VIRTUALIZATION PROJECT REPORT

TITLE: Creating and accessing a Private Cloud using OpenStack

TEAM MEMBERS:

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ABSTRACT:

The private cloud is defined as computing services offered either over the Internet or a private internal network and only to select users instead of the general public. Also called an internal or corporate cloud, private cloud computing gives businesses many of the benefits of a public cloud - including self-service, scalability and elasticity - with the additional control and customisation available from dedicated resources over a computing infrastructure hosted on-premises. In addition, private clouds deliver a higher level of security and privacy through both company firewalls and internal hosting to ensure operations and sensitive data are not accessible to third-party providers. One drawback is that the company's IT department is held responsible for the cost and accountability of managing the private cloud. So private clouds require the same staffing, management and maintenance expenses as traditional data centre ownership.

OpenStack software controls large pools of compute, storage, and networking resources throughout a datacentre, managed through a dashboard or via the OpenStack API. OpenStack is a combination of open source projects that use pooled virtual resources to build and manage private and public clouds. Six of these projects handle the core cloud computing services of compute, networking, storage, identity, and image services, while more than a dozen optional projects can be bundled together to create unique, deployable clouds. OpenStack is, therefore, best thought of as a framework rather than as a single monolithic project. In this project we use OpenStack to create a private cloud and further demonstrate how this cloud can be used to store and access files.

REFERENCE PAPERS

PAPER 1: Public vs Private Vs Hybrid Vs Community - Cloud Computing: A Critical Review –*IJCNIS by Sumit Goyal*

In this paper all the four cloud models are defined, discussed and compared with the benefits and pitfalls, thus giving a clear idea, which model to adopt for an organization. This paper also helped us understand the advantage that a private cloud has over other cloud computing models. Like the private cloud's ability to virtualized services maximizes hardware usage, ultimately reducing costs and complexity. The most important resources of any organization are arguably its resources and its data. Trusting these resources to outside entities that have been repeatedly proven vulnerable to attack puts an organization in a most precarious situation. The major drawback of private cloud is its higher cost. When comparisons are made with public cloud; the cost of purchasing equipment, software and staffing often results in higher costs to an organization having their own private cloud.

PAPER 2: OpenStack: Toward an Open-Source Solution for Cloud Computing – *IJCA published by Omar SEFRAOUI, Mohammed AISSAOUI, Mohsine ELEULDJ.*

This paper has the comparative study of cloud solutions like Eucalyptus, OpenStack and OpenNebula. This paper helped us understand the functional and architectural system of OpenStack. OpenStack architecture is built using three main components: OpenStack Compute, Image and Object.

