ClassCloud:
Turn your PC Classroom into Virtual Cluster using DRBL

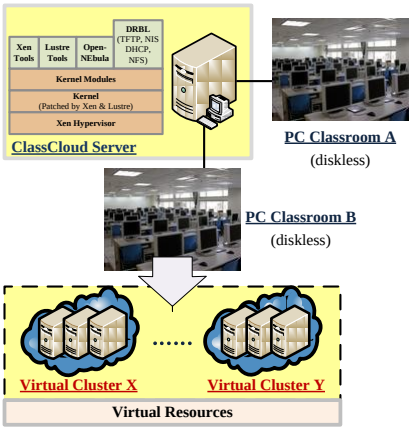
Abstract

Cloud Computing is a growing research topic in recent years. It offers dynamic scalability and virtualized resource to users, so it can bring great benefits such as resource utilities, cost reduction, and elastically computing. Building Cloud infrastructure to achieve these benefits is a trend, but it doesn't have a consistent Cloud Computing standard to follow now. Hence, how to effectively and quickly deploy Cloud infrastructure is a challenge. In this paper, we propose an architecture named ClassCloud for Cloud Computing using Diskless Remote Boot in Linux (DRBL). It's designed for building an experimental Cloud infrastructure in a PC classroom, and it's also a pure open source Cloud Computing solution. The ClassCloud offers flexible deployment, distributed file system, virtualized resource creation, and management capabilities to support Cloud Computing, and it also helps to dynamically redeploy and reconfigure the Cloud environment with ease of use. This paper is going to tell about how to easily build up a Cloud Computing infrastructure named ClassCloud for education or research in PC classroom by using DRBL.

Index Terms—DRBL, Lustre, OpenNEbula, Xen.

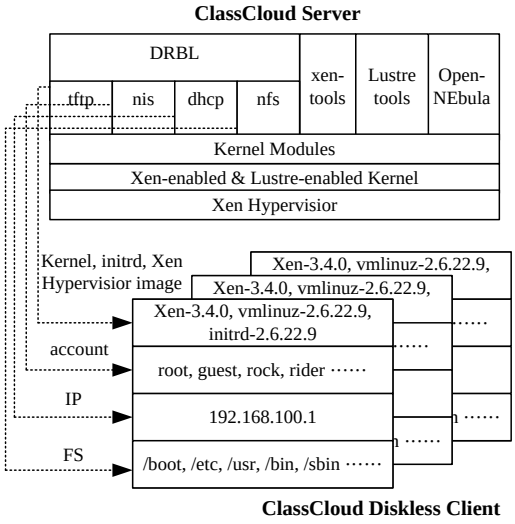
ClassCloud Concept

ClassCloud is designed for building Cloud infrastructure in PC classrooms. It is usually suitable for PC classrooms, because of the following reasons: (1) PC classrooms need flexible deployment and central management; (2) efficient utilization of idle resource in PC classrooms; and (3) enable PC classrooms to support Cloud Computing.



ClassCloud Architecture

In ClassCloud architectur, the Xen hypervisor, kernel and kernel modules are in kernel space. Xen hypervisor is the lowest layer; it handles hardware access between host and guest/VM. The kernel must supports capabilities of Xen and Lustre, so it needs to be patched. The DRBL, Xen tools, Lustre tools, and OpenNEbula are in user space. DRBL can automatically bind these GNU/Linux daemons (TFTP, NIS, DHCP, and NFS) to build up cluster environment, to deploy them into nodes and offers management utilities to control cluster. Xen tools offer Xen management interface, and Lustre tools offer configuration and management interface. OpenNEbula is responsible for resource pool management and virtual machine placement in cluster.

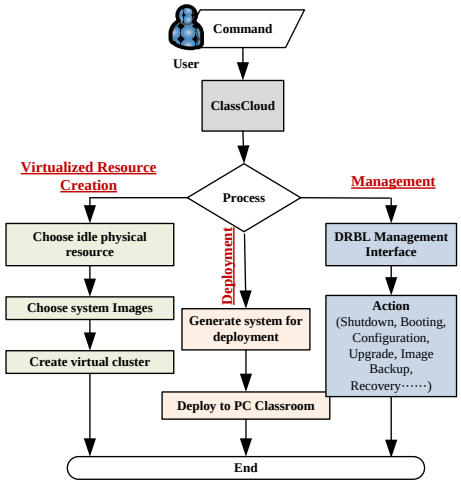


ClassCloud operation flow

Deployment: Administrator can quickly deploy system of PC classroom through ClassCloud.

Management: Central management can enhance PC Classroom management for administrator. It offers system capabilities such as booting, shutdown, upgrade, backup, and recovery etc. to help massive PC management.

Virtualized Resource Creation: User can get virtualized resource to run their applications through ClassCloud. User requests computing resource from ClassCloud to fit their requirement



Conclusion

The purpose of ClassCloud is to provide a useful toolkit for easily building Cloud Computing infrastructure, and it lets PC classroom become a Cloud Computing center for education or research institutions without influencing original system and environment. Our toolkit brings great benefits on system deployment, cluster management and virtualization applications. It helps to transform physical resource into virtualized resource from PC classroom, and then user can use these virtualized resources for specific computing cases.