DataExchange

Zen v16

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Introducing DataExchange

This guide contains information about DataExchange and its capabilities. It is intended to help you design databases for replication, implement the design, replicate data, monitor and maintain replication schedules, and troubleshoot replication issues. DataExchange is designed to avoid replicating corrupt data, spreading viruses, or deleting desired data. It can greatly lessen risk of data loss and down time in the event of system failures, hardware failures, or site disasters.

The following topics introduce you to DataExchange, its editions, and its components:

- DataExchange Technical Overview
- DataExchange Editions
- DataExchange Components
- Where to Install DataExchange

DataExchange Technical Overview

DataExchange is the Zen database replication solution. It copies data between two or more Zen databases to maintain warm backup systems, drive data into reporting servers, or synchronize remote databases.

The DataExchange technology works by capturing and sharing changes from one Zen database to other databases in a DataExchange replication network. The Zen Engine is augmented with DataExchange, which adds two software components to a Zen database, the Replication Event Handler and the replication engine.

- The Replication Event Handler (REH) plugs directly into the Zen database engine. Specifically, the REH is a set of DLLs that operate *within* the database engine, so if the database is running, the replication event handler is running as well. The database engine activates the REH when there is a change event (insert, update, delete). The REH then makes note of the event in one of its private control tables.
- The replication engine is a separate process that performs the actual replication task. It reads the control tables to determine what records have changed since the last replication session. It then groups these changes into packets and shares them with the other replication engines participating in a DataExchange replication network. These other engines then apply the updates to their own databases. The replication process occurs either continuously, at scheduled intervals, or on demand. The replication engine does not require constant network connectivity, so DataExchange is suitable for scenarios with intermittent connectivity, like remote users with dialup connections.

DataExchange focuses on the two types of data replication:

- Providing continuous access to data (Real-Time Backup)
- Synchronizing databases (Data Synchronization)

While both capabilities are useful, one typically surfaces as the primary driver for implementing data replication technology in a specific environment.

Notification Agent

The notification agent, or agent for short, is another component installed by DataExchange. Its purpose is to send email if a replication failure occurs. The agent requires the basic Simple Mail Transfer Protocol (SMTP) to communicate with a mail server.

For more information, see dxagent.

Replication-Specific Files

DataExchange adds its own tables on the machine where replication executes. It uses two types of tables: system configuration and replication control. Configuration tables record information such as the databases being replicated, the sites to which data is replicated, and replication schedules.

Control tables shadow data files and track the replication state of each record in the data. Each data table or file has a control table counterpart. Similarly, each data record has a companion control table record. Through the control tables, the replication engine determines what records need to be replicated when.

DataExchange tables for replication configuration and control can reside with the files to be replicated or separately in their own database. The choice of location depends on your replication needs.

DataExchange Editions

DataExchange is available in two editions: Real-Time Backup and Data Synchronization. The following table compares the two editions.

Feature	Real-Time Backup	Data Synchronization
1-way replication	X	X
2-way replication		X

Real-Time Backup Edition

DataExchange Real-Time Backup Edition is optimized for maintaining a backup server. It pairs high performance with minimal installation and maintenance. This edition supports 1-way replication between a primary server and a backup server.

Real-Time Backup solutions can be on- or off-site, depending on your needs. On-site backups can protect your data from hardware failures. Off-site backups can add protection against catastrophic loss, such as fire, flood or theft.

Data Synchronization Edition

DataExchange Data Synchronization Edition is designed for both one- and two-way replication scenarios. Its real-time data replication ensures all users see the same up-to-the-minute information.

DataExchange Components

DataExchange consists of the following primary components:

- Replication engine – Used for distributing and applying captured database changes
- Replication Event Handler (REH) – Used for recording or monitoring database change events
- DataExchange Agent – Used to provide notification in the event of a replication failure
- DataExchange utilities – Used to perform the tasks necessary for replication, such as design and activation
- DataExchange documentation – Provides concepts, instructions, and examples

DataExchange Utilities

DataExchange utilities help you configure and manage the replication process.

Utility Name	Capabilities
Deployment Wizard	Set up a replication network between a First Site and one or more Partner Sites. For examples of its use, see Replication Deployment.
Manager	Set up replication schedules and control user access.
Monitoring tool	Monitor data replication, configure replication sessions, and set logging options.
Activation tool	Enable a database to participate in replication and establish the database as belonging to a site on the replication network.
Deactivation tool	Remove a database from the list of those available for replication. If you want to delete a replicated database from physical storage, you must deactivate it first.

For more information, see Using the DataExchange Utilities and Services.

Documentation

DataExchange User's Guide includes conceptual and procedural information related to installation and configuration and design and deployment of a replication network. This guide covers both the Real-Time Backup and the Data Synchronization editions of the product. Many procedures for the two editions are identical or nearly so. Where differences occur, they are noted.

Where to Install DataExchange

DataExchange must be installed on the same system as Zen Enterprise Server or Cloud Server. See also Preparing to Install DataExchange.

Preparing to Install DataExchange

The following topics provide a list of preparations to install and run DataExchange:

- Checklist
- Precautions
- Administrator Rights
- DataExchange Licensing
- DataExchange Release Notes

Checklist

The following checklist helps you to prepare to install and use DataExchange.

- ☐ You have observed the appropriate precautions before installing DataExchange. See Precautions.
- ☐ Your system hardware and software meets the minimum requirements to install DataExchange. These requirements are the same as those for Zen, so they are not usually an issue.
- ☐ You are authorized to use administrator rights on the system where you install the product. See Administrator Rights to choose one of two ways to do this.
- ☐ You have a license, unless you plan to evaluate the trial version. For details, see DataExchange Licensing.
- ☐ You have considered special configuration issues, such as installing in a clustered environment.
- ☐ You have read the release notes for late-breaking information. See DataExchange Release Notes.

Precautions

The Zen database engine must be stopped and restarted during DataExchange installation. If your business requirements prohibit stopping the database engine during certain hours, install DataExchange outside those times.

Back up any important files on the target hard drive, including data files, before you begin the installation.

Administrator Rights

Security features on Windows 7, 8, 10, and Server 2012 require you to do one of the following things to successfully use your DataExchange installation:

- Log on as Administrator and always run DataExchange under that account.
- Before running DataExchange, go to C:\Program Files (x86)\Actian\Zen\bin, right-click dpwizard.exe, and open Properties. In the Properties sheet, select Compatibility and then under Settings, select **Run this program as an administrator**.

  Once you have turned on this setting, any user who is a member of the Administrators group will be able to create, deploy, and run replication projects. Administrators group members will no longer need to run DataExchange under the Administrator account. Other users will be unable to use DataExchange.

DataExchange Licensing

DataExchange requires an activation license to replicate data between two or more computers. The installer prompts you to enter a license key and decodes it to ensure that it is valid.

DataExchange Real-Time Backup supports installation on two machines: a First Site and a Partner Site. DataExchange Data Synchronization supports installation on a First Site and as many Partner Sites as you require. For both editions, you apply the same license key on every site.

With Real-Time Backup you have the option of creating more Partner Sites for additional backups, but you must purchase a DataExchange license for each Partner Site beyond the first one.

You may install an evaluation version of DataExchange without a license. At the end of the evaluation period, the replication engine returns an error when it attempts to start. Use the Event Viewer of your operating system to find this entry in the Application event log.

You can add a permanent license at any time using the following steps.

To upgrade an evaluation system with a license key

The easiest way to apply a license key is by using Zen License Administrator.

1. Obtain the license key from one of the following locations:
   - Case of the DataExchange installation CD
   - Product registration card
   - Printed license agreement
2. If you need to purchase a license, contact your Zen sales representative.
3. In ZenCC, open the License Administrator utility.
4. Enter the key in the **Key** field.

   Lowercase letters are automatically converted to uppercase.
5. Press **Enter** or click the Authorize button.

   The Key field is cleared if the key is successfully authorized.
6. Verify that the new license information that appears in the **License Information** list. If necessary, press F5 to refresh the list.

   The license is now active.

You can also apply a license using the **licadmin** command line utility. For more information, see *Zen User's Guide*.

DataExchange Release Notes

We recommend that you read the release notes. This readme file may have important information that could not be included in the product documentation but is essential to installing and using the product.

It is included in a DataExchange installation on 64-bit systems as the file readme_dx.htm in C:\Program Files (x86)\Actian\Zen\Replication\Docs. However, since this file may be updated after the release, its latest version is always posted on the Actian website.

Installing DataExchange with No Previous Installation

The following topics cover procedures for installing DataExchange:

- Before You Install DataExchange
- Installing DataExchange
- Common Questions After Installing DataExchange
- Uninstalling DataExchange

Before You Install DataExchange

The following topics provide information needed to successfully install DataExchange. Before you do the installation, first review the following:

- Preparing to Install DataExchange. This topic covers platform-specific notes that are relevant to your use of the product.
- Readme. These release notes may contain last-minute information that could not be included in the documentation. This document is included in your DataExchange installation files but may be updated after the release. Its latest version is always posted on the Actian website.

Windows Platform Notes

Be aware of the following conditions.

- You must have full administrator-level rights on the system where you install DataExchange.
- You may need to disable antivirus software or change its settings to allow installation.

Installing DataExchange

DataExchange requires the latest version of a Zen v15 Enterprise Server or Cloud Server engine be installed first. Be sure that the system has a database engine before trying to add DataExchange.

Note: DataExchange installation stops and restarts the Zen engine. If your business needs prohibit stopping the database engine during certain hours, install DataExchange outside those times.

DataExchange comes in two editions determined by the kind of license you purchase:

- Real-Time Backup: A two-machine, one-way replication network of a First Site and one Partner Site that serves as a backup location. Data changes are stored in a DataExchange database on the First Site and are replicated to the Partner Site on a schedule that you set.
- Data Synchronization: A two-way replication network consisting of a First Site and a Partner Site. Data changes at either site are replicated to the other site.

  For both editions, DataExchange uses a single license key, which is authorized on both the First Site and Partner Site.

If you omit the license key at installation time, DataExchange provides a 30-day evaluation license, which you can later replace with a permanent one. For more information, see DataExchange Licensing.

If the installation fails before the program copies any files to the target installation directory, for more information about why the installation failed, see the %temp% directory of the current login for the installation log file DataExchange_v*nn*_x64_Install.log, where *nn* is the product version.

DataExchange offers an email notification agent on systems with Zen Enterprise Server or Cloud Server. For more information, see dxagent.

The rest of this section covers the following topics:

- Installing DataExchange for Real-Time Backup
- Installing DataExchange for Data Synchronization
- After You Install DataExchange
- Zen Security with DataExchange

Installing DataExchange for Real-Time Backup

Follow these steps for the Real-Time Backup edition. To install the Data Synchronization edition, see Installing DataExchange for Data Synchronization.

To install DataExchange in a two-system configuration for Real-Time Backup

You will run the installation twice: once on the First Site and once on a Partner Site.

1. Launch the installer from your Windows system by doing one of the following:
   - Run the downloaded self-extracting installer executable, or insert the DataExchange CD into the CD-ROM drive of your system.
   - If you are installing from a CD and the installation does not start automatically, run the following command from the operating system: *drive*`:\autorun\autorun` where *drive* is the drive letter of your CD-ROM device.
2. In the **Welcome** window, click **Next**.

   The installer detects your Zen version and system information. This may take a few minutes.
3. Read the **Software License Agreement**. To continue, click **I accept** and then click **Next**.
4. In the License field, do one of the following:
   - Enter a license key.
   - Leave the field blank to have the installer apply a temporary evaluation license key.

   At the end of the evaluation period, the replication engine begins returning an error. You may apply a license key at any time. See To upgrade an evaluation system with a license key.
5. Click **Next** and do one of the following:
   - If you entered a license key, it will tell the installer which edition you will use, so you can simply proceed to **step** 6. Be sure that your license matches the edition you plan to use.
   - If you leave the license field blank, the installer asks which edition you would like to evaluate: Data Synchronization or Real-Time Backup. Choose one and click **Next**.
6. Choose one of the following installations:
   - **First Site: Design, administer, replicate**

     You will use a First Site to design and configure the replication network. Its components include the administrative utilities and the replication engine.
   - **Partner Site: Administer, replicate**

A Partner Site replicates data with the First Site. Its components include the DataExchange administrative utilities and replication engine. You may install a Partner Site before installing a First Site, but you must initialize and configure the replication network from the First Site.

Caution! Do not install more than one First Site on a network, or replication conflicts may occur. To lessen the risk of unintentionally installing a First Site, the default choice in this step is Partner Site.

7. After making your selection, click **Next**, then continue as follows:
   - To install a First Site, Click **Yes** if you have **not** installed a First Site on your replication network and continue with the next step. Otherwise, click **No** to finish using the installer and exit.
   - To install a Partner Site, continue with the next step.
8. Click **Next** to open a dialog to specify site information.

   Both fields default to the host name of your machine.
   - The **Site Name** identifies your system on the replication network. The name can be whatever you want. Accept the default or enter a more descriptive name.
   - The **Host Name** identifies this system to the DataExchange Engine. If your system has a fixed IP address and you prefer to use it, enter it here. If the IP address is assigned by DHCP, accept the default host name.
9. Click **Next**.
10. You may click **Back** to review installation settings and change them if needed. To start the installation, click **Install**.
11. At the end of installation, click **Finish**.

We recommend that you view the readme file for important release notes concerning configuration and use of the product. It is included in the installation on 64-bit systems as the file readme_dx.htm in C:\Program Files (x86)\Actian\Zen\Replication\Docs. However, since this file may be updated after the release, its latest version is always posted on the Actian website.

Installing DataExchange for Data Synchronization

Follow these steps for a Data Synchronization edition. For the steps to install a Real-Time Backup edition, see Installing DataExchange for Real-Time Backup.

To install DataExchange in a two-system configuration for data synchronization

You will run the installation twice: once on the First Site and once on a Partner Site.

1. Launch the installer from your Windows machine by doing one of the following:
   - Run the downloaded self-extracting installer executable, or insert the DataExchange CD into the CD-ROM drive of your system.
   - If you are installing from a CD and the installation does not start automatically, run the following command from the operating system: *drive*`:\autorun\autorun` where *drive* is the drive letter of your CD-ROM device.
2. In the **Welcome** window, click **Next**.

   The installer detects your Zen version and system information. This may take a few minutes.
3. Read the **Software License Agreement**. To continue, click **I accept** and then click **Next**.
4. In the License field, do one of the following:
   - Enter a license key.
   - Leave the field blank to have the installer apply a temporary evaluation license key.

   A First Site and a Partner Site use the same key, which is provided on the case of the DataExchange installation CD, the product registration card, and the printed license agreement.

   At the end of the evaluation period, the replication engine begins returning an error. You may apply a license key at any time. See To upgrade an evaluation system with a license key.
5. Click **Next** and do one of the following:
   - If you entered a license key, it will tell the installer which edition you will use, so you can simply proceed to **step** 6. Be sure that your license matches the edition you plan to use.
   - If you leave the license field blank, the installer asks which edition you would like to evaluate: Data Synchronization or Real-Time Backup. Choose one and click **Next**.
6. Choose one of the following installations:
   - **First Site: Design, administer, replicate**

You will use a First Site to design and configure the replication network. Its components include the administrative utilities and the replication engine.

- **Partner Site: Administer, replicate**

  A Partner Site replicates data with the First Site. Its components include the DataExchange administrative utilities and replication engine. You may install a Partner Site before installing a First Site, but you must initialize and configure the replication network from the First Site.

Caution! Do not install more than one First Site on a network, or replication conflicts may occur. To lessen the risk of unintentionally installing a First Site, the default choice in this step is Partner Site.

7. After making your selection, click **Next**, then continue as follows:
   - To install a First Site, click **Yes** if you have **not** installed a First Site on your replication network and continue with the next step. Otherwise, click **No** to finish using the installer and exit.
   - To install a Partner Site, continue with the next step.
8. Click **Next** to open a dialog to specify site information.

   Both fields default to the host name of your machine.
   - The **Site Name** identifies your system on the replication network. The name can be whatever you want. Accept the default or enter a more descriptive site name.
   - The **Host Name** identifies this system to the DataExchange Engine. If your system has a fixed IP address and you prefer to use it, enter it here. If the IP address is assigned by DHCP, accept the default host name.
9. Click **Next**.
10. You may click **Back** to review installation settings and change them if needed. To start the installation, click **Install**.
11. At the end of installation, click **Finish**.

We recommend that you view the readme file for important release notes concerning configuration and use of the product. It is included in the installation on 64-bit systems as the file

readme_dx.htm in C:\Program Files (x86)\Actian\Zen\Replication\Docs. However, since this file may be updated after the release, its latest version is always posted on the Actian website.

After You Install DataExchange

Your next step depends on which edition of DataExchange you have installed.

After Installing Real-Time Backup Edition

After you install DataExchange Real-Time Backup Edition on both sites, we recommend that you set up a sample replication deployment between the first and partner sites. Using this example is optional, but it may be helpful to step through a hands-on deployment with a sample database.

To use the example, see Replication Deployment.

After Installing Data Synchronization Edition

DataExchange Data Synchronization Edition provides several ways to design and deploy a database for replication. These methods involve a variety of decisions, which are under Data Synchronization Deployment Models.

Zen Security with DataExchange

Zen provides security models for Btrieve applications. However, an activated database created by DXdeploy does not automatically use security, even if its source database does. You can add security to a replication database. For an example using the Demodata sample database, see Replicating a Database with Zen Security. To learn more about Zen database security, see those topics in the Zen *Advanced Operations Guide*.

Common Questions After Installing DataExchange

You may have the following questions after installation.

Do I Have to Configure Anything in Control Center (ZenCC) for DataExchange?

No. DataExchange requires no special settings in ZenCC.

Does DataExchange Create Any Log Files?

Yes. See Log Files.

How Do I Automate a Scheduled Replication?

See Schedule Tasks.

How Do I Get Notified by Email for a Replication Failure?

See DataExchange Agent.

Where are the DataExchange files installed?

You will find new installations of DataExchange in the following locations:

Platform	File Types	Default Installation Location
Windows 7 and later[1] (64-bit)	Application Data	C:\ProgramData\Actian\Zen\Replication
	Program Files (64-bit) (Event Handler)	C:\Program Files\Actian\Zen\bin
	Program Files (32-bit)	C:\Program Files (x86)\Actian\Zen\Replication C:\Program Files (x86)\Actian\Zen\bin

[1] **Windows 7 and later** refers to Windows 7 and any Windows operating system released after Windows 7 that is currently supported by Actian Zen and DataExchange.

Uninstalling DataExchange

The uninstall program removes all DataExchange components from your system. Uninstalling removes databases registered by Zen that are located under C:\ProgramData\Actian\Zen\Replication or C:\Program Files (x86)\Actian\Zen\Replication. For locations other than these, uninstalling leaves databases untouched. It also does not remove DSNs and database names associated with databases in other locations.

If you have activated databases located under C:\ProgramData\Actian\Zen\Replication or C:\Program Files (x86)\Actian\Zen\Replication, you must perform the following actions before you uninstall DataExchange:

- Deactivate each database with the dxdeact utility. See dxdeact. For an example of deactivating a database, see Removing the Example Deployed Database.
- Remove the template with Template Remover wizard. See trwizard. For an example of using the wizard, see Removing the Example Deployed Database.
- Optionally, if you no longer need the data, delete the source database or specific tables using the Drop Database wizard or the Drop Table wizard in Control Center (ZenCC).

If you do not deactivate the database before you remove the template, uninstalling leaves the database files and associated replication files. The replication files do not cause any problems, but you may prefer to reclaim physical storage by deleting them.

Note: The Zen database engine must be stopped and restarted during DataExchange removal. If your business requirements prohibit stopping the database engine during certain hours, uninstall DataExchange during an acceptable period.

To uninstall DataExchange

Note: You can upgrade DataExchange without uninstalling it. To do so, use the steps under Upgrading Your DataExchange Installation. Completely removing DataExchange removes all design and activated database information from your system, as well as any databases created under the Replication directory. Since uninstalling would require you to redesign any replication databases after installing the new version, it is preferable to upgrade without this step.

If you need to uninstall DataExchange, use the following standard steps:

1. In the Windows Control Panel, open **Programs and Features**.
2. Click DataExchange in the list and select **Uninstall**.
3. When the installer has finished, restart your system if prompted to do so.

Upgrading Your DataExchange Installation

The following topics explain how to move to a newer version of DataExchange:

- Before You Upgrade DataExchange
- Upgrading DataExchange
- Common Questions After Upgrading DataExchange

Before You Upgrade DataExchange

For users who want to move to the current release of DataExchange from an earlier version, the upgrade steps have changed from past releases. You now must uninstall the previous version of DataExchange using a specific set of steps, while also upgrading Zen.

To get ready to upgrade DataExchange, review the following items before proceeding with the steps under Upgrading DataExchange. In addition, since upgrading requires a new installation, see also the topic Preparing to Install DataExchange.

DataExchange Readme

We strongly recommend that you read the DataExchange release notes. This readme file provides information that could not be included in the product documentation but may be essential to your installation and use of the product. It is included in a DataExchange installation on 64-bit systems as the file readme_dx.htm in C:\Program Files (x86)\Actian\Zen\Replication\Docs. However, since this file may be updated after the release, its latest version is always posted on the Actian website.

Windows Administrator Rights

You must have full administrator-level rights on the system where you install DataExchange. For more information, see Administrator Rights.

Data File Backup

We recommend that you perform a backup of all of your current data files before beginning the upgrade. You may also want to perform a full system backup and test its restoration. A full system backup is best practice before any software installation on a server.

Upgrading DataExchange

Upgrading to the latest version of DataExchange must be done at the same time as upgrading Zen. The following steps apply to upgrades from earlier versions of DataExchange to DataExchange 15.00 and from earlier versions of PSQL to Zen 15.00 and 15.10.

To upgrade DataExchange

Remember to upgrade **all** sites used in replication.

1. Deactivate the replication databases on both the Partner Site and First Site.
2. Remove the replication template from the First Site.
3. Stop the Zen services, then delete the replication databases and replication-related files from the following locations:
   - C:\Program Files (x86)\Actian\PSQL\Replication\projects
   - C:\Program Files (x86)\Actian\PSQL\Replication\templates
4. Uninstall DataExchange on the Partner Site.
5. Uninstall DataExchange on the First Site.
6. Upgrade Zen on the First Site.
7. Upgrade Zen on the Partner Site.
8. Install DataExchange on the First Site machine as the First Site.
9. Install DataExchange on the Partner Site machine as the Partner Site.
10. Use DXDeploy to create a replication project.
11. On the Partner Site, if you are asked to replace existing files for Real Time Backup (RTB), select **Save these files before replacing**.
12. Initiate replication.

If DataExchange installation fails before the program copies files to the target installation directory, see the %temp% directory of the current login for the installation log file DataExchange_v*nn*_64_Install.log.

Note: If you have been replicating multiple databases, instead of the steps 1–7 above, consider installing Zen on fresh machines using the ZenCC schema export and import feature to move the databases from their original locations to the new systems. Then continue with steps 8–12.

Common Questions After Upgrading DataExchange

See Common Questions After Installing DataExchange.

DataExchange Basics

The following topics explain the core concepts and routine tasks of using DataExchange. Information on working with the engine, logins and DSNs related to DataExchange is included.

- Starting and Stopping Replication
- Starting and Stopping the DX Agent Service
- ODBC Basic Concepts
- Replicating a Database with Zen Security

Starting and Stopping Replication

Depending on the Zen product, the DataExchange replication engine runs as a service or a console application. It can be accessed from Control Center (ZenCC). This topic covers starting and stopping the engine in all three cases.

As a Service

The DataExchange executable replserv.exe runs as a service on the system where Zen Enterprise Server or Cloud Server is installed. It is a single executable that runs under the Windows Service Control Manager. It is configured by default to run when the system starts under the LocalSystem account, which should be adequate in most cases. If needed, you can change the account in the Log On tab of the Properties dialog for the service in the Services Control Panel.

To start the Replication service

1. Open the **Services** Control Panel.
2. Select **Actian DX Replication**.
3. Do one of the following:
   - Select the **service** and then on the left, click **Start**.
   - Open the **service** and under Service Status, click **Start**.
   - Right-click the **service** and select **Start**.

To stop the Replication service

1. Open the **Services** Control Panel.
2. Select **Actian DX Replication**.
3. Do one of the following:
   - Select the **service** and then on the left, click **Stop**.
   - Open the **service** and under Service Status, click **Stop**.
   - Right-click the **service** and select **Stop**.