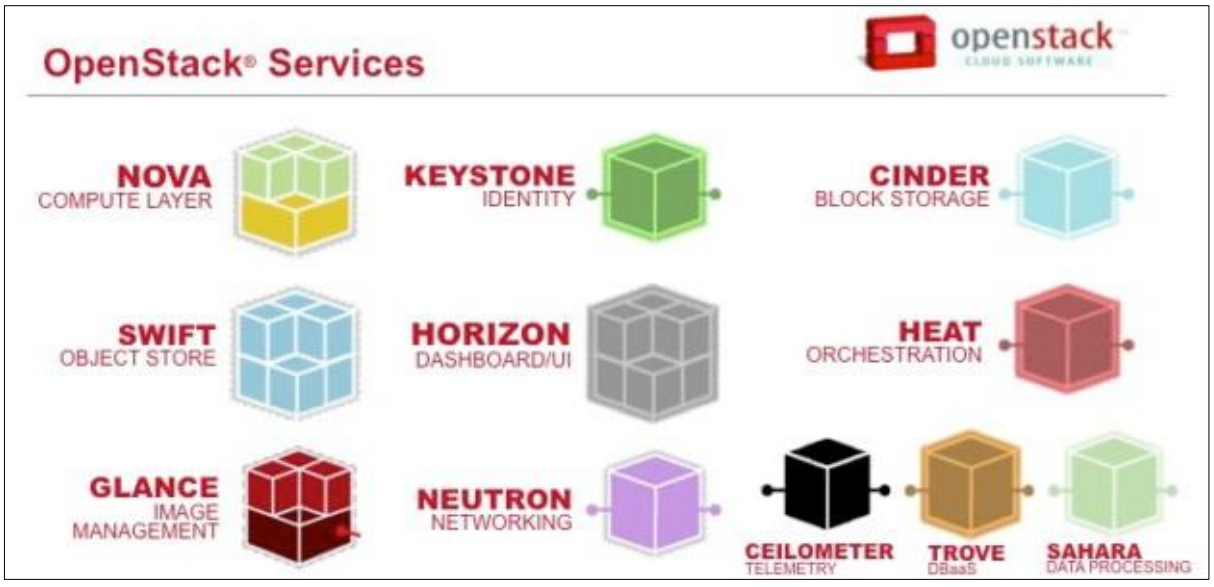
- **OpenStack Compute**, also known as **Nova**, is a management platform that controls the infrastructure to control IaaS clouds. Nova Compute allows managing large networks of virtual machines and redundant and scalable architectures. It provides an administrative interface and an API needed for the orchestration of the Cloud. It includes instances management for servers, networks and access control.
- **Imaging Service (project Glance**) provides storage services, recording and distributing the images to virtual machine disks. It also provides an API compatible with the REST architecture to perform queries for information on the images hosted on different storage systems.
- **Object Storage (Swift project)** is used to create a storage space redundant and scalable for storing multiple petabytes of data. It's not really a file system but is especially designed for long term storage of large volumes. It uses a distributed architecture with multiple access points to avoid SPOF (Single Point of Failure).

PAPER 3: IMPLEMENTATION OF STABLE PRIVATE CLOUD USING OPENSTACK WITH VIRTUAL MACHINE RESULTS – *IJCET published by Nikhil Wagh, Vikul Pawar and Kailash Kharat*

This paper details the implementation of Cloud OpenStack in Educational Organization and analyses the results. It also compares OpenStack cloud instance with traditional Virtual Machine instance and analyses the results and it was found that the best method for organization is Cloud Computing method as it is easy to use, fast, reliable and scalable platform and also contains backup for instance failure, data is stored and maintained properly. This paper also presents the clear implementation of cloud in Educational Organization.

FULL IMPLEMENTATION DETAILS:

The OpenStack services are given below.



1. First, we followed the Devstack tutorial to install OpenStack on a Virtual Machine. We faced a lot of difficulty in installing all the services due to some errors in the configuration file.
2. After OpenStack dashboard started working, we wanted to create a cloud server instance using Ubuntu or CirrOS. Although the images were correct, OpenStack's Horizon kept giving errors of not being able to retrieve the image. Some threads pointed to an error in one of the services. To counter this, we tried Command Line commands as well, but it did not work.
3. We thought that the Virtual Machine was having some issues, hence we installed Ubuntu on dual-boot and installed OpenStack on that. Although we faced python environment errors, we were able to install all OpenStack services after about 15 tries.
4. The functionality of OpenStack on native Ubuntu was significantly better. We were able to create "My Cloud Server" compute instance using CirrOS image quickly. Also, the instance was exposed at a private IP which would be used to connect to it.
5. As a final step to using the server, we tried to establish a ssh connection to the remote server from a client. However, we got "route not found" and "connection timeout" errors while trying to communicate to the private cloud server.

CONFIGURATION:

INITIALLY USED A VIRTUAL MACHINE	LATER, USED A UBUNTU HOST
RAM: 7.5 GB out of total 12 GB	RAM: Complete 12 GB
CPU: 3 CPU threads out of 8 threads on Intel i7	CPU: All 8 threads on the Intel i7

SCREENSHOTS:

