

IMPLEMENTATION PRIVATE CLOUD COMPUTING USING OPENSTACK WITH THE USE OF KVM HYPERVISOR AND GLUSTERFS

Surateno¹, Ery Setiyawan Jullev², Dimas Yuda Pratama³
Department of Information Technology, Politeknik Negeri Jember

surateno@polije.ac.id¹, ery@polije.ac.id²,

Abstract Computer network is a system consisting of two or more computers that are connected to each other through transmission media or communication media so that they can share data, applications or share hardware such as hard disk or others. One of the problems that arise is with the increase of applications and services used will require the increase hardware that will be integrated so that the value of the effectiveness of the system will decrease. The impact can be prevented by using the concept of cloud computing. Cloud Computing itself is a computing model that embodies the concept of IT resource providers (CPU, RAM, storage media) by utilizing and making other computers to provide services. One of the mechanisms in the cloud is Infrastructure As A Service (IAAS), one of the technologies that can be used in IAAS is the replication and distribution of files on a high computerized and keep the data in private cloud computing remains always active. By using glusterFS and KVM hypervisor optimizing CPU usage up to 67% and maximizing memory usage up to 79.3% on compute node so as to produce good latency according to resource load requested by user.

Keywords : Cloud Computing, IAAS, glusterFS, KVM Hypervisor, services

1. Introduction

Cloud Computing is a computational model which embodies the concept of providing IT resources (CPU, RAM, storage media) by utilizing and making other computers to provide services. Cloud Computing affects server virtualization technology, which is one and a combination of computing resources derived from physical infrastructure (Fujitsu.2013). cloud computing can be divided into the first few parts: Private cloud computing which is the design of concepts that provide services in meeting the needs of organizations or academics. Public cloud computing is a concept planning that provides services to public needs. Hybrid cloud computing is a combination of the concept of private cloud and public cloud. Community cloud is the concept of cloud computing that provides services in a special community scope and maintained as managed by the community, in contrast to private cloud computing that provides services to specialized and admin-managed organizations.

While the division of cloud computing based on services provided, namely IAAS (infrastructure as a service) is a cloud computing service to provide computing infrastructure resources (CPU, memory, media storage, network) according to the resources requested by this service as virtualization media. PAAS (as a service platform) is a cloud computing service that provides services in common with IAAS, but clients cannot control the resources needed. SAAS (software as a service) is a cloud computing service that provides software services that can be used by cloud computing providers.

Cloud computing systems do not only contain services and applications, but cloud computing can be reliable, low cost, and scalable frost & sullivan (2013).

In cloud computing technology has a managed storage media using network file systems mainly using the replication feature and distributing files between nodes. The replication and distribution feature is a method of copying files between nodes on a storage media that has been managed and connected using a network file system. In the title of this final project, I use glusterFS as a file system integrated on one cluster on a particular network and glusterFS supports replication and distribution features.

Based on these problems and explanations, this study will use cloud computing environment, namely openstack. With the design of the concept of private cloud computing that is used in the scope of the information technology department to provide IAAS services (infrastructure as a service). Using openstack can optionally select the services that will be used, examples in building private cloud computing in this final report will be used some openstack compute, identity, image, network services. As well as implementing KVM (kernel-based virtual machine) as a hypervisor type2 for deploying Openstack (Anton Beloglazov, Sareh Fotuhi Piraghaj, Mohammed Alrokayan, and Rajkumar Buyya, 2012). Storage media that scalability and availability on more than one server (node) aims to create a new storage media capacity on one node by implementing replication and distribution of files on the glusterFS (file system) feature (gluster.org, 2011).

2. Literature Review

Literature review that will be used for this research are

2.1. Cloud Computing

Cloud Computing is a computational model that provides resources (resources) such as processes (processors), storage media, software (software), and networks (networks) to be abstract or considered to be a logical form provided as a service through the internet or intranet that is accessed remotely. Every request according to needs, easy to supply, and almost unlimited dynamic and scalability are some important attributes of cloud computing (Budiyanto, 2012). Every concept or design of computing is giving and optimizing services, Cloud computing could be divided into 3 common service such as :

a. IAAS (Infrastructure As A Service)

IAAS is a service that aims to give users the possibility to manage IT infrastructure (computational units, storage media, memory, network, configuration) can be used and managed by the client according to needs. Easier IAAS is a service that provides virtual infrastructure (server virtualization) as requested by the client and the client can install the operating system on the server virtualization media

b. SAAS (Software As A Service)

