Microsoft System Center

System Center 2012 R2 Evaluation Guide

Microsoft

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Using This Guide

This guide gives you the necessary information to experience the datacenter built on System Center 2012 R2 and powered by Windows Server 2012 R2. The objective is to help you build an evaluation environment within your own datacenter and walk through the real-world guided experiences described in this guide. In addition to the guided experiences, you'll have the flexibility to expand on the product functionality and learn more based on your business requirements. Where indicated, some of the experiences are interdependent and build on earlier experiences.

Architectural and installation guidance is provided with the minimum hardware requirements for the evaluation environment. It is also possible to follow this guide and change the scenario to your own environment and parameters. This guide is created using evaluation or prerelease software, which is not supported within a production environment.

Navigating the document on your terms

This document is designed to allow you to easily locate the information that is most relevant to you. You will see the following buttons throughout the guide, which enable you to link quickly to the Table of Contents or the top of the main section you are reviewing.

Introduction to System Center 2012 R2

Information technology (IT) organizations need the ability to configure and manage an elastic, always- available, and highly scalable datacenter fabric that helps meet customers' needs. IT pros want to drive efficiency and reduce costs while delivering quality services and providing more value to customers.

Monitoring and managing your datacenter infrastructure grows less complex with System Center 2012 R2, which incorporates Microsoft's experience building and operating a globally distributed datacenter.

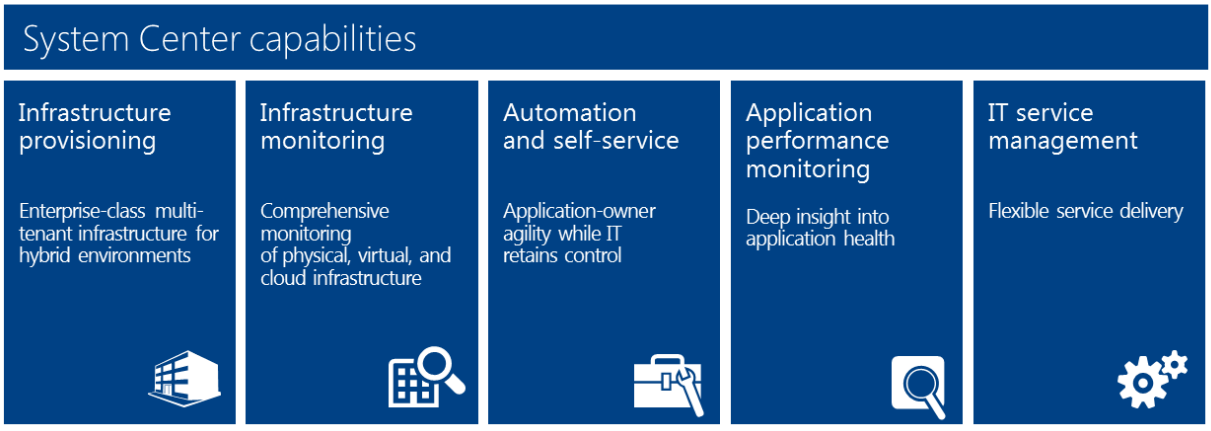
System Center introduces features and capabilities that help you:

- Reduce infrastructure cost and increase operational efficiencies.
- Automate repeatable tasks to enable focus on strategic projects.
- Benefit from a high level of cross-platform interoperability.
- Build and deploy modern, self-service and highly available applications that can span datacenters.

System Center 2012 R2 enables at-scale management of major Windows Server 2012 R2 capabilities, including storage, networking and server virtualization innovations.

With this toolset, you can provision and monitor infrastructure resources for physical, virtual or cloud computing models across on-premises, service provider and Windows Azure environments. You gain application diagnostics and an overview of the performance and availability of applications across the entire enterprise infrastructure.

The System Center management layer helps IT organizations automate routine tasks and empowers business application owners, resulting in freed-up resources that can be used to support high-impact projects. Organizations gain the ability to quickly offer new, value-add application services while maintaining focus on IT control and costs.



New Features and Highlights

Here are some of the new and improved features in System Center 2012 R2:

New in System Center 2012 R2

- Support for site-to-site gateway
- Virtual machine live cloning
- Shared virtual hard disk (VHDX) support
- Scale-Out File Server cluster deployment from bare metal
- Integration with differencing disks
- Auto-task resume after Virtual Machine Manager failover
- Improved Unix and Linux support
- Windows Azure Pack for Infrastructure as a Service (IaaS) for on-premise clouds
- Windows Azure performance monitoring

New in System Center 2012

- Global Service Monitor
- Application performance management
- Service Provider Foundation (SPF)
- Integration with Team Foundation Server (TFS)
- Offloaded Data Transfer (ODX) support for faster virtual machine provisioning from templates
- IP Address Management (IPAM) integration
- Chargeback support
- 360° .NET Application Monitoring Dashboards
- Microsoft System Center Advisor integration for workloads

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Capability Scenarios

Transforming Your Datacenter

This guide walks you through the steps to build a datacenter footprint with virtual machines, along the way pointing you toward a rich set of resources available on the Microsoft TechNet website. The virtual machines you create can be used to explore System Center and evaluate the hands-on experiences that bring System Center capabilities to life.

As an option, you may choose to reduce the manual configuration effort by downloading a set of Windows PowerShell scripts. More information about these scripts is available in Appendix: Using the Evaluation Scripts.

System Center Architecture

System Center 2012 R2 supports enterprise-class scale and performance for datacenter infrastructures built on Windows Server 2012 R2. As part of the evaluation process outlined in this guide, you will walk through experiences based upon a specific architecture and hardware configuration. The following diagram in Figure 1 shows the logical topology of the System Center components used in this evaluation.

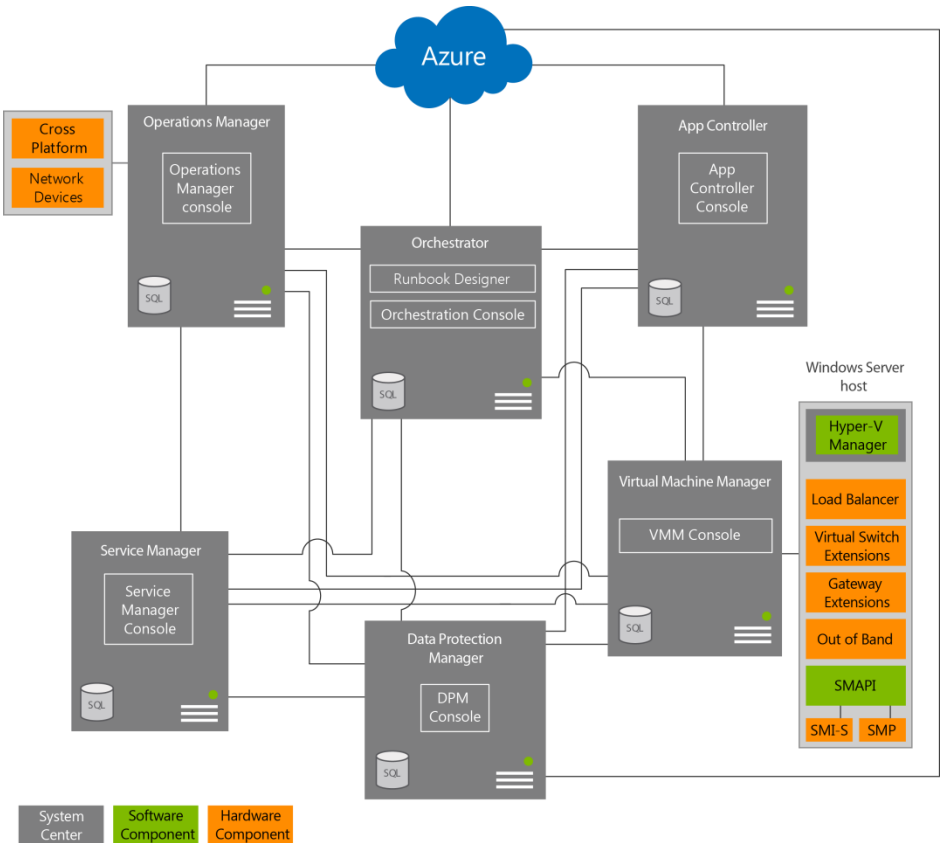

Figure 1: Logical topology for System Center 2012 R2

System Center components

System Center components deliver a consistent management platform that spans Windows Server and Windows Azure environments. What follows is an overview of the capabilities that the components enable.

Infrastructure provisioning — with System Center Virtual Machine Manager

When provisioning infrastructure for on-premises, service provider or Windows Azure environments, you need workload scale and performance, heterogeneity, multi-tenancy and chargeback support. Virtual Machine Manager (VMM) delivers virtual machine management and service deployment capabilities. VMM supports multi-hypervisor environments and enables you to define, create and manage the datacenter environment. The following table describes VMM components.

Components	Description
VMM Management Server	This is the server on which the Virtual Machine Manager service runs and which processes commands and controls communications with the VMM database, the library server, and virtual machine hosts.
VMM Console	The console is the user interface to your VMM environment.
VMM Database	The database stores all the Virtual Machine Manager configuration and information regarding the hosts and virtual guests.
VMM Library Server	The VMM Library Server is a catalog of resources containing all the ISO files, virtual hard disks, templates and profiles used to deploy virtual machines and services.

Enhanced capabilities:
System Center 2012 R2 Virtual Machine Manager

- Support for network virtualization with support for using Dynamic Host Configuration Protocol (DHCP) to assign customer IP addresses.
- Online VHDX resize with support for shared VHDX.
- Support for file shares using Server Message Block (SMB) 3.0.
- Bare metal deployment of Scale-Out File Server Clusters.

Infrastructure monitoring — with System Center Operations Manager

Operations Manager (OpsMgr) provides a single toolset to monitor infrastructure resources for physical, virtual or cloud computing models across on-premises, service provider and Windows Azure environments. You gain application diagnostics and an overview of the performance and availability of your applications across the entire enterprise infrastructure. The following table describes OpsMgr components.

Components	Description
Management Server	The primary server is the focal point for administering the management group and communicating with the database. When you open the operations console and connect to a management group, you connect to a management server for that management group. Depending on the size of your computing environment, a management group can contain a single management server or
Operations Console	The console is the user interface that will give you the single view for monitoring your infrastructure resources.
Operations Manager Database	The database is where all the collected data-like performance and event data and alerts are stored.
Operations Manager Data Warehouse	The data warehouse is used for trending and forecast reporting.
Operations Manager Web Console	The web console provides a browser-based alternative to the server-based console.
Operations Manager Advisor	The browser-based console provides deep insight in your .NET applications.
Gateway Server	The gateway server is used to monitor untrusted environments, such as a perimeter network. Audit Collection Server (ACS) is used for collecting and auditing security events.

Enhanced capabilities: System Center 2012 R2 Operations Manager

The diagnostic and monitoring capabilities have been expanded in R2. New features include:

- Monitoring Windows Services built on the .NET Framework.
- Automatic discovery of ASP.NET MVC3 and MVC Applications.
- Enabled application performance monitoring (APM) of SharePoint 2010.
- Integration with Team Foundation Server 2010 and 2012.

Automation and self-service — with Orchestrator, Service Manager and App Controller

Three System Center components work together, helping you deliver services to users in a

predictable, repeatable manner, maximizing both cost-effectiveness and IT control. Orchestrator is the workflow engine that helps automate IT processes through runbooks and Windows PowerShell. App Controller provides self-service capabilities for application owners. Service Manager provides standardization of service offerings, request offerings and service templates through the service catalog.

System Center Orchestrator

As a workflow engine, Orchestrator works in conjunction with all the System Center components, delivering orchestration, integration and automation of IT processes. It also can also be used to automate components from third-party applications. See TechNet for a full list of Orchestrator 2012 R2 integration packs.

Included as a part of Orchestrator 2012 is the Service Provider Framework, which enables service providers to offer Infrastructure as a Service (IaaS). Service Provider Framework allows clients access to their resources on the hosting provider's system, using the provider's front-end portal, without any change to the portal. The following table describes Orchestrator components.

Components	Description
Management Server	The management server is the communication layer between the Runbook Designer and the orchestration database.
Runbook Server	This is where an instance of a runbook runs. A runbook is a collection of actions bundled together that Orchestrator runs to perform various automated actions. Runbook servers communicate directly with the orchestration database. You can deploy multiple runbook servers per Orchestrator installation to increase capacity
Orchestration Database	The database is a SQL database that contains all of the deployed runbooks, the status of running runbooks, log files, and configuration data for Orchestrator.
Runbook Designer	The Runbook Designer is the tool used to build, edit, and manage Orchestrator runbooks. A single runbook or multiple runbooks form your workflow.
Runbook Tester	This is a run-time tool used to test runbooks developed in the Runbook Designer. This tool allows you to test your runbooks before taking them into production.
Orchestration Console	The console lets you start or stop runbooks and view real-time status on a web browser. This is a Microsoft Silverlight-based web console.
Orchestrator Web Service	The web service is a representational state transfer (REST)-based service that enables custom applications to connect to Orchestrator to start and stop runbooks, and retrieve information about operations by using custom applications or scripts. The Orchestration console uses this web service to interact with Orchestrator.
Deployment Manager	Deployment Manager is a tool used to deploy integration packs, runbook servers, and Runbook Designers.

Components	Description
Integration pack	Integration packs are collections of custom activities specific to a product or technology. Microsoft and other companies provide integration packs with activities to interact with their product from an Orchestrator runbook. Microsoft integration packs (full list here): • All System Center components • Windows Azure • SharePoint 2013 • Active Directory • Exchange Admin and Exchange User • Representational State Transfer • FTP Third-party created and Microsoft-supported integration packs: • HP iLO and OA • HP Service Manager

Enhanced capabilities:
System Center 2012 R2 Orchestrator

- Exchange Administrator Integration Pack for Orchestrator in 2012 R2.
- Exchange Users Integration Pack for Orchestrator in 2012 R2.
- Representational State Transfer Integration Pack Guide for Orchestrator in System Center 2012 R2.

System Center App Controller

Organizations using modern applications need the ability to connect with and manage services in other clouds through a single management experience within the datacenter.

App Controller offers a web-based Silverlight interface that allows you to manage, build, configure and deploy services both on the private and the public cloud. The interface provides a common self-service experience for application owners spanning different clouds. The following table describes App Controller components.

Components	Description
App Controller Server	The App Controller Server runs the web-based Silverlight application to manage, build, configure and deploy services both on your private cloud and the public cloud.
Database	The database that contains the necessary information for the connection to your Azure subscriptions and your Virtual Machine

Components	Description
Windows PowerShell Module	The Windows PowerShell module provides administrators with the ability to automate App Controller administration.

Enhanced capabilities:
System Center 2012 R2 App Controller

- Upload a virtual hard disk or image to Windows Azure from a VMM library or network share.
- Migrate a virtual machine from VMM to Windows Azure.
- Add a Service Provider Framework (SPF) hosting provider connection. SPF enables service providers to offer IaaS to their clients

System Center Service Manager

Service Manager provides an integrated platform for automating and adapting your organization's IT service management best practices, such as those found in Microsoft Operations Framework (MOF) and Information Technology Infrastructure Library (ITIL). Service Manager provides standardization of service offerings, request offerings and service templates through the service catalog. It provides built-in processes for incident and problem resolution, change management, and release management. The following table describes Service Manager components.

Components	Description
Management Server	The server contains the main software part of a Service Manager installation. You can use the Service Manager management server to manage incidents, changes, users, and tasks.
Database	The database contains Service Manager configuration items from the enterprise; work items, such as incidents, change requests, and the configuration for the product itself. This is the Service Manager implementation of a Configuration Management
Data warehouse management	The computer hosts the server piece of the data warehouse.
Data warehouse databases	These databases provide long-term storage of the business data that Service Manager generates. These databases are also used for
Service Manager console	The user interface piece that is used by both the help desk analyst and the help desk administrator to perform Service Manager functions, such as incidents, changes, and tasks. This part is installed automatically when you deploy a Service Manager management server. In addition, you can manually install the Service Manager console as a stand-alone part on a computer.
Self-Service Portal	A web-based interface into Service Manager.

Enhanced capabilities:
System Center 2012 R2 Service Manager

- Chargeback support helps you apply cloud-based pricing to your Virtual Machine Manager fabric.
- Improved Operations Manager Integration.
- SQL Server 2012 Support.
- Windows Server 2012 and Windows 8 Support.

Application Performance Monitoring —with Operations Manager

Application downtime and performance issues can disrupt operations, resulting in extra costs and lost revenue. Operations Manager ensures the datacenter organization can provide the necessary insight to deliver predictable service level agreements to application owners.

IT Service Management —with Service Manager

Service Manager helps deliver services in a flexible manner, enabling IT to apply unique policies while improving cost efficiency. System Center enables custom service request offerings, process and knowledge integration, and chargeback functionality, and supports incident management, change management, and release management.

Additional components for the cloud infrastructure

System Center also supports business continuity and data protection capabilities through its Data Protection Manager.

System Center Data Protection Manager

Data Protection Manager (DPM) enables disk-based and tape-based data protection and recovery for servers such as SQL Server, Exchange Server, SharePoint, virtual servers, file servers, and support for Windows desktops and laptops. DPM can also centrally manage system state and Bare Metal Recovery (BMR) which enables IT to protect servers that contain the virtualized infrastructure. The following table describes DPM components.

Components	Description
DPM server	This server contains the program files of the Data Protection Manager installation. This server is responsible for all the protection and recovery jobs.
Database	The database contains all the information of your Data Protection Manager environment. All protection group information, agent information and recovery points are stored

Components	Description
Central Console	Operations Management is used as the platform for the central console and is used to manage your SCDPM server (or multiple DPM
Storage Pool	The Storage Pool contains the storage used to take disk-to-disk backups.

Enhanced capabilities:
System Center 2012 R2 Data Protection Manager

- Cluster Shared Volume (CSV) 2.0 Support for improved performance on backing up virtual machines on CSVs.
- Hyper-V protection over remote SMB Shares.
- Scale-Out support for Hyper-V machines.
- Protection of Windows 8 deduplicated volumes.
- Support for live migration.
- Integration with Windows Azure Online Backup.
- Support for SQL 2012 Always-On feature.
- Support for Resilient File System (ReFS).

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Transforming Your Datacenter

System Center Installation

Before you can install System Center, complete the following tasks to properly prepare the host computers, using the *Installation* section in the *Windows Server 2012 R2 Evaluation Guide*.

- Set up host computers.
- Create and configure a virtual machine for the domain controller.
- Configure the two hosts.
- Create VHDX files.

If you already have host computers, a domain controller virtual machine, virtual switches, and other needed components, read this section to make sure that you have the correct environment requirements and to identify how your environment will vary.

This guide recommends two servers for your evaluation environment, with each component installed within a virtual machine. Figure 2 shows the virtual machine architecture recommended. If you have previously deployed the environment for the Windows Server 2012 R2 experiences, you will recognize the configuration.

> Note: This evaluation guide and the included experiences are designed to run on an isolated network environment on an isolated domain infrastructure. It is not recommended to run the experiences on your production network.