Fig 1: Installing OpenStack using Devstack is a compute intensive task

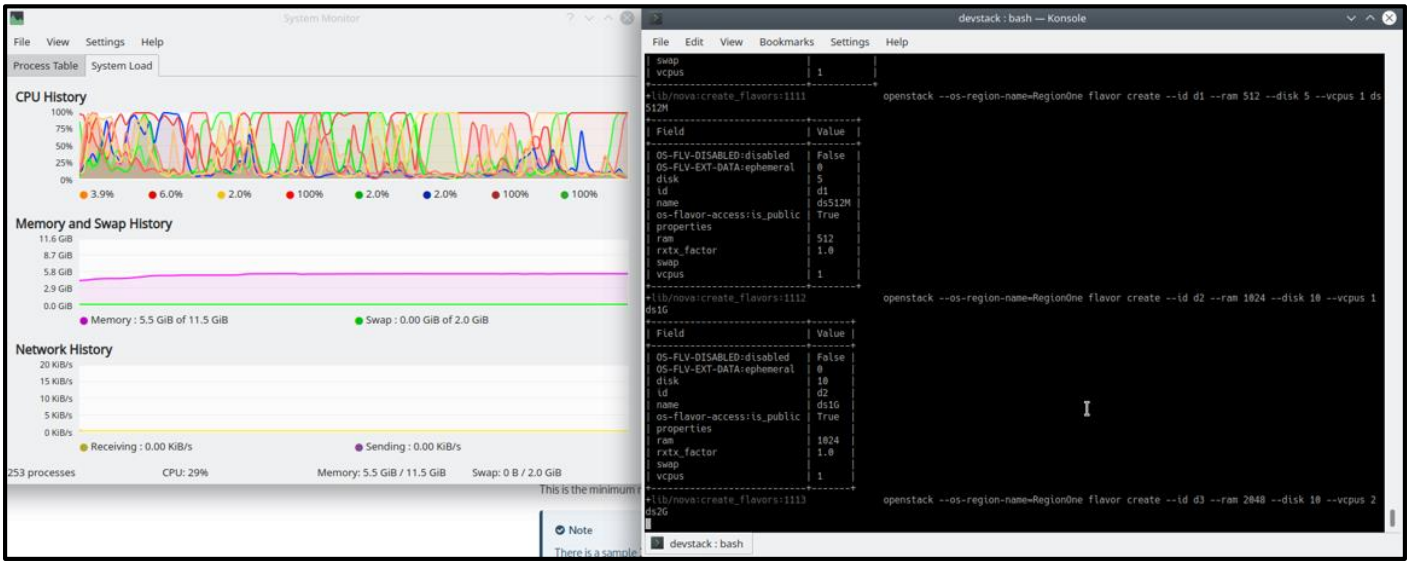


Fig 2: OpenStack dashboard on successful installation

