**Practical 1**

**Overview**

**Hyper-V** is Microsoft's hardware virtualization product. It allow you to create and run a software version of a computer, called a *virtual machine*. Each virtual machine acts like a complete computer, running an operating system and programs. When you need computing resources, virtual machines give you more flexibility, help save time and money, and are a more efficient way to use hardware than just running one operating system on physical hardware. Hyper-V runs each virtual machine in its own isolated space, which means you can run more than one virtual machine on the same hardware at the same time. You might want to do this to avoid problems such as a crash affecting the other workloads, or to give different people, groups or services access to different systems.

Features of Hyper-V

**Computing environment** - A Hyper-V virtual machine includes the same basic parts as a physical computer, such as memory, processor, storage, and networking. All these parts have features and options that you can configure different ways to meet different needs. Storage and networking can each be considered categories of their own, because of the many ways you can configure them.

**Disaster recovery and backup** - For disaster recovery, Hyper-V Replica creates copies of virtual machines, intended to be stored in another physical location, so you can restore the virtual machine from the copy. For backup, Hyper-V offers two types. One uses saved states and the other uses Volume Shadow Copy Service (VSS) so you can make application-consistent backups for programs that support VSS.

**Optimization** - Each supported guest operating system has a customized set of services and drivers, called *integration services*, that make it easier to use the operating system in a Hyper-V virtual machine.

**Portability** - Features such as live migration, storage migration, and import/export make it easier to move or distribute a virtual machine.

**Remote connectivity** - Hyper-V includes Virtual Machine Connection, a remote connection tool for use with both Windows and Linux. Unlike Remote Desktop, this tool gives you console access, so you can see what's happening in the guest even when the operating system isn't booted yet.

**Security** - Secure boot and shielded virtual machines help protect against malware and other unauthorized access to a virtual machine and its data.

Uses of Hyper-V

* **Establish or expand a private cloud environment.** Provide more flexible, on-demand IT services by moving to or expanding your use of shared resources and adjust utilization as demand changes.
* **Use your hardware more effectively.** Consolidate servers and workloads onto fewer, more powerful physical computers to use less power and physical space.
* **Improve business continuity.** Minimize the impact of both scheduled and unscheduled downtime of your workloads.
* **Establish or expand a virtual desktop infrastructure (VDI).** Use a centralized desktop strategy with VDI can help you increase business agility and data security, as well as simplify regulatory compliance and manage desktop operating systems and applications. Deploy Hyper-V and Remote Desktop Virtualization Host (RD Virtualization Host) on the same server to make personal virtual desktops or virtual desktop pools available to your users.
* **Make development and test more efficient.** Reproduce different computing environments without having to buy or maintain all the hardware you'd need if you only used physical systems.

**Practical NO 2**

System Center Virtual Machine Manager (SCVMM) is [Microsoft's virtual machine support center](https://searchservervirtualization.techtarget.com/tip/Managing-virtual-machines-with-Microsoft-System-Center) for Windows-based systems. SCVMM help administrators consolidate multiple physical servers within a central virtualized environment.

Before Virtual Machine Manager, administrators used Microsoft's Virtual Server product to meet their needs, including the creation and management of virtual machines. Released in 2004, Virtual Server came in two versions, Standard and Enterprise edition.

It is designed to build on Virtual Server, Virtual Machine Manager was later added to the System Center product line and is now a standalone product.

Several core components make up the foundation for SCVMM's more advanced functionalities: the manager server, library server, manager database, Administrator Console and virtual machine host.

When Virtual Machine Manager 2008 was released, Microsoft combined these core competencies with SCVMM 2007 features and added several upgrades for enhanced performance and functionality. The updates include [support for Microsoft Hyper-V](https://searchservervirtualization.techtarget.com/tip/Using-Virtual-Machine-Manager-for-Hyper-V-management), access management through three different user roles and Hyper-V failover cluster support with Active Directory.

In 2009, however, Microsoft revamped SCVMM yet again and delivered [Virtual Machine Manager 2008 R2](https://searchservervirtualization.techtarget.com/tip/New-features-in-Microsofts-SCVMM-R2-improve-Hyper-V-management) with added support for Windows Server 2008 R2 Hyper-V and VMware virtual machines. Other improvements include increased flexibility when working with virtual machines, simplified host management and storage enhancements.

