

Microsoft Dynamics® AX

Configuring a SQL Server Reporting Services scale-out deployment to run on a Network Load Balancing cluster

White Paper

A SQL Server Reporting Services (SSRS) scale-out deployment includes two or more report server instances that share a single report server database. By using a scale-out deployment, you can increase the number of users who can access reports at the same time, and improve the availability of the report server.

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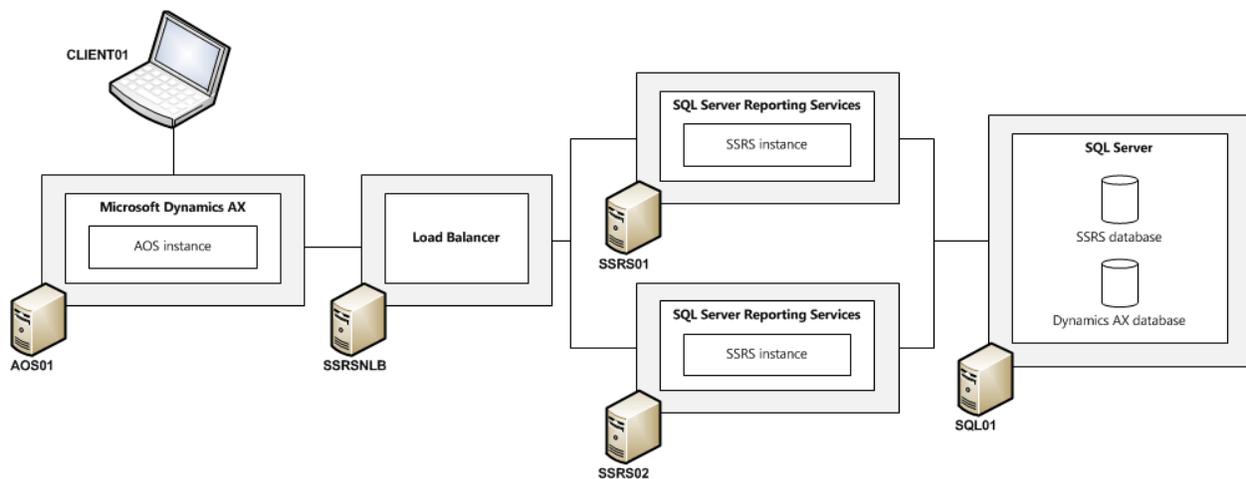
Introduction

A SQL Server Reporting Services (SSRS) scale-out deployment includes two or more report server instances that share a single report server database. By using a scale-out deployment, you can increase the number of users who can access reports at the same time, and improve the availability of the report server.

Microsoft Dynamics® AX supports scale-out deployments of Reporting Services in an environment that has the following configuration:

- The Reporting Services instances are installed on separate computers.
- The Reporting Services instances share a single database.
- A Network Load Balancing (NLB) cluster is used.
- The Reporting Services extensions (provided by Microsoft Dynamics AX) are installed on each computer where Reporting Services is installed.

This white paper will help you configure a scale-out deployment that resembles the following environment.



Prerequisites

This white paper identifies the computers in the scale-out environment (shown in the previous diagram) by using the names listed in the following table. The table also lists the prerequisite software that is installed on each computer.