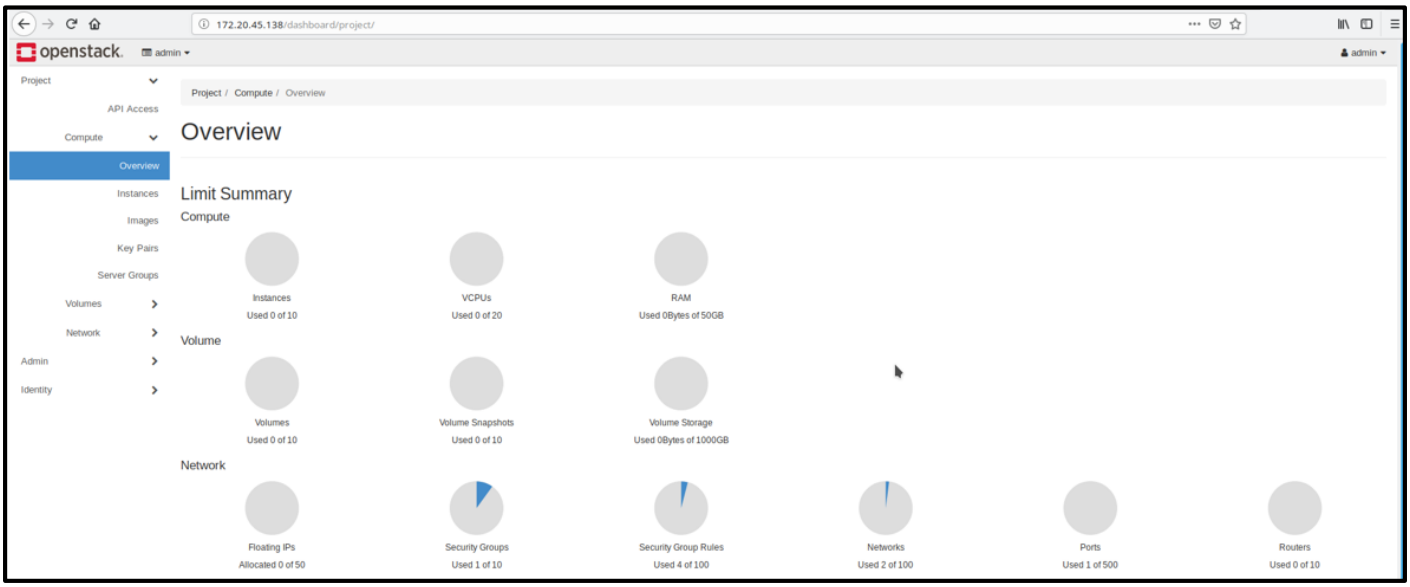


Fig 3: Uploaded a CirrOS image

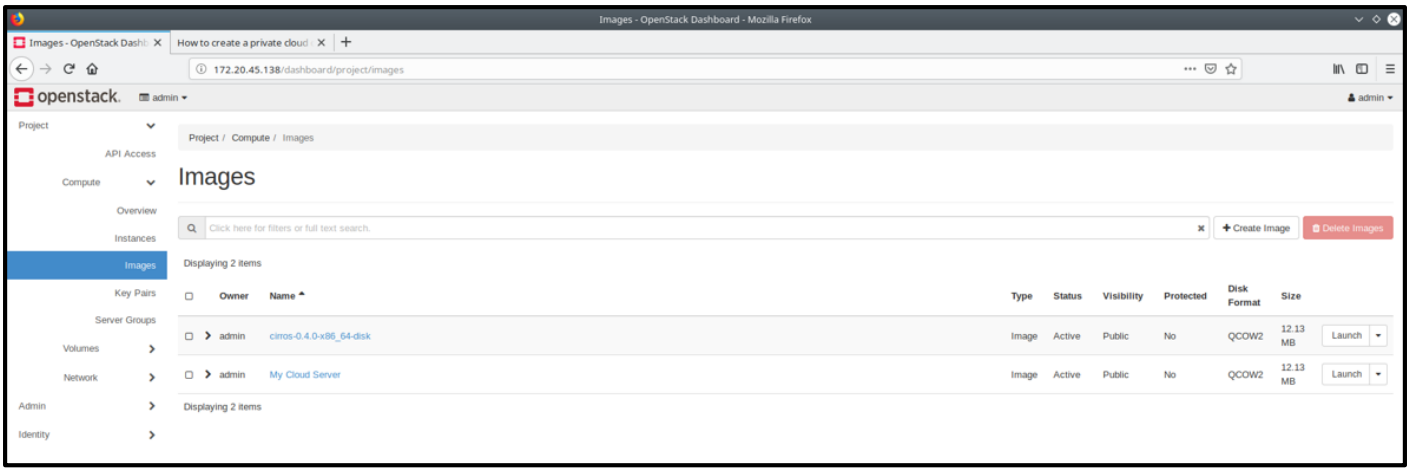


Fig 4: Started running an instance to work as our cloud server.