From Zen Control Center

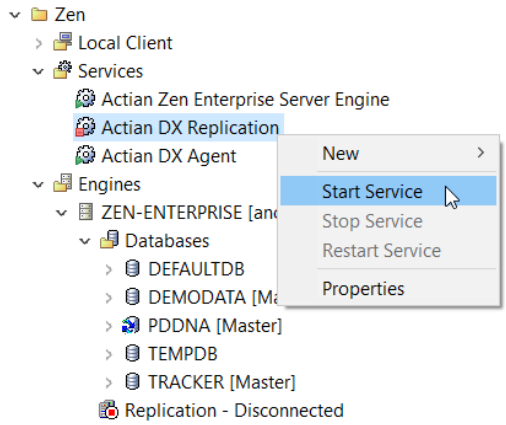
To start the Replication service

1. Start ZenCC if it is not already running.

   In Zen Explorer under Engines, the Replication icon shows a red dot to show the replication engine is stopped.

2. Expand the **Services** branch.

3. Right-click **Actian DX Replication** and select **Start Service**.



   Under Engines, the Replication icon shows a green arrow to show the replication engine is running.

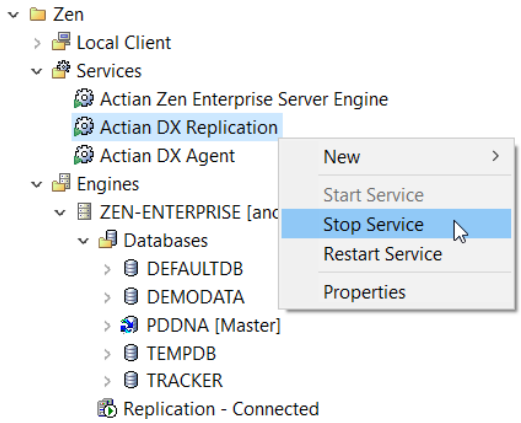
To stop the Replication service

1. Start ZenCC if it is not already running.

   In the Replication icon the green arrow shows the replication engine is running.

2. Expand the **Services** branch.

3. Right-click **Actian DX Replication** and select **Stop Service**.



In the Replication icon the red dot shows the replication engine is stopped.

Starting and Stopping the DX Agent Service

DataExchange Agent runs as a service. It can be accessed from ZenCC. This topic covers stopping and starting the agent as a service and from ZenCC.

As a Service

The DataExchange executable dxagent.exe runs as a service on the system where Zen Enterprise Server or Cloud Server is installed. It is configured by default to run when the system starts under the Local System account, which should be adequate in most cases. If needed, you can change the account in the Log On tab of the Properties dialog for the service in the Services Control Panel.

To start the DX Agent service

1. Open the **Services** Control Panel.
2. Select **Actian DX Agent**.
3. Do one of the following:
   - Select the **service** and then on the left, click **Start**.
   - Open the **service** and under Service Status, click **Start**.
   - Right-click the **service** and select **Start**.

To stop the DX Agent service

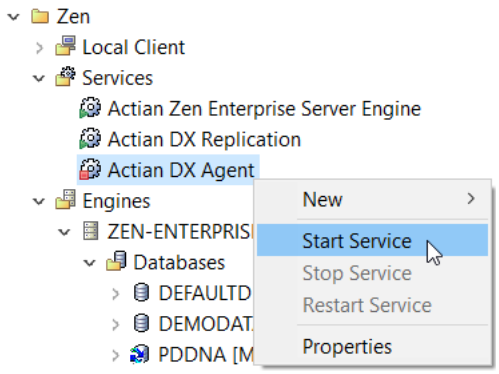
1. Open the **Services** Control Panel.
2. Select **Actian DX Agent**.
3. Do one of the following:
   - Select the **service** and then on the left, click **Stop**.
   - Open the **service** and under Service Status, click **Stop**.
   - Right-click the **service** and select **Stop**.

From Zen Control Center

To start the DX Agent service

1. Start ZenCC if it is not already running.

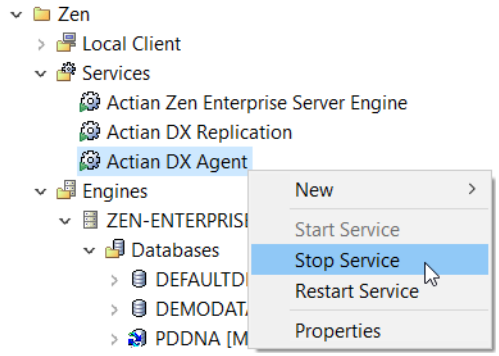
2. In Zen Explorer, expand the **Services** branch.
3. Right-click **Actian DX Agent** and select **Start Service**.



In the Services branch, the service icon is now green to show DX Agent is running.

To stop the DX Agent service

1. Start ZenCC if it is not already running. (Select **Zen Control Center & Documentation** from the **Start** menu.)
2. Expand the **Services** branch.
3. Right-click **Actian DX Agent** and select **Stop Service**.



In the Services branch, the service icon is now red to show DX Agent is stopped.

ODBC Basic Concepts

Zen follows the Microsoft standard for ODBC database connections. According to the standard, applications must connect to databases through Data Source Names (DSNs) defined in the operating system.

Every Zen database that you expect to access using ODBC must have a Data Source Name (DSN) available on the same computer as the database engine, and (if applicable) another DSN on the client computer. The only exceptions are Zen tools, which can access remote databases without using DSNs on the client computer. A DSN created on the same machine as the database engine is called an *Engine* DSN. A DSN created on the client machine is called a *Client* DSN.

Note: Zen databases that are accessed only through Btrieve do not need DSNs. However, in this case, the database is not visible in ZenCC nor can it be manipulated using ZenCC. Zen recommends using Data Dictionary Files (DDFs) and DSNs with all databases, including ones accessed only through Btrieve, to make them easier to manipulate.

Servers and Clients

Every Zen server engine includes a client installation. So you can use your server machine to connect to other servers as a client.

Zen clients can connect to remote machines where a Zen server engine is installed.

Data Source Names

In a client-server architecture, each data set must have a well-known name. A DSN is a well-known name for a data set. There are generally three ways to create DSNs:

- Create an Engine DSN from the server console.
- Create an Engine DSN remotely from a client machine.
- Create a Client DSN on each client machine.

Components of a Database Name

There are two components of a database name. Zen uses an internal Database Name (DBNAME) to identify the location of the Data Dictionary Files (DDFs) and the data files for each database. An ODBC Data Source Name (DSN) entry refers to one DBNAME.

You may set up more than one DSN that refers to the same DBNAME. If the physical location of the data files on the server is changed, only the DBNAME needs to be updated. All DSNs remain unchanged.

Replicating a Database with Zen Security

Zen provides security models for Btrieve applications. However, an activated database created by DXdeploy does not automatically use security, even if its source database does. You can add security in one of two ways:

- Enable security in ZenCC before designing a new template for replication.
- For an already activated database, first deactivate the database at all sites. Once Zen security has been configured, you can then reactivate the database.

For more information about security in Zen, see *Advanced Operations Guide*.

The following example uses Demodata to show the use of Zen security with DataExchange.

Deploying Demodata Under Zen Security

The topic Replication Deployment Using DXdeploy with an XML Descriptor File explains how to deploy the sample database Demodata under the Classic security model. However, if you are using either Database or Mixed security, you must first ensure that Demodata can be deployed successfully.

The following table lists actions required to deploy Demodata. Perform these on both the First Site and the Partner Site before attempting the DXdeploy example deployment.

Replication Site	Database Security Model	Mixed Security Model
First	• Add C:\ProgramData\Actian\Zen\Demodata as a data file location for DefaultDB • Add the templates directory as a data file location for DefaultDB. For example, on a 64-bit system this location is C:\Program Files (x86)\Actian\Zen\Replication\Templates. • In ZenCC under Configuration for Server Access, turn on Prompt for Client Credentials. You can also do this using the Zen pvnetpass utility. • During the example deployment, a login dialog prompts you to log in to DefaultDB. When you enter the user name and password, select the option **Save User Name and Password** to avoid having to log in for each table replicated. • After the example deployment finishes, we recommend that you use pvnetpass to remove the saved user name and password. If you choose not to do this, note that any Btrieve application on the secured site has access to all databases associated with DefaultDB.	• Add C:\ProgramData\Actian\Zen\Demodata as a data file location for DefaultDB • Add the templates directory as a data file location for DefaultDB. For example, on a 64-bit system this location is C:\Program Files (x86)\Actian\Zen\Replication\Templates. • In ZenCC, click **Users** for DefaultDB. Right-click the **Public** group, then click **Properties**. • Click the **Permissions** tab. Grant all permissions for Public, then click **OK**. • After the example deployment finishes, reset the permissions for user Public as suits your business requirements.
Partner	• Add C:\ProgramData\Actian\Zen\Demodata as a data file location for DefaultDB	• Add C:\ProgramData\Actian\Zen\Demodata as a data file location for DefaultDB

Once you have finished these actions, you can return to the example under Replication Deployment Using DXdeploy with an XML Descriptor File or to your own replication database deployment.

Using DataExchange

The following topics provide in-depth information for using DataExchange in daily operations. They include discussions about fundamental concepts, as well as procedural information for dealing with some of the common scenarios you may encounter during replication.

- Activation
- Deactivation
- Adding Dynamic Tables to an Activated Database
- Changing a Table Structure in an Activated Database

Activation

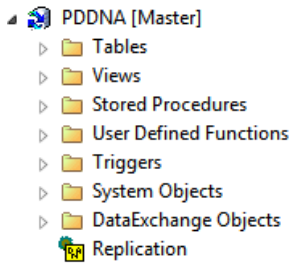
Activation is the process of creating a new database for replication, or enabling an existing one, and defining it as belonging to a site within a replication network so that it can replicate. Because activation associates a database with a site, *activating a database* and *activating a site* mean the same thing.

The Deployment Wizard and dxdeploy command line utility both activate replication databases automatically as part of deployment. The dxact command line utility provides a manual method of activation as well as the flexibility to specify options such as preprocessing of starter data. For this discussion, we use dxact to activate the sample database, but first it's important to first understand a few concepts in the activation process:

- Activation and Data Source Names
- Activating First and Partner Sites

Activation and Data Source Names

When you activate a database, DataExchange creates an internal system data source name (DSN) to point to the activated copy. In addition, DataExchange installation creates a database called PSQL DataExchange Database Network Analysis (PDDNA), which is the internal replication database. This database appears in Zen Explorer with the **DNA** icon in its Replication node.



Caution! Do not alter or otherwise directly attempt to use the internal DNA database (PDDNA). Doing so can corrupt the DataExchange installation.

Activating First and Partner Sites

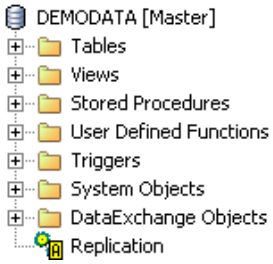
The First Site special because it contains information needed to manage the replication network. The First Site must be activated before any of the Partner Sites so that they each can obtain copies of the information. Once the First Site is activated, you may activate your Partner Sites in any

order. You can use the Deployment Wizard, dxdeploy.exe or dxact.exe on each Partner Site machine to activate it.

Tip... The replication engine must be running to activate a database.

If possible, each Partner Site machine should have a network connection to allow it to communicate with the First Site so that the initial replication session can start immediately. This is not mandatory, however. You can perform the initial replication at a later time if you prefer. In the Data Synchronization edition, a Partner Site cannot replicate with other Partner Sites until it performs an initial replication with the First Site.

After a successful activation, ZenCC displays the database as activated, with the Replication node icon showing a letter A.



Once the initial replication has succeeded, the newly installed site is fully aware of all administrative data in that network, including all replication schedules.

For more information

Specific information about using each of the DataExchange deployment utilities is available in Using the DataExchange Utilities and Services. The following table provides specific reference information.

Activation Method	For more information...
Deployment Wizard (Dpwizard.exe)	See dpwizard
Dxdeploy.exe	See dxdeploy
Dxact.exe	See dxact

To activate using dxact.exe

1. On the site machine you want to activate, open a command prompt window to start dxact.exe.

2. At the prompt, type a command similar to the following:

   ```
   dxact demodata /FI
   ```

   This example activates the demodata database on the First Site using the dxact.exe utility. By default, messages from dxact.exe are written to the dxact.log file, not to the screen. To view the messages on the screen while dxact.exe runs, use the /LOGFILE= option. To do so, you would enter a command similar to the following:

   ```
   dxact demodata /Logfile= /FI
   ```

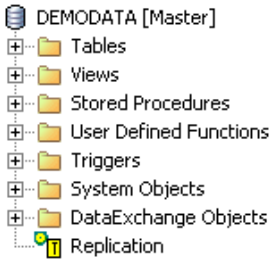
The /FI option specifies you are activating the First Site, but you should always run dxact.exe from the site you want to activate – remote activations are not available in DataExchange. For the complete list of dxact.exe options available, see dxact.

Now that we've covered the basics of activation, the next topics are deactivation and reactivation.

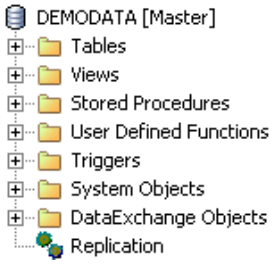
Deactivation

Deactivation is the disabling of an activated database in a replication network. Deactivation uses the dxdeact utility as explained in Using the DataExchange Utilities and Services.

If you deactivate a database on the First Site, Control Center displays the First Site database as a design template, since it was used to design the database for the replication network. When the First Site is deactivated, the Replication node icon displays a letter T.



When a Partner Site is deactivated, in Control Center on that site the Replication node icon for the database no longer displays a letter A for activation.



Other sites do not detect a deactivated site until replication occurs, which fails for the deactivated site. This is normal and generates an error message similar to the following in the dre.log file:

```
E 019f 0301-15:46:25 Partner site Partner_Site_2 (site number: 00LFLU) has been removed from the
replication network - it cannot replicate with any other site.
```

After the failed replication, the error no longer occurs because all sites in the replication network have detected the deactivated site.

To deactivate using dxdeact.exe

1. On the site machine you want to deactivate, open a command prompt window to start dxdeact.
2. At the prompt, type a command similar to the following:

   ```
   dxdeact demodata
   ```

This example deactivates the demodata database using the dxdeact utility. By default, messages from dxdeact are written to the dxdeact.log file, not to the screen. To view the messages on the screen while dxdeact runs, use the /LOGFILE= option just as you did earlier with dxact.exe. It's helpful to note that all the DataExchange Utilities provide the /LOGFILE= option to control logging output. For the complete list of dxdeact.exe options available, see dxdeact.

Reactivation

Reactivation is the reenabling of a deactivated site for replication. A database must be deactivated before it can be reactivated. Reactivation is, in essence, the same as activation in that you use the dxact utility in the same manner as you did when you activated.

If you deactivate a First Site, you must perform a manual replication if you reactivate the First Site. After you reactivate the First Site, you must manually initiate a replication session from each Partner Site to the First Site. The replication sessions ensure that all available sites appear on the **Initiate Replication** dialog.

Note: Manually initiating a replication session is not required if you deactivate/reactivate a Partner Site. It applies only to a First Site.

If you deactivate a First Site, you must perform a manual replication if you reactivate the First Site. After you reactivate the First Site, you must manually initiate a replication session from each Partner Site to the First Site. The replication sessions ensure that all available sites appear on the Initiate Replication dialog. This action is not required if you deactivate/reactivate a Partner Site. It applies only to a First Site.

Adding Dynamic Tables to an Activated Database

You applications may add tables to a Zen database that did not exist at the time database replication was set up in DataExchange. DataExchange provides a way to include these new tables in – or exclude certain tables from – the set of replicated tables for an activated database. Only table files should be included because only tables may be replicated. Any type of file may be excluded, but whether or not you exclude them, files other than tables are not replicated.

The new tables are identified by a pattern-matching algorithm, which uses glob-style patterns in both regular and dir expressions. You specify which file patterns you want the algorithm to use. Blank by default, the patterns are the only input required from you. DataExchange does the rest automatically.

DataExchange first compares file names for the include pattern then compares file names against the exclude pattern. Only files whose names pass both comparisons are included. For example, suppose you specify c:\mydata*.d?? as an include pattern. If you specify an exclude pattern of c:\mydata*.ddf, then all files in c:\mydata will be included except for ones with a file extension of "ddf."

Tip... For a detailed discussion about the types of expressions you can use as include and exclude patterns with dxdynpath, see Types of Expressions.

The inclusion or exclusion of tables begins when a table is successfully opened with the database open API. DataExchange then determines whether the table is identified as one to be replicated (that is, is the table new to replication). If the table is new and its name matches only with the exclude pattern, DataExchange takes no replication action on the table. DataExchange includes a new table if its name does not match with the exclude pattern but does match with the include pattern. Initially, after a successful open, the table is simply identified to DataExchange as being new. Data in the new table is not immediately replicated.

The next replication process (for example, from a scheduled replication) prepares the new table for replication and synchronizes the replication information about it on all sites. The second replication process includes the new table. Note, then, that the actual replication of data to or from a new table requires *two* replication cycles.

Note: Inclusion of dynamically created tables applies only to Real-Time Backup replication. Also, the dynamically created tables must be on the machine where the database application is running. That is, the tables must be on the machine that serves as the source location from which data is replicated.

Before you Begin

If you're unfamiliar with expressions or have had little exposure to working with them, we strongly recommend you first review Types of Expressions to gain a basic understanding of how to work with the different types of expressions.

Caution! Any file used with the dxdynpath utility requires system keys, which are needed by Zen for transaction logging purposes.

Include File Patterns

In our example database Demodata, we'll automatically generate a set of tables every day that contain the attendance records for each campus. This is important data that must be included in the replication. We'll add an include pattern using dxdynpath so these tables get replicated as well. The table name uses a naming convention of `attend<`*campusid*`>.mkd`, where <*campusid*> is the three letter campus code.

Caution! This topic applies only if your application dynamically creates new tables for an activated database. This process is only recommended as a solution for tables that are added dynamically.

To include new tables for replication

1. On the First Site, open a command prompt and type the command:

   ```
   dxdynpath /t=include /pa="dir attend*.mkd" append demodata
   ```

2. Verify that the include pattern is there by typing the following command:

   ```
   dxdynpath /t=both show demodata
   ```

   A message should display that lists the name and version of the dynamic table configuration and test utility, and additional information such as the following:

   ```
   INCLUDE pattern is "dir attend*.mkd"
   EXCLUDE pattern is ""
   ```

   You may want to manually initiate replication after you specify new files to include. This completes the first cycle of replication required to prepare the dynamic tables for replication. The new tables are then ready for the second cycle (for example, a scheduled replication) in which data is replicated.

Exclude File Patterns

Now let's fine tune our pattern expressions for our example database. We've included all of the attend*.mkd files, but there is a cumulative file (attendall.mkd) that gets created too. Since we have all the individual files that are included in the cumulative one, we don't really need that file replicated. So, we'll exclude it from our pattern matching.

To exclude files from replication

1. On the First Site, open a command prompt and type the following command:

   ```
   dxdynpath /t=exclude /pa="dir attendall.mkd" append demodata
   ```

2. Verify that the exclude pattern is there by typing the following command:

   ```
   dxdynpath /t=both show demodata
   ```

   A message should display that lists the name and version of the dynamic table configuration and test utility, and additional information such as the following:

   ```
   INCLUDE pattern is "dir attend*.mkd"
   ```

   ```
   EXCLUDE pattern is "dir attendall.mkd"
   ```

These simple examples illustrate how dxdynpath uses pattern matching to determine what files are replicated. For more detail on using dxdynpath and the types of expressions you can use, see dxdynpath.

Changing a Table Structure in an Activated Database

You may have a situation where a table that is currently part of a replication design changes structurally, or its system keys are updated, and these changes need to be synchronized with othersites. You'll need to be sure that these changes are captured in your replication design, are synchronized across sites, and that you are able to successfully replicate with the changes in place.

Before you Begin

We strongly recommend that you confirm the following items before beginning this procedure:

- Make sure that the replication schedules are currently disabled and that no users are working on the system. This procedure includes deactivating the database, and it is always a good practice to disable any replication schedules before deactivation.

Caution! It is important that no database user or application is active while tables are being modified because any changes to the database cannot be captured while databases are deactivated.

- It is critical that the system keys for records in each user table are accounted for in the corresponding replication table, which is prefixed by the letters PDC. This is the mechanism used to track which records need to be sent to the other sites in the replication network. If a user table and PDC table become disconnected because of incorrect system keys, it can cause replication to fail. For more information, see PDC Replication Tables.
- When you add or remove columns from the table at the First Site, make certain you remember to make the same changes to the table on the Partner Site so that the DDFs reflect the same structure for the tables.
- The procedures explained in this documentation assume that all sites in a replication network have been synchronized before you make any schema changes.

The high-level steps needed to complete this procedure are as follows:

- Clone PDC Tables
- Copy Files and Activate the Partner Site
- Verify the Replication Session

Clone PDC Tables

Although it is not required to use a blank copy of the PDC table, doing so will:

- Reduce PDC table size by including only new records, lessening transmission time to the other sites.
- Speed up the dxsynctables process because dxsynctables does not have to verify preexisting records in the PDC table.

To clone PDC tables

1. Identify tables that were modified in the user data, usually found on the customer production site.
2. Find the replication table for each of modified table. Replication table names have a PDC prefix. Their default location is C:\ProgramData\Actian\Zen\<database name>\DX_<project name>.
3. Use the Zen utility butil to clone the PDC tables, then replace the existing ones with the clones.

Tip... For information on using the butil utility to clone tables, see *Advanced Operations Guide*.

Activate the First Site and Sync Tables

1. Activate the First Site using the dxact.exe command.

   `dxact /FI <`*Database_DSN*`>`

   For example, to activate the Demodata sample database, the command is `dxact /FI demodata`.

2. For each modified table, run this command from a command prompt:

   `dxsynctables` <*TableName*> <*DSN*>

Note: This process may take some time to run, depending on the number of records contained in the user table. Tests show that in cases where there are several million records or more, disabling L2 caching can reduce the population times and speed up this process significantly. Make sure to reenable L2 after the user is finished with all the tables.

Copy Files and Activate the Partner Site

To copy files

1. Copy the newly modified user tables and newly populated PDC tables to the appropriate directories at each of the other sites in the replication network. Make certain that you overwrite the already existing tables there.

2. Activate each Partner Site using dxact.exe and the `/pa[rtneraddress]=<string>` option to designate the site with which you will replicate.

   For example, if the First Site address is SiteA, you would enter a command similar to the following:

   `dxact /pa=SiteA` <*Database_DSN*>

Verify the Replication Session

To verify the replication session

1. On the each site that should have replicated, browse to the LogFiles directory.

   This directory is C:\ProgramData\Actian\Zen\Replication\LogFiles.

2. Open the file dre.log and check for messages indicating success or errors.

3. Reenable replication schedules.

   You may now allow your users to return to the system.

Replication Deployment

The following topics provide several tutorials to show how to deploy a database for replication:

- Deployment Process
- Replication Deployment Using the DX Deployment Wizard
- Replication Deployment Using DXdeploy with an XML Descriptor File
- Working with Your Database
- 1-Way Deployment Using DXdeploy
- 2-Way Deployment Using DXdeploy

All examples in the DataExchange documentation use a 64-bit Windows system with an installation location of C:\Program Files (x86)\Actian\Zen.

Deployment Process

Most users run the DataExchange Deployment Wizard to create and deploy a replication network. This wizard automatically takes care of most of the things needed for replication.

One way to learn the DataExchange replication deployment in deeper detail is to step through an example using the sample database Demodata that is included with Zen. The example concentrates on *what* to do. You can then learn about *why* you perform certain actions by reading Working with Your Database.

This topic illustrates a working example of preparing a database for real-time backup between two systems. It involves the use of the DataExchange utility DXdeploy and the manual copying of a file.

The typical deployment process has four steps:

1. Edit the XML deployment descriptor file used by the DXdeploy utility.
2. Run DXdeploy on the First Site, setting the XML descriptor file as a parameter.
3. Copy the replication-enabled files from the First Site to the Partner Site.
4. Run DXdeploy on the Partner Site, setting the same XML descriptor file used for the First Site.

An optional fifth step involves setting up a replication schedule with DataExchange Manager.

