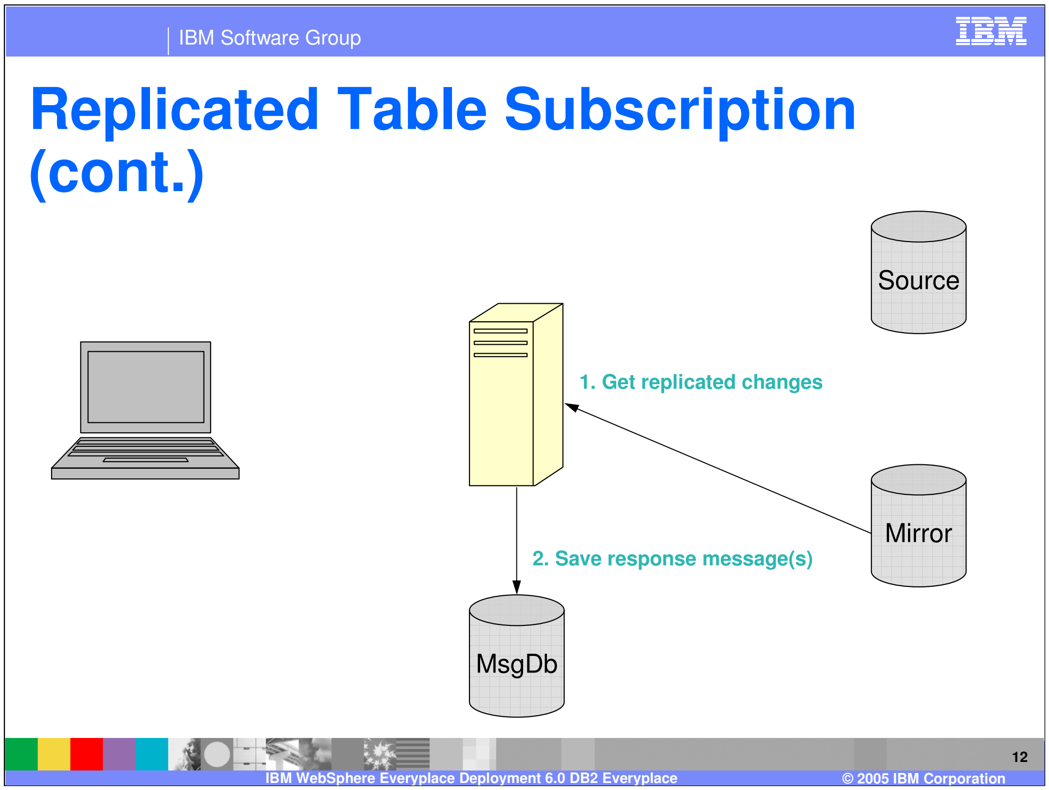
11

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

© 2005 IBM Corporation

- The bi-directional synchronization of relational data is shown in the replicated table subscription diagram above.
  1. The DB2 Everyplace application on the Everyplace Deployment client sends the synchronization request, including data changes from the client, to the DB2 Everyplace sync server.
  2. The sync server buffers the phase 1 message and associated data in the message database on the Everyplace Deployment server.
  3. The sync server sends an acknowledgement to the phase 1 message, to the client.

Replicated Table Subscription (cont.)



Source

1. Get replicated changes

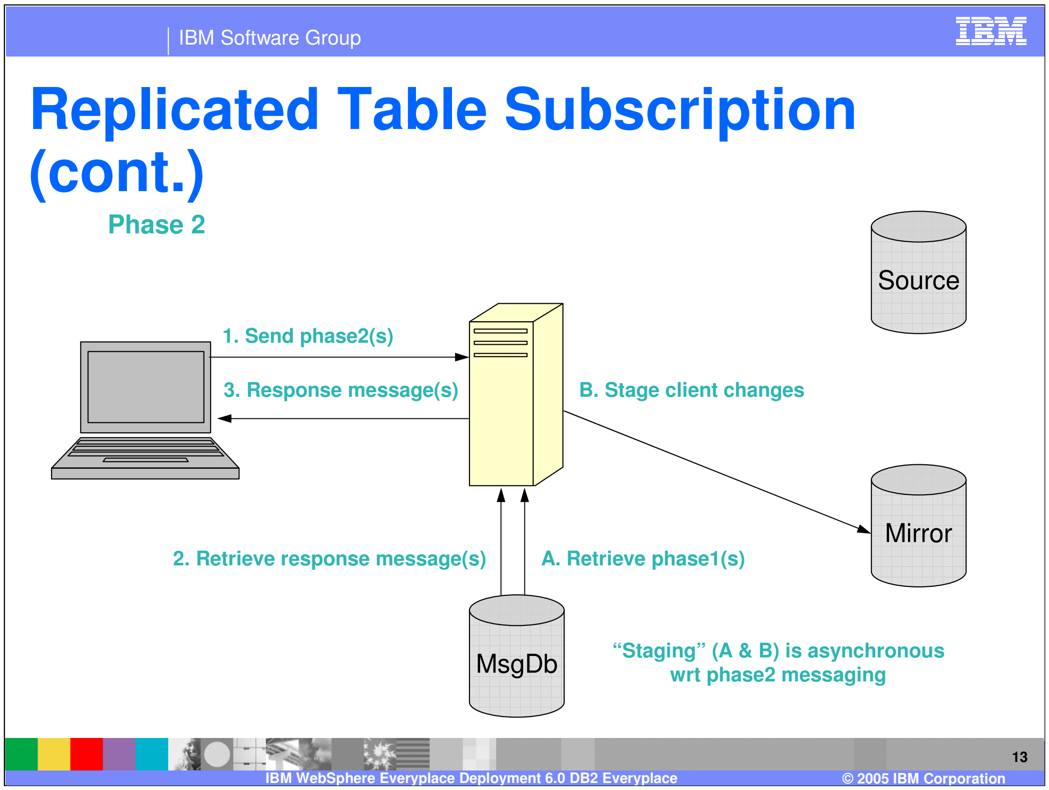
Mirror

2. Save response message(s)

MsgDb

1.The sync server retrieves replication changes from the mirror database on the Everyplace Deployment server. The mirror database is a staging database used by the synchronization server to merge two-way synchronization updates and perform conflict resolution.

2.The sync server buffers the synchronization request and data updates from the server in the message database.



IBM Software Group

Replicated Table Subscription (cont.)

