

UNIT-III

CLOUD MANAGEMENT

61. What is cloud OS? What are the three key platforms of Microsoft cloud OS? Enumerate the four key goals of Microsoft Cloud OS.

Ans:-

Cloud OS

The term Cloud OS represents Microsoft's visionary approach to how IT can deliver on all these needs and challenges businesses are facing today. The Cloud OS vision embraces datacenters, private clouds, public clouds, and hybrid solutions.

Three key platforms comprise the Cloud OS:

Windows Server 2012 R2

- Provides the foundation for building enterprise-class datacenter and hybrid cloud solutions that are simple to deploy, cost-effective, application-focused, and user-centric.

System Center 2012 R2

- Delivers a unified management experience across on-premises, service provider, and Windows Azure environments, in a manner that's simple, cost-effective, application-focused, and enterprise-class.

Windows Azure

- Provides an open and flexible cloud platform for building, deploying, and managing applications using almost any language, tool, or framework and running them in a secure public cloud hosted in a global network of Microsoft-managed datacenters. Windows Azure also lets you integrate your public cloud applications with your existing on-premises IT environment to enable hybrid-cloud capabilities.

Microsoft's Cloud OS vision has four key goals:

Transform the datacenter

- Windows Server and System Center can manage the compute, storage, and networking resources of the modern datacenter to support its virtual machines, applications, and services.

- Together, they can transform this environment to make it capable of handling rapidly changing needs and unexpected opportunities while providing continuous service availability.

Enable modern business applications

- Technology innovation is rapidly changing whole industries and business sectors today.
- These innovations in devices, data, and the cloud are creating a revolution in what applications can do and how people use them.
- System Center and Windows Azure provide tools for deploying, managing, and monitoring that can reach any device and extend to the cloud.

Empower people-centric IT

- People today need to be able to do their jobs from virtually anywhere on any device so that they can stay productive.
- They expect and deserve a consistent experience across desktop computers, laptops, tablets, and smartphones.
- System Center provides a unified management experience for provisioning, managing, and monitoring end-user computers and mobile devices.
- Sensitive business data can be protected as it is accessed from these devices, especially when the device is owned by the user instead of the company.

Unlock insights on any data

- Business data are being generated faster and in greater quantities than ever before. System Center, Windows Azure, and SQL Server provide tools to be able to store, access, and analyze such data to find insights that can help grow business.

62. Enumerate the benefits of Microsoft System Center 2012.

Ans:-

System Center is key to turning this vision into a reality by providing the following customer benefits:

Datacenter without boundaries

- System Center helps keep management simple with a consistent experience across devices and platforms, including public, private, and service-provider clouds.
- It can scale up and scale down through easy access to cloud resources. And it can help increase the resiliency of services and applications.

Cloud innovation everywhere

- System Center helps reduce cost and increase flexibility through the simplified implementation of hybrid cloud models using a consistent toolset for developers (with Visual Studio), database admins (with SQL Server), security experts (with Active Directory), and IT professionals (with Hyper-V and System Center).

Dynamic application delivery

- System Center lets you automate repetitive manual processes to reduce time and cost.
- You can manage and monitor systems, devices, and applications with enough detail to quickly fix problems when they occur through performance analysis at the code level.
- And it offers self-service options so that business units, departments, users, and customers can provision and manage applications and services both on-premises and in the cloud.

63. Explain the different components of Microsoft System Center 2012.

Ans:-

System Center 2012 Configuration Manager

- System Center 2012 Configuration Manager (SCCM) component, which is a toolset that has come a long way in the past decade.
- The earlier releases of Configuration Manager went by the name SMS, or Systems Management Server, which was known to take full-time personnel to manage the management system.
- However, now easily four or five generations later, SCCM 2012 has really helped organizations with the patching, updating, imaging, reporting, and compliance management of their systems, both Microsoft and non-Microsoft endpoint clients and servers.

System Center 2012 Operations Manager

- The second component the System Center 2012 Operations Manager (SCOM) component, which provides monitoring and alerting on servers and client systems as well as internetworking devices (routers/switches/firewalls) and cloud-based services.
- Rather than waiting for users to alert the help desk that a server is down, SCOM proactively monitors systems and networks and provides alerts before failures impact operations, plus it logs error events and system issues to help organizations address system problems—usually before they occur.

System Center 2012 Data Protection Manager

- System Center 2012 Data Protection Manager (DPM) is a relatively new addition to the Microsoft management family of components.
- As traditional tape backups have been replaced by digital snapshots and digital data backups of information, DPM provides organizations the ability to have backup copies of their data.
- DPM incrementally backs up information from servers so that instead of backing up information once a night, DPM makes backups all day long for faster backup times and more granular recovery windows.

System Center 2012 Virtual Machine Manager

- In the past three to four years, virtualization has gone from something that was only done in test labs to data centers that are now fully virtualized—enabling organizations to have more than one server session running on a physical server system, and sometimes upward of 10 or 20 server sessions running on a single system.
- With the huge growth in virtualization in the data center, Microsoft released four major updates to the System Center Virtual Machine Manager (VMM) component in three years to address the needs of the enterprise.

System Center 2012 Service Manager

- After an initial five years in development and over two years in production deployments, Microsoft now has a help desk/incident management/asset life—cycle management/change management component called System Center 2012 Service Manager (SCSM) that organizations are finding extremely valuable in their enterprises.
- SCSM brings together the information gathering, reporting, alerting, and knowledge-based information in the other System Center components into a single component that will help organizations better manage their IT infrastructures.

System Center 2012 Orchestrator

- System Center Orchestrator is a newcomer to the System Center family and has been instrumental in real-world implementations of System Center in helping to make process and runbook automated tasks that simplify the processes.
- For tasks that IT professionals have manually done day in and day out in the past that takes hours or days to complete, Orchestrator scripts run through the processes methodically in minutes and seconds.
- The consistency with Orchestrator scripts helps organizations maintain standards and consistency in processes and achieve end goals more efficiently and effectively than in the past.

