This project has received funding from the European Union's Competitiveness and Innovation Framework Programme

DELIVERABLE

Project Acronym: STORM CLOUDS

Grant Agreement number: 621089

Project Title: STORM CLOUDS – Surfing Towards the Opportunity of Real Migration to cloud-based public services

D2.3.1

Storm Clouds Platform Implementation Status Report

Document Control

Ref & Title	D2.3.1 - Storm Clouds Platform Implementation - Status Report
Version	1.0
Date	10/11/2014
Dissemination level	Public
Category	Technical
Document Owner	STORMS CLOUDS Consortium
Participant Partner(s)	Hewlett Packard (author) Euro Dynamics (reviewer) Ariadna (reviewer)
Author(s)	Consonni, Marco (marco.consonni@hp.com) Milani, Andrea (andrea.milani@hp.com)
Work Package	WP2 - OSS IaaS Cloud Platform and Related Services
Abstract	This document describes the SCP architecture providing the technical details for the implementation; it shows the main modules, what functions they implement, how they interact and what are the software products selected for the actual realization.
Status	☐ Draft ☐ Ready for internal review ☒ WP leader accepted ☒ Project Coordinator accepted
Previous Versions	N/A
Version Notes	Version | Date | Changes made 0.1 | 03/11/2014 | First Draft 0.2 | 05/11/2014 | Ready for review 1.0 | 10/11/2014 | Version 1.0

Table of Contents

Abbreviations

Acronym	Description
DB	Database
DBaaS	DB as a Service
DNS	Domain Name System
IaaS	Infrastructure as a Service
PaaS	Platform as a Service
SCP	Storm Clouds Platform
URL	Uniform Resource Locator
VM	Virtual Machine
VPN	Virtual Private Network
WLAN	Wireless Local Area Network

1 Introduction

Surfing Towards the Opportunity of Real Migration to Cloud-based public Services (STORM CLOUDS) is a project partially funded by the European Commission within the 7th Framework Program in the context of the CIP project (Grant Agreement No. 621089).

The project has the objective of exploring the shift to a cloud-based paradigm for deploying services that Public Authorities currently provide using 'more traditional' IT deployment models. In order to meet the project objectives, the consortium decided to conduct pilot experiments consisting in porting already implemented application programs to a cloud computing environment.

The implementation of the pilots uses a common centralized infrastructure that provides the computing resources. Computing resources are made available on an "as-a-Service" paradigm, meaning that resources are activated and de-activated on an on-demand basis. For this reason, in addition to providing the physical equipment used for running applications (i.e. server machines, mass storage and network connections), the project requires the implementation of a cloud computing platform that actually implements the "as-a-Service" paradigm.

Storm Clouds Platform (SCP) is the cloud computing platform designed and implemented for the Storm Clouds Project and this document reports the current implementation status.

According to [1], an actual implementation of the SCP shall be provided to the project participants in order to allow the migration of applications to a cloud infrastructure and, once the migration is complete, the applications shall be available on Internet to the end-users (e.g. citizens, public servants).

2 Current Implementation Status

As anticipated in [2], HP decided to take advantage of a public cloud operator for hosting the migrated applications. The public cloud operator provides computing resources like servers, connectivity, storage, Internet access, etc; HP uses such resources for implementing the SCP.
In addition, HP has implemented an in-house SCP instance at its own premises with the main purpose of providing all the partners with a testing and staging environment.

At the current stage, both the SCP instances fully implement IaaS functions. The in-house instance partially implements DBaaS features through some "*prefabricated*" virtual machine images.

2.1 Storm Cloud Platform @ Enter

Some public operators have been evaluated taking into account functional, budget and regulatory requirements; specifically, being based in the EU territory was an important criterion. The selected operator, Enter S.r.l. [3], is a public cloud provider based in Milan (Italy) with data centres in Italy (Milan), Germany (Frankfurt) and the Netherlands (Amsterdam). Enter provides Infrastructure as a Service (IaaS) functions implemented using technologies compliant to the SCP architecture described in [4]. As reported in [5], the cloud services are hosted on computing nodes (i.e. physical servers) equipped with Intel Xeon E5 CPUs, 64 or 128 GB of RAM and SATA/SSD drives. They are connected to the network with blazing fast 10/40 GbE redundant links. The nodes are equipped with Linux Ubuntu Operating system and the IaaS layer is implemented with OpenStack.