Phase 2

1. Send phase2(s)

3. Response message(s)

B. Stage client changes

2. Retrieve response message(s)

A. Retrieve phase1(s)

“Staging” (A & B) is asynchronous wrt phase2 messaging

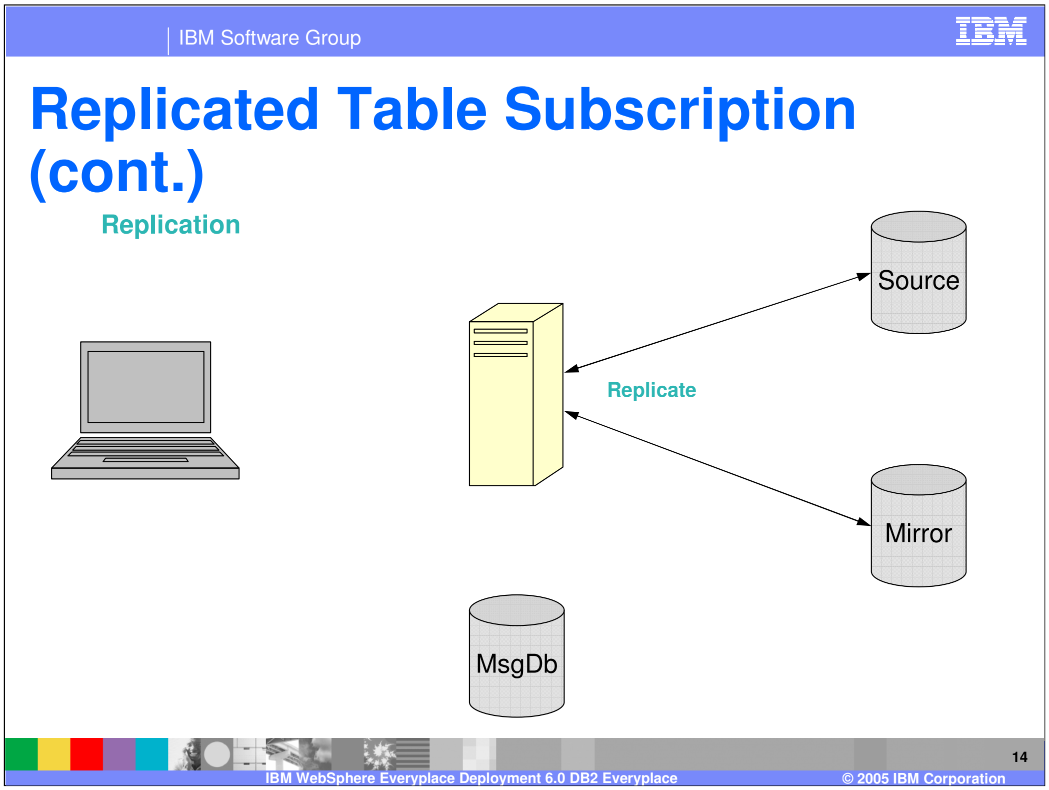
13

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

© 2005 IBM Corporation

This diagram illustrates the sync server reconciling the updates from the client with the updates from the server, and then sending those changes to both client and server.

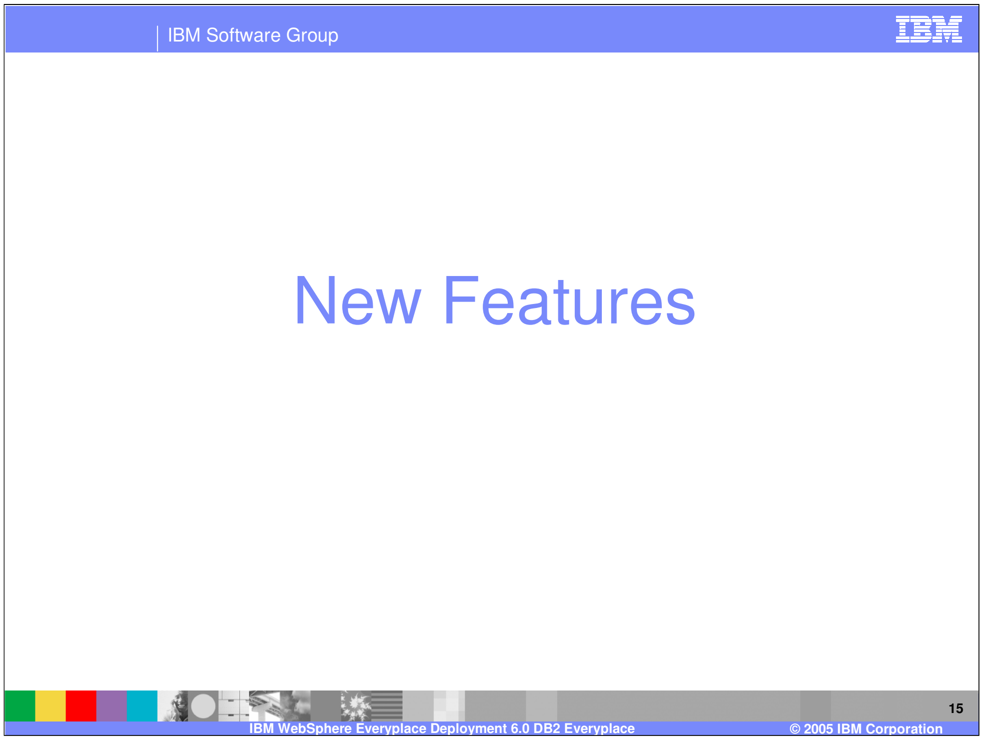
- The client has finished sending updated data in phase 1 and sends the phase 2 message.
- The sync server retrieves the response messages and the phase 1 data updates from the message database. The data updates from both the client and server (mirror database) are in the message database. The sync server reconciles the synchronization updates.
- The sync server sends the response messages to the client with any data updates from the server side.
- The sync server sends the changes from the client to the mirror database on the server.