Tip... The deployment process described here can also be performed using DX Deployment Wizard, which provides a graphical user interface and partial automation of replication deployment. For more information, see Replication Deployment Using the DX Deployment Wizard.

Replication Deployment Using the DX Deployment Wizard

DataExchange Deployment Wizard is the simplest and quickest way to create and deploy a replication network. The wizard is used on both First and Partner sites and includes a means of creating a replication schedule.

You can open DX Deployment Wizard by selecting it from the **Start** menu or from Control Center by selecting **DataExchange** > **Deployment Wizard**. Before you use the wizard, be sure to follow the instructions under Administrator Rights for DataExchange users.

To get ready to use DX Deployment Wizard, first write down the following deployment attributes. As you run the wizard, you will enter these items at various points in the process.

- Project Name – this corresponds to a specific database. If your goal is to replicate a database named *mydatabase*, then you may want to call the project *mydatabase project* or something similar.
- Network Name – this refers to the name you have chosen to represent the grouping of replication sites that participate in replication.
- Release Name – this is similar to a version number for the design of the replication database.
- DSN – this specifies the data source name (DSN) to be associated with the data files deployed for replication. The DSN must be unique on each site.
- Directories and file names of data – this specifies the directories and data files to be included in the replication.

The wizard automates almost all of the steps that you must follow in using the DXdeploy utility on the command line. The wizard does require you to do one thing manually:

1. After you run the wizard on the First Site, look for the file *projectname*.dxb in C:\Program File(x86)\Actian\Zen\Replication\projects. If the project name is mydatabase, as in the example above, this file will be named mydatabase.dxb.
2. Copy the .dxb file to the Partner Site and place it in one of the data directories to be replicated.
3. When you run Deployment Wizard on the Partner Site, it prompts you to select the .dxb file as part of setting up Partner site replication.

For More Advanced Explanation

If you want to find out more about how DataExchange works, see the tutorial Replication Deployment Using DXdeploy with an XML Descriptor File. It steps through replication deployment from the command line using an XML file that contains all needed settings, including the deployment attributes mentioned above.

We expect only advanced users to routinely use the command line method with DataExchange, but it may be useful to those who want a more detailed understanding of the product.

Replication Deployment Using DXdeploy with an XML Descriptor File

This command line tutorial provides a more detailed understanding of the creation and deployment of replication networks in DataExchange. The tutorial uses the Demodata sample database as an example. Demodata is provided with Zen.

The steps presented here focus on what to do rather than why. Afterwards you can read about why how it works in the next topic, Working with Your Database. This topic includes an explanation of the structure and elements of the XML Deployment Descriptor File.

Working with the sample consists of two procedures, each with several tasks:

- Deploying Demodata for Replication
  - Task 1: Edit the XML descriptor file
  - Task 2: Run DXdeploy on the First Site
  - Task 3: Verify deployment on the First Site (optional)
  - Task 4: Copy the Template to the Partner Site
  - Task 5: Run DXdeploy on the Partner Site
  - Explanation of the XML Deployment Descriptor File
- Removing the Example Deployed Database
  - Task 1: Deactivate the example database on both sites
  - Task 2: Run Template Remover on the First Site
  - Task 3: Delete files on the First Site
  - Task 4: Delete the example database and files on the Partner Site

Since this deployment is only an example, it does not show how to set up a replication schedule.

Note: Zen contains security models for Btrieve applications. The example used here assumes that you deploy Demodata on sites with the Classic security model (the default model). If DefaultDB uses either Mixed or Database security, you must ensure that Demodata can be deployed. The easiest way to do this is to disable security by removing the password for DefaultDB on each site where security is set. To do so, in ZenCC right-click DefaultDB and select **Properties**. Click the Security tab, select the checkbox **Disable database security**, and click **Apply**. If you are not logged in to DefaultDB, provide the master password. Click **OK**. Remember to reenable security for DefaultDB after you complete the example deployment. If you want to retain security, see the tutorial Replicating a Database with Zen Security, which uses Demodata as an example.

Deploying Demodata for Replication

Before you work through this example, be sure you have already installed both a First Site and a Partner Site (backup site) as explained in Installing DataExchange with No Previous Installation.

Tip... So that you can restore Demodata to its original state after this deployment exercise, we recommend saving a copy of the database files before proceeding with this example.

Task 1: Edit the XML descriptor file

1. On the First Site machine, open the folder C:\Program Files (x86)\Actian\Zen\Replication\Docs.
2. Make a copy of the XML descriptor file **EXPRESS.XML** and rename the copy **ExampleRTB.xml**.

   You may save the file to the location you choose on your First Site machine.
3. Open **ExampleRTB.xml** in a text editor.

   This template file is explained under XML Deployment Descriptor File.
4. Set the machine name or IP address of your First Site. “Localhost” is not permitted as the machine name.

   For example, if the name of your First Site is SiteA:

   ```
   <First
     ServerName="SiteA"
   ```
5. Set the root directory path to the data files on the First Site.

   For the First Site DataDirectory, change C:\MYDATA to C:\ProgramData\Actian\Zen\Demodata.

   The configuration should now be something similar to the following:

   ```
   <First
     ServerName="SiteA"
     DSN="DXDatabase"
     DataDirectory="C:\ProgramData\Actian\Zen\Demodata">
   ```

   Because this is just an example, leave the DSN as DXDatabase.
6. Specify the paths to the data files that you want to replicate relative to the root directory in DataDirectory.

   The Demodata data files use an .mkd extension, so keep the line `<Include Path="*.mkd" />`. You may include any extension used by Btrieve files in your Zen environment.

7. Delete the following lines because they do not apply to this example:

```
<Include Path="*.btr" />
<Include Path="*.dat" />
```

   Demodata has DDFs, so keep `<Include Path="*.ddf" />`. Typically, you will want to replicate DDFs. Note that the DSN created by DXdeploy does not use Demodata DDFs but rather uses its own in replication.

8. Set the machine name or IP address of your Partner Site.

   Change **remote.hostname** to your site name or IP address. For example, if the Partner Site machine is SiteB:

```
<Partner
  ServerName="SiteB"
```

9. Set the absolute path to the root directory of the data files on the Partner Site.

   For the Partner Site DataDirectory, change C:\MYDATA to C:\Demodata.

   The information should now read something like the following:

```
<Partner
  ServerName="SiteB"
  DSN="DXDatabase"
  DataDirectory="C:\Demodata" />
```

Note: The data directory on the Partner Site could be C:\ProgramData\Actian\Zen\Demodata if you want to overwrite the sample database. This example uses a different directory to preserve Demodata as installed by Zen.

10. Save and close the file **ExampleRTB.xml**.

Task 2: Run DXdeploy on the First Site

Open a command prompt on the First Site and run the following. The string is not case-sensitive.

```
dxdeploy /Site=First "C:\Program Files
(x86)\Actian\Zen\Replication\Docs\ExampleRTB.xml"
```

As it runs, DXdeploy displays high-level status messages:

- Starting the CreateDSN action
- Starting the Design action
- Starting the Activate action
- Activation done, now synchronizing tables

The file dxdeploy.log in C:\ProgramData\Actian\Zen\Replication\LogFiles records more detail. To view its entries on-screen while DXdeploy runs, you can use the /LOGFILE= option. For example, `dxdeploy /Site=First /LOGFILE= ExampleRTB.xml`. A space follows the equal sign after `LOGFILE=`.

DXdeploy is finished when the command prompt reappears, having entered the following message in the log file:

```
Successfully completed all deployment actions.
```

Task 3: Verify deployment on the First Site (optional)

You can visually verify that deployment has succeeded.

1. Start ZenCC if it is not already running. (Select **Zen Control Center & Documentation** from the **Start** menu.)

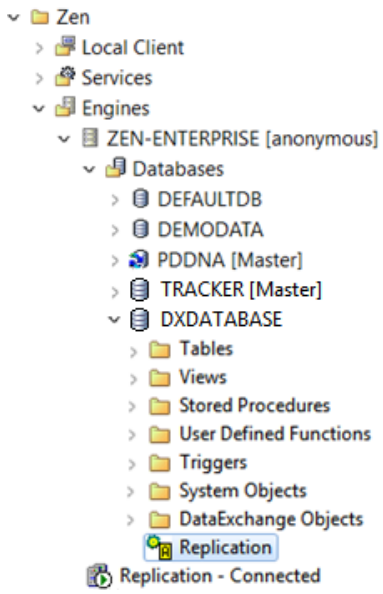
   The name of the First Site appears under the Engines branch.

2. Expand the First Site branch and its list of databases.

   DXDatabase is listed as a database.

3. Expand the DXDatabase branch.

   The letter A in the Replication node shows that the database is activated.



Task 4: Copy the Template to the Partner Site

After DXdeploy finishes on the First Site, do the following:

1. From the First Site, copy the file

   C:\Program Files (x86)\Actian\Zen\Replication\Docs\ExampleRTB.xml

   to the same folder on the Partner Site.

2. On the Partner Site, create the folder C:\Demodata.

3. From the First Site, copy the contents of the directory

   C:\Program Files (x86)\Actian\Zen\Replication\Templates\DXDatabase

   to C:\Demodata on the Partner Site.

Note: Demodata files reside in a relative location that can be wherever you choose on the Partner Site. Your application may require absolute paths to certain data files. See File Copying for details.

Task 5: Run DXdeploy on the Partner Site

Open a command prompt on the Partner Site and run the following. The string is not case-sensitive.

```
dxdeploy /Site=Partner "C:\Program Files
(x86)\Actian\Zen\Replication\Docs\ExampleRTB.xml"
```

As it runs, DXdeploy displays high-level status messages:

- Starting the CreateDSN action
- Starting the Design action
- Starting the Activate action
- Activation done, now synchronizing tables

The file dxdeploy.log in C:\ProgramData\Actian\Zen\Replication\LogFiles records more detail. To view its entries on-screen while DXdeploy runs, you can use the /LOGFILE= option. For example,

```
dxdeploy /Site=Partner /LOGFILE= ExampleRTB.xml
```

A space follows the equal sign after `LOGFILE=`.

DXdeploy is complete when the command prompt reappears and when it enters the following message in the log file:

```
Successfully completed all deployment actions.
```

When DXdeploy runs on the Partner Site, it also performs an initial replication between the First Site and the Partner Site. The initial replication populates the data on the Partner Site so that it is the same as on the First Site.

You have now successfully deployed Demodata for replication.

XML Deployment Descriptor File

The XML deployment descriptor file is a text file in which you set information for the DXdeploy utility. For Real-Time Backup between two machines, you use the descriptor file EXPRESS.XML. This file is located in C:\Program Files (x86)\Actian\Zen\Replication\Docs. The contents of the file has the following elements and also includes comments not shown here to help document them.

```
<?xml version="1.0"?>
<DXDeployment>
  <Configuration Project="DXProj" Network="DXNet" Release="1.0" Method="1-way">
    <Sites>
      <First
        ServerName="this.hostname" DSN="DXDatabase" DataDirectory="C:\MYDATA">
          <Files>
            <Include Path="*.mkd" />
            <Include Path="*.btr" />
            <Include Path="*.dat" />
            <Include Path="*.ddf" />
          </Files>
      </First>
      <Partner
        ServerName="remote.hostname" DSN="DXDatabase" DataDirectory="C:\MYDATA" />
    </Sites>
  </Configuration>
</DXDeployment>
```

To use this XML file you must always edit it for your situation. The following table explains the elements in the file that may require editing. The default value for some of the attributes may be adequate. With the exception of Exclude Path, DXdeploy requires all of the attributes. DXdeploy is further discussed under dxdeploy.

XML Attribute	Discussion
Project	A replication design requires names for the replication project, replication network, and project release. These names are of your own choosing to help you identify your replication setup. Project often corresponds to a specific database. If your goal is to replicate a database named *mydb*, then you may want to call the project *mydb project* or something similar that helps you remember which database is involved. Note that the three names – project, network, and release – are added to a replication system database used by the replication engine. The replication utilities also use these names to allow or disallow certain actions. For example, designed databases that differ only by release are allowed to replicate together so long as the project names and network names match.
Network	The replication network is the grouping of replication sites that participate in replication. A name that helps you remember the grouping is very useful. For example, if machines A and B participate, you could name the network *Sites A and B* or something similar. You may use spaces in this string.
Release	The release is like a version number for the design of the replication database. Your first design could be version 1, for instance. If you choose to change the design later, then you would create a version 2 and so forth.
Method	Sets whether replication will be 1-way or 2-way. This setting should match what your license allows. For example, you cannot set 2-way replication with a Real-Time Backup Edition license.
Include Path	Sets the files to deploy for replication. At least one Include Path attribute is required. The following properties apply to this attribute: • Relative paths are relative to DataDirectory listed in the <Sites> section of the XML file. • Absolute paths, if specified, must all start with the same drive letter, which must be the same drive letter specified by DataDirectory. • Paths must specify files individually or by wildcard. Wildcard characters “?” and “*” are allowed. • Subdirectories must be explicitly listed in the paths (DXdeploy does not automatically process subdirectories from a given root). • Multiple attribute lines are permitted.
Exclude Path	Sets which files, among the included files, to exclude. The same properties apply as for Include Path.
First Server name	Sets the machine name or IP address of the First Site. "Localhost" is **not** permitted.

XML Attribute	Discussion
DSN	Sets the data source name (DSN) to be associated with the data files deployed for replication. The DSN must be unique on each site.
DataDirectory	Sets the root path to which the Include Path and Exclude Path values are relative. DataDirectory must begin with a drive letter. DataDirectory in First Server name applies to the First Site. DataDirectory in Partner Server name applies to the Partner Site.
Partner Server name	Sets the machine name or IP address of the Partner Site. "Localhost" is **not** permitted.

Removing the Example Deployed Database

You do not need to keep the example deployed database. The following tasks explain how to remove it from the First Site and the Partner Site.

- Task 1: Deactivate the example database on both sites
- Task 2: Run Template Remover on the First Site
- Task 3: Delete files on the First Site
- Task 4: Delete the example database and files on the Partner Site
- Task 5: Restore the database copy, if needed

Task 1: Deactivate the example database on both sites

1. On the **First Site** machine, open a command prompt and run the following.

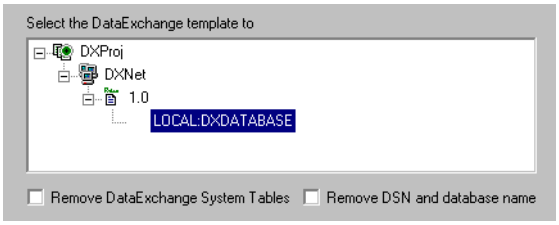
   ```
   dxdeact dxdatabase
   ```

   The example database on the First Site is now deactivated.

2. Repeat this step on the **Partner Site**.

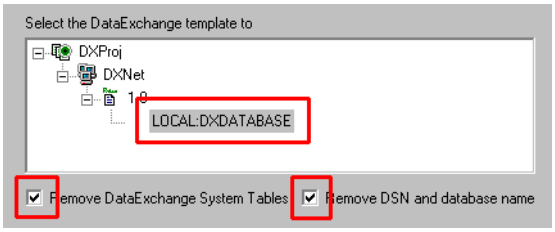
Task 2: Run Template Remover on the First Site

1. On the First Site, do one of the following:
   - Select **DX Template Remover** from the **Start** menu.
   - In ZenCC, select **DataExchange** > **Template Remover**.
2. In the Template Remover Wizard welcome dialog, click **Next**.
3. In the templates pane, select **LOCAL:DXDATABASE** as the template to remove.



4. Select **Remove DataExchange System Tables** and click **Yes** in the warning message to continue.
5. Select **Remove DSN and database name**.

   The wizard should now resemble the following:



6. Click **Next**.

   The wizard removes the template and presents a summary.
7. Click **Close**.

Task 3: Delete files on the First Site

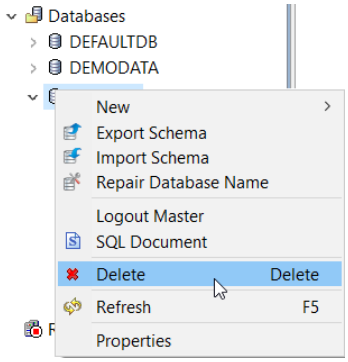
1. On the First Site, find the **DX**_*projectname* directory under C:\ProgramData\Actian\Zen\Demodata that was created during deployment.

   DX_*projectname* is the name given to your replication project in the XML deployment file, in this case `DXProj` in the following line in ExampleRTB.xml:

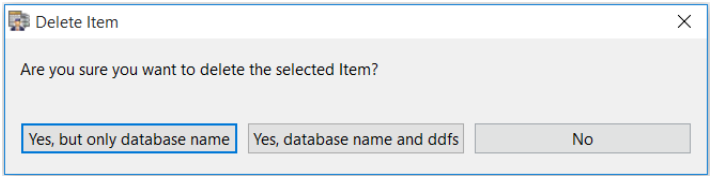
   ```
   <Configuration Project="DXProj" Network="DXNet" Release="1.0" Method="1-way">
   ```
2. Stop replication services as described under Starting and Stopping Replication. Replication must be stopped to do the next step as well.
3. Delete the **DXDatabase** folder under C:\Program Files (x86)\Actian\Zen\Replication\Templates.

Task 4: Delete the example database and files on the Partner Site

1. On the Partner Site, start ZenCC if it is not already running.
2. Make sure replication services are stopped as described under Starting and Stopping Replication. Deleting the Partner Site while replication is active can result in unwanted database behavior.
3. In the Databases list under Engines, right-click **DXDatabase** and select **Delete**.



4. In the delete confirmation dialog, you have several options.



5. Do one of the following:
   - To keep the database you were replicating, select **Yes, but only database name**.
   - To delete the database you were replicating, select **Yes, database name and ddfs**.
   - Select **No** if you decide not to delete the database.
6. To complete removal of the deployed replication database on the Partner Site, delete the directory **C:\Demodata**. This was the directory created in Task 4: Copy the Template to the Partner Site. You may have to temporarily stop Zen services to delete the directory.

Task 5: Restore the database copy, if needed

1. Open the folder where you saved a copy of your data files before you copied the replication files from the First Site.
2. Move or copy the files back to the folder where your original database was located.

In this example, the location to which files are restored is C:\ProgramData\Actian\Zen\Demodata.

Working with Your Database

The Demodata example demonstrates the four required steps in the replication deployment process. This topic reviews that process and its components in more detail.

1. Edit the XML deployment descriptor file that is used by the DXdeploy utility.
2. Run DXdeploy on the First Site, setting the XML descriptor file as a parameter.
3. Copy the replication-enabled files from the First Site to the Partner Site.
4. Run DXdeploy on the Partner Site, setting the same XML descriptor file used for the First Site.

This topic discusses the process in more detail so that you can apply it to your own database. Before beginning the process, however, you need to determine which tables to replicate and ensure that they can be replicated.

Tip... When you work with the examples in this documentation, you should **always make a copy** of your database before performing the steps so that you can use it to restore the original database when you are done. Also, you do not need to keep the example deployed database. After each deployment, you can perform the steps associated with your deployment method to remove the replication files and templates and restore your database from the copy you made.

What to Do First

To deploy a database for replication, you need first to do the following:

- Decide which tables in which databases should be replicated.
- Ensure tables to be replicated contain system data and key.

Which Tables To Replicate

Determine which tables need to be replicated. Consider any situations in which tables created dynamically also need to be replicated. See Adding Dynamic Tables to an Activated Database.

You set the tables to be replicated in the XML deployment descriptor file. See XML Deployment Descriptor File.

System Data and Key

For Real-Time Backup replication, DataExchange requires that each table to be replicated has a unique system key. The replication control tables track changes by using the unique keys.

You may use the Zen utility Butil to determine whether a table contains system key and data. For example, to check table mytable.mkd located in c:\mydata, you would enter the following at a command prompt:

```
butil -stat c:\mydata\mytable.mkd
```

Among other information, the statistics output informs you about system data and key. If the output shows that `System Data = Yes` and `SYSKEY Status = Present`, then system data and key is present.

If the existing database does not have system keys, you **must** add system data and keys with the Zen Rebuild utility. See the Rebuild Utility topic in *Advanced Operations Guide*.

Zen Security with DataExchange

Zen provides security models for Btrieve applications. However, an activated database created by DXdeploy does not automatically use security, even if its source database does. You can manually configure security for the replication database. For an example of this using the Demodata sample database, see Replicating a Database with Zen Security.

DXdeploy Utility on First Site

After you edit the XML descriptor file, you run the DXdeploy utility on the First Site. The utility creates a *template* of the source data files. Hereafter, for ease of discussion, the source data files will be referred to collectively as the source database.

A template is a special type of database specifically for use with the replication tools. It contains various types of control tables used for replication. A template may also contain the data from the source database. DXdeploy creates a template without source data. (In step four of the deployment process, the source data gets replicated from the First Site to the Partner Site.)

You use a template to activate a database. *Activation* is the process of enabling a database for replication and establishing it as belonging to a site. DXdeploy also activates the source database on the First Site.

The following table explains where DXdeploy places the deployment files.

Activated Database	Template
An activated database is placed in the folder DX_projectname, which is under the source database folder. For example, for source database C:\myfolder\mydb and project myproject, the activated database will be in C:\myfolder\mydb\DX_myproject. Your source database is not altered.	All templates are in C:\Program Files (x86)\Actian\Zen\Replication\Templates. For example, if your database is mydb and its DSN is mydbdsn, then the template resides in the following folders: • C:\Program Files (x86)\Actian\Zen\Replication\Templates\mydbdsn – Empty data files produced from source data files. These files are considered part of the template. Also in this folder is a copy of the XML descriptor file. • C:\Program Files (x86)\Actian\Zen\Replication\Templates\mydbdsn\DX_myproject – Other replication-enabled files, such as the control tables.

Note: The activation process performed by DXdeploy may take a few minutes to several hours depending on the size and number of data tables. However, you may proceed with the next step, copying the template files to the Partner Site, as soon as DXdeploy finishes creating the template.

Check the screen for the message: "Starting the Activate action . . ." After it appears, copy the template files to the Partner Site. Typically, the template is created rapidly, even for a large number of data files.

File Copying

After DXdeploy creates the template on the First Site, manually copy the template to your Partner Site.

Example of What to Copy Where

DXdeploy creates template directories to show where to copy files to the Partner Site. For example, if the application DSN is mydbdsn with database name mydb and mydb uses four data files on your First Site:

- C:\myapp\data\table1.mkd
- C:\myapp\data\table2.mkd
- C:\myapp\data\other\table3.mkd
- C:\employees\accting\table4.mkd

Your edited XML descriptor file would resemble the following:

```
<First ServerName="SiteA" DSN="mydbdsn" DataDirectory="C:\myapp\data" >
    <Files>
     <Include Path="*.mkd" />
     <Include Path="other\*.mkd" />
     <Include Path="c:\employees\accting\table4.mkd"/>
```

The first and second Include Path statements are relative to DataDirectory. Assuming that table4.mkd is a bound table and must be located at C:\employees\accting, then it requires an absolute path.

Given this example, the following tables explain where on the Partner Site to copy the template files.

C:\Program Files (x86)\Actian\Zen\Replication\Templates\mydbdsn\mydb\DX_myproject	
Contents	**Where to Copy on Partner Site**
Empty data files table1.mkd, table2.mkd, and \other\table3.mkd. The edited XML descriptor file. DX_projectname directory: C:\Program Files (x86)\Actian\Zen\Replication\Templates\mydbdsn\mydb\DX_myproject	C:\myapp\data, same as on the First Site. But the only requirement is that the location match the partner data directory in the XML descriptor file. The XML descriptor file can go anywhere, but it may be simplest to copy it to the data directory. DX_myproject holds other replication-enabled files. Copy this it to the same location as on the First Site.

C:\Program Files (x86)\Actian\Zen\Replication\Templates\mydbdsn\mydb\c_drive\employees\accting	
Contents	**Where to Copy on Partner Site**
Empty data file table4.mkd.	C:\employees\accting

Note: If data files already exist on the Partner Site, overwrite them with the template data files.

DXdeploy Utility on Partner Site

After you use DXdeploy to activate the template on the First Site, copy the template to the Partner Site and use DXdeploy to activate it on that site by running DXdeploy with the XML deployment descriptor file used for the First Site. The template file is found in the database directory under C:\Program Files (x86)\Actian\Zen\Replication\Templates. In the example above, this is C:\Program Files (x86)\Actian\Zen\Replication\Templates\mydbdsn\mydb.