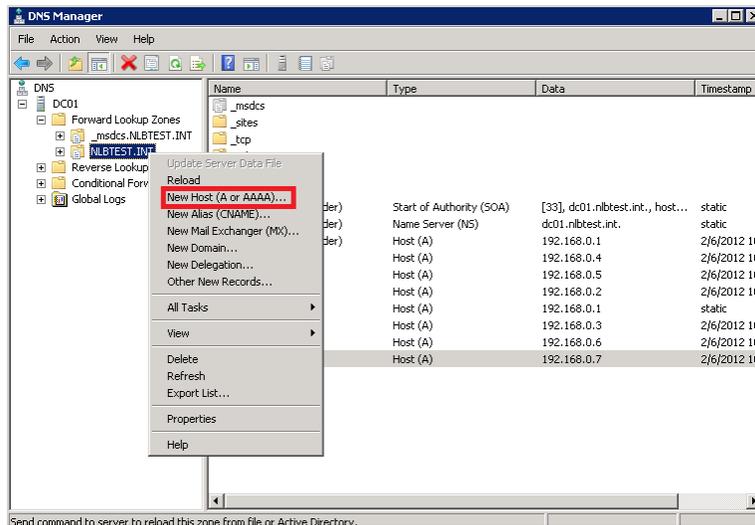
Computer name	Description	Prerequisites
CLIENT01	The Microsoft Dynamics AX client computer	<ul style="list-style-type: none">• Microsoft® Windows® 7• Microsoft .NET Framework 3.5 SP1• Microsoft .NET Framework 4• Microsoft Dynamics AX 2012 client
AOS01	The Microsoft Dynamics AX Application Object Server (AOS) computer	<ul style="list-style-type: none">• Microsoft Windows Server® 2008 R2 SP1 (64-bit)• Microsoft .NET Framework 3.5 SP1• Microsoft .NET Framework 4• Hotfix for Microsoft .NET Framework 4 (KB23390372)• Microsoft Dynamics AX 2012 AOS
SSRSNLB	The NLB virtual host, which provides a single point of entry to all the report servers in the NLB cluster	Make sure that the NLB cluster is accessible through a virtual server name that maps to a virtual server IP address.
SSRS01	The computer that hosts the first Reporting Services instance	<ul style="list-style-type: none">• Windows Server 2008 R2 SP1 (64-bit)• Microsoft .NET Framework 3.5 SP1• Microsoft .NET Framework 4
SSRS02	The computer that hosts the second Reporting Services instance	<ul style="list-style-type: none">• Windows Server 2008 R2 SP1 (64-bit)• Microsoft .NET Framework 3.5 SP1• Microsoft .NET Framework 4
SQL01	The computer that hosts both the Reporting Services database and the Microsoft Dynamics AX database	<ul style="list-style-type: none">• Windows Server 2008 R2 SP1 (64-bit)• Microsoft .NET Framework 3.5 SP1• Microsoft .NET Framework 4• Microsoft SQL Server® 2008 R2 (including the Database Engine Services and Full-Text Search)• Microsoft Dynamics AX 2012 database

Create a virtual host for the NLB cluster

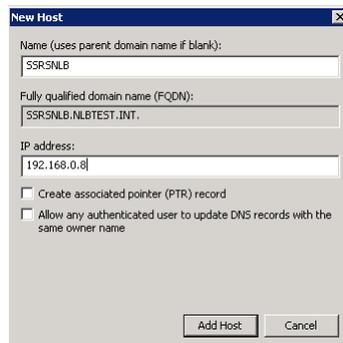
Complete the following procedure to create a virtual host for the NLB cluster. The virtual host provides a single point of entry to all the report servers in the NLB cluster. Complete this procedure on the domain controller.

1. Click **Start > Administrative Tools > DNS**.
2. In the left pane, expand the **Forward Lookup Zones** node.

3. Right-click the name of your domain, and then click **New Host (A or AAAA)**.



4. Enter the name and IP address of the NLB virtual host. In this example, the virtual host name is SRSNLB.



5. Click **Add Host**.

Install and configure NLB

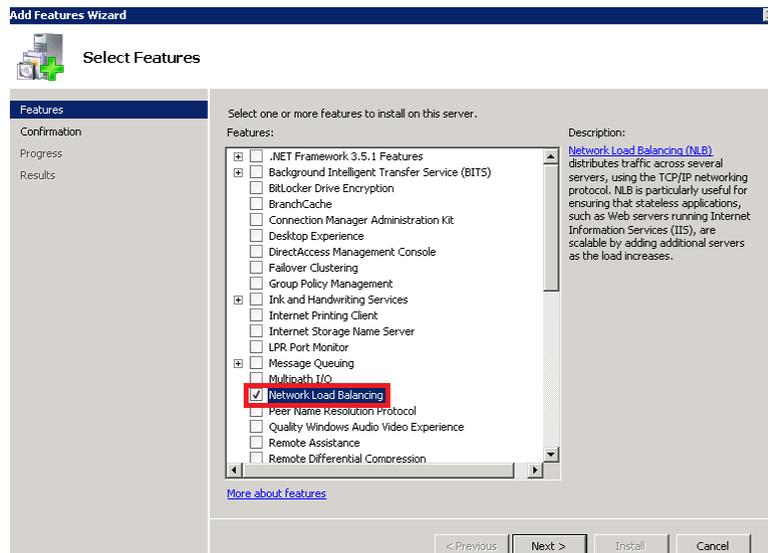
Complete the following procedures to configure the NLB cluster.

Install NLB

Complete the following procedure to install the NLB feature of Windows Server. Complete this procedure on the servers that run or will run Reporting Services.

