# Survey on Virtual Computing Systems

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*Abstract: The Virtual Computing System represents a true cloud computing solution that has been used in educational and research needs of the academic community. It Supports student computing labs at any place, at any time if they have internet. Students and faculty have flexibility in their choices of platform, software and mobility.*

*Keywords: Cloud computing, Virtual computing System, VM Ware Server, Blade Server and Application Image Libraby.*

## I. INTRODUCTION

Cloud Computing is a revolutionary concept. Cloud has many benefits for educational institutions. Students and faculties can take advantage of the ability to work and communicate from anywhere and on any device using Cloud-based applications.

Online education has a rapid growth in the past decade. According to report [1] released by U.S. Department of Education: students who took part of their class online performed better, than those taking the same course through traditional face-to-face instruction.

The Virtual Computing System is a cloud computing idea that has been used in the educational and research. This system can deliver user required solutions for variety of service environments anytime and at anyplace on demand/reservation through internet. VCL cloud provides exceptional computing power through a unique Open Software and Hardware Solution to run and host all university projects and learning programs.

## II. GOALS OF VCL

- Creates a multi institutional shared computing **services community** based upon the VCL model that will include universities, community colleges, K-12 schools and business partners.
- Reduce recurring cost of hardware platform refresh.
- Provide flexibility in compute images and/or software versions.
- Allow students access mobility so they do not have to physically be in a lab to work.
- Increase lab efficiency for technical support, staffing hours and complexity of compute images.

**Key differences are:**

A) Simplicity of implementation and maintenance.

B) versatility, security and cost-effectiveness

C) It's broad resource-based approach to "virtualization"

D) It's flexibility of delivering resource services through "images." This service facilitates students to run windows and most of software applications that are used in our labs on their own computers.

### III. RELATED WORK

It began in the year 2002, by name Virtual Computing Lab with the first general production system launched in 2004 by North Carolina State University with support from the IBM® Center for Advanced Studies (CAS). It has been continuously improved for more than eight years and is therefore extremely stable in production environments. In the year 2010, the North Carolina VCL cloud (NC VCL) delivered several hundred-thousand user sessions to over a quarter of a million North Carolina students and faculty. Originally developed as the education and research cloud computing production system for NC State University, it now supports students at other universities within the University of North Carolina System and in many schools within the North Carolina Community College System [3]. There are also several K-12 outreach pilots across the state. Similar education clouds based on VCL can be found in California, Virginia, Georgia, Tennessee and other states, as well as within the Historically Black Colleges and Universities (HBCU) community as part of the HBCU Cloud initiative. VCL-based education clouds also can be found in Europe, the Middle East, India, China and Japan, with VCL effort also started in Alberta and Ontario Canada. Its spread accelerated dramatically when VCL became an Apache open source project in 2009. Earlier this year, on June 2, IBM announced the IBM Smart Cloud™ for Education portfolio that included a set of solutions and services built upon VCL. It spread accelerated dramatically when VCL became an Apache open source project in 2009.

The IBM Cloud Academy has also expanded the platform for researchers to exchange ideas and further advance the university's mission in teaching, research and service through VCL at Georgia state university in the year 2010.  Research has been continued in collaboration with IBM Cloud Computing on VCL at Abdelmalek Esaki University in 2012 [2]. NC State is operating its cloud at just pennies per compute hour, with most universities that have adopted VCL experiencing annual total cost of ownership reductions in the range of 50 to 80 percent or more.

The VCL can deploy a wide range of solutions, from complex server clusters, to blocks of machines installed with all necessary software applications or middleware for a regularly scheduled class of students, to single physical machines and virtual desktops. As such, it has been used to support high performance computing (HPC) researchers, individual students and classroom instructors both in and out of class.

### IV. FEATURES OF VIRTUAL COMPUTING SYSTEM

1. Some of the existing desktops were clustered to create private cloud. Thus we need not spend additional capacity.

2. The students and staff of college had their own storage space in cloud so that they can store their daily data.

3. The final year projects were also stored on this cloud to avail reference for future projects.

4. This allows students to launch virtual machine instances based on various practical experiments in the private cloud environment.

5. Students will not able to use pen drive because the student pen drive can't be detected in VM. Virus gets downloaded within VM, it will die down along with VM, hence it will not affect other machine.

6. The students cannot misuse the internet connectivity as each virtual machine instance is allotted a fixed amount of Internet bandwidth [5].