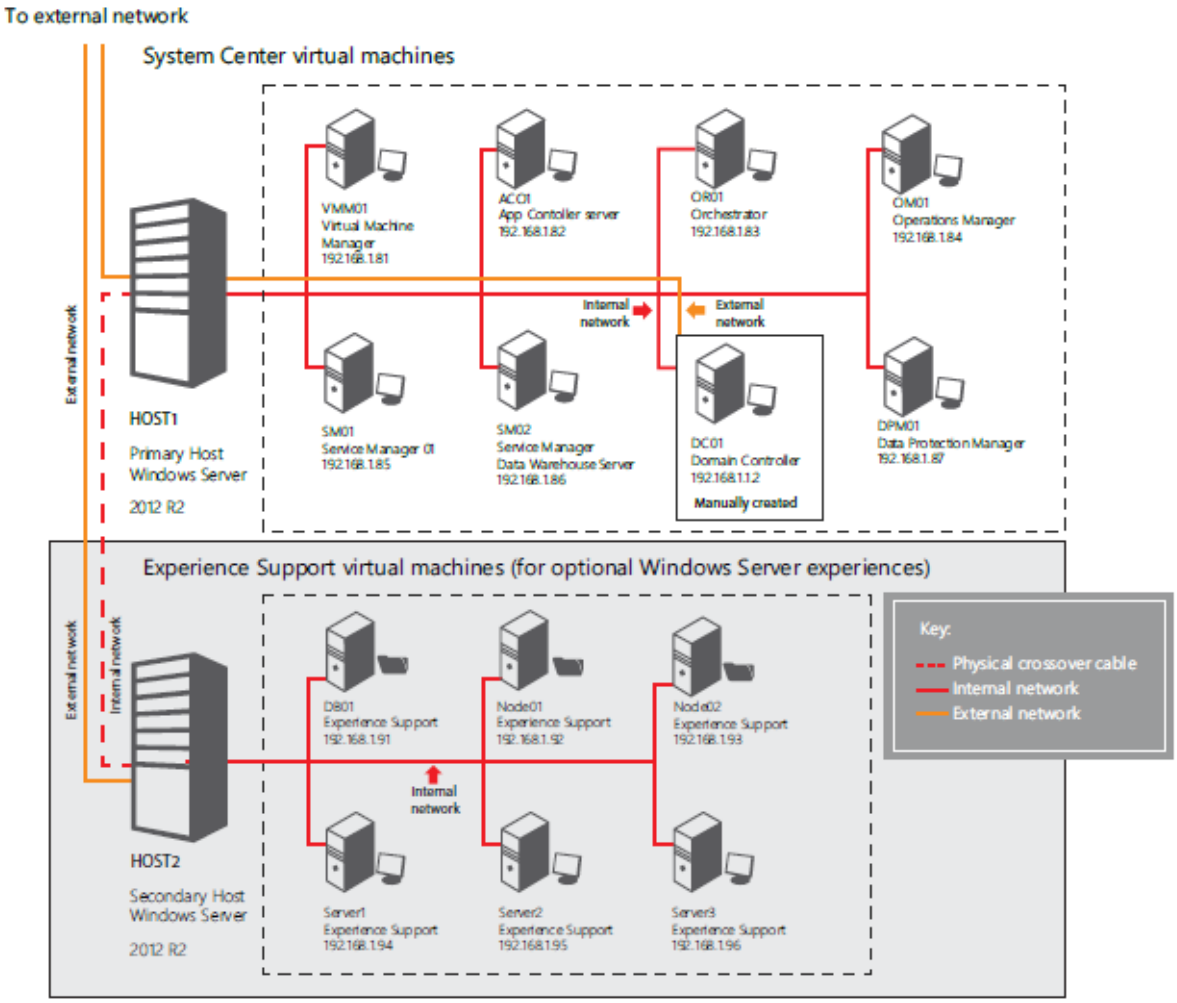

Figure 2: Evaluation environment for System Center 2012 R2

Prerequisites for the physical infrastructure to support the evaluation experiences

Hardware

The recommended datacenter evaluation environment requires two host machines with at least two physical NICs on each machine. The environment also requires hardware to support seven virtual servers on Host1. (You can use Host2 for optional Windows Server 2012 R2 experiences or you may choose to balance the System Center virtual machines across the two hosts.)

> Note: While two physical hosts are recommended, you may choose to set up one physical host and focus on System Center experiences.

Physical servers

The following table shows minimum physical servers recommended for the datacenter evaluation

environment, including the System Center experiences. Environments may differ, but this is the minimum necessary to perform the tasks with decent performance.

Name	CPU	Memory	Disk	NICs
HOST1	2 sockets with multiple cores per socket	48 GB	1TB divided into a 120GB C:drive with the remainder as D:drive	2 Physical NICs
HOST2 (optional)	2 sockets with multiple cores per socket	48 GB	1TB divided into a 120GB C:drive with the remainder as D:drive	2 Physical NICs

See the *Installation* section in the *Windows Server 2012 R2 Evaluation Guide* for more information.

Some important notes regarding the servers:

- The servers need D:\ drives where the VMCreator.ps1 script will build the virtual machines.
- Each host server must have Windows Server 2012 R2 with the Hyper-V role enabled and SQL Server 2012 SP1 installed on them.
- Both hosts require static IPs.
- Determine the primary network adapter settings based on the current external network environment.
- Reserve the IP ranges 192.168.1.0–192.168.1.99 for the isolated networking environment.
- For the evaluation environment, the secondary network adapter uses a crossover cable to direct-connect the two hosts on a private network. The subnet mask is 255.255.255.0. As an alternative, you can also connect the secondary network adapters of both hosts to an isolated switch environment.

  Note: This set up will require some reconfiguration when running some experiences.

Software

You will be downloading evaluation versions of System Center 2012 R2 onto a test environment. The evaluation software is not for production use. Following the evaluation period, you will need to replace the operating system on your test computer and reinstall all your programs and data. It is not possible to upgrade the evaluation to a licensed working version; a clean installation is required.

Download Software	
System Center 2012 R2	http://technet.microsoft.com/en-us/evalcenter/dn205295.aspx
SQL Server 2012 SP1	http://technet.microsoft.com/en-us/evalcenter/hh225126.aspx

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Transforming Your Datacenter

System Center Deployment

Follow the deployment steps to properly prepare and align your evaluation environment with the hands- on experiences in the *Capability Scenarios* section.

There are four steps:

1. Create virtual machines.
2. Download software.
3. Configure virtual machines.
4. Deploy System Center 2012 R2.

Create System Center virtual machines for evaluation experiences

First, you will build the virtual machine architecture to complete the evaluation process. To create the System Center virtual machines required for the experiences you have two options to choose from:

- Option A: Run the evaluation script VMCreator.ps1 to create and configure the virtual machines.
- Option B: Deploy the evaluation virtual machines through manual configuration.

Instructions for each option follow.

Option A: Automate virtual machine creation

Introduction to the evaluation scripts

Scripts are available to help you through several steps in the deployment process. The scripts are optional and can save you time and effort.

As mentioned previously, you can download scripts from Microsoft to help set up a datacenter evaluation footprint. The scripts can be customized to fit your environment.

> Note: You are ready to download the evaluation scripts once you have prepared the hosts and configured the virtual machine for the domain controller. The scripts work with Windows 8.1 and Windows Server 2012 R2 operating systems. See instructions to set up hosts with a Windows 2012 R2 operating environment in the *Installation* section in the *Windows Server 2012 R2 Evaluation Guide*.

Here are the steps to prepare the scripts for use:

1. Download and run the Datacenter Evaluation Deployment Tool.msi file. The scripts will be installed in the C:/temp directory, unless you changed the target.

   > Note: If you are using the scripts, be sure to transfer the scripts to the Windows Server 2012 R2 host before using, referencing the instructions in the following step.

2. Move the files to the **C:\temp** folder on **Host1**. You will be using these files to create and

configure the virtual machines for the experiences. The folder includes:

- **VMCreator.ps1** is a script to build virtual machines
- **SysCenterVariable.xml** contains settings used by the VMCreator.ps1 script to set up the virtual machines for the System Center experiences.
- You will also see the following optional files:
  - An **ExperiencesVariable.xml** file that contains settings used to set up the virtual machines for Windows Server experiences. (This script works with the experiences in the *Windows Server 2012 R2 Evaluation Guide*.)
    - An **ActiveDir folder** with scripts to set up the domain controller as detailed in the *Windows Server 2012 R2 Evaluation Guide.*
  - **Downloader.ps1** downloads the prerequisites needed to configure System Center. This script is optional and the steps to use are detailed in the *Appendix: Using the Evaluation Scripts* section.
  - **Workflow.xml** contains settings for the downloader script.

Customizing the scripts

The VMCreator script works with the SysCenterVariable.xml to perform four different tasks. The script does the following:

1. Creates all the virtual machines needed to evaluate System Center.
2. Installs the appropriate operating system on the virtual machines.
3. Sets virtual machine IP addresses.
4. Joins the virtual machines to the Contoso domain or the domain you are using.

If you plan to use the VMCreator.ps1 script to create the seven virtual machines for the experiences, first customize the SysCenterVariable.xml file included with the scripts to reflect your environment. Make sure that the **host name** reflects the actual host name and you join the virtual machines to the **domain** you are using.

You may also adjust the virtual machine IP addresses. The starting IP address is set in the SysCenterVariable.xml and the VMCreator.ps1 script assigns each virtual machine a sequential IP address. When deploying the infrastructure and working through the different experiences, you may use your own IP addresses and better hardware.

The following is a section of the SysCenterVariable.xml.

```
<VMs>

<Count>7</Count>-<Default>

<Host>localhost</Host>

<Folder>D:\VMs</VMFolder>

<VHDFolder>D:\VMs</VHDFolder>
```

The VMCreator.ps1 script will create the virtual machines listed in the following table, which includes the minimum hardware requirements for each virtual server supporting the System Center evaluation

environment. The script sets startup RAM for the virtual machines to 2GB or 8 GB, based on minimum memory needs. Memory is configurable through the SysCenterVariable.xml to support dynamic RAM.

System Center virtual machine specifications

Name	Function	Main IP	vCPU	Dynamic Memory minimum	Disk
AC01	App Controller server	192.168.1.82	2	2 GB	60 GB
DPM01	Data Protection Manager	192.168.1.87	2	2 GB	60 GB
OM01	Operations Manager	192.168.1.84	2	2 GB	60 GB
OR01	Orchestrator	192.168.1.83	2	2 GB	60 GB
SM01	Service Manager 01	192.168.1.85	2	8 GB	60 GB
SM02	Service Manager 02 (data warehouse)	192.168.1.86	2	8 GB	60 GB
VMM01	Virtual Machine Manager	192.168.1.81	2	8 GB	60 GB

Run the VMCreator.ps1 file

Once you have customized the script, you are ready to run it.

Find the VMCreator script in the **C:\Temp\EvalScripts** folder that you have downloaded and transferred to Host1. The script automates the virtual machine setup.

Open Windows PowerShell as Administrator, navigate to the following directory **C:\Temp\EvalScripts** and run the **VMCreator.ps1** to create the virtual machines needed for the evaluation.

- .\VMCreator –inputfile SysCenterVariable.xml

After the script runs successfully, you will see the newly created virtual machines listed in Hyper-V. **Figure 3** shows the virtual machines on Host1.

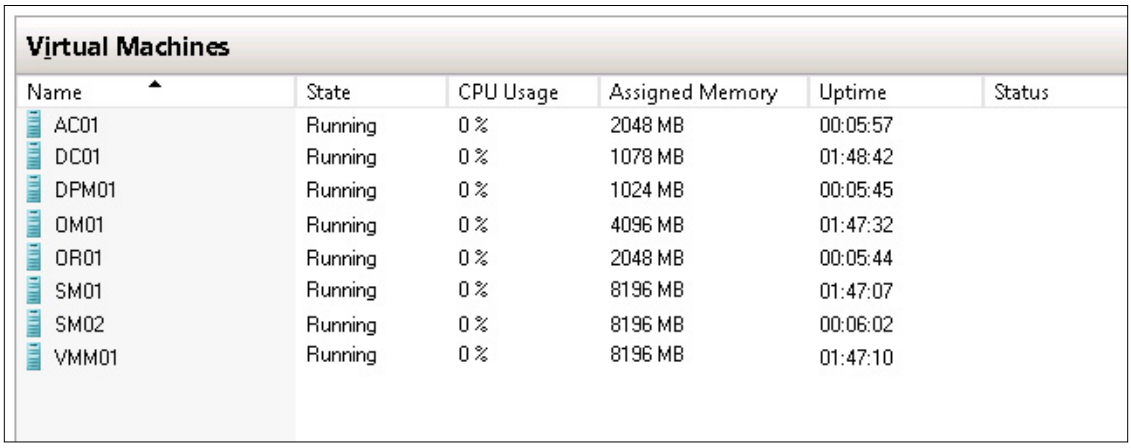

Figure 3: System Center Experience virtual machines

Option B: Manual virtual machine creation

Use the following steps to manually create each of the seven System Center virtual machines on Host1. Change the **VM name** and **IP address** for each virtual machine, using the specifications in **Figure 3** above.

1. Name: **VMM01** (or the name in the table).
2. Select the **Store the virtual machine in a different location** check box and set the location **to D:\VMs**.
3. For Specify Generation, select: **Generation 1**.
4. Set Startup memory at **2048 MB**, select **Use Dynamic Memory for this virtual machine** and set the maximum value to **10 GB**.
5. Connection: the **Eval-Internal Virtual Switch** created when configuring the hosts.
6. Under Connect Virtual Hard Disk, select **create a virtual hard disk** and name the disk **VMM01_ Disk0**, using the default location, then click **Next**.
7. Install Options: Install an operating system from a boot **CD/DVD-ROM** and select **Image File (.iso)**; then browse to **D:\ISOs** and select the ISO for **Windows Server 2012 R2**.
8. Start the Virtual Machine and **Install** Windows Server 2012 R2.
9. Once Windows is fully installed and running, open **System Properties** and rename the machine to **VMM01**.
10. Set the IP address to **192.168.1.81** (or the address in the table for the virtual machine).
11. Set the Subnet mask to **255.255.255.0**.
12. Set the Gateway to **192.168.1.1**.
13. Set the DNS to **192.168.1.2**.
14. Join the machine to the Contoso domain, using your Contoso\Administrator credentials.

After you have successfully created the seven virtual machines, you will see the virtual machines listed in Hyper-V on Host1, as shown in **Figure 3**.

Download software

After you create the necessary virtual machines and install the correct operating systems on the virtual machines, you are ready to prepare the virtual machines for a System Center install. Here are the steps:

Download software for System Center virtual machines to C:\temp on Host1.

> To save time and automate the download process, you may choose to use the downloader script referenced in the *Appendix: Using the Evaluation Scripts* section.

- Windows Server 2012 R2
- System Center 2012 R2
- SQL Server 2012 SP1
- Windows Assessment and Deployment Kit (Windows ADK)
    - Windows Deployment Tools
    - Windows Preinstallation Environment
- Silverlight
- WCF Data Services 5.0
- System Center 2012 R2 Virtual Machine Manager Console
- SQL Server 2008 R2 Management Tools
- Report Viewer 2010 Redistributable
- System Center 2012 R2 Orchestrator Component Add-Ons and Extensions
    - System_Center_2012_R2_Integration_Packs.EXE
    - System_Center_2012_R2_Orchestrator_Integration_ToolKit.exe

Configure virtual machines

This section lists the roles, features, and services to implement on each of the virtual machines and the software to install, including Windows, System Center, and SQL Server.

Follow these steps to install the prerequisite software on the virtual machines.

1. Copy all needed software for the virtual machine from the source location and paste in the virtual machine.

    > Note: The following tables indicate which software to install on each virtual machine.

2. Complete the software installation in the order identified in the following table.
3. Connect to each virtual machine and set the roles, features, and services according to the following table.

AC01 configuration

Roles	Features	Services
.NET Framework 3.51 .NET Framework 4.5	Web Server (IIS)	Default Document Directory Browsing HTTP Errors Static Content HTTP Logging Request Monitor Static Content Compression Request Filtering Basic Authentication Windows Authentication Management Console ASP.NET 4.5 .NET Extensibility 3.5 .NET Extensibility 4.5 ISAPI Extensions ISAPI Filters

DPM01 configuration

Roles	Features	Services
.NET Framework 3.51 .NET Framework 4.5	Web Server (IIS)	Web Server Default Document Directory Browsing HTTP Errors Static Content HTTP Logging Static Content Compression Request Filtering
	Application Server	.NET Framework 4.5

OM01 configuration

Roles	Features	Services
.NET Framework 3.51 .NET Framework 4.5 .NET HTTP Activation 4.5 Windows Process Activation Service Process Model Configuration APIs	Web Server (IIS)	Web Server Default Document Directory Browsing HTTP Errors Static Content HTTP Logging Request Monitor Static Content Compression Request Filtering Windows Authentication .NET Extensibility 3.5 .NET Extensibility 4.5 IIS ASP.NET 3.5 IIS ASP.NET 4.5 ISAPI Extensions ISAPI Filters Management Console ASP.NET 4.5 IIS 6 Metabase Compatibility Application Development
	Application Server	.NET Framework 4.5

OR01 configuration

Roles	Features	Services
.NET Framework 3.51 .NET Framework 4.5	Web Server (IIS)	Web Server Default Document Directory Browsing HTTP Errors Static Content HTTP Logging Static Content Compression Request Filtering
	Application Server	.NET Framework 4.5

SM01/SM02 configuration

Roles	Features	Services
.NET Framework 3.51 .NET Framework 4.5	Web Server (IIS)	Web Server Default Document Directory Browsing HTTP Errors Static Content HTTP Logging Static Content Compression Request Filtering Basic Authentication Windows Authentication IIS ASP.NET 4.5 ISAPI Extensions ISAPI Filters

SP01 configuration

Roles	Features	Services
.NET Framework 3.51 .NET Framework 4.5	Web Server (IIS)	Web Server Default Document Directory Browsing HTTP Errors Static Content HTTP Logging Static Content Compression Request Filtering Basic Authentication Windows Authentication IIS ASP.NET 4.5 ISAPI Extensions ISAPI Filters Management Console

VMM01 configuration

Roles	Features	Services
.NET Framework 3.51 .NET Framework 4.5 RSAT Clustering Powershell	Application Server	.NET Framework 4.5
	Remote Access	

Install System Center 2012 R2

Review this TechNet installation guidance before you install System Center 2012 R2 on the virtual machines.

Install the software on the virtual machines in this order using the guidance that follows for each component.

- Virtual Machine Manager
- Operations Manager
- Service Manager
- Orchestrator

- App Controller
- Data Protection Manager

Prerequisites

The following steps will help you install Windows features. You will set up Host1 as a central file share to supply key operating system components to the virtual machines to prepare for prerequisite software installation.

Begin this step logged on to **Host1** as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. Right-click and **mount** the Windows Server 2012 R2 installation ISO. Make note of the drive letter.
2. Share this drive in Windows.
    a. Right-click on the **Mounted Windows Server 2012 R2 installation ISO** and select **Share with→Advanced sharing**.
    b. On the drive properties, select **Advanced Sharing**.
    c. Select the **Share this folder** check box and name the share **Win2012R2**.
    d. Click **Permissions** and validate that everyone has Read access, then click **OK**.
    e. Click **OK** to close the sharing properties dialog window.
    f. Click **Close** to close the Drive properties dialog window.

Virtual Machine Manager

Add required Service Accounts and Service Account Groups

Begin this task logged on to **DC01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the **Users and Computers** MMC for Active Directory.
2. Expand the **Contoso.com** object, right-click **Users** and select **New→User**.
3. In the New Object – User dialog, enter the following information and click **Next**:
    - First name: **SRV_VMM**
    - User login name: **SRV_VMM**
4. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
5. Click **Finish**.

Install Virtual Machine Manager

Begin this task logged on to **VMM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install .NET Framework 3.5 features:
    a. In the Windows Server Manager Dashboard, select **Add roles and features**.
    b. On the Before you Begin page, click **Next**.
    c. On the Select installation type page, select **Role-based or feature-based installation** and click **Next**.
    d. On the Select destination server page, select the local server **VMM01** and click **Next**.
    e. In the Select server roles page, make no changes and click **Next**.
    f. On the Select features page, select the **.NET Framework 3.5 Feature**s and click **Next**.
    g. On the Confirm installation selections page, select **Specify an alternate source path**.
    h. Enter the following for your alternate source path: **\\Host1\Win2012R2\Sources\SxS** and click **OK**.
    i. Click **Install**, and then **close** when installation has completed.
2. Install SQL Server 2012 SP1 on VMM01 using the installation instructions on TechNet.
3. Include the following SQL Server features:
    - SQL Server 2012 Management Tools
    - SQL Server 2012 Analysis Management Objects
    - SQL Server 2012 Command Line Utilities

    Note: Make sure that you add the SRV_VMM Service account, Domain Admins, and yourself to the SQL Administrators groups when deploying SQL.
4. Copy the Virtual Machine Manager Installation file from C:\temp on Host1 to **VMM01 C:**.
5. Install the prerequisite software you downloaded earlier:
    - Windows Deployment Tools
    - Windows Preinstallation Environment
6. Install System Center 2012 R2 Virtual Machine Manager using the installation instructions found on TechNet.