SAAS is a cloud computing service when each client can use software that operates and is used on the cloud computing infrastructure. The client can only use the software and know the service is running well and can be used, but the client cannot configure the cloud computing infrastructure

c. PAAS (Platform As A Service)

PAAS is a service that provides or aims for clients to run applications that have been created or clients can install the application in accordance with the client's requirements on cloud computing infrastructure. However, the client does not have service allocation, because only the service provider (admin) can provide accessibility to the user and the selection of the cloud computing infrastructure system

2.2. Open Stack

OpenStack is an open source platform that can be used to build a cloud computing in the form of. Openstack will continue to produce a variety of open source cloud computing platforms in accordance with the needs of public cloud and private cloud providers from small to large cloud

providers. Openstack controls a collection of various processing resources (storage), storage, and networking found in the data center.

Openstack has various kinds of projects that are interconnected with each other to provide the components needed by cloud computing infrastructure. Each component is equipped with an API so that all components that control this data center resource can be managed through an interface that can be built by the administrator himself. The openstack API has a high compatibility level which means that the API can still be used on different versions of openstack. The openstack project is a general and overall collaboration of various developers and cloud computing technologies that focus on ease of implementation, high-scalability, and have various features. Openstack is designed for high horizontal scalability, so administrators can easily add new processing resources, storage, and networking to improve their cloud at any time.

2.3. Scalability and Availability

One of the challenges in the utilization of cloud technology is the availability of reliable and safe and easy services in addition and reduction of services based on user needs.

Scalability (scalability) is a system design method with the aim of enabling demand capacity growth by increasing potential. In the above explanation there are points taken, namely women, problems, materials and potential. These points are a basis for getting results in accordance with the objectives made. If it is concluded with an example system that contains a full storage load, then the system has two solutions. The first system that can be added to the hard drive and integrate the hard drive on one network using the network file system is glusterfs.

Availability (average) is a factor supporting the storage media in order to provide data, even though the data has been deleted. With explanation it can be concluded, if on one system there is a problem then the other system can work the job. Every file system network application can replicate and stored files from problem nodes in other nodes according to the services that will be provided.

2.4. Private Cloud Computing

Private cloud or cloud computing infrastructure model that is and is designed in privacy. It is cloud computing that aims to provide cloud computing services to the interests of corporate, organizational, and academic education that operate on intranet networks. This privacy-based cloud computing infrastructure model uses IAAS services, when using Iaas is for each client in the company or organization to manage IT infrastructure needs according to the client's needs.

The way private cloud service providers manage cloud computing will provide applications with the aim of designing virtualization media. The purpose of the client can be to use IT infrastructure such as processors and virtual RAM provided by a physical server on an LAN network intranet. Example: one computer that has installed virtualbox user computer is designing virtual mechine (guestOS) with network configuration with LAN. Which is where virtualbox is an application, the user can be as an admin or normal user, and the network configuration uses the LAN model

3. Working Methodology

3.1. System Design

Private cloud is a cloud computing design concept that provides services for virtual machine infrastructure service needs for internal infrastructure (organizations). On this research the cloud computing service that used is IAAS (Infrastructure As A Service), the IAAS (infrastructure as a service) is a cloud computing service with a focus on providing virtual infrastructure by utilizing other computers (compute nodes) with controller node control on one cluster, the infrastructure design of this reseach is using multiple node and computing