Caution! DXdeploy must finish activation on the First Site before you run it on the Partner Site. On the First Site, check on-screen for the message "Activation done, now synchronizing tables." Once the message appears, you can then run DXdeploy on the Partner Site.

Replication Schedule

After DXdeploy finishes on the Partner Site, it performs an initial replication with the First Site. The initial replication between the sites fully populates the data tables on the Partner Site.

Following deployment, you may want to set up a replication schedule to keep Partner Site data current with First Site data. See Schedule Tasks for steps to set up a replication schedule.

Note: Replication works in either direction and is determined only by where you set the schedule. If the data changes that you want to back up occur on the First Site, then set the schedule on the First Site so that backups flow from the First Site to the Partner Site. If in your environment data changes occur instead on the Partner Site, then you must set the schedule there so that backups flow in the other direction, from the Partner Site to the First Site.

Disaster Recovery

If your First Site is catastrophically destroyed, you may restore your data from the Partner Site to a new First Site and reestablish your replication network. See Disaster Recovery.

Removing Databases Deployed with Designer

DataExchange Designer is a deprecated utility that was included with DataExchange before version 5.1. You may need to remove a database that was deployed with DataExchange Designer. Use the following tasks to complete the removal of a database deployed using DataExchange Designer.

1. Deactivate the Database on Both Sites
2. Run Template Remover on the First Site

3. Delete Database and Files on the Partner Site
4. Restore the Database Copy

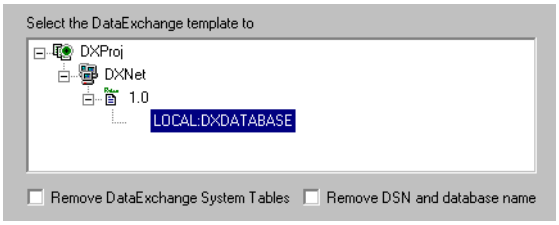
Deactivate the Database on Both Sites

For this example, the value for *DSN* is Demodata.

1. Run DXdeact *DSN* at the First Site.
2. Run DXdeact *DSN* at the Partner Site.

Run Template Remover on the First Site

1. On the First Site, in the **Start** menu select **Actian DataExchange 15 > DX Template Remover**.
2. In the welcome dialog, click **Next**.
3. In the templates pane, when asked to choose a template to remove, click **LOCAL:***DSN*. In this example, the value of *DSN* is DXDATABASE.



4. Select **Remove DataExchange System Tables** and click **Yes** to confirm that you wish to continue.
5. Select **Remove DSN and database name** and click **Next**.
6. After the wizard removes the template and presents a summary, click **Close**.

Delete Database and Files on the Partner Site

Before deleting a database or its files, you may need to stop replication. See Starting and Stopping Replication.

1. On the Partner Site machine, delete the contents of the folder to which you copied the replication replication files from the First Site.
2. If you need to use the Demodata sample database again, restore it in the next task.

Restore the Database Copy

1. Open the temporary folder to which you saved a copy of your data files before you copied the replication files from the First Site.
2. Move or copy the files back to the folder where your original database was located.

1-Way Deployment Using DXdeploy

This topic provides a step-by-step discussion on deploying a replication solution using the DXdeploy utility and the EXPRESS.XML descriptor template to create your XML descriptor file. This example can be used with either the Real-Time Backup or the Data Synchronization edition. It is similar to the tutorial Replication Deployment Using DXdeploy with an XML Descriptor File.

You need two machines for the example session. One machine must have DataExchange installed as a First Site. The other machine must have DataExchange installed as a Partner Site. Before you use DXdeploy, be sure to follow the instructions under Administrator Rights for DataExchange users.

This topic contains the following tasks:

1. 1-Way Deployment Using DXdeploy
2. Run DXdeploy on the First Site
3. Copy the Template to the Partner Site
4. Run DXdeploy on the Partner Site

Note: This topic covers only deployment and does not discuss setting up a replication schedule.

Before You Get Started

Before performing this task you must install DataExchange on First Site and a Partner Site.

Tip... So that you can restore your database to its original state after this deployment exercise, we recommend saving a copy of your database files before proceeding with this example.

To create your version of the XML descriptor file, first make note of the following items:

- Name or IP addresses for the two database servers
- Root path for the source data
- Directories and file names for the source data
- Root path for the replicated data

Caution! All applications using the database you are about to deploy must be shut down before using this deployment method.

Create the XML Descriptor File

To create the XML Descriptor file

1. On the First Site machine, open the folder C:\Program Files (x86)\Actian\Zen\Replication\Docs.
2. Make a copy of the XML descriptor file **EXPRESS.XML** and rename the copy **EXP_1WAY.XML**.

   You may move the file to any location on your First Site machine. For this task we assume that you keep it in its original location. If EXPRESS.XML is no longer on your system, copy the text from the next step to recreate it.
3. Open **EXP_1WAY.XML** in a text editor.

   This template file has the contents explained under XML Deployment Descriptor File.
4. For this example, we are replacing the contents of EXP_1WAY.XML with the following:

```
<?xml version="1.0"?>
<DXDeployment>
  <Configuration Project="mydbproject" Network="sales dept net" Release="1.0"
Method="1-way">
    <Sites>
      <First
        ServerName="SiteA" DSN="SalesDB" DataDirectory="C:\CompanyData\SalesData">
          <Files>
            <Include Path="*.mkd" />
            <Include Path="*.ddf" />
            <Include Path="SalesReports\*" />
            <Include Path="*SalesReports\Q1Rept.mkd" />
           <Include Path="C:\Employee\SalesRep\sample.mkd" />
          </Files>
      </First>
      <Partner
        ServerName="SiteB" DSN="SalesDB" DataDirectory="C:CompanyData\SalesData" /
>
    </Sites>
  </Configuration>
</DXDeployment>
```

Run DXdeploy on the First Site

To run DXdeploy on the First Site

1. On the First Site, open a command prompt and enter the following:

   ```
   dxdeploy "C:\Program Files (x86)\Actian\Zen\Replication\Docs\EXP_1WAY.XML"
   ```

   The command is not case-sensitive.

2. Press **Enter**.

   As DXdeploy executes, high-level status messages display on the screen as it completes certain actions. For a successful deployment, the following messages appear:

   - Starting the CreateDSN action
   - Starting the Design action
   - Starting the Activate action
   - Activation done, now synchronizing tables

   By default, detailed messages from DXdeploy are written to dxdeploy.log, not to the screen. This log is located in C:\ProgramData\Actian\Zen\Replication\LogFiles. If you want to view detailed messages on the screen while DXdeploy executes, use the `/LOGFILE=` option.

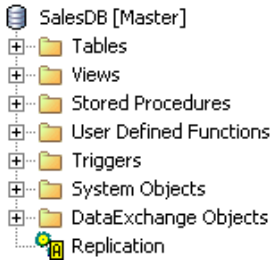
3. For example, you would enter the following:

   ```
   dxdeploy /LOGFILE= "C:\Program Files
   (x86)\Actian\Zen\Replication\Docs\EXP_1WAY.XML"
   ```

   DXdeploy is complete when the command prompt reappears. You may also check the DXdeploy log file to determine when DXdeploy finishes. The following message appears at the bottom of the log file: “Successfully completed all deployment actions.”

4. Optionally, start ZenCC if it is not already running. (Select **Zen Control Center & Documentation** from the **Start** menu.)

5. In Zen Explorer under Engines, open the SalesDB database branch. Notice that SalesDB is now listed as a database with the letter A shown on its Replication node to show that the database is activated.



Copy the Template to the Partner Site

To copy the template to the Partner Site

1. After DXdeploy finishes on the First Site, copy the **SalesData** directory from C:\Program Files (x86)\Actian\Zen\Replication\Templates\SalesDB to **C:\CompanyData** on your Partner Site.

Note: Note that the example used here contains data files in both relative and absolute locations. When copying your files, you *must* include absolute paths to data residing outside the DataDirectory location you specified. For information on where to copy your files, see File Copying in the Real-Time Backup replication example.

Tip... When using DXdeploy deployment, the template is a copy of the database files. These files are located in the directory C:\Program Files (x86)\Actian\Zen\Replication\Templates.

Run DXdeploy on the Partner Site

To run DXdeploy on the Partner Site

1. On the Partner Site, open a command prompt.
2. At the prompt, you would enter the following:

   ```
   dxdeploy C:\CompanyData\SalesData\EXP_1WAY.XML
   ```

   The command is not case-sensitive.
3. Press **Enter**.

   DXdeploy provides high-level status messages on the screen as it completes certain actions. For a successful deployment, the following messages appear:

- Starting the CreateDSN action
- Starting the Design action
- Starting the Activate action

By default, detailed messages from DXdeploy are written to dxdeploy.log rather than to the screen. DXdeploy is complete when the command prompt reappears. You may also check the DXdeploy log file to determine when DXdeploy finishes. The following message appears at the bottom of the log file: “Successfully completed all deployment actions.”

When DXdeploy runs on the Partner Site, it performs an initial replication with the First Site. This replication populates data on the Partner Site so that it is the same as on the First Site.

Note: Depending on database size and connection bandwidth, initial replication can take from a few minutes to several hours.

Tip... For steps to remove the deployed database you just created, see Removing the Example Deployed Database.

2-Way Deployment Using DXdeploy

This topic discusses at a high level how to deploy a database for replication using the DXdeploy utility. It uses the sample database, TRACKER, as a working example. This sample database is provided with the Zen installation. This example can be used only with the Data Synchronization edition, since the Real-Time Backup edition supports only 1-way replication.

The example session requires two machines. One must have DataExchange installed as a First Site. The other must have DataExchange installed as a Partner Site. Before you use DXdeploy, be sure to follow the instructions under Administrator Rights for DataExchange users.

To step through the example, you will use the following tasks:

1. Create the XML Descriptor File
2. Run DXdeploy on the First Site
3. Copy the Template to the Partner Site
4. Run DXdeploy on the Partner Site

These steps omit setting up a replication schedule. Since the TRACKER deployment is only an example, setting up a regular replication schedule is unnecessary.

Before You Get Started

Before performing this task you must install DataExchange on a First Site and a Partner Site.

Tip... So that you can restore your database to its original state after this deployment exercise, we recommend saving a copy of your database files before proceeding with this example.

In order to complete the changes necessary to the XML descriptor file, we recommend that you make note of the following items:

- Name or IP addresses for the two database servers
- Root path for the source data
- Directories and file names for the source data
- Root path for the replicated data

Caution! All applications using the database you are about to deploy must be shut down before using this deployment method.

Create the XML Descriptor File

To create the XML Descriptor file

1. In the directory C:\Program Files\Actian\Zen\Replication\Docs\, make a copy of the XML descriptor file CUSTOM.XML and rename the copy **CUST_2WAY.XML**.

   You may move the file to any location on your First Site machine. For this task we assume that you keep it in its original location. If CUSTOM.XML is no longer on your system, copy the text from the next step to recreate it.

2. Open **CUST_2WAY.XML** in a text editor.

   This template file differs slightly from EXPRESS.XML as documented under XML Deployment Descriptor File. It has the following contents:

```
<?xml version="1.0"?>
<DXDeployment>
  <Configuration Project="DXProj" Network="DXNet" Release="1.0" Method="1-way">
    <Sites>
      <First ServerName="this.hostname" DSN="DXDatabase"
DataDirectory="C:\MYDATA">
        <Files>
          <Include Path="*.mkd" />
          <Include Path="MoreData\dataFile.dat" />
          <Exclude Path="DontNeed.dat" />
          <Include Path="C:\OtherDir\*" />
          <Exclude Path="C:\OtherDir\Temp*" />
          <Include Path="*.ddf" />
        </Files>
      </First>
      <Partner ServerName="remote.hostname" DSN="DXDatabase"
DataDirectory="C:\MYDATA" />
    </Sites>
  </Configuration>
  <Actions>
    <CreateDSN />
    <Design />
    <Activate />
  </Actions>
</DXDeployment>
```

3. For this example, we are replacing the contents of CUST_2WAY.XML with the following:

```
<?xml version="1.0"?>
<DXDeployment>
  <Configuration Project="mydbproject" Network="admin dept net" Release="1.0"
```

```
Method="2-way">
    <Sites>
      <First ServerName="SiteA" DSN="TrackerDB"
DataDirectory="C:\ProgramData\Actian\Zen\Replication\Demodb">
        <Files>
          <Include Path="*.mkd" />
          <Include Path="Misc\*.dat" />
          <Include Path="Misc\misc_file3.dat" />
          <Include Path="C:\Archive\*.dat" />
          <Include Path="C:\Archive\History.dat" />
          <Include Path="*.ddf" />
        </Files>
      </First>
      <Partner ServerName="SiteB" DSN="TrackerDB" DataDirectory="C:\Program
Files\Actian\Zen\Replication\Demodb" />
    </Sites>
  </Configuration>
  <Actions>
    <CreateDSN />
    <Design />
    <Activate />
  </Actions>
</DXDeployment>
```

Run DXdeploy on the First Site

To run DXdeploy on the First Site

1. On the First Site, open a command prompt and enter the following:

   ```
   dxdeploy "C:\Program Files (x86)\Actian\Zen\Replication\Docs\CUST_2WAY.XML"
   ```

2. Press **Enter**.

   DXdeploy provides high-level status messages on the screen as it completes certain actions. For a successful deployment, the following messages appear:

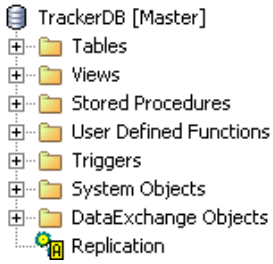
   - Starting the CreateDSN action
   - Starting the Design action
   - Starting the Activate action
   - Activation done, now synchronizing tables

   By default, detailed messages from DXdeploy are written to dxdeploy.log, not to the screen. This log is located in C:\ProgramData\Actian\Zen\Replication\LogFiles. If you want to view

detailed messages on the screen while DXdeploy executes, use the `/LOGFILE=` option. For example, `dxdeploy /LOGFILE= CUST_2WAY.XML`. A space character follows the equal sign.

DXdeploy is complete when the command prompt reappears. You may also check the DXdeploy log file to determine when DXdeploy finishes. The following message appears at the bottom of the log file: “Successfully completed all deployment actions.”

3. Optionally, open Control Center (ZenCC) and in Zen Explorer under Engines, open the TrackerDB branch. Notice that TrackerDB is now listed as a database with the letter A shown on its Replication node to show that the database is activated.



Copy the Template to the Partner Site

To copy the template to the Partner Site

After DXdeploy finishes on the First Site, copy the **DemoDB** directory on the First Site from

C:\Program Files (x86)\Actian\Zen\Replication\Templates\TrackerDB

to the following directory on your Partner Site:

C:\Program Files (x86)\Actian\Zen**Replication**

This example contains data files in both relative and absolute locations. When copying your files, you must include absolute paths to data residing outside the DataDirectory location you specified. For information on the copy locations, see File Copying.

Note: When using DXdeploy deployment, the template consists of a copy of the database files. These files are all located in C:\Program Files (x86)\Actian\Zen\Replication\Templates.

Run DXdeploy on the Partner Site

To run DXdeploy on the Partner Site

1. On the Partner Site, open a command prompt and run the following:

```
dxdeploy "C:\Program Files (x86)\Actian\Zen\Replication\DemoDB\CUST_2WAY.XML"
```

2. Press **Enter**.

   DXdeploy provides high-level status messages on the screen as it completes certain actions. For a successful deployment, the following messages appear:

   - Starting the CreateDSN action
   - Starting the Design action
   - Starting the Activate action

   By default, detailed messages from DXdeploy are written to dxdeploy.log, not to the screen. DXdeploy is complete when the command prompt reappears. You may also check the DXdeploy log file to determine when DXdeploy finishes. The following message appears at the bottom of the log file: “Successfully completed all deployment actions.”

When DXdeploy runs on the Partner Site, it performs an initial replication with the First Site. This replication populates data on the Partner Site so that it is the same as on the First Site.

Note: Depending on database size and connection bandwidth, initial replication can take from a few minutes to several hours.

Tip... For steps to remove the deployed database you created, see Removing the Example Deployed Database.

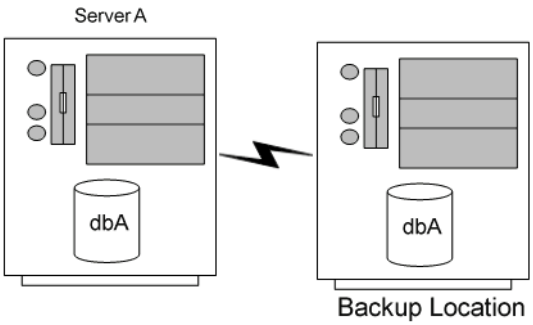
Real-Time Backup Deployment

The following topics discuss deployment methods for Real-Time Backup replication, as well as disaster recovery steps in the event you need to restore a replicated database:

- Real-Time Backup Configurations
- Disaster Recovery

Real-Time Backup Configurations

The Real-Time Backup configuration replicates data in real-time from a Zen database to a standby backup server also running Zen and DataExchange. Upon a system failure, clients can be directed to the standby server. The following figure illustrates this 1-way replication backup, where the First Site named ServerA is networked with a Partner Site named ServerB as the backup server. ServerA runs its database dbA. DataExchange maintains a copy of the dbA database on the backup server, which replicates changes on ServerA on a set schedule.



Before You Get Started

To follow this working example, you will install DataExchange on a First Site and a Partner Site that already have a Zen database engine installed.

The example assumes the following:

- You have read Replication Deployment.
- You have a First Site and a Partner Site named ServerA and ServerB.
- A copy of the Demodata sample database that comes with the Zen installation is used for this example. Consider using the ZenCC schema export and import feature to create the Demodata copy in a different location on the First Site, such as C:\Data.

Deploying Using DXdeploy

To deploy a database in a Real-Time Backup configuration

1. Confirm that the database to be replicated is not being accessed by your application.

   For example, if Demodata is used by Myapp.exe, ensure that Myapp is not accessing Demodata while you deploy Demodata for replication.

2. On First Site, open the XML descriptor file **EXPRESS.XML** in a text editor. On a 64-bit system this file is found in C:\Program Files (x86)\Actian\Zen\Replication\Docs.

3. Edit the XML descriptor file, specifying the appropriate information for ServerA and the ServerB backup.

   Note that you will edit and use a different descriptor file for each site. Some information in the descriptor file must be unique each time that you use the file. The following table explains this.

XML Descriptor File Attribute	Must Be Unique for Each Partner Site	Notes
Project	Yes	
Network	Yes	
Release	No	
First ServerName	No	This is the name of the First Site.
First Site DSN	Yes	The DSN must also be unique on the First Site.
First Site DataDirectory	Yes	This is the location on the First Site to be backed up to a Partner Site.
Relative Include Path	No	You could, for example, include “*.mkd” files for the Partner Site.
Absolute Include Path	Yes	Absolute paths on the Partner Site must not conflict with those on the First Site. For example, if ServerA and ServerB each use the same absolute data path C:\mydata\table1.mkd, then that path can exist only once on the First Site. This would result in a conflict because the table1.mkd file from the Partner Site would get overwritten on the First Site.
Partner ServerName	Yes	
Partner DSN	No	Each partner may use the same DSN, provided the DSN is unique on the Partner Site.
Partner DataDirectory	No	The location on the First Site to be backed up does not have to be the same as the backup location on the Partner Site.

4. Save **EXPRESS.XML** as ServerA.xml to a chosen location. This example assumes C:\.

5. Copy the Demodata directory from ServerA to the backup directory on ServerB.

   The backup location must be unique and must match the location for First Site DataDirectory in the XML descriptor file. This task assumes that the backup location is C:\Demodata_Backup_ServerA.

6. On ServerA, open a command prompt and enter the following:

   ```
   dxdeploy /Site=First C:\ServerA.xml
   ```

7. Press **Enter**.

   DXdeploy provides high-level status messages and is done when the command prompt reappears.

8. After DXdeploy finishes, enter the following:

   `dxdeact <`*First Site DSN*`>`

   <*First Site DSN*> is the DSN you specified in ServerA.xml for the First Site.

9. Press **Enter**.

10. Copy the contents of the DataExchange directory from C:\Demodata_Backup_ServerA on the First Site to the Demodata directory on ServerB.

11. Copy ServerA.xml from the First Site to ServerB.

12. At a command prompt on the First Site, enter the following:

    `dxact /FIRSTSITE <`*First Site DSN*`>`

    <*First Site DSN*> is the DSN you specified in ServerA.xml for the First Site.

13. Press **Enter**.

14. On ServerA, open a command prompt and enter the following:

    ```
    dxdeploy /Site=Partner C:\ServerA.xml
    ```

15. Press **Enter**.

    DXdeploy provides high-level status messages on the screen as it completes its actions. DXdeploy is complete when the command prompt reappears.

16. On ServerA, set up a replication schedule.

    See Managing Replication Schedules for how to set up a replication schedule.

17. Bring your application back online.

Disaster Recovery

This topic explains how to recover from the failure of one replication site. The information assumes that the disaster occurs to your primary site, requiring that you temporarily switch production to your backup site. After a primary site is again provided, you then need to reestablish the primary site/backup site replication network.

A disaster could, of course, occur to the backup site. The information still applies; just substitute backup for primary. For ease of discussion, and to remain consistent with terminology commonly used to discuss disaster recovery, this topic refers to primary site and backup site. Think of them as the First Site and Partner Site, respectively.

The information here applies only to a real-time backup situation or to a 1-way situation. See Deployment Process for an explanation of real-time backup deployment. See 1-Way Deployment Using DXdeploy for a working example of 1-way deployment.

Failover

In the event of a disaster, you must switch your users to access the backup site. Use whatever methods are in place at your company to accomplish switching to a different server. Such methods are many and varied and beyond the scope of this document.

Since the backup site contains current data, your application should continue to function as before.

Once your users are accessing the backup site, reestablish your First Site. Two disaster scenarios exist pertaining to the data on the primary site:

- The primary site is catastrophically destroyed and no data can be recovered from it.
- The primary is brought back into service and its data is still available, but no longer current.

No Data Recoverable

Use the following steps to reestablish your primary site.

To set up a new primary site

1. Install the Zen database product on the new machine.
2. Install DataExchange on the new machine.

   If the system was a First Site before, install a First Site. If it was a Partner Site, install the Partner Site.

3. Install any previously installed applications on the new system.

   This creates a fresh copy of your application database on the new machine.

4. Create the same data source name (DSN) on the primary as used for the replication database on the backup.

5. Take your application offline on the backup site.

   You must ensure that the database is not being accessed until you get the primary and backup sites synchronized.

6. Deactivate the replication database on the backup site.

   See dxdeact.

7. From the backup machine, copy the following to the same locations on the primary machine:

   - All user database tables.
   - All data dictionary files (DDFs).
   - All replication control tables, which have the name of each data table with the prefix PDC. Default location is C:\ProgramData\Actian\Zen\<database name>\DX_<project name>.
   - All replication system tables shown in the following list. Their default location is C:\ProgramData\Actian\Zen]Replication\Data.

dacthist.mkd	dactsite.mkd	dacttbl.mkd
dcmd.mkd	dcmdsite.mkd	dcnf.mkd
dfkey.mkd	dfragf.mkd	dfragi.mkd
dgrp.mkd	didb.mkd	didbdef.mkd
dkey.mkd	dlang.mkd	dmsg.mkd
dmsglang.mkd	dpkey.mkd	dprm.mkd
dprmgrp.mkd	dprmtyp.mkd	dqueue.mkd
dsched.mkd	dschema.mkd	dset.mkd
dsfsite.mkd	dsite.mkd	dsiteext.mkd
dsitelnk.mkd	dsiteset.mkd	dsort.mkd
dtblchg.mkd	dtrn.mkd	dusr.mkd
dusrgrp.mkd	dusrprf.mkd	dver.mkd
dwsts.mkd		

8. Activate the replication database on the primary site.

   See dxact.

9. Activate the replication database on the backup site.

   See dxact. Note that the activation on the backup site performs an initial replication with the primary site. An initial replication is a full replication, in which all data is synchronized between the two machines.

   The primary site and backup site now contain the same data.

10. Recreate any replication schedules from the primary site to the backup site.

    See Schedule Tasks.

11. Switch your users to access the primary site and bring your application back online.

Data Recoverable But Not Current

Use the following steps to reestablish your primary site.

