How to Configure ANSYS® FLUENT®, Workbench, and Remote Solve Manager to Submit Solve Jobs to a Microsoft HPC Cluster via RSM

Introduction

This tutorial walks you through the process of configuring ANSYS FLUENT, Workbench, and Remote Solve Manager (RSM) to submit solve jobs to a Microsoft HPC Server Cluster via RSM.

This process is useful if you want to submit your job from your workstation or laptop and then log off. Once you submit your job via RSM to a compute cluster, your job remains running. You can queue up multiple jobs and then job submission will begin in the order the jobs are queued.

Important

Design Point Updates can only be run with 1 core for FLUENT (-t1).

Before You Begin

This document assumes the following:

• You have installed and configured Microsoft HPC properly and that the compute nodes can access the head node.

If Microsoft HPC is not configured properly contact Microsoft for support before you attempt to install ANSYS® CFX® or FLUENT. You can also download the Getting Started Guide for Windows HPC Server 2008 at http://technet.microsoft.com/en-us/library/cc793950.aspx. This guide is also available with the installation files for Microsoft® HPC Pack 2008 (HPCGettingStarted.rtf, in the root folder).

• You are the local administrator of the cluster and know how to share directories and map network drives.

If you do not know how to perform these tasks, please contact your Systems Administrator for assistance. You can also go to Help and Support from the Start menu on your desktop.

• You have the machine name of the head node on the Microsoft HPC cluster.

• You are able to install and run ANSYS, Inc. products, including licensing, on Windows systems. Please see the tutorials on the Download Center at https://www1.ansys.com/customer/ to install ANSYS, Inc. product and licensing installation.

• If you have any problems with or questions about the installation process please log a Service Request on the ANSYS Customer Portal. A Systems Support Specialist will respond to assist you.

Configure RSM on the Head Node

RSM Services are required if the computer will be accessed by remote clients (Manager Service required) or a remote Manager (Compute Server service required [also known as ScriptHost]). Use the following steps to install the Manager and Computes Server services as required.
Administrative privileges are required to perform these steps.

1. Before starting the configuration verify that no Ans.Rsm.* processes are running in Task Manager.
2. Open up Task Manager and choose the Processes tab and look for the following:
   - Ans.Rsm.Admin.exe
   - Ans.RSM.JMHost.exe
3. If these services are running, open up Control Panel>Administrative Tools>Services and stop them.
4. Open up a Command Prompt and navigate to the C:\Program files\Ansys Inc\v140\RSM\bin directory.
5. Type in the following command:
   
   AnsConfigRSM.exe –mgr -svr

6. Create a Shared Cluster Directory. For example, C:\Temp.
7. Share this directory, giving Full Control to all users submitting jobs.

Run Caspol

By default, the .NET 3.5 Framework prevents applications from being run over a network. You can allow network execution by running the Microsoft Caspol utility from the command line. The Caspol utility is located under the .NET Framework installation, in C:\Windows\Microsoft.NET\Framework64\... The security exception executed by the Product Configuration Manager displays the command that opens Full Trust to files on the shared drive.

   • Open a Command Prompt and enter the following text, replacing //headnode/temp with the actual name of the Head Node.

   C:\Windows\Microsoft.NET\Framework64\v2.0.50727\CasPol.exe -q -machine -ag 1.5 -url "file://headnodename/temp/*" FullTrust -name "Shared Drive Work Dir"

   **Note**

   Do not change the text, "Shared Drive Work Dir".

Add RSM ports to the Firewall

If you have a local Firewall turned on (Server and Client machines), you will need to add two ports to the Exceptions List for RSM:

   • Add port 8140 to Ans.Rsm.SHHost.exe.Config.
   • Add port 9140 to Ans.Rsm.JMHost.exe.Config.