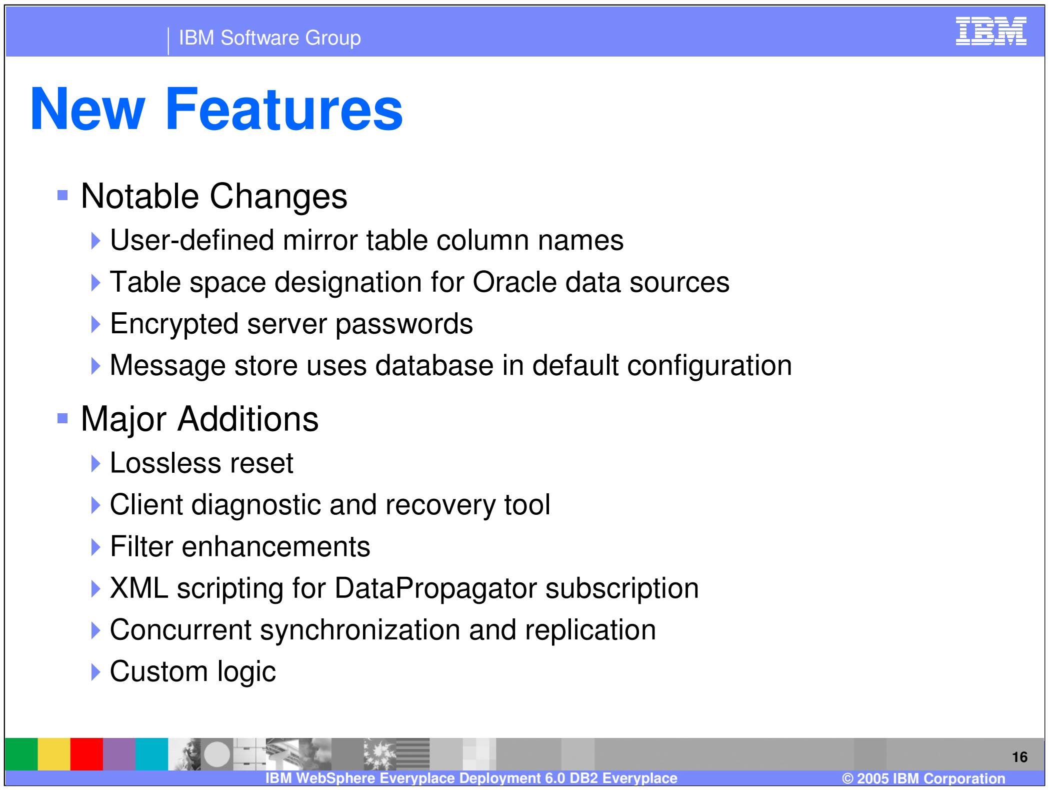
Replicated Table Subscription (cont.)

Replication

- In this final stage of replicated table synchronization, the replication process updates the source database with the latest changes in the mirror database.