To place an existing primary site back into replication

1. Bring the primary machine back online.
2. Take your application offline.

   Be sure that the database is not accessed until you get the primary and backup sites synchronized.

3. Delete all replication schedules on the primary site.

   See Schedule Tasks.

4. Deactivate the replication database on **both** the primary and the backup sites.

   See dxdeact.

5. Activate the replication database on the primary site.

   See dxact.

6. Activate the replication database on the backup site.

   See dxact. Note that the activation on the backup site performs an initial replication with the primary site. This is a full replication, in which all data is synchronized between the two systems.

The primary site and backup site now contain the same data.

7. Recreate any replication schedules from the primary site to the backup site.

   See Schedule Tasks.

8. Bring your application back online.

Data Synchronization Deployment Models

The following topics explain conceptual information pertaining to the various deployment methods and options available in Data Synchronization. They also provide step-by-step instructions for each available method.

- Data Synchronization Deployment Methods
- DataExchange Implementation Options

Data Synchronization Deployment Methods

Data Synchronization offers two methods for deploying replication, depending on database properties and business needs. The methods are 1-way and 2-way.

To determine the best deployment method, see the following table. It lists database properties and the best deployment method to meet those needs. So, if your database contains the properties listed in the first column, select the corresponding deployment method in the second column.

Your Database Properties	Deployment Method
If you need one or both of the following: • A data replication solution to ensure that you can restore data from a backup copy. Replication is 1-way from one machine to another. • A data portal solution to ensure data backup and be able to run reports on the backup server	1-way
If one or both of the following is true: • You want a data synchronization solution (2-way replication). • You do not require sophisticated conflict handling. That is, record conflicts can be handled at the column level based on the most recent time stamp and other criteria.	2-way

DataExchange Implementation Options

DX Deployment Wizard and the DXdeploy utility are implementation options for the deployment methods.

DX Deployment Wizard

DX Deployment Wizard is used to implement 1-way and 2-way deployment methods. It walks you through entry of necessary information to deploy a replication database and, if desired, create a replication schedule. The wizard creates a deployment bundle when you deploy at the First Site. This bundle is then used at the Partner Sites to complete the deployment. The wizard automates designing a replication template, activating the database for replication, synchronizing tables, performing an initial replication, and setting a replication schedule.

See dpwizard for more information on DX Deployment Wizard.

DXdeploy Utility

The DXdeploy utility can be used to implement 1-way and 2-way deployment methods. This command line utility reads information from an XML descriptor file that you create to include specific information about your database and replication environment. You then include this file as an argument when you execute the utility. DXdeploy uses the XML descriptor file to design a replication template, activate the database for replication, synchronize tables, and perform an initial replication.

DataExchange includes two XML descriptor templates that you can use to create your own XML descriptor file to use with DXdeploy. You must make a copy of the template and edit it to include information needed by DXdeploy to replicate your own data. The default values in the template files cannot successfully replicate your data. See dxdeploy for more information on these templates and how to use them with DXdeploy.

Note: The use of the DXdeploy utility and XML description templates is optional. Most users simply run the DX Deployment Wizard from the Start menu or the ZenCC DataExchange menu.

Where To Go From Here

By now, you should have a good idea as to the deployment method and implementation option that is right for you. The next table lists each deployment method and implementation option described and lists where to find specific instructions for implementing each specific scenario.

DataExchange Deployment Method and Implementation Option	For step-by-step instructions
1-way using Deployment Wizard	See Replication Deployment Using the DX Deployment Wizard
1-way using DXdeploy	See 1-Way Deployment Using DXdeploy
2-way using Deployment Wizard	See Replication Deployment Using the DX Deployment Wizard
2-way using DXdeploy	See 2-Way Deployment Using DXdeploy

Using the DataExchange Utilities and Services

A Reference for Using the DataExchange Utilities and Services

See the following topics for tools and resources used in different phases of creating and maintaining a replication network:

- Utilities and Services Overview
- Command-Line Utility Reference
- GUI-based Utilities
- Services

Utilities and Services Overview

DataExchange contains a suite of utilities and services for every phase of replication. The DataExchange utilities assist you in designing, customizing, and administering your replication requirements. This topic covers the following:

- Replication Stages and the Utilities Used
- Accessing the Utilities

Replication Stages and the Utilities Used

The next table lists the DataExchange utilities and services and the four primary replication stages in which each is used. Detailed information on the DataExchange utilities and services is included in the topics that follow.

Replication Stage	Utility/Service Name	File Name	For more information...
Activation	Activate a Project Release	dxact	See dxact
Deactivation	Deactivate a Project Release	dxdeact	See dxdeact
Activation	Utility to read/write the event handler DLL path to the database.	dxdeploy	See dxdeploy
Design / Activation	Deployment Utility	dxdeploy	See dxdeploy
Design / Activation	Deployment Wizard	dpwizard	See dpwizard
Design	Dynamic Table Configuration and Test Utility (Real-Time Backup Edition only)	dxdynpath	See dxdynpath
Design	Template Remover Wizard	trwizard	See trwizard
Replication	DataExchange Agent	dxagent	See dxagent
Replication	Control Table Cleanup Configuration Utility	dxcleanup	See dxcleanup
Replication	Table Synchronization and Check Utility	dxsynctables	See dxsynctables
Replication	Administrator	da	See da and Using DataExchange Manager

Replication Stage	Utility/Service Name	File Name	For more information...
Replication	Statistics and Log View	replmonitor	See replmonitor and Using the DataExchange Monitoring Tools
Replication	Console Replication Initiation Utility	dxrepl	See dxrepl
All	Zen Replication	replserv	See replserv

Accessing the Utilities

Some DataExchange utilities can be accessed as windows opened in Control Center (ZenCC) or from the Start menu. Other tools offer only a command line interface and must be run from a command prompt. Services are available in the Windows Control Panel. The following topics list ways to access the DataExchange utilities, services, and shortcuts.

Accessing Command-Line Utilities

To run the replication command line utilities, open a command prompt.

Note: For more information, see Command-Line Utility Reference.

Accessing GUI Utilities and Wizards in ZenCC

To run GUI utilities or wizards, follow these steps:

1. Expand the tree view in ZenCC and select an item.

   ZenCC menus vary according to what is selected in the tree.

2. Select the **Replication** node for a database

3. Select **DataExchange** from the ZenCC menu and select the utility.

Note: For more information, see GUI-based Utilities.

Command-Line Utility Reference

This topic provides a reference to the command line utilities in DataExchange. The following table lists the utilities with brief descriptions. Following this table you can find more detail about each utility and a list of its command line options.

Utility File Name	Utility Name	Description
dxact	Database Activation Utility	Activates an enabled database by registering it with the local runtime environment as belonging to a site on the replication network.
dxcleanup	Control Table Cleanup Configuration Utility	Sets/gets control table cleanup schedules for an activated database.
dxdeact	Database Deactivation Utility	Deactivates a release that was previously activated using dxact.
dxdeploy	Deployment Utility	Deploys DataExchange on two sites using settings given in the XML deployment descriptor file.
dxdynpath (Real-Time Backup Edition only)	Dynamic Table Configuration and Test Utility	Supports appending, replacing, showing and testing regular expressions and file patterns for a designed database.
dxrepl	Console Replication Initiation Utility	Replicates files from DSN to Partner Site.
dxsynctables	Table Synchronization and Check Utility	Finds modified data missed by DataExchange event handler and returns control tables to the consistent state.

dxact

DataExchange Activate a Project Release

Description

This program activates an enabled database by registering it with the local replication runtime environment.

If the replication engine is running and control tables have been populated, the first replication with the initial Partner Site will be performed automatically. Once this first replication has

succeeded, the newly activated database will be fully aware of all administrative data in that network, including all replication schedules.

Syntax

`dxact` [*options*] <*DSN*>

Argument	Description
<*DSN*>	Data Source Name for the database to be activated.

Options

Option	Description
/DES[CRIPTION]=<*string*>	Description of this replication site, e.g. "My First Site". Database name will be automatically appended to it. [default=MyFirstSite]
/DL[LPATH]=<*string*>	Full path to the event handler DLL, if specified. [default=<null>]
/FI[RSTSITE]	Use this switch only if this is the First Site at which this release is being activated
/FO[RCEINSTALL]	If specified, allows activation of a database that is a copy of an already-activated site
/LOG={flags}	Specify which messages types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' (the default) logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\DXACT.log]
/LOGH[ISTORY]=*nnn*	Number of files to maintain in the log history [default=5]
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/NOI[NITIALREPL]	If specified, the replication engine will not perform an initial replication after the release has been activated.
/NOL[OGO]	Do not display starting logo.
/ODBCC[ONNSTR]=<*string*>	Additional ODBC connection string parameters in the form: <name>=<value>[;<name>=<value>...] [default=<null>]
/ODBCN[AME]=<*string*>	User name for ODBC connection [default=PDUSER]
/ODBCP[ASSWORD]=<*string*>	Password for ODBC connection [default=<null>]

Examples

Running the following example from a command prompt on a First Site activates a DSN named Demodata on a First Site machine.

```
dxact /FIRSTSITE Demodata
```

The next example, if run from a Partner Site, would activate a DSN named Demodata on a Partner Site machine replicating with a machine named Win10Server.

```
dxact /PARTNERNETADDR=Win10Server Demodata
```

This example activates the DSN named Demodata on the First Site machine and sets the dxact logging to the console.

```
dxact /FIRSTSITE /LOGFILE= Demodata
```

This example activates the DSN named Demodata on the Partner Site machine replicating with a machine addressed as Adminserver and sets the dxact logging to a file named adminlog.txt located in C:\ProgramData\Actian\Zen\Reports.

```
dxact /PARTNERNETADDR=AdminServer /
LOGFILE=C:\ProgramData\Actian\Zen\Reports\adminlog.txt Demodata
```

dxcleanup

DataExchange Control Table Cleanup Configuration Utility

Description

This program sets or shows the control table cleanup schedules for an activated database.

Syntax

`dxcleanup` [*options*] <*Operation*> <*DSN*>

Argument	Description
<*Operation*>	Valid arguments include SET or SHOW
<*DSN*>	Database datasource name

Options

Option	Description
/C[LEANUPPERIOD]=*nnn*	Time (in days) between cleanup cycles [default=7]
/DXA[DMIN]=<*string*>	DX administrator name [default=ADMIN]

Option	Description
/DXP[ASSWORD]=<*string*>	DX administrator password [default=password]
/H[ELP]	Displays the command usage help text.
/LOG={*flags*}	Specify which message types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' (the default) logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\DXCLEANUP.log]
/LOGH[ISTORY]=*nnn*	Number of files to maintain in the log history [default=5]
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/N[OLOGO]	Do not display starting logo.
/ODBCN[AME]=<*string*>	User name for this database (if security enabled) [default=<null>]
/ODBCP[ASSWORD]=<*string*>	Password for the user specified as ODBCName (if security enabled) [default=<null>]
/OL[DESTALLOWED]=*nnn*	Age (in days) of oldest allowed record [default=90]
/PA[RTNERNETADDR]=<*string*>	The network address of the Partner Site we should replicate with first. If this switch is not specified, DXact will display a prompt for the user to enter the partner network address. [default=<LocalHost>]
/PN[LICENSE]=<*string*>	Specifies name of PNLicense file to register (specify at network First Site only) [default=C:\Program Files (x86)\Actian\Zen\bin\repllicense.pnl]
/PR[EPROCESS]	If specified, preprocessing of starter data will be performed. This should be done unless it is known that no database changes occur between design and activation, and that starter data was preprocessed at design time. Otherwise, starter data will not get replicated.

Option	Description
/REC[ONCILEREP]	If specified, the replication engine will perform reconciliation processing during the initial replication after the release has been activated. Should be specified unless data is identical between the site being activated and the First Site. Otherwise, reconciliation will not be performed.
/SI[TETYPE]=<*string*>	Override new site's default site type. Must be one of: COMPLETE or HIGH [default=COMPLETE]
/SU[BSCRIBESITES]	If specified, this site will be automatically subscribed to all new sites (via the dSite table).

Example

This example displays the number of days set for the cleanup period and the age (in days) of the oldest allowed record currently in place for the data source name demodata.

```
dxcleanup show demodata
```

A message should display that lists the name and version of the control table cleanup configuration utility, and additional information such as the following:

```
Cleanup Period is 7 day(s)
```

```
Oldest Allowed is 90 day(s)
```

dxdeact

DataExchange Deactivate a Project Release

Description

This program deactivates a release that was previously activated using DXact and removes the activated database from the list of those available for replication. If you want to delete a replicated database from physical storage, you must deactivate it first.

Syntax

`dxdeact` [*options*] <*DSN*>

Argument	Description
<*DSN*>	Database datasource name

Options

Option	Description
/K[EEPINFO]	Keep Activation Information in system database (by default, that info is removed)
/LOG={flags}	Specify which messages types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' (the default) logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\DXDEACT.log]
/LOGH[ISTORY]=*nnn*	Number of files to maintain in the log history [default=5]
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/N[OLOGO]	Do not display starting logo.
/ODBCN[AME]=<*string*>	User name for this database (if security enabled) [default=<null>]
/ODBCP[ASSWORD]=<*string*>	Password for the user specified as ODBCName (if security enabled) [default=<null>]
/H[ELP]	Displays the command usage help text.

Examples

This example deactivates the data source name demodata and retains the activation information in the system database. By default, activation information is removed.

```
dxdeact /keepinfo demodata
```

dxdeploy

DataExchange Deploy

Description

This program deploys DataExchange on two sites using settings given in the XML Deployment Descriptor file. This utility streamlines replication processes by combining functionality of Dxact and Dxsynctables.

Syntax

`dxdeploy` [*options*] <*XML File*>

Argument	Description
<*XML file*>	XML Deployment Descriptor file. XML Descriptor file templates (EXPRESS.XML and CUSTOM.XML) are located in C:\Program Files (x86)\Actian\Zen\Replication\docs on 64-bit systems.

Options

Option	Description
/LOG={flags}	Specify which messages types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' (the default) logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\DXDEPLOY.log]
/LOGH[ISTORY]=*nnn*	Number of files to maintain in the log history [default=5]
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]

Option	Description
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/N[OLOGO]	Do not display starting logo.
/S[ITE]=<*string*>	Choose which site in Sites list to deploy: First | Partner (This setting is optional and is used for demonstration purposes only.) [default=<null>]
/H[ELP]	Displays the command usage help text.

XML Descriptor File Templates

DXdeploy is used to implement 1-way Real-Time Backup and 1-way and 2-way Data Synchronization. The DXdeploy utility uses an XML descriptor file that you create to capture information about your database and replication environment. As shown in the syntax example, this file is included as an argument when you execute the utility. DXdeploy uses the XML descriptor file to handle the processes required for replication.

DataExchange includes two different XML descriptor templates you can use to create your specific XML descriptor file to use with DXdeploy. You must edit the template to include necessary information in order for DXdeploy to successfully replicate your data.

Caution! You cannot use these template files as is and successfully replicate your data. You must create a template file to include specific information about your replication environment.

EXPRESS.XML

See 1-Way Deployment Using DXdeploy for an example deployment using the EXPRESS.XML template file.

CUSTOM.XML

See 2-Way Deployment Using DXdeploy for an example deployment using the CUSTOM.XML template file.

dxdynpath

DataExchange Dynamic Table Configuration and Test Utility (Real-Time Backup Only)

Description

Append, replace, or show the existing include and exclude patterns and regular expressions for a given designed database. Optionally test existing or hypothetical patterns or regular expressions.

Syntax

`dxdynpath` [*options*] <*Operation*> <*DSN*>

Argument	Description
<*Operation*>	Valid arguments include APPEND, REPLACE, SHOW or TEST.
<*DSN*>	Database datasource name created by DataExchange.

Options

Option	Description
/F[ILEPATH]=<*string*>	Absolute file path to test (valid only for <Operation> TEST). The path used here is the absolute path to the database created by DataExchange. [default=<null>]
/LOG={flags}	Specify which messages types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' (the default) logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\DXDYNPATH.log]
/LOGH[ISTORY]=*nnn*	Number of files to maintain in the log history [default=5]

Option	Description
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/N[OLOGO]	Do not display starting logo.
/ODBCN[AME]=<*string*>	User name for this database (if security enabled) [default=<null>]
/ODBCP[ASSWORD]=<*string*>	Password for the user specified as ODBCName (if security enabled) [default=<null>]
/P[ATTERN]=<*string*>	Glob-style pattern (e.g. "dir newfile*.mkd") or regular expression. For <Operation> APPEND or REPLACE, PATTERN is applied to Dynamic Table Configuration. For <Operation> TEST, PATTERN is used to test for a match, otherwise ignored [default=<null>]
/T[YPE]=<*string*>	INCLUDE, EXCLUDE or BOTH (BOTH is valid only for <Operation> SHOW) [default=INCLUDE]
/H[ELP]	Displays the command usage help text.

Remarks

Any file used with the dxdynpath utility requires system keys.

Before we explain how DataExchange automatically includes or excludes files using pattern matching, let's first discuss the types of expressions you can use.

Note: Dxdynpath should only be used with the Real-Time Backup Edition.

Types of Expressions

You may use the following types of pattern-matching expressions with the dxdynpath utility:

- Dir expressions
- Regular expressions

Dir Expressions

This type of expression is based on the Windows directory (dir) command, and provides an alternative to using regular expressions. Dir expressions have the following characteristics:

- Must contain `dir` as the first characters (`dir` is not case-sensitive).

- May include a relative path to the dictionary files. See Relative Paths. Absolute paths are not allowed.
- Must include the names of files. File names may include the ? or * wildcard. Note that a period (.) designates a period. It is **not** the same as the ? wildcard.
- May include the slash (/) character, backslash (\) character, or a combination of the two.
- May include the /s option to specify files in subdirectories. The /s option may not be the first characters in the expression. Other than that, the option is not positional.
- Must include a space character as the separator between the elements of the expression.
- May be used in a series, separated by semicolons (;). A space character may precede or follow the semicolon if you choose, but is not required.

The following dir expressions are valid examples:

- `dir mydbase\*.mkd /s`
- `dir ..\..\acct/acct*.?db`
- `dir ../payables/custdb/??posted??.pay`
- `dir mydbase\*.mkd /s ; dir ..\..\acct/acct*.?db`

Regular Expressions

Regular expressions are a pattern-matching technique to parse and manipulate text. DataExchange uses the same regular expressions as the Windows version of the programming language perl.

Regular expressions have the following characteristics:

- May include literal or relative paths. If relative paths are used, see Relative Paths.
- May include the slash (/) character, backslash (\) character, or a combination of the two as characters in a relative path. When paired with the double period (..) characters in a relative path, slash and backslash are interpreted as part of a path structure. For example, ..\..\.*bak. If relative paths are used, see Relative Paths.
- May be used in a series, separated by semicolons (;). A space character may precede or follow the semicolon if you choose, but is not required.
- May use uppercase characters, lowercase characters, or a combination of the two.
- Must be surrounded by double quotation marks if the expression contains characters that are meaningful to the command line interpreter. For example, the “|” character is legitimate in a regular expression to indicate “or.” That same character, however, represents a pipe directive

to the command line interpreter. Any regular expression that uses the "|" character must be surrounded by double quotation marks. If you are unsure about a character, surround the regular expression with double quotation marks.

- Must use valid regular expression syntax, with the exceptions noted above in this bulleted list. Consult the regular expression syntax in your perl documentation.

The following regular expressions are valid examples:

- "..\..\(mon|tue|wed|thru|fri)\\(([01][0-9]|2[0-3]))\\.*\.mkd" (any mkd file in a relative directory structure of weekday\hour)
- .*bak (any backup file in or below the "home" directory)
- day\dt\.ddf (dictionary files with a name format of day[0-9]t.ddf, such as day0t.ddf, day4t.ddf, and so forth)
- (\w+)\\.*\\\1\\.* (all files in subordinate directories under the home directory where a subordinate directory name recurs, for example /data/acct/data/purged)

Relative Paths

Relative paths are relative to a home directory. The home directory is the one that contains data dictionary files (DDFs) recognized by DataExchange. To be recognized by DataExchange, the dictionary files must have been created by one of the DataExchange utilities or by a DataExchange replication process. If you already have dictionary files created by a replication process, the home directory is relative to their location.

Relative paths use "..\" to refer to a directory level. You may also use the slash character (/) instead of the backslash (\). Each "..\" means to move up the directory structure relative to the home directory. For example, if your home directory is c:\myapp\mydata\accounts\, then a relative path of "..\" navigates to c:\myapp\mydata. Similarly, a relative path of "..\..\" navigates to c:\myapp.

Verifying Expression Pattern Matching

Constructing valid regular expressions can be challenging. To help, DataExchange provides the utility Dxdynpath.exe to verify the pattern matching of your regular and dir expressions. The utility compares the pattern against the command line arguments and reports whether the comparison passes or fails.

Note: Dxdynpath bases pattern matching solely on its command line arguments. It does not check for the existence of files or directories or navigate them. For example, if you test an

expression against the file acctdata\Bbzz95.mkd, dxdynpath does not check whether this folder and file exist.

The following example compares a dir expression against a supposed file located in c:\bklog\hr or in any subdirectories to c:\bklog\hr. The example would be entered as a single line at the command prompt.

```
dxdynpath /f=c:\mydata\acct\dbQ299x.mkd /p="Dir ..\..\bklog\hr\dbQ2???.mk? /s" test mydbdsn
```

Dxdynpath reports “matches pattern” because supposed file dbQ299x.mkd matches the pattern and resides in a subdirectory of c:\bklog\hr.

By default, output from Dxdynpath is written to a log file, **not** to the screen. If you want output written to the screen, use the /LOGF= option.

Examples

This example displays the include and exclude patterns currently in place for the data source name demodata.

```
dxdynpath /t=both show demodata
```

If there are no include or exclude patterns configured, a message similar to the following returns:

```
INCLUDE pattern is ""
```

```
EXCLUDE pattern is ""
```

Running the following command on the First Site appends attend*.mkd as an include pattern to any include patterns that already exist for demodata.

```
dxdynpath /t=include /p="dir attend*.mkd" append demodata
```

Note: Commands are case insensitive. You may use uppercase characters, lowercase characters, or a combination of the two.

dxregevnt

DataExchange utility to read/write the event handler DLL path to the database

Description

Registers, unregisters, or shows the event handler for an activated database.

Syntax

`dxregevnt` [*options*] <*Operation*> <*DSN*>

Argument	Description
<*Operation*>	Valid arguments include REGISTER, UNREGISTER or SHOW
<*DSN*>	Datasource name

Options

Option	Description
/DXA[DMIN]=<*string*>	DX administrator name [default=ADMIN]
/DXP[ASSWORD]=<*string*>	DX administrator password [default=password]
/LOG={flags}	Specify which messages types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' (the default) logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\DXREGEVNT.log]
/LOGH[ISTORY]=*nnn*	Number of files to maintain in the log history [default=5]
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/N[OLOGO]	Do not display starting logo.
/ODBCN[AME]=<*string*>	User name for this database (if security enabled) [default=<null>]
/ODBCP[ASSWORD]=<*string*>	Password for Administrator. [default=<null>]
/P[ATH]=<*string*>	Absolute path to an event handler (a shared library) [default=<null>]
/H[ELP]	Displays the command usage help text.

Examples

Running this example displays if the specified database has an Event Handler DLL registered.

```
dxregevnt show demodata
```

If you do not have an Event Handler DLL registered, a message similar to the following displays:

```
No Event Handler is Registered
```

The next example registers an Event Handler DLL named dxevent.dll located in C:\Program Files (x86)\Actian\Zen\bin with demodata on 64-bit systems.

```
dxregevnt /p="C:\Program Files (x86)\Actian\Zen\bin\dxevent.dll" register demodata
```

If you have an Event Handler DLL registered, a message similar to the following displays:

```
Event Handler is "C:\Program Files (x86)\Actian\Zen\bin\dxevent.dll"
```

dxrepl

DataExchange Console Replication Initiation Utility

Description

Replicate files from DSN to Partner Site.

