

PROFESSIONAL TRAINING REPORT

Sathyabama Institute of Science and Technology

(Deemed to be University)

Submitted in partial fulfillment of the requirements for the Award of

Bachelor of Technology Degree in Information Technology

BY

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DEPARTMENT OF INFORMATION TECHNOLOGY

SCHOOL OF COMPUTING

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

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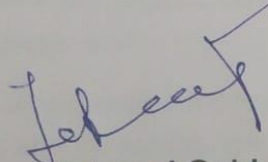
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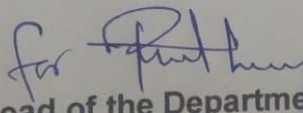
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of **Abdulajees I** (Reg. No: 40120002) who carried out the project entitled "**BUILDING A WINDOWS 2012 VIRTUAL MACHINE IN OPENSTACK**" under my supervision from January 2023 to April 2023.

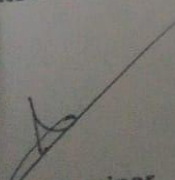

Internal Guide

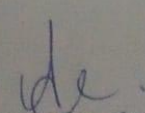
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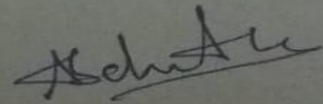

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DECLARATION

I hereby declare that the Project Report entitled "**BUILDING A WINDOWS 2012 VIRTUAL MACHINE IN OPENSTACK**" done by me under the guidance of **DR. R.JEBERSON RETNA RAJ M.Tech., Ph.D.**, at Sathyabama Institute of Science and Technology (Deemed to be University), Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600119 is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Information Technology.

DATE: 28/04/23
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CERTIFICATE OF COMPLETION

ABSTRACT

This system involves creating a Windows 2012 virtual machine, uploading it to the Glance image service, and launching a sample application within the VM. This process can be achieved using a combination of tools such as the OpenStack dashboard and Power Shell. The creation of the virtual machine involves setting up the necessary specifications such as the operating system, memory, and storage requirements. Uploading the VM image to Glance involves packaging it in the Open Virtualization Format (OVF) and importing it to Glance. Finally, launching the sample application requires creating an instance of the uploaded VM and configuring it to run the application. Through this process, users can create customized Windows 2012 environments for various applications and services.

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CHAPTER 1

INTRODUCTION

Virtualization has become a critical aspect of modern computing, providing a way to maximize hardware utilization, increase efficiency, and reduce costs. With the rise of cloud computing, creating and managing virtual machines has become an integral part of IT operations. OpenStack, an open-source cloud computing platform, offers a flexible and scalable solution for managing virtual machines. In this tutorial, we will walk through the process of creating a Windows Server 2012 virtual machine on OpenStack, uploading an image to the Glance image service, and launching a sample application.

By following these steps, users can quickly create a virtual machine with Windows Server 2012 and launch applications on it, without the need for dedicated hardware or infrastructure. This tutorial is aimed at users who are familiar with OpenStack and Windows Server 2012, and want to leverage the benefits of virtualization to enhance their computing operations. Creating a Windows 2012 VM (Virtual Machine) and uploading it to Glance can be done in several steps. Here is a brief overview of the process:

Choose a hypervisor: The first step in creating a VM is choosing a hypervisor. A hypervisor is a piece of software that allows multiple VMs to run on a single physical machine. Popular hypervisors include Hyper-V, VMware, and VirtualBox.

Install Windows 2012: Once you have chosen a hypervisor, the next step is to install Windows 2012 on the virtual machine. This involves creating a new VM, configuring its settings such as memory, storage, and network, and then installing the operating system.

Install necessary software: After installing Windows 2012, you will need to install any necessary software or applications that the VM will require. This may include things like antivirus software, database software, or web server software.

Prepare for upload to Glance: Before you can upload the VM to Glance, you will need to ensure that it is properly configured and ready for distribution. This may involve things like installing any necessary drivers or updates, optimizing the VM's performance, and ensuring that it is properly licensed.

Upload to Glance: Once the VM is ready, you can upload it to Glance. Glance is an image service that is used by OpenStack to store and distribute virtual machine images. To upload the VM, you will need to create an image file in a supported format (such as VHD or QCOW2), and then use the Glance CLI (command-line interface) to upload the image to Glance.

Use the VM: Once the VM has been uploaded to Glance, it can be used to launch new instances of the VM in OpenStack. This allows you to easily create new VMs that are based on the Windows 2012 image that you uploaded.

CHAPTER 2

CLOUD COMPUTATION AND VIRTUALIZATION

2.1 CLOUD COMPUTING

In the context of technology, "cloud" refers to a network of remote servers that are hosted on the internet and used to store, manage, and process data. These servers are typically operated by third-party service providers, who offer their resources to businesses and individuals who need them. Cloud computing allows users to access and use computing resources on-demand, without needing to own or maintain their own hardware or software. This means that businesses and individuals can scale their computing resources up or down as needed, without having to invest in expensive infrastructure.

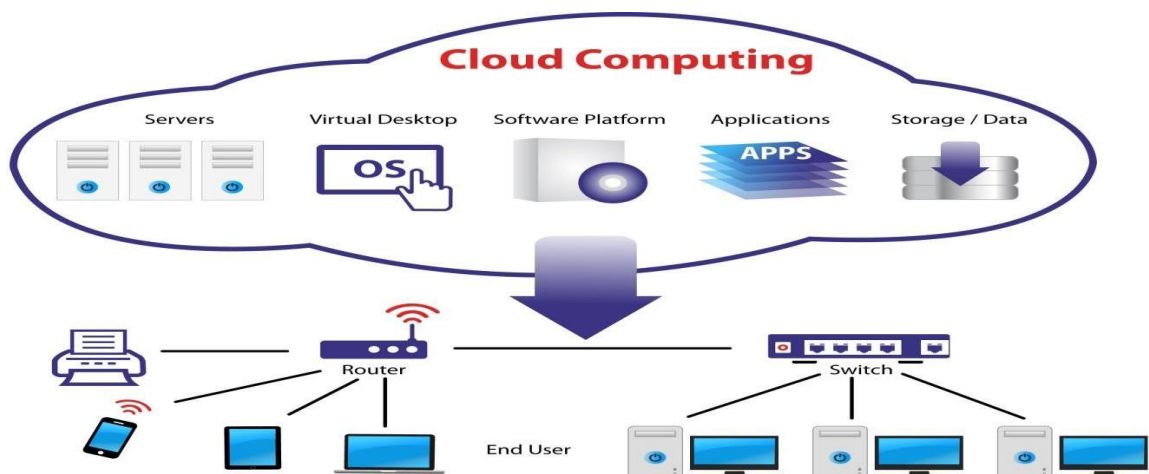


Fig 2.1 Cloud Computing

2.2 MULTICLOUD AND HYBRID MULTICLOUD

Multicloud is the use of two or more clouds from two or more different cloud providers. Having a multicloud environment can be as simple using email SaaS from one vendor and image editing SaaS from another. But when enterprises talk about multicloud, they're typically talking about using multiple cloud services including SaaS, PaaS, and IaaS services from two or more of the leading public cloud providers. Hybrid multicloud is the use of two or more public clouds together with a private cloud environment.

Organizations choose multicloud to avoid vendor lock-in, to have more services to choose from, and to access to more innovation. But the more clouds you use each with its own set of management tools, data transmission rates, and security protocols the more difficult it can be to manage your environment. Multicloud management platforms provide visibility across multiple provider clouds through a central dashboard, where development teams can see their projects and deployments, operations teams can keep an eye on clusters and nodes, and the cyber security staff can monitor for threats.