2.2 Storm Cloud Platform @ HP

The consortium participants can access the HP's SCP through a Virtual Private Network (VPN) connection. Functionally speaking, the HP platform is equivalent to the one implemented at the public operator; the main difference between the two is that the migrated applications running in the former platform can't be accessed from Internet by other project stakeholders (i.e. citizens). This is not an issue because when the applications are ready for being used they are simply "moved" from the HP's SCP to the SCP at Enter.

As described in [4] and summarized in the following picture, the IaaS Layer (i.e. OpenStack) is at the basis of the SCP architecture and all the other components are deployed on top of it as virtual machines[1]:

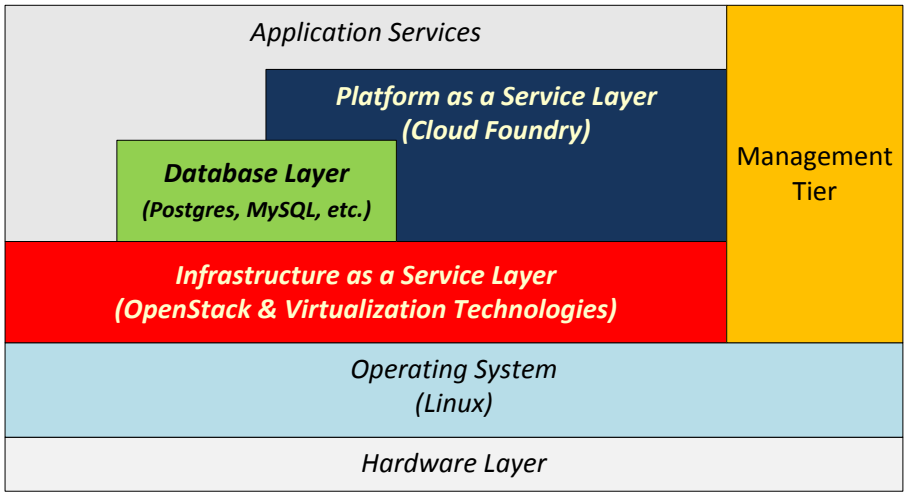

Figure 2-1 - Storm Clouds Platform Overall Architecture

In order to fully describe the current SCP deployment, it is fundamental to provide:

- the list of servers used to run the SCP;
- the network connections;
- the software components of the IaaS platform (i.e. OpenStack and Virtualization Technology) installed on each node.

The SCP installation at HP's premises is described by the following picture:

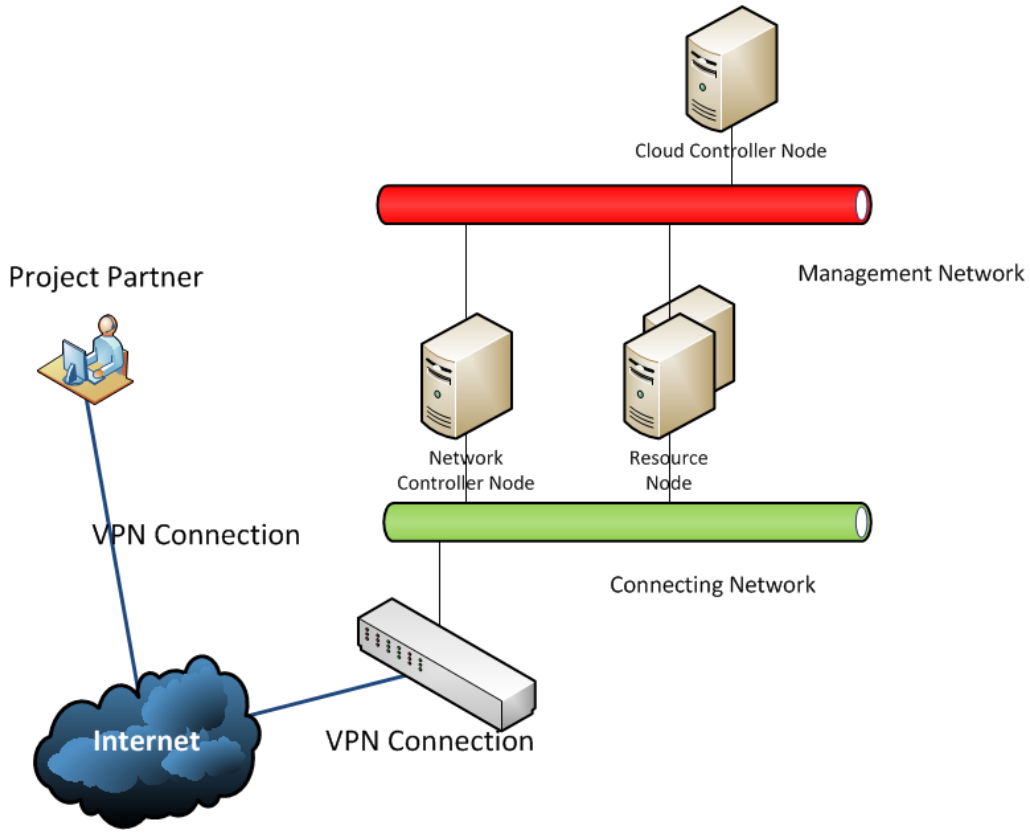

Figure 2-2 - Storm Clouds Platform at HP's Premises

[1] With the exception of the Management Tier that it is currently not implemented.

The installation is similar to the OpenStack deployment detailed in [4] (basic deployment), but in a smaller expansion state:

- Cloud Controller Node and Network Controller Node are implemented by two virtual machines running on a HP blade server;
- 2 Resource Node hosts play both the role of Computing Node and Storage Node;
- Connecting Network collapses the Data Network, the External Network and the API Network in a single network trunk.

The following table lists the most relevant information about the software and hardware configuration:

Node	**HW Configuration**	**SW Configuration**
Cloud Controller	**CPU**: 1 Intel(R) Xeon(R) E5506 @ 2.13GHz **RAM**: 12GB **Storage**: 1 Disk 107GB	*Operating System* • Ubuntu 14.04 LTS *OpenStack Deployment* • MySQL Ver. 5.5 • RabbitMQ Ver. 3.2.4 • keystone-all • glance-api • glance-registry • nova-api • nova-conductor • nova-consoleauth • nova-novncproxy • nova-scheduler • cinder-api • cinder-scheduler • neutron-server • heat-api • heat-api-cfn • heat-engine
Network Controller	**CPU**: 1 Intel(R) Xeon(R) E5506 @ 2.13GHz **RAM**: 5GB **Storage**: 1 Disk 5GB	*Operating System* • Ubuntu 14.04 LTS *OpenStack Deployment* • neutron-dhcp-agent • neutron-l3-agent • neutron-metadata-agent • neutron-ns-metadata-proxy • neutron-openvswitch-agent
Resources	**CPU**: 32 Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz **RAM**: 126GB **Storage**: 2 Disk 900GB	*Operating System* • Ubuntu 14.04 LTS *Virtualization Layer* *Hypervisor* • QEMU (KVM) 2.0.0 *Storage Virtualization* • iSCSI target tgt • LVM version: 2.02.98(2) (2012-10-15) *Network Virtualization* • ovs-vswitchd (Open vSwitch) 2.0.1 • Compiled Feb 23 2014 14:42:34 • OpenFlow versions 0x1:0x1 *OpenStack Deployment* • nova-compute • neutron-openvswitch-agent

Node	HW Configuration	SW Configuration
		• cinder-volume

The reported information is:

- **Node**: the name of the node as reported in Figure 2-2;
- **HW Configuration**: information on the hardware resources the node is equipped with;
- **SW Configuration**: information on the software packages installed on the node:
  - **Operating System:** all the nodes install Ubuntu 14.04 LTS;
  - **Virtualization Layer:** software for implementing the server virtualization (hypervisor), the storage virtualization and the network virtualization;
  - **OpenStack Deployment:** list of the software packages installed for implementing the OpenStack IaaS layer.

Acknowledgements and Disclaimer

This work was partially funded by the European Commission within the 7th Framework Program in the context of the CIP project Storm Clouds Projects (Grant Agreement No. 621089). The views and conclusions contained here are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of the Storm Clouds project or the European Commission.

References

[1] Consonni, Marco;Panuccio, Pasquale, "Storm Clouds Project: D 2.1 - Storm Clouds Platform – Requirements and Specification," STORM CLOUDS Project, 2014.

[2] "Surfing Towards the Opportunity of Real Migration to CLOUD-based public Services," STORM CLOUDS Consortium, November 2013.

[3] Enter S.r.l., [Online]. Available: http://www.enterpoint.it/. [Accessed October 2014].

[4] Consonni, Marco; Milani, Andrea, "Storm Clouds Project: D2.2.1 - Storm Clouds Platform - Architectural Design," STROM CLOUDS Project, 2014.

[5] Enter S.r.l., [Online]. Available: http://www.entercloudsuite.com/en/features/technology/. [Accessed October 2014].