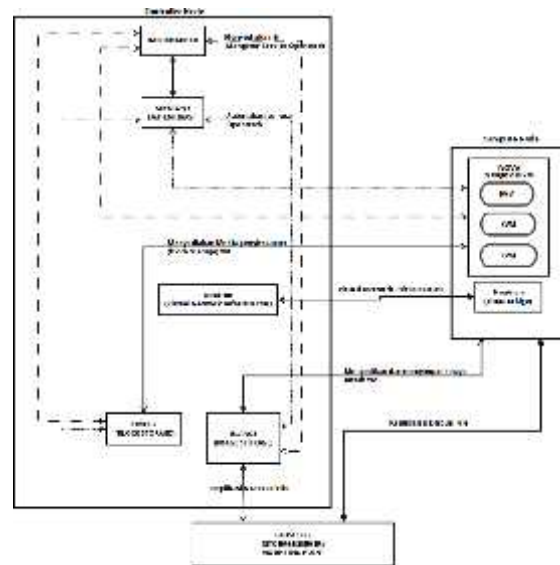


Figure 1 System Design

3.2. Data partition

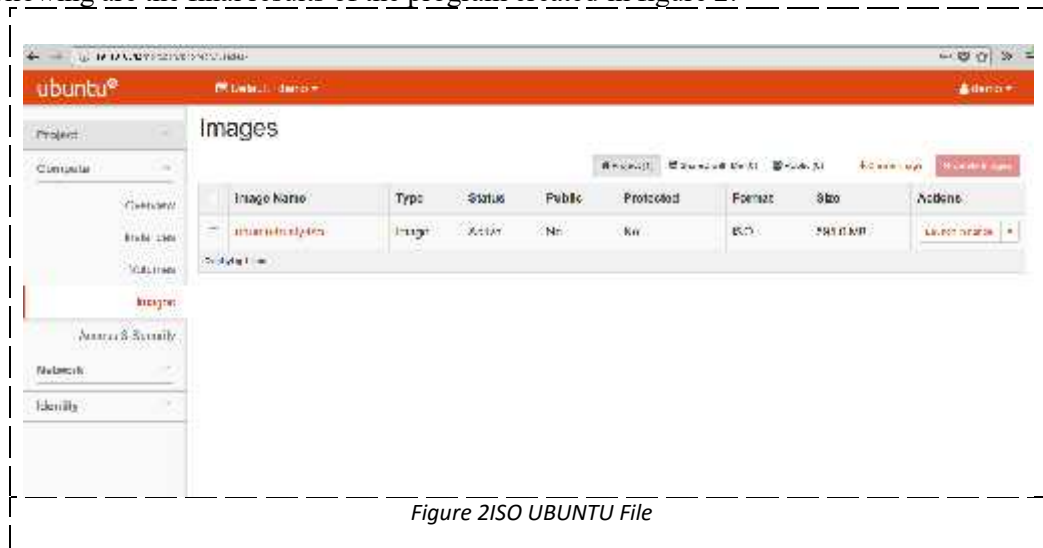
The default partition that will be used on all nodes is divided into the swap area partition, system partition, glusterfs partition, and image-store partition. While partition management uses LVM. Using storage media on each compute node and the controller node will be configured when the installation process is complete.

Table 1 Partission For Node Controller

Node Controller			
Device	Size	Mount Point	type
LVM dan Volume Group			
• vg_system	52 GB		
1. lv_root	23 GB	/	ext4
2. lv_home	20 GB	/home	ext4
3. lv_swap	8 GB		ext4
• vg_img	23 GB		
1. lv_img	23 GB	/var	ext4
Partisi Hardisk			
• sda		/boot	ext4
• sda5			PV LVM
• sda6	23 GB	/stgluster	ext4
• sda7			PV LVM

4. Experiment and Result

Openstack experiment testing is done by using the openstack dashboard (web GUI). By doing this process, each service on OpenStack Environment can be used. One of the benefit by using this section are to simplify upload the image file and also operating system file by using physical data storage. After upload the operating system installer file and create an instance (virtual machine). The following testing phase will be done with openstack environment with the same specifications, the testing it self use the operating system installer an ISO based ubuntu system. The following is the drawing process. The following are the final results of the program created in figure 2:



Data retrieval will be carried out by taking the latency results using a stopwatch in second form and taking the percentage value on the system usage performance with tool glances. The following are the results of data retrieval in accordance with the scenario that has been made.

Table 2 Data collection Using m1.Tiny Node Controller

Minimum Data m1.tiny Node Controller Sistem Operasi Cloud Based				
Instance	Latency (S)	CPU (%)	Memory (%)	Swap (%)
Before	0	4.4	94.6	26.0
Process	28.5	29.8	95.7	28.5
After	0	6.2	95.2	25.9
Average				
	28.5	13.46	95.16	26.8

5. Conclusion

From the results of the discussion regarding the design of the concept of a private cloud computing system using the openstack platform. By implementing hypervisor using KVM and disk storage media openstack glance images using replication and file distribution using glusterFS, conclusions can be drawn:

1. By using Openstack Nova (computing management service) the KVM infrastructure can be directly managed according to the requested resources.

2. By comparing storage media using direct partition performance is obtained more quickly in the storage of openstack glance disk images, but using direct partitions does not support the availability of openstack glance disk image files.
3. With the result of retrieving the data the value of openstack environment using KVM hypervisor produces good latency according to the requested resource load

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