64. What is virtual machine manager? What are the benefits of virtual machine managed to an enterprise?

Ans:-

Virtual machine manager

- Virtual Machine Manager (VMM) enables you to configure and manage the virtualization hosts, host clusters, and infrastructure resources used to create and deploy virtual machines (VMs) and services to private clouds.
- These infrastructure resources include host groups, networking resources, storage resources, and library servers and shares.
- Together these different resources constitute the fabric from which private clouds can be deployed and managed using the System Center family of products.

These benefits to an enterprise and more are described in the following list:

Centralized Management

- VMM offers a centralized management solution for the entire virtual enterprise.
- Using one tool, the administrator can manage, create, deploy, move, copy, or delete any virtual machine in the enterprise.
- It makes no difference whether the host or virtual machine is running Microsoft Hyper-V, VMware FSX, or Citrix XenServer.

Decreased server sprawl

- VMM prevents virtual machine server sprawl by managing all the host servers in the enterprise.
- Due to the ease of deploying virtual machines, virtual server sprawl can become a real issue if not managed.
- Virtual machines can be deployed to the wrong host servers, and precious network resources can be squandered.
- VMM provides a way to take control of the virtual infrastructure and deploy virtual machines in the best way, based on resource and performance needs.

Integration with System Center Operations Manager

- Tight integration with System Center Operations Manager 2007 R2 or 2012 (SCOM) provides the capability to monitor and manage the virtual network.
- SCOM offers VMM and Hyper-V management packs to provide real-time monitoring of host and virtual servers.

- It provides both alerting and built-in knowledge that aids the administrator and troubleshooting and recovery.
- In addition, administrators also gain access to PRO (Performance and Resource Optimization), which is an enhanced monitoring and management feature that is enabled when VMM is paired with SCOM.

Profiles and templates that make provisioning easier

- VMM provides the administrator with a complete, yet simple, server provisioning process.
- Multiple hardware and operating system profiles can be stored in the VMM library.
- Hundreds of virtual machine templates can be stored and grouped together for easy deployment.

Self-service provisioning

- Self-Service Users can deploy the virtual machines they have access to without the need to understand the underlying physical infrastructure.
- By using the Self-Service Portal, these users can automatically deploy VMware, Hyper-V, and XenServer virtual machines to the most suitable server, based on the criteria set by the administrator.

Disaster recovery and business continuity

- One of the most important promises of virtualization is the increased ability to perform disaster recovery operations.
- To make this promise a reality, offers several features that increase server uptime and provide business-continuity protection.
- Because VMM is cluster aware, it can automatically move highly available (HA) virtual machines from one cluster node to another, without an administrator having to worry about which host is appropriate for that particular virtual machine.

Optimized resource allocation

- By knowing and understanding the resource requirements and constraints of each physical host and virtual machine server, VMM can make the best use of the hardware available.
- With this knowledge, more virtual machines can be placed on existing host servers, realizing an even greater value from the virtual environment.

Physical and virtual server conversions

- VMM provides both physical-to-virtual (P2V) and virtual-to-virtual (V2V) conversion capabilities.
- The P2V process is used to rapidly convert a physical server to a Hyper-V or VMware virtual server, preserving the existing operating system, applications, and data.
- This is useful when the administrator needs to virtualize an existing physical server, but the configuration is too complex or the application software is no longer available.

Role-based access control

- The VMM role-based access control (RBAC) model, along with administrator delegation, allows VMM Administrators to provide more autonomy and less administrative overhead in managing and working with the virtual infrastructure.

65. How can virtual machine manager 2012 be used for building private cloud? What are the other components required with VMM2012 for construction of private cloud?

Ans:-

Constructing the Private cloud:-

- Constructing the private cloud Virtual Machine Manager is essential if you want to use the System Center platform to create and deploy a private cloud.
- The reason for this is because Virtual Machine Manager provides resource pooling, enables self-service, and supports the elasticity required to build cloud solutions.
- We can use Virtual Machine Manager to create a private cloud from a host group that contains any or all of the following types of hosts: Hyper-V, VMware ESX, and Citrix XenServer.
- We can also use Virtual Machine Manager to create a private cloud from a VMware resource pool if you have VMware vCenter Server deployed in our environment.
- Although Virtual Machine Manager provides some basic building blocks for creating private clouds, you can build more robust cloud solutions by integrating **Virtual Machine Manager** with other **System Center components**, including the following:
 - ❖ **Operations Manager** with Operations Manager, you can use the System Center Monitoring Pack for System Center 2012 Virtual Machine Manager to monitor the health of resources. It also provides reporting capabilities for your Virtual Machine Manager environment.
 - ❖ **Orchestrator** Use Orchestrator to create workflows that interact with Virtual Machine Manager to automate common tasks.

- ❖ **Service Manager** this feature integrates with Virtual Machine Manager through the System Center Virtual Machine Manager Connector.
- ❖ **Data Protection Manager** Use this feature to back up your Hyper-V hosts, virtual machines, and applications running within virtual machines.

66. Explain the following components with reference to VMM2012:

- **Hosts and host clusters**
- **Host groups**
- **Networking resources**
- **Storage resources**
- **Library servers and shares**
- **Management server**

Ans:-

Hosts and host clusters

- Virtual Machine Manager can manage multiple hypervisor platforms, including Microsoft Hyper-V hosts, Citrix XenServer hosts, and VMware ESX hosts.
- Virtual Machine Manager can also be used to manage Hyper-V, VMware, and Citrix host clusters to ensure the availability of virtual machines and services deployed on such hosts.

Host groups

- To make it easier to manage large numbers of virtualization hosts and host clusters, Virtual Machine Manager lets you organize them into host groups.
- A host group is simply a logical grouping of virtualization hosts. Host groups can be created based on different criteria, such as the physical location of the hosts or how resources are allocated to them.
- **Networking resources**
- Virtualization hosts, virtual machines, and services require networks in order to be able to communicate with each other, applications, and users.
- Virtual Machine Manager enables you to provision and manage a wide range of networking resources for the hosts and host clusters you use to build your private cloud.
- These different networking resources can include logical networks, which represent network sites defined by IP subnets, virtual local area networks (VLANs), or both; logical switches, which allow you to define a virtual network configuration as a template and apply it across Hyper-V hosts; static IP address pools and MAC address pools, which can be created for logical networks so that DHCP is not required; IP Address Management (IPAM), which allows you to display IP address utilization and inventory

data; load balancers so that you can load-balance requests to virtual machines making up an application or service tier, along with a collection of Virtual IP Addresses (VIPs); and virtual switch extensions, which enable you to do such things as provide quality of service (QoS) or monitor network traffic.