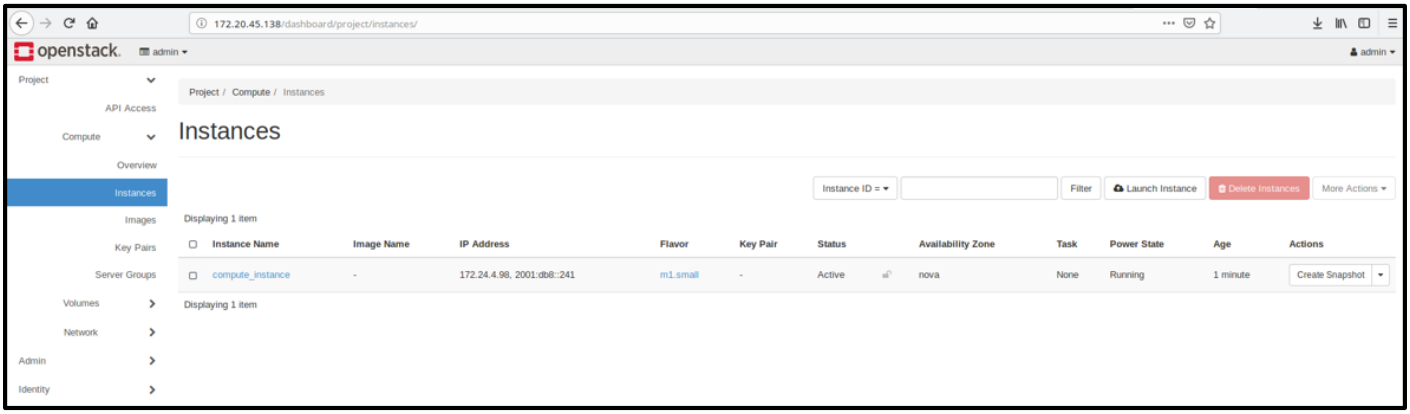


Fig 5: Monitoring the running instances

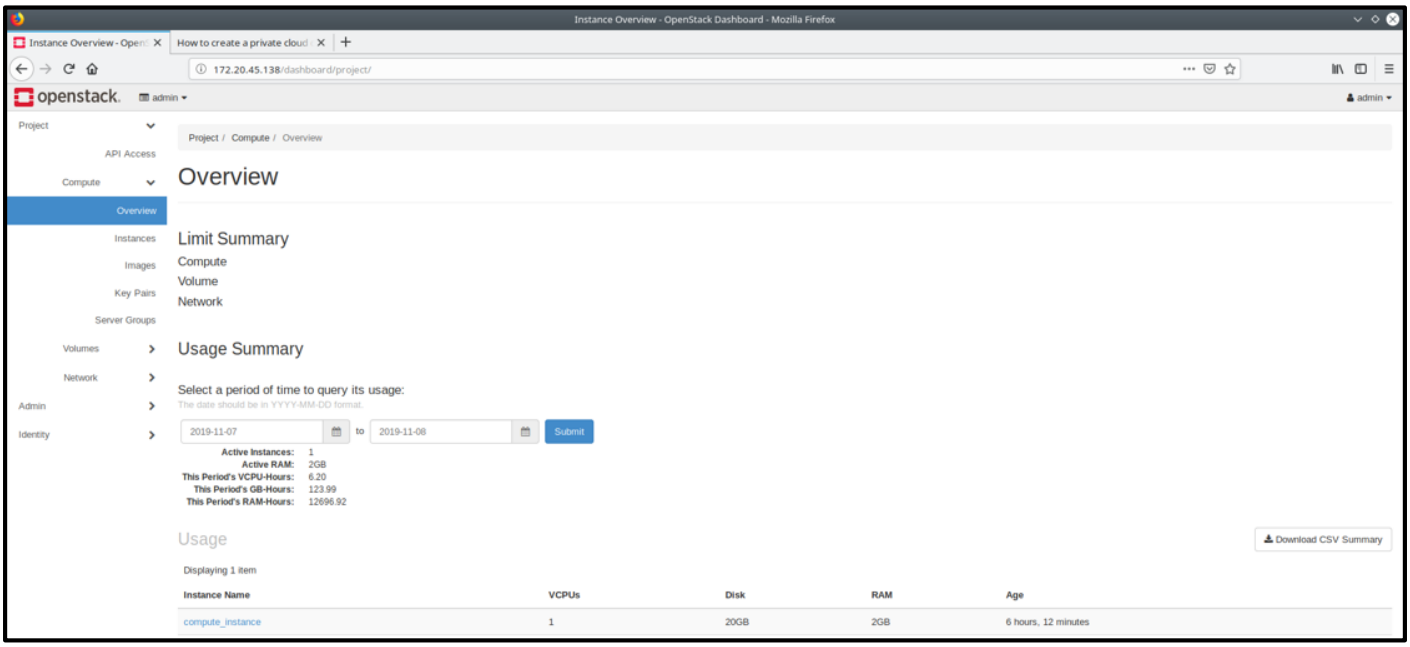


Fig 6: Opening the console