1. After you add the Firewall, choose Start>Programs>ANSYS 14.x>Utilities>Remote Solve Manager. This opens the Remote Solve Manager Dialog.
2. Right-click on My Computer in the RSM tree and select Set Password to set the password for the user specified in the previous step. A command prompt will open prompting for the user’s password. This is the username and password that you use to log in to your Windows machine.
Add a Compute Server

1. Right-click **Compute Servers** in the RSM tree and select **Add**.

2. In the **Compute Server Properties** window, enter the following information under the **General** Tab:

   1. Enter a **Display Name** for the server. This name can be any name that makes sense for you. This example uses **MS Compute Cluster**.
   
   2. Enter the **Machine Name**. This name must be the actual computer name of the head node. This example uses **dellwinhpc**.
   
   3. Set the **Working Directory Location** to **Automatically Determined**.

3. Enter the following information under the **Cluster** Tab:

   - **Display Name**
   - **Machine Name**
   - **Working Directory Location**
   - **Working Directory**

   ![Compute Server Properties Window](image)
1. Set the **Cluster Type** to **Windows HPC**.

2. Set the **Shared Cluster Directory** to the directory that is shared out to all the cluster nodes from the Headnode. This example will use the shared temp directory `\\dellwinhpc\temp`. See Step 6 in the section "Configuring RSM on the Headnode".

3. Set the **File Management** to **Use Execution Node Local Disk**.

### Add a Queue

1. Right-click on **Queues** in the **RSM** tree and select **Add**.

2. In the **Queue Properties** window, under **General**, enter a name for this queue. In this example, we will use **MS Compute Cluster**.

3. The Compute Server you added previously (MS Compute Cluster) appears under **Assigned Servers**. Check the box.

4. Click **OK** in the **Queue Properties** window.

5. In the **RSM** tree, expand the **Compute Servers** item to see the Compute Server you added (MS Compute Cluster in this example).
Configure Multiple Network Cards

If your Microsoft HPC Cluster is configured using multiple network cards where there is more than one network defined, you must edit some configuration files on the head node to explicitly define the IP address of the head node.

1. On the client machine, ping the head node using the fully qualified domain name.

   For example, open up a Command Prompt and type:
   
   \texttt{ping headnode.domain.com}
   
   (where \texttt{headnode} is the actual name of the head node).

   The ping command should return a statement similar to the following:
   
   \texttt{Pinging headnode.domain.com [10.2.10.32] with 32 bytes of data:}
   \texttt{Reply from 10.2.10.32: bytes=32 time=56ms TTL=61}

   \textbf{Note}

   The IP address is \textbf{10.2.10.32} in the above example. You will need this address in the following steps.

2. Navigate to \texttt{C:\Program Files\Ansys Inc\V140\RSM\bin} and locate the \texttt{Ans.Rsm.JM-Host.exe.config} and \texttt{Ans.Rsm.SHHost.exe.config}.

3. Open both files in a text editor.

4. Add the following text, "\texttt{machineName=\"ip_address\"}", using the IP address obtained in Step 1, as shown below.
<channels>
  <channel ref="tcp" port="9140" secure="false "machineName="ip_address"
  <serverProviders>
    <formatter ref="binary" typeFilterLevel="Full"/>
  </serverProviders>
</channel>
</channels>

Test the Connection

- Right-click **Compute Server>MS Computer Cluster** and select **Test Server** to test the connection and view a report of any problems. Once the test is complete it should read **Finished**. If it fails, check the steps above to make sure you followed them correctly.

![Image of RSM window](image_url)

**Note**

If you see the following exception from script: That assembly does not allow partially trusted callers., run Caspol. See the section, *Run Caspol* (p. 2).

Configure RSM on the Client Machine

Run the following steps from each RSM client (end user) machine that will be submitting RSM jobs to the Microsoft HPC cluster. The last step is a test to verify that communication between the head node and the client machine is working correctly. If the test fails, you must resolve any errors before continuing with this tutorial.