1. Click **Start > Administrative Tools > Server Manager**.
2. In the **Features Summary** area, click **Add Features**.

3. Select the **Network Load Balancing** check box.

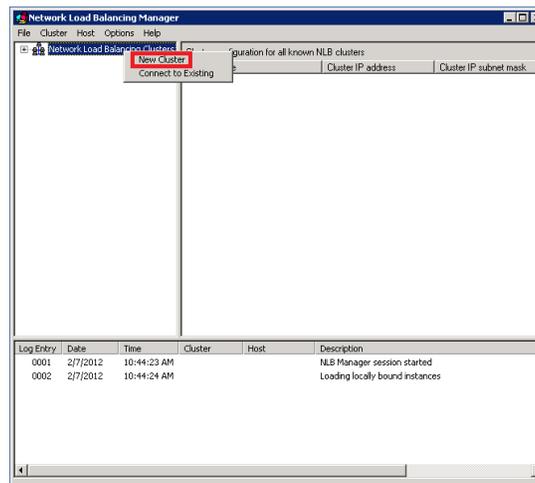


4. Click **Next**.
5. Click **Install**.
6. Repeat this procedure on each server that runs or will run Reporting Services.

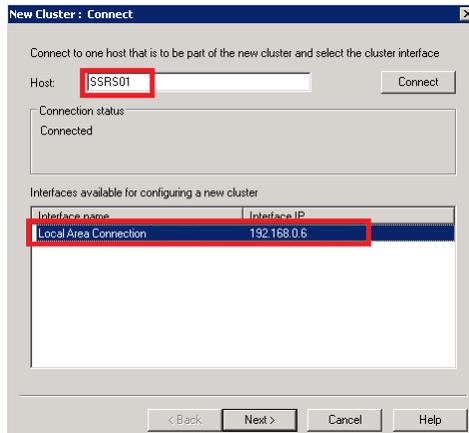
Create the NLB cluster

Complete the following procedure to create the NLB cluster. Complete this procedure on the server that hosts or will host the first Reporting Services instance.

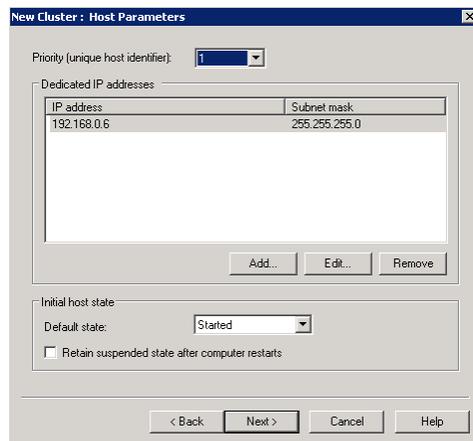
1. Click **Start > Administrative Tools > Network Load Balancing Manager**.
2. In the left pane, right-click **Network Load Balancing Clusters**, and then click **New Cluster**.



3. The **New Cluster: Connect** page is displayed. Complete the following steps:
 - a. Enter the name of the server that hosts or will host the first Reporting Services instance (that is, the computer that you are using to complete this procedure).
 - b. Click **Connect**, and then select the network adapter that is connected to the domain.
 - c. Click **Next**.

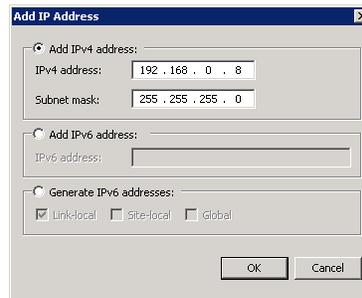


4. The **New Cluster: Host Parameters** page is displayed. Accept the default settings, and then click **Next**.

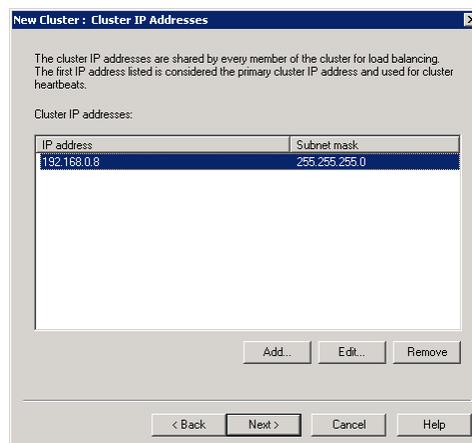


5. The **New Cluster: Cluster IP Addresses** page is displayed. Click **Add**.

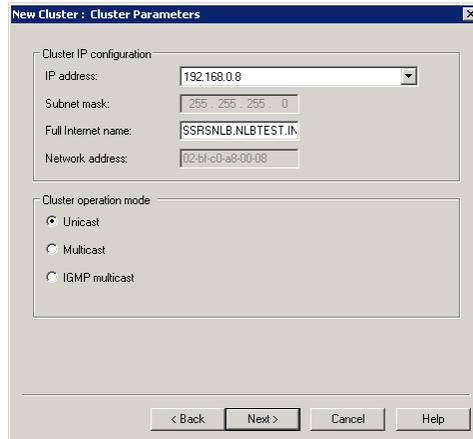
6. The **Add IP Address** dialog box is displayed. Complete the following steps:
 - a. Enter the IP address of the server that acts as the NLB virtual host.
 - b. Enter the subnet mask of the server that acts as the NLB virtual host.
 - c. Click **OK**.



