



Virtualization as Foundation for Cloud Computing

Part of UC Berkeley's Professional Series in Cloud Computing

Venue

Next U @ NTUC
Trade Union House
73 Bras Basah Road

Course Fees

\$5,000 per module

Discounts are available for the following:

- **Group Registration for 3 or more students**
- **NTUC Members**
- **Partner Association Members**
(SITF, SCS & ITMA)
- **Registration for full program**
(i.e. all 4 modules)

Funding of up to 50% available!*

Register Now!

Seats are limited!
For registration or enquiries, please call **6837 8388** or email us at pme@nextu.com.sg

*Terms & Conditions apply.
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Course Introduction

Commencing with a basic understanding of virtualization, students will then delve into the underpinnings of virtualization. This course is ideal for programmers, hardware engineers, desktop/server/network administrators and technical customer support professionals. Students will go through practical understanding of modern virtualization theories. Creating their own Virtual Machine using a GUI-driven Virtualization Manager, students will learn how to create, configure and maintain a high performance Virtual Machine. Projects will highlight the performance tuning of various system resources such as CPU, memory, network and storage using GUI, command line and SDK interfaces. Students will have the opportunity to build and present their own custom configuration and monitoring scripts. In the class, group feedback will provide a chance for each student to improve their virtual machine and scripts.

Who will Benefit

- Cloud Programmers, technical support
(must have advanced C experience)
- Cloud Administrators
(must have advanced bash scripting experience)
- Virtual Machine Programmers
(must have advanced C experience)
- Virtual Machine Administrators
(must have advanced bash scripting experience)

Course Objectives

Upon successful completion, students are able to:

- Understand the 'computer science' fundamentals behind virtualization
- Comprehend various different kinds of virtualizations
- Grasp how CPU and memory resources are virtualized
- Understand how Storage and network virtualization takes place based on CPU and memory virtualization.
- Be well versed with the "Virtual kernel Operating System" concepts, which are common to all hypervisors such as ESX(VMWare), Hyper-v (Microsoft) etc.
- Understand the main components of Redhat's Virtual operating system at the source code level and hence gain in-depth understanding of virtualization.
- Analyze a virtualization product from a vendor interim of how it can perform with respect to their CPU, memory, network and storage needs.
- Know the various key features to look for in a Virtualization management tool.
- How to use command line and GUI based virtualization tools to create, configure, diagnose and delete virtual machines.
- Perform monitoring functions on Virtual Machines to check whether everything is running smoothly.
- Know how the SDKs interact with the hypervisors.
- Grasp the essence of various SDKs available to manage the Virtual machines

Pre-requisites

In addition to having a general idea of how computers work, students must possess the following skill pre-requisites:-

- a) Know how to program in at least one imperative computer language (C and/or bash shell scripting)
- b) Be somewhat comfortable with UNIX/Linux
- c) Be willing/able to install software as root user or administrator of Operating System(s)
- d) Have downloaded any virtual computing environment (open source or otherwise such as Oracle VirtualBox and/or VMware server) and explored it before coming to the first class
- e) Have good understanding of technical (computer science) English

Instructional Methodology

Classroom instruction will contain:

- Lectures
- Group Discussions
- Class Participation
- Quiz

Course Outline

1. Introduction and class overview

2. Virtualization Basics

3. What is Virtualization

- Different kinds of Virtualizations
- Advantages and disadvantages of the different kinds of virtualizations
- Introduction to virtualization of CPU, Memory, Network & Storage Resources
- Hands on Exercise

4. Discussion of the homework in the class

- Study of VMWare and Microsoft Virtualization approaches.

5. Storage Virtualization

- How Local Storage (SATA, SCSI, ATA) are used in Virtualization
- How Fiber Channel is used in Virtualization
- How iSCSI is issued in Virtualization
- Creation of LUNs, how to make the LUNs aware to the hypervisor and how to utilize them
- How to construct fail-safe storage systems

6. How the fundamental Virtualization concepts are utilized in VMWare ESX, Microsoft Hypervisor and Linux KVM

- Virtualization based on CPU allocation
- CPU – Time Multi plexed
- Memory
 - i. Zone based Virtualization
 - ii. Segmentation/page based virtualization

7. Network Virtualization (VLAN based – layer 2, NAT based – layer 3, “VMNet”)

8. Demonstration of ESX

9. Introduction to various SDK (libvirt) of KVM.

- Programming the life cycle of Virtual Machine using libvirt API / virsh
- Networking concepts involved in KVM Virtual Machines work

10. Network Virtualization exercises

