



OpenStack at NDSU - College of Engineering

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1. Overview

1.1 Introduction

The North Dakota State University College of Engineering and Architecture Technical Support Department would like to evaluate OpenStack for information technology uses. Their interests are diverse, but their main uses would include using the cloud for a more stable server environment and various uses of client virtual machines. They would like to be able to independently maintain and further develop this system after it is delivered. Lastly they want to see the feasibility of thin clients.

1.2 Scope

Implementation would include a complete OpenStack environment. The environment needs to be a multiple node setup that is easily expandable through deployment services on a Chef server. All networking will need to be working and should support IPv6 and be able to use at least four different subnets. The servers that will be running on virtual machines will need to be capable of running both Windows and Linux operating systems. There will need to be a secure way to remotely access the virtual machines once the environment is operational and will need to be backed using the college's active directory. Lastly there will need to be a way to utilize thin clients. The college does not have control over the network so PXE booting likely will not be an option, but being able to minimize physical hardware on the clients would be optimal.

2. High-Level Design

2.1 High-Level Component Design

Component	Description
Chef - Deployment	Need to have the ability to easily add servers to the environment.
Documentation	Thorough documentation is a necessity as the college wants to be able to independently maintain the cloud.

2.2 Required Services

Component	Related Requirements
All Grizzly Services	Nova, Glance, Cinder, Keystone, Quantum
Heat	VM orchestration using a rest API to create different image modification templates
Oz	Oz is a set classes and scripts that allow Heat to do automatic installations of various guest operations.
libguestfs	Is a set of tools used by Oz to access and modify VM disk images.

2.3 College Example Uses

The most important uses, for now, is to run servers to provide user services. The servers functions are varied, but should include domain controllers, user shares, license servers, and possibly web servers. The college also has several clusters for student use and they are often used beyond capacity. There is interest in seeing how feasible it is to allow students to remotely use cloud VMs that are identical to the lab computer images. There is also a teaching cluster in the college that is used by all the departments. It would be favorable to allow individuals who take classes to have access to the software they were trained on afterwards from a remote location. Lastly, to take this a step further, there is interest in how well thin clients work and what their capabilities are.

3. Non-Functional Design

- Must use the CEA Active Directory for authentication
- Cloud nodes must be able to be easily added and monitored
- Must provide documentation for future use and maintenance

4. Definitions and Acronyms

Term	Definition
Redundancy	Data will be written in more than one place. This allows for contingency in case of disk failure. Redundancy can be done at the level of bytes, files or filesystems.
Orchestration	Automated arrangement, coordination, and management of complex computer systems, middleware, and services.
Cluster	A set of connected computers that work together so that in many respects they can be viewed as a single system.

5. Document Review

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