Open Source Solution for Cloud Computing

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Abstract: Cloud computing is a new concept for which the resources are virtualized, provided as a service on the Internet. It is an attractive computing model since it allows for resources to be provisioned according on a demand basis of cloud user can rent resources as they become necessary for them. This model represent motivated several academic and non-academic institution to develop open-source cloud solution for cloud computing. In this paper we discuss about open-source solution for cloud computing.

1. Introduction: Cloud computing is a new concept that brings together all the disciplines, technologies i.e. Web services, virtualization, SOA (service oriented architecture, grid computing) and business models used to deliver IT capabilities as a service request, scalable and elastic. This is the new concept of computing where IT resources are dynamically scalable, exposed as a service on the Internet.

Cloud computing is often associated with the supply of new mechanisms which is allow provides to give users access to a virtually infinite number of resources. It also uses billing mechanisms to use these resources on the basis of their consumption. Cloud computing consist some characteristics that is On Demand Self Service, Broad Network Access, Resource Pooling, Rapid Elasticity, Measured Service.

The popularization of the cloud computing increased in 2007, IBM Blue Cloud, several enterprises become cloud computing providers; Amazon and their Windows Azure Platform, and so on. Therefore in the cloud computing environment some problems occurs and some challenges are found. All this problems and challenges are overcome with some solution.

This paper represents and discusses the state of the open-source solution for cloud computing.

2. Cloud Computing Service Model

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{service_model.png}
\caption{Service Model}
\end{figure}

It consist main three service model they as follows

2.1. Software as a Service

Software that provide network or web based applications or services. Pretty much everything is abstracted away from the user here; they don’t need to know what OS the application is running on, nor how many resources are allocated to it.

2.2. Platform as a Service

A PaaS is a service or stack that takes care of the infrastructure, middleware to allow developers to focus on creating an application. Basically, it abstracts away the infrastructure layer so developers can create an application in their own or favorite language or framework. Google AppEngine is the best example of PaaS.

2.3. Infrastructure as a Service

In IaaS, users can provision compute, storage and network resources but the underlying details are still abstracted away.
Apache Cloud stack, Eucalyptus, Open stack is the example of IaaS.

3. Challenges

In 21st century cloud computing uses are increased day by day. The development of cloud computing solutions brings several technical challenges to cloud developers. These challenges can be grouped in three main areas:

3.1. Negotiation

In the negotiation area, these are the challenges relative to how application developers interface with the cloud as well as the description of the cloud offering. Basically, the interface between the cloud and application developers assumes the form of an Application Programming Interface, but it depending on the programmability level offered by the cloud. At the present.

3.2. Decision

The main purpose of any cloud operator is to schedule developer applications aiming for the maximum utilization of cloud resources. Thus, the cloud operator turns into that of selecting the suitable physical resources to accommodate these virtual resources. The main target of this area is how virtual resources can be scheduled to meet user requirements?

3.3. Operation

This area related with the enforcement of decisions and the communication between the cloud elements. The enforcement here consist the communication protocol and configuration of cloud elements. A configuration protocol can be used to monitor and reserve resources in the cloud. Generally, existing cloud solutions use web services to provide communication with processing and storage nodes. But some communication elements so not support such implementation.

4. Open-Source solutions for Cloud Computing

Due to large growth of cloud computing, there are solutions are present in this area. So, this article focused and defined an open source solutions, discussed their main characteristics and architecture.

4.1. Xen Cloud Platform (XCP)

The Xen Hypervisor is a solution for Infrastructure virtualization. It contains a subset of features of the commercial distribution Xenserver from Citrix. It provides an abstraction layer between servers and operating system. Xen includes Xen API tool stack which provide host system pool management, multi latency, SLA support and pre-integration of network and disk functionality. The Xen solution is used by many cloud solution like Amazon EC2, Nimbus, Eucalyptus.