window of the cloud server instance

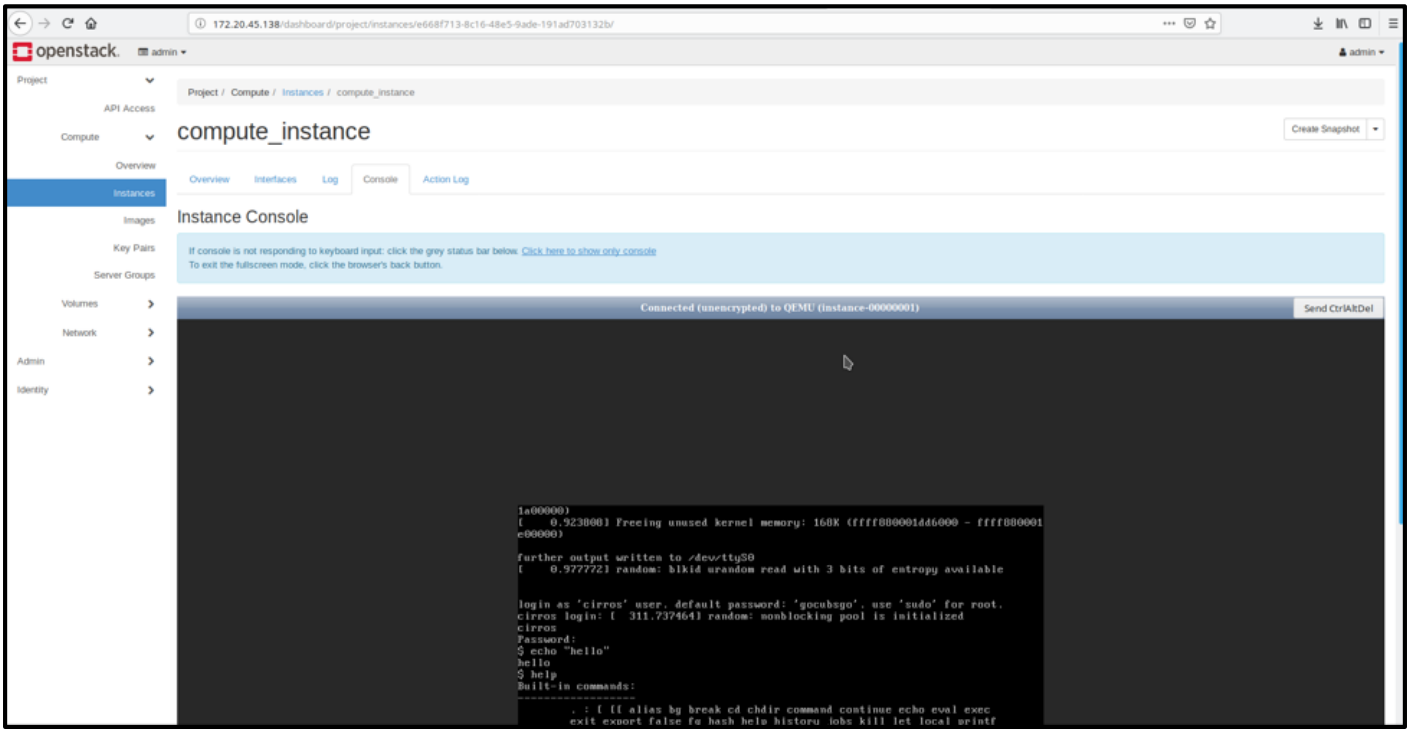


Fig 7: Error in establishing a connection with the CirrOS server instance