

Las Positas College  
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## Course Outline for CNT 7701

### VMWARE, MICROSOFT & XEN VIRTUAL MACHINES

Effective: Fall 2008

#### I. CATALOG DESCRIPTION:

CNT 7701 — VMWARE, MICROSOFT & XEN VIRTUAL MACHINES — 4.00 units

VMWare, Microsoft Virtual Server, Virtual PC and XEN are virtualization softwares, more common every day. Using virtual machines gives huge savings in time, money, energy and resources for individuals and companies. Every power user and sysadmin needs to understand virtualization and the implications for the future of desktops and servers. This class covers Virtual Machine basics, concepts, and use.

3.00 Units Lecture 1.00 Units Lab

#### **Strongly Recommended**

CIS 50 - Intro to Computing Info Tech

#### **Grading Methods:**

Letter or P/NP

#### **Discipline:**

	<b>MIN</b>
<b>Lecture Hours:</b>	54.00
<b>Lab Hours:</b>	54.00
<b>Total Hours:</b>	108.00

#### II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 2

#### III. PREREQUISITE AND/OR ADVISORY SKILLS:

**Before entering this course, it is strongly recommended that the student should be able to:**

A. CIS50

#### IV. MEASURABLE OBJECTIVES:

**Upon completion of this course, the student should be able to:**

- A. outline the key features, concepts and uses of Virtual Machines;
- B. install and configure a virtual machine, host and guest OS
- C. install and configure common software packages in a guest OS;
- D. identify and discuss the operation, features and limitations of closed source and open source VM technologies;
- E. use VMware player to install and evaluate pre-built Virtual Machines;
- F. describe common types of Virtual Machine software and tools;
- G. outline the steps necessary to plan and design a Virtual Machine installation;
- H. demonstrate an understanding of Windows, Linux and Apple OS X operating systems as they relate to Virtual Machines;
- I. demonstrate the ability to configure system and network settings for a host and guest OS;
- J. discuss and evaluate security and, backup methods;
- K. demonstrate an understanding of TCP-IP basics related to Virtual Machines on LANs;
- L. demonstrate the use of Wireshark and other tools in evaluating VM network operations;
- M. describe and evaluate physical machine to virtual migration options.

#### V. CONTENT:

- A. Virtualization
  - 1. History
  - 2. Development
  - 3. Terms and concepts
- B. VM software's
  - 1. VMware
  - 2. Microsoft Virtual PC
  - 3. Microsoft Virtual Server
  - 4. Zen
  - 5. Parallels
  - 6. WINE
- C. Installation

1. Requirements
2. Hardware
3. Software
4. Planning an installation
5. Pre and Post installation tasks
- D. Configuring a Virtual Machine
  1. Virtual machine basics
  2. Guest OS
  3. Formatting / Virtual drives
  4. Golden Masters / Clones
- E. Advanced Configuration
  1. Networking options
  2. Traffic shaping
  3. Disk / Memory management
  4. CPU management
  5. Device Mapping
- F. Virtual Machine worlds
  1. Clustering
  2. Virtual Networks
  3. Standby host
  4. Load Balancing
- G. Advanced Networking
  1. Virtual Switches
  2. VMNets
  3. VNICS
  4. Bonded NICS
  5. MAC addresses
  6. VLANs
- H. Physical to Virtual Migration
- I. P2V terms and concepts
  1. Legal issues
  2. Software options
  3. Image Servers
- J. Desktop and Server consolidation
  1. Concepts and terms
  2. Business Case / Requirements
  3. Planning / Strategy
  4. Cost / Performance
  5. Migration Issues
  6. Training / Support
- K. Maintenance and Troubleshooting
  1. Useful tools / Utilities
  2. Wireshark
  3. NewSID
  4. Virtual Infrastructure administration
- L. Best practices / common problems
  1. Hardware
  2. Software
  3. Planning
  4. Sandbox
  5. Backup
  6. Redundancy / resiliency
- M. Future of Virtualization
  1. Fault tolerance
  2. Hardware agnosticism
  3. OS agnosticism
  4. Virtual resources
  5. Virtual storage systems

## VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. **Demonstration** -
- C. **Research** -
- D. **Lab** -
- E. Assigned reading
- F. **Discussion** -

## VII. TYPICAL ASSIGNMENTS:

A. Reading / listening to presentations and readings

1. Presentations and lectures
  - a. Example: Lecture on ESX configuration
  2. Selected current online readings
    - a. Example: Read Parallels Installation Guide tutorial, at [www.parallels.com](http://www.parallels.com)
    - B. Search for relevant material and read
    1. Students use search engines to find readings relevant for each module
    - a. Example: Find resources describing virtual switches, select 3 to read
    - C. Provide comments regarding curriculum
    1. Discussion and response questions accompany each module
    - a. Example: Discuss how CPU and resource allocation affect host and guest OS speed.
    - D. Answer comments and questions from fellow students and instructor
    1. Students must participate in group discussion
    - a. On the VMWare.com web site, research the cross platform capabilities of VMWare Player and discuss the installation of VM Player on Linux/Unix

## VIII. EVALUATION:

### A. **Methods**

### B. **Frequency**

1. Frequency:
  - a. 6-10 module assignments
  - b. Weekly discussion of group work
  - c. 6-10 module quizzes
  - d. 6-10 labs
  - e. 1 final project

2. Typical quiz question:
  - a. What are the characteristics of shared networking between host and guest OS?
  - b. Describe the process of migrating a physical machine to a virtual machine
3. Final exam

IX. TYPICAL TEXTS:

1. Al Muller, Seburn Wilson *Virtualization with VMware ESX Server.*, Syngress, 2006.
2. Dennis Zimmer *Vmware Server and Vmware Player.*, Bod, 2006.
3. Ron Oglesby *VMware ESX Server: Advanced Technical Design Guide.*, Madden Publishing Group, 2005.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Students require access to a computer connected to the Internet, with word processing and browser software, and an email address.