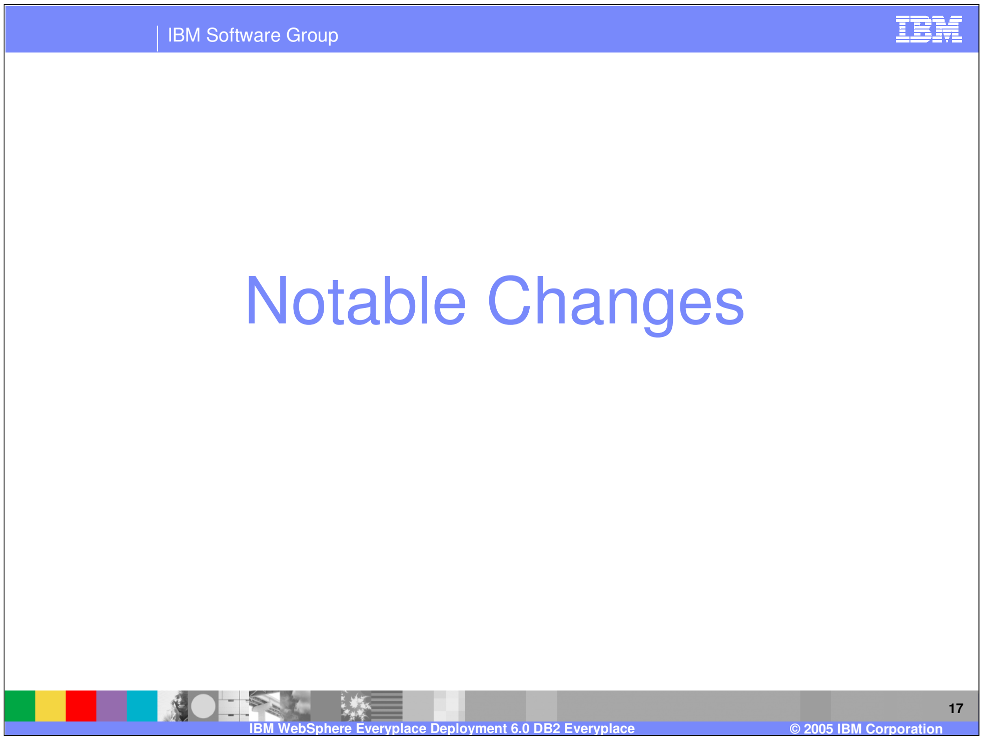


New Features

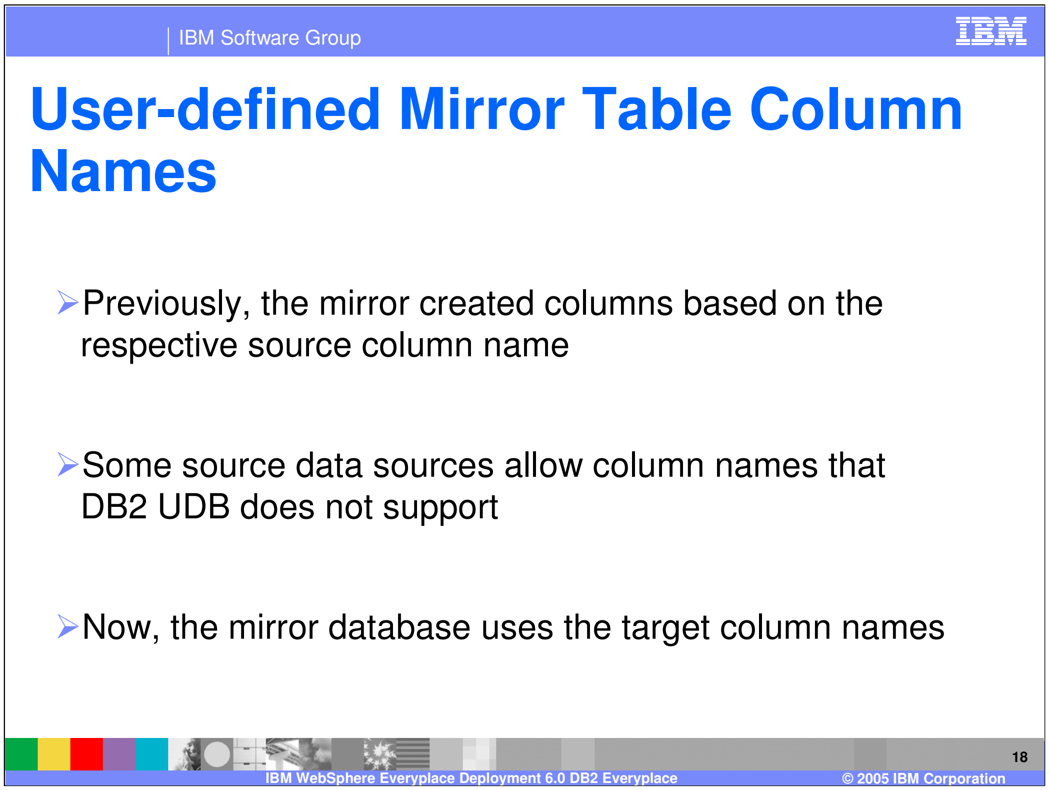


New Features

- Notable Changes
  - User-defined mirror table column names
  - Table space designation for Oracle data sources
  - Encrypted server passwords
  - Message store uses database in default configuration
- Major Additions
  - Lossless reset
  - Client diagnostic and recovery tool
  - Filter enhancements
  - XML scripting for DataPropagator subscription
  - Concurrent synchronization and replication
  - Custom logic



Notable Changes



User-defined Mirror Table Column Names

- Previously, the mirror created columns based on the respective source column name
- Some source data sources allow column names that DB2 UDB does not support
- Now, the mirror database uses the target column names

•Previously the mirror database created columns based on the respective name of that column in the source database. Some source database allow columns names that are not supported by DB2 UDB. Now the mirror database uses target column names.

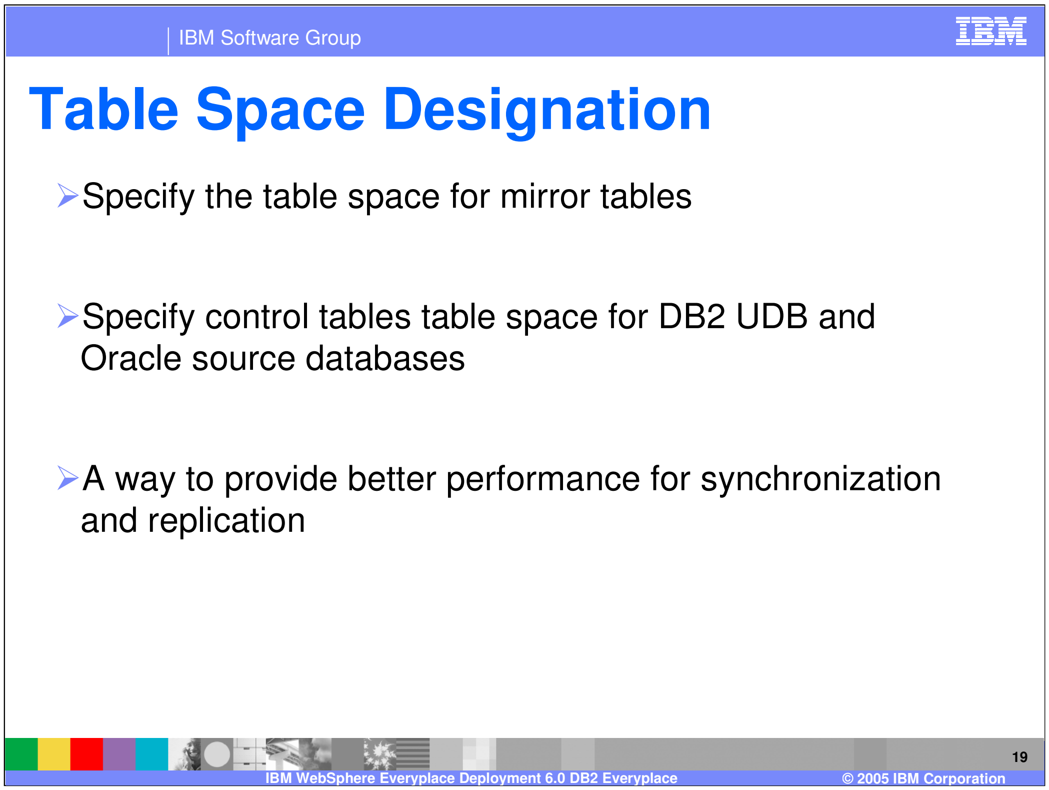
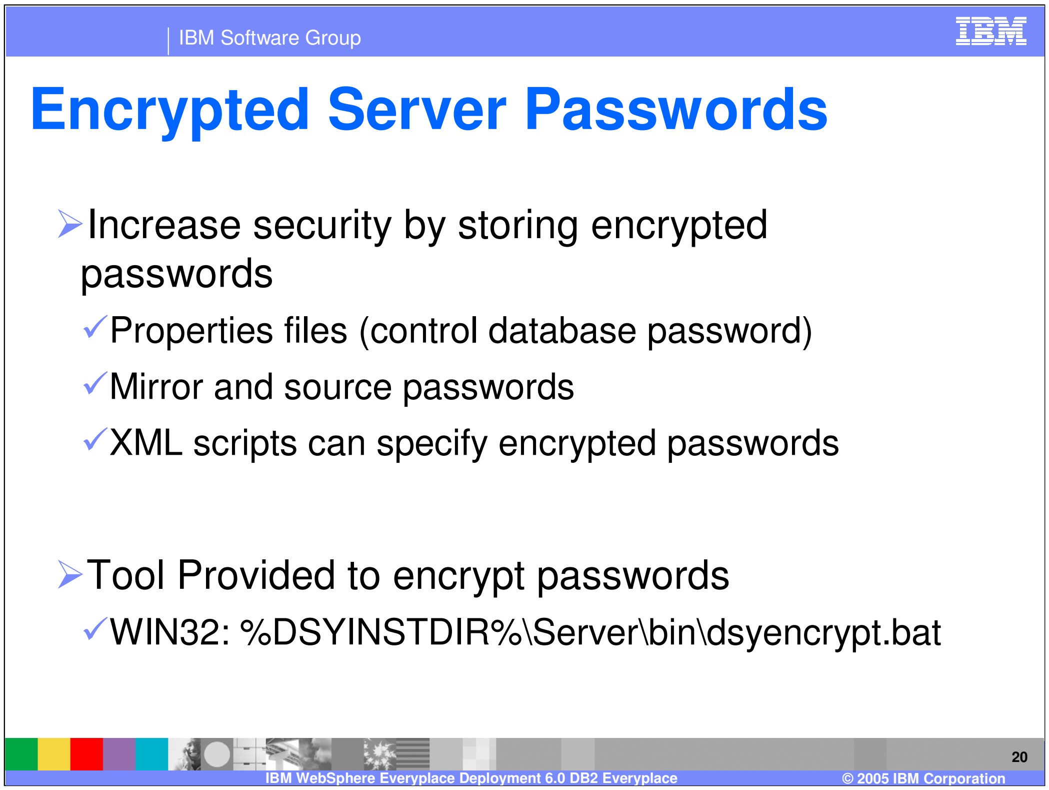