Operations Manager

Add required Service Accounts and Service Account Groups

Begin this task logged on to **DC01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the **Users and Computers** MMC for Active Directory.
2. Expand the **Contoso.com** object, right-click Users and select **New→User**.
3. In the New Object – User dialog, enter the following information and click **Next**:
    - First name: **SRV_OM**
    - User login name: **SRV_OM**

4. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
5. Click **Finish**.
6. Right-click **Users** and select **New→User**.
7. In the New Object – User dialog, enter the following information and click **Next**.
    - First name: **SRV_OMDA**
    - User login name: **SRV_OMDA**
8. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
9. Click **Finish**.
10. Right-click **Users** and select **New→User**.
11. In the New Object – User dialog, enter the following information and click **Next**:
    - First name: **SRV_OMDataReader**
    - User login name: **SRV_OMDataReader**
12. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
13. Click **Finish**.
14. Right-click **Users** and select **New→User**.
15. In the New Object – User dialog, enter the following information and click **Next**:
    - First name: **SRV_OMDataWriter**
    - User login name: **SRV_OMDataWriter**
16. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
17. Click **Finish**.
18. Right-click **Users** and select **New→Group**.
19. In the New Object – Group dialog, enter the following information and click **OK**:
    - First name: **OMAdmins**
    - Group Scope: **Global**
    - Group Type: **Security**
20. Click **Finish**.
21. In the Users list, right-click on **OMAdmins** and select **Properties**.
22. In the OMAdmins properties dialog, select the **Members** tab and click **Add**.
23. In the **Select Users**, **Contact**, **Computer**, **Service Accounts** or **Groups** dialog, enter **SRV_OM**; **SRV_ OMDA**; **SRV_OMDataReader**; **SRV_OMDataWriter**; **Domain Admins** and click **OK**.
24. In the OMAdmins properties dialog, click **OK** to apply and close.

Install Operations Manager

Begin this task logged on to **OM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install .NET Framework 3.5 features:
    a. In the Windows Server Manager Dashboard, select **Add roles and features**.
    b. On the **Before you Begin** page, click Next.
    c. On the Select installation type page, select **Role-based or feature-based installation** and click **Next**.
    d. On the Select destination server page, select the local server **OM01** and click **Next**.
    e. On the Select server roles page, make no changes and click Next.
    f. On the Select features page, select the **.NET Framework 3.5 Feature**s and click **Next**.
    g. On the Confirm installation selections page, select **Specify an alternate source path**.
    h. Do one of the following steps:
        i. Enter the following for your alternate source path: **\\Host1\Win2012R2\Sources\SxS** and click **OK**.
        ii. Or, attach Windows Server 2012 R2 ISO and enter the alternative source path as **drive:\Sources\SxS**
    i. Click **Install**, and then close when installation has completed.
2. Install SQL Server 2012 SP1 on OM01 using the installation instructions on TechNet.
3. Include the following SQL Server features:
    - SQL Server 2012 Management Tools
    - SQL Server 2012 Analysis Management Objects
    - SQL Server 2012 Command Line Utilities
4. Copy the Operations Manager installation file from C:\temp on Host1 to **OM01 C:**.

    Note: Make sure that you add the SRV_OM, SRV_OMDA, SRV_OMDataReader, SRV_ OMDataWriter Service accounts; Domain admins, and yourself to the SQL Administrators groups when deploying SQL.

5. Install the prerequisite software you downloaded earlier:
    a. Report Viewer 2010 Redistributable See this TechNet article: How to install the Microsoft Report Viewer Redistributable Security Update.
6. Install System Center 2012 R2 Operations Manager using the installation instructions on TechNet.
7. Download and install the following management packs by using one of two methods:
    - Option A–Recommended for the evaluation environment: Copy the downloaded MSI files from the links that follow to a directory on OM01 and then extract the files:
        - Windows Server Internet Information Services 2003, Windows Server 2008, Internet Information Services 7, Windows Server Internet Information Services Library
        - SQL Server Core Library
        - System Center Management Pack for Windows Server Operating System

- Windows Server 2012 R2 Management Packs for System Center 2012

- Option B–Used in a production environment: If OM01 had Internet access; you would use the catalog option for importing a management pack in Operations Manager.

8. In Operations Manager console, click the **Administration Workspace**.
9. **Click Management Packs** item and select **Import Management Packs**.
10. Select **Add→Add from Disk**.
11. Choose all the packs extracted.

> Note: Remove any management pack that fails to install due to a dependency. You can add it later.

12. Add **Host1** to Operations Manager.
13. Click the **Administration Workspace**.
14. Click **Discovery Wizard**.
15. Select **Windows Computers** and click **Next**.
16. Select **Automatic Computer Discovery** and click **Next**.
17. Select **Other user account**.
18. In User name, type **SRV_OM**.
19. In Password, type **pass@word1**.
20. Select **Host1** and click **Next**.
21. Click **Finish**.

Service Manager and Data Warehouse

Add required Service Accounts and Service Account Groups

Begin this task logged on to **DC01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the Users and Computers MMC for Active Directory.
2. Expand the **Contoso.com** object, right-click Users and select **New→User**.
3. In the New Object – User dialog, enter the following information and click **Next**:
    - First name: **SRV_SM**
    - User login name: **SRV_SM**
4. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
5. Click **Finish**.
6. Right-click **Users** and select **New→User**.
7. In the New Object – User dialog, enter the following information and click **Next**.
    - First name: **SRV_SMWorkflow**

- User login name: **SRV_SMWorkflow**

8. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
9. Click **Finish**.
10. Right-click **Users** and select **New→User**.
11. In the New Object – User dialog, enter the following information and click **Next**.
    - First name: **SRV_SMReporting**
    - User login name: **SRV_SMReporting**
12. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click Next.
13. Click **Finish**.
14. Right-click **Users** and select **New→User**.
15. In the New Object – User dialog, enter the following information and click Next:
    - First name: **SRV_SMAnalysis**
    - User login name: **SRV_SMAnalysis**
16. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
17. Click **Finish**.
18. Right-click Users and select **New→User**.
19. In the New Object – User dialog, enter the following information and click **Next**:
    - First name: **SRV_SMPortal**
    - User login name: **SRV_SMPortal**
20. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
21. Click **Finish**.
22. Right-click Users and select **New→Group**.
23. In the New Object – User dialog, enter the following information and click **OK**:
    - First name: **SMAdmins**
    - Group Scope: **Global**
    - Group Type: **Security**
24. Click **Finish**.
25. In the Users list, right-click on **SMAdmins** and select **Properties**.
26. In the SMAdmins properties dialog, select the **Members** tab and click **Add**.

27. In the **Select Users**, **Contact**, **Computer**, **Service Accounts** or **Groups** dialog, enter **SRV_SM**; **SRV_SMWorkflow; SRV_SMReporting; SRV_SMAnalysis; SRV_SMPortal; Domain Admins** and click **OK.**
28. In the SMAdmins properties dialog, click OK to apply and close.
29. Right-click Users and select **New→Group**.
30. In the New Object – User dialog, enter the following information and click OK:
    - First name: **SMDWAdmins**
    - Group Scope: **Global**
    - Group Type: **Security**
31. Click **Finish**.
32. In the Users list, right-click on **SMDWAdmins** and select **Properties**.
33. In the **SMDWAdmins** properties dialog, select the Members tab and click **Add**.
34. In the Select Users, Contact, Computer, Service Accounts or Groups dialog, enter SMAdmins and click **OK**.
35. In the SMDWAdmins properties dialog, click **OK** to apply and close.

Install Service Manager

Begin this task logged on to **SM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install .NET Framework 3.5 features:
    a. In the Windows Server Manager Dashboard, select Add roles and features.
    b. On the Before you Begin page, click Next.
    c. On the Select installation type page, select Role-based or feature-based installation and click Next.
    d. On the Select destination server page, select the local server SM01 and then SM02 and click Next.
    e. On the Select server roles page, make no changes and click Next.
    f. On the Select features page, select the .NET Framework 3.5 Features and click Next.
    g. On the Confirm installation selections page, select Specify an alternate source path.
    h. Enter the following for your alternate source path: **\\Host1\Win2012R2\Sources\SxS** and click OK.
    i. Click Install, and then close when installation has completed.
2. Install SQL Server 2012 SP1 on SM01 using the installation instructions on TechNet.
3. Include the following SQL Server features:
    - SQL Server 2012 Management Tools
    - SQL Server 2012 Analysis Management Objects
    - SQL Server 2012 Command Line Utilities
4. Install SQL 2012 SP1 on SM02 using the same instructions.

Note: Make sure that you add the SRV_SM, SRV_SMWorkflow, SRV_SMReporting, SRV_SMAnalysis, and SRV_SMPortal Service accounts, Domain Admins, and

yourself to the SQL Administrators groups when deploying SQL on both machines.

Note: Confirm the Database engine, Reporting Services, and Analysis Service are also installed with SQL Server 2012 SP1 on both machines.

5. Copy the Service Manager installation file from C:\temp on Host1 to SM01 and SM02 C:\.
6. Install the prerequisite software you downloaded earlier:
   - Report Viewer 2010 Redistributable See this TechNet article: How to Install the Microsoft Report Viewer Redistributable Security Update.
   - Silverlight
7. Install System Center 2012 R2 Service Manager as per the installation instructions on TechNet. Use the two-computer scenario.
8. Deploy the Self-Service Portal for System Center 2012 R2 Service Manager using the instructions on TechNet.

Orchestrator

Add required Service Accounts and Service Account Groups

✔ Begin this task logged on to **DC01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the Users and Computers MMC for Active Directory.
2. Expand the Contoso.com object, right-click Users and select **New→User**.
3. In the New Object – User dialog, enter the following information and click Next:
   - First name: **SRV_OR**
   - User login name: **SRV_OR**
4. For the password type pass@word1 or the credentials for the domain you created. Then de- select User must change password at next login, select the Password never expires check box, and click Next.
5. Click Finish.

Install Orchestrator

✔ Begin this task logged on to **OR01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install .NET Framework 3.5 features:
   a. In the Windows Server Manager Dashboard, select **Add roles and features**.
   b. On the Before you Begin page, click **Next**.
   c. On the Select installation type page, select **Role-based or feature-based installation** and click Next.
   d. On the Select destination server page, select the local server OR01 and click Next.
   e. On the Select server roles page, make no changes and click Next.

f. On the Select features page, select the .NET Framework 3.5 Features and click Next.
g. On the Confirm installation selections page, select Specify an alternate source path.
h. Enter the following for your alternate source path:
\\Host1\Win2012R2\Sources\SxS and click OK.
i. Click Install, and then close when installation has completed.

2. Install SQL Server 2012 SP1 on OR01 using the installation instructions on TechNet.
3. Include the fol1lowing SQL Server features:
   - SQL Server 2012 Management Tools
   - SQL Server 2012 Analysis Management Objects
   - SQL Server 2012 Command Line Utilities

   Note: Confirm that you add the SRV_OR Service account, Domain Admins, and yourself to the SQL Administrators groups when deploying SQL on both machines.

4. Copy the Orchestrator installation file from C:\temp on Host1 to OR01 C:\.
5. Install the prerequisite software you downloaded earlier:
   - Report Viewer 2010 Redistributable See this TechNet article: How to Install the Microsoft Report Viewer Redistributable Security Update.
6. Install System Center 2012 R2 Orchestrator using the installation instructions on TechNet.
7. Install System Center 2012 R2 Orchestrator Component Add-Ons using the installation instructions on TechNet.

App Controller

Add required Service Accounts and Service Account Groups

✔ Begin this task logged on to **DC01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the Users and Computers MMC for Active Directory.
2. Expand the Contoso.com object, right-click Users and select New→User.
3. In the New Object – User dialog, enter the following information and click Next:
   - First name: **SRV_AC**
   - User login name: **SRV_AC**
4. For the password type pass@word1 or the credentials for the domain you created. Then de- select User must change password at next login, select the Password never expires check box, and click Next.
5. Click Finish.

Install App Controller

✔ Begin this task logged on to **AC01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install SQL Server 2012 SP1 on AC01 using the installation instructions on TechNet. Include the following SQL Server features:
    - SQL Server 2012 Management Tools
    - SQL Server 2012 Analysis Management Objects
    - SQL Server 2012 Command Line Utilities
2. Copy the App Controller installation file from C:\temp on Host1 to **AC01** C:\.
3. Install the prerequisite software you downloaded earlier:
    - Silverlight
    - WCF Data Services 5.0
    - Windows Deployment Tools
    - System Center 2012 R2 Virtual Machine Manager Console
    - Windows Preinstallation Environment
4. Install System Center 2012 R2 App Controller using the installation instructions on TechNet.

Data Protection Manager

Add required Service Accounts and Service Account Groups

Begin this task logged on to **DC01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the **Users and Computers** MMC for Active Directory.
2. Expand the **Contoso.com** object, right-click **Users** and select **New→User**.
3. In the New Object – User dialog, enter the following information and click **Next**:
    - First name: **SRV_DPM**
    - User login name: **SRV_DPM**
4. For the password type **pass@word1** or the credentials for the domain you created. Then de- select **User must change password at next login**, select the **Password never expires** check box, and click **Next**.
5. Click **Finish**.

Install Data Protection Manager

Begin this task logged on to **DPM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install SQL Server 2012 SP1. When prompted during the installation of DPM as part of Step 2, select the DPM 2012 SQL instance, instead of using the bundled SQL.

> Note: DPM includes SQL 2008 R2 as part of the product download and this will be installed during the install phase.

2. Copy the Data Protection Manager installation file from C:\temp on Host1 to **DPM01** C:\.
3. Install the following prerequisite software:
    a. Report Viewer 2010 Redistributable See this TechNet article: How to Install the Microsoft Report Viewer Redistributable Security Update.
    b. SQL Server 2008 R2 Management Tools Optional if you have already installed SQL Server 2012 SP1 on this virtual machine.
4. Install System Center 2012 R2 Data Protection Manager using the installation instructions on TechNet.

You are now ready to walk through the experiences found in the next section, *Capability Scenarios*.

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Capability Scenarios

Capability Scenarios

With this guide you can discover new capabilities through a series of experiences based on the day-to-day activities at a fictitious company, Contoso. Like other organizations, Contoso's information technology (IT) team is turning to a cloud datacenter environment to support the needs of its internal customers. Among the team members at Contoso are Richard and Michael, who are datacenter admins, and Sarani, a service admin. In the next pages, you'll walk through a series of business challenges and resolutions.

These experiences require the virtual machines specified in the *System Center Deployment* section of this guide.

System Center Experiences

Infrastructure Provisioning

Experience: Provision your on-premises cloud infrastructure

- Configure storage fabric.
- Configure the network.
- Prepare a private cloud.
- Create a service template.

Infrastructure Monitoring

Experience: Monitor cloud performance and health

- Prepare and connect the environment.
- Showcase health report in Operations Manager.

Automation and Self-Service

Experience: Manage your service delivery and automation

- Create and test a runbook.

Application Performance Monitoring

Experience: Using Application Performance Monitoring and Global Service Monitor

IT Service Management

Experience: Enable reporting insights with the chargeback feature

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Capability Scenarios

Infrastructure Provisioning

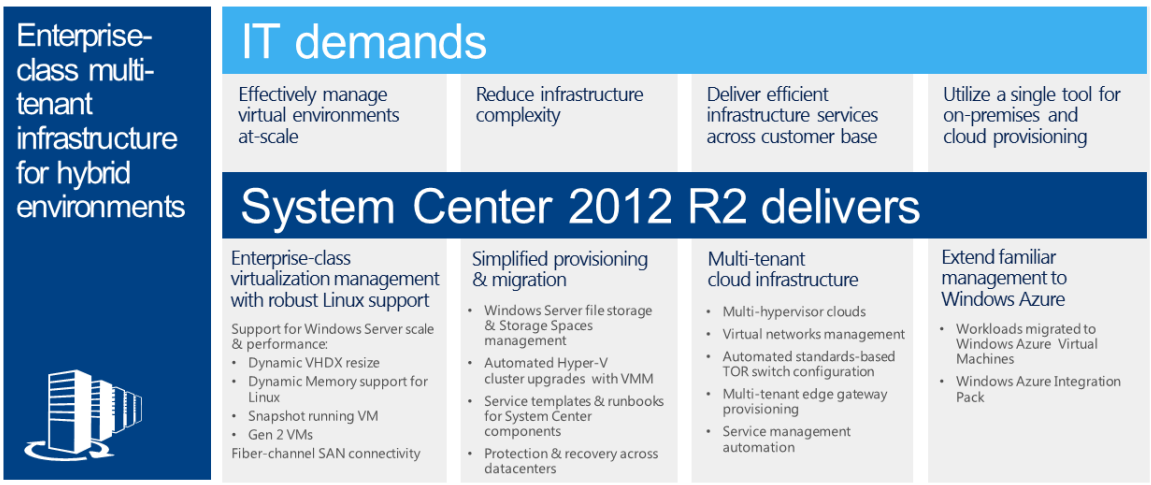
Manage the underlying fabric

Roles:	Technology:
Infrastructure admin	Microsoft System Center 2012 R2 Virtual Machine Manager
Service admin	Windows Server 2012 R2

Features enabled in this capability

- Dynamic Optimization
- Service template deployment
- Bare metal deployment
- Multi-tenant networks

To benefit from cloud computing, organizations must learn how to effectively manage and provision the underlying fabric, which means handling not only computing, but storage and networking resources as well. IT organizations want to manage compute needs across the organization and seamlessly add or remove storage to the underlying infrastructure. IT organizations also wants to be able to create secure networks and protect isolated networks, managing cloud resources across groups without concern for conflicting network addresses and storage needs.



At Contoso, for example, secure networking is essential to the development of a new, innovative product. Richard, the infrastructure administrator, has been tasked with creating a development

environment for a team spread across multiple locations. The product designers are in one office, the developers and testers are in a different city, and the prototyping organization is somewhere else. The environment must connect all locations securely, because of the proprietary nature of the new product.

All of the Contoso locations are already connected on the Contoso network and use existing servers and storage. Rather than buying new server and storage hardware, Richard has decided to use Microsoft System Center 2012 R2 to create a private network on top of the existing Contoso network.

Richard uses the provisioning and management capabilities of Windows Server 2012 R2 and System Center to accomplish the following:

- Provision a multi-tenant network on the existing Contoso physical infrastructure. Using network virtualization, he creates a separate, secure network on the existing servers and storage for the new development team. The new, isolated network is protected from the larger Contoso organization. Others cannot see or use the network resources.
- Optimize the new network dynamically; balancing the workloads of what is now a multi-tenant network across servers and managing storage as needed. The dynamic optimization used by System Center adjusts virtual machine distribution and automatically powers down servers when their resources are not used, reducing energy consumption.
- Manage the Contoso clouds as if they were a single, physical network.

Next, take a look at how you can provision your on-premises cloud infrastructure.

Experience: Provision your on-premises cloud infrastructure

Building a private cloud requires the ability to abstract needed physical resources (compute, storage, and networking) into pools that can be allocated to users who need capacity to run applications. In this experience, you will configure the fabric, which is an abstraction of the storage, server, and network resources, and other elements of the virtual infrastructure required to create a private cloud. You will also create a service template that allows you to deploy an application infrastructure onto this cloud, and then deploy an application onto your infrastructure.

- Configure storage fabric
- Configure the network
- Prepare a private cloud
- Create a service template

Reference Links

For additional guidance, see the following TechNet article:

Data-tier Applications

✔ **Before** beginning this experience, create checkpoints of all your virtual machines. To do this, right- clicks on the virtual machine and select **Create Checkpoint.** This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Configure storage fabric

You can create private clouds using resources contained in host groups. Before creating a private cloud, you need to prepare the underlying infrastructure.