**NEW FEATURES**

* **Smoother VM migration** – SCVMM 2008 R2 includes improved virtual machine transfers with Live Migration, which allows a virtual machine to be transferred from one host to another without any downtime. Note that an upgrade to Windows Server 2008 R2 is necessary for Live Migration to work with Virtual Machine Manager.
* **Added backup support** – With Virtual Machine Manager 2008 R2, VM migrations can now take place using storage area networks (SANs) with automated capabilities to eliminate the manual work that previously accompanied VM migrations. Other SAN-related upgrades include enhanced iSCSI and cluster support.
* **Consistency with CSV** – SCVMM 2008 R2 helps eliminate the issue of complex LUN configuration and management with Cluster Shared Volumes (CSVs), used to simplify virtual machine failovers. Additionally, Cluster Shared Volumes provide a simplified overall storage system.
* **Riskless maintenance mode** – Maintenance mode is another addition to SCVMM 2008 R2 that provides secure upgrades and maintenance without threatening the virtual machines in a cluster. When in maintenance mode, administrators can transfer virtual machines into a "saved state" or use Live Migration.

**FEATURED CONTENT**

* [**Virtual Machine Manager R2 released to manufacturing**](https://itknowledgeexchange.techtarget.com/server-virtualization/virtual-machine-manager-2008-r2-released-to-manufacturing/)
* [**Microsoft readies Virtual Machine Manager self-service portal**](https://searchwindowsserver.techtarget.com/news/1516698/Microsoft-readies-Virtual-Machine-Manager-self-service-portal)
* [**The nuances of managing VMware virtual machines with SCVMM**](https://searchwindowsserver.techtarget.com/tip/The-nuances-of-managing-VMware-virtual-machines-with-Microsoft-SCVMM)

**App Controller**

* Microsoft System Center App Controller is a new member of the System Center family of products. Although other products in this suite can be implemented independently of one another (with the ability to integrate, of course), App Controller is highly dependent on System Center Virtual Machine Manager (VMM) or Windows Azure.
* App Controller is a product for managing applications and services that are deployed in private or public cloud infrastructures, mostly from the application owner's perspective. It provides a unified self-service experience that lets you configure, deploy, and manage virtual machines (VMs) and services. App Controller also focuses on services and applications. App Controller lets users focus on what is deployed in the VM, rather than being limited to the VM itself.

Practical 3 :

* Microsoft System Center App Controller is a new member of the System Center family of products. Although other products in this suite can be implemented independently of one another (with the ability to integrate, of course), App Controller is highly dependent on System Center Virtual Machine Manager (VMM) or Windows Azure. App Controller is a product for managing applications and services that are deployed in private or public cloud infrastructures, mostly from the application owner's perspective. It provides a unified self-service experience that lets you configure, deploy, and manage virtual machines (VMs) and services. VMM Self-Service portal was used primarily for creating and managing VMs, based on predefined templates; App Controller also focuses on services and applications. App Controller lets users focus on what is deployed in the VM, rather than being limited to the VM itself.

**The key point is**

* self-servicing: App Controller enables application owners to deploy new instances of a service or application without requiring them to deal with jobs such as creating VMs, Virtual Hard Disks (VHDs), or networks or installing OSs. To achieve that level of automation, administrators should do a lot of work in VMM
* App Controller can't create or manage building blocks for VMs or services. Nor can it be used to create new objects from scratch (except for service instances). Anything you work with in App Controller must first be prepared in VMM. That means creating VM templates, guest OS profiles, hardware profiles, application profiles and packages, and logical networks, as well as providing Sysprepped .vhd files, ISO images, and private cloud objects. To deploy services through App Controller, a VMM administrator must create a service template and deployment configuration. Self-service user roles also should be created in VMM and associated with one or more private clouds and quotas.
* App Controller doesn't have its own security infrastructure: It relies completely on security settings in VMM, so available options for a user in App Controller depend directly on the rights and permissions that are assigned to the user in VMM. Authentication is performed by using a web-based form, but you can opt to use Windows Authentication in Microsoft IIS to achieve single sign-on (SSO).

**Private Clouds**

* [Private clouds](https://www.asigra.com/private-enterprise-clouds) are data center architectures owned by a single company that provides flexibility, scalability, provisioning, automation and monitoring.  The goal of a private cloud is not sell “as-a-service” offerings to external customers but instead to gain the benefits of cloud architecture without giving up the control of maintaining your own data center.
* Private clouds can be expensive with typically modest economies of scale. This is usually not an option for the average Small-to-Medium sized business and is most typically put to use by large enterprises. Private clouds are driven by concerns around security and compliance, and keeping assets within the firewall.

