MULTIPLE ENVIROMENTS
SETUP GUIDE
Contents

Introduction ................................................................................................................... 3
Environment Setup Examples .......................................................................................... 3
  Environment Manager ................................................................................................. 3
  Simple Diagram .......................................................................................................... 3
  Expanded Diagram ...................................................................................................... 4
Planning ........................................................................................................................ 5
  Service Account User .................................................................................................... 5
  Local and Remote Ports ................................................................................................. 5
Walkthrough .................................................................................................................. 5
  Verify the Development Server Settings .......................................................................... 5
Configure the Production Server ..................................................................................... 6
  Project Repository ....................................................................................................... 6
  Create the Production Environment ................................................................................ 7
Configure the TX DWA Server Service .......................................................................... 9
Configure the Development Server ............................................................................... 11
  Development Server Environments ............................................................................... 11
Create the Global Databases ......................................................................................... 14
Change Project Settings ............................................................................................... 20
Create an execution package and deploy ...................................................................... 23
Transfer the Project to Production ............................................................................... 28
Additional Actions ....................................................................................................... 33
  Version Selection ....................................................................................................... 33
  Environment Security ................................................................................................. 38
  Controlling Sequence Numbers ................................................................................... 39
Multiple Environments on a Single Server ..................................................................... 42
  Two Environment Setup ............................................................................................... 42
  Three+ Environment setup .......................................................................................... 43
Helpful Tips ............................................................................................................... 49
  Keep Track of Current Environment ............................................................................. 49
  Repository Connection for Service User ....................................................................... 52
User Switching ............................................................................................................. 52
Find Environment Ports .................................................................................................................. 52
Concepts ........................................................................................................................................... 53
Local and Remote Ports .................................................................................................................... 53
TX DWA Server Service .................................................................................................................... 54
Project Repository ............................................................................................................................ 54
Global Databases ............................................................................................................................... 54
Sequence Numbers .......................................................................................................................... 54
Troubleshooting ............................................................................................................................... 55
Introduction

Multiple environments solves problems associated between development and production work. Trying to do development work in your production environment is very risky. Any error in the new development can potentially bring down your project, leaving it offline until the development team can find and fix the problem. You may also come across security and governance issues, such as the development team members needing elevated permissions and direct access to your production server. Multiple environments solves these issues. With this solution, you can setup dedicated environments for development, testing, and finally producing your datawarehouse solution. Each environment can have its own settings and be deployed across a single or multiple servers.

Some of the advantages of utilizing this feature are:

- All work is done in the development environment, limiting the need to physically access production.
- Separate permissions on development and production results in higher security and reliability of your production databases.
- Automatic project transfers to the production environment helps maximize availability.

Environment Setup Examples

This section covers common multiple environment scenarios.

Environment Manager

A simple setup consists of a Development and Production server, with the Development server sending projects to Production. Other than the initial setup, Production is never physically accessed because all work is done in Development. In this case Development is the Environment Manager as it controls all aspects both environments.

If you expand on this and add a Test server inbetween Development and Production, Development is still considered the Environment Manager as it holds the settings and details for both Test and Production. Changing environment settings such as global databases or sequence numbers takes place on Development.

Simple Diagram

The image shown below illustrates a common multiple environment setup and the one that will be used in this guide. Note the ports used.
The Development server uses two environments: Local and Remote. Note that the remote port of 10001 is the same as the local port on the Production server.

**Expanded Diagram**
This expanded diagram illustrates three different servers and is shown to further explain the port numbering used in a setup.

The Development server has a local port of zero because it will not be listening for instructions from any servers. It also has two other environments: remote to Test and remote to Prod. While Development will not push directly to Production (that is done through Test), it holds this information so that Test can push to Production.

The Test server has a local port of 10002 to listen for instructions from Development.

The Production server only needs one local environment to listen for instructions from the Test server.

When you decide to push a new project to Production, the general flow would be:

1. Development asks Test for a project.
2. Test gives Development the project.
3. Development gives the Test project to Production.

