

# Design and Deployment of College Cloud for Education-as-a-Service Using OpenStack and Docker

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## Abstract:

In modern day research and education there constant need for dedicated server Installations for both staff and students. Typically there is need for access to computational power, network connectivity and specialized software. The classical solution for this problem is to delegate physical hardware for all of these needs. This is unpractical and results in an inefficient use of hardware, electricity and administrative resources.

A self-service virtualization system could benefit these institutions by making computing resources more easily available to its students and researchers, and by improving the utilization of hardware resources. In this project we identify the requirements for such a system, by installing and configuring a prototype private cloud solution for students at the college.

*Keywords* — **OpenStack Keystone, Swift, Docker, OwnCloud, OpenSSH, Instances.**

## I. INTRODUCTION

Seeing the wide use of Cloud Computing we have tried to in-cooperate the use of Cloud Computing in the field of Education. By in-cooperating Cloud Computing in this field we try to provide on-demand services so that it would help all the entities in the Education sector. Cloud Computing provides us anytime access to all our documents (E-Portfolio) using Swift Storage, Owncloud for mobile access and teachers able to provide assignments and assesses them anytime from anywhere (E-Assessment) using Openstack Nova or Docker and Swift [5].

Cloud Computing provides various services such as SaaS, PaaS, IaaS which helps to attain [10]

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service.

This paper proposes the deployment of private cloud using Openstack Components like Nova or Docker, Swift, Horizon and OwnCloud.

## II. GOALS AND OBJECTIVES

- Storage of Documents of the students. (e-Portfolio)
- An e-Assessment service for managing student assessments.
- Sharing paper Individual Instance for assignment/exam/practical.
- An online community service that teachers use to interact with peers and share lesson plans.
- Storage for student and teacher on any device, laptop, mobile devices from anywhere in the college campus.

## III. EXISTING SYSTEM

### Limited Storage of Students and Teacher

The amount of Storage provided to the Students and Teacher has been fixed to certain amount due to the limitation of the old Storage Servers and the Data might also get lost after the damage of the server.

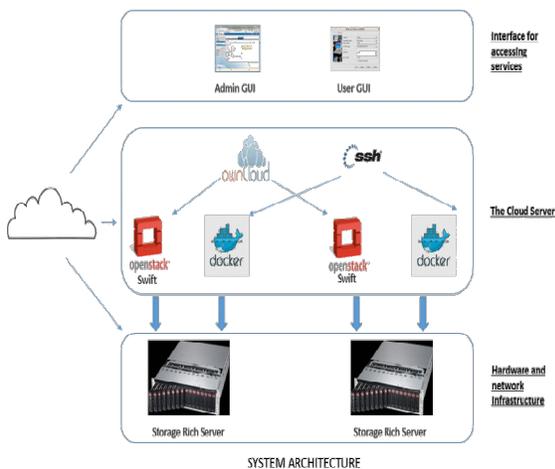
### Installation of the Software on each machine and amount of the RAM required (Hardware Configuration)

The Lab Admins have to set up the labs every time before and after exam and each software requires different capabilities so by in-cooperating Docker (light-weight container) we can easily manage and ship the container to the student when required and easily during practical examination.

### Unable to access the store data

The Student or the Teacher could not access the stored data on the server as they are on local server so by using the Owncloud server and client we can access the stored data easily from anywhere.

## IV. SYSTEM ARCHITECTURE



The hardware and network infrastructure propose the Storage Rich Server in which the hard-disk can be added as when there is deficiency of the Storage.

The user of the College Cloud can login to the particular storage and store data as and when required and when they require the storage they can request for the extra storage to the admin.

Also the student can practice on the machine by requesting the kind of software or compiler they

require and the admin would create the docker image and ship it to the student and easily the student could ssh the docker image and perform his work and store the output or required on the Cloud Storage provided.

## V. METHODOLOGY

### Establishing Servers:

The server compatible to serve the needs of the College must be established more specifically the Storage-Rich must be used.

### Providing Storage:

Every student and teacher have different requirement of the storage according the specified by the admin the storage must be provided and connected to the Owncloud Server so that the Stored documents and data can be retrieved from anywhere.

### Providing Instances:

By checking the requirements of the student and teacher docker images must be created and assigned port accordingly. If a student needs a container for practice he/she must make a request to the admin through GUI and the admin must provide the required things.

### GUI:

A GUI must be created so that the student and teacher can put and get the documents easily and make a request for extra storage and software for practice to the user. And the admin used be able to manage all things properly and efficiently.

## VI. COMPARISON WITH OTHER TECHNIQUES

### Amazon Education Cloud

The Amazon has a paid service and we have to pay after a certain amount of time and by in-cooperating our system which is free and unlimited storage the cost factor and reduced.

### Intel Education Cloud

Only the Storage is provided to the by this and our Cloud provides the shipping of images and it can be done as and when required by the student and teacher.

### **Cisco Education Cloud**

All this cloud providers provide the resources on pay per use the requirements of the college are large so the college must setup their own cloud using Openstack and Docker for better functionality.

### **VII. CONCLUSIONS**

If we in-cooperate this system in each college then the cost and time for the hardware setup would be reduced and the admins load will also get reduced.

It helps reshape teaching and expand collaboration

As the teacher can know what is the student doing the practicals as the output is stored on the provided storage and can access from anywhere.

The Student can also perform practicals from anywhere and submit the assignments regularly.

### **VIII. FUTURE WORK**

All the output are stored on the cloud so by performing data mining and applying cognitive computing technique the education can be made easier as it would easy to suggest the student the efforts to be taken based on the results.

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