Rack Server Virtualization

A Microsoft Office Visio 2007 Connector Implementation

2008

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## Introduction

A Microsoft Office Visio 2007 Connector Implementation.

Microsoft Visio 2007 Connector for Rack Server Virtualization (Virtual Rack) uses various new features of Visio 2007 to display the details of servers, racks and colors present in the Data Centre. This add-in enables [consolidation](#_Consolidation_Criteria) of physical servers by allowing many virtual servers to run concurrently on one physical server results in improvement of system utilization, reduction in number of physical servers, lowering costs, increasing flexibility etc. The Visio 2007 Connector provides users a virtualization picture in addition to the existing picture of the rack based on some parameters to compare the power consumption and space saving before and after consolidation.

## Installation Overview

## Permission to run Setup.exe

Permissions required to run Setup.exe

|  |  |
| --- | --- |
| Permissions needed | Description |
| Local Administrator on the Server | Required for  - invoke the Setup.exe  - read/write registry |

Table 1: Permissions for Installation

## Software Prerequisites

1. .NET Framework 2.0
2. Microsoft Office Visio 2007
3. Microsoft VSTO 2005 SE Runtime

## Installing the Prerequisites

1. **.NET Framework 2.0**

Download and install the .**NET framework 2.0** from

<http://msdn2.microsoft.com/en-us/netframework/aa731542.aspx>

1. **Microsoft Office Visio 2007**

The system should have the **Microsoft Office Visio 2007** installed.

1. **Microsoft Visual Studio 2005 Tools for Office Second Edition runtime**

Download and install the **Microsoft VSTO 2005 SE Runtime** from

<http://go.microsoft.com/fwlink/?linkid=49612>

## Installation Flow

The Setup.exe installs the Visio Connector for Rack Server Virtualization as an Add-In on the machine.

1. Run the Setup.exe/RackServerVirtualization.msi.
2. The Welcome screen appears.

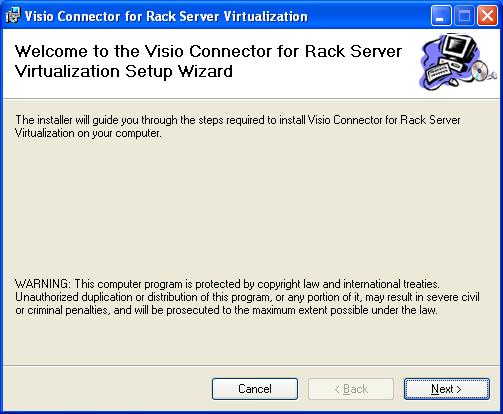


Figure 1: Welcome Screen

1. Click **Next** to continue.
2. The **Setup Installation Path and Disk Space Information** screen appears.

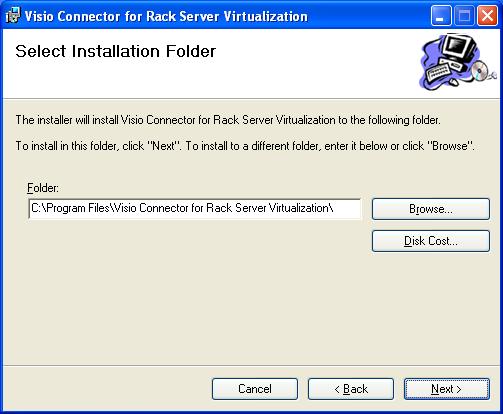


Figure 2: Set Up Installation Path and Disk Space Information

* Click **Next**, for the default path,or click **Browse** to select the destination folder path.
* To check the Disk Space Required, click **Disk Cost**.

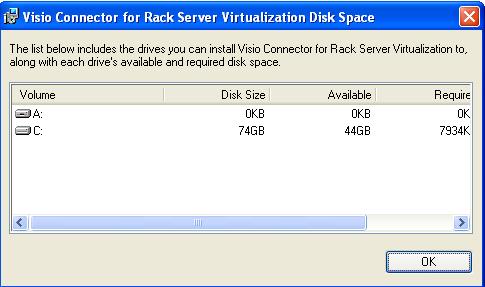


Figure 3: Rack Server Virtualization Add-in Disk Space

1. Click **Next** to continue.
2. The **Confirm Installation** screen appears.
3. Click **Next** to begin installation or **Cancel** to exit the setup wizard

**Note**: If you want make any changes to the installation settings or go back to the previous pages, click **Back**.

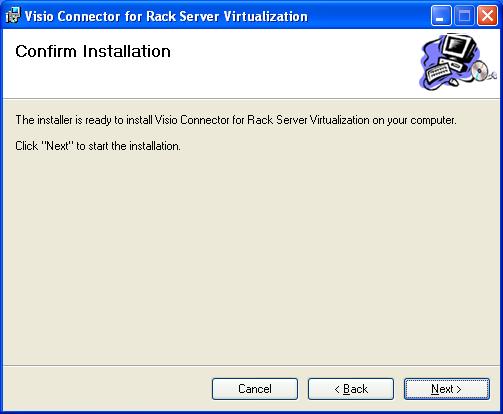


Figure 4: Confirm Installation

1. Installing Rack Server Virtualization Add-in screen appears.

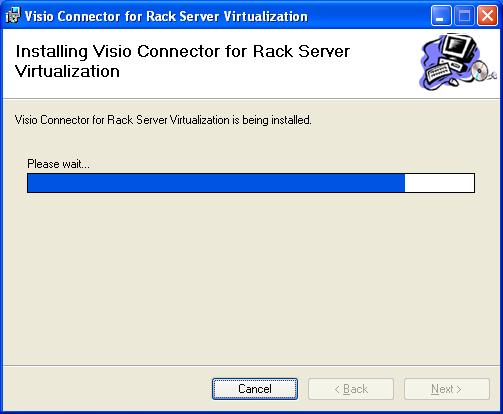


Figure5: Installing Rack Server Virtualization Add-in

**Note** : Please wait while the setup wizard installs Rack Server Virtualization Add-in. This may take few minitues. The installation bar is dispalyed.

To cancel the installation click **Cancel**

1. Once the installation is successful the **Installation Complete** screenappears.

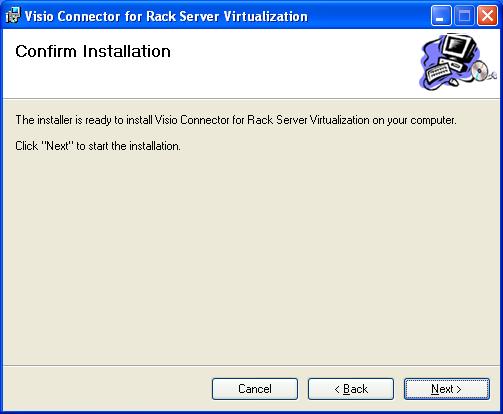


Figure6: Installation Complete

## Getting Started

This section describes the basic flow of the reference implementation.

The Microsoft Office Visio 2007 Connector for Rack Server Virtualization is a COM Add-In that starts up automatically with Visio 2007.

## Selecting/Opening the Rack Server Virtualization Template

The Add-In when installed adds a new template “**Rack Server Virtualization**“ under “**Connectors”** Templates Category.

1. Open Visio 2007, from **File**, select **New** and the **Getting Started**.

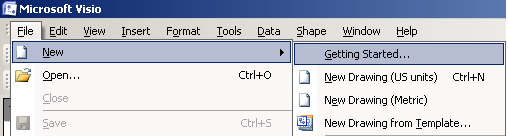


Figure7: Getting Started

1. Select “**Connectors**” from the “**Template Categories**” list from the left pane.
2. Select “**Rack Server Virtualization**” from the “**Featured Templates**” group.
3. Click on “**Create**” button.