- Virtual Machine Manager also provides network virtualization capabilities, including support for creating and managing virtual networks and network gateways.
- Network virtualization is a parallel concept to a server virtualization, where it allows you to abstract and run multiple virtual networks on a single physical network.
- Network virtualization through VMM offers several advantages compared to using traditional networks. First it connects virtual machines to other virtual machines, hosts, or applications running on the same virtual network. When a VM gets moved to a different host, VMM will automatically migrate that virtual network with the VM so that it remains connected to the rest of the infrastructure.
- Finally, using a gateway, a VM running on a virtual network can connect to any physical network in the same site or a different location. System Center 2012 R2 Virtual Machine Manager even includes an inbox NVGRE gateway that can be deployed as a VM to provide this cross-network interoperability.

Storage resources

- Virtualization hosts, virtual machines, and services require storage in order to store application data and settings and to access shared storage from multiple locations so that virtual machines can run on different hosts.
- Virtual Machine Manager enables you to discover, classify provision, allocate, and assign both local storage, where the storage capacity is directly attached to the virtualization host, and remote storage, in which the task of storage management is offloaded from the host to an external storage device.
- In addition, Virtual Machine Manager supports both block storage including Fibre Channel, iSCSI, and Serial Attached SCSI (SAS) storage area networks (SANs) and files storage using file shares that support the Server Message Block (SMB) 3.0 protocol.

Library servers and shares

- The Virtual Machine Manager library contains a catalog of resources used for creating and deploying virtual machines and services on virtualization hosts.

These resources are of two types:

File-based resources

- This type includes virtual hard disks, ISO images, Microsoft Windows PowerShell scripts, Microsoft SQL Server scripts, driver files, Microsoft Server Application Virtualization (Server App-V) packages, and answer files.

Non-file-based resources

- This type includes virtual machine templates, service templates, and profiles used to standardize the creation of virtual machines and templates.
- File-based resources are stored on the library servers themselves, while non-file-based resources are stored in the Virtual Machine Manager database.

Management server

- The management server is the server on which the Virtual Machine Manager Service runs.
- The management server controls communications with the Virtual Machine Manager Database, library servers, and virtual machine hosts.

67. What technical problems are addressed by the virtual machine manager?

Ans:-

Delegated administration

- IT environments with delegated administration and permissions models require a flexible and granular management solution to manage and control their virtual environment.
- VMM offers this flexibility via its RBAC model, which provides better control and granularity in administration and user delegation.

Meeting ITIL requirements

- Enterprises that utilize Information Technology Infrastructure Library (ITIL) concepts and techniques will benefit from the service-based management that VMM provides.
- For example, a VMM Administrator can provide a higher level of service to other departments and users thanks to VMM.

Disaster recovery and business continuity

- Any IT environment with a need for server disaster recovery or line—of-business continuity will appreciate the high-availability features built in to VMM.

- For example, thanks to VMM's native awareness of Windows and VMware clusters, it is an ideal management solution that can automatically move HA virtual machines from one host cluster node to another when the situation warrants.

Dynamically changing environments

- Every IT environment has finite resources. VMM provides dynamic virtual server placement based on physical constraints.
- Administrators define scores for physical hosts that define the suitability of a virtual machine for each host.
- VMM then displays the score of each potential host in an easy-to-understand five-star rating.
- As resources change on these hosts, the rating changes, thus providing for the most optimal virtual machine placement based on the current resources available within the virtual infrastructure.

Dealing with heterogeneous environments

- Current VMware ESX and Virtual center customers who want to use Hyper-V can use VMM 2012 to manage both environments.
- This heterogeneous management solution reduces administrative overhead and complexity.
- VMM provides the same functionality as VMware Virtual Center and VMotion for both VMware and Hyper-V environments, all in the same virtual machine management solution.

68. What are the components of Virtual Machine Manager? Explain each component.

Ans:-

VMM Server

- The VMM server has the Virtual Machine Manager Service (VMMSservice), but it can also include the VMM database and the VMM library depending on how you are deploying VMM.
- The VMMSservice service provides the needed interfaces to run and manage VMM, communicating with and storing its configuration in the SQL database.
- This service also monitors the health of virtual machines and hosts. When necessary, it moves virtual machines between host servers to ensure the availability of virtual machines that are being managed by VMM.

VMM Administrator Console

- The Administrator Console is a Microsoft Management Console (MMC) that is built upon Windows PowerShell.
- This console provides an administrative interface to the VMM server and it offers complete management of the virtual environment, including creating, managing, and deploying virtual machines and virtual local area networks (VLANs) managing host servers; configuring user roles; and so forth.
- VMM Administrators can manage all virtual machines and the VMM organizational settings using this console, whereas VMM Delegated Administrators can manage only The virtual machines that have been delegated to them.

VMM Self-Service Portal

- The VMM Self-Service Portal provides a web-based interface that allows Self-Service Users to provision virtual machines from The VMM library.
- It also allows Self-Service Users to store virtual machines in the library if they have sufficient rights.
- The most common use of the Self-Service Portal is to provide an environment for developers and testers to create and manage their own virtual labs.
- Depending on an organization's needs, multiple types of Self-Service User roles can be provisioned by a VMM Administrator to facilitate the deployment and management of virtual machines using the Self-Service Portal.

VMM Agent

- The VMM Agent is the agent software that allows VMM to monitor and manage Windows Server 2008 and Windows Server 2008 R2 Hyper-V host servers. It can be installed remotely using the VMM Administrator Console or manually using the VMM software media.
- All Windows host servers must also be joined to a domain.
- This can either be the same domain as The VMM server or in a different domain that is either trusted or non-trusted.