Recently, Xen.org declared as the Xen Cloud Platform as a solution for cloud infrastructure virtualization. The main goal of XCP is to provide a tool to cope with automatic configuration and maintenance of cloud platforms.

4.2. Nimbus

Nimbus is an open source solution to turn clusters into Infrastructure as a Service. It is used mainly in scientific applications. It gives to users the possibility to allocate and configure remote resources by deploying VMs as Virtual Workspace Services. The workspace components are shown in above figure 4.2. The main purpose of these components is as follows:-

4.2.1. Workspace Service

It is based on web services. It provides security with the GSI authentication and authorization. Nimbus supports two frontends that is Amazon EC2 and WSRF.

4.2.2. Workspace control

It is controlling VM instances, managing and reconstructing images, integrating a VM to the network. It also used to assigning IP and MAC address.
4.2.3. Workspace resource management

It is an open source solution. It is used to managing different VMs, but can be replaced by other technologies such as Open Nebula.

4.2.4. Workspace pilot

It is providing virtualization with few changes in cluster operation. This component handles signals and has administration tools.

5. Open Nebula

Eucalyptus is an open source cloud computing framework focused on academic research. In 2009, the Eucalyptus project represents four characteristics that differentiate it from others cloud computing solutions they describe follows:-

6.1. Eucalyptus was designed to be simple without requiring dedicated resources.

6.2. Eucalyptus was designed to encourage third party extensions through modular software framework and language- agnostic communication mechanisms.

6.3. Eucalyptus external interface is based on the Amazon API.

6.4. Eucalyptus provides a virtual network overly that both isolates network traffic of different users and allows clusters to appear to be part of the same local network.

Eucalyptus architecture made up of four high level components:

6.1.1. Node Controller (NC)

It runs on every node that is designed for hosting VM instances. It is used to responsible query and control the system software. The main role of NC queries is to collect information like node’s physical resources. Main work of NC that is first sends this information to its cluster controller and control VM instances on a node, then verifying the authorization, confirming resources availability and executing the request with the hypervisor.

6.1.2. Cluster Controller (CC)

This component execute on a cluster front end machine, or any machine which has network connectivity to two nodes:

6.1.2.1. Running NCs
6.1.2.2. Running the Cloud Controller (CLC)

It is used to collect information about and schedule VM execution on specific NCs and also it manage virtual instance network completely.

6.1.3. Storage Controller

It is data storage service that provides a mechanism for storing and accessing virtual machine image and user data. It is based on web services technologies.
6.1.4. Cloud Controller (CLC)

It is entry point into the cloud users. The main purpose of CLC is to offer and manage Eucalyptus underlying virtualized resources. This component composed into three service categories based on set of web services:-

6.1.4.1. Resource Services
6.1.4.2. Data Services
6.1.4.3. Interface Services

7. TPlatform

This is cloud solution for cloud computing. It is development platform for web mining applications, which is supported in Google cloud technologies. Its acts as a Platform as a Service (Peas) solution.

7.1. Taiwan File System (TFS)

Its also known as scalable file system which is similar to the Google File System.

7.2. Big Table data storage Mechanism

Its best technology which is used in TPlatform for data storage purpose.

7.3. Map Reduce Programming Model

It is most popular programming which used in TPlatform.

8. Conclusion

In 21st century use of cloud computing increased day by day. In this paper there are different type of cloud solutions for cloud computing which is focusing on various areas and ranging from hardware resource outsourcing to service providing. Each solution represents different vision about cloud architecture and implemtaiation.

There is clear need for the standerization of current cloud platforms at least term of interface, negotiation and access trough Web services. There are solutions that offer a middleware like approach to users, where the hardware resource can be configured and handled subject to some restriction and where and where applications can also be developed.

In future author purpose to evaluate performance of solution in dynamic reconfiguration in a IaaS Cloud Computing. Also purpose a quantitative comparison of the presented solution through performance evolution measurement.

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It has been increasing in vast areas and becoming adaptable day by day which is been used by many people.

10. References


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