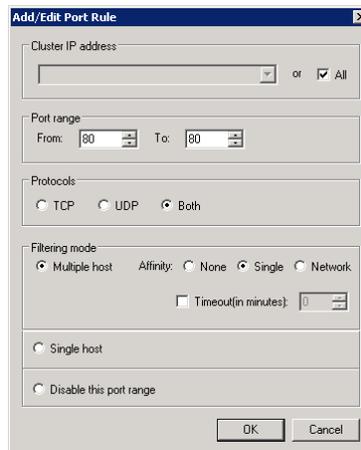
7. The **New Cluster: Cluster IP Addresses** page is redisplayed. Click **Next**.



8. The **New Cluster: Cluster Parameters** page is displayed. Complete the following steps:
 - a. Enter the fully qualified domain name of the server that acts as the NLB virtual host.
 - b. Select the cluster operation mode that best suits your needs.
 - c. Click **Next**.



9. The **New Cluster: Port Rules** page is displayed. Complete the following steps:
 - a. Click **Remove**.
 - b. Click **Add**.
10. The **Add/Edit Port Rule** dialog box is displayed. Change the settings based on your needs, and then click **OK**.

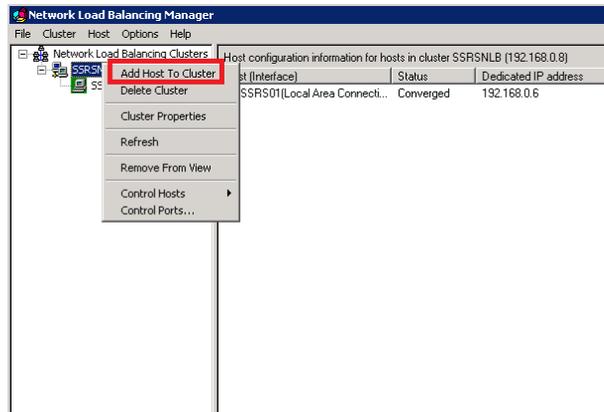


11. The **New Cluster: Port Rules** page is redisplayed. Click **Finish**.

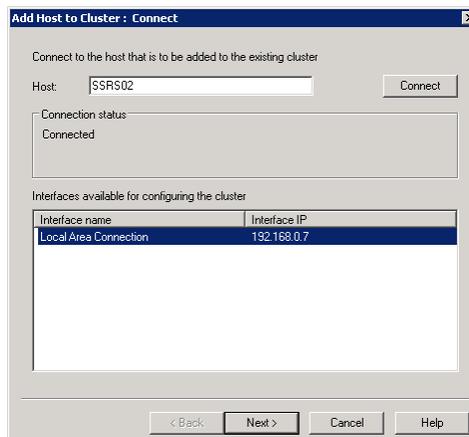
Add the second report server to the NLB cluster

Complete the following procedure to add the second server that runs or will run Reporting Services to the NLB cluster. Complete this procedure on the server that hosts or will host the second Reporting Services instance.

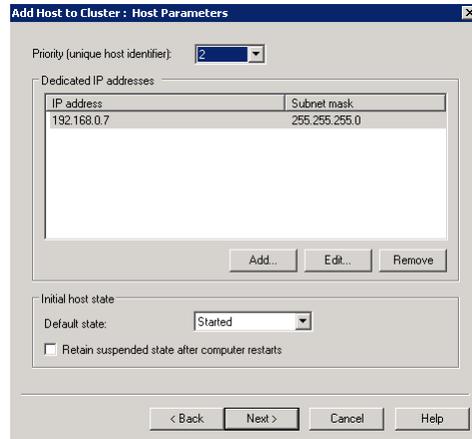
1. Click **Start > Administrative Tools > Network Load Balancing Manager**.
2. In the left pane, right-click the cluster name, and then click **Add Host To Cluster**.



3. The **Add Host to Cluster: Connect** page is displayed. Complete the following steps:
 - a. Enter the name of the server that hosts or will host the second Reporting Services instance.
 - b. Click **Connect**, and then select the network adapter that is connected to the domain.
 - c. Click **Next**.