VMM Library

- The VMM library is a centralized repository for all Windows-based and VMware-based virtual machine related objects.
- These objects are the building blocks of the virtual machines that will be created and include the following: hardware profiles, guest OS profiles, templates, virtual hard disks (VHDs), CD-ROM images (ISOs), and so on.

The VMM Library consists of the following:

- Hardware profiles-
- Guest OS profiles-
- Disk images and ISO image files-
- VM templates.

69. What type of physical and virtual systems can be managed by virtual machine manager? Explain.

Ans:-

Microsoft designed VMM to be a heterogeneous management system that reduces the complexity of managing different physical and virtual systems in the enterprise by providing the ability to manage the following host systems:

Hyper-V hosts

- VMM supports hosts running Windows Server 2008 and Windows Server 2008 R2 that have the Hyper-V server role enabled. Additionally, if an administrator adds a Windows Server 2008 and R2 host to VMM and the Hyper-V server role has not been enabled, VMM enables the Hyper-V server role automatically as it adds the server as a host managed by VMM.
- VMM can also import a Windows Server 2008 or R2 computer that is already configured as a Hyper-V host and will import any Hyper-V virtual machines that are already deployed on that host.

VMware hosts

- VMM supports connecting to a VMware virtualization manager server.
- It imports its data (including the host servers that it manages and the virtual machines deployed on those hosts) into the VMM library database.
- VMM then integrates the imported VMware objects into its set of Windows-based objects. From an administrator's point of view, the Windows-based and VMware-based objects are managed in the same way using the same VMM Administrator Console.

Citrix XenServer hosts

- VMM supports Citrix XenServer hosts as target and managed physical host servers, including the monitoring and management of the target host servers in the environment.

70. Write a short note on cluster support in virtual machine manager.

Ans:-

Cluster Support in VMM

- Clusters are an important resource in the virtual enterprise because they offer a highly available platform to host mission-critical virtual machines.
- After all, if a single host system is responsible for hosting an enterprise's most critical systems, then that host becomes a single point of failure.
- To fill this gap, VMM supports both Windows Server 2008 failover clusters and VMware ESX host clusters. Using VMM's native cluster support, administrators can move virtual machines from one physical node of a cluster to another, either manually or automatically.
- Being able to move virtual machines allows an administrator to patch the active node or bring it down for maintenance without impacting the mission-critical virtual machines hosted on the server.
- It also provides automatic fault tolerance in the event of an unexpected server failure. Additionally, VMM's cluster support allows administrators to reduce costs by consolidating different clustered host systems into a commit managed collection of resources.
- VMM can manage VHD to 16 node host clusters that are configured using the Windows Failover Cluster management console.
- VMM takes advantage of the many cluster management improvements available in Windows Server 2008/2008 R2, making cluster configuration and management much easier for administrators.
- Because of this tight integration, VMM can automatically detect the addition or removal of a node within the host cluster.
- Furthermore, if one host in the host cluster becomes unavailable, the virtual machines on that host are automatically moved to another host in the same host cluster.
- VMM's support for host clusters ensures the virtual machines deployed on hosts in that cluster are highly available.
- Virtual machines deployed on host clusters are called highly available virtual machines, or HA virtual machines.
- Configuring a virtual machine as an HA virtual machine can be done using an option in its hardware profile.

71. Explain the three basic role types in virtual machine manager.

Ans:-

There are three basic user role types in VMM:

VMM Administrator

- This user role has complete, unlimited access to VMM and the objects in the VMM library.
- Members of this role can be Active Directory users or groups. VMM Administrators can add or remove members to this role, but because only one VMM Administrator role exists, it cannot be created, deleted, or modified.
- Members of the VMM Administrator role can use the Administrator Console and the command shell, but cannot access the Self-Service Portal unless they are also members of a Self-Service User role.

VMM Delegated Administrator

- This user role is scoped to a particular set of VMM objects (determined during role configuration). Members can be Active Directory users or groups.
- VMM Delegated Administrators cannot add themselves to the VMM Administrator role or configure global settings across the VMM environment.
- They can, however, perform all operations on all VMM objects within the specified scope. Scopes are made up of one or more host groups or library servers.
- Members of a VMM delegated Administrator role can use the Administrator Console and the command shell, but cannot access the Self-Service Portal unless they are also members of a Self-Service User role.

Self-Service User

- This user role is made up of Active Directory users or groups who can perform all allowed operations on a specific set of virtual machines deployed on one or more hosts within specified host groups.
- Self-Service Users can be granted the right to store their own virtual machines on a VMM library server. Administrators can limit their access to one or more specified library shares on a server.
- Members can access the Self-Service Portal interface and the command shell, but cannot access the Administrator Console unless they are also a member of at least one of the Administrator roles listed previously.
- Furthermore, VMM allows self Service Users to work with any virtual machine in either hyper-V or VMware to check out or deploy virtual machines to the proper host, without having to know which host to use. It is completely transparent to the end user.

72. What are the changes and additions to virtual machine manager 2012 over its previous versions?

Ans:-

VMM 2012 was completely rewritten with a focus on the cloud and fabric as the overall look and structure of the tool. VMM 2012 starts off with the premise that in order to build and deploy virtual images, the organization needs to have the appropriate storage sub systems and networking fabric in place.

VMM 2012 that is covered the following:

Inclusion of fabric management-

- The focus on being able to manage virtual machines and a mixed private and public cloud infrastructure, Virtual Machine Manager 2012 starts with the configuration and management of fabric resources.
- VMM 2012 allows for the ability to create and manage Hyper-V clusters, use Citrix XenServers as target virtual hosts, and discover physical host systems and automatically make the host into a Hyper-V managed host server.
- VMM also allows for the configuration of network and storage resources, including creating logical networks, IP address pools, load balancing, storage logical units, and storage pools.

Simplification of host provisioning

- VMM 2012 allows for the provisioning of systems, including host servers from bare metal to Hyper-V hosts, and the inclusion of Hyper-V hosts to highly available clusters.

Allocation of logical networks and address management

- VMM 2012 allows for the creation of VLANs and subnets within a data center, as well as management of the IP addresses, load balancing VIPs, and MAC addresses for host systems, guest sessions, and networks.