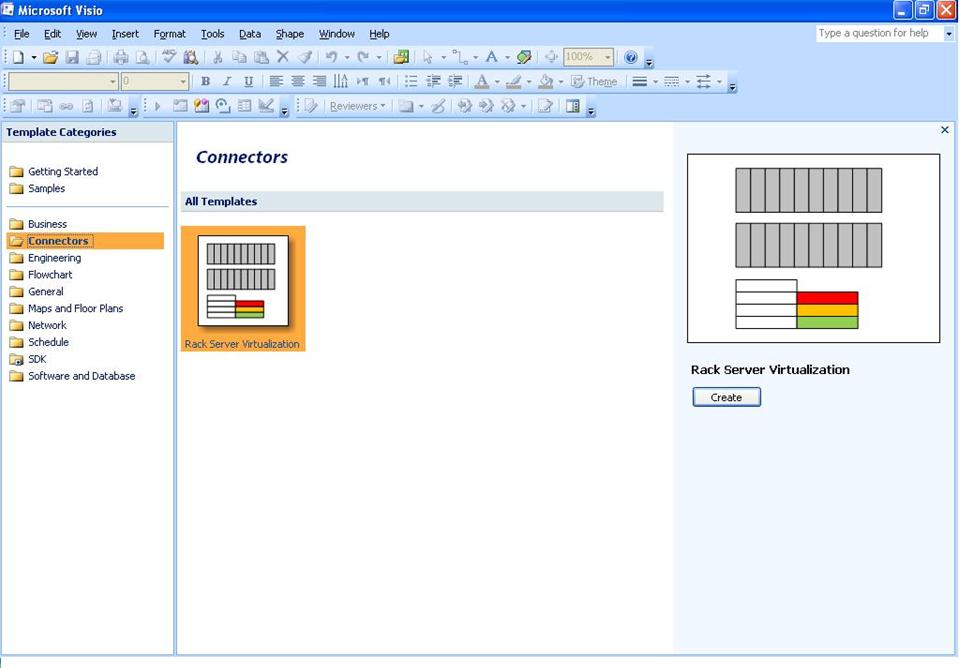


Figure8: Selecting the template

A new menu “**Virtual Rack**” and toolbar **“Virtual Rack Add-in”** is added as the template opens a new document**.** A stencil **Rack Server Virtualization** consists of predefined shapes to show Rack Server Virtualization diagram will be also be opened.

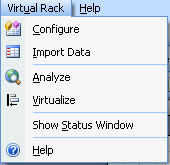


Figure9: Virtual Rack Menu

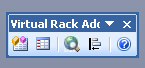


Figure10: Virtual Rack Add-in Toolbar

Also, Import wizard dialog of the connector will be open. This wizard provides different modes of including the data into the connector. The wizard can also be open from Virtual Rack menu or toolbar.

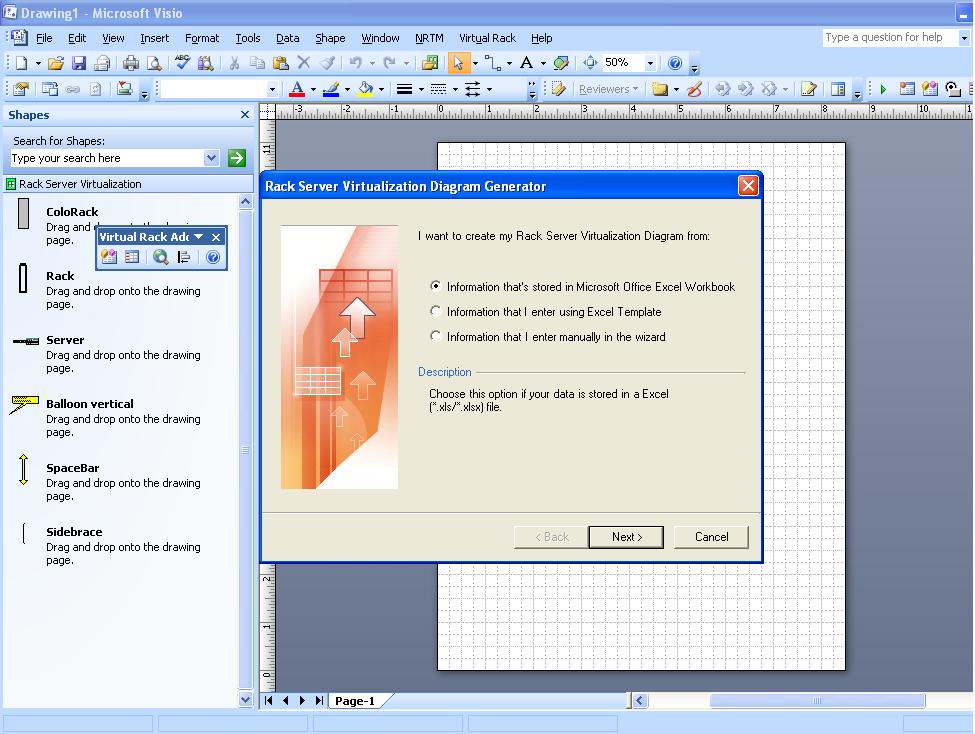


Figure11: Import Wizard, Virtual Rack Add-in & Menu On Load.

The **Virtual Rack** menu consists of the following menu items –

* Configure – To configure CPU utilization and logon credentials.
* Import Data – To import data for analyze through various means.
* Analyze – To retrieve server, rack and colo data.
* Virtualize – To virtualize the existing rack servers depending on CPU usage, power rating etc.
* Show Status Window – To see the status of Analyze.
* Help – User Guide for Visio Connector for Rack Server Virtualization.

## Import Data

To create the Rack Server Virtualization diagram following are the Import Options:

1. Import data from a Microsoft Office Excel Workbook.
2. Use the Microsoft Excel Sample Template to provide the data.
3. Manual entry of data using the wizard.

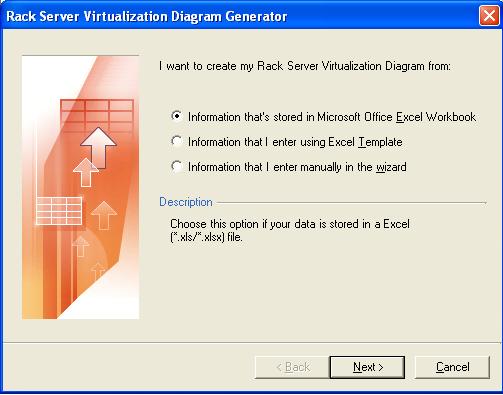


Figure12: Source to create Virtual Rack Diagram.

## Selecting the Microsoft Office Excel Workbook

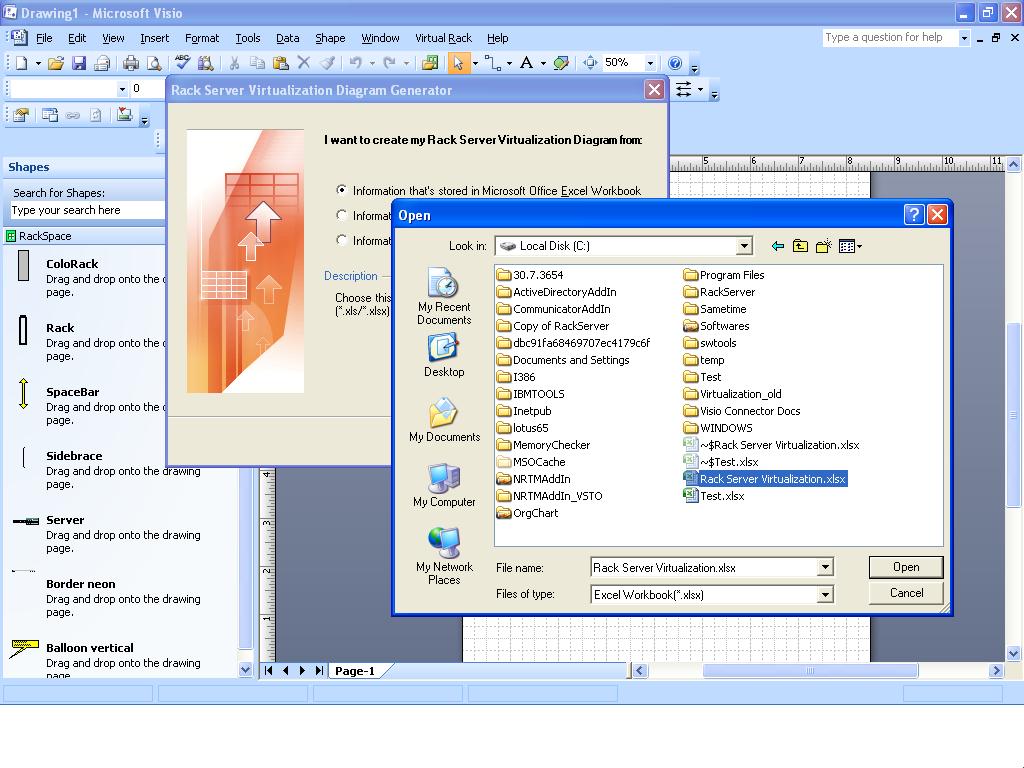
1. Select the **Information that’s stored in Microsoft Office Excel Workbook** and click **Next**.
2. Select an **Excel Workbook** that consists of Colo, Rack and Server details.