With this setup, a TX DWA Server service will be needed to run on the Test and Production servers because they will be listening/receiving commands from another server.
Planning

Service Account User
Each environment needs a dedicated account to run the TX DWA Server Service. Best practice is to create a new account specifically for this role and nothing else. This account will need to access the listening server (locally or remote desktop), and access the project in order to establish a connection to the project repository. For example, in a Development and Production environment, the Production server will be the listening server. In this case, the user account will need to access the Production server and open the project once. Afterwards, the user account can be denied desktop access.

This account will need the following permissions in SQL:

- Db_Owner of the Staging, Data Warehouse, and Project Repository databases.
- DB_Reader of any data sources used in the project.
- Administrative rights in SQL Server Analysis Server (SSAS) if needed.
- DB_ssisadmin of the msdb database if using SQL Server Integration Services (SSIS).

Local and Remote Ports
Choose the ports desired for the two environments. These ports need to be open and unused in order to successfully establish communication.

Walkthrough
Follow the instructions below to configure a multiple environment setup following the simple diagram shown above. Refer to the Concepts section for in-depth explanation of terms used in this guide.

This guide assumes the following:

- SQL Server is installed on both Development and Production.
- The same version of TX DWA is installed on both Development and Production.
- An existing project is already created on Development.

In addition, these environments are set up on two different servers. If you are setting up a multiple environment on one server, please refer to the Single Server Setup for additional instructions.

Verify the Development Server Settings
Before jumping into configuration, we need to make sure that the Development server’s project is setup.

1. On the Development server, open your DWA project and verify you have the following established:
   a. Project Repository
   b. Data source(s)
Configure the Production Server

Follow the below instructions to setup the Production server.

TX DWA Server Service

Before connecting to Production, you need to think about how you are going to configure the server service. You have two options:

- Perform the following steps using the same account that will be used to run the service
- Create the project repository as a developer, remote into Production as the service account user, access the project to create the connection, then switch back to the developer account to finish the work.

This guide uses the account that will run the server service for the following steps.

Project Repository

2. Access the Production server as the service account user.
3. Create a new project repository by clicking on Tools and then General Settings.
4. Choose or enter the name of the Production server’s project repository.
5. Click on the Create button to create the database and then click OK.
Create the Production Environment
We now need to create the Production environment which will be used to listen for instructions from the Development environment.


7. Click on the New Environment button to open the Environment properties window.
8. In the Add Environment window, enter in the name of the environment, select the Local radio button, and enter in the desired port number. The example below shows a local environment called Prod that will listen on port 10001.

9. Click OK to finish.
10. Click the OK button again to exit the Environment Properties window.
Configure the TX DWA Server Service
Now that the environment is created we can configure the service user. Note that if you have not accessed the project as the server service user the following instructions will fail! Do that before moving on.


13. Right click on the TX DWA Server service and choose Change Username and Password.
14. Enter in the new user account information and then click Update. Note that the username must be the full username (domain name, user name).

15. Click the OK button on the confirmation screen.

16. Right click the TX DWA Server service and hover over Start Mode, and select Automatic Delayed. This will ensure that the service starts after SQL server.
17. Right click the TX DWA Server service again and select Start Service. See the Troubleshooting section if the service fails to start.

18. The status of the service should now be Running.

Configure the Development Server
Return to the Development server to continue work.

Development Server Environments
Log into the Development server using your normal user account to finish creating the environments.

20. In the Environment Properties window, click on the New Environment button.

21. Create the local environment by entering in a name, choosing the Local radio button, and entering in a port number (or leave at 0).
22. Click OK to finish creating the local environment.
Click on the New Environment button again to configure the connection to the Production server.

Enter the name of the environment and choose the Remote radio button.

Enter the name of the Production server.

Enter in the local and remote ports.

Remember the remote port is the same port number used as the local port on the Production server!
27. Click OK.

Create the Global Databases
Now that the environments are set and the TX DWA Server service is running, we can configure our global databases.

28. In the Environment Properties window and click on the New Global Database button.

29. To define a Global Database, enter in a name for the connection and select the type of database. The following image illustrates creating the Global Database for a Microsoft SQL data source.
30. Repeat steps 28-29 to create the Staging, Data Warehouse, and Olap (optional) Global databases.

31. Return to the Environment Properties window when finished. You should now have a minimum of three global databases along with a Dev and Prod environment.
Now we need to define the settings for our global databases. Refer to the image below.