Storage management and storage classification

- Beyond just managing virtual hosts and guest sessions, VMM 2012 added the ability to also manage storage systems using SM I-S, a storage management standard.
- Additionally, storage was able to be classified based on storage performance and storage subsystem capabilities.

Support for private cloud configurations

- VMM 2012 allows for the creation of private clouds, including combining hosts, networks, storage subsystems, and resource libraries to identify a private cloud environment.
- Application profiles can then be created to automatically install server application virtualization (Server App-V), Web-deployed applications, Microsoft SQL data-tier applications (DACs), and creation of virtual guest sessions from virtual machine templates.

Administration improvements

- VMM 2012 adds administration improvements, including several new roles, such as the Delegated Administrator, Read-Only Administrator, and Self-Service User roles.
- Additionally, the ability to create and use Run As accounts allows an organization to delegate administration and management tasks without having to directly give each role administrator critical credential access information.

Improvements in scalability and high availability

- Additions in VMM 2012 provide improvements for scalability by providing the ability to add additional virtual machines to a deployed service as well as update a service within a private cloud for dynamic growth as required by the application or needs of an organization.
- Additionally, VMM 2012 provides the ability to install a highly available VMM management server so that the management of VMM services can keep up with the demands and needs for reliability in an enterprise environment.

73. Discuss the hardware and software pre-requisites for the different components of virtual machine manager.

Ans:-

Virtual Machine Manager Prerequisites

- This section describes the hardware, operating system, and software requirements for each of the VMM components, which must be met before installing and using System Center Virtual Machine Manager 2012.

VMM Server

The following are the system requirements for installing the VMM Server component.

Hardware Requirements

Table 12.1 shows the minimum and recommended hardware requirements for a VMM server that is managing up to 150 hosts.

TABLE 12.1 VMM Server Hardware Requirements

Component	Requirement
Processor speed	Minimum: Pentium 4, 2GHz (x64 bit only) Recommended: Dual-Processor, Dual-Core, 2.8GHz (x64) or greater
Memory	Minimum: 2GB Recommended: 4GB
Disk space (with a local VMM database)	Minimum: 2GB Recommended: 50GB
Disk space (using a local, full version of SQL Server)	Minimum: 80GB Recommended: 150GB

Supported Operating Systems

The following operating systems are supported by the VMM Server component:

- Windows Server 2008 R2 SPI x64, Standard and Enterprise Editions or more current
- Remote SQL Instance Requirements

The VMM Server component supports the following versions of SQL Server:

- SQL Server 2008, Standard or Enterprise Editions (32-bit or 64-bit)
- SQL Server 2008 R2, Standard, Enterprise, or Datacenter Editions (32-bit or 64-bit)

Software Requirements

The VMM Server component has the following software requirements:

- Microsoft .NET Framework 3.51 Sp1
- Windows Automated Installation Kit (WAIK) for Windows 7 (x64).

VMM Administrator Console

- The VMM Administrator Console can be installed on other computers to remotely access and manage a VMM deployment.
- However, it is recommended that the Administrator Console also be installed on the same machine that is hosting the VMM Server component.

- In fact, if you are planning to use the VMM Reporting feature, the Administrator Console must be installed on the VMM server.

Hardware Requirements

Table 12.2 shows the minimum and recommended hardware requirements for the Administrator Console.

Component	Requirement
Processor speed	Minimum: Pentium 4, 550MHz Recommended: Pentium 4, 1GHz or greater
Memory	Minimum: 512MB Recommended: 1GB
Disk space	Minimum: 512MB Recommended: 2GB

Supported Operating Systems

The VMM Administrator Console supports the following operating systems:

- Windows Server 2008 R2 SP1 (full installation), Standard, Enterprise, or Datacenter Editions (x64 only)
- Windows 7 SP1 Professional, Enterprise, or Ultimate (x86 or x64)

Software Requirements

The Administrator Console has the following software requirements:

- Windows PowerShell 2.0
- Microsoft .NET Framework 3.51 SP1

VMM Self-Service Portal

- The following are the system requirements for installing the VMM Self-Service Portal on a dedicated machine.
- The actual requirements for this VMM component will vary depending on the number of concurrent self-service connections being made on the web server.

Hardware Requirements

Table 12.3 shows the minimum and recommended hardware requirements for the Self-Service Portal for maintaining up to 10 concurrent connections.

TABLE 12.3 VMM Self-Service Portal Hardware Requirements

Component	Requirement
Processor speed	Minimum: Pentium 4, 2.8Ghz Recommended: Pentium 4, 2.8GHz or greater
Memory	Minimum: 2GB Recommended: 2GB
Disk space	Minimum: 512MB Recommended: 20GB

Supported Operating Systems

The VMM Self-Service Portal supports the following operating systems:

- Windows Server 2008 R2 SP1 x64, Standard and Enterprise Editions or more current

Software Requirements

The VMM Self-Service Portal has the following software requirements:

- Windows PowerShell 2.0
- Microsoft .NET Framework 3.51 SP1
- Web Server (IIS) role must be installed along with the following server role services:
 - .NET Extensibility
 - ASP.NET
 - Default Document
 - Directory Browsing
 - HTTP Errors
 - IIS 6 Metaphase Compatibility
 - IIS 6 WMI Compatibility
 - ISAPI Extensions
 - ISAPI Filters
 - Request Filtering
 - Static Content
 - Virtual Machine Hosts

The following are the system requirements for virtual machine hosts that can be managed by VMM:

- Windows Server 2008 R2 SPI (full installation or Server Core), Enterprise/Datacenter Editions (x64 only)
- Windows Server 2008 SP2 (full installation or Server Core), Enterprise/Datacenter

- Editions (x64 only)
- Hyper-V 2008 R2 (x64 only)

VMware vCenter v4.1 with the following hosts:

- ESX4.1
- ESXI4.1
- LSX 3.5
- LSXI 3.5
- Citrix XenServer 6.0 (with Citrix XenServer Integration Suite supplemental Pack for System Center Virtual Machine Manager)

74. Explain the nine steps in planning the virtual machine manager deployment.

Ans:-

Step One: Understand the Environment

The first step of the VMM planning process is to understand the environment in which the deployment will take place. To complete this step, review the relevant design documents for information systems in your organization, perform discovery sessions with the owners of systems, and review the status of the systems in real time.