Table Space Designation

- Specify the table space for mirror tables
- Specify control tables table space for DB2 UDB and Oracle source databases
- A way to provide better performance for synchronization and replication

•DB2 Everyplace now allows you to specify a separate table space for the mirror tables used in replication. The use of a separate table space allows you to optimize your synchronization performance by tuning the table spaces separately.



IBM Software Group

Encrypted Server Passwords

- ➢Increase security by storing encrypted passwords
  - ✓Properties files (control database password)
  - ✓Mirror and source passwords
  - ✓XML scripts can specify encrypted passwords

- ➢Tool Provided to encrypt passwords
  - ✓WIN32: %DSYINSTDIR%\Server\bin\dsyencrypt.bat

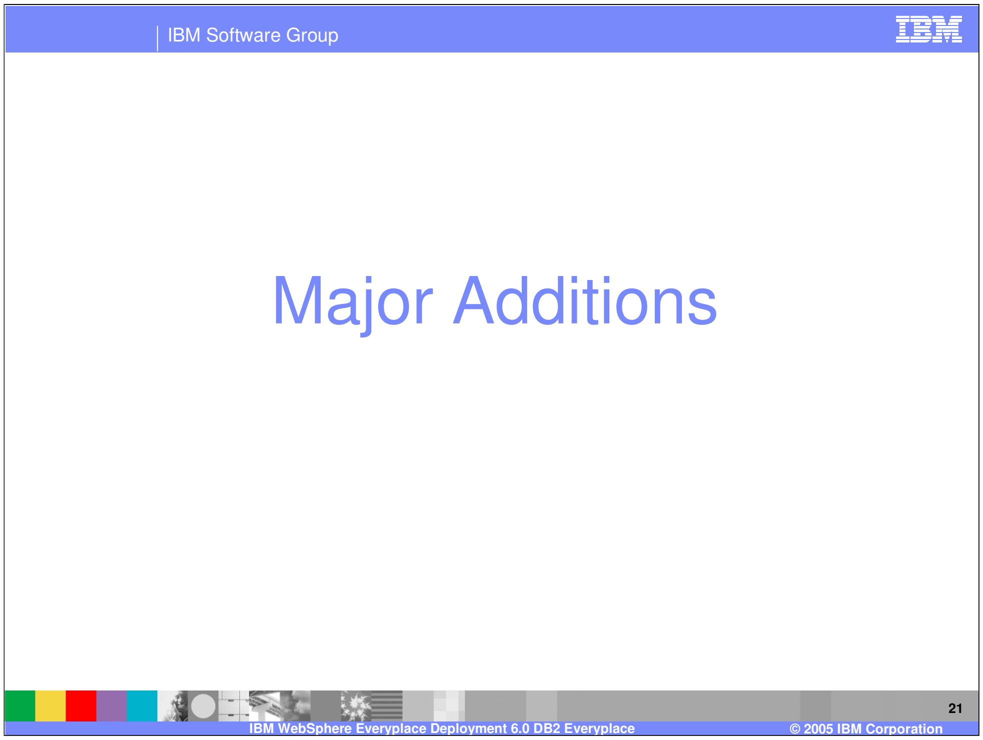
20

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

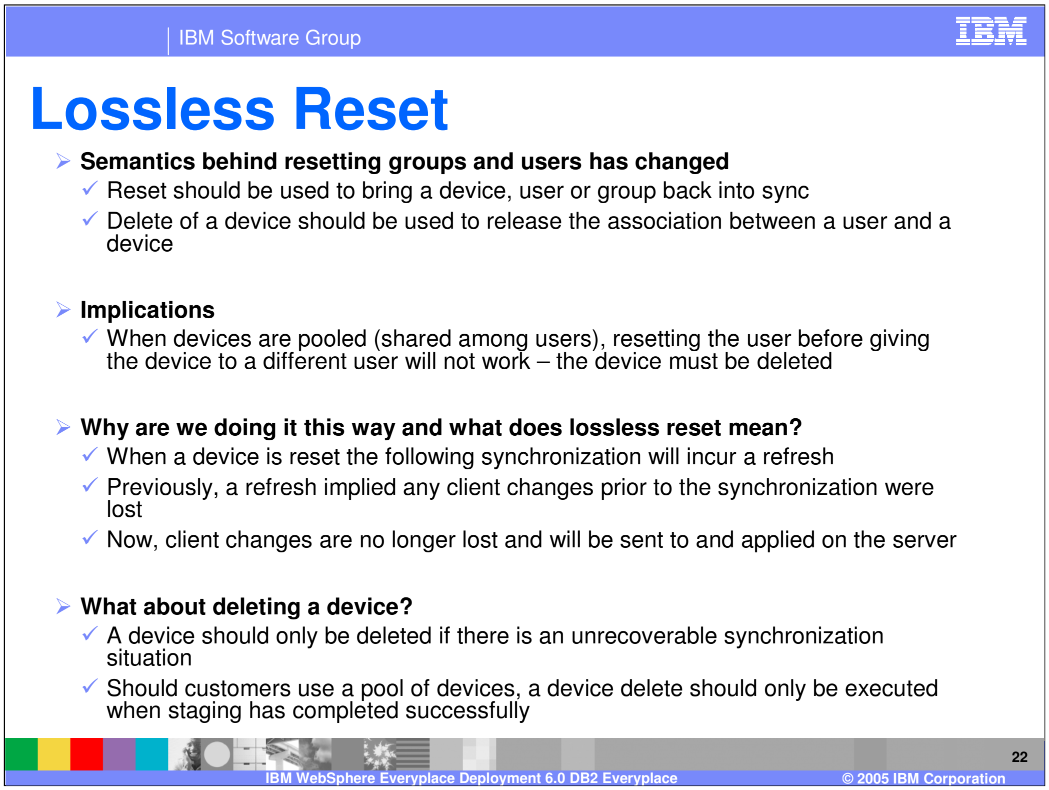
Sync Server passwords appear in properties files and XML scripts. Two properties files contain passwords used by the Sync Server:

•DSYIdflt.properties contains the password for the control database, DSYCTLDB.
•DSYLDAP.properties contains the password for the SOAP router HTTP connection.