32. Select the settings field under the Dev environment.
33. In the right window, we need to set the Server and Catalog.
   a. Server: Enter the name of the server hosting the Datasource (do not use localhost).
   b. Catalog: Enter the name of the database.

34. Repeat this process to set the data warehouse and staging databases for the Dev environment.

The following image shows the settings for the data warehouse.
35. Select the Datasource settings for the Prod environment.
36. Enter the name and catalog for the datasource.
37. Repeat this process for the data warehouse and staging databases.

The following image shows the settings for the Production server’s data warehouse.

The following image shows the settings for the Production server’s staging database.
38. If the staging and data warehouse databases already exist in the Production server then we are done configuring the settings for our global databases. You can confirm this by right-clicking the field and select Test Connection.

39. If they do not exist, select the Create Database option as shown above.
40. We have finished configuring the settings for our global databases. Click the OK button to close the window.

Change Project Settings
We have configured our global databases settings but now need to change our project settings so that our project on the Development server uses them. You do not need to do this process on the Production server as the settings will be pushed to it.

41. In the project window, right-click your data source and edit it.
42. Select the radio button to Use Global Database. If needed, select the global data source from the dropdown list.

![Edit SQL Server Data Source](image)

43. Click the OK button to close the window.
44. Back in the project, right-click the staging database and edit it.
45. Change the radio button to use the global database. If needed, select the global staging database from the dropdown list.

46. Click OK to close the window.
47. Right click the data warehouse and edit it.
48. Select the global database and if needed, choose the data warehouse from the dropdown list.

49. Click OK to close the window.

Create an execution package and deploy
We need to create an execution package and fully deploy our project for it to be ready to be transferred to production.

50. Click on the Execution tab in your project.
51. Right click on Execution Packages and select Add Execution Package.

52. Name the package and drag the step Execute Project over into the Included Steps window.

53. Make any other desired changes and click on the OK button.
54. Click OK on the information window.

55. Return to the project by clicking on the data tab.
56. Select the project and click on Manual Deployment and Execution.
57. Click on the Start button.
58. Enter in the version details (optional), and click on the OK button.

59. Click on the Close button when finished.
Transfer the Project to Production

Now that we have configured our environments and defined our settings we can transfer our project to the production server.

60. On the Tools tab, click on Multiple Environment Transfer.

In the Multiple Environment Transfer window, we are shown information about our current project, such as project name and deployed date.

61. Click on the Transfer button to transfer the project to Production.
62. Click on the OK to confirm the transfer.

Back in the Multiple Environment Transfer window, we can see that our project successfully transferred to Production. We are shown a version number, date, and whether the project has been deployed. Since it has not been deployed we need to do that now.
63. Right click on the Prod environment folder and select Deploy.

You are now presented with the Deploy Settings window where you can choose what type of deployment you would like to do.
The options are:

- Managed Deployment – If checked, TX DWA will manage the order of deployment to ensure that the tables are deployed in the correct order.
- Full – Deploys everything in the project.
- Partial – Opens a window showing the project tree where you can individually select the objects you want to deploy.
- Perspective – If using perspectives, you can select the perspective you want to deploy. A window will then show the project tree with the objects contained in that perspective already checked. You can add or remove additional objects as needed.
- Differential – TX DWA will check each object to determine whether or not it needs to be deployed. A window will then show the project tree with the objects needing deployment checked. You can add or remove additional objects as needed.

64. Choose the Full deployment setting and click OK.

The status has been updated to show that the project has been deployed onto the Production server.
65. Right-click the Prod environment folder again and this time select the execution package we created earlier.

The status has been updated and now shows the execution date and duration.
We have now successfully created a multiple environment setup and pushed our project from Development to Production.

**Additional Actions**
This section contains additional actions you can take using multiple environments.

**Version Selection**
There may be times when you need to rollback a project migration due to unforeseen errors. Normally this would be accomplished by opening a previous version of the project and then deploying it, but you might not have access or the right permissions to make changes directly in the Production environment. Now you can revert to a previous version from within the Multiple Environment Transfer window.