2.3 CLOUD COMPUTING ARCHITECTURE

Cloud computing architecture refers to the components and sub-components required for cloud computing.

These components typically refer to:

1. Front end(fat client, thin client)
2. Back-end platforms(servers, storage)
3. Cloud-based delivery and a network(Internet, Intranet, Intercloud).

Hosting a cloud: There are three layers in cloud computing. Companies use these layers based on the service they provide.

1. Infrastructure
2. Platform
3. Application

2.4 TYPES OF CLOUD

There are several different types of cloud services, including:

Infrastructure as a Service (IaaS) - which provides access to computing resources such as virtual machines, storage, and networking.

Platform as a Service (PaaS) - which provides a platform for developers to build and deploy their applications, without needing to manage the underlying infrastructure.

Software as a Service (SaaS) - which provides access to software applications over the internet, without needing to install or maintain the software locally.

1. INFRASTRUCTURE AS A SERVICE (IAAS) :

IaaS stands for Infrastructure as a Service, which is a type of cloud computing service that provides users with access to virtualized computing resources over the internet. With IaaS, users can access and manage virtualized computing resources such as servers, storage, and networking components, without needing to own or maintain their own physical hardware. Instead, the IaaS provider manages the underlying infrastructure, while users have control over the operating systems, applications, and storage they deploy on the virtual machines.

IaaS allows users to quickly and easily scale up or down their computing resources as needed, without having to invest in expensive hardware. This makes it a flexible and cost-effective option for businesses and individuals who need access to computing resources for a variety of purposes, such as hosting websites or running complex applications.

Some popular examples of IaaS providers include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform.

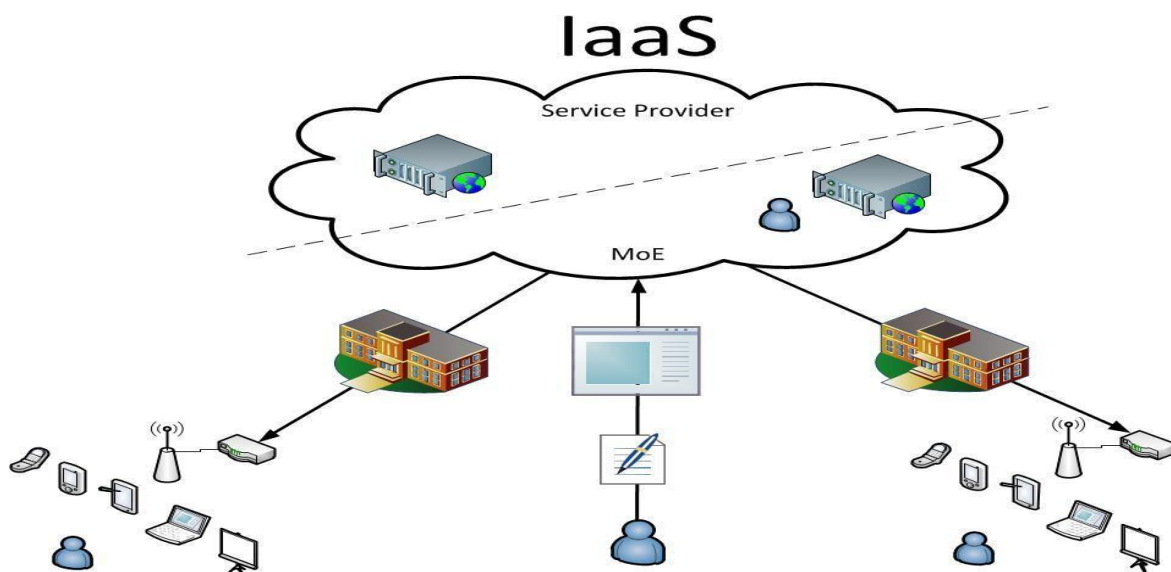


Fig 2.2 Infrastructure As a Service

2. PLATFORM AS A SERVICE (PAAS) :

PaaS stands for Platform as a Service, which is a type of cloud computing service that provides users with a platform for developing, deploying, and managing their applications over the internet. With PaaS, users can access a pre-configured platform that includes all the necessary infrastructure, middleware, and tools needed to develop and deploy applications, without needing to manage the underlying hardware or software.

PaaS providers typically offer a range of services, such as application hosting, development tools, database management, and integration with other cloud services. Users can access these services through a web-based interface, API, or command line interface, depending on the provider.

PaaS allows users to focus on developing and deploying their applications, without having to worry about the underlying infrastructure. This makes it a popular choice for developers who want to quickly and easily create and deploy applications, without needing to invest in expensive hardware or software.



Fig 2.3 Platform As a Service

3. SOFTWARE AS A SERVICE (SAAS) :

SaaS stands for Software as a Service, which is a type of cloud computing service that provides users with access to software applications over the internet. With SaaS, users can access and use software applications hosted by a third-party provider, without needing to install or maintain the software locally. Users typically access the software through a web browser or mobile app, and pay a subscription fee to the provider for access.

SaaS providers manage the underlying infrastructure, including servers, storage, and networking, as well as software updates and maintenance. This means that users can focus on using the software to accomplish their goals, without having to worry about the underlying technology.

SaaS is a popular choice for businesses and individuals who need access to software applications for a variety of purposes, such as productivity tools, customer relationship management (CRM) software, and accounting software. It allows users to quickly and easily access the software they need, without having to invest in expensive hardware or software licenses.



Fig 2.4 Software As a Service

2.5 ADVANTAGES OF CLOUD COMPUTING

Cloud computing offers several advantages, some of which include:

Scalability: Cloud computing allows for easy scaling up or down of computing resources as per the needs of the organization or user. This flexibility helps to optimize resources and reduce costs.

Cost savings: Cloud computing can reduce IT costs by eliminating the need for expensive hardware and software investments, maintenance, and upgrades. It offers a pay-as-you-go model where users only pay for the resources they use, which helps to minimize waste.

Accessibility: Cloud computing services are available over the internet, making it easy for users to access their applications and data from anywhere, anytime, and from any device.

Disaster recovery: Cloud computing offers an easy and affordable way to back up data, applications, and systems. In the event of a disaster or data loss, users can quickly restore their data from the cloud.

Collaboration: Cloud computing enables collaboration among team members, regardless of their location. It offers a centralized location for sharing files and documents, which improves team productivity and efficiency.

Security: Cloud computing providers offer robust security measures to protect user data, applications, and systems from cyber threats. They also ensure compliance with industry standards and regulations. Virtualization is achieved through the use of specialized software, called a hypervisor.

Innovation: Cloud computing enables organizations to quickly adopt new technologies and innovations without the need for large investments in hardware and software. This helps to foster innovation and competitive advantage.

2.6 DISADVANTAGE OF CLOUD COMPUTING

Cloud computing also has some disadvantages, some of which include:

Dependency on Internet Connectivity: Cloud computing requires an internet connection to access the services and data stored in the cloud. In the absence of a

stable internet connection, the user may experience downtime or loss of access to their data.

Security Risks: Storing data in the cloud creates security risks, such as data breaches and cyber attacks. Despite the robust security measures put in place by cloud providers, these risks cannot be entirely eliminated.

Vendor Lock-in: Moving data and applications from one cloud provider to another can be challenging and costly. This can create a dependency on the cloud provider and limit the user's flexibility in terms of choosing other providers.

Limited Control: Cloud computing services are managed and operated by the cloud provider, and users have limited control over the infrastructure and management of their data and applications.

