An Overview of OpenNebula Project and its Applications

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This paper provides insight into how OpenNebula can provide the right cloud services for unique needs of each organization by managing data center's virtual infrastructure to build private, public and hybrid implementations of infrastructure as a service.

Keywords: opennebula, open cloud, cloud computing

https://github.com/narayana1043/sp17-i524/blob/master/paper1/S17-IR-2017/report.pdf

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This review document is provided for you to achieve your best. We have listed a number of obvious opportunities for improvement. When improving it, please keep this copy untouched and instead focus on improving report.tex. The review does not include all possible improvement suggestions and for each comment you may want to check if it applies elsewhere in the document.

Abstract: Your abstract should convey what OpenNebula is and the most important things about it. It's the part of the paper that most people will read and will use to decide whether to read the whole paper. Currently, your abstract doesn't achieve its main purpose, and can be replaced with a single statement: "OpenNebula provides services for managing data centers' virtual infrastructure." The rest is either unnecessary – "This paper provides insight...", "unique needs of each organization" – or unclear – "private, public and hybrid implementations..."; how would someone not familiar with OpenNebula or its problem domain know what these terms mean? Please, redo the abstract by focusing on what OpenNebula is, and what is most important about it. Try to keep sentences short to make it more clear; right now your abstract is a single sentence that is too long.

Abstract: "center's" should be "centers'"

In general: The paper needs to be revised. Many section consist of assertions or subjective valuations that haven't been supported by other parts of the paper or by references. This makes the paper sound more like a press release than a scientific paper. You need to focus on informing what OpenNebula is used for, and provide the necessary context as well. Please, see the comments below.

INTRODUCTION

OpenNebula[1]is a

Grammar

open cloud platform using which each organization setup the right cloud for its organizational needs. This quite natural like it happened with the databases and web-servers

Grammar

. As one cloud could not solve all the needs of various work environments OpenNebula helps in setting up and deploying cloud platform based on needs[2]. It is a simple feature rich and flexible solution for the management of virtualized data centers.

"simple", "feature-rich" and "flexible" are subjective, and are more appropriate for a press release, advertisement, or a company website than a neutral paper.

It's

Grammar

Please, know the difference between "it's" and "its"

interoperability makes cloud progress in developments of new methodologies to take advantage of the IT assets in turn saving investments and completely avoiding lock-in costs for the project. It's

> **Grammar**

platform manages a data center's virtual infrastructure to build private, public and hybrid implementations of infrastructure as a service. It is a trunkey

> **Spelling**

enterprise-ready solution that includes all features need

> **Grammar**

to provide private and public cloud services. It is a open cloud architecture which is simple, open, reliable and flexible.

> Again, this paragraph sounds like a press release or an advertisement. "turn-key", "enterprise-ready", includes "all features needed to provide...", "simple", "reliable", etc. These are all content-less, or assertions that haven't been supported in the paper. This paragraph needs to be removed or rewritten.

The paper is organized as follows. First OpenNebula's Architecture is discussed followed by Integration, API's and Language Binding. It is then followed by OpenNebula ecosystem and licensing. Finally, use cases are discussed with respect to its intended users which followed by key features and educational resources. It is then concluded by high lighting the major drawbacks that need attention in moving forward.

> This paragraph is unnecessary, especially for a short paper.

ARCHITECTURE OF OPENNEBULA

OpenNebula is a cloud computing platform for managing heterogeneous distributed data center infrastructures.

> This sentence belongs in the introduction.

The OpenNebula platform manages a data center's virtual infrastructure to build private, public and hybrid implementations of infrastructure as a service.

> Please, provide context. What are private, public and hybrid implementations, and why are they desirable?