- The **Add Host to Cluster: Host Parameters** page is displayed. Accept the default settings, and then click **Next**.



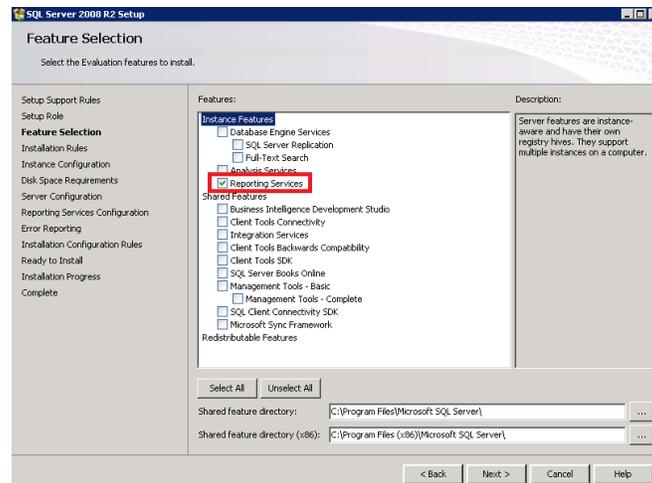
- The **Add Host to Cluster: Port Rules** page is displayed. Click **Finish**.
- Repeat this procedure for each report server that you want to add to the cluster.

Install and configure Reporting Services

Complete the following procedures to install and configure SQL Server Reporting Services.

Install Reporting Services

On each server that will act as a report server, run the SQL Server Setup wizard to install Reporting Services.



Note: When you install Reporting Services, select the **Install but do not configure server** option.

For more information about the versions of Reporting Services that are supported with Microsoft Dynamics AX, see the [Microsoft Dynamics AX system requirements](#). For more information about how to install Reporting Services, see the SQL Server documentation on TechNet.

Configure the first instance of Reporting Services

Complete the following procedure to configure the first instance of Reporting Services.

1. Click **Start > All Programs > Microsoft SQL Server 2008 > Configuration Tools > Reporting Services Configuration Manager**.
2. Connect to the first Reporting Services instance.
3. Configure the options that are described in the following table. For detailed information about each option, see the SQL Server documentation.

Click this option	To do this
<i>ServerName\InstanceName</i>	Verify that the Reporting Services instance is running. If it is not running, click Start .
Service Account	Select the built-in account, Network Service , as the service account. Note: When you install the Reporting Services extensions, the Business Connector proxy account will automatically be assigned as the service account for the Reporting Services instance.
Web Service URL	Create a virtual directory for the Reporting Services web service. By default, the virtual directory is named ReportServer, and the URL is <code>http://SSRSServerName:80/ReportServer</code> .
Database	Create a database for the Reporting Services instance. Create the database on the remote SQL Server database server. In this example, the server name is SQL01. By default, the database is named ReportServer. On the database server, verify the following: <ul style="list-style-type: none"> • The SQL Server Browser service has been started. • The TCP/IP protocol for the database instance is enabled. You can enable it by following these steps: <ol style="list-style-type: none"> 1. Open SQL Server Configuration Manager. (Click Start > All Programs > Microsoft SQL Server 2008 R2 > Configuration Tools > SQL Server Configuration Manager.) 2. In the left pane, click SQL Server Network Configuration > Protocols for SQLServerInstanceName. 3. In the right pane, if TCP/EP is disabled, right-click it, and then click Enable. 4. After you have enabled the TCP/IP protocol for the database, restart the SQL Server service. • The firewall is configured for database access. For more information, see How to: Configure a Windows Firewall for Database Engine Access.
Report Manager URL	Create a virtual directory for Report Manager. Report Manager is the website that reports are published to. By default, the virtual directory is named Reports, and the URL is <code>http://SSRSServerName:80/Reports</code> .
E-mail Settings	This option is not required. For more information, see the SQL Server documentation.
Execution Account	Take no action. Note: When you install the Reporting Services extensions, the Business Connector proxy account will automatically be assigned as the execution account for the Reporting Services instance.
Encryption Keys	This option is not required. For more information, see the SQL Server documentation.
Scale-out Deployment	Take no action.

4. Click **Exit** to close Reporting Services Configuration Manager.

5. Configure the Reporting Services instance for local administration. For instructions, see [How to: Configure a Report Server for Local Administration on Windows Vista and Windows Server 2008](#) on TechNet.
6. After you have configured the Reporting Services instance for local administration, verify that you can access the sites that are listed in the following table.