Cost: While cloud computing offers cost savings, it can also be expensive, especially when users require more resources or services than initially anticipated. Users may also incur additional costs for data storage, bandwidth, and support services.

Compatibility: Some legacy applications or systems may not be compatible with cloud computing, requiring modifications or upgrades to make them compatible.

Performance Issues: The performance of cloud computing services is dependent on the internet connection and the quality of service provided by the cloud provider. Users may experience performance issues if the provider experiences downtime, maintenance, or high traffic.

2.7 VIRTUALIZATION

Virtualization refers to the creation of a virtual version of a computing resource, such as a server, operating system, storage device, or network. Virtualization allows multiple virtual resources to be created and used on a single physical computing resource, such as a server, which can improve resource utilization and flexibility. For example, a single server can be virtualized into multiple virtual servers, each of which can run different operating systems and applications, allowing multiple users or applications to share the physical computing resources.

that manages the creation and operation of virtual resources. The hypervisor abstracts the underlying hardware resources and presents them to the virtual

resources as if they were physical resources, allowing the virtual resources to operate as if they were running on dedicated hardware.

Virtualization has many benefits, including improved resource utilization, flexibility, and cost savings. It is commonly used in data centers, cloud computing, and virtual desktop infrastructure (VDI), among other applications.



Fig 2.5 Virtualization

2.8 TYPES OF VIRTUALIZATION

1. Operation system virtualization
2. Server virtualization
3. Hardware virtualization
4. Storage virtualization



Fig 2.6 Types Of Virtualization

1. Operating system virtualization :

Operating system virtualization, also known as containerization, is a type of virtualization that allows multiple isolated user-space instances, or containers, to run on a single operating system kernel.

In this type of virtualization, the host operating system runs on the physical hardware, and multiple containers are created on top of the host operating system. Each container is isolated from the other containers and from the host operating system, and appears to have its own isolated environment with its own resources, including its own file system, network interface, and user accounts.

Operating system virtualization is commonly used in cloud computing and in containerization platforms such as Docker, Kubernetes, and LXC. It provides many benefits, including improved resource utilization, faster deployment and scaling of applications, and better isolation and security of application environments.

Unlike traditional virtualization, where each virtual machine requires its own operating system and resources, operating system virtualization allows multiple applications to share the same operating system kernel, which reduces overhead and improves performance. Additionally, since each container is isolated from the others, application dependencies can be easily managed and conflicts can be avoided, making it easier to manage and deploy applications at scale.

2. Server virtualization :

Server virtualization is a type of virtualization that allows multiple virtual servers to run on a single physical server, by creating multiple isolated virtual environments, each of which appears to be a dedicated physical server.

In server virtualization, a hypervisor is installed on the physical server, which enables the creation of multiple virtual machines, each with its own operating system, applications, and resources. The hypervisor abstracts the underlying hardware and presents it to each virtual machine as if it were dedicated hardware, allowing each virtual machine to operate as if it were running on its own physical server.

Server virtualization provides many benefits, including improved resource utilization, flexibility, and scalability. By consolidating multiple physical servers into a single virtual server, organizations can reduce hardware costs, power consumption, and data center footprint. Additionally, virtual machines can be easily migrated between physical servers, which allows for better load balancing and disaster recovery.

Server virtualization is commonly used in cloud computing, data centers, and virtual desktop infrastructure (VDI). Some popular server virtualization platforms include VMware, Hyper-V, and KVM.

3. Hardware virtualization :

Hardware virtualization is a type of virtualization that enables the creation of multiple virtual machines (VMs) on a single physical machine, by abstracting and partitioning the underlying hardware resources.

Hardware virtualization requires the use of a hypervisor, which is a layer of software that creates and manages the virtual environment. The hypervisor sits between the physical hardware and the virtual machines, and enables each virtual machine to access a portion of the underlying hardware resources, such as CPU, memory, storage, and network connectivity.

Hardware virtualization provides many benefits, including improved resource utilization, better isolation and security, and increased flexibility and scalability. By creating multiple virtual machines on a single physical machine, organizations can reduce hardware costs, energy consumption, and data center footprint.

Hardware virtualization is commonly used in data centers, cloud computing, and virtual desktop infrastructure (VDI), among other applications. Some popular hardware virtualization platforms include VMware, Hyper-V, and KVM.

4. Storage virtualization :

Storage virtualization is a type of virtualization that abstracts physical storage resources, such as disks, tapes, and flash drives, and creates a logical view of those resources that can be accessed by users or applications.

Storage virtualization allows for the creation of a pool of storage resources that can be shared by multiple users or applications, regardless of the physical location of the storage devices. This improves storage utilization and allows for more efficient use of storage resources.

Storage virtualization can be implemented using hardware or software. Hardware-based storage virtualization uses specialized hardware devices, such as storage arrays, to virtualize storage resources. Software-based storage virtualization uses software applications, called virtual storage appliances, to provide virtualized storage resources.

Storage virtualization provides many benefits, including improved storage utilization, easier management of storage resources, and increased flexibility and scalability. It can be used in a variety of applications, including cloud computing, data centers, and virtual desktop infrastructure (VDI).

Some popular storage virtualization platforms include VMware Virtual SAN, Microsoft Storage Spaces, and IBM Spectrum Virtualize.

2.9 HOW IS VIRTUALIZATION DIFFERENT FROM CLOUD COMPUTING

Cloud computing is the on-demand delivery of computing resources over the internet with pay-as-you-go pricing. Instead of buying, owning, and maintaining a physical data center, you can access technology services, such as computing power, storage, and databases, as you need them from a cloud provider.

Virtualization technology makes cloud computing possible. Cloud providers set up and maintain their own data center. They create different virtual environments that

use the underlying hardware resources. You can then program your system to access these cloud resources by using APIs. Your infrastructure needs can be met as a fully managed service.

2.10 ADVANTAGES OF VIRTUALIZATION

Virtualization and cloud computing are often used together to deliver scalable and efficient IT services. The advantages of virtualization and cloud computing combined include:

Scalability: Virtualization allows for the efficient use of resources, and cloud computing provides scalable computing resources. Together, they enable the quick and easy provisioning of resources to meet changing business needs.

Cost Savings: By consolidating multiple virtual machines on a single physical server, virtualization reduces the number of physical servers needed. This leads to lower hardware costs, and when combined with cloud computing, organizations can benefit from a pay-as-you-go model, paying only for the resources they need.

Flexibility: Cloud computing and virtualization provide flexibility by enabling resources to be dynamically allocated and adjusted as needed. This allows businesses to quickly respond to changing business needs and demands.

Increased Security: Virtualization provides a secure, isolated environment for applications and data, and cloud computing provides robust security measures to protect against cyber threats.

Disaster Recovery: Virtualization simplifies disaster recovery by allowing virtual machines to be easily backed up, replicated, and restored. Combined with cloud computing, it provides a robust disaster recovery solution, ensuring business continuity in the event of a disaster or hardware failure.

Improved Resource Utilization: Virtualization and cloud computing together provide better resource utilization by enabling multiple virtual machines to share the same physical resources. This leads to improved performance and reduced energy consumption.

Simplified Management: Virtualization and cloud computing provide a centralized management interface for all virtual machines and resources. This simplifies

management, making it easier to deploy, manage, and monitor multiple virtual machines and cloud resources from a single console.

2.11 DISADVANTAGES OF VIRTUALIZATION

While virtualization and cloud computing offer many advantages, there are also some disadvantages to consider. Some of the disadvantages of virtualization and cloud computing include:

Complexity: The deployment of virtualization and cloud computing can be complex, requiring specialized skills and expertise. The implementation process can also be time-consuming, leading to potential delays and disruptions.