Step Two: Define the Project Scope

The next step of the VMM planning process is to define the scope of the VMM deployment project. While completing this task, it is important to ensure the goals of the project are aligned to the business requirements for virtualization, fault tolerance, capacity, performance, and disaster recovery.

Step Three: Determine Operations Manager Integration

The third step in the VMM planning process is to determine if System Center Operations Manager should be integrated with the VMM deployment. For VMM to make intelligent placement recommendations for where virtual machines should be deployed or automatically moved to, the VMM Agent collects performance data from host server(s) and sends it to the VMM server every 9 minutes.

Step Four: Determine the Number of VMM Instances

The fourth step in the VMM planning process is to determine the number of VMM instances that should be deployed. A VMM instance is a single installation of VMM Server, which has the following considerations:

- Each VMM instance must have its own separate SQL Server database instance.
- Each managed host server can only be managed by a single VMM instance.
- There is no relationship between VMM instances. Therefore, they cannot be integrated nor can they share data.

Step Five: Design the VMM Server

The fifth step in the VMM planning process is to design the VMM server infrastructure.

By definition, the VMM server is the central hub for what defines a VMM managed host set and how the various VMM components interact with that set.

Therefore, the recommended hardware configuration for a VMM server that is supporting up to 8,000 virtual machines and 400 host servers is a dual-processor or dual-core, 3.6GHz or greater (x64) with 8GB of RAM.

Step Six: Design the Database Server and Database

The sixth step in the VMM planning process is to create and document the VMM database server and database design. The VMM database is used to store the configuration information for a VMM instance and any performance data that might be collected by VMM.

Step Seven: Design the Self-Service Portal Web Server(s)

The seventh step in the VMM planning process is to determine the Self-Service Portal web server design. As discussed previously in this chapter, the Self-Service Portal allows users to provision and manage their own virtual machines with administrator intervention.

Step Eight: Design the Infrastructure Fabric

The eighth step in the VMM planning process is to design the infrastructure fabric, specifically the LAN and WAN network infrastructure and the storage subsystem.

Fabric management involves identifying the bandwidth requirements and the bandwidth capacity of the virtualized environment. If the demands exceed the capacity, a well-planned management platform will provide the needed information to detect the change and increase capacity as needed.

Step Nine: Design the Library Servers and Libraries

The ninth and final step in the VMM planning process is to determine the library servers and library's design. As discussed earlier in this chapter, a VMM library is a collection of resources that includes such items as:

- VM templates
- Disk images and ISO image files
- Guest OS profiles
- Hardware profiles

A library server is a file server with one or more shares that is used to store the previously listed items. Although each VMM instance must have at least one library server, you can deploy more than one library server depending on the needs of your VMM deployment.

75. What are the three resource pools that make up a virtual machine manager fabric? Explain.

Ans:-

VMM Fabric Resources

On a high level, there are three resource pools that make up the fabric, as follows:

- Servers
- Networking
- Storage

Servers

In addition to Hyper-V hosts, VMM 2012 allows two other host server platforms to be included as part of a private cloud: VMware ESX/ESXi (versions 3.5 and 4.1) and Citrix XenServer (version 6.0 and above). The following are the VMM fabric resources that make up the Servers resource pool:

- ❖ **Host groups-**
 - Collections of host servers that serve as destinations where virtual machines can be deployed.
- ❖ **Library servers-**
 - Repositories for resources that can be used to build virtual machines, such as ISO files, VM templates, and hardware templates
- ❖ **PXE servers-**
 - Systems used to automatically deploy images and boot VMs from a bare-metal state via the network, using the reboot Execution Environment (PXE) Update servers-Systems used for automatically patching and updating VMs based on compliance policies
- ❖ **vCenter servers-**

- VMware management servers used to allow interoperability between VMM and VMware ESX/ESXi hosts
- ❖ **VMM server-**
 - Authorized VMM servers that form the backbone of the VMM 2012 platform

Networks

VMM 2012 provides a variety of networking resources that can be used to quickly service the network requirements of the private cloud. The following are the VMM fabric resources that make up the Networking resource pool:

- ❖ **Logical networks-**
 - User-defined groupings of IP subnets and virtual local area networks (VLANs) used to organize and simplify VM network assignments.
- ❖ **MAC address pools-**
 - Static collections of MAC addresses that can be used to creatively manage network address assignments for Windows-based VMs running on any managed hyper-V, VMware ESX/ESX1, or Citrix XenServer host.
- ❖ **Load balancers-**
 - Hardware load balancers that can be integrated with the VMM Console and used to load-balance the network traffic for VMs that make up a service tier.
- ❖ **Virtual IP (VIP) templates-**
 - A collection of load balancer related configuration settings for a specific type of network traffic. When creating a service that requires load balancing, VMM users (including Self-Service Users) can select a VIP template that matches the load balancing requirements of the application being deployed.

Storage

- VMM 2012 provides some interesting new features that allow an administrator to discover, classify, and provision remote storage on supported storage arrays.
- The new Microsoft Storage Management Service, which is automatically installed during the installation of VMM 2012, is used to communicate with external storage arrays that leverage Storage Management Initiative — Specification (SMI-S).
- SMI-S is a storage standard developed and maintained by the Storage Networking Industry Association (SNIA), with the main objective of enabling broad interoperable management of heterogeneous storage vendor systems.
- Once an SMI-S compatible storage array has been made available, the storage array can be added to VMM 2012 and used to automate and track storage assignments to Hyper-V hosts and host clusters.

Following are the VMM fabric resources that make up the Storage resource pool:

❖ **Classifications and pools-**

- User-defined labels applied to storage, typically used to differentiate the various storage pools by quality of service

❖ **Providers**

- SMI-S providers that can be discovered and integrated with VMM

❖ **Arrays-**

- SMI-S storage arrays that can be discovered and selected for use with VMM

76. What are the different virtual machine manager management interfaces? Explain each in detail

Ans:-

Refer Pg No. 122

77. Explain the different virtual machine conversions. How are they done?

Ans:-

Refer Pg No. 126

78. What are the different user roles available in virtual machine manager? Explain each role. How are the roles created?