Syntax

`dxrepl` [*options*] <*DSN*> [<*SiteID*>]

Argument	Description
<*SiteID*>	The target site for the replication session [default=<null>]
<*DSN*>	The Zen replication data source name

Options

Option	Description
/LOG={flags}	Specify which messages types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>/	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\DXREPL.log]
/LOGH[ISTORY]=*nnn*/	Number of files to maintain in the log history [default=5]
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/N[OLOGO]	Do not display starting logo.
/ODBCN[AME]=<*string*>	User name for this database (if security enabled) [default=<null>]
/ODBCP[ASSWORD]=<*string*>	Password for the user specified as ODBCName (if security enabled) [default=<null>]
/H[ELP]	Displays the command usage help text.

dxsynctables

DataExchange Table Synchronization and Check Utility

Description

Finds modified data missed by DataExchange event handler and returns control tables to the consistent state.

Syntax

`dxsynctables` [*options*] <*Table*> <*DSN*>

Argument	Description
<*Table*>	Name of table to be updated (*=All tables)
<*DSN*>	Datasource name

Options

Option	Description
/E[XCLUDE]=<*string*>	Optional comma-separated list of tables to exclude [default=<null>]
/F[ORCE]	Forces update of timestamped columns.
/LOG={flags}	Specify which messages types to log: I = informational messages W = warning messages E = error messages For example, '/log=e /log=w' or '/log=we' (the default) logs errors and warnings only. Any message type left unspecified is suppressed. [default=iwe]
/LOGF[ILE]=<*string*>	File name for log messages. Specifying '/LOGFILE=' alone sets logging to the console. [default=C:\ProgramData\Actian\Zen\Replication\LogFiles\].
/LOGH[ISTORY]=*nnn*	Number of files to maintain in the log history [default=5]
/LOGS[IZE]=*nnn*	Maximum size of the log file (0 means 'no limit') [default=0]
/LOGW[IDTH]=*nnn*	Log messages are wrapped to fit within this line length. (minimum 50) [default=79]
/M[SD]	Mark the data with starter data timestamp
/N[OLOGO]	Do not display starting logo.
/ODBCN[AME]=<*string*>	User name for this database (if security enabled) [default=<null>]
/ODBCP[ASSWORD]=<*string*>	Password for the user specified as ODBCName (if security enabled) [default=<null>]
/H[ELP]	Displays the command usage help text.

GUI-based Utilities

DataExchange includes four graphical user interface tools for replication design, administration, and monitoring tasks. The following table lists the GUI utilities and their descriptions.

Utility File Name	Utility Name	Description
da	Manager	GUI DX Administration utility. Sets up notifications, user access, and replication schedule information.

replmonitor	Replication Progress and Log Viewers	GUI statistics and logging view utility. Configures replication sessions, monitors data replication, and sets logging options.
dpwizard	Deployment Wizard	Wizard to deploy replication.
trwizard	Template Remover Wizard	Wizard to remove a replication template.

da

DataExchange Manager

Description

DataExchange Manager is used to administer replication networks. It is a separate application that can be run external to ZenCC. You can open it by selecting **Actian DataExchange > DX Manager** from the **Start** menu or within ZenCC by selecting **DataExchange** > **Manager**.

For more information, see Using DataExchange Manager.

replmonitor

Replication Progress and Log Viewers

Description

DataExchange allows you to configure replication sessions, initiate replication, monitor it, and log it. The tools with which you perform these actions are the Replication Progress and Log Viewers. Their window is accessed from ZenCC.

For more information, see Using the DataExchange Monitoring Tools.

dpwizard

DataExchange Deployment Wizard

Description

DataExchange Deployment Wizard walks you through the steps necessary to deploy replication on First and Partner Sites. The wizard is an automated alternative to the DXdeploy command line

utility and can be invoked by selecting **Actian DataExchange > DX Deployment Wizard** from the **Start** menu or from within ZenCC by selecting **DataExchange** > **Deployment Wizard**.

trwizard

DataExchange Template Remover Wizard

Description

Template Remover is a wizard that deletes a replication template. You can no longer use the template to activate sites. You access this wizard by selecting **Actian DataExchange > DX Template Remover** from the **Start** menu or from within ZenCC by selecting **DataExchange** > **Template Remover**.

Services

DataExchange includes two services that initiate automatically at the time of startup. This topic discusses these services and includes specific information on configuring these for your specific business requirements.

File Name	Utility Name	Description
dxagent	DataExchange Agent	Detects critical replication failures, and notifies administrators by email.
replserv	Zen Replication	Performs data replication between databases.

dxagent

DataExchange Agent

Description

Detects critical replication failures and notifies administrators by email.

Failure Notification

DataExchange has the ability to notify you by email if a scheduled replication fails. The failure can be either of the following types:

- A scheduled replication fails to replicate within a specified period.
- Communication with a replication site fails. Perhaps the machine is down, the network has failed, and so forth.

Notification Agent

DataExchange installs a component called the notification agent if the machine contains the Zen Server product. The notification agent, or DX Agent, provides the notification functionality when scheduled replication fails.

The agent sends email if a replication failure occurs. The email subject line contains the words “DataExchange alert.” The email body contains the following primary content:

- Identity of computer on which the failure occurred
- Name of database
- Time since the last successful replication

Communication Protocol

The agent requires the basic Simple Mail Transfer Protocol (SMTP) to communicate with a mail server. Each replication machine with an agent must be configured to access the SMTP server. The SMTP server correspondingly must be set up to accept email from each replication site running the agent.

The agent does not deal with authentication or encryption. It does allow a different port other than the standard SMTP port 25. Thus, if a firewall opens a different port, you can specify which one. The port must not require authentication or encryption.

If a replication failure occurs and the SMTP server cannot be reached, a pop-up message appears. The message informs you that email could not be sent and lists the name of the SMTP server that cannot be communicated with. Note that the pop-up message appears even if no one is logged on to the computer. Also, the message continues to display until replication succeeds or the SMTP server becomes available. This is true even if you click **OK** to dismiss the message.

Agent Configuration

DataExchange contains a configuration file with which you configure the agent.

To configure the notification agent

1. In a text editor, open the file **DXAgentConfig.xml**, found on 64-bit systems in C:\Program Files (x86)\Actian\Zen\Replication\Config.

```
<?xml version="1.0"?>
<dxagentconfig>
   <smtpserver>
     <hostname>SMTP Server To Be Configured
     </hostname
     <port>25</port>
   </smtpserver>
   <email>
     <from>DXAgent@MyCompany.com</from>
     <to>Email Address To Be Configured</to>
   </email>
</dxagentconfig>
```

2. Specify the following in the file:
   - **SMTP Server To Be Configured** – The name or IP address of the email server.
   - **25** – Port number on the email server used for receiving mail. By default, set to port 25.
   - **DXAgent@mycompany.com** – The email address used by the agent for the sender of the notification. This address is for information only and does not have be an valid address.

- **Email Address To Be Configured** – The email address used by the agent for the recipient of the notification. Only one address is allowed, but it may be a group address.

The following example shows a modified DXAgentConfig.xml file.

```
<?xml version="1.0"?>
<dxagentconfig>
   <smtpserver>
     <hostname>myserver.mylocation.mycompany.com</hostname>
     <port>25</port>
   </smtpserver>
   <email>
     <from>DXAgent@mycompany.com</from>
     <to>mailbox@myserver.mylocation.mycompany.com</to>
   </email>
</dxagentconfig>
```

3. Save your modified DXAgentConfig.xml file.
4. If you have not already done so, reset your replication schedule to include notification.

replserv

Zen Replication Service

Description

The executable of the Replication service. The DataExchange service performs data replication between databases.

For information, see Starting and Stopping Replication.

Using DataExchange Manager

A Tour of DataExchange Manager Utility

This utility is covered in the following topics:

- DataExchange Manager Concepts
- DataExchange Manager GUI Visual Reference
- DataExchange Manager Tasks

DataExchange Manager Concepts

DataExchange Manager provides a standard interface to administer your activated databases. You may perform the following functionality with the utility:

- Manage replication schedules
- Mange information about a site
- Manage user information and group memberships

To use DataExchange Manager, you must log on to the utility and connect to a database. By default, the logon user name is `ADMIN` and the password is `password`. Both are case-sensitive.

DataExchange Manager writes entries to da.log in C:\ProgramData\Actian\Zen\Replication\LogFiles. You may customize logging features as explained in DataExchange Manager Tasks.

Managing Replication Schedules

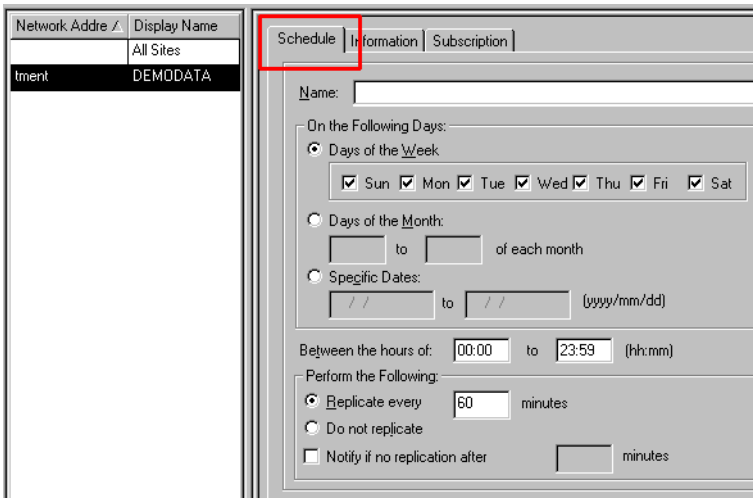
The replication of data to and from sites can be automated by schedules. You may also initiate replication manually. With DataExchange Manager, you may view, change, add, and delete replication schedules.

A schedule becomes effective immediately if you create one for the First Site machine on which you are running the DataExchange Manager. If you create a schedule for a site not local to machine on which the DataExchange Manager is running, the schedule becomes effective after the next successful replication between those sites. For example, suppose you are running the DataExchange Manager on machine A and you create a schedule for machine B. The schedule takes effect the next time site A replicates with site B.

Caution! Typically when using Real-Time Backup, data is replicated from the First Site to the Partner Site. When using Real-Time Backup, **do not set schedules from the Partner Site or with the Partner Site selected**. Doing so will result in changes from the Partner Site being replicated to other sites in the network and may also cause other schedules to operate incorrectly.

Site Schedule Tab

The site **Schedule** tab allows you to view, create, delete, or edit replication schedules for a site. You can also schedule periods when replication is not to occur. You access the site **Schedule** tab by clicking **Database** > **Sites**.



A schedule for the First Site applies to all sites that are subscribed to the First Site. You can create as many schedules as you need for each site.

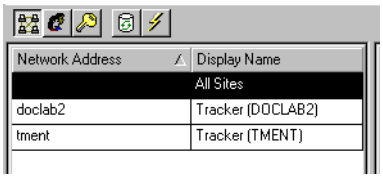
Managing Site Information

DataExchange Manager allows you to manage information about any site in your replication network from a single site (assuming that you have the correct authorization). By default, a user defined in DataExchange Manager as a system administrator can view all sites, and users other than system administrators can view only their own site.

Managing a remote site is done the same way as managing your own site. However, because any changes you make to a remote site are initially stored in your local copy of the replication system database, the changes do not take effect until your site replicates with the managed site. To manage a remote site, your site must subscribe to that remote site.

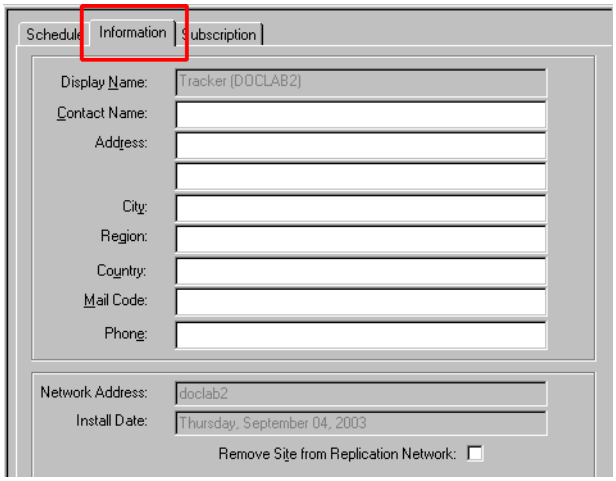
Site List

The site list contains a list of all the sites to which you have administrative access in the replication network. You can display the site list by selecting **Database** > **Sites**. The first entry in the site list is always All Sites. The other sites are listed under All Sites.



Site Information Tab

The site **Information** tab allows you to view or change the information about a site, such as contact information for a person responsible for the site. You access the site **Information** tab by clicking **Database** > **Sites**.



Remove Site from Replication Network

The **Information** tab contains an option **Remove Site from Replication Network**. This options acts as a toggle to remove a site from a replication network, or to restore a site that has been previously removed. This option does not delete any database files. The option marks the site as no longer belonging to the replication network.

This option is typically used to exclude a database from replication over a long period. See Using the DataExchange Monitoring Tools.

The other sites on your replication network do not know that a site has been removed until you perform a replication. Until you replicate, only the site for which you are logged on to DataExchange Manager knows that a site has been removed. An example helps clarify this.

The DataExchange Manager requires that you connect to a specific database when you log on. Assume that you select MyDataBase when you log on to DataExchange Manager. Once logged on, you remove site Partner_Site_2. At this point, only the replication tables for MyDataBase contain the removal information. The information has not been replicated to the rest of your replication network.

If you were to open the Initiate Replication dialog and select MyDataBase as the source database, Partner_Site_2 would not be included in the list of sites to replicate with. However, if you were to select a different site on the same replication network—for example Partner_Site_1—then Partner_Site_2 would still be listed in the sites to replicate with because you have not yet replicated. After you replicate, then Partner_Site_2 is no longer listed in the sites to replicate with.

Note that the first replication after removing (or restoring) a site from the replication network will fail for that site. After the first replication, this error no longer occurs because all sites on the replication network are aware of the site's status (removed or restored).

Managing Users

DataExchange Manager is supplied with two groups of users: System Administrators and Everyone. With DataExchange Manager, you may view, change, add, and delete user information and membership groups.

Each group contains certain permissions within DataExchange Manager and within your replication project.

By default, the System Administrator user for DataExchange Manager is named ADMIN. The ADMIN user's password, by default, is "password." Both are case-sensitive. When you add a user, he or she is automatically added to the Everyone permission group.

The following table compares the default permissions of System Administrators (abbreviated System Admins) and Everyone.

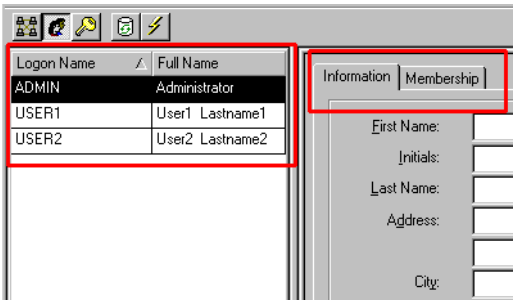
Permissions Within DataExchange Manager and Replication Network	System Admins	Everyone
Can add DataExchange Manager users	X	
Can see all users	X	
Can change information for any group or user	X	

Permissions Within DataExchange Manager and Replication Network	System Admins	Everyone
Can view, add, change, or delete replication schedules for any site	X	
Can view, add, change, or delete replication schedules only for their own site		X
Can change only their own user information		X
Can change any site's information	X	
Can change only their own site's information		X

Tabbed Dialogs and User List

Two tabbed dialogs allow you to specify user information and group membership, respectively. You access the tabbed dialogs by clicking **Database** > **Users**.

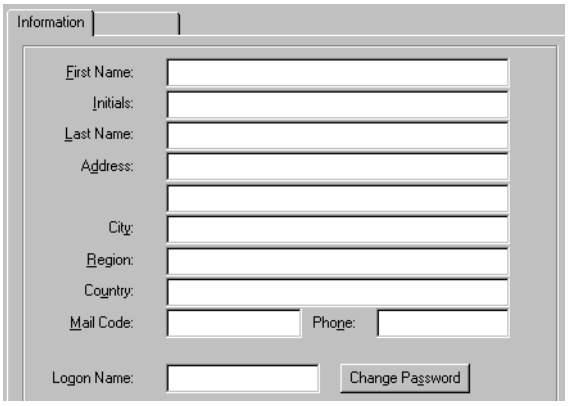
A user list appears to the left of the tabbed dialogs and contains a list of the users who can access DataExchange Manager. By default, nonadministrative users have permission to see only themselves in the list.



By default, new users added to your database project are automatically made members of the Everyone group. To change a user's membership from the Everyone group, you must change the user's group membership. See To change a user's group membership.

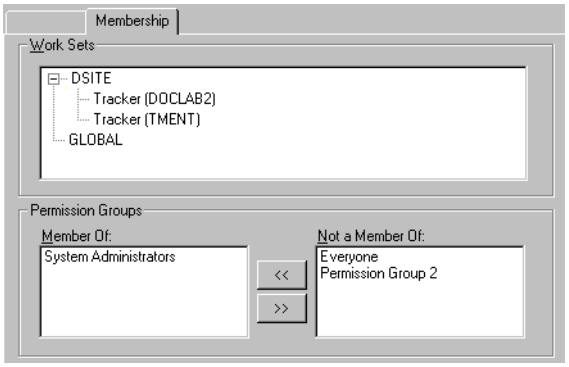
User Information Tab

This tab allows you to specify information about a user such as name, address, login name, and password.



User Membership Tab

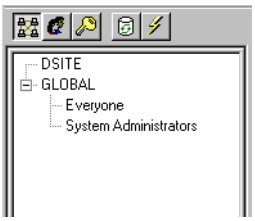
This tab controls user membership in the defined permission groups.



Your ability to perform many administrative and data access functions is controlled by the permission group to which you belong.

Managing Permissions

With DataExchange Manager, you may only view the permission groups available with DataExchange Manager. The DataExchange permission groups are System Administrators and Everyone. You access the permissions group list by clicking **Database** > **Permission Groups**.



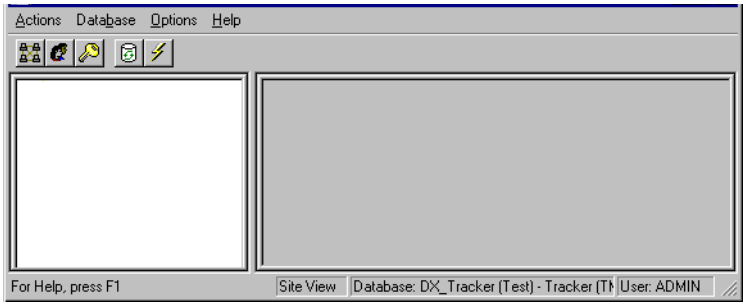
A user's permissions are determined based on the permission groups to which they belong. As you add new users, you must decide the appropriate permission group to which that user should belong. By default, new users added to your replication project are automatically made members of a permission group Everyone.

DataExchange Manager GUI Visual Reference

This topic details the objects on the DataExchange Manager graphical user interface.

Main Window

The following screen shot shows the main window of the GUI. The following table describes the parts of the window. You can click in the screen shot to jump to rows in the table.



GUI Object	Description	Related Information
Title Bar	Shows the name of the utility	
Actions menu	Provides the following commands: • Reconnect • Refresh • Exit	
Reconnect command or  icon	Displays the Logon dialog from which you may disconnect from and reconnect to a database as a different user or connect to a different database.	To log in to DataExchange Manager To log on as a different user or to connect to a different database
Refresh command or  icon	Applies changes made by another running copy of DataExchange Manager so that the changes are visible to your instance of the utility.	To refresh DataExchange Manager view

GUI Object	Description	Related Information
Exit command	Terminates the execution of DataExchange Manager.	
Database menu	Provides the following commands: • Sites • Users • Permission Groups	
Sites command or  icon	Switches to site view. A list of sites appears in the List pane and tabbed dialogs appear in the Tabbed Dialog pane.	Managing Replication Schedules Managing Site Information Site Information Tasks
Users command or  icon	Switches to user view. A list of users appears in the List Pane and tabbed dialogs appear in the Tabbed Dialog pane.	User Tasks
Permission Groups command or  icon	Switches to permission group view. A list of permission groups appears in the List pane.	Managing Permissions
Options command	Displays the dialog on which you specify logging options for DataExchange Manager.	To set the log options for DataExchange Manager
Help menu	Provides the following commands: • Help Topics • About	
Help Topics	Lists the documentation topics for DataExchange Manager.	To display help
About	Displays the name and version of DataExchange Manager and the DataExchange copyright information.	To display help

GUI Object	Description	Related Information
List pane	Depending on the selected view, displays a list of the following: • Activated sites within the replication network • DataExchange Manager users • Permission Groups	Site Information Tasks User Tasks
Tabbed Dialog pane	Depending on the selected view, displays the following: • Tabbed dialogs for working with sites • Tabbed dialogs for working with users	Site Information Tasks User Tasks
View indicator	Specifies the current view: • Sites • Users • Permission	Site Information Tasks User Tasks
Logged on Database indicator	Identifies the database to which DataExchange Manager is currently connected.	To log in to DataExchange Manager To log on as a different user or to connect to a different database
User indicator	Identifies the user currently accessing DataExchange Manager.	User Tasks

DataExchange Manager Tasks

This topic explains the tasks that you perform with DataExchange Manager:

- General Tasks
- Schedule Tasks
- Site Information Tasks
- User Tasks

General Tasks

General tasks apply to the overall use of the tool:

- To start DataExchange Manager from Control Center (ZenCC)
- To start DataExchange Manager from a command prompt
- To log in to DataExchange Manager
- To log on as a different user or to connect to a different database
- To change a logon password
- To set the log options for DataExchange Manager
- To refresh DataExchange Manager view
- To display help

To start DataExchange Manager from Control Center (ZenCC)

1. Start ZenCC if it is not already running.
2. Select **DataExchange** > **Manager.**

To start DataExchange Manager from a command prompt

1. Open a command prompt, enter `da` then press **Enter**.

   The DataExchange Manager executable is da.exe. The executable also supports command line options. At a command prompt, enter **da /h** to display the help text and view the available options.

To log in to DataExchange Manager

You must log in to DataExchange Manager before you can use the utility. A login dialog appears when you start the utility.

1. From the **Database** selection list, select the activated database to which you want to connect.
2. For **Login Name**, enter a valid user's name. The default login name is **ADMIN** (all capital letters).
3. For **Password**, enter a valid password. The default password is **password** (all lowercase).
4. Click **OK**.

Note: DataExchange Manager exits after three unsuccessful attempts to connect to a database.

To log on as a different user or to connect to a different database

These steps require that you already be logged on to DataExchange Manager.

1. Click **Actions** > **Reconnect** or click  .

   Clicking **Cancel** returns you to **DataExchange Manager**. However, if an unsuccessful logon attempt has been made, clicking **Cancel** exits **DataExchange Manager**.

To change a logon password

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

1. Click **Database** > **Users** or click  .
2. In the user list, click the user whose password you want to change.
3. Click the **Information** tab.
4. Click **Change Password**.
5. Enter a new password in the **New Password** and **Confirm Password** entry fields.

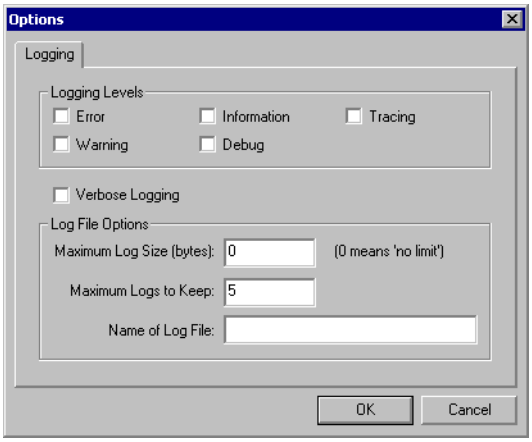
Note: The password is stripped of leading and trailing blanks.

6. Click **OK** to return to the **Information** tab.
7. Click **Apply** to save your changes.

To set the log options for DataExchange Manager

1. In the menu bar, click **Options**.
2. Specify the options you want on the logging options dialog.

The following screen shot shows the **Options** dialog. Click an item in the screen shot to jump to more information in the following table.



Option	Discussion
Error	Turns on or off the logging of errors to the log file. On by default. Errors are indicated by an **E** in the first column: `E 0142 1109-16:33:26 Login unsuccessful, the username/password combination is invalid`
Information	Turns on or off the logging of information messages to the log file. On by default. Information messages are indicated by an **I** in the first column: `I 019c 1109-14:06:36 Zen Replication Administrator`
Tracing	Turns on or off the logging of trace information to the log file. The information being traced is every function call. Trace information is indicated by a **T** in the first column: `T 0172 1109-16:33:26 0 << MessageEvent (0ms)` **Caution:** Avoid using the Trace option for long periods (over 30 minutes), particularly if you are performing numerous tasks with DataExchange Manager. Trace outputs every function call to the log file. Your log file can grow enormously in a very short period. Generally, use Trace only when requested by a technical support representative.