In this example, we have added a table to our data warehouse named CustInvoices. This has been transferred and deployed on our Production server as shown below.
Now we know that this was a mistake and the additional table is causing problems for reporting. We need to rollback to a previous version on the Development server that does not contain the table and transfer that version to Production.

We could simply remove the table from Development and transfer to Production, but we want the table fixed, not removed.

1. Open the Multiple Environment Transfer window by clicking on Multiple Environment Transfer in the Environments group.

Referring to the image below, we can see the version numbers in both environments. These numbers increase on each deployment.

Our last deployment on the Development server pushed the CustInvoices table onto Production so we need to roll back to a previous version.
2. Right-click the dev folder and choose Select Version. Alternatively you can right-click the prod folder and select a version from there.

3. The Select Project Version window appears as shown below. Select the version you want to deploy (in this example version 15), and click the OK button.
4. Back in the Multiple Environment Transfer window, notice that the version for dev changed from 16 to 15. Version 15 is the one we want that will undo the change we made earlier.

5. Click on the Transfer button.
6. Click on the OK button to confirm transfer.
7. Right-click the prod folder and select full deployment.

Refer to the image below. You check the data in the Production environment you will see that the CustInvoices tables has been removed, but since it still remains in your Development environment we can fix the mistakes and retransfer it when ready.
Environment Security

Environment security allows you to set permissions as to who can transfer, deploy, and so on in your multiple environment setup. This feature only works in domain environments and is set on the group level (assign groups to the roles, not users).

1. Open the Environment Properties window on the listening server
2. Right-click the environment as shown below and select Environment Security

The Environment Security window opens. See below the image for role definitions.
Role Definitions

- Admin – Able to accomplish any task.
- Transfer – Allowed to transfer to this environment.
- Deploy – Allowed to deploy to this environment.
- Execute – Can execute projects once transferred and deployed.
- Database – Able to change the database connection properties.

3. Enter groups by using the domain\group naming convention or click the “..” button to search for groups within the domain.
4. Click Ok when finished.

Controlling Sequence Numbers

If you already have two environments configured and need to setup a third, you may need to change the order in which the environments talk to each other. The first example below shows Development and Production. Following the rules, Development is able to talk to Production.

If you need to add a Test or QA server to the mix then you will end up with the following data flow.
The Test server above is listed after Production because the sequence number is automatically incremented and assigned to environments in the order in which they are created.

We need to change the environment setup to match the following diagram so that Development can push to Test and then Test can push to Production.

1. To accomplish this task, open the Environment Properties window on the Development server.
2. Select the Production environment (shown below as Prod). The sequence number, called “SeqNo,” is shown in the properties.
3. Change this from 1 to 2.
4. Select the Test environment.

5. Change the sequence number from 2 to 1.
6. Click OK

You can open the Environment Properties window again and notice the order of the environments have changed.
If you open the Multiple Environment Transfer window, you will see that you can now transfer from Development to Test and from Test to Production.

**Multiple Environments on a Single Server**
Guidelines for configuring multiple environments on a single server.

**Two Environment Setup**
When establishing two environments on a single server, follow the same guidelines as you would when using multiple servers. The only difference is that you point the environments to the same server. In the image below, we have our development environment set to Local port 0 and the production environment set to 10001. When we push our projects from Development to Production, it will be doing so on port 10001 but remain on the same machine.
You will still need a user account to run the DWA Server service. In the image above, we are using the user TXUser2. This user will need access to the project repository associated with the Production Environment. See the Service Account section for more information.

### Three+ Environment setup

You can configure as many environments as you want on a single machine. In addition to the standard rules regarding ports, you will also need to setup one unique user per listening environment when configuring additional DWA Server services. Also, make sure that each instance of TX DWA is using a unique repository. Shown below is an outline showing a three environment setup followed by how to configure additional services.

Note that this information only shows how to configure additional services. Refer to the standard Walkthrough on setting up the environments.

<table>
<thead>
<tr>
<th>Environment</th>
<th>Service</th>
<th>User</th>
<th>Repository</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>n/a</td>
<td>n/a</td>
<td>projectRepositoryDev</td>
</tr>
<tr>
<td>Test</td>
<td>TX DWA Server service</td>
<td>TXUser1</td>
<td>projectRepositoryTest</td>
</tr>
<tr>
<td>Production</td>
<td>TX DWA Server service (Production)</td>
<td>TXUser2</td>
<td>projectRepositoryProd</td>
</tr>
</tbody>
</table>

### Configuring Additional Services

Follow these steps to configure additional services.