Figure13: Select Excel Workbook.

1. Click **Open**.
2. Select a worksheet each for Colo, Rack and Server to get their details. Click **Next**.



Figure14: Select Worksheets.

1. All the columns of the Worksheet will be displayed in the combo boxes.
2. Select columns for **Server** details corresponding to the **Shape Field**.

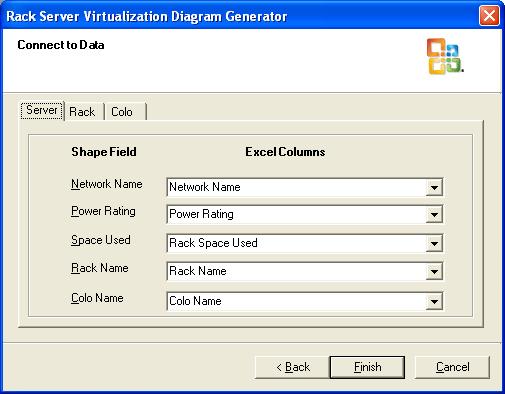


Figure15: Select Columns for Server Details.

1. Select columns for **Rack** details corresponding to the **Shape Field**.

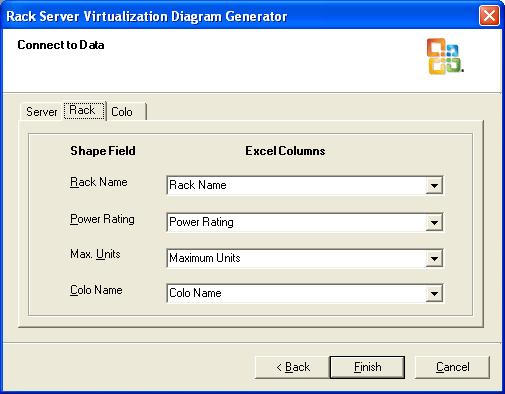


Figure16: Select Columns for Rack Details.

1. Select columns for **Colo** details corresponding to the **Shape Field**.

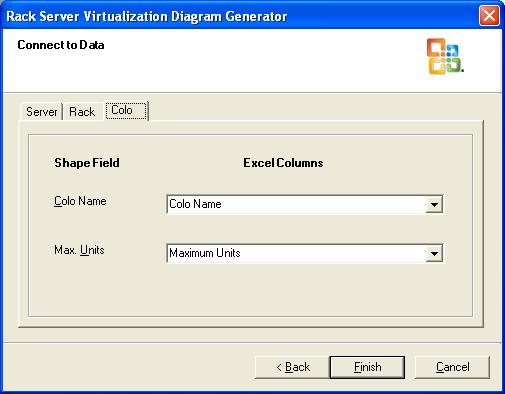


Figure17: Select Columns for Colo Details.

1. Click **Finish**. A diagram will be auto generated for all the colo(s) present in the Excel Worksheet. This diagram consists of all the racks present in the Colo.

**Note:** There will be a separate page created for each Colo.

**Note:** Each page can contain up to 120 racks, if the number of racks exceed 120, a new page will be added to the drawing.

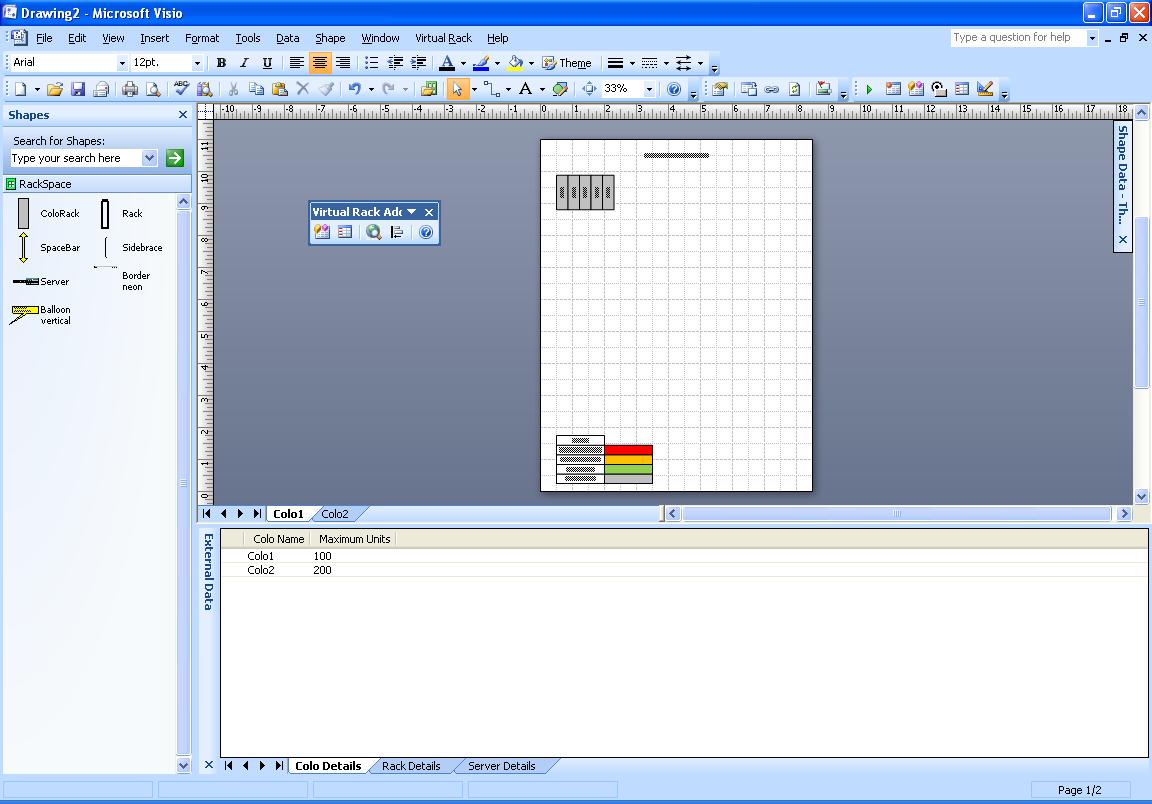


Figure18: Auto-Generated Diagram of the Colo Racks.

## Using the Microsoft Office Excel Template

1. On **Import Data Wizard**, Select **Information that I enter using Excel Template** and click **Next**.
2. Create a new excel file.

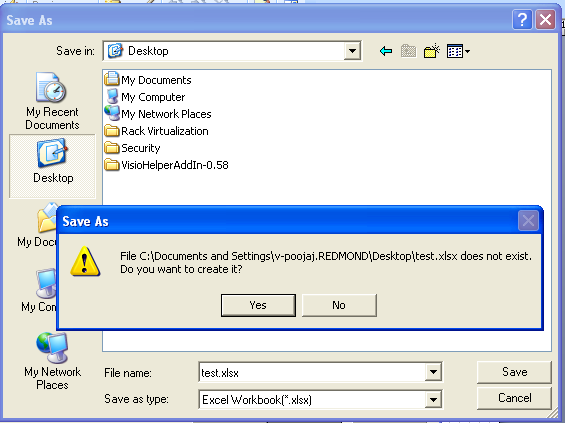


Figure19: Create excel workbook.