**Practical 4**

* Data protection management (DPM) is the administration of backup processes to ensure that tasks run on schedule, and that data is securely backed up and recoverable. Good data protection management means having effective processes and methodologies in place to maintain data integrity.
* Data protection management software is the enterprise data storage market with data backup reporting tools designed to help storage administrators analyze their backup environments. Early DPM products reported on backup failure and success rates.
* Modern data protection management tools allow storage administrators to set service level-driven backup and recovery policies and tier data protection based on its value to the business. The newer products are designed to help administrators understand what is or is not working in their environment so they can spend less time troubleshooting and more time managing errors and infrastructure issues. A data protection management tool can provide visibility into such issues that isn't possible with a standalone backup application.

DPM can be used for the following tasks:

* **Data backup**—Back up data to and recover data from Windows servers, Windows client computers, and supported Microsoft applications. For more details, see the [DPM protection support matrix](https://technet.microsoft.com/en-us/library/jj860400(v=sc.12).aspx), and [Plan for data backup and protection](https://technet.microsoft.com/en-us/library/hh758123(v=sc.12).aspx).
* **Data storage**—Back up data to different storage types, including tape, disk, and the Microsoft Azure cloud. For more information, see [Plan DPM storage](https://technet.microsoft.com/en-us/library/hh757941(v=sc.12).aspx).
* **Data recovery**—Recover data from any backed up data source using the DPM console. For more information, see [Plan for data recovery](https://technet.microsoft.com/en-us/library/hh757783(v=sc.12).aspx).

DPM can be deployed in the following environments:

* **Physical server**——you can run DPM on a physical server. You can’t deploy physical DPM servers in a cluster, but you can manage multiple physical DPM servers from a single console by installing [Central Console](https://technet.microsoft.com/en-us/library/dn789204.aspx) on System Center Operations Manager.
* **Hyper-V virtual machine**—you can run DPM as a virtual machine hosted on an on-premises Hyper-V host server. In this configuration you’ll need to make sure that DPM has access to all necessary resources and to the disks it needs for the storage pool. For details, see [Install DPM as a virtual machine on an on-premises Hyper-V server](https://technet.microsoft.com/en-us/library/dn440941(v=sc.12).aspx).
* **Azure virtual machine**—For DPM 2012 R2 Update 3 and later, you can run DPM as a virtual machine in Azure. However, this type of deployment does not support the backup of all workloads. For details, see [Install DPM as an Azure virtual machine](https://technet.microsoft.com/en-us/library/jj852163(v=sc.12).aspx)

**Practical 5**

Operations Management Suite (also known as OMS) is a collection of management services that were designed in the cloud from the start. Rather than deploying and managing on-premises resources, OMS components are entirely hosted in Azure. Configuration is minimal, and you can be up and running literally in a matter of minutes.

* **Minimal cost and complexity of deployment.** Because all of the components and data for OMS are stored in Azure, you can be up and running in a short time without the complexity and investment in on-premises components.
* **Scale to cloud levels.** You don't have to worry about paying for compute resources that you don't need or about running out of storage space since the cloud allows you to pay only for what you actually use and will readily scale to any load you require. You can start by managing a few resources to get started and then scale up to your entire environment.
* **Take advantage of the latest features.** Features in OMS services are continuously being added and updated. You constantly have access to the latest features without any requirement to deploy updates.
* **Integrated services.** While each of the OMS services provide significant value on their own, they can work together to solve complex management scenarios. For example, a runbook in Azure Automation might drive a failover process with Azure Site Recovery and then log information to Log Analytics to generate an alert.
* **Global knowledge.** Management solutions in OMS continuously have access to the latest information. The Security and Audit solution for example, can perform a threat analysis using the latest threats being detected around the world.
* **Access from anywhere.** Access your management environment from anywhere you have a browser. Install the OMS app on your smartphone for ready access to your monitoring data

Practical 6

Advisor is a personalized cloud consultant that helps you follow best practices to optimize your Azure deployments. It analyzes your resource configuration and usage telemetry and then recommends solutions that can help you improve the cost effectiveness, performance, high availability, and security of your Azure resources.

With Advisor, you can:

* Get proactive, actionable, and personalized best practices recommendations.
* Improve the performance, security, and high availability of your resources, as you identify opportunities to reduce your overall Azure spend.
* Get recommendations with proposed actions inline.

The Advisor dashboard displays personalized recommendations for all your subscriptions. You can apply filters to display recommendations for specific subscriptions and resource types. The recommendations are divided into four categories:

* **High Availability**: To ensure and improve the continuity of your business-critical applications. For more information, see [Advisor High Availability recommendations](https://docs.microsoft.com/en-us/azure/advisor/advisor-high-availability-recommendations).
* **Security**: To detect threats and vulnerabilities that might lead to security breaches. For more information, see [Advisor Security recommendations](https://docs.microsoft.com/en-us/azure/advisor/advisor-security-recommendations).
* **Performance**: To improve the speed of your applications. For more information, see [Advisor Performance recommendations](https://docs.microsoft.com/en-us/azure/advisor/advisor-performance-recommendations).
* **Cost**: To optimize and reduce your overall Azure spending. For more information, see [Advisor Cost recommendations](https://docs.microsoft.com/en-us/azure/advisor/advisor-cost-recommendations).