Cost: While virtualization and cloud computing can offer cost savings, there may be additional costs associated with hardware, software, and maintenance. Organizations must carefully evaluate the costs and benefits of virtualization and cloud computing to determine if they are cost-effective.

Security Risks: Virtualization and cloud computing create new security risks that must be carefully managed. Virtual machines can be more vulnerable to cyber-attacks, and cloud providers can be targeted by hackers, leading to data breaches and other security incidents.

Performance Issues: Virtualization and cloud computing can lead to performance issues, especially if resources are not allocated properly. This can result in slower application performance and decreased productivity.

Dependency on Internet Connectivity: Cloud computing requires a stable internet connection to access services and data stored in the cloud. In the absence of a stable internet connection, the user may experience downtime or loss of access to their data.

Vendor Lock-In: Moving data and applications from one cloud provider to another can be challenging and costly. This can create a dependency on the cloud provider and limit the user's flexibility in terms of choosing other providers.

Compatibility: Some legacy applications or systems may not be compatible with virtualization and cloud computing, requiring modifications or upgrades to make them compatible. This can lead to additional costs and complexity.

CHAPTER 3

VIRTUAL BOX AND UBUNTU

3.1 ORACLE VM VIRTUAL BOX

Virtual Box (also known as Oracle VM Virtual Box) is a free and open-source virtualization software that allows users to run multiple guest operating systems (OS) on a single host machine. It can run on Windows, Linux, and Mac OS X hosts, and supports a wide range of guest operating systems, including Windows, Linux, Solaris, and BSD.

With Virtual Box, users can create and manage virtual machines (VMs), which are isolated software environments that emulate a complete hardware environment, including a CPU, memory, storage, and network interfaces. VMs can be used for a variety of purposes, such as software development, testing, and experimentation, as well as running legacy applications and operating systems.

Virtual Box provides a user-friendly interface for creating and configuring VMs, as well as for managing snapshots, virtual disks, and virtual networking. It also supports a range of advanced features, such as seamless windows, shared folders, and USB device pass through.

Oracle VM Virtual Box, commonly referred to as just VirtualBox, is a free and open-source virtualization software developed by Oracle Corporation. It allows users to run multiple guest operating systems (OS) on a single host machine, allowing for easy testing and development.

VirtualBox supports a wide range of guest operating systems, including Windows, Linux, Solaris, and BSD, and can be run on a variety of host operating systems, including Windows, Linux, Mac OS X, and Solaris. VirtualBox provides a user-friendly interface for creating and configuring virtual machines (VMs), as well as managing virtual disks, virtual networking, and snapshots. Users can customize the hardware of each VM, including the amount of CPU cores, RAM, and storage space allocated to the VM.

VirtualBox also supports a range of advanced features, such as seamless windows, shared folders, and USB device passthrough. Additionally, it provides support for

remote desktop protocols, making it possible to run a VM on a remote machine. Overall, Oracle VM Virtual Box is a powerful and flexible virtualization solution that is widely used by developers, IT professionals, and hobbyists around the world. Its ease of use and wide range of features make it an attractive choice for anyone looking to run multiple operating systems on a single machine.

3.2 INSTALLIZATION OF ORACLE VIRTUAL BOX ON WINDOWS

Here are the steps to install Oracle VM VirtualBox on Windows:

1. Go to the official Virtual Box website:
<https://www.virtualbox.org/wiki/Downloads>
2. Click on "Windows Hosts" to download the installer for your Windows version.
3. Once the download is complete, run the installer file and follow the on-screen instructions.
4. During the installation process, you may be prompted to install additional drivers. Follow the prompts to complete the installation.
5. Once the installation is complete, launch VirtualBox.
6. To create a new virtual machine, click on the "New" button.
7. Follow the prompts to configure your virtual machine, including selecting the operating system and setting the amount of RAM and storage.
8. Once your virtual machine is configured, you can start it by selecting it in the VirtualBox Manager and clicking on the "Start" button.

That's it! You should now have Oracle VM VirtualBox installed and be able to create and run virtual machines.

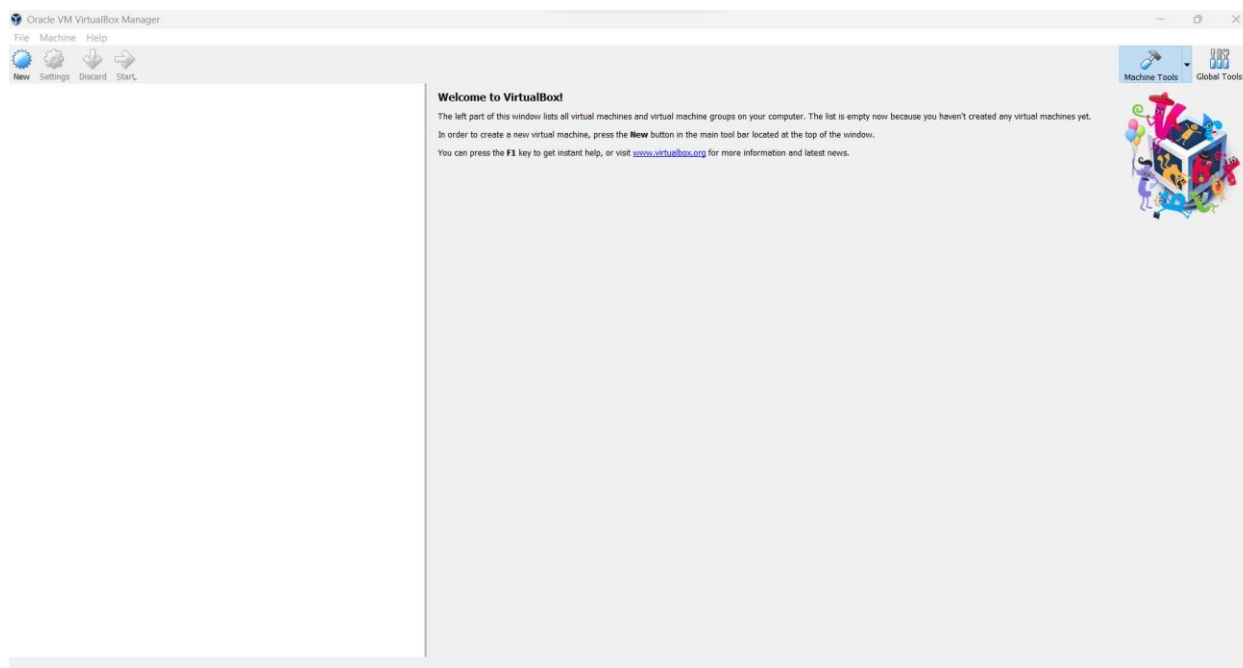


Fig-3.1 Installation Of Oracle VM Virtual box

3.3 UBUNTU

Ubuntu is a popular open-source Linux-based operating system (OS) developed by Canonical. It is based on the Debian distribution of Linux and is known for its ease of use and user-friendly interface. Ubuntu is widely used for personal computers, servers, and cloud computing.

Ubuntu is available in different editions, each designed for different use cases. The most popular edition is the Ubuntu Desktop, which is designed for personal computers and laptops. It includes a wide range of pre-installed software, such as web browsers, office suites, multimedia players, and graphics editors.

Another popular edition is the Ubuntu Server, which is designed for server applications. It includes a minimal set of software packages, allowing users to install and configure only the software they need. Ubuntu also has several other editions, such as Ubuntu Core for Internet of Things (IoT) devices and Ubuntu Studio for multimedia creation.