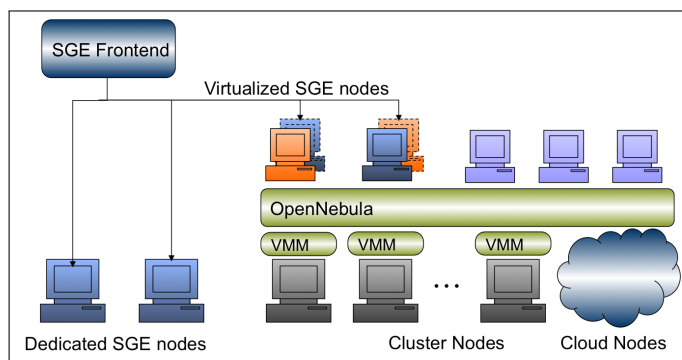It provides features at two main layers of Data Center Virtualization and Cloud Infrastructure.

Fig. 1. The OpenNebula Engine for Data Center Virtualization and Cloud Solutions.

> **Citation**

> If you didn't create the diagram yourself, you need to cite where it is coming from.

Data Center Virtualization Management

Many users use OpenNebula to manage data center virtualization[3], consolidate servers, and integrate existing IT assets for computing, storage, and networking. In this deployment model, OpenNebula directly integrates with hyper-visors

> What are hyper-visors?

and has complete control over virtual and physical resources, providing advanced features foe

> **Spelling**

capacity management, resource optimization, high availability and business continuity.

Cloud Management

OpenNebula also provides a multi-tenant, cloud-like provisioning layer on top of an existing infrastructure management solution (like VMware vCenter). It helps in provisioning, elasticity and multi-tenancy

> Again, please provide context. What are "provisioning", "elasticity" and "multi-tenancy"? Your goal is to make someone understand what OpenNebula is and why it's useful. All these buzzwords need to be explained or not used at all.

cloud features like virtual data centers provisioning, data center federation or hybrid cloud computing to connect in-house infrastructure is managed by already familiar tools for infrastructure management and operation.

INTEGRATION, API'S AND LANGUAGE BINDING

> You need to introduce what you are trying to achieve in this section. Otherwise you have some subsection that don't really flow together very much, and each could stand independently. What is the connection between them?

System Interfaces

OpenNebula has been designed to be easily adapted to any infrastructure and easily be extended with new components. The result is a modular system that can implement a variety of cloud architectures and can interface with multiple data center services.

> What are some examples where this has been done successfully? These are assertions that need to be supported by evidence.

It interfaces can be classified into e categories

> **Grammar**

1. end-user cloud interfaces

2. system interfaces

Cloud interfaces are primarily used to develop tools to the end-user, and they provide a high level abstraction of the functionality provided by the cloud. They are designed to manage virtual machines, networks and images through a simple and easy-to-use REST API. The clod interfaces hide most of the complexity of a cloud and specially suited for end-users. OpenNebula features a EC2 interface, implementing the functionality

offered by the Amazon's EC2 API, mainly those related to virtual machine management. In this way, you can use any EC2 Query tools to access your OpenNebula Cloud.

> This is a good paragraph; you should try to make the rest of the paper take a similar approach.

System interfaces[4] expose the full functionality of Open-Nebula and are mainly used to adapt and tune the behavior of OpenNebula to the target infrastructure. The XML-RPC interface is the primary interface for OpenNebula, exposing all the functionality to interface the OpenNebula daemon. The Open-Nebula cloud API provides a simplified and convenient way to interface with the OpenNebula core XMLRPC API. OpenNebula also includes 2 language bindings for OCA: Ruby and JAVA. The OpenNebula OneFlow API is a RESTful service to create, control and monitor service to create, control and monitor services composed of interconnected VMs with deployment dependencies between them.

Infrastructure Integration

The interactions between OpenNebula and the Cloud infrastructure[5] are performed by specific drivers. Each one addresses a particular area:

Storage The OpenNebula core

> Term

issue abstracts storage operations that are implemented by specific programs that can be replaced or modified to interface special storage back-ends and file systems.

Virtualization The interaction with the hypervisors are also implemented with custom programs to boot, stop or migrate a virtual machine. This allows you to specialize each VM operation so to perform custom operations.

Monitoring Monitoring information is also gathered by external probes. You can add additional probes to include custom monitoring metrics that can later be used to allocate virtual machines or for accounting purposes.