Option	Discussion
Warning	Turns on or off the logging of warnings to the da.log file. On by default. Warnings are indicated by a **W** in the first column: `W 0142 1109-14:07:05 Could not find site 000000`

Debug	Turns on or off the logging of debug information to the log file. Debug information is indicated by a **D** in the first column:
	`D 013f 1109-14:06:37 Response received from DRE:`
	`1:SUCCESS:PD2PQQ85001,TrackerPROJ (net) - Tracker`
	`PD2PQQ85002,TrackerPROJ (net) – TrackerPrtnr`
	`PD2PQQ86001,tracker-project`
	`int-tut-network) - IntTut_First_Site`
	`PD2PQQ86002,tracker-project`
	`int-tut-network) - IntTut_Partner_Site`
	`PD2PQQ86003,tracker-project`
	`(int-tut-network) - drelogtest`

Verbose Logging	This option applies only to Debug. (The Debug option must also be checked.) Verbose outputs the source program name and the line number within the program. For example, the following example shows that program cmdsend is receiving a response from the replication engine (line 308 of the source code).
	`D 013f 1109-14:06:37 cmdsend 308 Response received from DRE:`
	`1:SUCCESS:PD2PQQ85001,TrackerPROJ (net) – Tracker`
	Note: Some of the programs listed in verbose mode may not exist as a separate file on physical storage. Verbose mode shows the programs that are part of a compiled executable or dynamic link library.

Maximum Log Size	This value determines when a new history log file is started (lo1, lo2, and so forth). See Maximum Logs to Keep.
Maximum Logs to Keep	This value sets the number of history log files retained. Default is 5. When a log file reaches its maximum size, the file is reassigned to the next history file name. For example, when a log file, such as da.log reaches its maximum size, da.LO1 gets created. The da.log file is then empty and starts acquiring new entries. When the maximum size is again reached, da.LO1 becomes da.LO2, a new da.LO1 is created from da.log, and da.log is again empty. The **Keep** setting determines the extent of the history retained: LO1, LO2, LO3, and so forth.
Name of Log File	Sets log file name and location, defaulting to C:\ProgramData\Actian\Zen\Replication\Logfiles. You can change this path name.

To refresh DataExchange Manager view

When you make changes to a database from another running copy of DataExchange Manager, such as adding a user or changing a schedule, the changes may not be immediately visible to your current instance of the Manager.

For example, suppose that you made changes to a specific user in a second instance of the Manager. To see the changes, you would need to switch to the user **Information** tab in the first Manager and refresh the view.

1. In the menu bar, click **Options**, or press **F5** or click  .

To display help

1. Click **Help**, then the type of help you want:
   - **Help Topics** – Lists the documentation topics for DataExchange Manager.
   - **About** – Displays the name and version of DataExchange Manager and the DataExchange copyright information.

   You may also press F1 to access the list of help topics.

Schedule Tasks

Schedule tasks apply to automating replication:

- To create a replication schedule
- To change a replication schedule
- To delete a replication schedule

To create a replication schedule

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

1. Click **Database** > **Sites** or click  .
2. In the site list, click the site for which you want to set up a replication schedule.

   You cannot set up a schedule for All Sites.
3. Click the **Schedule** tab.
4. Click **Add** on the tab.

5. Enter a name for the new schedule.
6. Specify the days of the week, month, or specific dates for which the replication occurs.
7. Specify the hours, in 24-hour format, for which the replication occurs.

   The range is 00:00 to 23:59.
8. Specify the action taken by the schedule:

Option	Meaning
Schedule every [value] minutes	The frequency, in whole minutes, in which the replication schedule runs. A value of zero indicates continuous replication, which means that another replication session begins as soon as the previous session completes.
Do not replicate	Disables the replication schedule.
Notify if no replication after [value] minutes	See dxagent for a discussion of the notification agent and how this option applies to the agent. The minutes value for the notify option must be either zero, for continuous replication, or greater than the **Replicate every** value by at least one minute.

9. Click **Apply** to save the changes.
10. Click **OK** to acknowledge that a replication is required for the changes to take effect.

To change a replication schedule

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

1. Click **Database** > **Sites** or click  .
2. In the site list, click the site for which you want to set up a replication schedule.

   You cannot set up a schedule for All Sites.
3. Click the **Schedule** tab.
4. In the **Name** list, click the schedule that you want to change.
5. Complete steps 6 through 9 as explained in To create a replication schedule.

To delete a replication schedule

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

1. Click **Database** > **Sites** or click  .
2. In the site list, click the site that you want to delete.
3. Click the **Schedule** tab.
4. Click **Delete** on the tab.
5. Click **Yes** to confirm the deletion.

Site Information Tasks

Site information tasks apply to contact information about a site or removing a site from a replication network:

- To change site information
- To remove a site from or restore a site to a replication network

To change site information

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

1. Click **Database** > **Sites** or click  .
2. In the site list, click the site that you want to delete.
3. Click the **Information** tab.
4. Specify the contact information for the site.

   To remove a site from a replication network, or to restore a site that has been previously removed, see the following task.
5. Click **Apply** to save the changes.

To remove a site from or restore a site to a replication network

1. Click **Database** > **Sites** or click  .

2. In the site list, click the desired site.
3. Click the **Information** tab.
4. Do one of the following:
   - To remove a site, select **Remove Site from Replication Network**.
   - To restore a site already removed, clear **Remove Site from Replication Network**.

Note: The option **Remove Site from Replication Network** does not require you to apply the action. Selecting or clearing the option is sufficient. For the removal or restoration to take effect, however, you must perform a replication session.

User Tasks

User tasks apply to adding or deleting users and membership groups and changing user information:

- To add a new user
- To change user information
- To delete a user
- To change a user's group membership

To add a new user

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

1. Click **Database** > **Users** or click  .
2. Click the **Information** tab.
3. Click **Add** on the **Information** tab.
4. Enter the desired user information in the entry fields. The **First Name**, **Last Name**, **Logon Name**, and **Password** are mandatory.

   Note that the Logon name is automatically converted to uppercase and stripped of leading and trailing blanks.
5. Click **Set Password**.

6. For **New Password**, enter the desired password. Reenter this same password for **Confirm Password**.
7. Click **OK**.

   Note that the password is stripped of leading and trailing blanks.
8. Click **Apply** to save your changes.

To change user information

Permission Group Requirement: To edit a user's information (other than your own), you must be a member of the System Administrator Permission Group. All users can change their own information.

1. Click **Database** > **Users** or click  .
2. In the user list, click the desired user.
3. Click the **Information** tab.
4. Change the user information as desired.

   See To change a logon password if you want to change a password.
5. Click **Apply** to save your changes.

To delete a user

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

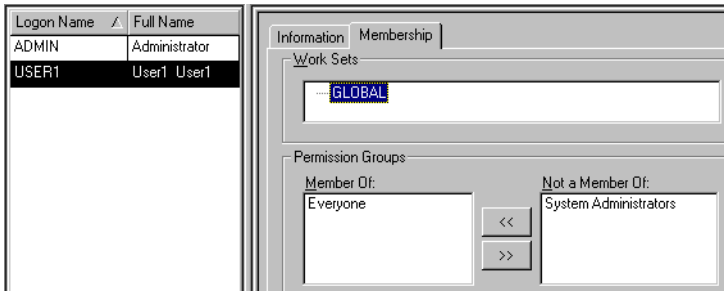
1. Click **Database** > **Users** or click  .
2. In the user list, click the desired user.
3. Click the **Information** tab.
4. Click **Delete**.

   You cannot delete the default administrator user ADMIN.

To change a user's group membership

Permission Group Requirement: You must be a member of the System Administrator Permission Group to perform this task.

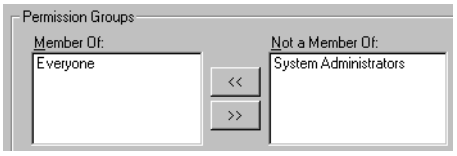
1. Click **Database** > **Users** or click  .
2. In the user list, click the desired user.
3. Click the **Membership** tab.
4. In the Work Sets pane, click the work set to which the permission group belongs.



   Permission groups for a selected work set are sorted into two lists: **Not a Member Of** and **Member Of**. The selected user is a member of all those groups in the **Member Of** list.

5. Click the desired permission group, then use the arrow buttons between the lists to move the group to the Member Of or Not a Member Of lists.

   For example, in the following image, if you wanted to add a user to the System Administrators group, click System Administrators in the Not a Member Of list, then click  .



6. Click **Apply** to save your changes.

Using the DataExchange Monitoring Tools

DataExchange allows you to configure replication sessions, initiate replication, monitor it, and log it. The tools with which you perform these actions are the Replication Progress and Log Viewers. Their window is accessed from Control Center (ZenCC).

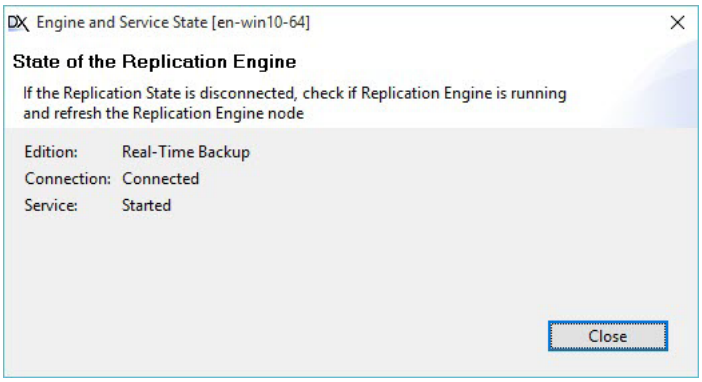
These viewers are covered in the following topics:

- Checking the Replication Engine and Service
- Initiating Replication from the Progress and Log Viewers
- Capturing Replication Activity in the DRE Log

Checking the Replication Engine and Service

To view engine and service state

1. From Control Center (ZenCC), right-click the **Replication - Connected** node and select **View Engine and Service State**.
2. The **Engine and Service State** dialog box opens, similar to the following:

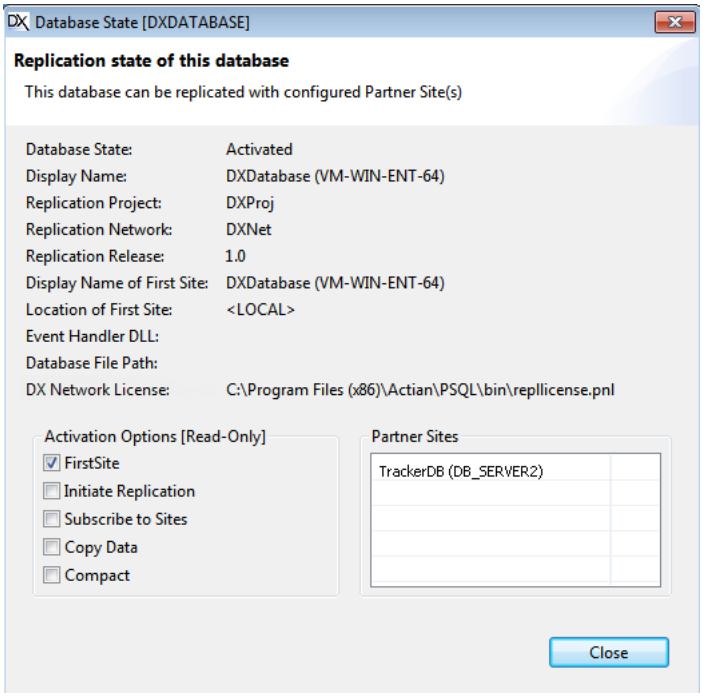


The information displayed in this dialog is only for information and cannot be edited.

To view the state of a database

1. In ZenCC, right-click the Replication node under a specific database and select **View Database State**.

If the database has been activated, the following dialog appears.



All of the fields in the dialog are read-only.

The types of states include the following:

- **DNA**. This indicates that the database is the replication system database: Database Network Analysis (DNA). This database has a data source name like PD00000x and is created when you install DataExchange.

Caution! Do not delete this database. DataExchange will not function if you do.

- **Pure**. This indicates that the database does not contain replication control tables. That is, the database has not been activated nor is it a template.
- **Template**. This indicates that the database is a replication template.

2. Click **Close** when you are done.

Initiating Replication from the Progress and Log Viewers

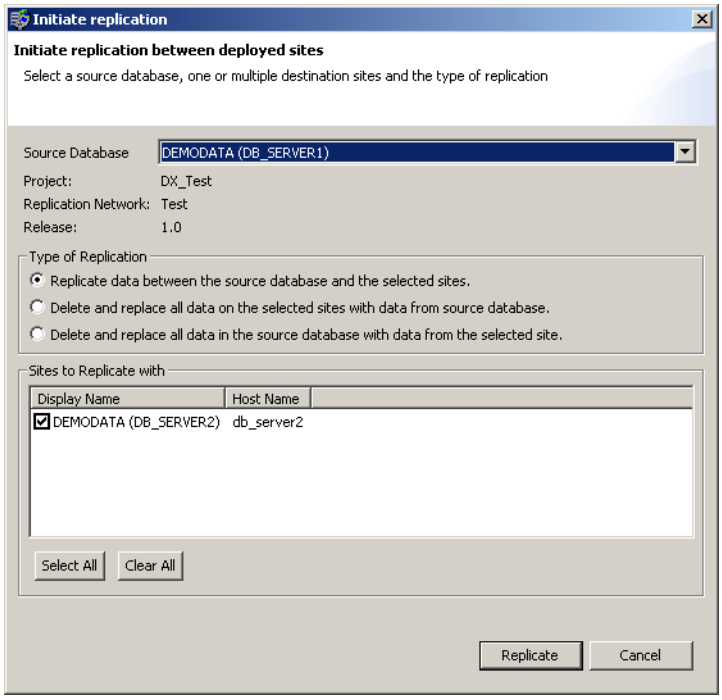
You can manually initiate a replication session. The Initiate Replication dialog box lets you select a database to replicate, the type of replication, and the sites to include. This topic covers the following:

- Initiating a Replication Session
- Reading the Initiate Replication Dialog Box

Initiating a Replication Session

To initiate replication

1. In ZenCC right-click the **Replication - Connected** node in Zen Explorer and select one of the following:
   - **Initiate Replication**
   - **Statistics and Log Views** to open the Replication Progress and Log Viewers and then in the toolbar, click the **Initiate replication** icon .



2. In the **Initiate Replication** dialog, select a database from the **Source Database** list.

3. Click the type of replication you want. Choose one of the following options:
    - **Replicate data between the source database and the selected sites.**

      This option replicates data between the source database and the selected sites. This default causes the replication engine to replicate the data among the machines specified, resolving any data conflicts. Either default conflict handling is used (most recent change wins) or an event handler callback DLL is used if you set one at activation time.
    - **Delete and replace all data on the selected sites with data from the source database.**

      This option deletes and replaces all data on the selected sites with data from the source database. This deletes all data on the sites you check mark in the list of sites to replicate with. The data from the source database replaces the data. The source database can be used to delete and replace data on one or more sites. Conflict resolution is not performed.
    - **Delete and replace all data on the local site with data from the selected site.**

      This option deletes and replaces all data on the local site (the source database) with data from the selected site. This deletes all data in the source database and replaces it with the data from the selected site. You can designate only one selected site (a one-to-one situation). Conflict resolution is not performed.
4. Check mark the sites with which you want to replicate with the source database. Clear the check mark for the sites you do **not** want to participate in the replication.
5. Click **Replicate**.

Note: The list of sites to replicate with may seem inconsistent depending on how you activated your Partner Sites.

Reading the Initiate Replication Dialog Box

The list of sites to replicate with may seem inconsistent depending on how you activated your Partner Sites. For example, you create Partner Site PS1 and perform an initial replication with the First Site (the default behavior). You create Partner Site PS2 but do not perform an initial replication with the First Site.

In the Initiate Replication dialog, if you select as the source database the First Site or PS1, neither shows PS2 as a site to replicate with. This may lead you to question, "What became of my second Partner Site? Why isn't PS2 in the list?"

It is not in the list because the information about the replication network, such as the sites on it, is also replicated. If you select PS2 as the source database, the choice **First Replication Site** shows

as a site to replicate with. After you replicate with the First Site, then PS2 appears in the list for the First Site and PS1.

The easiest way to ensure consistency in the list is to perform an initial replication with the First Site when you activate each Partner Site. A Partner Site cannot replicate with other sites until it replicates with the First Site.

Capturing Replication Activity in the DRE Log

The DataExchange replication engine (DRE) records its operations in the file dre.log, located by default in C:\ProgramData\Actian\Zen\Replication\LogFiles. You can review replication activity in this log from ZenCC by right-clicking the Replication icon under the Databases branch and selecting Statistics and Log Views. You can also use a text editor to open the log file directly.

Where appropriate, the messages in the dre.log include the user-supplied names for the database, replication project, replication network, and replication release. The local database is referred to by its data source name (DSN). Remote sites are referred to by their display name and a site number. Remote sites typically have the same database name as the local site.

Each site in every replication network is numbered, beginning at 1,000,000 for the First Site, and incrementing by one for each site thereafter. These numbers appear as base 36 numbers. The dre.log is the only log that uses base 36 site numbers.

The type of message in dre.log is indicated by a letter in the first column of the entry, as follows:

- D – debug
- E – error
- I – information
- T – trace
- W – warning

The setting of logging levels and their meanings is documented in DataExchange Manager Tasks.

Basic Troubleshooting

The following topics provide information for troubleshooting and resolving the most commonly encountered problems you may encounter as you implement a replication solution.

- Troubleshooting Resources
- Troubleshooting Strategies
- Multiple First Sites
- Uninstalling
- Network Communications
- Database Engine
- Replication Engine
- Log Files
- Data Replication
- Data Conflicts
- Notification Agent

Troubleshooting Resources

The following table describes resources available to help you solve problems.

Feature/Component	Function	For More Information
DataExchange log files	Logs information during replication processing.	See Log Files
DataExchange Table Synchronization and Check utility	Ensures that every record in the data tables has a corresponding record in the replication control tables.	See dxsynctables
Zen System Analyzer	Tests active engine installations and network communications in DataExchange.	See Network Communications
Knowledge Base	Provides information about many Zen software configurations and common environments.	Search the knowledge base on the Actian website

Troubleshooting Strategies

You must first diagnose a problem before you can fix it. The following checklist contains items to help you diagnose problems with DataExchange.

- ☐ Does my DataExchange configuration have more than one First Site?
- ☐ Did DataExchange uninstall correctly?
- ☐ Does the network function correctly?
- ☐ Is the database engine running?
- ☐ Is the replication engine running?
- ☐ Is data being replicated correctly?
- ☐ Is the notification agent sending email?
- ☐ Do the log files contain errors?

Continue reading for details about each checklist item.

Multiple First Sites

Unpredictable results can occur if you set up multiple First Sites per replication network. Install only one First Site per replication network.

Uninstalling

If you have activated databases that are located under C:\ProgramData\Actian\Zen\Replication, first deactivate them then delete the replication template with the Template Remover wizard. If you do not deactivate the database then remove the template, uninstall leaves the database files and the associated replication files. The remaining files do not cause any problems but you may prefer to reclaim physical storage by deleting them. You may delete the files manually if you want. Remember, also, to remove the DSN associated with the database.

Network Communications

Zen System Analyzer (PSA) is a diagnostic utility included with the Zen database engine. PSA can be used as a stand-alone diagnostic tool to help you troubleshoot network problems.

Using PSA for Network Troubleshooting

To start PSA

1. Select **Zen System Analyzer** from the **Start** menu.
2. To troubleshoot network communications for DataExchange, select **Test Active Installation** in the **System Analyzer Options** dialog in PSA.

Note: *Zen User's Guide* covers the features and use of PSA. For DataExchange, use PSA only to troubleshoot network problems. PSA has other uses with Zen database engines that do not apply to DataExchange.

Database Engine

The Zen database engine must be running to perform replication.

To verify Zen Server engine is running

1. Open the Windows **Control Panel**.
2. Click **Administrative Tools**, then open **Services**.
3. Scroll the list until you reach one of the following services:
   - Actian Zen Enterprise Server
   - Actian Zen Cloud Server

   The service must be started for the Zen database engine to function correctly.

   The Status column shows whether the service is currently running. The Startup column shows whether the service is set to automatically start on system startup or start manually.
4. If a service is not started, right-click it and select **Start**.

Replication Engine

The DataExchange replication engine must be running to perform replication. The engine will not run, for example, if a temporary license has expired.

Use the Zen License Administrator utility to determine if you have a permanent license installed for DataExchange or to see if a temporary license has expired. See the License Administrator topic in *Zen User's Guide*.

To verify the replication engine is running with Zen Server

1. Access the **Services** Control Panel.
2. Scroll the list of services until you reach the service **Actian Zen Replication**.

   This service must be started for the DataExchange replication engine to function correctly.

   The Status column shows whether the service is currently running. The Startup column shows whether the service is set to automatically start on system startup or start manually.
3. If the service is not started, right-click it and select **Start**.

Log Files

DataExchange allows you to enable event logging. You may capture the activity of the DataExchange Monitoring Tools, DataExchange Manager, and DataExchange Replication Engine. Additionally, DataExchange keeps a messages log and an installation log.

All logs are text files and have a file extension of .log for the most current one saved. The files produce any mix of data: Information, Warning, Error, and Debugging. You can choose verbose (as opposed to terse) messages. Verbose messages contain the name of the program and a line number within the program to help you debug situations. Verbose applies only to the Debug logging level.

The DataExchange replication engine (DRE) records its operations in the file dre.log, located by default in C:\ProgramData\Actian\Zen\Replication\LogFiles. You can review replication activity in this log from ZenCC by right-clicking the Replication icon under the Databases branch and selecting Statistics and Log Views. You can also use a text editor to open the log file directly.

You can set a number of log file options in DataExchange Manager. You can change the default logging location. You can also change the default log size and the default number of files kept as history. For instructions, see DataExchange Manager Tasks.

Log File Size

If you set the maximum log size to zero, or no limit, the log will increase in size to whatever capacity the physical storage allows. We recommend that you do not set a maximum log size of zero except for troubleshooting. Even then, avoid using the no limit setting for an extended period (typically, more than four hours). The DRE log, for example, can grow rapidly depending on the type of logging being performed (such as Debug logging), the frequency of replication, and the number of sites replicating.

In the case of dre.log, when the log file reaches its maximum size, the file is reassigned to the next history file name. For example, when dre.log reaches its maximum size, it gets renamed to dre.LO1 and a new dre.log gets created. The dre.log file is then empty and starts acquiring data once more. When the maximum size is again reached, dre.LO1 gets renamed to dre.LO2, dre.log gets renamed to dre.LO1, and a new dre.log file is again empty and able to acquire data. The **Maximum Logs to Keep** setting determines the extent of the history retained: LO1, LO2, LO3, and so forth.

Other DataExchange components automatically start a new log file when the utility or service executes. Each time the utility is activated the associated *filename*.log file is copied to *filename*.LO1. The utility then begins logging in the now empty filename.log file. Again, the **Maximum Logs to Keep** setting controls retention.

The DataExchange Manager and DataExchange Monitoring Tools have a logging dialog that allows you to change the logging settings.

Log File Descriptions

The following table describes the content of the various log files.

Log File (.log)	Description
da	Updated by DataExchange Manager when you modify schedules, user access, and so forth.
DX_Dnewsite	The replication installation log. This log is created when you install DataExchange and contains information about setting up the replication DNA database.
dre	Contains detailed information on the status of the replications, and is the most active log file. The replication engine updates this log as replication occurs. The default maximum size of this log is 2 MB. You may want to limit this log to a maximum 5 MB. Some text editors cannot open files larger than 10 MB. When the replication engine reassigns the DRE log to the next history version (dre.log to dre.lo1, for instance), some log messages may be lost. The loss is typically minimal and may not even occur, depending on the replication activity when the history version is assigned.
DX_Dregdtk	Created if you install a First Site. The log contains information about registering the licenses.
dxact	Updated by the activation utility when you activate a site.
dxdeact	Updated by the deactivation utility when you deactivate a site.
dxdeploy	Updated by the dxdeploy utility. See also Replication Deployment Using DXdeploy with an XML Descriptor File for a hands-on example in which information is written to dxdeploy.log.
dxevent	Updated by the dxevent.dll, which handles replication session event callbacks.
dxsynctables	Updated by the dxsynctables utility, which synchronizes data files and the replication data control files.
<DX prefix>Install	Created to record information related only to installation. This log file is especially useful if installation fails. Its file name is DataExchange_v*nn*_64_Install.log.
mer	Written if errors occur while DataExchange routes calls to the MKDE. This log is usually empty. If you suspect that data is not getting replicated correctly, check this log.