1. Open TX DWA in the listening environment (i.e., Production).
2. Following the outline above, connect to the Test environment.
3. Click on the Tools tab.
4. Click on Windows Service Setup in the Environments group.

5. Right-click the TX DWA Server service and choose Change User Name and Password.

6. Enter in the full username (machine name\username) and password and then click Update.

   If setting up in a domain, use the domain name\username.
7. Right-click the TX DWA Server service and choose Start Service.

If the Service does not start, refer to the **Troubleshooting** section.

8. If you want to have both environments open at the same time, launch a separate instance of TX DWA, otherwise, click on General Settings.

9. Change to the Production repository by clicking on Tools and then on General Settings.
10. Click the OK button to change repositories.
11. Click on Windows Service Setup in the environments group.

12. Click on Options.
13. Click on Create Service for (version number).
Refer to the image below.

14. Enter the environment name. This name is up to you and serves to identify the service in the Windows Services Management window.
15. Enter the full username (machine name\username), to run the service. This user must connect to the project repository in order to establish a connection.
16. Enter the password for the user.
17. Optional – enter a description for the service.
18. Click Create to create the service.
19. Click OK on the Success window.

20. Right-click the new service and choose Start Service.
21. The service is now setup and ready to receive information. If the service did not start, refer to the Troubleshooting section.

Helpful Tips
This section contains helpful hints regarding multiple environments on one machine.

Keep Track of Current Environment
It can be difficult tracking which environment you are in when using multiple environments on the same machine. Shown below are some options to help.

Option 1
The bottom of the TX DWA window lists the Environment name along with the server you are connected to and the active project. The image below shows us connected to our Test environment.
Option 2
You can change the color scheme of your TX DWA application.

1. Click on the Tools Tab.
2. Click on Window and Menu settings in the Application Settings Group.

3. In the Window look and feel area, change the color scheme by clicking on the dropdown menu.
4. Click OK to finish.

The image below shows our test environment using the black color scheme.
Repository Connection for Service User
After setting the required permissions inside SQL Server Management Studio, you need to create the repository connection for the user account running the TX DWA Server service. If you are setting up the environment for the first time, the easiest way to accomplish this is to have this user create the project repository, environment, and configure the service.

User Switching
Remember that each environment will need to run as a separate user account. While you can log in and out to switch users, it is more efficient to either:

1. Shift+right-click the TX DWA executable and run as a different user.
2. Use the run as command via Windows command prompt.

Find Environment Ports
You can view which ports you are using for your environments within the Environment Properties window.

1. Open the Environment Properties window.
2. Click on the environment name to see its settings.

The image below shows the settings for the dev environment, which is using 0 for both local and remote ports.

The following image shows the Prod environment using a local port of 5001 and remote port of 10001.
Concepts
Local and Remote Ports
TX DWA communicates from one environment to other using the TX DWA Server service in combination with local and remote ports. Local ports are used to listen for instructions (i.e. project updates), from another server while remote ports are used to send those instructions to the listening server. Said another way, local ports are for incoming information, remote ports are for outgoing information. Each of these combinations of remote and local environment and remote and local port has its own role, as shown here:

<table>
<thead>
<tr>
<th>Local Environment</th>
<th>Local Port</th>
<th>Remote Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Environment</td>
<td>Listen for commands</td>
<td>N/A</td>
</tr>
<tr>
<td>Remote Environment</td>
<td>Listen for confirmation or error responses from the remote environment</td>
<td>Send commands to the remote environment</td>
</tr>
</tbody>
</table>

The local port on the listening server needs to match the remote port on the sending server. For example, if the Production server’s local port is 10001, then the Development server’s remote port will also be 10001.
TX DWA Server Service
This service needs to run on the listening server in order to establish communication between the two environments. It must run as a local user account and will be given the “Log on as a service” right automatically when established.

Project Repository
Each environment will need its own unique project repository.