To simplify the creation and addition of resources, you can create a Run As account as a stored set of credentials used to pass domain names and authentication for performing tasks like deploying applications, domain-joining virtual machines, or managing access.

Create a domain admin Run As account

1. On **VMM01**, launch the **Virtual Machine Manager Console**.
2. When prompted, click **Connect**.
3. In the left navigation, click the **Settings** workspace.
4. On the Home tab, click **Create Run As Account**.
5. On the Name and Description fields, type **DomainAdmin**.
6. In the User field, type **Contoso\Administrator**.
7. In the password and confirm password fields, type **pass@word1**.

Create a new share named VMMShare on DC01 for storage fabric

The following experience requires extra storage for the infrastructure that can be managed by VMM. By adding an additional VHDX file to DC01, in the following steps, you will gain the extra space required for evaluation purposes. If you were to deploy this in a production environment, you would need to confirm that the configured storage has enough capacity and performance to handle productions workloads.

✔ Begin this step logged on to **Host1**, your first Hyper-V host, as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. Open **Hyper-V Manager**.
2. Right-click on **Host1** and select **New→Hard Disk**.
3. Click **Next**.
4. Click **VHDX** and click **Next**.
5. Click **Dynamically Expanding** and click **Next**.
6. Name the disk **VMMShare** and set the storage path to **D:\VHDs**. Create the folder if it does not already exist.
7. Click **Next**.
8. Make the size **300 GB** and click **Next**.
9. Click **Finish**.

Assign the VMMShare disk to DC01

1. Remain in **Hyper-V Manager**.
2. Right-click on **DC01** and select **Settings**.
3. Click **SCSI Controller** and click **Add**.
4. Switch to **ID 1**.
5. Browse to **D:\VHDs** and select **VMMShare.vhdx**.
6. Click **OK**.

Activate and format VMMShare on DC01

Begin this step logged on to **DC01** as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. Open the run prompt, and type **Run DiskMgmt.msc** to open Disk Manager. You should see the new 300 GB disk.
2. Right-click the new disk and select **Online**.
3. Right-click the new disk and select **Initialize**.
4. Verify that **MBR** is selected and click **OK** to initialize the new disk
5. Right-click on the disk and select new simple volume.
6. Click **Next**.
7. Accept the default volume size and click **Next**.
8. Assign Drive Letter **E:**, or the next available letter, and click **Next**.
9. Set the volume label to **VMMShare**.
10. Leave Perform Quick Format checked.
11. Click **Next**.
12. Click **Finish**.

Create an application share for VMMShare

1. Open Server Manager on **DC01**.
2. Expand **File and Storage Services**.
3. Click **Shares**.
4. On the **Tasks** menu, select **New Share**.
5. Click **SMB Share-Applications** and click **Next**.
6. Make sure DC01 is selected as the server.
7. Select the **E:** drive, or the letter of the new disk you just created, and click **Next**.
8. For Share Name, type **VMMShare** and click **Next**.
9. On the Other Settings page click **Next**.
10. On the specify permissions, click **Customize Permissions**.
11. Click **Add**.
12. Click **Select a Principle**.
13. Click **Object Types**.
14. Click **Computers**.
15. Click **OK**.
16. Click **Advanced**.
17. Click **Find Now**.
18. Add **VMM01**, and the two Hyper-V hosts, **Host1** and **Host2**.

19. Select **Full Control** and click **OK**.
20. Click **OK**.
21. Click **OK**.
22. Click **Next**.
23. Click **Create**.
24. Click **Close**.

New in System Center 2012 R2

Provision a clustered Scale-Out File Server from bare metal hardware

Now you can provision a Scale-Out File Server Cluster with highly available storage space in minutes from either bare metal servers, or existing Windows Server 2012 R2 servers that are racked in your datacenter. This task requires System Center 2012 R2 Virtual Machine Manager and Windows Server2012 R2. The following steps describe the general flow for provisioning a clustered Scale-Out File server from bare metal and not all the steps are required.

Use the VMM Console for these steps:

1. From the **Fabric** workspace, choose **Create Files Server Cluster**.
2. Select a **Run As account** and Baseboard Management Controller (BMC) protocol.
3. Select the servers using an IP Range or Server Names. The servers cannot already have the Hyper – V role installed.
4. SCVMM will execute a Wake-on-LAN (WOL) to start the servers and begin the Scale-Out File Server (SOFS) provisioning process. SCVMM also will generate Windows PowerShell code that you can use to repeat the process for other provisions.

   Note: The back-end storage can be JBOD storage running a storage pool.

5. Once you complete provisioning, expand the front-end file servers by adding more servers to the Scale-Out File Server by using a similar process and add additional disks to the storage pool while the file server is running.

Configure the network

An important part of configuring the private cloud infrastructure is configuring the underlying network infrastructure that the virtual machines will use, encompassing both the virtual and the physical networks. Configuring this network infrastructure can appear complex. Virtual machines must be placed on the proper networks to ensure appropriate security and access controls. Also, virtual machines need IP and MAC addresses to ensure proper communication.

First, in VMM, you will configure the network fabric to simplify some critical administrative tasks.

In this experience, you will create a logical network and an IP Address pool, and then create a virtual

machine network. A logical network is an abstraction of the physical network environment that VMM will use to handle the provider addresses for network virtualization. The virtual machine network is the representation of the network from the virtual machine point of view. In other words, the virtual machine sees the IP address and subnets presented by the virtual machine network. The virtual machine network will sit on the logical network, and VMM will handle the association between them and assign IP addresses as virtual machines are deployed.

Create new Host Group for Contoso

In this task, you will configure the fabric to make a new host group for management of Host1 and Host2. A Host group allows you to set properties across the selected hosts, including host reserves and storage.

Begin this step logged on to **VMM01** as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. In the left navigation of Virtual Machine Manager Console, click **VMs and Services**.
2. In the VMs and Services pane, click **All Hosts**.
3. On the Home tab, click **New Host Group**.
4. Name the Host Group **Contoso**.

Add Host1 and Host2 to the Contoso Host Group

In this task, you will configure the fabric to include the two Hyper-V hosts in the Contoso host group.

Begin this step logged on to **VMM01** as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. In the left navigation of Virtual Machine Manager Console, click **Fabric** workspace.
2. Scroll to the top of the left navigation pane and select the **Contoso** host group.
3. Click the **Add Resource** button.
4. Click **Hyper-V hosts** and **Clusters**.
5. Leave **Windows Server Computers in a Trusted Active Directory** selected.
6. Click **Next**.
7. Select the **DomainAdmin Run As** account and click **Next**.
8. On the **Discovery** page, specify both **Host1** and **Host2** by name.
9. Select both computers and click **Next**.
10. Select the Contoso host group, and select the check box to re-associate this host with the VMM environment and click **Next**.
11. In the VMs and Services pane, click **All Hosts**.
12. On the Home tab, click **New Host Group**.
13. Name the host group **Contoso**.
14. Accept the default Migration Settings and click **Finish**.
15. Wait for the Add Virtual Machine Host job to complete. It should take 3-5 minutes.

Create virtual networks

In this task, you will configure the fabric to make a virtual network available to the virtual machines to manage through VMM. You will create a logical network in this task that you will later use to create a private cloud.

Begin this step logged on to **VMM01** as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. In the left navigation of Virtual Machine Manager Console, click **Fabric** workspace.
2. In the Fabric workspace, click to expand the Networking node and click **Logical Networks**.
3. In the left navigation, right-click Logical Networks and click Create Logical Network.
4. In the Name text box, type **Contoso Service Network**.
5. Click **Allow new VM networks created on this logical network to use network virtualization** and click **Next**.
6. On the Network Sites page, click **Add**.
7. In the host groups that can use this network site section, click to select **All Hosts**.
8. In the Associated VLANs and IP subnets section, click **Insert row**.
9. Leave the VLAN field blank and in the IP subnet field, type **192.168.1.0/24** and click **Next**.
10. On the Summary page, click **Finish**.
11. When the jobs complete, close the **Jobs** window.

Create IP address pools

Creating IP address pools in the fabric helps simplify your ability to manage IP address configurations for Hyper-V hosts created from bare metal and for virtual machines running on Hyper-V hosts. By leveraging IP pools, you can have VMM statically assign IP addresses to virtual machines from a given pool. These statically assigned IP addresses can also be updated within your Windows Server 2012 R2 IPAM infrastructure. In this task, you will create a range of IP addresses and other configurations, such as DNS address and suffixes, available via an IP address pool.

Begin this step logged on to **VMM01** as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. In the Logical Networks and IP Pools results pane, right-click **Contoso Service Network** and click **Create IP Pool**.
2. In the Name field, type **Service Pool**, confirm that **Contoso Service Network** is selected in the Logical network field and click **Next**.
3. On the Network Site page, click **Next**.
4. On the IP address range page, set the Starting IP address to **192.168.1.151** and the Ending IP address to **192.168.1.175**.

   Note: You can create IPv6 addresses, but you cannot mix IPv6 and IPv4 addresses in the same pool. You must use a separate pool.
5. Confirm that there are 25 total addresses and click **Next**.
6. On the Gateway page, click **Insert**, and in Gateway Address, type **192.168.1.1** and click **Next**.

Note: Leave Metric set to Automatic.

7. On the DNS page, in the DNS server addresses in the order of use section, click **Insert**.
8. Type **192.168.1.2**, or the IP address of your DNS server and press ENTER.
9. In the **Connection Specific DNS suffix** text box, type **contoso.com**.
10. In the **DNS search suffixes to append section**, click **Insert**.
11. Type **contoso.com** and press **ENTER**.
12. Click **Next**.
13. On the WINS page, click **Next**.
14. On the Summary page, click **Finish**.
15. When the jobs complete, close the **Jobs window**.

Manage Hyper-V virtual networks

With Hyper-V in Windows Server 2012 R2, you have the ability to create isolated virtual networks. System Center 2012 R2 Virtual Machine Manager can manage these and configure virtual machines to use these virtual networks. VMM will handle the mapping of the logical networks in the physical fabric to the virtual machine networks that overlay the logical network. Network virtualization provides the ability to deploy multiple virtual networks (virtual machine networks) on the same physical network.

In the following task, you will create a Hyper-V virtual network available in VMM. As part of the evaluation experience, you will create a virtual machine network that maps directly to the logical network to facilitate virtual machine deployment and access to the existing domain. Windows Server 2012 and VMM provides a network virtualization gateway where you can create an isolated virtual network using Network Virtualization Generic Routing Encapsulation (NVGRE) and use the gateway to route packets to the physical world, but that is beyond the scope of this evaluation guide.

Begin this step logged on to **VMM01** as **Contoso\administrator** with the password **pass@word1** or the credentials for the domain you created.

1. In the left navigation pane of Virtual Machine Manager Console, click **VMs and Services** workspace.
2. In the left navigation pane, click **VM Networks**.
3. On the Home tab, in the **Show** group, click **VM Networks**.
4. On the Home tab, in the **Create** group, click **Create VM Network**.
5. On the Name page, type **Service VM Network**, and then in the Logical network list, verify **Contoso Service Network** is selected and click **Next**.
6. On the **Isolation** page, click **No Isolation**, and then click **Next**.
7. On the **Summary** page, click **Finish**.
8. When the job is finished, close the Jobs window.
9. Verify that the Service VM Network appears in the VM Networks pane.

Prepare a private cloud

A private cloud in VMM takes disparate computer, network and storage infrastructure components and creates an abstraction of those resources that is managed as a single entity to be used for self-service by authorized users. A private cloud, as opposed to a public cloud, is deployed using an organization's on- premises hardware. When creating a private cloud, you need to choose the underlying fabric resources, including storage, networking, library servers, and host groups. These underlying resources should be created beforehand, as you have done in previous exercises.

Private clouds confer a number of benefits, including self-service, resource pooling, opacity, or the ability to hide the underlying complexity of the physical resources), optimizations, and elasticity (the ability to add resources).

Private clouds can be created from host groups that contain Hyper-V, VMware ESX, and Citrix XenServer hosts or from VMware resource pools.

Next, you will create a private cloud in VMM using the fabric and other elements configured earlier. Before creating the private cloud, you will create new disks to be used in the read-only VMLibary1 and

VMLibrary2 shares. These shares will host the virtual machine library shares in the Contoso cloud.

Create VMLibrary1 and VMLibrary2 Shares on VMM01

Begin this task logged on to **Host1** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Hyper-V Manager**.
2. Right-click **Host1** and select **New→Hard Disk**.
3. Click **Next**.
4. Click **VHDX** and click **Next**.
5. Click **Dynamically Expanding** and click **Next**.
6. Name the disk **VMMLibrary1** and set the storage path to **D:\VHDs**. Create the folder if it does not already exist.
7. Click **Next**.
8. Make the size **300 GB** and click **Next**.
9. Click **Finish**.
10. Repeat steps 1-11 to create a new **VMLibrary2** disk.

Assign the virtual machine library disks to VMM01

In this task, you will assign the new disks to VMM01 which will be used in the read-only VMLibrary1 and VMLibrary2 shares.

1. Remain in Hyper-V Manager.
2. Right-click **VMM01** and select **Settings**.
3. Click **SCSI Controller** and click **Add**.
4. Switch to **ID 2**.
5. Browse to **D:\VHDs** and select **VMLibrary1.vhdx**.

6. Click **OK**.
7. Repeat steps 1-6 for VMLibary2. (Use ID 3 and VMLibrary2.vhdx.)

Activate and format VMLibrary1 and VMLibrary2 on VMM01

In this task, you will activate and format the new disks.

Begin this task logged on to **VMM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the run prompt, and type **Run DiskMgmt.msc** to open Disk Manager. You should see the two new 300 GB disks.
2. Right-click the new disk and select **Online**.
3. Right-click the new disk and select **Initialize**.
4. Verify that **MBR** is selected and click **OK** to initialize the new disk.
5. Right-click on the disk and select **new simple volume**.
6. Click **Next**.
7. Accept the default volume size and click **Next**.
8. Assign Drive Letter **F:**, or the next available drive letter, and click **Next**.
9. Set the volume label to **VMLibrary1**.
10. Leave **Perform Quick Format** selected.
11. Click **Next**.
12. Click **Finish**.
13. Repeat steps 1-14 for **VMLibrary2**.

Create Application Shares for VMlibrary1 and VMLibrary2

In this task, you will create the read-only application shares to be used for the virtual machine libraries.

1. Open Server Manager on **VMM01**.
2. Expand File and Storage Services.
3. Refresh Disks so that you see the two new 300 GB disks.
4. Click **Shares**.
5. On the **Tasks** menu, select **New Share**.
6. Click SMB Share-Applications and click **Next**.
7. Make sure VMM01 is selected as the server.
8. Select the **F:** drive, or the drive letter of your new **VMLibrary1** disk, and click **Next**.
9. For Share Name type **VMLibrary1** and click **Next**.
10. On the Other Settings page click **Next**.
11. On the specify permissions, click **Customize Permissions**.
12. Click **Add**.
13. Click **Select a Principle**.
14. Click **Object Types**.
15. Click **Computers**.
16. Click **OK**.

17. Click **Advanced**.
18. Click **Find Now**.
19. Add **VMM01**.
20. Select **Read** and click **OK**.
21. Click **OK**.
22. Click **OK**.
23. Click **Next**.
24. Click **Create**.
25. Click **Close**.
26. Repeat steps 1-25 for the new VMLibrary2 share.

Add VMLibrary1 and VMLibrary2 share to the Library Workspace

In this task, you will add DC01 and the two new shares as a library server.

Begin this task logged on to **VMM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In left navigation of the Virtual Machine Manager Console, click **Fabric** workspace.
2. Under Infrastructure, click **Library Servers**.
3. Right-click **VMM01** and click **Add Library Share**.
4. Select **VMLibrary1** and **VMLibrary2** and click **Next**.
5. Wait for the job to complete and close **Jobs**.

Create a private cloud

Create a private cloud in VMM using the fabric and other elements configured earlier.

Begin this task logged on to **VMM01** as **Contoso\administrator** using the **password pass@word1** or the credentials for the domain you created.

1. In left navigation of the Virtual Machine Manager Console, click the **VMs and Services** workspace.
2. **Expand All Hosts | Contoso**, then right-click **Host1** and click **Properties**.
3. On the Hardware property page, under Network Adapters, click **Logical network**.
4. In the Logical network connectivity pane, select the check box for **Contoso Service Network**.
5. Click **OK** when prompted.
6. Click **OK** to close.
7. Repeat steps 2-6 for **Host2**.
8. If not already, selected, click the **VMs and Services** workspace.
9. In the ribbon, click **Create Cloud**.
10. On the General page, in the Name field, type **Contoso-Cloud**, and then click **Next**.
11. In Resources, select **Contoso**, and then click **Next**.

    Note: You have the option to add VMware resource pools.
12. In **Logical Networks**, select **Contoso Service Network**, and then click **Next**.

13. In **Load Balancers**, select **Microsoft Network Load Balancing (NLB),** then click **Next**.
14. On the **VIP Templates** page, click **Next**.
15. On the **Port Classifications** page, review the different built-in options, then click **Next**.
16. On the **Storage** page, click **Next**.
17. On the **Library** page, in the Read-only library shares pane, click **Add**.
18. Select **VMLibrary1** and **VMLibrary2** on **VMM01** and click **OK**.
19. Click **Next**.
20. On the **Capacity** page, de-select the **Use Maximum** check boxes.

    Note: Resource usage for the private cloud is limited both by the configuration of the private cloud and by user role quotas.
21. Click **Next**.
22. On the **Capability Profiles** page, select the check box for **ESX Server and Hyper-V**, and then click **Next**.
23. Click **Finish**.
24. When the job is complete, close the Jobs window.
25. In the VMs and Services pane, expand **Clouds**.
26. Select **Contoso** Cloud, right-click **Contoso Cloud** and click **Properties**.
27. Browse through the properties and click **Cancel**.

Create a service template

Service templates can help you provision and manage complex application infrastructures by helping automate the process of deploying and updating these applications. While service templates can be used to deploy a single virtual machine, they are often used to deploy multiple virtual machines that represent a multi-tiered application infrastructure; for example, web front-end tiers with SQL Server as a back end tier. In this experience, you will be preparing the infrastructure and then creating a simple, single-tier service template. Then, you will deploy the service in your environment.

Service templates are built using virtual machine templates that consist of a virtual hard disk (.vhdx file), a hardware profile, and the guest operating system profile. You can also add an application profile to describe the application deployed in the virtual machine. This application can consist of an MSDeploy package (for a web application), or a Server App-V package (created by sequencing your line of business application), or a SQL DACPAC (configuration of a SQL server environment).

For this experience, you will perform the following tasks:

- Import a virtual hard disk (VHDX) resource.
- Create a guest operating system profile.
- Create a hardware profile.
- Create a virtual machine template.
- Create a service template.
- Deploy the service from the template.

Import virtual hard disk (VHDX) resources

Most virtual machines use a virtual hard disk, or VHDX file. To create a virtual machine template, start with a VHDX (or VHD) file in the library. You will use one of the existing VHDX files used to build the evaluation environment. For more information, see **Create VHDX file** in the *Installation* section in the *Windows Server 2012 R2 Evaluation Guide*.

Begin this task logged on to VMM01 as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the left navigation pane of Virtual Machine Manager Console, click the **Library** workspace.
2. On the Home tab, in the Import group, click **Import Physical Resource**.
3. Click **Add Resource**. For this exercise do not choose **Add Custom Resource**.
4. Navigate to **\\HOST01\D\VHD** or to the directory where the VHDX file is located.
5. Select **WS2012R2.vhdx** (or your desired .VHDX file) and click **Open**.
6. In the Select library server and destination for the imported resources section, click **Browse**.
7. Select **VMLibrary2** and click **OK**.
8. Click **Import**.
9. When the import completes, close the **Jobs** window.
10. In the Virtual Machine Manager, select the **Library** workspace.
11. Expand **Library Servers** and navigate to **VMLibrary2**.
12. In the **Physical Library Objects** pane, right-click the **WS2012R2.vhdx** object and click **Properties**.
13. Change the Operating System to **Windows Server 2012 R2 Datacenter** and click **OK**.