1. A message is displayed to create a new File if the File name entered by you does not exist. Click **Ok**. A new File will be created at the selected location.

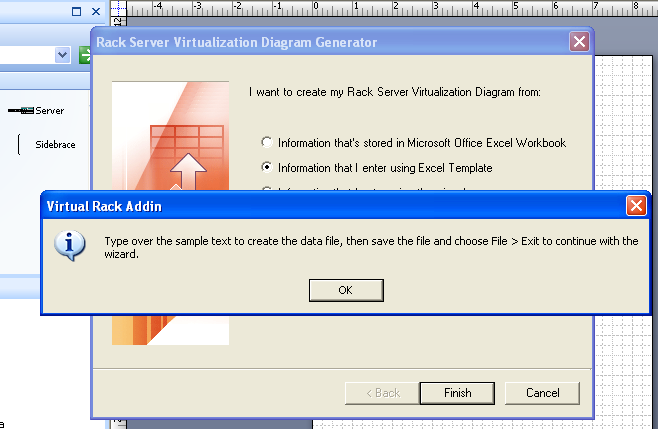


Figure20:” Type Over Sample Data” Message box.

1. The new Excel file created with the template will open. Type the Colo, Rack and Server details. Click **Save**. Click **File** > **Exit**.

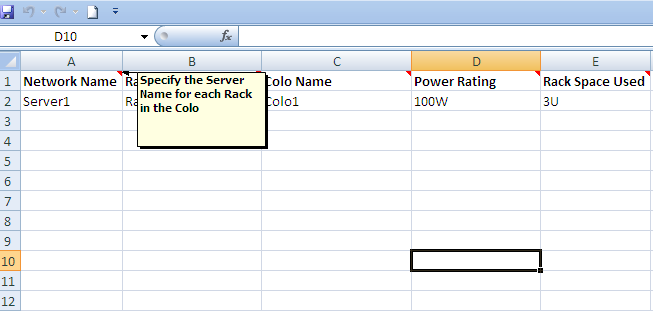


Figure21: Sample Excel Template.

1. As user exits the Excel file, a diagram is auto generated for all the colo(s) present in the Excel Workbook. This diagram consists of all the racks present in the Colo.

**Note:** There will be a separate page created for each Colo.

**Note:** Each page can contain up to 120 racks, if the number of racks exceed 120, a new page will be added to the drawing.

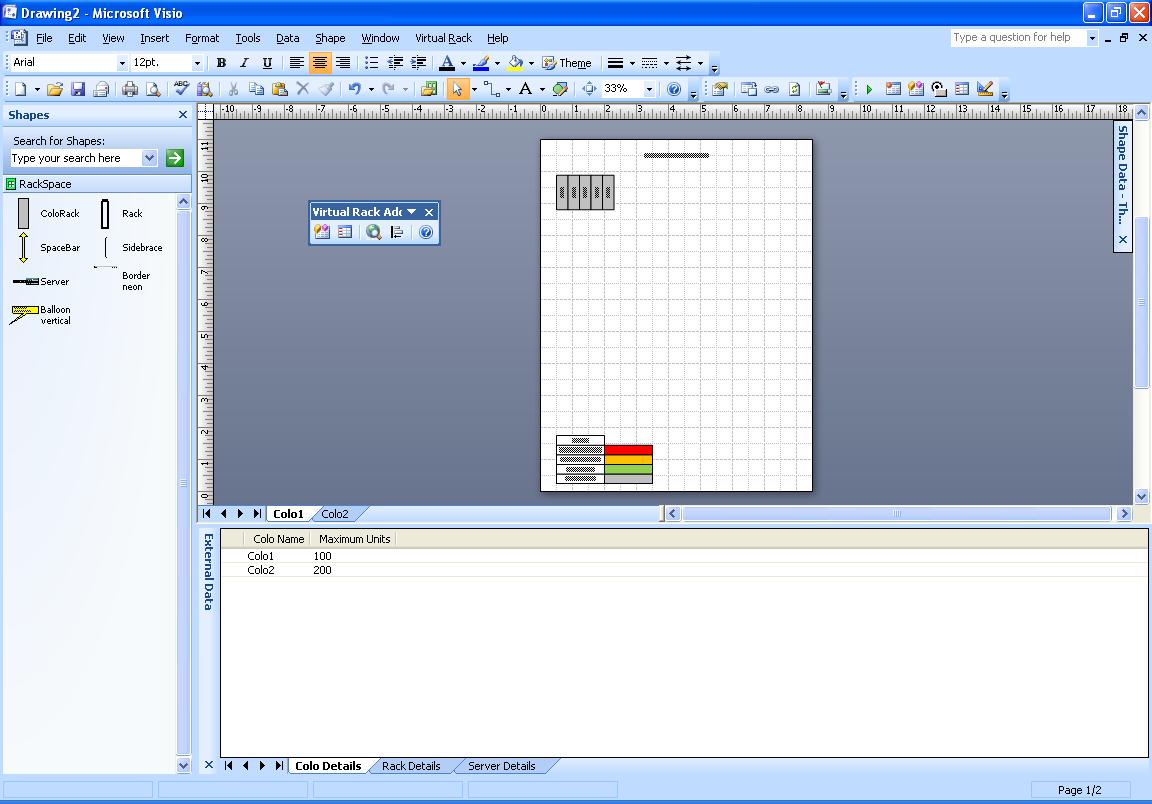


Figure22: Auto-Generated Diagram of the Colo Racks.

## Using the Manual Wizard

4. On **Import Data Wizard**, Select the **Information that I enter manually in the wizard** and click **Next**.
5. Enter the **Colo Name** and **Maximum Units**.

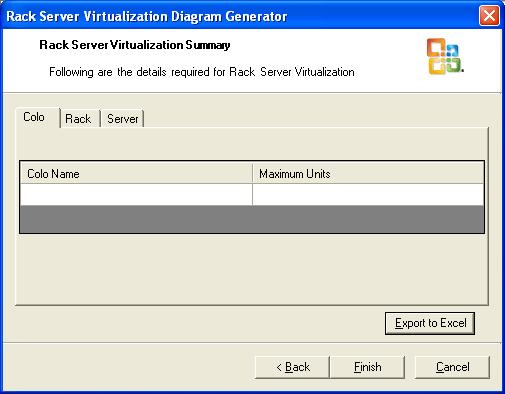


Figure23: Colo Details .

1. Select **Rack** tab. Enter the **Rack Name**, **Colo Name**, **Power Rating**, **Maximum Units** for each rack.

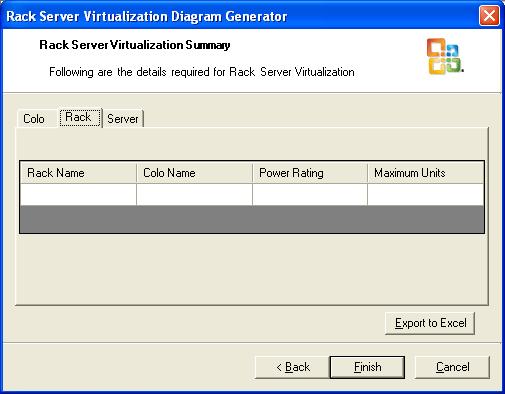


Figure24: Rack Details.

1. Select **Server** tab. Enter the **Network Name**, **Rack Name**, **Colo Name**, **Power Rating**, **Rack Space Used** details.