Global Databases
Global databases allow all environments a way of knowing where to look for database settings. When configuring multiple environments, you set each area (staging, data warehouse, etc.), to use global databases. This allows each environment a way to supply the project with the correct database settings. For example, if you were to push a project from the development environment to production without using global databases, the production environment would see the databases as configured (permissions, connection info, etc.), for the development environment. When global databases are used, the project can tell which environment it is currently in, and use the development connections when it is in the development environment and the production connections when in the production environment.

Sequence Numbers
Sequence numbers are used to control the data flow in multiple environments. They start at 0 and increase by 1 for each new environment. Environments can only transfer to another environment that is exactly 1 numbers higher than it. For example, in a three environment setup, you may have development, test, and production. When created in this order, the sequential numbers would be:

- Development: 0
- Test: 1
- Production: 2

In this scenario, the following actions occur:

- Development (0), can transfer to Test (1).
- Test (1), can transfer to Production (2).
- Production (2), cannot transfer to Test (1), or Development (0).
- Test (1), cannot transfer to Development (0).
- Development (0), cannot transfer directly to Production (2).
Troubleshooting
This section contains common errors encountered during the setup of multiple environments. For further help, email support@timextender.com.

The image below shows the most common error when configuring the user account for the TX DWA Server service.

![Services Window]

This error occurs when the user running the service has either inadequate permissions to access the project or has not accessed the project and created the connection.

**Solution 1** - Log into the server and open the project as the account to create the connection.

**Solution 2** - Ensure the user has the following permissions in SQL Server Management Studio.

- Db_Owner of Staging, data warehouse, and project repository.
- DB_Reader of any data sources used in the project.
- SSAS admin if using cubes.
- Db_ssisadmin of the msdb database if using SSIS.

**Solution 3** - Check to make sure that the environment has successfully been created. If no environment exists within the Environment Properties window then the service will fail to start. See the image below for an example of missing environments.
Solution 4 - Check the port being used for the local environment. A port of 0 cannot be used for listening environments. If this is the case, choose a new local port.

Solution 5 - Check to make sure the configuration file is correct.

A configuration file is created when a user account is used for the TX DWA Server service.

1. In Windows, navigate to C:\Users\<Service User>\AppData\Roaming\TX DWA Server\TX DWA Server\<version number>.
2. Locate and open the file “Config.xml” using a text editor such as Notepad.
3. Locate the line that reads.

   `<ProjectConnectionString ProjectConnectionString="Data Source=localhost;Initial Catalog=projectRepositoryTest;Integrated Security=True;User ID=;Password=;Connect Timeout=15" />

4. Verify that the Data Source is pointed to the right server and the Initial Catalog is set to the correct project repository.

The following image refers to an error relating to connection issues between the environments.
Solution 1 - Ensure that the remote port you are connecting to is open in the firewall.

Solution 2 - Ensure that both environments are using the same version of TX DWA.

Solution 3 - Check the listening environment (i.e. Prod), and ensure the TX DWA server service is running.

The following image refers to the usage of a socket address (protocol/network address/port).

Solution - Review the ports you use in your environments and ensure that they are all unique and not in use by either another TX DWA environment or a Windows service.

The following image refers to an error that occurs when you attempt you create a remote environment.
**Solution** – Define your local environment before creating a remote environment.

The following image shows an error referring to your local environment. This occurs when you already have one local environment and try to create a second one.

![Error](image)

Only one environment can be local. Current local environment is 'test'.

**Solution** – Review your environments and ensure that you only have one local environment. If needed, make adjustments to that environment instead of creating a second one.

The following three images show errors resulting in lack of permissions for the service account user.

![Error](image)

Cannot open database "projectRepositoryProd" requested by the login. The login failed. Login failed for user 'SHIGOTO\TXUser3'.

![Error](image)

The EXECUTE permission was denied on the object 'EnvironmentsList', database 'projectRepositoryProd', schema 'dbc'.
Solution - Ensure the user has the following permissions in SQL Server Management Studio.

- Db_Owner of Staging, data warehouse, and project repository.
- DB_Reader of any data sources used in the project.
- SSAS admin if using cubes.
- Db_ssisadmin of the msdb database if using SSIS.
End of Document