One of the key features of Ubuntu is its package management system, which allows users to easily install, update, and remove software packages from a centralized repository. Additionally, Ubuntu has a large and active community of users and developers who provide support, documentation, and software updates.

3.4 INSTALLIZATION UBUNTU IN VM BOX

1. To install Ubuntu in VirtualBox, please follow these steps:
2. Download the Ubuntu ISO file from the official website:
<https://ubuntu.com/download>
3. Open VirtualBox and click on the "New" button to create a new virtual machine.
4. Give your virtual machine a name, select "Linux" as the type, and "Ubuntu" as the version.
5. Allocate the amount of RAM you want to assign to the virtual machine.
6. Create a virtual hard disk for the virtual machine. You can select the default settings or customize them based on your requirements.
7. After creating the virtual machine, select it and click on the "Settings" button.
8. In the "Settings" window, select "Storage" and click on the "Empty" CD/DVD icon.
9. Click on the "Add" button and select the Ubuntu ISO file you downloaded earlier.
10. Click on the "Start" button to start the virtual machine.
11. Ubuntu will start booting from the ISO file. Follow the on-screen instructions to complete the installation process.
12. Once the installation is complete, you can use Ubuntu in VirtualBox.

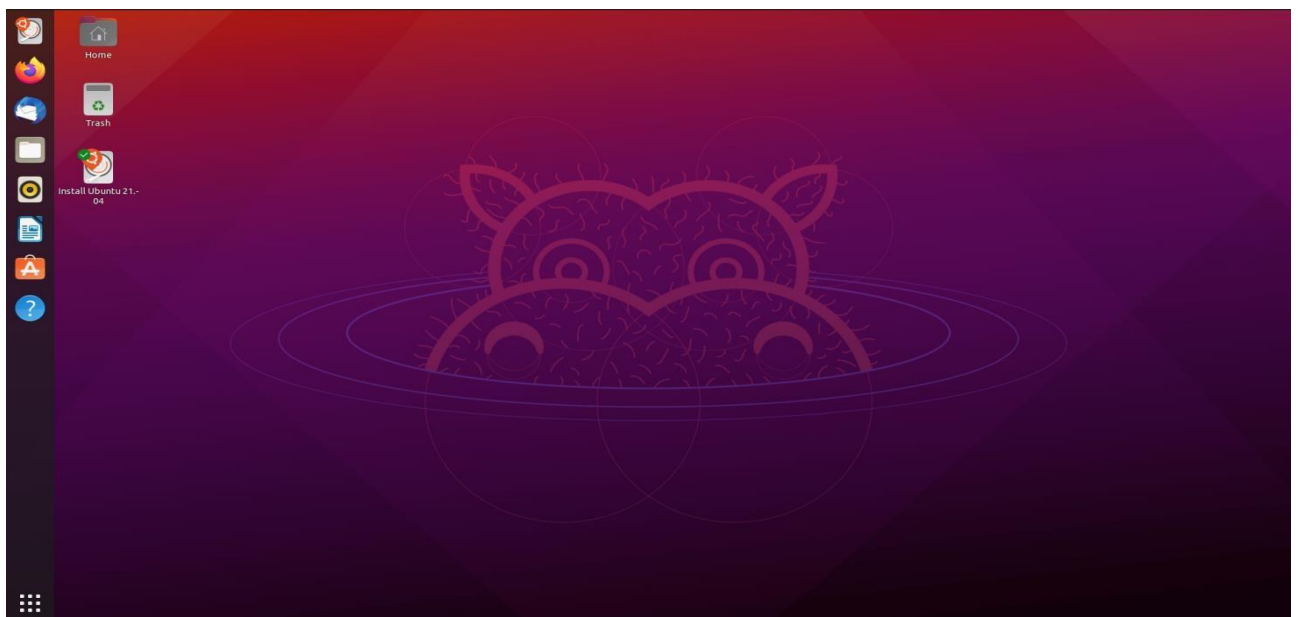


Fig 3.2 Installization Ubuntu in VM Box

3.5 FEATURES OF UBUNTU

Ubuntu has a wide range of features that make it a popular choice for personal and professional use. Here are some of its key features:

Open-source: Ubuntu is an open-source operating system, which means that the source code is available to the public, and anyone can modify and distribute it.

User-friendly interface: Ubuntu has a simple and intuitive user interface, which makes it easy to use even for beginners.

Security: Ubuntu has a strong focus on security, and it includes built-in security features such as AppArmor and a firewall.

Stability: Ubuntu is known for its stability and reliability, and it includes features such as error reporting and automatic updates.

Package management: Ubuntu has a powerful package management system that allows users to easily install, update, and remove software packages from a centralized repository.

Multilingual support: Ubuntu supports a wide range of languages, making it accessible to users from different regions of the world.

Customizability: Ubuntu can be customized to suit individual needs, with a range of desktop environments, themes, and software packages available.

Compatibility: Ubuntu is compatible with a wide range of hardware and software, making it a versatile operating system.

Community support: Ubuntu has a large and active community of users and developers who provide support, documentation, and software updates.

Overall, Ubuntu is a feature-rich and versatile operating system that is suitable for a wide range of applications and use cases.

3.6 WORK FOR UBUNTU

If you're interested in working for Ubuntu, there are a few ways you can get involved:

Join the Ubuntu community: The Ubuntu community is a large and active group of users and developers who contribute to the development of the operating system. By joining the community, you can participate in discussions, contribute code, and help with testing and bug reporting.

Apply for a job at Canonical: Canonical is the company that develops and maintains Ubuntu. They often have job openings for developers, engineers, and other positions. You can visit their website to see current job openings and apply online.

Contribute to Ubuntu projects: Ubuntu has a wide range of projects that you can contribute to, such as documentation, translations, and software development. By contributing to these projects, you can help improve the operating system and gain experience working with Ubuntu.

Start your own Ubuntu-related project: If you have an idea for an Ubuntu-related project, you can start your own project and contribute to the Ubuntu ecosystem. This could be anything from a new software application to a hardware project that runs on Ubuntu.

Overall, there are many ways to get involved with Ubuntu and contribute to its development. Whether you're a developer, designer, or enthusiast, there are opportunities to help improve Ubuntu and make it even better.

3.7 A WINDOWS SERVER 2012 VIRTUAL ON MACHINE

To create a Windows Server 2012 virtual machine on OpenStack, upload an image to the Glance image service, and launch a sample application, follow these steps:

1. Create a virtual machine on OpenStack

1. Log in to the OpenStack dashboard and navigate to the Compute section.
2. Click on Instances and then Launch Instance to start the instance creation wizard.
3. Select the Windows Server 2012 image from the list of available images.
4. Choose the flavor and network settings for the instance.
5. Customize the instance as per your requirements, such as the hostname and security settings.

6. Click Launch to create the virtual machine.

2. Configure the virtual machine

1. Once the virtual machine is created, access it through a remote desktop protocol (RDP) client.
2. Configure the Windows Server 2012 instance as per your requirements, such as installing updates, software, and drivers.

3. Create an image using the Glance image service

1. Log in to the OpenStack dashboard and navigate to the Image section.
2. Click on Create Image to start the image creation wizard.
3. Provide a name and description for the image.
4. Select the virtual machine instance created earlier as the source for the image.
5. Choose the format and visibility settings for the image.
6. Click Create Image to start the image creation process.