Create a guest operating system profile

The guest operating system profile is similar to the one created in previous versions of VMM. The guest operating system profile contains unique information for the virtual machine, including host name, domain join information, roles and features information. In the following task, you will create a guest operating system profile for use in the service template.

Begin this task logged on to **VMM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In Virtual Machine Manager, click the **Library** workspace.
2. On the Home tab, in the Create group, click **Create**, and then click **Guest OS Profile**.
3. In the New Guest OS Profile screen, in the Name field, type **WS2012R2-VM**.
4. Click the **Guest OS Profile** tab.
5. Under General Settings, click **Operating System**.
6. In Operating System field, type **Windows Server 2012 R2 Datacenter**.

7. Under General Settings, click **Identity Information**.
8. In the Computer Name field, type **WS2012-VM##**.

   Note: For the computer name, provide a pattern to generate computer names. For example, if you type server####, the computer names created will be server0001, server0002, and so on.

9. Under General Settings, click **Admin Password**. Specify the Local Administrator password, or a **Run As account** for the Local Administrator password. If you don't have a **Run As account** created for the Local Administrator, create a new one from the dialog box.
10. Under **Roles and Features**, click **Roles** and scroll down to select the check box for Web Server.

    Note: Unlike the guest operating system profile in previous versions of VMM, you can add roles and features, which will be automatically configured when you deploy the virtual machine as part of a service, but not if you deploy it as a regular virtual machine.

11. Under **Networking**, click **Domain/Workgroup** and click the **Domain** radio button. Type **contoso.com** or the domain you created earlier.
12. Click **Select the Run As** account to use for joining the domain radio button, and then click **Browse**.
13. In the **Select a Run As** account dialog box, click **DomainAdmin**, and then click **OK**.
14. In the **Domain/Workgroup** dialog, type **Contoso** in **Domain** text box, and then click **OK**.
15. In the New Guest OS Profile dialog, click **OK**.

Create a hardware profile

✔ Begin this task logged on to VMM01 as Contoso\administrator using the password pass@word1 or the credentials for the domain you created.

1. In Virtual Machine Manager, in the Library workspace, expand **Profiles** and click **Hardware Profiles**.
2. Right-click **Hardware Profiles** and click **Create Hardware Profile**.
3. In the **Name** field, type **WS2012R2-HW**.
4. Click the **Hardware Profile** tab.
5. Click the **Cloud Compatibility Profile** section and click **Hyper-V**.
6. Click **Processor** and change the Number of processors to 2.
7. Click **Memory** and select **Dynamic**.
8. Set the Startup memory value to **2 GB**.
9. Set the Minimum memory value to **1 GB**.
10. Set the Maximum memory value to **4 GB**.
11. Scroll down to **the Network Adapters** section and click **Network Adapter.**
12. In the **Connectivity** section, select **Connected to VM network** and select **Browse**.
13. Choose **Service VM Network** and click **OK**.

14. Close the New Hardware Profile page.

Create a virtual machine template

You would typically use an MSDeploy package or a Server App-V package to create an Application Profile. Similarly, you would start with a SQL DACPAC to create a SQL profile. For this exercise, you will create a simple template without an application or SQL package.

Begin this task logged on to **VMM01** as **Contoso\administrator** using the password pass@word1 or the credentials for the domain you created.

1. In the Library workspace, expand **Templates** and click the **VM Templates** node.
2. Right-click VM Templates and click **Create VM Template**.
3. Click **Browse to Use an existing VM template or a virtual hard disk stored in the library**.
4. Select **WS2012R2.vhdx** or the name of the virtual hard disk you imported earlier and click **OK**.
5. Click **Next**.
6. On the VM Template Identity page, in the **VM Template name** text box, type **WS2012R2-VM** and click **Next**.
7. On the **Configure Hardware** page, click the Hardware profile drop-down list and select **WS2012R2-HW** and click **Next**.

   This may take a few moments to complete.
8. Browse through Settings and notice that the values are populated with the options you entered when creating the hardware profile. You can override these settings, if desired.
9. Click N**ext**.
10. On the Configure Operating System page, click the Guest OS Profile drop-down and select WS2012R2-VM.
11. Select **Features**, and under Role Administration Tools, select **Hyper-V Management Tools**, **Hyper- V GUI Management Tools**, and **Hyper-V Module for Windows PowerShell** .
12. Click **Next**.
13. On the Configure Applications page, click **Next**.
14. On the Configure SQL server page, click **Next**.
15. On the Summary page, click **Create**. This may take a few moments to complete.
16. When this task completes, close the **Jobs** window.

Create a service template

Put all the previously configured elements together to create a service template.

Begin this task logged on to **VMM01** as **Contoso\administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the Library workspace, under Templates, click **Service Templates**.
2. Right-click **Service Templates** and click **Create Service Template**.
3. In the New Service Template dialog, type **WS2012R2 Service** in the Name field and **1.0** in the Release field.
4. Select **Single Machine (v1.0)** and click **OK**

5. Maximize the **Service Template Designer**.
6. From the VM Templates pane, click and drag **WS2012R2-VM** to the **Single Tier** box.

   Note: Notice the Alert in the Machine Tier 1 box. This is expected since the template has not been saved and validated.

7. Click **Save** and **Validate**. Confirm that no Alert is present in **Machine Tier 1**.
8. Click on the box in the designer pane labeled **WS2012R2-VM – Machine Tier 1**.
9. In the **Properties** pane on the bottom of the screen, select the box for this computer tier can be scaled out.
10. Change the Maximum instance count to **5**.
11. Click **Save** and **Validate**. Confirm that no alert is present in Machine Tier 1.
12. Close the VMM Service Template Designer.

Deploy the service from the template

1. Right-click WS2012R2-Service and click Configure Deployment.
2. Type Service01 in the Name field and click OK.
3. Choose Contoso Cloud in the Destination field and click OK.
4. Wait for the Deploy Service window to appear. This may take a few moments to complete.
5. When you see a warning icon in the virtual machine item, click Refresh Preview to perform a placement operation.
6. Use one of the following two approaches, based on results:
   - If the configuration is successful, and you don't see any errors, click **Deploy Service**.
   - If you see an error on the Deploy Service screen, click on the **VMM01**, and choose **Ratings** to determine the error and possible resolution.
7. Click **Deploy**.
8. Click on the **Create Service Instance** job and monitor the deployment progress.
9. Once the job is complete, close the Jobs window.
10. Under Service Templates, select **WS2012R2-Service** and click **Publish** in the **Ribbon**.

✔ Merge the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

Table of Contents

Capability Scenarios

Infrastructure Monitoring

Monitor and correct issues proactively

Roles:

Infrastructure admin

Service admin

Technologies:

Windows Server 2012 R2

Microsoft System Center 2012 R2 Operations Manager

Windows Azure

Features enabled in this capability

- Improved UNIX and Linux support
- Private cloud monitoring
- Proactive monitoring
- Improved workload monitoring
- Azure monitoring

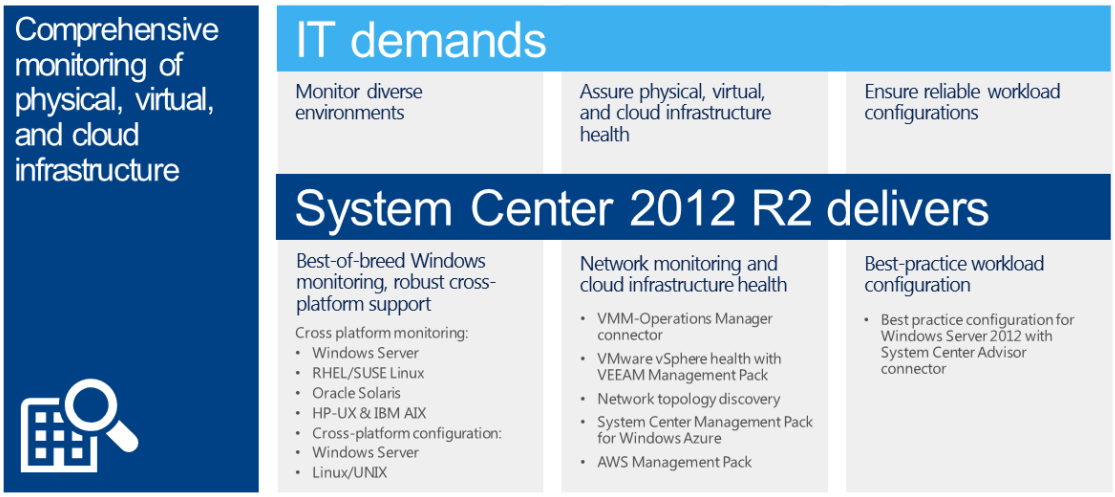
Increasingly, datacenters require integrated monitoring across physical, virtual and public cloud resources. Organizations need to be able to monitor all aspects of operations and take swift corrective action to maintain services. Admins are looking for a level of centralized control and visibility across the entire enterprise infrastructure on all levels, from the infrastructure to the applications. Better visibility can help admins identify the source of a problem, such as whether it is related to the infrastructure or an application, which can help reduce finger-pointing and ultimately speed time to resolution.

At Contoso, infrastructure admin Richard has been facing growth in the number of servers and associated devices that his group is responsible for monitoring and maintaining. In addition to the company's headquarters datacenter, each of the four regional offices, up from two a year ago, has its own datacenter. The company has several local sales offices equipped with servers. Contoso continues to grow and several corporate acquisitions are pending.

To complicate the monitoring situation, some regional offices were originally separate companies acquired by Contoso. These locations still use their legacy servers running on older versions of Linux and UNIX, whereas the main Contoso datacenter is a Windows Server shop.

Richard wants to achieve these objectives:

- Centralize the administration and monitoring of local and remote servers.
- Monitor a hybrid IT environment with servers that run different operating systems.
- Expand the monitoring capabilities to additional servers running on various operating systems, as new corporate acquisitions occur.



Implementing System Center 2012 R2 enables Richard to centralize IT infrastructure monitoring while allowing for corporate growth. System Center provides a customizable dashboard that enables IT staff to monitor geographically-dispersed servers, devices, network configuration, and network performance from a single location.

It enables at-scale management of virtual machine snapshots, dynamic VHDX resize, and Storage Spaces. It eases management of heterogeneous datacenter environments by providing Dynamic Memory support for Linux guests and the ability to deploy Linux virtual hard drives (VHDs) consistently to Windows Server 2012 R2 and Windows Azure infrastructure. System Center enables Contoso to monitor physical, virtual, and cloud datacenters.

Experience: Monitor cloud performance and health

In the following exercises, you will connect the Virtual Machine Manager (VMM) environment with the Operations Manager environment. This will allow you to view the performance and health of your clouds created in VMM from within OpsMgr. This delivers a centralized view for monitoring the cloud health state, and the host, network and storage resources. You will:

- Prepare and connect the environment
- Showcase health report in Operations Manager

✔ **Before** beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint.** This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Prepare and connect the environment

Install the Operations Manager Console on VMM01

✔ Begin this step logged on to **VMM01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install the Report Viewer prerequisite by opening **File Explorer** and connecting to

\\HOST01\temp\prerequisites\RV2010.

2. Launch the file **ReportViewer.exe** as Administrator.
3. Click **Yes**.
4. Click **Next**.
5. Accept the license agreement and click **Install**.
6. Click **Finish**.
7. Browse to where the Operations Manager install files are located: **\\OM01\C\SC2012 R2 SCOM**.
8. Launch the **setup.exe** and click **Install**.
9. Select **Operations console** and click **Next**.
10. Click **Next**.
11. After the prerequisite check is complete, click **Next**.
12. Accept the license agreement and click **Next**.
13. Select your choices for the **Customer Experience Improvement Program** and **Error Reporting** and click **Next**.
14. Click **Install**.
15. Click **Close**.

Connect VMM and Operations Manager

Begin this step logged on to **VMM01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open Virtual Machine Manager console.
2. In the Settings workspace, under System Center Settings, right-click **Operations Manager Server** and select **Properties**.
2. Click **Next**.
3. For Server name type: **OM01**.
4. Select the **Use a Run As account** radio button and select **Browse**.
5. Select **ContosoAdmin** and select **OK**.
6. Click **Next**.
7. For User name enter **SRV_VMM**.
8. For Password enter **pass@word1**.
9. Click **Next**.
10. Click **Finish**, and then wait for the job to complete in the VMM Jobs window.

Import the System Center Management Pack for VMM Fabric Dashboard 2012 R2

Begin this step logged on to **OM01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Download the updated **System Center Management Pack for VMM Fabric Dashboard 2012 R2** from the Microsoft Download Center.
2. Copy the Virtual Machine Manager Fabric Dashboard.msi file on the **OM01 server**, and **launch** the MSI installer.
3. Accept the license agreement and click **Next**.
4. Accept the default folder and click **Next**.

5. Click **Install**.
6. Click **Close**.
7. Open the **Operations Manager Console** and click on the **Administration Workspace**.
8. Click **Management Packs** and choose **Import Management Packs** task on the right pane.
9. Click **Add→Add from disk**.
10. Select **No** from the Online Catalog Connection Dialog.
11. Browse to where the MSI installer installed the management pack **C:\Program Files (x86)\System Center Management Packs\Virtual Machine Manager Fabric Dashboard**.
12. Choose the management pack **Microsoft.SystemCenter.VirtualMachineManager.Dashboard.mpb**.
13. Click **Open**.
14. Click **Install**.
15. Click **Close**.

Showcase health report in Operations Manager

- Begin this step logged on to **OM01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
  1. Click the **Monitoring** workspace.
  2. Expand the **Microsoft System Center Virtual Machine Manager** folder.
  3. Expand the **Cloud Health Dashboard**.
  4. Click **Cloud Health**.
  5. Select **Contoso Cloud** and click on the **Fabric Health Dashboard** task in the Tasks Pane.

     Note: Notice the data may take some time to populate within the Operations Manager console due to polling intervals.
- **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

Table of Contents | Capability Scenarios

Automation and Self-Service

Empower enterprise users while retaining control

Roles

Service admin

Technologies:

Microsoft System Center 2012 R2 Service Manager

Microsoft System Center 2012 R2 Orchestrator

Microsoft System Center 2012 R2 App Controller

Windows Server 2012 R2 PowerShell

Features enabled in this capability

- Self-service portal with service catalog.
- Runbook automation and integration packs including third-party management solutions.

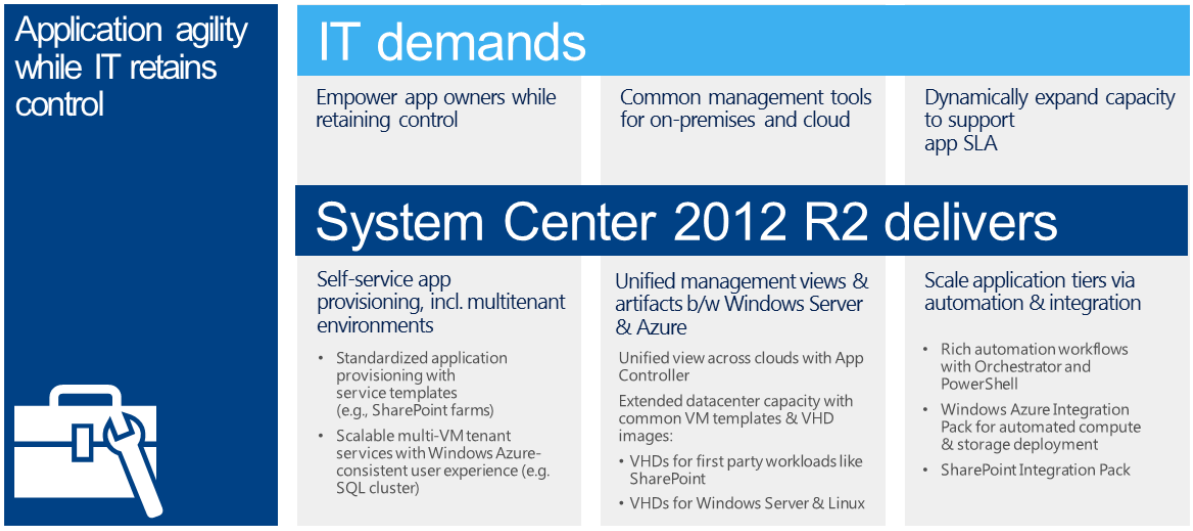
As organizations strive to deliver standardized services across more complex datacenter environments, service administrators can leverage System Center 2012 R2 Orchestrator, Service Manager and App Controller to provide a predictable self-service experience and scale through automation. Working together, the System Center components can help organizations manage infrastructures that include on premises, service-provider cloud and Azure public cloud, enabling service admins to provision and manage service delivery processes.

By automating repetitive activities and by empowering application owners to deploy and manage applications, IT teams can reduce operational costs, retain control of the process and focus efforts on more pressing matters. IT customers benefit from repeatable and efficient service delivery and an increased sense of empowerment. System Center enables these features for delivering services to the enterprise:

- Self-service and standardization of offerings through a service catalog.
- Automation of service delivery across the organization.
- Integration across private, public and service provider clouds.

At Contoso, for example, the IT department treats each division and user as tenants and delivers a common set of services to the teams. Teams may request services via the service catalog, including requesting clouds or creating virtual machines that are configured and provisioned uniquely for each team based on a set of templates.

Any tenant user or admin that needs a virtual machine or a customized set of virtual machines opens a ticket. In the request, tenants specify the number, scope and scale of the virtual machines needed. Tickets also describe whether virtual machines in a suite must be provisioned differently. Service admins take the ticket from a queue for action.



Sarani, an IT service administrator, spends much of her time fulfilling such tickets. She has automated some aspects of virtual machine creation, but she still must configure and kick off the virtual machine creation automation for each requested virtual machine. She must provision each virtual machine as described, which is often complicated and time-consuming. Since the provisioning descriptions are sometimes ambiguous, Sarani often takes the time to ask for clarification. Sarani and her IT coworkers spend hours on routine but time-consuming tasks and want to improve turnaround time on requests.

With System Center 2012 R2, Sarani is able to simplify the request process. With the service catalog, her team is able to provide a self-service experience with service level agreements. The new process forces service-level discussions and removes the burden to manually procure, provision, and manage infrastructure on a per-application, ad-hoc basis. The solution meets all the Contoso requirements:

- IT retains ultimate control of automated services.
- The user interface for any IT automation solution is intuitive, no more difficult than filling out a ticket, and presents a common interface for various services.
- The solution is flexible enough to be useful for very small requests, such as a single virtual machine, as well as much larger requests.
- The solution uses a common set of management tools for both on-site installations and those based in the cloud.

Service Manager provides standardization of service offerings, request offerings and service templates through the service catalog while Orchestrator provides extreme task automation through runbooks and Windows PowerShell.

Using automation of various virtual machine provisioning tasks with runbooks, Sarani can empower users to specify desired services in the Service Catalog. Instead of manually writing a descriptive ticket, Contoso can now provide a standard form through the self-service portal to display the service catalog and drive improvements in request fulfillment.

Take a look at features in Orchestrator that enable service delivery and automation.

Experience: Manage your service delivery and automation

Requesting resources from IT is typically a long, involved process involving numerous stakeholders, meetings, revisions, and approvals. The application owner typically wants a faster process to get resources from IT. The service administrator wants a standardized system for self-service access to IT services. In this experience, you will begin to examine how Service Manager and Orchestrator can help automate resource request fulfillment through runbooks and Windows PowerShell, while enforcing controls for business processes and rules.

To see how automation with Orchestrator enables faster and predictable service delivery, start by creating a simple runbook. A runbook is a set of activities that Orchestrator will run in a specific order. The runbook activities are made up of either pre-installed activities or activities from an Integration Pack. An Orchestrator Integration Pack extends Orchestrator functionality by creating ways that Orchestrator can talk with other systems or perform certain tasks. Orchestrator Integration Packs are available from Microsoft and third-party vendors.