Sync Server passwords can also appear in XML scripts, and they can be specified using the Mobile Devices Administration Center. To prevent accidental or unauthorized access to these resources, passwords can be encrypted. DB2 Everyplace provides a command line utility that encrypts passwords. Given a password, the utility returns an encrypted version of that password. The utility, named dsyencrypt.bat, is installed by default in the%DSYINSTDIR%\Server\bin directory.



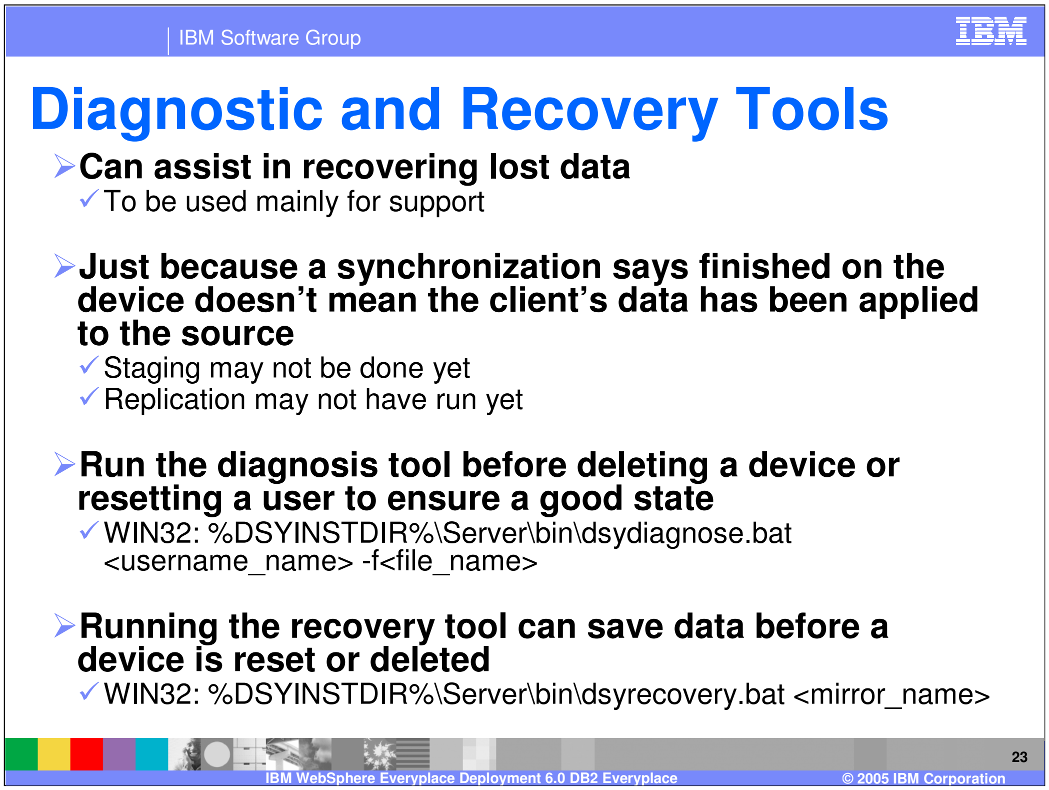
Major Additions



Lossless Reset

- **Semantics behind resetting groups and users has changed**
  - ✓ Reset should be used to bring a device, user or group back into sync
  - ✓ Delete of a device should be used to release the association between a user and a device
- **Implications**
  - ✓ When devices are pooled (shared among users), resetting the user before giving the device to a different user will not work – the device must be deleted
- **Why are we doing it this way and what does lossless reset mean?**
  - ✓ When a device is reset the following synchronization will incur a refresh
  - ✓ Previously, a refresh implied any client changes prior to the synchronization were lost
  - ✓ Now, client changes are no longer lost and will be sent to and applied on the server
- **What about deleting a device?**
  - ✓ A device should only be deleted if there is an unrecoverable synchronization situation
  - ✓ Should customers use a pool of devices, a device delete should only be executed when staging has completed successfully

•Lossless reset is a major new feature in DB2 Everyplace 8.2.1. The semantics behind resetting groups and users has changed. Reset is used to bring a device, user, or group back into synchronization. A device should be deleted only when the association between a user and device needs to be released.



IBM Software Group

Diagnostic and Recovery Tools

- **Can assist in recovering lost data**
  - To be used mainly for support
- **Just because a synchronization says finished on the device doesn’t mean the client’s data has been applied to the source**
  - Staging may not be done yet
  - Replication may not have run yet
- **Run the diagnosis tool before deleting a device or resetting a user to ensure a good state**
  - WIN32: %DSYINSTDIR%\Server\bin\dsydiagnose.bat <username_name> -f<file_name>
- **Running the recovery tool can save data before a device is reset or deleted**
  - WIN32: %DSYINSTDIR%\Server\bin\dsyrecovery.bat <mirror_name>

23

IBM WebSphere Everyplace Deployment 6.0 DB2 Everyplace

DB2 Everyplace provides diagnostic and recovery tools to assist in recovering lost data.