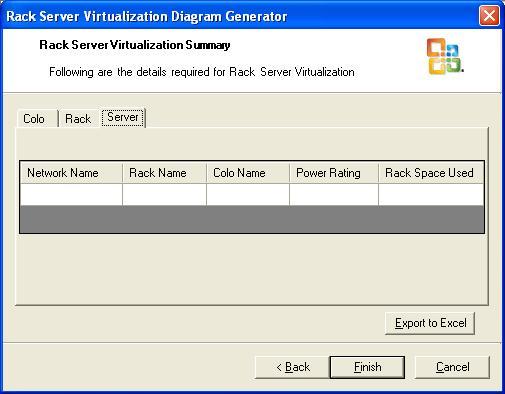


Figure25: Server Details.

1. After filling the data, Click **Finish**.
2. Once the user clicks **Finish**, a diagram is auto-generated for all the colos provided in the data grid by the user. This diagram consists of all the racks present in the Colo.

**Note:** There will be a separate page created for each Colo.

**Note:** Each page can contain up to 120 racks, if the number of racks exceed 120, a new page will be added to the drawing.

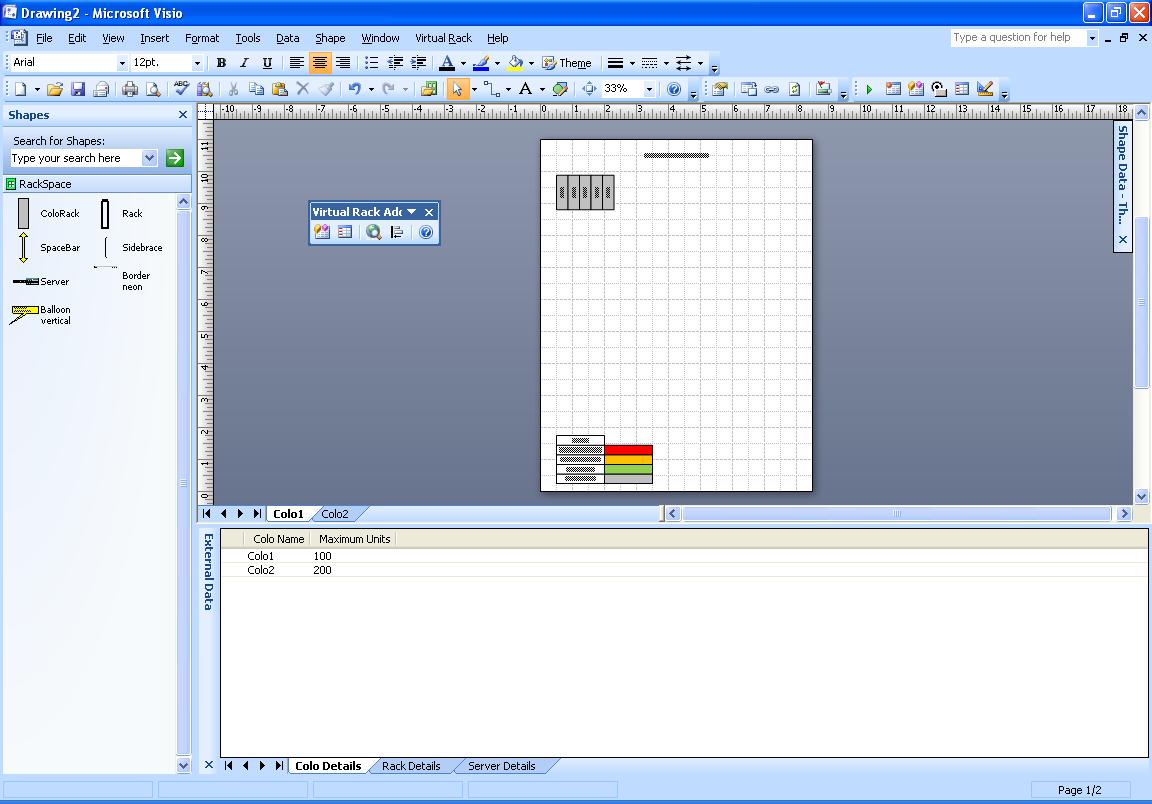


Figure26: Auto-Generated Diagram of the Colo Racks.

1. User can Export the data entered into the manual entry data grid onto an excel spreadsheet.
   1. Click **Export to Excel**.
   2. **Save As** dialog will open.
   3. Select the desired path.

**Note: Default** path will be Installation Path.

Default file name will be **RackServerVirtualization-Data-Time.xslx**.

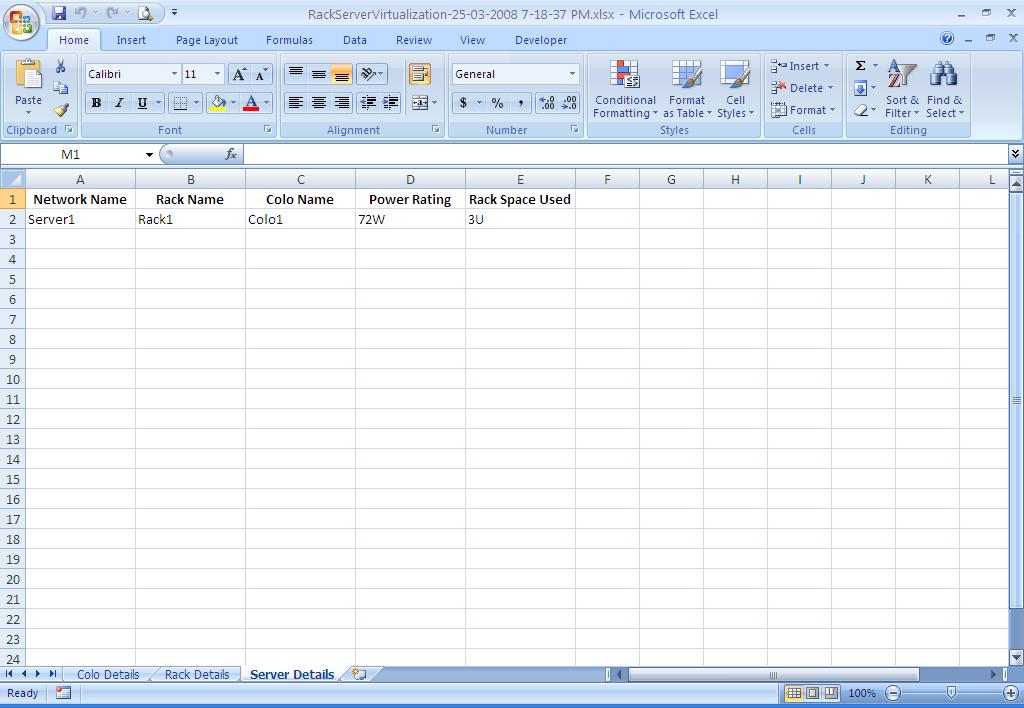


Figure27: Format of Excel saved



## View Rack Details

User can view the details of each Rack in the diagram created as:

1. Hover the cursor on any of the Rack shape of the colo, a smart tag will be visible. The smart tag consists of menu items **View Rack Details**, **Analyze Rack** and **Rack Virtualization**. Rack Virtualization will be disabled until Analyze is performed.

1. Click **View Rack Details**.

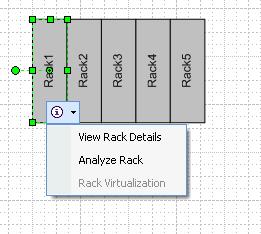


Figure28: Smart Tag to View Rack Details.

1. A new page will be created comprising of detailed diagram of that particular Rack.

The diagram shows the detailed information of the Rack and the servers consisted by the Rack.

The Shape Data consists of Rack’s Name, Power Rating, Maximum Units and Server’s Power Rating, Rack Space Used etc.