More advanced experiences are available in the *Appendix: Advanced System Center Experiences* section.

Prerequisites

This experience requires additional software setup and builds on the steps in the *Infrastructure Provisioning* experience. Please complete that section first. In addition:

- Confirm that the System Center 2012 R2 Component Add-Ons and Extensions, which contain the Orchestrator Integration Packs, are installed and configured, using the instructions found in the *System Center Deployment* section. These packs enable System Center components to communicate.
- This experience requires integration packs for Virtual Machine Manager and Service Manager. If you are having trouble with the installation process, use the following steps for installing and configuring the software.

Important

Before getting started, make sure that a minimum of 8GB RAM is allocated to the Service Manager (SM01) virtual machine. If not, the performance may be poor.

- ✔ **Before** beginning this experience, create checkpoints of all your virtual machines. To do this, right- click on the virtual machine and select **Create Checkpoint.** This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Integration pack installation and configuration instructions

Registering and Deploying the Integration Pack

After you download the integration pack file, you must register it with the Orchestrator management server and then deploy it to Runbook servers and Runbook Designers. For the procedures on installing integration packs, review How to Install an Integration Pack.

Install the Windows Installer XML (WiX) Toolset v3.7

Download and install the WiX toolkit from Codeplex.

To register an integration pack

On the management server OR01, copy the .OIP files for the integration packs to a local hard drive or network share.

> Note: Confirm that the file is not set to Read Only to prevent un-registering the integration pack at a later date.

1. Start the **Deployment Manager**.
2. In the navigation pane of the Deployment Manager, expand **Orchestrator Management Server**, right-click **Integration Packs** and select **Register IP with the Management Server**. The Integration Pack Registration Wizard opens.
3. Click **Next**.
4. In the Select Integration Packs or Hotfixes dialog box, click **Add**.
5. Locate the .OIP files that you copied locally from step 1, click **Open**, and then click **Next**.
6. In the Completing the Integration Pack Wizard dialog box, click **Finish**.
7. On the End User Agreement dialog box, read the Microsoft Software License Terms, and then click **Accept**.

> Note: The Log Entries pane displays a confirmation message when the integration pack is successfully registered.

To deploy an integration pack

1. In the navigation pane of Deployment Manager, right-click **Integration Packs**, click **Deploy IP to Action Server or Client**.
2. Select the integration pack that you want to deploy, and then click **Next**.
3. Enter the name of the runbook server or computers with the Runbook Designer installed, on which you want to deploy the integration pack, click **Add**, and then click **Next**.
4. Continue to add additional runbook servers and computers running the Runbook Designer, on which you want to deploy the integration pack. It is recommended that you install all of the System Center Integration Packs. Click **Next**.
5. In the Installation Options dialog box, configure the following settings:

6. To choose a time to deploy the integration pack, select the **Schedule installation** check box, and then select the time and date from the **Perform installation** list.
7. Click one of the following:
    a. Stop all running runbooks before installing the integration pack to stop all running runbooks before deploying the integration pack (recommended).
    b. Install the Integration Packs without stopping the running Runbooks to install the integration pack without stopping any running runbooks (requires reboot).
8. Click **Next**.
9. In the Completing Integration Pack Deployment Wizard dialog box, click **Finish**.

> Note: When the integration pack is deployed, the Log Entries dialog box displays a confirmation message.

Configure Windows Remote Management

The VMM and Service Manager Integration packs use Windows PowerShell remoting to enable the connection between the Orchestrator runbook server and the computer running the VMM Administration Console and Service Manager. Windows PowerShell Remoting relies on Windows Remote Management (WinRM) to establish the communications between the two systems. You must perform the following tasks before you configure the VMM and Service Manager connections in Runbook Designer.

> Note: Runbook Designer will also connect to the computer running the VMM Administration Console when you are configuring activities from the VMM Integration Pack. If Runbook Designer is installed on a different computer than the runbook server, then you will also need to configure Windows PowerShell and WinRM on that computer.

Confirm Windows PowerShell 2.0 installation

Windows PowerShell 2.0 must be installed on both the Orchestrator runbook server, OR01; the Service Manager servers, SM01 and SM02; and the computer running the VMM Administration Console, VMM01. Follow these steps to confirm Windows PowerShell 2.0 installation:

1. Open Registry Editor.
2. Expand the **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\PowerShell\1\PowerShellEngine** subkey.
3. Confirm that the value of the Runtime Version entry begins with **v2.0**.
4. If this value begins with 1.0, or the subkey is not present, see Windows Management Framework (Windows PowerShell 2.0, WinRM 2.0, and BITS 4.0) for information on installing Windows PowerShell 2.0.

Confirm Windows Remote Management installation

Windows Remote Management 2.0 (WinRM 2.0) must be installed and configured on both the Orchestrator runbook server, OR01; the Service Manager servers, SM01 & SM02; and the computer

running the VMM Administration Console, VMM01. You can do this using the Local Group Policy Editor. Follow these steps to confirm Windows Remote Management installation.

1. Click Start, then Run, then type gpedit.msc, and then click OK.
2. Under Local Computer Policy, expand Computer Configuration, then expand Administrative Templates, and then expand Windows Components.
3. Verify that Windows Remote Management is listed.

For more information about how to install and configure WinRM 2.0, see the MSDN article, Installation and Configuration for Windows Remote Management.

Enable Windows Remote Management Trusted Hosts

WinRM requires that you explicitly specify the name of any host computers to which you will connect. This enhances security by ensuring that the Orchestrator runbook server is connecting to the expected computer running the VMM Administration Console. Follow these steps to enable Windows Remote Management Trusted Hosts:

1. On the Orchestrator runbook server OR01, open the **Local Group Policy** Editor. To do this click **Start**, click **Run**, type **gpedit.msc**, and then click **OK**.
2. 2. Under **Local Computer Policy**, expand **Computer Configuration**, then expand **Administrative Templates**, then expand **Windows Components**, then expand **Windows Remote Management**, and then select **WinRM Client**.
3. Double-click **Trusted Hosts**.
4. In the Trusted Hosts dialog box, select **Enabled**.
5. Add *.contoso.com to the **TrustedHostsList**. Click **OK**.

Windows PowerShell Execution Policy

The execution policy in Windows PowerShell determines which scripts must be digitally signed before the scripts will run. By default, the execution policy is set to Restricted which prohibits loading any configuration files or running any scripts. To run the scripts in this integration pack, you must set the execution policy to RemoteSigned on both the Orchestrator runbook server, OR01; the Service Manager servers, SM01 and SM02; and the computer running the VMM Administration Console, VMM01. Follow these steps to set the execution policy in Windows PowerShell:

1. Click **Start**, then **All Programs**, then **Accessories**, and then **Windows PowerShell**.
2. Right-click **Windows PowerShell** and select **Run As Administrator**. Click **Yes** when prompted by User Account Control.
3. Type the following command, and then press **Enter**.

```
↪ set-executionpolicy  remotesigned
```

4. Press **Y** to confirm change.

For more information about how to configure the Windows PowerShell execution policy, see Set-ExecutionPolicy in the Microsoft TechNet Library.

Use Windows PowerShell Remote Connection quota

You can use WS-Management quotas in Windows PowerShell remoting to protect the Orchestrator runbook server and the computer running the VMM Administration Console from excessive resource use, both accidental and malicious. The MaxConcurrentOperationsPerUser quota setting in the WSMan:\<ComputerName>\Service node provides this protection by imposing a limit on the number of VMM objects that can run concurrently.

By default, MaxConcurrentOperationsPerUser is set to 5. This means that a maximum of five VMM objects can run concurrently across all VMM activities. If this default setting does not meet the needs of your organization, review the TechNet article, About_Remote_Troubleshooting for information about how to configure remote operations in Windows PowerShell.

> Note: The MaxConcurrentOperationsPerUser affects all Windows PowerShell objects whether or not they are from a runbook. If there are remote sessions from other applications, they will be included in this limit.

Configure the System Center 2012 Virtual Machine Manager connections

Once you have validated the WinRM configuration, you must add a connection that defines communications between the Orchestrator runbook server and a computer running the VMM Administration Console. This configuration will include the credentials required to access VMM and the authentication protocol to be used. When you configure actions from the VMM Integration Pack, you select a configuration that defines the connection that the activity should use. You can create multiple configurations if you need to connect multiple VMM computers. Follow these steps to configure a System Center 2012 Virtual Machine Manager connection:

1. In the Runbook Designer, click the **Options** menu, then select **System Center 2012 Virtual Machine Manager**. The System Center 2012 Virtual Machine Manager dialog box appears.
2. On the **Configuration** tab, click Add to begin the configuration setup. The Connection Entry dialog box appears.
3. In the Name box, type a name for the connection. This could be the name of the VMM computer for example.
4. In the **Properties** box, enter a value for each property according to the following table.

Property	Descripti
VMM Administrator Console	The name or IP address of the computer running the VMM Administrator Console.
VMM Server	The name of the VMM server that action will be performed on. Use **localhost** to if the

Property	Descripti
User	The name of a user with access to VMM. This user account must have permissions to the VMM Administration Console and to the VMM server to perform the actions requested by the activities. If you leave this property empty, the configuration will use the credentials from the Runbook Service Account. If this account has appropriate permissions to VMM, then you do not need to provide credentials for the configuration.
Domain	The domain where the user account resides.
Password	The password for the specified user account.
Authentication Type (Remote only)	The type of authentication to use. This is only required if the runbook server and VMM Administration Console are installed on different computers. The authentication method that you choose must be enabled in WinRM. You can enable the authentication methods using the **Local Group Policy Editor**. For more information see the MSDN article, Installation and Configuration for
Port (Remote only)	The port used for Windows PowerShell remoting between the Orchestrator runbook server and the computer with the VMM Administration Console. This is only required if the runbook server and VMM Administration Console are installed on different computers.
Use SSL (Remote only)	Specifies whether SSL should be used for the connection. This is only required if the runbook server and VMM Administration Console are installed on different
Cache Session Timeout (min.)	The number of minutes before the session will timeout from lack of activity and need to reconnect.

5. Click OK.
6. Add any additional configurations as required.
7. Click Finish.

Configure the System Center 2012 R2 Service Manager connections

Once you have validated the WinRM configuration, you must add a connection that defines communications between the Orchestrator runbook server and a computer running the Service Manager Administration Console. This configuration will include the credentials required to access Service Manager and the authentication protocol that should be used. When you configure actions from the Service Manager Integration Pack, you select a configuration that defines the connection that the activity should use. You can create multiple configurations if you need to connect multiple Service Manager Computers. Follow these steps to configure a System Center 2012 R2 Service Manager connection:

1. In the Runbook Designer, click the Options menu, then select System Center 2012 Service Manager. The System Center 2012 Virtual Machine Manager dialog box appears.
2. On the Connections tab, click Add to begin the connection setup. The Connection Entry dialog box appears.
3. In the Name box, type a name for the connection. This could be the name of the Service Manager computer, for example.
4. In the Properties box, enter a value for each property according to the following table.

Property	Description
Server	The name of the Service Manager server that action will be performed on.
Domain	The domain that the user account resides in.
User	The name of a user with access to Service Manager. This user account must have permissions to the Service Manager Administration Console and to the Service Manager server to perform the actions requested by the activities. If you leave this property empty, the configuration will use the credentials from the Runbook Service Account. If this account has appropriate permissions to Service Account, then you do not need to provide credentials for the configuration.
Password	The password for the specified user account.

5. Click Test Connection, to validate that the connection works as expected.
6. Click OK.
7. Add any additional configurations as required.
8. Click Finish.

Create and test a runbook

Once Orchestrator is setup and configured with the proper integration packs, and connections to VMM and Service Manager, you can create a simple runbook that takes user input from a form in the Service Manager self-service portal, and then creates a virtual machine from a template in VMM.

You will create a runbook, and then test it using the Orchestrator Runbook Tester, in which parameters will be injected into the workflow.

> Note: Assuming you have completed the experience that showcases infrastructure provisioning referenced in the Prerequisites section, you will be able to create a virtual machine using the WS2012R2-VM service template.

- Create a new runbook.
- Configure the runbook parameters.
- Define the virtual machine to be created.
- Test the runbook.

Create a new runbook

System Center 2012 R2 Service Manager component uses runbooks to automate workflow procedures. The Runbook Designer provides a visual representation of the workflow procedures, and a place to create new runbooks.

> Note: Confirm that you have installed the System Center Integration Pack referenced in the Prerequisites section.

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Click the Runbook Designer shortcut in the taskbar and maximize it.
   In the **Navigation** tree, right-click Runbooks and select **New Runbook**.
2. Right-click the New Runbook tab and click **Check Out**.
3. Right-click the New Runbook tab and click **Rename**.
4. Type **AddVM** and press **ENTER**.

With the new runbook, Sarani can apply additional parameters for the commands to be executed in his new workflow. Whenever a new workflow or automated process is created, a new runbook will serve as the playbook for the associated process. Now Sarani will configure the individual parameters for the "AddVM" runbook.

In this step, configure the parameters of the runbook, beginning with the initialize data activity.

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the Activities pane, expand **Runbook Control**.
2. Click and drag **Initialize Data** into the workspace.
3. Double-click **Initialize Data**.
4. Under the **Details** tab click **Add** and click **Parameter 1**.
5. Append the line to read **Parameter 1 – User** and click **OK**.
6. Click **Add** and click **Parameter 2**.
7. Append the line to read **Parameter 2 – VMName** and click **OK**.
8. Click **Add** and click **Parameter 3**.
9. Append the line to read **Parameter 3 – VMTemplate** and click **OK**.
10. Click **Add** and click **Parameter 4**.
11. Append the line to read **Parameter 4 – Reason** and click **OK**.
12. Click **Add** and click **Parameter 5**.
13. Append the line to read **Parameter 5 – Cloud** and click **OK**.
14. Click **Finish**.

The "AddVM" runbook has been created with the desired parameters, including user requesting the provisioned virtual machine, requester email address, virtual machine name, correct VMM template, reason for the resource and the cloud in which the resource will be spun up.

Define the virtual machine to be created

In this step, you will link the desired virtual machine template to your runbook, setting the parameters for the virtual machine to be created.

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the Activities pane, click on the SC 2012 R2 Virtual Machine Manager Integration Pack.

2. Click and drag Create VM from Template to the workspace.
3. Hover over Initialize Data until an arrow appears. Move the mouse over to the arrow on the right-hand side of the icon, and wait for the crosshairs to appear.
4. Double-click the new blue arrow. Notice that it is defined as success, and click Cancel.
5. Double-click Create VM From Template.
6. In the Configuration area, click the ellipsis (…), select SC2012 VMM and click OK. Wait a moment for the Properties page to populate.
7. Click in the Destination Type field and click the ellipsis (…).
8. Select Cloud and click OK.
9. Click in the Destination field, click the ellipsis (…) and note the options.
10. Click Cancel.
11. Right-click in the Destination field and click Subscribe | Published Data.
12. Make sure Initialize Data is selected in the Activity dropdown, select Parameter05 - Cloud and click OK.
13. Click in the Path field, click the ellipsis (…), select D:\ and click OK.
14. Right-click in the VM Name field, and click Subscribe | Published Data.
15. Select Parameter 2 - VMName and click OK.
16. Click in the Source Template Name field, click the ellipsis (…) and note the options. Assuming you have completed the experience that showcases infrastructure provisioning, you will see the WS2012R2-VM service template.
17. Click Cancel.
18. Right-click in the Source Template Name field, and click Subscribe | Published Data.
19. Select Parameter 3-VMTemplate and click OK.
20. Click in the Cloud Capability Profile field, click the ellipsis (…), select Hyper-V and click OK.
21. Click Finish.

In earlier steps, we created the basic runbook for adding a virtual machine. Sarani has taken advantage of VMM integration via the integration pack to define the specs of the actual virtual machine to be built. In this process, Sarani creates a virtual machine from a VMM template and uses Runbook Designer to apply unique parameters for the template that the runbook will execute.

Test the runbook

In this step, test the runbook created in this experience.

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. From the System Center 2012 Orchestrator Runbook Designer select the AddVM runbook.
2. Click Runbook Tester.
3. On the Confirm Check out dialog select Yes.
4. From the Runbook Tester select Run.
5. In the Initialize Data Parameters dialog, enter the following data to test the runbook.

Note: The parameters may appear in a different order.

```
↪  Parameter  1-  User:  EndUser

↪  Parameter  2-  VMName:  VM01

↪  Parameter  3-  VMTemplate:  WS2012R2-VM

↪  Parameter  4-  Reason:  Web  Server

↪  Parameter  5-  Cloud:  Contoso-Cloud
```

The Runbook Tester starts and you can see progress in the Log.

> Note: When the test completes, the results should be a Pass for Initialize Data, followed by a Pass for Create VM From Template.

6. Expand Show Details for the Activity Create VM From Template.
7. Expand Show Details for Create Incident with Template. Scroll to ID and notice the incident ID generated for this test (Service-"Variable"). Make a note of this ID number.
8. Close the Runbook Tester.
9. In Runbook Designer, click Check In.
10. Close the Runbook Designer.

Within the Runbook Designer, Sarani has been able to test the runbook to make sure all of the steps are executed as expected without negatively impacting the production environment. Admins must be careful to ensure that the runbook is checked out when performing any creation or maintenance tasks within Orchestrator.

- ☑ **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

Table of Contents | Capability Scenarios

Application Performance Monitoring

Keep applications relevant with rapid application lifecycle

Role:

Service admin

Technology:

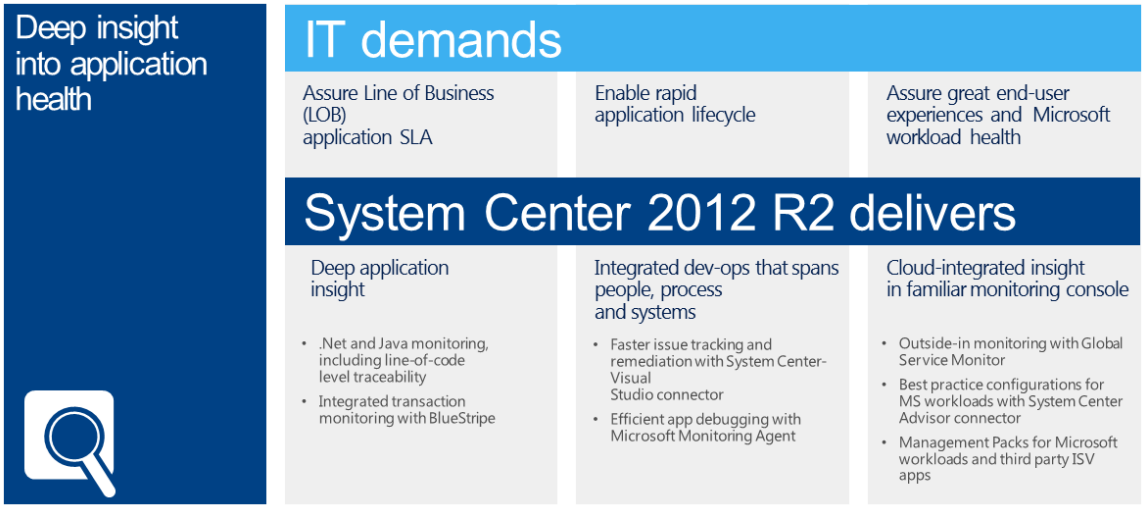
Microsoft System Center 2012 R2 Operations Manager

Features enabled in this capability

- Global Service Monitor (GSM).
- Management packs.
- Application Performance Monitoring for .NET and Java applications.

Server-side applications are the lifeblood of an organization and require close monitoring. Downtime and performance issues can disrupt operations, resulting in extra costs and lost revenue. Organizations need a consistent way to monitor the health, performance and availability of applications from development through production. As issues arise, deeper insight into how the application is performing helps identify whether an issue is related to hardware or software. By speeding the time it takes to find the root cause, you can more quickly identify the problem, resolve it and redeploy the updated application.