Using the diagnosis utility

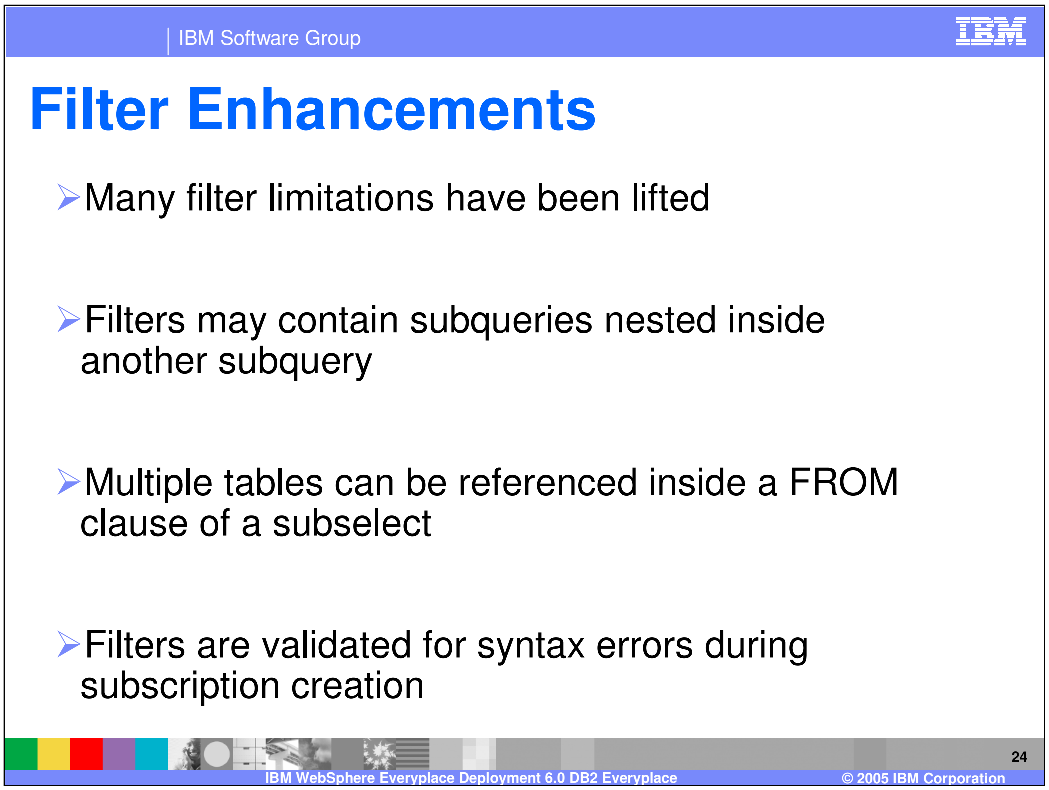
The diagnosis utility recovers data from the message store. The utility tool checks the synchronization status of each subscription that the user is associated with and checks if it needs recovery. If it does, the tool recovers and writes the recovery status in an output file. You can run this utility before deleting or resetting a device or user ID to collect data that can help you diagnose client synchronization problems.

Using the recovery utility

For the DB2 Everyplace Sync Server, a *task* is one of two things:

- Preparing a message to send to a mobile device.
- Saving data from a mobile device into the database

When a client synchronization attempt fails, you can use the recovery utility to redo Sync Server tasks by rebuilding messages or saving changes to the database. The recovery utility and the Sync Server can run at the same time without causing conflicts.

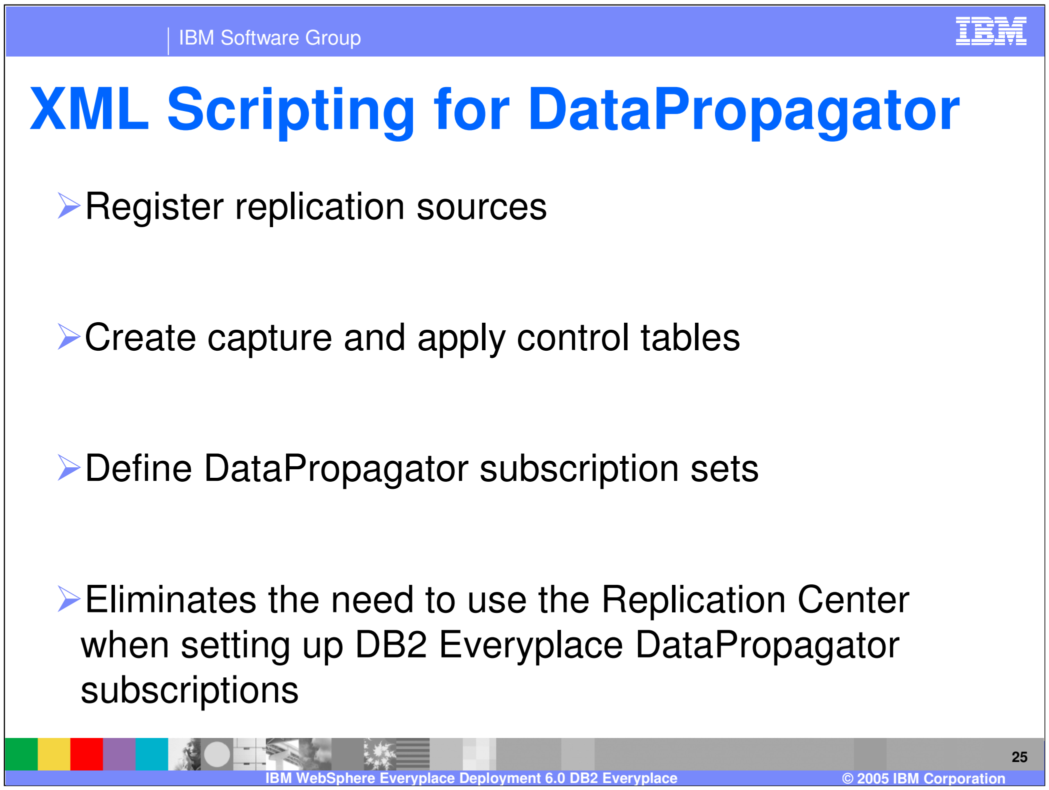


Filter Enhancements

- Many filter limitations have been lifted
- Filters may contain subqueries nested inside another subquery
- Multiple tables can be referenced inside a FROM clause of a subselect
- Filters are validated for syntax errors during subscription creation

When users subscribe to a table, they usually only need a subset of table rows or table columns. A data filter lets you deliver only the data that a user needs. You can apply horizontal and vertical filters in tandem or separately for specific subscriptions, groups, and users. Data filters only apply to JDBC and DataPropagator subscriptions. There are two different types of data filters: horizontal and vertical.

In DB2 Everyplace 8.2.1 many filter limitations have been lifted. Filters may not contain subqueries nested inside another subquery. Multiple tables an be referenced inside a FROM clause of a subselect. Filters are validate for syntax errors during subscription creation.