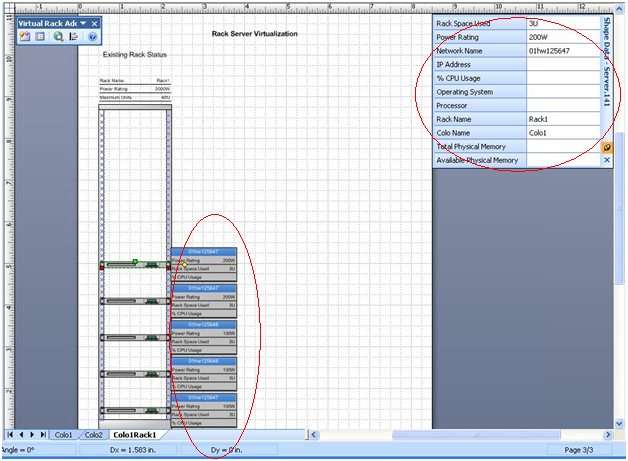


Figure29: View Rack Details.

1. Select the **Rack Shape**, Right click **Properties.** User canview the Rack shape data.

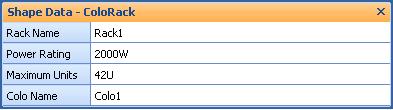


Figure30: Rack Shape Properties.

1. Select the **Server shape**, Right click **Properties.** User can view the Server shape data.

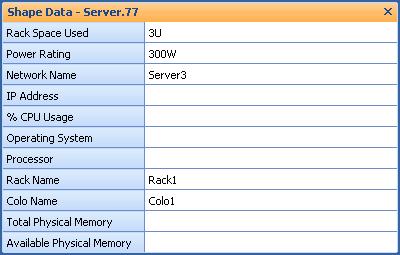


Figure31: Server Shape Properties.

## Configuration

Before starting the Analyze process, user can configure the mode of fetching the data of Rack-Server for Rack Server Virtualization. The connector uses CPU utilization as the factor to consider a Server as Virtualizable.

1. Click **Configure** from the **Virtual Rack** Menu or click **Configure** icon from **Virtual Rack Add-in** toolbar.

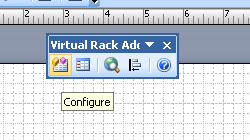
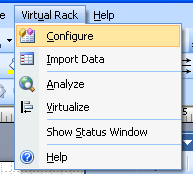
 

Figure32: Configure Button on Toolbar Figure33: Configure Menu

1. User can choose between the **Current CPU Utilization** (CPU Utilization at that instance) or **CPU** **Utilization of servers over a period of time**.

Note: *Current CPU Utilization* uses the **WMI** query to fetch the data from Rack Servers and *CPU Utilization* *for Duration* uses the **Operations Manager** to get the data. By default, Current CPU Utilization is selected.

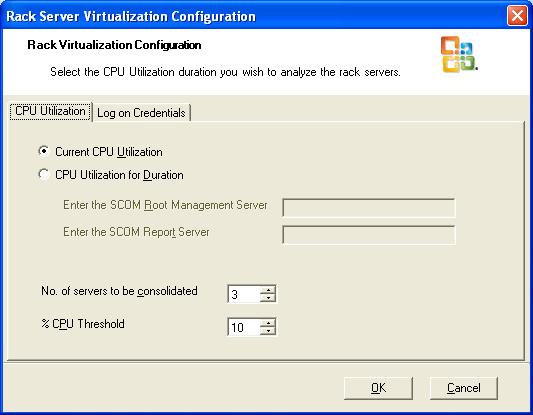


Figure34: Configuration: Current CPU Utilization.

1. Select **CPU Utilization for Duration**. Type a valid **Operations Manager Root Management Server** and **Operations Manager Reporting Server.** If any of the servers are unavailable user will be prompted for an error.

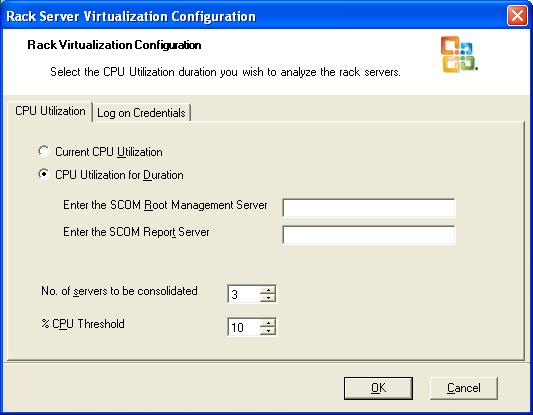


Figure35: Configuration: CPU Utilization for Duration.

1. User can set the value of **number of servers to be consolidated** (default 3) for virtualization.
2. User can change the **% CPU Threshold** value (default 10%) below which servers can be considered as underutilized and can be proposed for Virtualization (consolidated into other Servers of the same Rack).
3. User can change the **Logon credentials** (default **Windows Authentication.**)

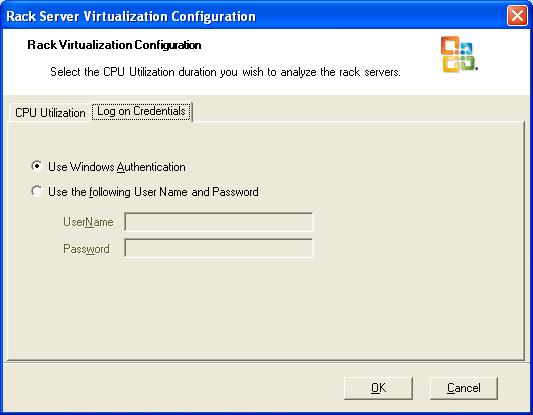


Figure36: Configuration: Logon Credentials.

## Analyze

1. Users can Analyze Rack from **Virtual Rack Menu > Analyze** or from **toolbar Analyze icon**.
2. If user hover the cursor over the Rack shape of the colo, a smart tag will be visible. The smart tag consists of menu items **View Rack Details**, **Analyze Rack** and **Rack Virtualization**. Rack Virtualization will be disabled until Analyze is performed.

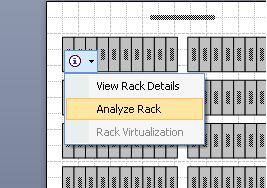


Figure37: Smart Tag to Analyze Rack.

1. By selecting the **Analyze Rack** menu item from the **smart tag** menu will start analyzing the Rack of the Colo. User can also **select multiple Racks** and click **Analyze Rack**, will analyze multiple racks.
2. If user selects the **Analyze** from **Virtual Rack menu** or **toolbar**, will analyze all the Racks of the drawing.
3. A Status window is displayed showing the status of the Analysis. User can cancel the Analyze process by clicking **Cancel**.

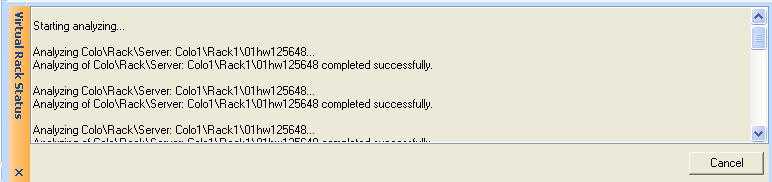


Figure38: Virtual Rack Status Window.

1. Color of Racks will change after analyzing based on the color codes in [Legend](#_Legends_Definition). Rack will be considered as underutilized or over utilized based on the % CPU Usage of Servers in the Rack. If any Server in a Rack has CPU Utilization below threshold value it will be considered as underutilized and the Rack is considered as Virtualizable.