Application Performance Monitoring starts with aligning operations and application development. This can help avoid misunderstandings and friction. Providing operations the tools to effectively explain application issues can help developers diagnose and resolve problems. System Center provides monitoring information designed to allow insight to speed issue resolution. It supports effective monitoring during the application delivery lifecycle and throughout the datacenter infrastructure, independent of location.



Sarani, an IT service administrator at Contoso, shares monitoring responsibility for the various hosted applications. She wants to be able to provide detailed information to developers to help them resolve application problems, including insight into real-world application issues. In addition to information about application execution on the server, she requires information about client-side issues to understand where a problem may reside. Regular testing of frequently used and historically problematic execution pathways in various applications would help Sarani and her team members anticipate and quickly respond to performance issues and in some cases avoid application failures.

System Center provides the tools Sarani needs to monitor Contoso's applications.

- **Server-side monitoring** provides back end server information, monitoring the application where it actually resides and runs.
- **Client-side monitoring** provides insight into the end-user experience with the application, including load and execution times, network latency, and possible client-side scripting exceptions.
- **Synthetic monitoring** runs periodic prerecorded tests through predetermined paths, ensuring that the application remains available and functions correctly.

Experience: Using Application Performance Monitoring and Global Service Monitor

Global Service Monitor allows an organization to view the performance of an application from multiple points around the globe. Global Service Monitor helps an organization quickly identify possible access or performance issues that end-users around the world might encounter when trying to run an application. In this experience, you will configure Global Service Monitor and see how dashboards help you monitor application health.

References

For additional guidance, see the following TechNet articles:

Server Roles and Technologies in Windows Server 2012

Install or Uninstall Roles, Role Services, or Features

Before beginning this experience, create checkpoints of all your virtual machines. To do this, right- clicks on the virtual machine and select **Create Checkpoint.** This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Configure Global Service Monitor

System Center Global Service Monitor helps achieve a 360-degree view of the health of web applications. It uses Windows Azure points of presence across the globe, monitored alongside existing data found within the familiar System Center 2012 Operations Manager console. Global Service Monitor reports on availability, performance, and function of web applications by scheduling and executing synthetic transactions against the application from Windows Azure.

Add second external facing network connection to OM01

Begin this experience logged on to **OM01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

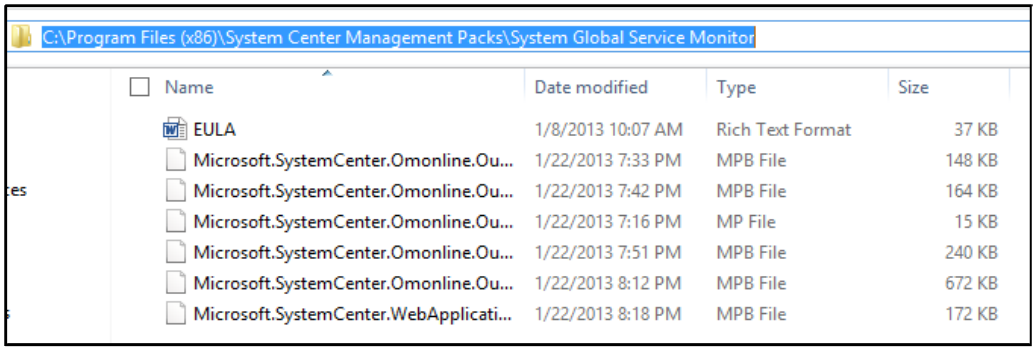
1. Open **Hyper-V Manager**.
2. Right-click on **OM01**, and select **Settings. I**f the virtual machine is running, shut it down before proceeding.
3. From the **Settings** menu, select **Add Hardware**. From the list of available hardware to add to your virtual machine, select **Network Adapter** and click **Add**.
4. In the **Network Adapte**r settings dialog for your new adapter, select **Eval-Internal for your Virtual Switch** and click **OK**.
5. Start the virtual machine.

Create a Global Service Monitoring trial account

Begin this experience logged on to **Host1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Launch a web browser and go to **http://www.microsoft.com/en-us/server-cloud/system- center/global- service-monitor.aspx.**
2. On the GSM Overview page, click on the **Sign-Up**→link in the top banner that says **External Monitoring**.
3. A new page should open requesting to either Sign In with an existing Microsoft Organizational Account, or Set a New Account. If setting up a new account, click **continue**. If you sign in with an existing account, proceed to Step 7 after you have signed in.

4. Click on the **Setup a New Account** to be directed to a web form requesting for details. Fill out the details, especially fields that are marked as ***Required**.
5. After successful creation of the Microsoft Organizational Account, you will be automatically signed in and re-directed to the Organizational Account homepage.
6. Click on the **System Center Global Service Manager** link that states GET STARTED.
7. You should be directed to another page that now states that your GSM trial has 90 days remaining. Click on the **Download** link.
8. Download the **Management Pack** and extract it to the **C:\Temp\GSM** folder.



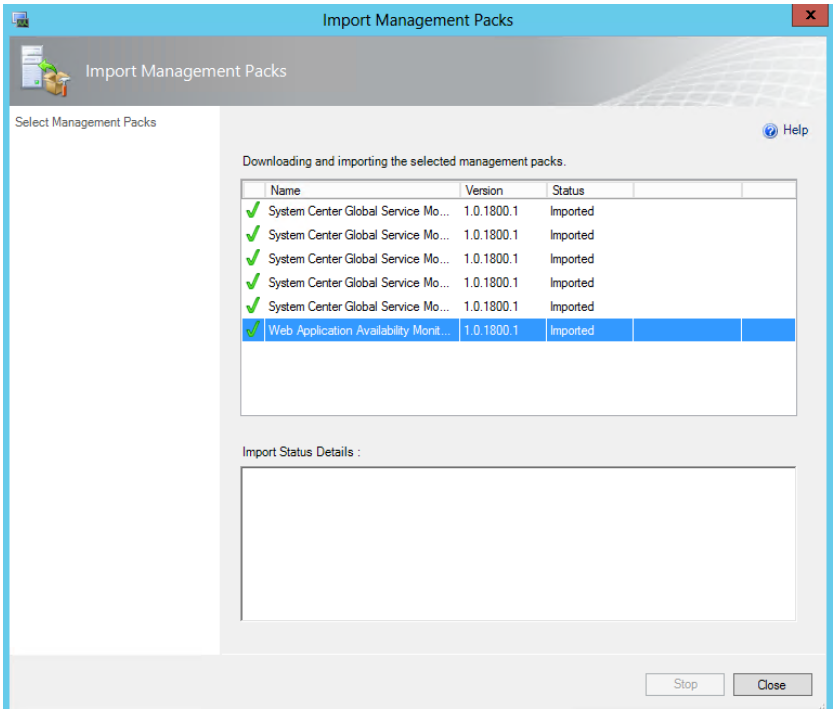
9. Close Internet Explorer.

Import the management pack

Begin this experience logged on to **OM01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the System Center Operations Manager 2012 window, click the Administration workspace.
2. Right-click **Management Packs** and select **Import Management Packs**.
3. Click on the **Add** button and select **Add from disk…**
4. When prompted with a message asking about whether to check on the Internet for dependencies, select **No**.
5. Browse to **\\Host1\Temp\GSM** and **Select all the files**. There will be six management pack files. Click **Open**.
6. If you see an error for the Visual Studio management pack, manually add an additional management pack: first, select Management Pack folder under System Center Operations Manager storage media and then import **Microsoft.SystemCenter.AlertAttachment.mpb** file. Finally, install Visual Studio Web Test Management Pack.
7. Click **Close**.

Verification



Configure the Global Service Monitor

1. In the System Center Operations Manager 2012 window, click the **Administration** workspace.
2. Select **Global Service Monitor** tree in the left **Details** pane.
3. On the Overview page on the right, click on **Install Windows Identity Foundation**.
4. After installation is completed, click on the **Verify Prerequisites** button on the page.
5. On the **Overview Page**, click on **Start Subscription**.
6. On the **Subscription Credentials Wizard** page, Sign-in using the Microsoft Organizational account credentials created earlier.
7. When signed in, then click **Next**.
8. On the **Component Configuration** page, select **All Management Servers Resource Pool** in the **Resource Pool** section.
9. Click **Next**.
10. Click **Start Subscription**.
11. When completed, click **Finish**.

Configure Web Application Availability tracking

1. In the System Center Operations Manager 2012 window, click the **Administration** workspace.
2. Select **Global Service Monitor** in the LEFT Details pane.
3. On the right pane, click on Configure Web Application Availability Tests.
4. In the Add Monitoring wizard window, select **Web Application Availability Monitoring**,

click **Next**.

5. In the **Name** field, type **Fourth Coffee Web Availability**.
6. In the **Management** pack section, click **New**.
7. In the **Create a Management Pack** window, select the **Name** textbox and type **GSM Management Pack**, and then click **Next**.
8. On the **Knowledge Article** page, click **Create** and click **Next**.
9. On the **What to Monitor** page, click on the **Name** and **URL** sections, type the following and click **Next**.
    a. Name: **Fourth Coffee Home**
    b. URL: **http://fourth-coffee.azurewebsites.net**
10. On the **Where to Monitor From** page, above the **External Locations** section, click **Add**.
11. On the **Select External Locations** page, do the following:
    a. From the Search For options, select **External Location** and click **Search**.
    b. From Where to Monitor results, select **GB : London** and click **Add**.
    c. From Where to Monitor results, select **RU : Moscow** and click **Add**.
    d. Click **OK**, click **Next**.
12. On View and Validate Tests page, click on Change Configuration.
    a. Change the **Test Frequency** to **5** minutes, press **Tab**. Ensure **Performance data collection interval** updates to 5 minutes as well.
    b. Enable the **Transaction Response Time** and configure **Greater than 0.5 seconds**.

        Note: This setting is to demonstrate that the alert that can be picked up based on a criterion. You may want to change this in your production environment.

    c. Click **Apply**, and then **OK** on the same page.
13. Click **Next**.
14. On the **Summary** page, review the configuration and click **Create**.

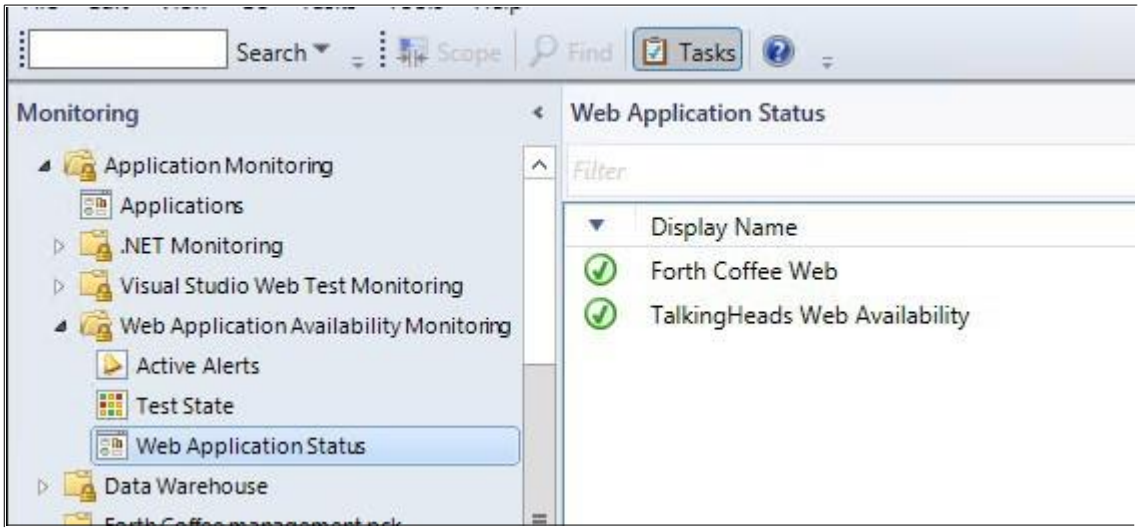
Restart the health service

1. On the **Desktop**, double-click and launch the **Services Control Panel.**
2. In the **Services** Window, search for the **System Center Management service**.
3. Right-click the **System Center Management** service and select **Restart**.
4. After successful **Restart**, you may close the Services window.
5. On the SCOM Operations Console, go to the **Monitoring** Workspace. In the Monitoring tree view, go to **Application Monitoring web Application Availability Monitoring** and click on **Web Application Status**.

    Note: It may take up to 10 minutes for the Web Application to be monitored. Refresh the view to update the view if you do not see it.

Verification

Note under the Web Application Availability Monitoring View that the Website is now being monitored.

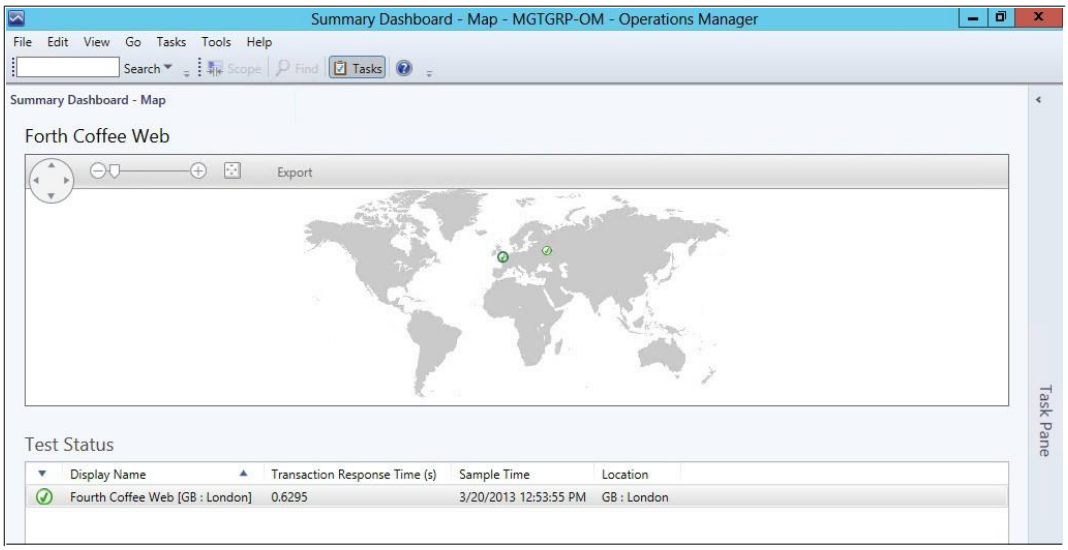


Viewing the Global Service Monitor summary dashboard

1. In the System Center Operations Manager 2012 window, click the **Administration** workspace.
2. On the LEFT Details Pane, click on **Global Service Monitor**.
3. On the RIGHT Overview Pane, under **Actions**, click on **View Test State**. If you are unable to view the **View Test State**, then take the following steps:
    a. Go to the **Monitoring** workspace. Under the **Application Monitoring Folder View** expand **Web Application Availability Monitoring**.
    b. Click and select the **Test State** view.
4. On the Details pane, select one of the **Fourth Coffee Monitoring** entries.
5. On the Task Pane, on the right under **the Navigation** section, click on **Summary Dashboard – Map**. If the pane is hidden, click on the Arrow to see it.
6. Click and select the **Health State Icons** on the Map to view the Test Results.

Verification

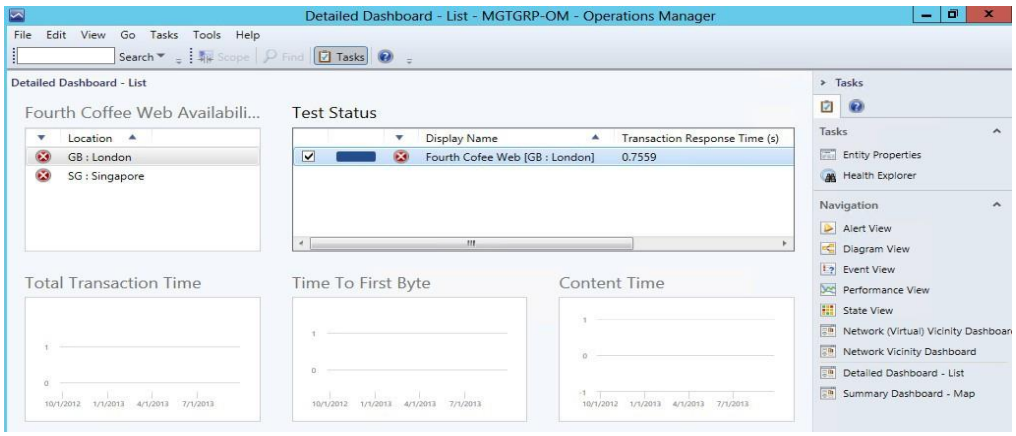
Note the map view showing the Point of Presence (PoP) that was chosen. Select multiple PoP.



Viewing the Global Service Monitor detailed dashboard

1. In the System Center Operations Manager 2012 window, click the **Administration** workspace.
2. On the left Details Pane, click on **Global Service Monitor**.
3. On the right **Overview Pane**, click on **View Test State**, under **Actions**. If you are unable to see the **View Test State**, do the following steps:
   a. Go to the **Monitoring** workspace. Under the **Application Monitoring Folder View** expand **Web Application Availability Monitoring**.
   b. Click and select the Test State view.
4. On the **Details** pane, select one of the **Fourth Coffee Monitoring** entries.
5. On the **Task Pane**, on the right under the **Navigation** section, click b – List. If the pane is hidden, click the Arrow to see it.
6. On the **Detailed Dashboard** page, click and select **GB : London**.
7. On the Test Status widget, enable the **Fourth Coffee Web [GB : London]** test status.
8. View the metrics in the different widgets.

Verification



- **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

Experience summary

In this experience, you configured the Global Service Monitor feature and looked at how the dashboards give you important information about the health of your applications.

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IT Service Management

Integrate people, process and knowledge

Role

Service admin

Technology

Microsoft System Center 2012 R2 Service Manager

Features enabled in this capability

- Chargeback Support
- Problem, incident, and change management.
- Cloud Service Process Pack (CSPP)

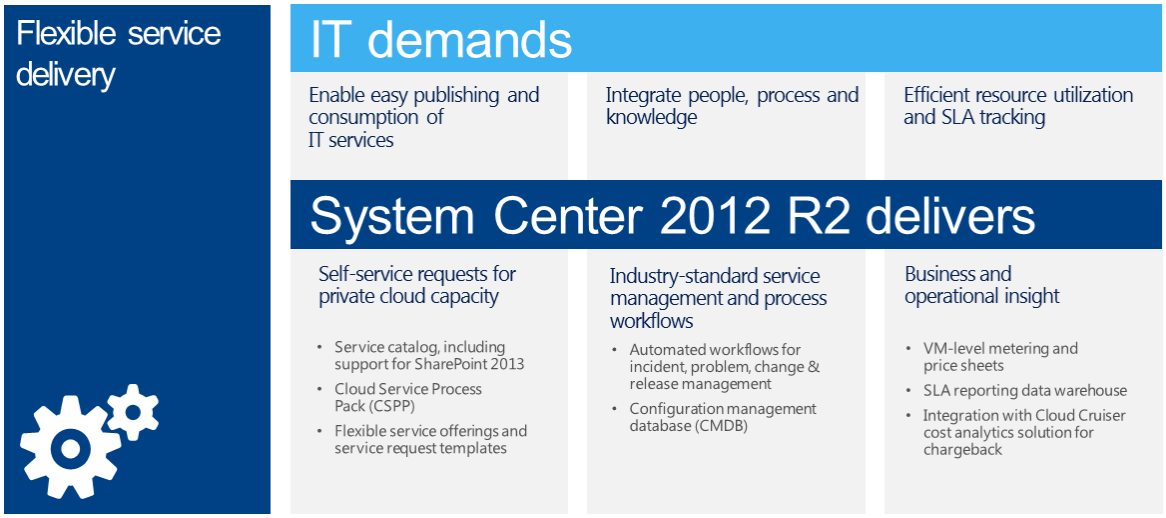
When you manage an IT infrastructure that spans across on-premises, Azure and service provider platforms, standardizing practices such as incident management, change management, and release management can help you stabilize the service delivery model and maximize uptime.