## V. APPROACH

End-users could build their own workspaces which consist of OS images, applications, and even user's personal profiles and could execute and they can migrate from one PC to another.

VCL support a virtual infrastructure environment that includes multiple virtual hosts, centralized virtualization management, distributed data storage, site security through access controls, and resource migration. In this lab students will install and administer datacenters. Each datacenter includes minimum of two VMware ESX servers, a VMware vCenter server and a data storage server.

In a normal lab environment, these servers require expensive hardware to run. The minimum hardware requirement for a student server requires at least two 64-bit processors, 4GB or more RAM, three Ethernet NICs (100MB or 1 GB), 120 GB or more of local storage accessible through the SCSI controller. For a  class of 20 students, a minimal of 10 dedicated student servers, a data storage server plus gigabit Ethernet switches, cabling and optionally 20 student workstations from which the students access the servers. The cost of setting up and maintaining the lab can be very expensive. Instead of acquiring expensive physical machines to set up the datacenters in a physical lab, we create virtual environments which consist of virtual machines, hosting VMware ESX4 servers, a vCenter server and an Openfiler ischia/NFS storage server respectively. The virtual environment functions as a virtual datacenter. The datacenter virtual environment image can be loaded on demand, on blade servers that are in the Virtual Computing Lab (VCL). Students are able to make reservations through the VCL system. As a result, every student has the opportunity to manage her/his own virtual datacenter and complete hands-on exercises, individually, at any time and from any location with a connection to the Internet. Virtual datacenter images differ from other typical VCL virtual environments.
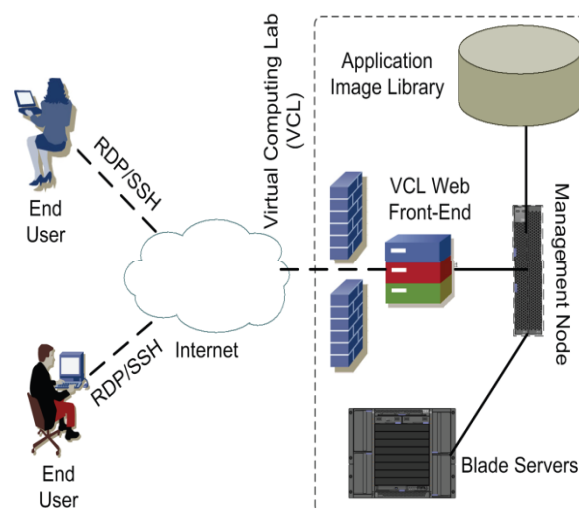
## VI. ARCHITECTURE



Fig: Architecture of VCL System

Above figure represents virtual computing system [6]

VCL infrastructure composes of

- Web  front-end server

- Management node server

- Application image library and

- Blade center which contains multiple blade servers.

The web frond-end server runs VCL manager software and contains the web server, the scheduler and the schedule database. The web server facilitates the user interface and the management interface for administration and virtual environment reservation. The scheduler checks whether any blade server is preloaded with the user requested image. If no blade runs the image, the scheduler instructs the management node server to load user-requested virtual environment onto a blade server. The schedule database is responsible for storing system data such as image revisions, image information, server information, user information, user requests, user and group privileges, etc. Behind the web front-end server, the management node server loads images on servers based on instructions from the scheduler. In a compact implementation, the web front-end server, the management node server and the image library can reside on a single computer (blade) or on a virtual machine. A large-scale VCL infrastructure can have more than one web frond-end servers, multiple management nodes, multiple image storage servers, and blade centers at different locations, shared by different institutions.

End users can reserve different virtual environments through VCL. To make a reservation, the user first logs in to the VCL front-end website. Virtual environments (images) that the user can access are shown in a drop-down menu. The user chooses a virtual environment (e.g., MySQL and PHP or CentOS Linux with Apache, Windows XP with adobe design) and then submits the request. The waiting time will be 25 minutes if virtual image is to be transferred from image library to blade server or less than one minute if a blade server is already preloaded with the requested virtual environment image. The user may also place a reservation for a future time. Once the VCL node (blade server) is ready, the username, the randomly-generated onetime- use password and the IP address of the node will be made available to the user.

## VII. CONCLUSION

Main purpose of Virtual computing system is to make students more comfort by availing resources to complete their exercises in labs at home through internet and make avail of different softwares  that are used while doing their project or research work.

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