Website	URL
Reporting Services web service	http://SSRSServerName:80/ReportServer
Report Manager	http://SSRSServerName:80/Reports

Configure the second instance of Reporting Services

Complete the following procedure to configure the second instance of Reporting Services.

1. Click **Start > All Programs > Microsoft SQL Server 2008 > Configuration Tools > Reporting Services Configuration Manager**.
2. Connect to the second Reporting Services instance.
3. Configure the options that are described in the following table. For detailed information about each option, see the SQL Server documentation.

Click this option	To do this
<i>ServerName\InstanceName</i>	Verify that the Reporting Services instance is running. If it is not running, click Start .
Service Account	Select the built-in account, Network Service , as the service account. Note: When you install the Reporting Services extensions, the Business Connector proxy account will automatically be assigned as the service account for the Reporting Services instance.
Web Service URL	Create a virtual directory for the Reporting Services web service. By default, the virtual directory is named ReportServer, and the URL is http://SSRSServerName:80/ReportServer.
Database	Click Change Database . A wizard appears. Complete the following steps: <ol style="list-style-type: none"> 1. Click Choose an existing report server database. Click Next. 2. Enter the name of the SQL Server database server. In this example, the server name is SQL01. Click Next. 3. Select the report server database that is used by the first instance of Reporting Services. Click Next, and then complete the wizard.
Report Manager URL	Create a virtual directory for Report Manager. Report Manager is the website that reports are published to. By default, the virtual directory is named Reports, and the URL is http://SSRSServerName:80/Reports.
E-mail Settings	This option is not required. For more information, see the SQL Server documentation.
Execution Account	Take no action. Note: When you install the Reporting Services extensions, the Business Connector proxy account will automatically be assigned as the execution account for the Reporting Services instance.
Encryption Keys	This option is not required. For more information, see the SQL Server documentation.
Scale-out Deployment	Take no action.

4. Click **Exit** to close Reporting Services Configuration Manager.

- Configure the Reporting Services instance for local administration. For instructions, see [How to: Configure a Report Server for Local Administration on Windows Vista and Windows Server 2008](#) on TechNet.
- After you have configured the Reporting Services instance for local administration, verify that you can access the sites that are listed in the following table.

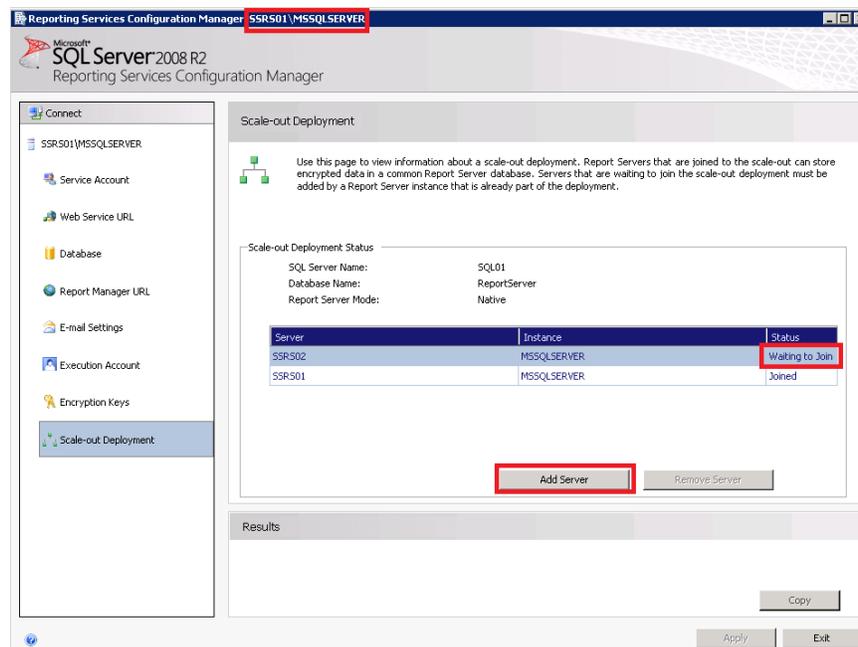
Website	URL
Reporting Services web service	http://SSRSServerName:80/ReportServer
Report Manager	http://SSRSServerName:80/Reports

- Repeat this procedure for any other instances of Reporting Services in the scale-out deployment.

Join the second instance of Reporting Services to the scale-out deployment

Complete the following procedure to join the second instance of Reporting Services to the scale-out deployment. Complete this procedure on the server that hosts the first Reporting Services instance.