Practical 7

**System Center Service Manager** is a software product by [Microsoft](https://en.wikipedia.org/wiki/Microsoft) to allow organizations to manage incidents and problems. Microsoft states that the product is compliant with industry best practices such as the Microsoft Operations Framework ([MOF](https://en.wikipedia.org/wiki/Microsoft_Operations_Framework)) and in the Information Technology Infrastructure Library ([ITIL](https://en.wikipedia.org/wiki/Information_Technology_Infrastructure_Library)). SCSM has integrated ITIL compliant fulfillment of service requests. Service requests are submitted by the end user in order to obtain information, access to a new application or the most common of all, password reset.

■ Self-service for users by providing a self-service portal (known as the Service ManagerPortal or “SMPortal”) that allows consumers of IT services to submit requests and view their status, search the knowledge base, and perform other tasks. The self-service portal is customizable and is built on top of Microsoft SharePoint. Service Manager also provides customizable dashboards and reporting based on SQL Server Reporting Services (SSRS) that can provide both real-time and historical information for the service desk.

■ A standardized experience for implementing ITSM processes according to standardizedframeworks. Service Manager uses templates for defining business processes, and youcan build and customize these templates to meet the specific needs of your businessthrough GUI-based wizards, so no coding is required.

■ Compliance by logging every service management action in a database so that it canbe reviewed and analyzed when needed. Compliance can be continuously evaluated inreal time against a predefined baseline, and incidents can be automatically generatedwhen deviation from the baseline is detected.

Practical 8

# **Overview of System Center – Orchestrator**

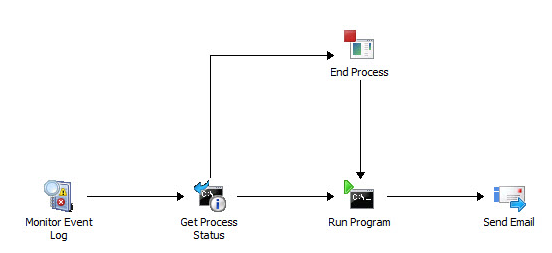
As an IT administrator, you probably perform a lot of tasks and procedures to keep your computing environment healthy. You may have automated individual tasks, but typically, not the whole process. With System Center - Orchestrator you tie disparate tasks and procedures together using a graphical user interface Runbook Designer to create reliable, flexible, and efficient end-to-end solutions in your IT environment. Using Orchestrator, you can:

* Automate processes in your data center, regardless of hardware or platform.
* Standardize best practices to improve operational efficiency.
* Connect systems from different vendors without having to know how to use scripting and programming languages.

## **Automation by using runbooks**

To automate a task or process in Orchestrator, you use the Runbook Designer to create a runbook. You add activities to the runbook by dragging them from the **Activities** pane, and then link activities in the required order to create a workflow.

The following illustration shows a simple runbook.



This runbook monitors an event log. When it detects the specified event, the runbook checks the status of a particular process in Windows on a specific computer. If the process is found to be running, it is stopped. The runbook then starts the process and sends an email as a notification of the change of process state.

Each runbook activity finishes before proceeding to the next, and activities are available that provide complex logic such as requiring that multiple activities are completed before the runbook proceeds. By using a combination of logic on activities and smart links, you can implement whatever logic your particular automation scenario requires.

## **How Orchestrator processes a Runbook**

After you have created a runbook, you commit it to the orchestration database by checking it in. You can then use either the Runbook Designer or the Orchestration console to start and stop the runbook.

A request to run a runbook creates a job that is stored in the orchestration database. Each runbook can define a primary runbook server and one or more standbys that process the runbook if the primary is unavailable. A service on each runbook server continuously monitors the orchestration database for jobs that it can process. When a runbook server detects a job, it logs that it is working on the job, copies the runbook locally, logs that it is running an instance of the runbook, and then begins processing the runbook. For any runbook not containing a monitor, you can create multiple runbook requests meaning that a single runbook can have multiple jobs.

When a runbook server processes a job, it creates an instance of the runbook by making a copy of it locally, and then performing the actions defined within the runbook according to the included workflow logic. Status information, activity results, and data are recorded in the orchestration database so that you can monitor the real-time and historical status of the runbook.

## **Key features**

* Improve service delivery times
* Simplify management
* Innovate with customizable features
* Meet stringent SLAs