4. Launch a sample application

1. Log in to the OpenStack dashboard and navigate to the Compute section.
2. Click on Instances and then Launch Instance to start the instance creation wizard.
3. Select the image created earlier from the list of available images.
4. Choose the flavor and network settings for the instance.
5. Customize the instance as per your requirements, such as the hostname and security settings.
6. Click Launch to create the virtual machine.
7. Once the virtual machine is created, access it through a remote desktop protocol (RDP) client.

8. Install the sample application on the Windows Server 2012 instance.
9. Launch the sample application to confirm it is working correctly.

You have now created a Windows Server 2012 virtual machine on OpenStack, uploaded an image to the Glance image service, and launched a sample application on the virtual machine.

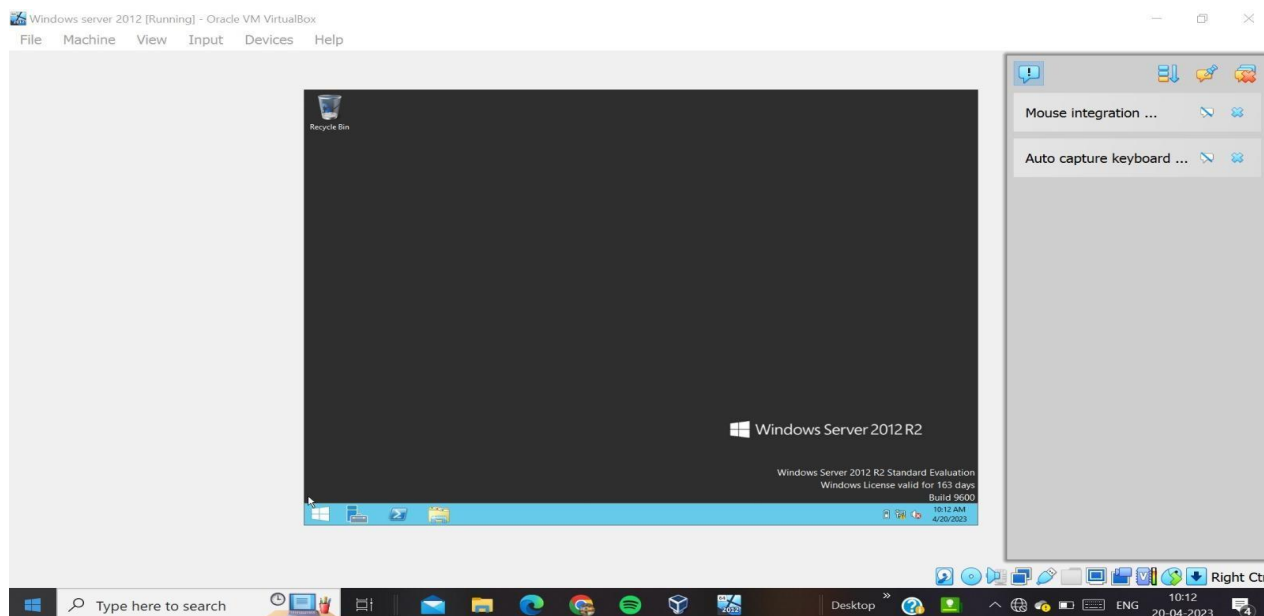


Fig 3.3 A Windows Server 2012 On Virtual Machine

3.8 OPEN STACK

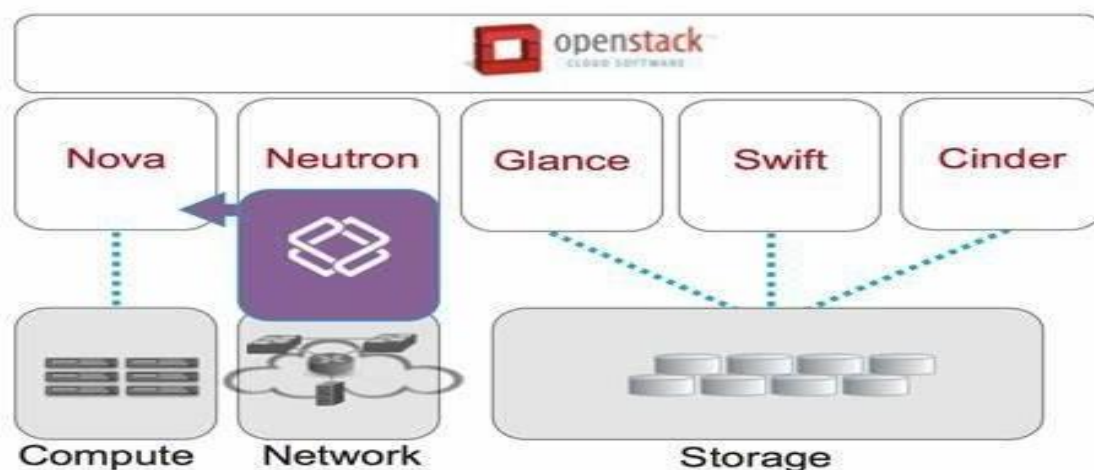


Fig 3.4 OpenStack

OpenStack is an open-source software platform for building and managing private and public clouds. It provides a set of tools and services for deploying and managing cloud infrastructure, including compute, storage, and networking resources. OpenStack was first launched in 2010 as a joint project between Rackspace and NASA, and has since become one of the most widely used cloud computing platforms, with a large and active community of contributors and users.

OpenStack is designed to be highly scalable and flexible, allowing users to build and manage cloud environments that can be customized to meet their specific needs. It includes a range of services, including Nova for compute, Cinder for storage, Neutron for networking, and Keystone for authentication and authorization. OpenStack is also designed to be highly interoperable, with support for a wide range of virtualization and containerization technologies, as well as integration with a variety of other cloud services and tools.

OpenStack can be deployed on a variety of hardware and virtualization platforms, and can be managed using a variety of tools and interfaces, including the OpenStack Dashboard, the OpenStack API, and a range of third-party tools and services. OpenStack is often used by organizations that require highly scalable and customizable cloud infrastructure, such as telecom providers, financial services companies, and research institutions.

OpenStack is an open-source cloud computing platform that provides a set of tools and services for building and managing private and public clouds. OpenStack works by abstracting the underlying infrastructure and providing a layer of software that enables users to manage their cloud resources as if they were a single system.

3.9 WORK FOR OPENSTACK

Here are some of the main components and work of OpenStack:

Compute (Nova): This component provides the virtualization layer and manages the creation, scheduling, and termination of virtual machines (VMs) on the cloud infrastructure.

Storage (Cinder and Swift): These components provide different types of storage services. Cinder provides block storage, which is used to store persistent data for

VMs, while Swift provides object storage, which is used for storing large volumes of unstructured data.

Networking (Neutron): This component provides network connectivity for the VMs and enables the creation of virtual networks, routers, and firewalls.

Identity (Keystone): This component provides authentication and authorization services and manages user and project information for the OpenStack environment.

Dashboard (Horizon): This component provides a web-based graphical user interface (GUI) for managing OpenStack resources.

Orchestration (Heat): This component provides a framework for automating the deployment and scaling of OpenStack resources.

Telemetry (Ceilometer): This component provides monitoring and metering services to track resource usage and performance.

OpenStack works by providing a set of APIs that enable users to interact with the various OpenStack components and manage their cloud resources. Users can deploy OpenStack on their own hardware or use a public cloud service that runs on OpenStack. OpenStack is highly flexible and can be customized to meet the specific needs of different organizations, making it a popular choice for building and managing cloud infrastructure.