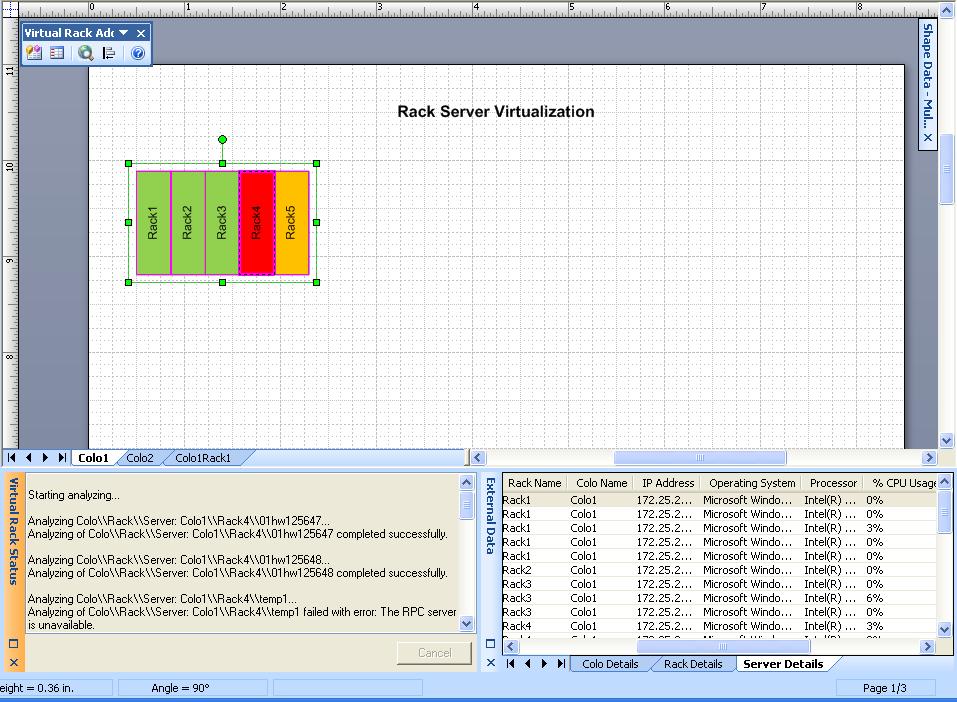


Figure39: Rack Color After Analyzing.

1. User can close the Status Window and Open it again from the **Show Status Window** in **Virtual Rack** Menu in the Visio Menu Bar.

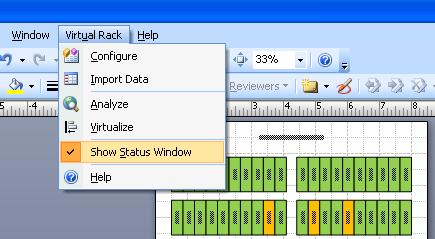


Figure40: Show Status Window Menu Item.

## Virtualization

This section describes the Virtualization of Rack Servers:

1. After successfully completing the **Analyze**, the External Data window adds the fetched IP Address, Operating System, Processor, % CPU usage, Total Physical Memory, Available Physical Memory details of the analyzed servers.

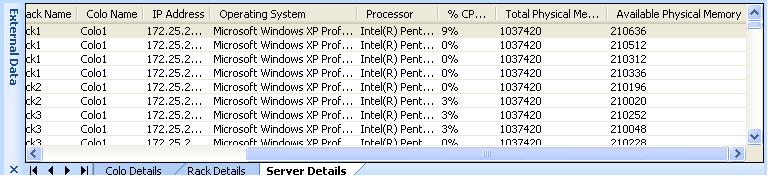


Figure41: External Data.

1. Users can **View the Rack Details** of the **analyzed racks** from smart tag on a Rack shape.

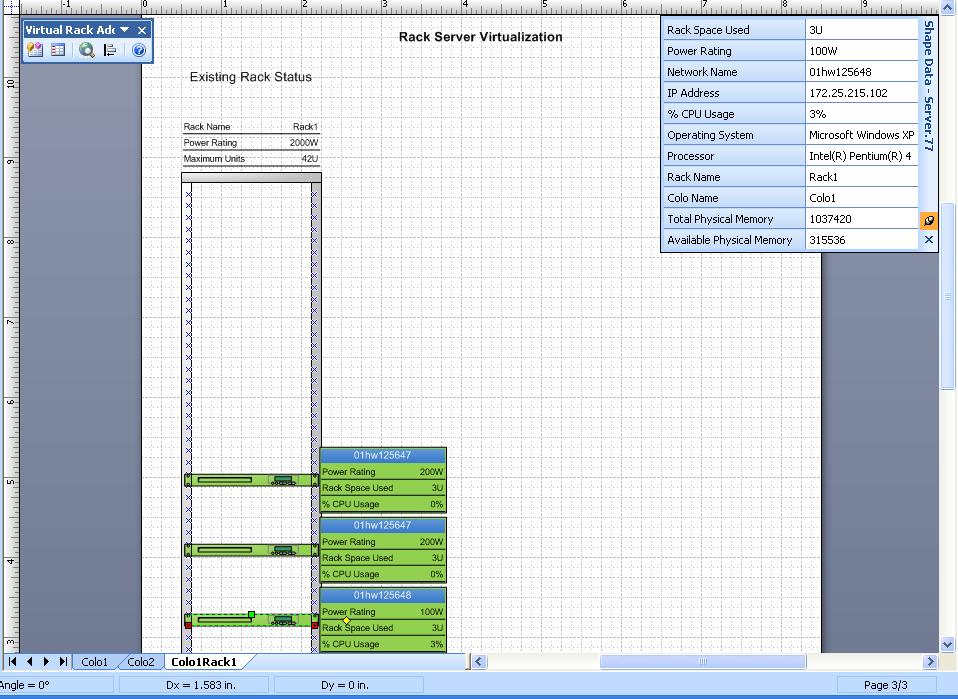


Figure42: View Rack Details of the Analyzed Racks.

1. After Analyze, smart tag menu item Rack Virtualization will be enabled. Click **Rack Virtualization**.

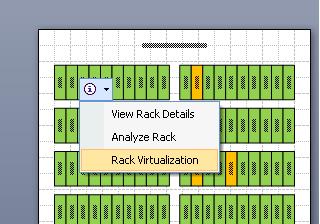


Figure43: Smart Tag to Rack Virtualization.

1. Proposed Rack Status after Virtualization will be displayed along with the Existing Rack Status. The after virtualization diagram shows the **Power Drop** and **Rack Space Saved**.

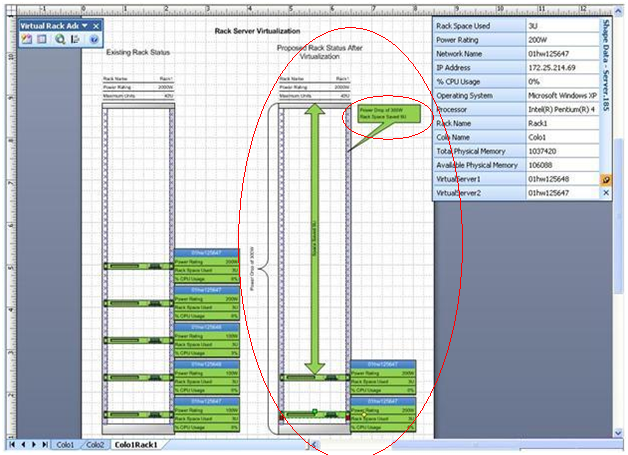


Figure44: Virtualization of Servers.

1. User can see the **Virtual Servers** [consolidated](#_Consolidation_Criteria) under a **Physical Server**. Select the Physical Server, right click **Properties**, **Virtual Server Shape Field**.

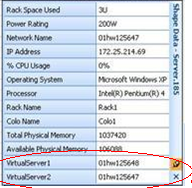


Figure45: Virtual Servers in Shape Data Window.

## Consolidation Criteria

**Consolidation** is done based on the following parameters according to the priority as below:

* 1. **Power Rating:** The server with higher Power Rating is considered to be a better candidate than server with lower Power Rating.
  2. **Rack Space Used:** A Server that occupies more space is merged into the Server that occupies less space to minimize the space occupied by the Servers within a Rack.
  3. **CPU Utilization:** A Server with lower CPU Utilization is merged into the Server with higher CPU Utilization.
  4. **Physical Memory:** Server with lower Physical Memory will be merged into the Server with higher Physical Memory.

## Legend Definition

The legend is defined according to the analysis done.

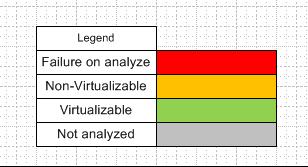


Figure46: Legend Definition.