- Click **Start > All Programs > Microsoft SQL Server 2008 > Configuration Tools > Reporting Services Configuration Manager**.
- Connect to the first Reporting Services instance.
- In the left pane, click **Scale-out Deployment**.
- For each report server instance that has **Waiting to Join** status, click **Add Server**.



Configure view state validation

To run a scale-out deployment, you must configure view state validation, so that users can view interactive HTML reports. To do this, you must modify the Reporting Services configuration files. Complete the following procedure on each report server.

Note: We recommend that you make a backup of each configuration file before you modify it.

1. Generate a validation key and decryption key. For more information, see the following articles:
 - [How to create keys by using Visual C# .NET for use in Forms authentication](#)
 - [machineKey Element \(ASP.NET Settings Schema\)](#)
2. Open the Report Manager web.config file.
 - If you are using SQL Server 2008, the default location of this file is \Program Files\Microsoft SQL Server\MSRS10.SSRInstanceName\Reporting Services\ReportManager.
 - If you are using SQL Server 2008 R2, the default location of this file is \Program Files\Microsoft SQL Server\MSRS10_50.SSRInstanceName\Reporting Services\ReportManager.
3. Locate the **<system.web>** section.
4. In the **<system.web>** section, add the **<machineKey>** element that you generated in step 1.

```
<system.web>  
  <machineKey validationKey="EF9703737808DF2A84082EDECC123  
  <pages validateRequest="false" />
```

5. Save the web.config file.
6. Open the report server web.config file.
 - If you are using SQL Server 2008, the default location of this file is \Program Files\Microsoft SQL Server\MSRS10.SSRInstanceName\Reporting Services\ReportServer.
 - If you are using SQL Server 2008 R2, the default location of this file is \Program Files\Microsoft SQL Server\MSRS10_50.SSRInstanceName\Reporting Services\ReportServer.
7. Locate the **<system.web>** section.
8. In the **<system.web>** section, add the **<machineKey>** element that you generated in step 1.

```
<system.web>  
  <machineKey validationKey="EF9703737808DF2A84082EDECC123  
  <pages validateRequest="false" />
```

9. Save the web.config file.
10. Repeat this procedure on each report server in the scale-out deployment.
11. Verify that all web.config files in the \Reporting Services\Report Manager and \Reporting Services\Report Server folders contain identical **<machineKey>** elements in the **<system.web>** section.

Add the host name and URL of the virtual host

To run a scale-out deployment, you must add the name and URL of the NLB virtual host to the RsReportServer.config file. Complete the following procedure on each report server.

Note: We recommend that you make a backup of the RsReportServer.config file before you modify it.

1. Open the RsReportServer.config file.
 - If you are using SQL Server 2008, the default location of this file is \Program Files\Microsoft SQL Server\MSRS10.SSRInstanceName\Reporting Services\ReportServer.
 - If you are using SQL Server 2008 R2, the default location of this file is \Program Files\Microsoft SQL Server\MSRS10_50.SSRInstanceName\Reporting Services\ReportServer.
2. Locate the **<Service>** section.
3. In the **<Service>** section, add the **<Hostname>** element, as follows.

```
<Hostname>VirtualHostServerName</Hostname>
```

In this example, the **<Hostname>** element is as follows.

```
<Service>  
  <Hostname>SSRSNLB.NLBTEST.INT</Hostname>  
  <IsSchedulingService>True</IsSchedulingService>
```

4. Locate the **<UrlRoot>** element.
- Note:** By default, this element is unspecified in the configuration file.
5. In the **<UrlRoot>** element, enter the URL of the Reporting Services web service on the NLB virtual host.

```
http://VirtualHostServerName/ReportServer
```

In this example, the **<UrlRoot>** element is as follows.

```
<Service>  
  <Hostname>SSRSNLB.NLBTEST.INT</Hostname>  
  <IsSchedulingService>True</IsSchedulingService>  
  <IsNotificationService>True</IsNotificationService>  
  <IsEventService>True</IsEventService>  
  <PollingInterval>10</PollingInterval>  
  <WindowsServiceUseFileShareStorage>False</WindowsServiceUseFileShareStorage>  
  <MemorySafetyMargin>80</MemorySafetyMargin>  
  <MemoryThreshold>90</MemoryThreshold>  
  <RecycleTime>720</RecycleTime>  
  <MaxAppDomainUnloadTime>30</MaxAppDomainUnloadTime>  
  <MaxQueueThreads>0</MaxQueueThreads>  
  <UrlRoot>http://SSRSNLB.NLBTEST.INT/ReportServer</UrlRoot>  
  <UnattendedExecutionAccount>
```

6. Save the RsReportServer.config file.
7. Repeat this procedure on each report server in the scale-out deployment.

Note: You may want to test access to the Reporting Services instance via a virtual server name. However, when you do that, you may see an error page. According to [Microsoft KB article 896861](#), this behavior is by design. For information about how to work around the issue, see the KB article. You must then restart your server, because you do not have Microsoft Internet Information Services (IIS) on the NLB cluster nodes.