3.10 ADVANTAGES OF OPENSTACK

OpenStack is an open-source cloud computing platform that provides a range of benefits to organizations looking to deploy and manage private or public clouds. Some of the key benefits of OpenStack include:

Flexibility: OpenStack is a highly customizable cloud computing platform that enables organizations to configure and deploy their cloud environment to meet their specific needs.

Scalability: OpenStack enables organizations to scale their cloud computing resources up or down, as needed, to meet changing demand.

Cost-Effective: OpenStack is an open-source platform, which means it is free to use, modify and distribute. This makes it a cost-effective solution for organizations that want to deploy private or public clouds.

Open Standards: OpenStack adheres to open standards, which makes it easier for organizations to integrate with other systems and services.

High Availability: OpenStack provides high availability and fault tolerance features that ensure the cloud infrastructure remains available even if some components fail.

Multi-Tenancy: OpenStack provides multi-tenancy features that enable multiple users or groups to share the same cloud infrastructure while maintaining isolation and security.

API Compatibility: OpenStack provides a standardized API that makes it easy to integrate with other systems and services.

Community Support: OpenStack has a large and active community of developers and users who collaborate to improve and enhance the platform. This provides a wealth of resources, support, and knowledge for organizations using OpenStack.

Vendor-Neutral: OpenStack is vendor-neutral, which means it can be deployed on any hardware or cloud infrastructure, providing greater choice and flexibility for organizations.

Overall, OpenStack provides a range of benefits that enable organizations to deploy and manage private or public clouds that are flexible, scalable, cost-effective, and easy to integrate with other systems and services.

3.11 DISADVANTAGES OF OPENSTACK

While OpenStack provides a range of benefits, there are also some potential disadvantages to consider. Some of the disadvantages of OpenStack include:

Complexity: OpenStack is a highly customizable cloud computing platform, which can make it complex to deploy and manage. Organizations need to have skilled personnel with expertise in OpenStack to manage and maintain the cloud infrastructure.

Resource Requirements: OpenStack requires significant hardware resources to run, which can be costly to acquire and maintain. Organizations need to ensure they have the necessary hardware infrastructure in place to support OpenStack.

Integration Challenges: While OpenStack provides a standardized API for integration with other systems and services, integration can still be challenging, especially with legacy systems or proprietary software.

Security Risks: OpenStack provides a range of security features, but organizations need to ensure they properly configure and manage the security features to avoid potential security risks.

Limited Vendor Support: OpenStack is an open-source platform, which means that vendor support can be limited compared to proprietary cloud computing platforms. Organizations need to ensure they have the necessary support in place to manage and maintain the OpenStack infrastructure.

Learning Curve: OpenStack is a complex platform with a steep learning curve, which can make it challenging for organizations to deploy and manage. Organizations need to ensure they have the necessary resources and training in place to properly manage the OpenStack infrastructure.

Overall, while OpenStack provides a range of benefits, organizations need to carefully consider the potential challenges and disadvantages before deploying OpenStack. Organizations need to ensure they have the necessary resources, skills, and support in place to properly manage and maintain the OpenStack infrastructure.

3.12 INSTALLIZATION OF OPENSTACK

Installing OpenStack is a complex process that requires a good understanding of the underlying technology and the steps involved. Here are the basic steps to install OpenStack:

Choose a distribution: OpenStack is available in several distributions, including Canonical's Ubuntu, Red Hat's RHEL, and Mirantis' OpenStack. Choose a distribution that fits your requirements.

Prepare the host system: Ensure that the host system meets the minimum hardware and software requirements, such as CPU, RAM, disk space, and operating system.

Install and configure the database: OpenStack requires a database to store configuration data, metadata, and other information. The recommended database is MariaDB or MySQL.

Install and configure message broker: OpenStack uses message brokers to communicate between its components. RabbitMQ is the most commonly used message broker in OpenStack.

Install and configure Identity service (Keystone): Keystone is the identity service in OpenStack that manages authentication and authorization. It should be installed and configured before other OpenStack services.

Install and configure other OpenStack services: After Keystone is set up, you can install and configure other OpenStack services such as Compute (Nova), Networking (Neutron), Block Storage (Cinder), Object Storage (Swift), and Image Service (Glance).

Configure the dashboard: OpenStack has a web-based dashboard (Horizon) that allows users to manage their cloud resources. You can configure Horizon to customize the look and feel of the dashboard.

Verify the installation: After the installation is complete, verify that OpenStack is working correctly by creating instances, networks, and storage.

These are only the basic steps involved in installing OpenStack. Depending on your use case and requirements, you may need to perform additional configurations and customizations. It's also recommended to follow the official OpenStack documentation for your chosen distribution for detailed installation instructions.

3.13 A WINDOWS 2012 VM AND UPLOAD TO GLANCE

1. Install OpenStack CLI tools: You need to have OpenStack CLI tools installed on your machine to connect to OpenStack cloud. You can install them by running the following command:

```
-> pip install python-openstackclient
```

2. Connect to OpenStack: You need to authenticate yourself with OpenStack before you can use it. You can do this by running the following command and entering your OpenStack credentials:

```
-> openstack login
```

3. Create a Windows 2012 VM: You can create a Windows 2012 VM using the following command:

Php :

```
openstack server create --flavor <flavor_name> --image  
<windows_2012_image_name> --key-name <key_pair_name> <server_name>
```

Here, <flavor_name> is the flavor you want to use, <windows_2012_image_name> is the name of the Windows 2012 image you want to use, <key_pair_name> is the name of the key pair you want to use for SSH access, and <server_name> is the name you want to give to the VM.

4. Upload the VM image to Glance: Once the VM is created, you need to upload it to Glance so that it can be launched later. You can do this using the following command:

Css :

```
openstack image create --container-format bare --disk-format vhd --file  
<vhd_file_path> <image_name>
```

Here, <vhd_file_path> is the path to the VHD file of the VM, and <image_name> is the name you want to give to the image.

5. Launch a sample application: Once the VM image is uploaded to Glance, you can launch it and install a sample application. You can do this using the following steps:

Launch the VM using the image you just uploaded:

Php :

```
openstack server create --image <image_name> --flavor <flavor_name>
<server_name>
```

Once the VM is launched, SSH into it and install the sample application:

Php :

```
ssh -i <path_to_private_key> <username>@<vm_ip_address>
```

Here, <path_to_private_key> is the path to your private key, <username> is the username you want to use to SSH into the VM, and <vm_ip_address> is the IP address of the VM.

Php :

```
<install_sample_app_command>
```

Here, <install_sample_app_command> is the command to install the sample application.

6. Access the sample application: Once the sample application is installed, you can access it using a web browser by entering the VM's IP address and the port on which the application is running.

These are the general steps you can follow to create a Windows 2012 VM and upload to Glance, and launch a sample application. However, the specific steps may vary depending on your OpenStack configuration and environment.

3.14 KEY CONCEPTS FOR CREATE A WINDOWS 2012 VM AND UPLOAD GLANCE

Here are some key concepts to keep in mind while creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application:

Virtualization: Virtualization is the process of creating a virtual representation of hardware resources, such as CPU, memory, and storage, and running multiple operating systems on a single physical machine.

OpenStack: OpenStack is an open-source cloud computing platform that provides a suite of services for managing virtual machines, storage, and networking.

Windows Server 2012: Windows Server 2012 is a server operating system developed by Microsoft that provides a range of features and services for managing servers and workloads.

Glance: Glance is the OpenStack image service that provides a repository for storing, discovering, and retrieving virtual machine images.

Remote Desktop Protocol (RDP): RDP is a protocol developed by Microsoft that allows users to connect to a remote computer and access its desktop environment.