Authorization OpenNebula can be also configured to use an external program to authorize and authenticate user requests. In this way, you can implement any access policy to Cloud resources.

Networking The hypervisor is also prepared with the network configuration for each Virtual Machine.

ECOSYSTEM

The OpenNebula Ecosystem[6] is formed by external tools and extensions that complement the functionality provided by the OpenNebula Cloud Management Platform. In addition, the ecosystems

> needs to be capitalized

built around the cloud interfaces implemented by OpenNebula, Amazon AWS and OGC OCCI, can also be leveraged.

USE CASES OF OPENNEBULA

For the Infrastructure Manager

OpenNebula responds quickly

> "quickly" is subjective unless there is something to back it up

to infrastructure needs for services with dynamic resizing of the physical infrastructure by adding new hosts and dynamic

cluster partitioning to meet capacity requirement of services. It has centralized management of all the virtual and physical distributed infrastructure. It can improve the utilization of existing resources in the data center and infrastructure sharing between different departments managing their own production clusters, so removing application silos. It improves operational saving with server consolidation to a reduced number of physical systems, so reducing space, administration efforts, power and cooling requirements. It has also reduced infrastructure expenses with the combination of locate and remote cloud resources so eliminating the over purchase of systems to meet peak demands.

> Most of the preceding paragraph are assertions that need to be back up by references. Otherwise, this sounds like an advertisement.

For the Infrastructure user

It is built for fast delivery and scalability of services to meet dynamic demands of service end-users. It supports heterogeneous execution environment with multiple, even conflicting, software requirements on the same shared infrastructure. It also provides full control of the life cycle of virtualized services management.

For System Integrators

It fits into any existing data center due to its open, flexible and extensible interfaces, architecture and components. It can build any type of cloud deployment. It is open sourced under Apache license and has seamless integration with any product and service in the virtualization/cloud ecosystem and management tool in the data center.

KEY FEATURES AND COMPONENTS OPENNEBULA

Features

There are several key features of OpenNebula[7] for the comprehensive management of virtualized data centers to enable private, public and hybrid clouds. Some of these key features are interfaces for cloud consumers, service management and catalog, interfaces for administrators and advanced users, appliance market place, chargeback, capacity and performance management, high availability and business continuity, virtual infrastructure management and orchestration, external cloud connector, platform independent, security, integration with third-party tools, fully open-sourced, automatic upgrade process, quality assurance and community support.

Components

OpenNebula has several advanced components[8] that can be easily integrated and deployed. Some of the important components that are extensively used are listed below:

1. Multi-VM Applications and Auto-scaling

2. Host and VM Availability

3. Data Center Federation

4. Cloud Bursting

5. Application Insight

6. Public Cloud

7. MarketPlace

EDUCATIONAL MATERIAL

A great place to start is by reading the OpenNebula documentation[9]. Future Systems has a tutorial on there

> Term

webpage[10] to get started with OpenNebula. Handbook of Research on High Performance and Cloud Computing in Scientific Research and Education[11] by Marijana Despotovic-Zrakic is great

> Term

> "great" is subjective

book to get started from the basics of cloud computing and understanding the working of OpenNebula.

CONCULSION

OpenNebula is made impact

> Grammar

> How has it made impact? Needs reference.

in the way cloud services are offered before it was introduced by reducing costs of infrastructure, increasing the utilization of available resources, increase the computing power by integrating different machines and simplifying the development and deployment in industry. However, there are some disadvantages that needs attention.

> The Conclusion should provide a summary of what has been covered earlier in the paper. This is the first time you've mentioned any disadvantages. Perhaps, have a separate section on this.

Some of them are Greater dependency on service providers, Risk of being locked into proprietary or vendor-recommended systems, Potential privacy and security risks of putting valuable data on someone else's system. Another important problem what happens

> Grammar

if the supplier suddenly stops services. Even with this disadvantages the technology is still used greatly in various industries and many more are looking forward to move into cloud.

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