Log File (.log)	Description
msg	Lists messages about the replication sessions, the sites that replicated and if the replication was successful. The replication engine writes to this log. The dre log is more detailed.
reh	Contains information only if the Replication event handler encounter problems updating control tables. If you suspect that data is not getting replicated correctly, check this log.
sess####	Contain information about particular replication sessions. The #### represents a four-digit number. The logs are created if you set up a replication schedule and then replicate. The logs are deleted if you stop the replication engine, and are also deleted at regular intervals. The deletion interval is set by a registry setting.

To change the deletion interval for session logs

Note: Incorrectly editing the Windows registry can damage it, causing undesirable results, such as your computer failing to start. If you do not feel comfortable editing the registry, work with an IT professional. Actian Corporation accepts no responsibility for a damaged registry. We suggest that you create a backup of your registry before editing it.

1. Run the **regedit** utility.
2. In the Registry Editor window, find the following registry key:

   HKEY_LOCAL_MACHINE\Software\Pervasive Software\Pervasive Replication\SessionExpiry
3. In this key, double-click **REG_DWORD**.
4. In the Edit DWORD Value dialog in the Value Data field, change **the number** of minutes (default 5).
5. Click **OK** to exit Registry Editor.

Data Replication

The following topics pertain to replicating data:

- False Alert Because of Schedule Manipulation
- Correct Alarms but Replication on Wrong Schedule
- Dynamically Created Tables Not Being Replicated
- SQL Triggers and Replication
- Data Conflicts When Activating Partner Sites
- Index Segments

False Alert Because of Schedule Manipulation

If you delete, disable, or modify a schedule, the other replication sites are not aware of this because replication does not take place. The notification agent on the other sites continues to contact the scheduling site. If the scheduling site is down or unreachable, the agent sends a failure alert. The alert is false because the schedule no longer applies.

To prevent such false alerts, manually initiate replication after you delete, disable, or modify a schedule. The replication ensures that the schedule changes get replicated. Alternatively, if your entire replication network no longer needs replication, deactivate all replication sites on the network.

Correct Alarms but Replication on Wrong Schedule

This situation occurs if you change a schedule remotely. For example, you start DataExchange Manager on site B and use it to change the schedule on site A. The replication engine on site A will not use the new settings until you restart the engine. The notification agent, however, uses the new schedule without having to be restarted. The agent properly notifies of replication being off schedule.

To prevent this situation, do not update schedules remotely.

Dynamically Created Tables Not Being Replicated

If your dynamically created tables are not being replicated, verify that the file matching patterns in the dCNF table are correct. DataExchange provides a utility, Dxdynpath, to help you verify file matching patterns. See dxdynpath.

Note that relative paths are relative to a home directory that contains data dictionary files (DDFs) recognized by DataExchange.

Note: Dxdynpath should only be used with the Real-Time Backup Edition.

SQL Triggers and Replication

SQL triggers are a type of stored procedure that are automatically executed when data in a table is modified with an INSERT, UPDATE, or DELETE. (Stored procedures are SQL statements that are predefined and saved in the database dictionary.)

Replication updates the base table before updating the dependent tables. This sequence maintains the correct foreign key relationships. In the case of the sample database Tracker, for example, the Region table is updated before the Employee table.

For illustration, suppose you have a database with a base table A and a dependent table B (table B has a foreign key relationship to table A). You create a trigger that updates base table A when a new record is inserted into table B.

Partner site 1 inserts a new record into table B, causing the trigger to execute. Table A is updated on Partner Site 1. Then you replicate Partner Site 1 with your other sites.

On the other sites, replication updates table A, then inserts a new record into table B, causing the trigger in table B to execute and again attempt to update table A. This may not be the desired behavior because the replication engine has already updated the record in table A with changes made on Partner Site 1.

Definitive rules concerning triggers and replication cannot be given. In general, carefully consider each trigger that is part of a replicated database. Make certain that the trigger's functionality and the behavior of replication are compatible to ensure the outcome you desire.

Data Conflicts When Activating Partner Sites

The template data prepared for replication during design is marked differently (with timestamps and other internal methods) than the data prepared during activation. The replication engine resolves the differences during replication. In a few cases, data conflicts may result between how you activate your First Site versus how you activate your Partner Sites.

Index Segments

For data files with 4096-byte page size, you are limited to 119 index segments per file. Because each indexed nullable column with true NULL support requires an index consisting of 2 segments, you cannot have more than 59 indexed nullable columns in a table (or indexed nullable true NULL fields in a Btrieve file). This limit is smaller for smaller page sizes.

Any file created with Zen, with file create mode set to 7.x, and TRUENULLCREATE set to the default value of On, has true null support. Files created using an earlier file format, or with PSQL 7, or with TRUENULLCREATE set to Off, do not have true null support and do not have this limitation.

See *SQL Engine Reference* for more information about TRUENULLCREATE.

Data Conflicts

Central to any replication solution is its ability to detect and resolve conflicts when they occur. The best method of handling conflicts is a preventative one: avoid conflicts by design. In addition to this, DataExchange includes a default last-in-wins policy. By maintaining time stamps in control tables and synchronizing clocks on replication sites, an accurate account of when records where inserted, updated, and deleted is kept. The replication engine is responsible for enforcing the conflict policy (and logging conflicts) as they occur.

In addition, DataExchange provides an interface with which you can define your own conflict resolution. You can design the appropriate conflict resolution for any set of business rules and provide the resolution through an event handler DLL. The DLL overrides or extends the functionality of the replication engine.

Conflict Types

Data conflicts are divided into types by DataExchange. Each conflict is recorded in the log dre.log. You can read the log entries and determine what, if any, action needs to be taken. Messages similar to the following appear in the log. It contains the type of conflict, the key of the record involved, and how the conflict was resolved.

When a conflict occurs and a record must be overwritten, the newest record is always used. To alter this behavior, you can register your customized Event Handler DLL with the replication engine.

```
W 0130 0321-17:44:04 CONFLICT: Type I: Record 2 for table Customer has been altered at
both sites (key: 123).
```

```
W 0130 0321-17:44:04 Type I conflict resolved: Record 2 will be updated at partner
(Table Customer, key: 123).
```

The log file of the site where the record was not updated will contain a message saying that the record at the partner Site was updated (as above). At the site where a record was overwritten, messages similar to the following show the data value that was updated as well as the new value (in this case the last name Yin was replaced by the last name Yan:

```
I 0130 0321-17:44:04 Local field Customer.LastName replaced by remote value
I 0130 0321-17:44:04 Before: Yin
I 0130 0321-17:44:04 After: Yan
```

Type I Conflict

A Type I conflict occurs when a record has been updated at both sites since the last replication session. When this occurs the newer record is replicated and a log message similar to the following is generated:

```
W 0130 0321-17:44:04 Type I conflict resolved: Record 2 will be updated at partner
(Table Customer, key: 123).
```

Variations of this conflict type include the following possible scenarios and associated log messages:

- local site has more recent record and initiator is local site

```
W 01f8 08-17 19:09:41 CONFLICT: Type I: a record in table Employee has been altered at both sites
GIDSysKey: 632940095990000027 GIDSiteID: 0 Unless overridden by an event handler, the DRE will choose
the most recent (partner) record.
```

- local site has more recent record and initiator is partner site

```
W 055c 08-17 19:00:51 CONFLICT: Type I: a record in table Employee has been altered at both sites
GIDSysKey: 632940095990000028 GIDSiteID: 0 Unless overridden by an event handler, the DRE will choose
the most recent (local) record.
```

- partner site has more recent record and initiator is local site

```
W 0518 08-17 19:14:25 CONFLICT: Type I: a record in table Employee has been altered at both sites
GIDSysKey: 632940095990000029 GIDSiteID: 0 Unless overridden by an event handler, the DRE will choose
the most recent (local) record.
```

- partner site has more recent record and initiator is partner site

```
W 0954 08-17 19:05:23 CONFLICT: Type I: a record in table Employee has been altered at both sites
GIDSysKey: 632940095990000030 GIDSiteID: 0 Unless overridden by an event handler, the DRE will choose
the most recent (partner) record.
```

Type V Conflict

Type V conflicts occur when there is an error with the starter data at each Site (the data that already exists in the database when your database application is activated).

If starter data exists at one Site and not at the other, the starter data is replicated to the other site. If the existing starter data is different, however, a type V conflict is logged and replication stops:

```
W 0130 0321-17:44:04 CONFLICT: Type V: Starter data in record 2 for table Customer is
different at the two sites - the conflict must be resolved manually.
```

Type VI and VIa Conflicts

Conflicts between a record inserted or updated at one site and deleted at another site are treated as a Type VI conflict. During conflict processing, if all records are updated at one site (or the record was inserted) and the record is deleted at the other site, a type VIa conflict is logged and the most recent operation wins. If any records are not updated, then the delete operation must always win. This type VI conflict needs to be resolved in this way because there is insufficient information available to reinsert the entire record at the site where the record was deleted. The following describes the possible scenarios and the associated log messages:

- record updated or inserted locally and deleted on the partner site

```
W 0130 0321-17:44:04 CONFLICT: Type VI: A locally-updated record in table Customer
has been deleted at the partner site (key: 123)
Creation date: 2000/05/10 12:26:45
Deletion date: 2000/05/11 11:18:23
The record will be deleted locally.
W 0130 0321-17:44:04 CONFLICT: Type VIa: A newly-inserted record in table Customer
has been deleted at the partner site (key: 123)
Creation date: 2000/05/10 12:26:45
Deletion date: 2000/05/11 11:18:23
The record will be transmitted.
```

- record updated or inserted at the partner site and deleted locally

```
W 0a78 08-17 13:05:13 CONFLICT: Type VI: A record in table t1 has been deleted at the partner site and
updated locally. GIDSysKey: 632939880130000000 GIDSiteID: 0 The record will be deleted locally.
```

Successful Conflict Resolution

Note that if conflicts were successfully resolved during a replication cycle, a message similar to the following appears in the replication log file:

```
0082 0818-10:47:36 Replication of Tracker with 000030 ended successfully with 2
conflicts resolved.
```

Resolving Primary Key Conflicts

The best way to avoid primary key conflicts is to design your source database with unique primary keys. If you are using an existing database for replication that does not have unique primary keys, you can designate primary keys with the Control Center.

A primary key conflict occurs when two rows have been inserted into two different activated databases that have the same primary key. Because each row could potentially have relevant data, the replication engine stops the replication and will not modify these rows.

You will see the following errors the dre.log file on the system that detects the primary key conflict. For this example, the primary key conflict has been detected on the Region table of the sample database Tracker.

```
E 01cb 1108-11:42:21 sqlhelp 852 ODBC Error -1: (S1000) '[Pervasive][ODBC Client
Interface][LNA][Pervasive][ODBC Engine Interface][Data Record Manager] The record has
a key field containing a duplicate value(Btrieve Error 5)' <-4994>
E 01cb 1108-11:42:21 dbutil 629 ODBC statement failed: -1 from function Execute
E 01cb 1108-11:42:21 dbutil 636 ODBC statement: INSERT INTO "Region"
("RegionID","NameStr") VALUES (?,?)
E 01cb 1108-11:42:21 dsectbl 927 Unable to insert new record into table Region having
key: 8
E 01cb 1108-11:42:21 dresyncs5368 FSM:{22: An ODBC error occurred}: Unable to store
next PD2PQQ88002.Region record from partner's data list (key:PDCID(1000010))
```

All other systems that attempt to replicate with this system will fail with the Error:

```
E 01e8 1108-11:36:40 dresyncs1542 Error received from partner replication engine:
'Update of Region failed'
Replication stopped.
```

Remedying a primary key conflict requires manual intervention. You must update the primary key of one of these conflicting rows to a new, unique value. Following that, you must start a replication session.

For instance, from the example above, the conflict occurred with primary key 8. So, on one of the databases involved you would update the primary key to 9, a unique key value for the table. Then you would replicate the two systems together.

Note that during this replication, the replication control tables are cleaned up to correct the primary key conflict, and the following is written to the dre.log file as a warning message. Its purpose is to let you know that the primary key conflict was successfully resolved.

```
W 01b7 1107-17:12:56 dsectbl 893 A primary key conflict has been rectified on a
replication control table. Table: PDCRegion, Column: CRegionID with key value of: 8
```

So, what transpired in terms of data in the database? Here is the contents of the Region table throughout the process. First, a row with the same key is inserted onto each site.

Site 1		**Site 2**	
RegionID	NameStr	RegionID	NameStr
8	Site1Data	8	Site2Data

We replicate and we get the primary key conflict, replication is stopped, no tables are updated.

Site 1		Site 2	
RegionID	NameStr	RegionID	NameStr
8	Site1Data	8	Site2Data

Update one of the sites to a new unique value.

Site 1		Site 2	
RegionID	NameStr	RegionID	NameStr
9	Site1Data	8	Site2Data

Replicate the new change.

Site 1		Site 2	
RegionID	NameStr	RegionID	NameStr
8	Site2Data	8	Site2Data
9	Site1Data	9	Site1Data

Now both sites are replicated to a consistent copy and no data has been lost.

Notification Agent

The notification agent is installed only if the machine contains the Zen Server product. If the notification agent is not sending email, check the following:

- The agent is running as a service.
- The agent is correctly configured (see dxagent).
- The SMTP port through which the agent communicates does not require authentication or encryption.
- Each replication machine with an agent has access to the SMTP server.
- The SMTP server is set up to accept email from each replication site running the agent.

To verify notification agent is running

1. Open the Windows **Control Panel**.
2. Click **Administrative Tools**, then open **Services**.
3. In the list of services, find **Actian DX Agent**.

   This service must be started for the notification agent to function correctly.

   The Status column shows whether the service is currently running. The Startup column shows whether the service is set to automatically start on system startup or start manually.
4. If the service is not started, right-click it and select **Start**.

Testing the Mail Server

The SMTP mail server must also be functioning correctly. If required, verify that the SMTP mail server is sending and receiving email correctly. Reference the documentation supplied for your SMTP server software or check for testing procedures on vendor websites.

Supported Data Types

Supported data types are covered in the following topics:

- Data Types
- Notes on Data Types

Data Types

The following table lists the Zen data types supported by DataExchange.

Data Type	DataExchange Implementation	Can be Used as Primary Key for Replication
Bit	bool	no
Tinyint	byte	yes
Utinyint	byte	yes
Decimal	numeric	yes
Numeric[1]	numeric	no
Bigint[1]	numeric	no
Ubigint[1]	numeric	no
Currency[1]	numeric	no
Longvarbinary	blob	no
Binary	blob	no
Longvarchar	blob	no
Char[2]	string	yes
Varchar[3]	string	yes
Integer	long	yes
Uinteger	long	yes
BigIdentity[4]	long	yes
Identity[4]	long	yes
Smallint	short	yes
Usmallint	short	yes
Smallidentity	short	yes
Float	double	yes
Real	double	yes
Double	double	yes

Data Type	DataExchange Implementation	Can be Used as Primary Key for Replication
Autotimestamp	timestamp	yes
Date	timestamp	yes
Time	timestamp	yes
Timestamp	timestamp	yes
Timestamp(*n*)	timestamp	yes
Timestamp2	timestamp	yes

[1]Partially supported data type. See data types appendix in *SQL Engine Reference*.

[2]Limited to 255 characters.

[3]Limited to 254 characters.

[4]DataExchange permits BigIdentity and Identity for replication primary keys, but we discourage it for any part of unique indexes.

Notes on Data Types

This topic lists special information regarding the use of data types in DataExchange.

DECIMAL

DECIMAL is implemented in DataExchange as a NUMERIC and can be use as a primary key for replication.

NUMERIC, BIGINT, UBIGINT and CURRENCY

The other data types that are implemented as NUMERICS **cannot** be used as primary keys for replication. These include NUMERIC, BIGINT, UBIGINT, and CURRENCY.

CHAR

The CHAR data type is limited to 255 characters.

VARCHAR

The VARCHAR data type is limited to 254 characters.

IDENTITY

Although you may use IDENTITY data types for primary keys in DataExchange, we strongly recommend that you *not* use this data type as part of a unique index.

Reserved Table Names

DataExchange Reserved Words and Table Names

DataExchange reserved words are keywords with special meanings when processed by the replication engine. These words cannot be used as database or table names in your applications. The following table lists the replication system table names used by DataExchange.

ActivateInfo	dActHist	dActSite
dActTbl	dCmd	dCmdSite
dCnf	dFKey	dFragF
dFragI	dGrp	dIDB
dIDBDef	dKey	dLang
dMsg	dMsgLang	dPKey
dPrm	dPrmGrp	dPrmTyp
dQueue	dSched	dSchema
dSet	dSFSite	dSite
dSiteExt	dSiteLnk	dSiteSet
dSort	dTblChg	dTrn
dUsr	dUsrGrp	dUsrPrf
dVer	dWSTS	

PDC Replication Tables

In addition to the system table names listed here, DataExchange creates a unique replication table for each user table in your database that you have marked for replication. Replication user tables created by DataExchange are named by prefixing PDC to the original file name for the table. For example, a file named Billing.mkd has a companion replication file named PDCBilling.mkd. DataExchange uses the PDC*filename* convention to keep track of the files during replication.

In the event of tables with the same name in different folders, DataExchange creates a unique file name, similar to the naming convention used for log files. For example, two files named Billing.mkd located in different directories would result in files named PDCBilling.mkd and PDCBilling0.mkd.

DataExchange requires that the replication tables created from selected user tables have unique names. Zen limits table names to 20 characters. Replication table names created by DataExchange meet these requirements.

Note: A database deployed for replication is allowed to include table names that start with PDC. However, if you add those tables to a replication template, DataExchange asks you to confirm that they are not files internal to the replication system.

Other Limitations

DataExchange conforms to almost all of the same limitations and conditions implied in Zen. The following lists any known DataExchange limitations that *differ* from those listed for the ODBC Engine Interface.

Feature	DataExchange Limit or Condition
Database tables	4,800 (per replication network)

For the complete list of ODBC engine interface limitations, see the ODBC documentation.

Silent Installation of DataExchange

Installing DataExchange as Part of Your Application

This user's guide explains how to install DataExchange interactively from a download archive or CD. However, you can also install DataExchange as part of your own application installation process. The DataExchange installation can be noninteractive, in which no input is required from the user. This is referred to as a silent installation.

See also the topic on embedding Zen in *Installation Toolkit Handbook*.

How To Perform a Silent Installation

The following steps explain how to perform a silent installation for a First Site or a Partner Site.

Note: Be sure that all Zen utilities and all applications that use Zen are closed before running the silent installation.

To install DataExchange silently

1. Copy all files from the DataExchange download or CD to a temporary directory. Use a system that does not have DataExchange already installed.
2. Open a command prompt and navigate to the directory location where you copied the program files.
3. Execute the DataExchange installer command and specify a product license key, similar to the following:

   ```
   Install_DataExchange.exe /s /v" /qn PVSW_DX_LICENSE_KEY=key"
   ```

   Where *key* is the DataExchange keyThe product license key is provided on the following:

   - The case of the DataExchange installation CD
   - The product registration card
   - The printed license agreement

   Because the silent installation has no user interaction, you will not receive notification of a successful installation. You will notice, however, that DataExchange is automatically installed in your Zen program group once installation has finished.

Custom Installation

As with Zen and PTKSetup.ini, DataExchange has DXSetup.ini, which contains default settings that you can change for custom installations. This file can be found in the same directory as the .msi files used by the installer.

Glossary

Accelerated

In Btrieve 7.x, 8.x, 9.5, and 13.0, this refers to a file open mode that provides improved response time over Normal mode when updating data files. However, Accelerated mode disables the MicroKernel logging capability. Therefore, the MicroKernel cannot guarantee transaction durability or atomicity on files opened in Accelerated mode.

If you are using Btrieve 6.x, Accelerated mode is equivalent to Normal mode, except that opening a data file in Accelerated mode cancels the effect of flagging a file as transactional.

Activated Database

A database on a specific site that is capable of replicating data to or from another site's database, provided the other site is a member of the same replication network. Activated databases contain a copy of the replication template with information about the sites that constitute the replication network.

Activation

The process of creating a new database for replication – or enabling an existing one – and establishing the database as belonging to a site.

Change Capture / Change Apply

The change capture/change apply mechanism is a major subsystem of any replication implementation and is used to track and propagate modifications to replicated databases. Change capture occurs concurrent with database application execution, whereas change apply occurs during database synchronization. The DataExchange change capture mechanism is not log-based. It is based on control tables that store only the most recent changes. It reflects the current state of the database and not the history of prior states as in log-based mechanisms.

Control Table

Each replicated table in the database has a control table associated with it. Control tables store a record for each record in its corresponding user table, and contain associated information such as the creation date of the record, last change date for the record, and so forth. By creating a control

table for each replicated table, Zen ensures that you do not have to make any changes to your existing tables to enable replication.

DataExchange Manager

A graphical user interface for managing tasks, users, and sites in a replication network. DataExchange Manager can:

- Manage replication schedules
- Manage site information
- Manage local or remote sites

DNA

Database Network Analysis, the replication system database.

Encryption

Encryption is the process of disguising a message to hide its contents. An encrypted message is referred to as ciphertext; the original, or decrypted message is referred to as plaintext.

First Site

Every replication network must have a First Site, which is the first site to be activated for replication. The First Site contains information about the whole replication network, such as, sites available for replication, etc. It also contains a copy of the whole database. Any other site in the replication network is a Partner Site.

Globally Unique IDs

A record ID that is guaranteed to be unique throughout your entire network, even if some sites create many new records in the same table between replications.

In Place Activation

Activation of an existing database by either using a replication template or by using a design exported from a template.

Local Table

A nonreplicated table. Each site can have different local tables.

Network

A network is a collection of sites that can replicate among themselves. You can create separate environments, called networks, in which to run different versions of your database. For example, Version 1.0 could be running on a Production network, while Version 2.0 could be running on a Test network with its own separate and distinct data.

ODBC

Open Data Base Connectivity, a standard programming interface used to connect to a variety of data sources. DataExchange connects to all of its supported databases using ODBC.

Partner Site

Any site that is not the First Site in a replication network.

Peer-to-Peer

A replication network configuration in which every node, regardless of its size, amount of data, or location, behaves as a true peer to other sites in the network. Each node with a replication engine can schedule and manage replication and provides it share of the replication processing burden. Peer-to-peer is the default replication network configuration.

Project

A project represents a single replicated database. Each time you enable a different database, you must specify a new project. A project can contain a number of networks and releases.

Refresh

A term used for a mode of synchronization that involves unidirectional flow of data, as opposed to the default bidirectional flow of data commonly referred to as replication. A refresh is used to manually override the conflict resolution rules by specifying a prevailing site. For example, a “refresh local” operation overwrites all local data with data from a specified site.

Release

A release represents a change in your database schema. Therefore, each time you modify your database schema you must create a new release. A replication project can contain several networks and releases.

Replication

The default database synchronization mode that involves bidirectional flow of data between two or more sites based on conflict resolution rules.

Replication Engine

The component that manages the replication process. All replication is performed in the background and can be fully automated according to schedules that you define.

Zen Control Center contains the user interfaces to the replication engine from which you can:

- Remotely manage replication sites
- View current state of replication nodes
- Query history of replication activity
- Provide multiple views of replication statistics and information
- Filter replication messages/logs

Replication Network

A collection of sites that can replicate among themselves. A replication network can contain several releases.

Replication Template

A copy of a database that includes the user's database tables, replication control tables, system tables, and optionally, the user data.

Site

A replication-enabled database that can replicate and synchronize database information with other sites across TCP/IP networks over an ODBC interface. Each local replication-enabled database is

one site regardless of the number of users accessing it or the amount of data stored in it. A site can be:

- One computer with its own local database
- A local database shared by a local network
- A large client-server database used by hundreds or thousands of users

Subscription

A site's authorization to replicate with other sites on the replication network.

Template

See Replication Template.