Install the Reporting Services extensions

On each report server, run the Microsoft Dynamics AX 2012 Setup wizard to complete the following tasks:

- Install the Reporting Services extensions.
- Deploy the reports that are included with Microsoft Dynamics AX.

For step-by-step instructions, see [Install Reporting Services extensions](#) on TechNet.

Connect Microsoft Dynamics AX to the report servers

Complete the following procedures to connect Microsoft Dynamics AX to the report servers. You first connect Microsoft Dynamics AX to the NLB virtual host. Then you connect Microsoft Dynamics AX to each report server in the NLB cluster.

Connect Microsoft Dynamics AX to the NLB virtual host

Complete the following procedure to connect Microsoft Dynamics AX to the NLB cluster. Complete this procedure by using your Microsoft Dynamics AX client.

1. Open Microsoft Dynamics AX.
2. Click **System administration > Setup > Business intelligence > Reporting Services > Report servers**.
3. In the **Configuration ID** field, enter a name that identifies the Reporting Services instance and AOS instance that you are connecting.
4. In the **Description** field, enter a brief description to help you identify the Reporting Services instance and AOS instance that you are connecting.
5. Select the **Default configuration** check box.
6. On the **Reporting Server information** FastTab, enter the following information about the Reporting Services instance:
 - a. The name of the server that is the NLB virtual host.
 - b. The name of the Reporting Services instance.
 - c. The URL of Report Manager. By default, the URL is `http://VirtualHostServerName:80/Reports`.
 - d. The URL of the Reporting Services web service. By default, the URL is `http://VirtualHostServerName:80/ReportServer`.
 - e. A name for the report folder that will be created for you on the Report Manager website.
7. On the **Application Object Server information** FastTab, select the name of the AOS instance.
8. Click **Create report folder** to create the report folder.

- Click **Validate settings** to verify that the information that you entered in this form is correct, and that the report folder has been created.

Report servers (1) - Report Server configuration ID: SSRSNLB, 01@AOS01

File New Delete Validate settings Create report folder Use default settings

Configuration ID	Description
ssrs01	
ssrs02	
SSRSNLB	

Configuration ID: SSRSNLB
Description:

Default configuration:

Reporting Server information
Note: Make changes only if necessary to match the settings on the Reporting Server.

Report server
Server name: SSRSNLB
Server instance name: MSSQLSERVER

Reporting Server URLs
Report Manager URL: http://SSRSNLB:80/Reports
Web service URL: http://SSRSNLB:80/ReportServ

Reporting server options
If the report server is configured to run in SharePoint integrated mode, you must enter the URL of the report folder.
SharePoint integrated mode:
Microsoft Dynamics AX report folder: DynamicsAX

Application Object Server information
Note: Add Application Object Server name and instance in format instance@server or use lookup
Application Object Server name: 01@AOS01

Configuration identifier that is used for report deployment

Close

Connect Microsoft Dynamics AX to each report server instance

Complete the following procedure to connect Microsoft Dynamics AX to each report server in the NLB cluster. Complete this procedure by using your Microsoft Dynamics AX client.

- Open Microsoft Dynamics AX.
- Click **System administration > Setup > Business intelligence > Reporting Services > Report servers**.
- In the **Configuration ID** field, enter a name that identifies the Reporting Services instance and AOS instance that you are connecting.
- In the **Description** field, enter a brief description to help you identify the Reporting Services instance and AOS instance that you are connecting.
- Do not select the **Default configuration** check box.
- On the **Reporting Server information** FastTab, enter the following information about the Reporting Services instance:
 - The name of the report server.
 - The name of the Reporting Services instance.
 - The URL of Report Manager. By default, the URL is `http://SSRSServerName:80/Reports`.
 - The URL of the Reporting Services web service. By default, the URL is `http://SSRSServerName:80/ReportServer`.
 - A name for the report folder that will be created for you on the Report Manager website.
- On the **Application Object Server information** FastTab, select the name of the AOS instance.

-
8. Click **Create report folder** to create the report folder.
 9. Click **Validate settings** to verify that the information that you entered in this form is correct, and that the report folder has been created.
 10. Repeat this procedure for each report server in the scale-out deployment.

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