Ans:-

Types of User Role:-

Four types of user roles are available in VMM, as follows:

Administrator:-

- Users who are assigned the Administrator role have full rights to the virtual infrastructure and can perform all actions in the VMM Administrator Console.
- These administrators can create new Delegated Administrator and Self- Service User roles.
- Only members of this role can add additional members to the Administrator role.
- The Administrator role is created when VMM is installed for the first time in the domain.
- The user who installs VMM is automatically added to the Administrator tier role during installation. There is only one Administrator user role in each domain.

Delegated Administrator:-

- Users who are assigned the Delegated Administrator role can perform all actions in the VMM Administrator Console that apply, or are scoped, to them.
- The scope of objects is defined during the creation of the role.
- The Delegated Administrator user role does not exist by default.
- There can be zero or more Delegated Administrator roles in each domain.
- Delegated Administrator roles are created by users who have the Administrator user role.
- Members of this user role can create new Delegated Administrator and Self-Service User roles, but only within the scope of objects that apply to them.

Read-Only Administrator:-

- Users who are assigned the Read-Only Administrator role can view properties, status, and job status of objects in the VMM Administrator Console that apply, or are scoped, to them.
- As indicated by the title of the role, the Read-only Administrator cannot modify any of the objects in VMM.
- The scope of objects is defined during the creation of the role. The Read-Only Administrator tier role does not exist by default.
- There can be zero or more Read-Only Administrator roles in each domain. Read-Only Administrator roles are created by users who have the Administrator user role or Delegated Administrator role.
- One of the primary purposes of the Read-Only Administrator role is to grant required access to auditors within VMM without allowing the configuration to be modified.

Self-Service User:-

- Users who are assigned the Self-Service User role can be granted rights to operate, create, manage, store, create checkpoints for, and connect to VMs in their scope using the Self-Service Portal.
- This role is scoped by a member of the Administrator or Delegated Administrator role to pertain to a specific set of virtual infrastructure objects. Users with this role cannot manage their role or any other role in VMM. They also cannot create new user roles.

79. What is virtual machine placement what are the different ways of deploying virtual machines? Explain

Ans:-

Virtual Machine Placement:-

- The process of selecting the most suitable host upon which to deploy a virtual machine is called virtual machine placement.
- When you attempt to deploy a virtual machine using VMM, a list is created of all the managed host servers where the virtual machine can be placed.
- Each host is given a star rating, from zero to five stars, indicating its suitability for the given virtual machine.
- This star rating is based on the VM's hardware and resource requirements and each host's ability to fulfill these requirements.
- Host ratings also take resource maximization, fault tolerance, and load balancing into consideration.

Deploying Virtual Machines Using the Administrator Console

To deploy a virtual machine that's stored in the library using the VMM Administrator Console, complete the following steps:

- Log on to a computer that has the Administrator Console installed using a domain user account that is a member of the VMM Administrator role.
- Next, open the Administrator Console using either the desktop or Start menu icon and connect to your VMM server.
- Once the console has loaded, click the Library icon in the navigation pane to open the Library workspace.
- In the Library workspace, expand the Library Servers node and the appropriate library server that holds the virtual machine that you want to deploy.
- Next, select the Stored Virtual Machines and Services node to display the available virtual machines.
- In the results pane, select the virtual machine that you want to deploy.
- From the tool ribbon, click Deploy. This starts the Deploy Virtual Machine Wizard.
- On the Select Host page, select the most suitable host server to deploy the new virtual machine to. Each host has a star rating (from zero to five stars) indicating its suitability to host the new virtual machine.

80. Explain the different types of migrations of virtual machines.

Ans:-

Types of Virtual Machines Migrations:-

Migration Type	Technologies Used	Migration Time
Live Migration	Windows Server 2008 R2 Hyper-V Windows Server 2008 Failover Cluster ESX/ESXi 3.5 and 4.1 with VMotion Citrix XenServer 6.0 with Microsoft SCVMM XenServer Integration Suite	None
Quick Migration	Windows Server 2008 Hyper-V or greater Windows Server 2008 Failover Cluster	Under a minute (Virtual machine is placed into a saved state while being moved between cluster nodes.)
SAN Migration	Windows Server 2008 Hyper-V or greater Virtual Server 2005 R2 Virtual Disk Service (VDS) Hardware Providers N-Port Identification Virtualization (NPV) on Emulex and QLogic Fibre Channel HBAs iSCSI on EMC, HP, Hitachi, NetApp, EqualLogic arrays	Under a minute (Virtual machine is placed into a saved state while being moved between hosts using unmasking and masking operations at the SAN level.)

Network Migration	Windows Server 2008 Hyper-V or greater Virtual Server 2005 R2 BITS for Virtual Server and Hyper-V ESX/ESXi 3.5, 4.1 sFTP for ESX XenServer 6.0	Minutes or hours (For Windows Server 2008 or Virtual Server hosts, the virtual machine needs to be stopped or in a saved state for the entire duration of transfer.) Under a minute (For Windows Server 2008 R2 Hyper-V host, the virtual machine remains in a running state during the transfer of its virtual disks. However, to move the virtual machine's memory state and associated differencing disks, it is placed into a saved state.)
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81. What is Server App-V? Explain the following terms with reference to App-V:

- **Sequencer**
- **Virtual application package**
- **Deployment configuration file**
- **Virtual environment**
- **Server App-V agent**

Ans:-

Server App-V:-

Server App-V builds on the application virtualization (App-V) technology used to streamline desktop deployments by separating the application configuration and state from the underlying operating system, resulting in an effective method of reducing hardware and operational costs that is associated with application deployment.

For example, Server App-V can be used to significantly reduce the number of images that need to be managed, and can be used to automate deployment of applications across the data center.

