

# A Step-by-Step Guide to Installing OpenStack on CentOS Using the KVM Hypervisor and GlusterFS Distributed File System

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## 1 Introduction

- Cloud Computing [1], [2]
- Public / Private / Hybrid
- Why Open Souce Cloud Platforms are Important
- OpenStack / Eucalyptus / CloudStack / OpenNebula
- Complexity of Installing OpenStack
- Our Step-by-Step Scripted Installation Approach

## 2 Comparison of Open Source Cloud Platforms

- OpenStack
- Eucalyptus
- CloudStack
- OpenNebula

## 3 Overview of the OpenStack Cloud Platform

- History
- Features
- Main Services
- Service Interaction

## 4 Existing OpenStack Installation Tools

- DevStack<sup>1</sup>
- Puppet / Chef<sup>2</sup>
- Difference From our Approach

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<sup>1</sup>[Http://devstack.org/](http://devstack.org/).

<sup>2</sup>[Http://docs.openstack.org/trunk/openstack-compute/admin/content/openstack-compute-deployment-tool-with-puppet.html](http://docs.openstack.org/trunk/openstack-compute/admin/content/openstack-compute-deployment-tool-with-puppet.html).

## 5 Step-by-Step OpenStack Installation

### 5.1 Hardware Setup

The testbed used for testing the installation scripts consists of the following hardware:

- 1 x Dell Optiplex 745
  - Intel(R) Core(TM)2 CPU (2 cores, 2 threads) 6600 @ 2.40GHz
  - 2GB DDR2-667
  - Seagate Barracuda 80GB, 7200 RPM SATA II (ST3808110AS)
  - Broadcom 5751 NetXtreme Gigabit Controller
- 4 x IBM System x3200 M3
  - Intel(R) Xeon(R) CPU (4 cores, 8 threads), X3460 @ 2.80GHz
  - 4GB DDR3-1333
  - Western Digital 250 GB, 7200 RPM SATA II (WD2502ABYS-23B7A)
  - Dual Gigabit Ethernet (2 x Intel 82574L Ethernet Controller)
- 1 x NetGear ProSafe 16-Port 10/100 Desktop Switch FS116

The Dell Optiplex 745 machine has been chosen to serve as a management host running all the major OpenStack services. The management host is referred to as the *controller* further in the text. The 4 IBM System x3200 M3 servers have been used as *compute hosts*, i.e. for hosting VM instances.

Due to specifics of our setup, the only one machine connected to public network and the Internet is one of the IBM System x3200 M3 servers. This server is referred to as the *bridge*. The bridge is connected to the public network via the eth0 network interface.

All the machines are connected into a local network through the NetGear FS116 network switch. The compute hosts are connected to the local network via their eth1 network interfaces. The controller is connected to the local network through its eth0 interface. The bridge performs Network Address Translation (NAT) for the hosts in the local network to provide the access to the public network and the Internet.

## 5.2 Organization of the Installation Package

- Config Directory
- Lib Directory
- Ordered Script Directories
- Script ordering

## 5.3 Configuration Files

- configrc
- hosts
- ntp.conf

## 5.4 Installation Procedure

### 5.4.1 Network Gateway

### 5.4.2 GlusterFS Distributed Replicated Storage

All nodes

Controller

All nodes

### 5.4.3 KVM

### 5.4.4 OpenStack

All nodes

Controller

Compute nodes

Network Gateway

## Controller

### 5.4.5 Testing of the OpenStack Installation

## 5.5 OpenStack Troubleshooting

## 6 Conclusion

## 7 References

- [1] M. Armbrust, A. Fox, R. Griffith, A. D. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica, and others, “A view of cloud computing,” *Communications of the ACM*, vol. 53, pp. 50–58, 2010.
- [2] R. Buyya, C. S. Yeo, S. Venugopal, J. Broberg, and I. Brandic, “Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility,” *Future Generation computer systems*, vol. 25, pp. 599–616, 2009.