**Grey**: No analysis is done.

**Green**: Virtualizable (Rack contains a server whose CPU Utilization is less than the threshold.)

**Orange**: Non-Virtualizable (Rack contains no server whose CPU Utilization is less than the threshold.)

**Red**: There is an error while analyzing the Servers in the Rack.

## Troubleshooting

This section describes the errors user may get.

## Error while Importing Data

Error scenario 1:

On the Import wizard form of Rack Server Virtualization when user selects **Information that’s stored in** **Microsoft Office Excel Workbook** option, click **Next** then the following error appears:



Error Description:

The selected option requires either Microsoft Office Excel 2003 or Microsoft Office Excel 2007 installed on the user machine.

Error scenario 2:

On Select columns form of Rack Server Virtualization when user selects the default text for Excel columns **<Select a column name>** and click **Finish** then the following error appears:



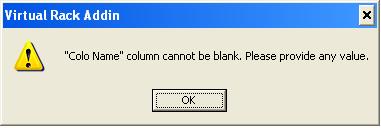
Error Description:

The selected item is not a valid excel column name. This text is selected by default when the form loads and Excel Column name doesn’t match with the Shape Field.

Error scenario 3:

On the Manual data entry form of Rack Server Virtualization when grid columns get blank and doesn’t have any value and user clicks **Finish**,then the following error appears:

**“Column Name” column cannot be blank. Please provide any value.**



Error Description:

Data Grid columns cannot contain blank values. User has to provide some values for rack diagram to be created.

Error scenario 4:

On the Import Wizard form of Rack Server Virtualization when the user selects existing **Microsoft Office Excel Workbook** option or **Microsoft Office Excel Template** and click **Next**, file dialog opens and select an invalid excel, then the following error appears:



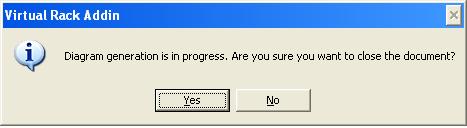
Error Description:

The input excel used for these options must be a valid excel file.

## Error while Diagram Generation

Error scenario 1:

During the diagram generation process when the user tries to close the document on which the diagram is being generated. The following error message appears.

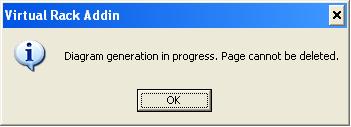


Error Description:

The diagram generation process needs to be terminated if user wants to close the document. Click **Yes** to stop the diagram generation process and close the document, click **No** to continue the diagram generation without closing the document.

Error scenario 2:

During the diagram generation process user tries to delete a page from the document on which the diagram is being generated, the following error message appears.

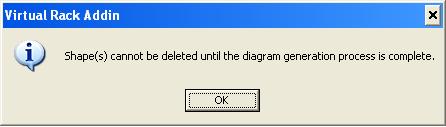


Error Description:

Page cannot be deleted until the diagram generation process is complete.

Error scenario 3:

During the diagram generation process, if user tries to delete shape(s) from the document on which the diagram is being generated, the following error message appears.

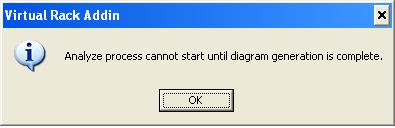


Error Description:

Shape(s) cannot be deleted until the diagram generation process is complete.

Error scenario 4:

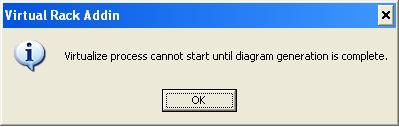
During the diagram generation process user tries to Analyze the Racks either from **Virtual Rack Menu** or **toolbar**, the following error message appears.



Error Description:

Analyze cannot be started until the diagram generation process is complete.

Error scenario 5:

During the diagram generation process user tries to Virtualize the Racks either from **Virtual Rack** **Menu** or **toolbar**, the following error message appears.

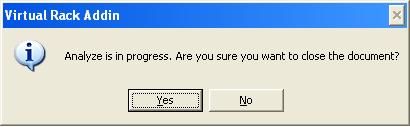
Error Description:

Virtualize cannot be started until the diagram generation process is complete.

## Error while Analyze

Error scenario 1:

During the Analyzing process user tries to close the document on which the analyzing is in progress. The following error message appears.

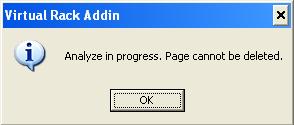


Error Description:

The analyzing process need to be terminated if user wants to close the document. Click **Yes** to stop the analyzing process and close the document, click **No** to continue the analyzing without closing the document.

Error scenario 2:

During the analyzing process user tries to delete a page from the document on which the analyzing is in progress. The following error message appears.



Error Description:

Page cannot be deleted until the analyzing process is complete.

Error scenario 3:

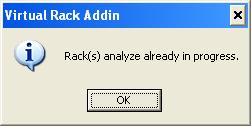
During the analyzing process user tries to delete shape(s) from the document on which the analyzing is in progress. The following error message appears.



Error Description:

Shape(s) which are present on Colo pages cannot be deleted until the analyzing process is complete.

Error scenario 4:

During the Analyzing process user tries to start the Analyzing process again for the same document. The following error message appears.

Error Description:

Only one analyzing session is allowed at any given point of time for a particular document. To restart analyzing process, stop the current analyzing session and start new analyzing session.

Error scenario 5:

Before the diagram generation process starts, user tries to Analyze the Rack shapes on the document. The following error message appears.



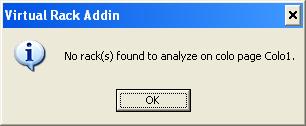
Error Description:

Analyze process cannot start before diagram generation is performed.

Error scenario 6:

After diagram generation process completed, user deletes all the Rack shapes from the page and tries to Analyze the Rack shapes on the document. The following error message appears.

**No rack(s) found to analyze on colo page “Page Name”**



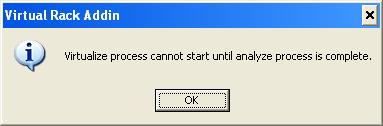
Error Description:

Rack shapes are required for Analyze even if the data record set (Rack Details) is present.

## Error while Virtualize

Error scenario 1:

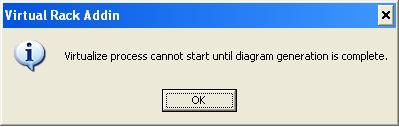
During the Analyze process user tries to Virtualize the Rack shape(s) either from **Virtual Rack Menu** or **toolbar**, the following error message appears.



Error Description:

Virtualize cannot be started until the Analyze process is complete.

Error scenario 2:

During the diagram generation process user tries to Virtualize the Racks either from **Virtual Rack** **Menu** or **toolbar**, the following error message appears.

Error Description:

Virtualize cannot be started until the diagram generation process is complete.

Error scenario 3:

User tries to Virtualize without selecting a Rack shape, the following error message appears:



Error Description:

Selection of a rack is must for virtualization.

Error scenario 4:

Before diagram generation process is performed user tries to virtualize the Rack shape(s) either from **Virtual Rack Menu** or **toolbar**, the following error message appears:

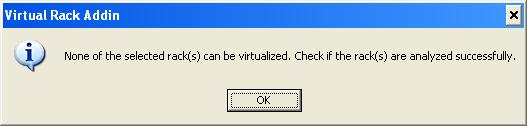
**Data record set “Record Set Name” not found.**



Error Description:

Virtualize process cannot start before Diagram generation is performed.

Error scenario 5:

Before Analyze process is performed user tries to virtualize the Rack shape(s) either from **Virtual Rack Menu** or **toolbar**, the following error message appears:

Error Description:

Virtualize process cannot start before Analyze is performed.

## Error while Exporting Data Grid data to Excel

Error scenario 1:

On Rack Virtualization Summary form user clicks on **Export to Excel** and the following error message appears:

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Error Description:

To save the data to an Excel File, installs either Microsoft Office Excel 2003 or Microsoft Office Excel 2007.