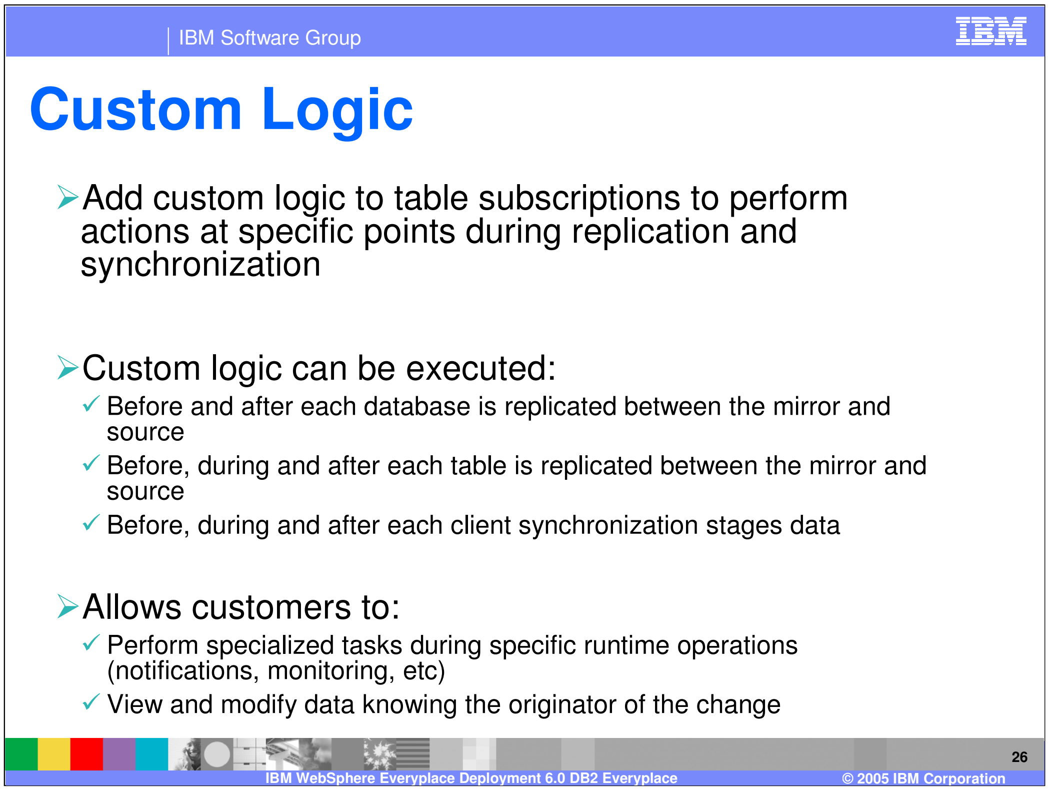


XML Scripting for DataPropagator

- Register replication sources
- Create capture and apply control tables
- Define DataPropagator subscription sets
- Eliminates the need to use the Replication Center when setting up DB2 Everyplace DataPropagator subscriptions

•A DataPropagator subscription is a subscription in which the Sync Server replicates tables between a DB2 UDB source database and a DB2 mirror database using DB2 DataPropagator. The Sync Server synchronizes the devices with the mirror database and uses DataPropagator to replicate the mirror database with the source database. A DB2 Everyplace DataPropagator Subscription is mapped to a DataPropagator Subscription Set.

•Support to create a Data Propagator subscription has been removed from the Mobile Devices Administration Center (MDAC) and is now available only through XML Scripting.   Using the XML Scripting eliminates the need to use the DB2 UDB Replication Center to define a Data Propagator subscription.



Custom Logic

- Add custom logic to table subscriptions to perform actions at specific points during replication and synchronization

- Custom logic can be executed:
  - ✓ Before and after each database is replicated between the mirror and source
  - ✓ Before, during and after each table is replicated between the mirror and source
  - ✓ Before, during and after each client synchronization stages data

- Allows customers to:
  - ✓ Perform specialized tasks during specific runtime operations (notifications, monitoring, etc)
  - ✓ View and modify data knowing the originator of the change

DB2 Everyplace now allows you to write custom logic to add to database table subscriptions. You can add custom logic to a subscription to perform actions at specific points during the synchronization and replication processes. Custom logic can execute before, during, and after the initial handling of input data from the users in any table subscriptions and before, during, and after the replication of data between the mirror and source tables.

For example, custom logic can do the following:

•View and modify data knowing the originator of the change.
•Maintain statistics on synchronization activity.
•Maintain statistics on replication activity.
•Perform primary and foreign key substitution on incoming synchronization data.
•Perform conflict resolution, including the ability to merge column values from different users into a single row or calculate new column values. Initiate an external process.

Trademarks, Copyrights, and Disclaimers

The following terms are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM
IBM(logo)
e(logo)business
AIX

CICS
Cloudscape
DB2
DB2 Universal Database

IMS
Informix
iSeries
Lotus

MQSeries
OS/390
OS/400
pSeries

Tivoli
WebSphere
xSeries
zSeries

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are registered trademarks of Microsoft Corporation in the United States, other countries, or both.

Intel, ActionMedia, LANDesk, MMX, Pentium and ProShare are trademarks of Intel Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a registered trademark of Linus Torvalds.

Other company, product and service names may be trademarks or service marks of others.

Product data has been reviewed for accuracy as of the date of initial publication. Product data is subject to change without notice. This document could include technical inaccuracies or typographical errors. IBM may make improvements and/or changes in the product(s) and/or program(s) described herein at any time without notice. Any statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business. Any reference to an IBM Program Product in this document is not intended to state or imply that only that program product may be used. Any functionally equivalent program, that does not infringe IBM's intellectual property rights, may be used instead.

Information is provided "AS IS" without warranty of any kind. THE INFORMATION PROVIDED IN THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER EXPRESS OR IMPLIED. IBM EXPRESSLY DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT. IBM shall have no responsibility to update this information. IBM products are warranted, if at all, according to the terms and conditions of the agreements (e.g., IBM Customer Agreement, Statement of Limited Warranty, International Program License Agreement, etc.) under which they are provided. Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. IBM makes no representations or warranties, express or implied, regarding non-IBM products and services.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents or copyrights. Inquiries regarding patent or copyright licenses should be made, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput or performance improvements equivalent to the ratios stated here.

Note to U.S. Government Users - Documentation related to restricted rights-Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract and IBM Corp.