Image: An image is a pre-configured template of a virtual machine that can be used to create new virtual machines with the same configuration and settings.

Flavor: A flavor is a predefined set of resources, such as CPU, memory, and storage, that can be used to create a virtual machine with a specific configuration.

Network: A network is a set of interconnected devices, such as computers and servers, that can communicate with each other and share resources.

Sample application: A sample application is a simple program or software that is used to test or demonstrate the capabilities of a system or platform.

3.15 CHALLENGES FOR CREATE A WINDOWS 2012 VM AND UPLOAD GLANCE

Creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application can come with its own set of challenges. Here are a few potential challenges that you may encounter.

Compatibility issues: One of the primary challenges when creating a virtual machine is ensuring that the hardware and software components are compatible with each other. This can include issues with drivers, firmware, and other system components.

Resource allocation: Virtual machines require dedicated resources, such as CPU, memory, and storage, which can be a challenge when working with limited resources. It's essential to allocate the right amount of resources to the virtual machine to ensure that it runs smoothly and without issues.

Networking configuration: Configuring the network settings for the virtual machine and ensuring that it can communicate with other devices on the network can be a challenge, especially if you're working with a complex network topology.

Image creation: Creating an image that contains all the required software and configurations can be a time-consuming and complex process. It's essential to ensure that the image is tested and validated before uploading it to the Glance image service.

Application compatibility: Ensuring that the sample application is compatible with the Windows Server 2012 operating system can be a challenge. Some applications may require specific dependencies or configuration settings, which can impact their functionality on the virtual machine.

Overall, creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application requires careful planning and attention to detail to ensure that the process is successful.

3.16 LIMITATION FOR CREATE A WINDOWS 2012 VM AND UPLOAD GLANCE

There are some limitations that you may encounter when creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application. Here are a few potential limitations:

Resource limitations: Virtual machines require dedicated resources, such as CPU, memory, and storage, which can be limited in some environments. If you're working with limited resources, you may need to adjust the resource allocation for the virtual machine or consider upgrading your hardware.

Compatibility issues: Compatibility issues can limit your ability to run certain software applications or drivers on the virtual machine. This can impact the functionality of the virtual machine and limit its capabilities.

Network limitations: Networking limitations can impact your ability to communicate with other devices on the network, which can limit the functionality of the virtual machine.

Image size limitations: The size of the image that you can upload to the Glance image service may be limited based on the available storage space. This can impact your ability to store and retrieve images from the Glance image service.

Software licensing limitations: Some software applications may have licensing restrictions that limit their use in virtualized environments. It's essential to ensure that you're using software applications that are licensed for virtualization.

Performance limitations: Virtual machines can sometimes experience performance limitations compared to physical machines. This can be due to the overhead of virtualization, resource contention, or other factors.

Overall, it's important to be aware of these limitations when creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application. By understanding these limitations, you can better plan and design your virtualization environment to ensure that it meets your needs and expectations.

3.17 ADVANTAGES FOR CREATE A WINDOWS 2012 VM AND UPLOAD GLANCE

Creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application can offer several advantages, including:

Scalability: Virtual machines can be quickly and easily provisioned, allowing you to scale up or down based on your needs. This can help you better manage resources and reduce costs.

Flexibility: Virtual machines offer greater flexibility than physical machines, allowing you to customize the hardware and software settings to meet your specific needs.

Portability: Virtual machines can be easily moved between different physical servers or cloud environments, making it easier to migrate workloads and applications as needed.

Centralized management: Virtual machines can be centrally managed using tools like OpenStack, allowing you to monitor and control multiple virtual machines from a single interface.

Cost savings: Virtual machines can help you reduce hardware and infrastructure costs by allowing you to run multiple virtual machines on a single physical machine.

Rapid deployment: Virtual machines can be quickly and easily deployed, allowing you to get up and running with new applications or workloads faster.

Testing and development: Virtual machines can be used for testing and development purposes, allowing you to experiment with new software or configurations without impacting production environments.

Overall, creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application can provide several advantages that can help you better manage your infrastructure, reduce costs, and improve performance and flexibility.

3.18 DISADVANTAGES FOR CREATE A WINDOWS 2012 VM AND UPLOAD GLANCE

While creating a Windows Server 2012 virtual machine, uploading an image to the Glance image service, and launching a sample application offer several advantages, there are also some potential disadvantages to consider, including:

Resource utilization: Virtual machines require dedicated resources, such as CPU, memory, and storage. If the virtual machines are not correctly sized, it can lead to resource contention, which can impact performance and cause other issues.

Complexity: Virtualization environments can be complex and require specialized knowledge and expertise to manage effectively. This can be a disadvantage if you don't have the necessary skills or resources to manage the virtual machines properly.

Security: Virtual machines are susceptible to the same security risks as physical machines. Additionally, virtualization can introduce new security vulnerabilities that must be addressed, such as the potential for unauthorized access to the hypervisor or other virtual machines on the same host.

Licensing: Licensing can be a challenge when working with virtual machines, particularly for software applications that require specific licensing arrangements.

Dependency on hardware and software: Virtual machines are dependent on the underlying hardware and software components. This means that compatibility issues, hardware failures, or software vulnerabilities can impact the virtual machines running on top of them.

Performance overhead: Virtualization can introduce performance overhead due to the hypervisor layer that sits between the virtual machine and the physical hardware. This overhead can impact performance, particularly in I/O intensive workloads.

Overall, while virtualization offers several advantages, it's important to consider the potential disadvantages and weigh them against the benefits before deciding whether to create a Windows Server 2012 virtual machine, upload an image to the Glance image service, and launch a sample application.

CHAPTER 4

CONCLUSION

Building a Windows Server 2012 VM in OpenStack requires specific knowledge of both OpenStack and Windows Server 2012. It is important to understand the system requirements and configurations for both OpenStack and Windows Server 2012 to ensure a successful installation. It is crucial to choose the appropriate hardware resources for the VM, including CPU, RAM, and storage, based on the workload requirements of the Windows Server 2012 environment. It is also essential to allocate appropriate network resources, including IP addresses and network interfaces. Security considerations should be taken into account when building a Windows Server 2012 VM in OpenStack. This includes securing access to the VM, managing user accounts and permissions, and configuring firewall rules. Testing and monitoring the Windows Server 2012 VM in OpenStack is critical to ensure that the environment is stable and performing optimally. This includes monitoring resource usage and performance metrics and addressing any issues that arise. Building a Windows Server 2012 VM in OpenStack requires specific knowledge and expertise, careful consideration of hardware and network resources, attention to security, and ongoing testing and monitoring.

CHAPTER 5

REFERENCE

Here are some references that may be helpful for creating a Windows 2012 VM and uploading it to Glance, and launching a sample application:

1. OpenStack documentation: <https://docs.openstack.org/>
2. DevStack documentation: <https://docs.openstack.org/devstack/latest/>
3. OpenStack Image service (Glance) documentation: <https://docs.openstack.org/glance/latest/>
4. OpenStack command-line client documentation: <https://docs.openstack.org/python-openstackclient/latest/>
5. Microsoft Windows 2012 image for OpenStack: <https://cloudbase.it/windows-cloud-images/>
6. Sample application for Windows: <https://www.microsoft.com/en-us/p/windows-terminal/9n0dx20hk701?rtc=1&activetab=pivot:overviewtab>

Please note that the exact steps for creating a Windows 2012 VM and uploading it to Glance may vary depending on your specific environment and requirements.

APPENDIX