- **Sequencer**:-A software utility used to create virtual application packages by monitoring and recording the entire installation and setup process for an application.
- **Virtual application package**:-An application packaged by the Sequencer to run in a self-contained, virtual environment. The virtual environment contains the information necessary to run the application on the client without installing the application locally.
- **Deployment configuration file**:-An .xml file that contains customized settings that are applied to a specific virtual application package when the package is run on a target computer.
- **Virtual environment**—A runtime container that defines the resources available to application processes that are launched from a sequenced application package.
- **Server App-V Agent**—Agent software installed on Server App-V clients, used to accept and then set up virtualization packages on the target system.

82. What is AppController? What are the different day to day tasks that can be performed using AppController?

Ans:-

AppContoller:-

- App Controller provides a self-service experience for deploying and managing virtual machines (VMs) and services in cloud environments.

- The self-service experience provided by App Controller through a web browser is consistent across all types of clouds, including private, public, and hosted clouds.
- This capability makes App Controller the ideal platform for implementing the hybrid computing model.

Day-to-day operations

Once App Controller has been installed and configured in your environment, you are ready to begin working with App Controller. Some of the day-to-day operations tasks you can perform include the following:

- ✓ Creating and managing user roles
- ✓ Delegating users
- ✓ Adding or removing library resources, such as file shares, private cloud libraries, and Windows Azure storage accounts
- ✓ Connecting to private or public clouds
- ✓ Copying files between file shares and private or public clouds
- ✓ Copying library resources between clouds of the same type
- ✓ Deploying virtual machine templates to private clouds
- ✓ Uploading virtual hard disks or images to Windows Azure
- ✓ Monitoring the usage of private and public clouds
- ✓ Backing up and restoring the App Controller database
- ✓ Performing any other cloud-related management tasks

83. How can hybrid cloud be set up and managed using AppController? Explain.

Ans:-

Managing Hybrid clouds with System Center App Controller

- As organizations progress with their journey to the cloud, transitioning from virtualized datacenters to private clouds, service-provider hosted clouds, and public clouds, we are seeing cloud administrators and business unit IT administrators of these organizations entrusted with managing these clouds.
- With each of these clouds on various virtualization platforms with different capabilities and different administrative consoles, administrators often find it difficult to manage them all, be it day-to-day tasks like provisioning, deprovisioning, start, stop, snapshot, or other tasks like migrating virtual machines between clouds (from a private cloud to the Windows Azure public cloud).
- System Center 2012 R2 App Controller delivers a web interface that provides administrators and end users with a common self-service experience to manage resources across private, public (Windows Azure), and hosting service provide clouds:

Setting up clouds

- App Controller connects to Virtual Machine Manager to provide private cloud management, and both App Controller and Virtual Machine Manager need to be running the same version (2012 or 2012 R2).
- To connect to a service-provider cloud, the administrator enters the details provided by the hosting service provider, who will have configured System Center Provider Foundation with the tenant details and provided the necessary certificate to import into App Controller. Similarly, Windows Azure subscription details can be entered by providing the Subscription ID and Management certificate details.
- Access to hosting service-provider clouds and Windows Azure subscriptions can then be managed by creating or modifying the user role.
- The administrator can add users and groups from Active Directory that will have either read-only or full access to these clouds.
- In case there are multiple subscriptions, the administrator can choose which subscriptions individual users and groups will have access to:

Managing clouds

- Once the administrator connects to all the clouds that the organization has access to, the business unit IT administrators and self-service users see the clouds that they have access to, based on the roles defined in Virtual Machine Manager (for private clouds) and App Controller (for hosting service-provider clouds and Windows Azure).
- The page displays the quota assigned for each cloud, and the current resource utilization, so that you are in a better position to decide where you want to create your next virtual machine or service:
- When you are ready to deploy your service or virtual machine, select the cloud where you want the service or virtual machine deployed, and choose from the available templates.
- The templates shown here are again based on the permissions given in Virtual Machine Manager:
- The Services workspace displays all the services deployed to private, public, and service-provider hosted clouds, and it lets you perform administration tasks like start, stop, resume, suspend, shutdown of the service, which in turn will do the corresponding task for all the virtual machines that are part of the template.
- This is useful for administrators, especially when there are a lot of services deployed.
- You can also get a diagram view of a service that gives a visual representation of all the virtual machines that are part of a service and the networks and other virtual machines that they are connected to.

- When the administrator publishes an update for a deployed service template, a notification appears in the portal and you can update the template at your convenience.
- The Virtual Machines workspace displays all the virtual machines that are deployed either as a standalone deployment or as part of a service template.
- All the virtual machines running on the service-provider hosted cloud as well as the public cloud are also listed in the same page, giving you an overall picture of all the resources that you own or are responsible for from a single page, as well as their current status and resources utilization. Administration tasks like start, shutdown, pause, save, store, mount image, and remote desktop can be performed by selecting the appropriate option:

Performing operations across clouds

- One of the biggest benefits of App Controller is the flexibility that it provides administrators to perform operations across clouds using a single management interface.
- This may be important for different scenarios, like moving a workload temporarily to Windows Azure when you anticipate an increased load, or even to automate the migration using System Center 2012 R2 Orchestrator.
- With AppController, this can be achieved by just copying the virtual machine that needs to be moved. The virtual machine that needs to be moved from the private cloud to Windows Azure has to be first shut down and stored in the library.
- Once the virtual machine is in a stored state, you can copy the virtual machine's disk to Windows Azure, and then create a VM in Azure using that disk.
- Similarly, you can move a virtual hard disk from Windows Azure to the local virtual machine library by selecting the virtual hard disk from Windows Azure and copying it from there: You can then use the Virtual Machine Manager console to deploy the virtual hard disk that has been copied.

84. What are the components of AppController?

Ans:-

- App Controller consists of one or more **App Controller servers**, a website hosted by Internet Information Services (IIS), a Microsoft SQL Server database, and a Microsoft Windows PowerShell module. This website can be accessed through any supported web browser, such as Internet Explorer.
- The **App Controller library** is a logical representation of all library objects from clouds that have been registered in App Controller. These clouds can be private clouds associated with Virtual Machine Manager or the Windows Azure public cloud. The App Controller library can manage three kinds of shared storage: file shares on your network, private cloud libraries, and Windows Azure storage accounts.