1. Install ANSYS, Inc. products on each client machine that will be submitting RSM jobs to the Microsoft HPC cluster. When installing, be sure to choose a product that includes ANSYS Workbench. See the tutorials on the Download Center at [www.ansys.com](http://www.ansys.com) for detailed instructions on installing ANSYS, Inc. products.
2. Click **Start> ANSYS 14.0> Utilities> Remote Solve Manager** to open the RSM.
3. Right-click **My Computer [Set Password]** in the **RSM** tree on the client machine and select **Set Password** to set the password for the client machine. A command prompt will open, prompting for the user's password.
4. Select **Tools> Options**.
5. In the **Name** field, add the name of the head node (dellwinhpc in this example).
6. Click **Add**, then click **OK**.
Configure FLUENT

Configure FLUENT on the Head Node

1. Install FLUENT (it is only necessary to install FLUENT on the Head node).
   By default it will be installed in `C:\Program Files\ANSYSInc\v14.x\fluent`.

2. Share the FLUENT directory that sits under `C:\Program Files\ANSYS Inc\v14.x\` so that all computers on the cluster can access this shared directory through the network.

3. Edit the `AWP_ROOT140` environment variable to reflect the UNC path to the Head node and the Ansys Inc shared directory. The value of this variable should be `\\headnode\AWP_ROOT140\ANSYS Inc\V140`.

Configure FLUENT on the Client Machine

Note the following requirements before you begin configuring FLUENT on the client machine:

- Client machines must be running Microsoft Windows XP 64-bit, Windows Vista 64-bit, Windows 7 64-bit or Microsoft HPC 2008 Server 64-bit.
- Client machines must have the Microsoft HPC 2008 Server Client Utilities installed.
- Client machines must have a high-end graphics card with the latest graphics driver from the vendor installed. (Contact ANSYS for recommendations).
- All pre/post processing will be done on the client machines. Only the FLUENT solve jobs will be submitted to the cluster.
1. To install the Microsoft HPC 2008 Server Client Utilities on the client machines from the head node network share or the CD, choose **Start > Run** and type:

```
\HEADNODE\REMINST
```

(where **HEADNODE** is the actually name of the Head node on the cluster).

2. Double-click on **setup.exe**. The installer prompts you to install required programs.

3. Create a working directory where your case and data files will reside. The working directory should not contain spaces in the directory name.

4. Share the working directory with the client machines and give them Full Control Access.

5. Map a network drive to the Shared Working Directory. This is required if you will be compiling and loading User-Defined Functions (UDFs).

**Submit FLUENT Jobs Through Workbench**

1. Open Workbench.
2. Right-click on the **Setup** cell and choose **Import Case**.

**Note**

Before you can submit a job to the Microsoft Compute Cluster through Workbench, you must change the FLUENT root path in the FLUENT Launcher to a Universal Naming Convention (UNC) path (`\HEADNODE\fluent`) (See Step 2 from the section, **Configure FLUENT on the Head Node** (p. 7)) and then launch FLUENT after this change has been made. After FLUENT has launched using the UNC in the FLUENT Root Path, FLUENT will save the settings for future runs and this step will no longer be required.

a. Right-click the **Setup** cell and choose **Edit**.

![Screenshot of Workbench Setup cell]

b. Start the FLUENT Launcher and change the FLUENT Root Path to a UNC Path pointing to the HEADNODE on the MS HPC Cluster and the shared FLUENT directory name.
3. After the run is completed, right-click the **Solution** cell.

4. Check the following under the Solution Process:
   - **Update Option**: Submit to Remote Solve Manager.
   - **Solve Manager**: Type in the name of the Head node on the Compute Cluster.
   - **Queue**: Choose the MS Cluster Queue.
   - **Execution Mode**: Parallel.
   - **Number of Processors**: Type in the number of cores you wish to run on.
Important

Design Point updates can only be run with 1 core for FLUENT (-t1).