System Center 2012 R2 Service Manager takes advantage of these processes based on ITIL v3 standards and delivers a framework for service admins to apply their unique policies and deliver infrastructure resources more efficiently. Enhanced reporting capabilities provide IT with insights and analysis to better equip the enterprise to make key business decisions.

For both short term maintenance and long term capacity planning, the ability to collect usage data and trends is key. Chargeback reporting can provide consumption data to help balance datacenter resources against service needs and business objectives. When resources are provisioned but not fully used, for example, the organization ties up resources that could be used elsewhere. Chargeback data can empower IT to affect usage behavior across the enterprise.

By implementing the ITIL processes and enabling chargeback support, service admins can take advantage of the robust configuration management database (CMDB) that stores all of the policies and schema for the automated tasks performed across the datacenter infrastructure. System Center 2012 R2 supports IT service management by helping you monitor the health of your infrastructure. It enables you to:

- Apply ITIL processes and meet service level agreements.
- Scale cloud resources based on cost, pricing and usage trends with chargeback support.
- Automatically implement changes and resolve problems proactively and reactively.



As Contoso's lead service admin, Sarani needs information that can help her deploy services predictably and anticipate future changes in demand. This data helps her team accurately forecast future needs and recommend timely investment in new resources and reallocation of existing resources.

Sarani requires infrastructure information delivered concisely in an easily understood format. She depends on Service Manager for insight into the consumption and status of cloud resources consumed from Virtual Machine Manager:

- Reporting provides visibility into cloud usage and applies chargeback capabilities.
- Comprehensive reporting provides insight into current and historical service usage and associated costs. For example:
  - Building utilization reports enable datacenter administration IT decision-making.
  - Operations Manager provides operational reports for utilization and forecasting.
  - Service delivery reports provide problem and incident trends and demonstrate the overall state of service offerings.

Experience: Enable reporting insights with the chargeback feature

Now that you've set up the new System Center 2012 R2 components within your own environment, you may want to take some time to explore the chargeback capabilities available in the Service Manager component.

Features enabled in this capability

To learn more about the features that enable IT service management capabilities, see the following TechNet resources:

Service Manager blog

Service Manager Operations Guide

Chargeback scenario example

System Center 2012 R2 Service Manager leverages chargeback support to report on cloud service usage to minimize virtual machine oversubscription and underutilization. There is dependency on the integration between Virtual Machine Manager, Operations Manager and the data warehouse in Service Manager.

Follow these steps to enable chargeback reports for cloud services that are requested by various tenant users throughout the enterprise. First, set up the chargeback feature manually to explore the reporting features for cloud services.

Important

Before getting started, make sure that a minimum of 8GB RAM is allocated to the Service Manager (SM01) virtual machine. If not, the performance may be poor.

Begin this step logged on to **SM01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Install and configure the chargeback reports using the instructions on TechNet.
2. Download the Cloud Service Process Pack (which applies to R2 as well).
3. Run the wizard by clicking on the Setup executable within the CSPP folder you downloaded.
4. Click Install the Cloud Service Process Pack and follow the steps in the wizard.

   Note: You may navigate to the Windows Installer file (.msi) directly. The file is called IaaSRequestMPB and it is located at \\<your download location>\CSPP\Setup.

5. When complete, return back to the wizard and then click Install the Cloud Services Runbooks.

   Note: You may navigate to the Windows Installer file (.msi) directly. The file is called SCORunbooks and it is located at \\<your download location>\CSPP\Setup.

Explore chargeback capabilities

You are now ready to explore chargeback capabilities within your datacenter. Here are some hyperlinks to guide you through further evaluation:

1. Create and modify a price sheet.
2. Publish your price sheet.
3. Assign your price sheet to a cloud.
4. Manage user roles and price sheets
5. View and use your chargeback reports.
6. Configure sample chargeback reports.
7. Use and manage standard reports for other IT service management processes.
8. Use OLAP cubes for advanced analytics.
9. Customize the data warehouse.

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Conclusion

System Center and the Datacenter

As you have seen in these pages and in your evaluation environment, System Center delivers a management layer that helps IT organizations automate routine tasks, empower business application owners and free up resources to support high impact projects. Organizations gain the ability to quickly offer new, value-add application services while maintaining focus on IT control and costs.

If you have already walked through some of the experiences, take the time to explore your evaluation environment further. Review the *Appendix: System Center Resources* for ideas and more information.

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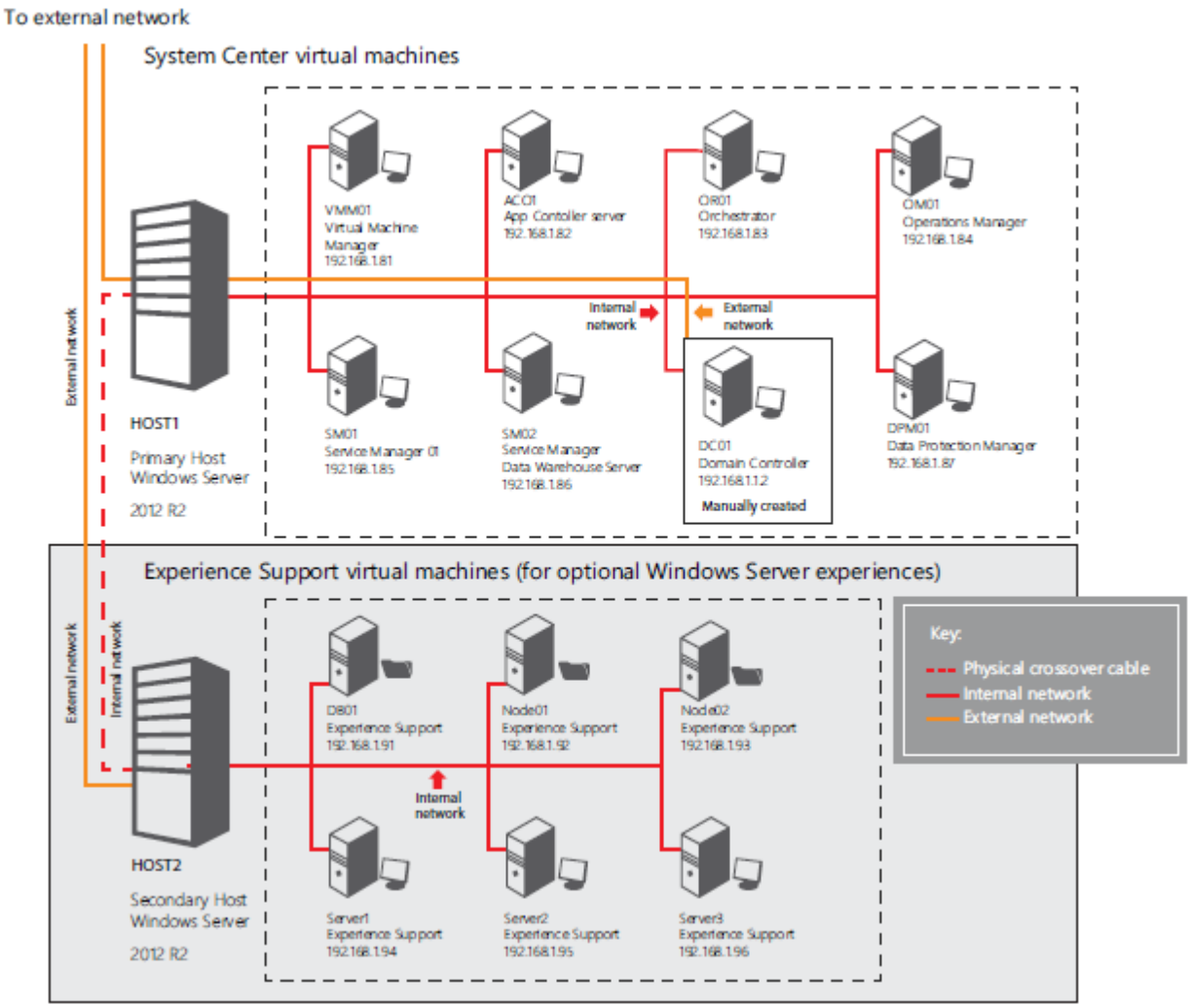
Appendix: Using the Evaluation Scripts

Introduction to the evaluation scripts

You can download evaluation scripts from Microsoft that can help you set up a datacenter evaluation footprint similar to what you see in the following diagram. The Windows PowerShell scripts can be customized to fit your environment.



When you download and run the Datacenter Evaluation Deployment Tool.msi file, the scripts download to **C:\temp** unless you change the directory. Move the files to the **C:\temp** folder on **Host1**. You can use these files to create and configure the virtual machines for the experiences. The scripts work with Windows 8.1 and Windows Server 2012 R2 operating systems.

The scripts folder includes:

- **VMCreator.ps1** is a script to build virtual machines.
- **SysCenterVariable.xml** contains settings used by the VMCreator.ps1 script to set up the virtual machines for the System Center experiences.
- **Downloader.ps1** downloads the prerequisites needed to configure System Center.
- **Workflow.xml** contains settings for the downloader script.
- You will also see, but not use these files:
    - An **ExperiencesVariable.xml** file – this file contains settings used to set up the virtual machines for Windows Server experiences. This script works with the experiences in the *Windows Server 2012 R2 Evaluation Guide*.
    - An **ActiveDir folder** with scripts to set up the domain controller as detailed in the *Windows Server 2012 R2 Evaluation Guide*.

Using a second script to configure System Center virtual machines for evaluation experiences

Installing the System Center environment requires four main steps, as follows. You can use scripts as an option for two of these steps.

1. Manually prepare the hosts as outlined at the beginning of the *System Center Installation* section.
2. Create the evaluation virtual machines using one of the two following approaches:
    - Option A: Run the evaluation script **VMCreator.ps1** to create and configure the virtual machines. The steps to use this script are detailed in the *System Center Deployment* section of this guide.
    - Option B: Deploy the evaluation virtual machines through manual configuration.
3. Download the software needed to install System Center, including the prerequisites, using one of the two following approaches:
    - Option A: Manually download the prerequisites as detailed in the *System Center Deployment* section.
    - Option B: Run the evaluation script **Downloader.ps1** to automatically download prerequisites for installing System Center. The steps to use this script are detailed in the following section.
4. Manually deploy System Center as detailed in the *System Center Deployment* section.

The following section explains how to use the Downloader.ps1 script to download the prerequisites you need in your System Center environment, saving you time and effort.

Download the prerequisites using evaluation script

The downloader script extracts the software necessary to configure the virtual machines. Executing the downloader script can take a few hours depending on the internet connection speed.

Note: The content being downloaded by the downloader script is not necessary for running the VMCreator script. The content is necessary for configuring System Center, after the virtual machines have been created with the operating system.

Execute Downloader.ps1

The script will download and extract the files into the C:\temp folder.

1. Start **Windows PowerShell** as **Administrator** and navigate to the **Evaluation** files.
2. Run the **Downloader.ps1** script: \Downloader.ps1
3. The download script will download these prerequisites to C:\temp
   - SQL Server 2012 SP1
   - Windows Assessment and Deployment Kit (Windows ADK)
     - Windows Deployment Tools
     - Windows Preinstallation Environment
   - Silverlight
   - WCF Data Services 5.0
   - System Center 2012 R2 Virtual Machine Manager Console
   - SQL Server 2008 R2 Management Tools
   - Report Viewer 2010 Redistributable
   - System Center 2012 R2 Orchestrator Component Add-Ons and Extensions
4. When complete, the downloader script will open Internet Explorer to the System Center 2012 R2 download page.
5. Register and download System Center software
6. Mount the ISOs on Host 1.
   a. Navigate to ISO files.
   b. Click **ISO file**, in top navigation click **Manage**, and then click **Mount**.
   c. **Copy** all files and **Paste** into appropriate folder on **C:\temp** on **Host1**.
   d. **Paste** these files into the **C:\temp** folder on **Host 2** also, if you are using.

Install prerequisites on the virtual machines

Once you have downloaded the prerequisites, note the file locations for those items downloaded by the script. You will find all software on the C:\temp folder on Host1.

You are now ready to configure System Center, using the instructions in the *System Center Deployment* section of this guide.

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Appendix: Advanced System Center Experiences

Automation and Self Service

These advanced experiences offer a deeper view into how Service Manager and Orchestrator can help automate resource request fulfillment through runbooks and Windows PowerShell, while enforcing controls for business processes and rules. In this experience, you will configure the Service Manager connection and review a runbook.

Prerequisites

This experience requires additional software setup and configuration.

- Install and configure the System Center 2012 Virtual Machine Manager Integration Pack using the instructions included in the experience in the *Automation and Self-Service* section.
- Download Orchestrator Runbook Samples and save to Host1 C:\Temp\RunbookSamples.

Reference links

For additional guidance, see the following TechNet articles:

Getting Started with System Center 2012 Configuration Manager

Getting Started with System Center 2012 Operations Manager

Getting Started with System Center 2012 Orchestrator

Using Services Templates in System Center 2012 Virtual Machine Manager

Before beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint.** This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Configure the Service Manager connection

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the Runbook Designer, click the **Options** menu, then select **System Center 2012 Service Manager**. The System Center 2012 Virtual Machine Manager dialog box appears.
2. On the Connections tab, click **Add to begin the connection setup**. The Connection Entry

dialog box appears.

3. In the Name box, type a name for the connection. This could be the name of the Service Manager computer, for example.
4. In the Properties box, enter a value for each property according to the following table.

Property	Description
Server	The name of the Service Manager server where the action will be performed
Domain	The domain where the user account resides
User	The name of a user with access to Service Manager. This user account must have permissions to the Service Manager Administration Console and to the Service Manager server to perform the actions requested by the activities. If you leave this property empty, the configuration will use the credentials from the Runbook Service Account. If this account has appropriate permissions to Service Account, then you do not need to provide credentials for the configuration.
Password	The password for the specified user account

5. Click **Test Connection** to validate that the connection works as expected.
6. Click **OK.**
7. Add any additional configurations as required.
8. Click **Finish**.

Install Orchestrator Runbook Samples

In this step, you will browse through available integration packs. Integration packs enable you to extend System Center functionality by integrating with other Microsoft and third-party platforms and products.

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. On OR01, click the **Actions→Import** link in the taskbar.
2. In the Import Options Window, under file location browse to: **\\Host1\Temp\RunbookSamples** and select **SC2012_Solution_Examples.ois_export** and click **Open**.

   Note: Alternatively, you can download the file from CodePlex.

3. Use the pre-defined default settings and click **Finish**.

You should now see the sample Runbooks under **Runbooks→SC2012 Solutions**.

Browse integration packs

In this step, you will browse through available integration packs. You can expand System Center's functionality and ability to integrate with other Microsoft and third-party platforms and products by

installing integration packs.

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. From the Deployment Manager, expand **Orchestrator Manager**.
2. Review the Activities in the following **Integration Packs**:
   - System
   - Monitoring
   - File Management
   - Utilities
   - Windows Azure
   - Active Directory
   - System Center 2012 Service Manager
   - System Center 2012 Virtual Machine Manager
   - Assuming you have installed all System Center integration packs, also review the activities for the following:
     - (optional) System Center 2012 Operations Manager
     - (optional) System Center 2012 Data Protection Manager
     - (optional) System Center 2012 Configuration Manager

Review a runbook

In this step, review the properties of a runbook. Runbooks in System Center 2012 Service Manager are used to automate procedures among single or disparate systems.

Begin this step logged on to **OR01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the Runbook Designer navigation pane, navigate to **OR01 | Runbooks | SampleBooks (or a name similar to SM-CloudServices) | SC2012 Solutions | 1.0 Cloud Management | 1.1.0 VM Checkpoint Management**.
2. Select the tab for **Cloud Management | VM Checkpoint Management | 1.1.2 Manage Checkpoint**.
3. Double-click the **Initiate Checkpoint Management** activity. Review the different data inputs that will be used in this workflow, noting the Virtual Machine Name and Action (Remove or Restore).
4. Click **Cancel**.
5. Double-click the **Get VM** activity.
6. Double-click the line of text **VM Name under Filters**.

   Note: This takes the input Virtual Machine Name from the last activity and uses this parameter to specify which virtual machine will be changed by this runbook.
7. Click **Cancel**.
8. Double-click the **Failure Notification 1** activity.

   Note: This will create a system event warning that an administrator can

view later using parameters passed from the Initiate Checkpoint Management activity. This warning will be triggered if the virtual machine cannot be found.

9. Click **Cancel**.
10. Double-click the **Type Check activity**.

    Note: This will look at user input and make a decision based on the data using conditional statements.

    Based on the outcome of this comparison the workflow will branch into different directions. This comparison looks at whether the input is a Checkpoint Name (the upper path to Get Checkpoint – Name) or a Checkpoint ID (the lower path to Get Checkpoint Name (2).

11. Click **Cancel**.
12. Double-click the upper activity called **Get Checkpoint – Name**.

    Note: This activity takes the Checkpoint Name and VM ID parameters from the Initiate Checkpoint Management activity. It will then find a checkpoint for a particular virtual machine using the name of the checkpoint.

13. Click **Cancel**.
14. Double-click the **Passthrough** activity which will run a script.
15. Under Language in the Type box click the **ellipsis (…)**.

    Note: Note the different types of scripts that can be triggered in Orchestrator, and also note that these scripts can even invoke other scripts or APIs.

16. Click Cancel and Cancel again.
17. Double-click the Manage Checkpoint activity.
18. Restore a checkpoint and click Cancel.
19. Double-click the **Failure Notification 2** activity.

    Note: This will create a system event error that an administrator can view later using parameters passed from the Initiate Checkpoint Management activity. This error will be triggered if Virtual Machine Manager is unable to Remove or Restore a checkpoint.

20. Click **Cancel**.
21. Double-click the **Success Notification** activity.

    Note: This will create a system event informational alert that an administrator can view later using parameters passed from the Initiate Checkpoint Management activity. This alert will be triggered if Virtual Machine Manager is able to successfully Remove or Restore a checkpoint.

22. Click **Cancel**.

- **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

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Appendix: System Center Resources

References for IT Professionals

Take a look at videos, podcasts, and educational sessions created for IT pros.

Video and audio resources	Details
TechNet Radio	The podcast for anyone who is passionate about IT. Weekly guests include IT peers and technical roles inside Microsoft and industry experts.
TechNet Video	Videos, screencasts, podcasts, and articles to help IT pros stay up to date on the latest Microsoft products and
The Edge Show (formerly TechNet Edge)	Weekly news from Microsoft relevant for IT pros and a technical dive into various products and scenarios like Windows Server, Windows Azure, Private Cloud, and Consumerization of IT.
TechEd 2013 Keynote Presentation	With Brad Anderson, Microsoft
TechEd 2013 Foundation Session: Transform the Datacenter with Server and Management Innovations from Microsoft	With Jeffrey Snover and Jeff Woolsey, Microsoft
TechEd 2013 Foundation Session: Big Data. Small Data. Any Data	With Shawn Bice, Microsoft
TechEd 2013 Foundation Session: Enabling People-Centric	With Andrew Conway, Microsoft
TechEd 2013 Foundation Session – Building Modern Business	With Scott Woodgate, Microsoft
MMS 2013 Keynote – Cloud Optimize your Business with Microsoft Management Solutions	With Brad Anderson, Microsoft

Event Resources
TechEd North America 2013, New Orleans, June 3-June 6
Build 2013, San Francisco, June 26-June 28
TechEd Europe 2013, Madrid, June 25-June 28
Microsoft Management Summit 2013, Las Vegas, April 8-April 12

Education
Microsoft Virtual Academy Courses – System Center
Microsoft Virtual Academy Courses – Windows Azure
Microsoft Virtual Academy Courses – SQL Server
Microsoft Learning – Private Cloud training
Microsoft Learning – SQL Server training
Microsoft Learning – Windows Azure training
Microsoft Jump Start series

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