



South Portland, Maine 04106

Information Technology

Title: Virtualization Fundamentals

Catalog Number: CMIT 140

Credit Hours: 3

Total Contact Hours: 45

Lecture (or Lab): Learning Commons, rm 173

Instructor: Leon C Perrin

Office Hours – Location:

Contact Information:

By Appointment

Email: lperrin@smccme.edu

Course Syllabus

Course Description

This course focuses on concepts surrounding virtualization with emphasis on Desktop Virtualization. Virtualization is abstracting hardware from operating systems. Technology, procedures, and methods of implementation will be examined. Subsections will include managing CPU's, memory, storage, and other peripherals. Specific labs include: basic installation, setup and configuration of a PC Virtual Machine. Required knowledge includes PC experience, PC architecture, and how programs use PC resources

Pre-Requisites: CMIT100, CMIT105

Co-Requisites: MATH125, ENGL050, ENGL075

Course Objectives / ACM Learning Outcomes

The Association for Computing Machinery (ACM) Committee for Computing Education in Community Colleges (CCECC), at the direction of the ACM Board, convened a task force to produce curricular guidance for associate-degree programs in Information Technology (IT). In fulfilling its charge, the CCECC identified the body of knowledge as a set of fifty student learning outcomes that constitute core IT competencies for all IT-related associate degree programs. The full list of student outcomes is available for download at <http://www.acmcecc.org/>.

An ability to demonstrate core IT competency in client computing and user support

1. Carry out trouble-shooting strategies for resolving an identified end-user IT problem.
2. Differentiate among various operating systems.
3. Explain the process of authentication and authorization between end-user devices and computing network resources
5. Identify basic components of an end-user IT system.
6. Implement a hardware and software configuration responsive to an identified scenario.

7. Summarize life-cycle strategies for replacement, reuse, recycling IT technology and resources.

8. Summarize strategies to support or train users with their IT resources.

9. Use a variety of practices for making end-user IT systems secure.

An ability to demonstrate core IT competency in digital media and immersive technology

19. Differentiate among data types, data transfer protocols and file characteristics specific to the targeted use.

An ability to demonstrate core IT competency in networking and convergence

24. Diagram the components of an integrated IT system.

25. Differentiate among various computer networking models.

26. Differentiate among various techniques for making a computer network secure.

27. Summarize the flow of data through a computer network scenario.

An ability to demonstrate core IT competency in servers, storage and virtualization

35. Differentiate among strategies for business continuity provisioning of IT resources at the enterprise level.

38. Implement an application of virtualization.

An ability to engage in continuous learning as well as research and assess new ideas and information to provide the capabilities for lifelong learning

46. Discuss significant trends and emerging technologies and their impact on our global society.

An ability to demonstrate business awareness and workplace effectiveness

50. Summarize the role of IT in supporting the mission and goals of an organization.

After successfully completing the course, the student should be able to:

1. Understand and explain a Hypervisor
2. Understand and define a Virtual Machine and its interaction with a Hypervisor
3. Understand and explain virtualization and cloud computing topics
4. Configure a Virtual Machine
5. Install Windows O/S and Linux O/S as a Virtual Machine
6. How to manage and fine tune CPU, memory and other peripherals
7. Configure a stand-alone Hyper-V server
8. Configure a stand-alone ESXi server

Course Outline

Note: course schedule and course content are subject to change in accordance with industry standards

Week	Lecture Topics	Readings
1	Understanding Virtualization Understanding Hypervisors	Lecture – Chapter 1 Lecture – Chapter 2 Read - Chapter 1 Read – Chapter 2 Read – Chapter 3 Homework: The Essentials and Beyond, Task 2 Page 18 The Essentials and Beyond, Task 2 Page 33
2	Understanding Virtual Machines	Lecture - Chapter 3 Read – Chapter 4 Homework: The Essentials and Beyond, Task 2 Page 49
3	Creating a Virtual Machine Installing Windows in a VM	Quiz 1 - Chapters 1, 2, & 3 Lecture - Chapter 4 Lecture – Chapter 5 Read – Chapter 5 Read – Chapter 6 LAB – Installing Windows 7 (Easy Install) LAB – Installing Windows 7 (Manual Install) Homework: The Essentials and Beyond, Task 2 Page 69 The Essentials and Beyond, Task 1 & 2 Page 96
4	Installing Linux in a VM Managing vCPUs	Lecture - Chapter 6 Read – Chapter 7 Lecture – Chapter 7 Read – Chapter 8 LAB – Install Lubuntu LAB – Examine Virtual Machine Files LAB – Reconfigure CPU Settings

		Homework: The Essentials and Beyond, Task 1 & 2 Page 135
5	Managing VM Memory Managing Storage for a VM	Quiz 2 - Chapters 4, 5, 6, & 7 Lecture - Chapter 8 Read – Chapter 8 Lecture – Chapter 9 Read – Chapter 10 LAB – Reconfigure RAM LAB – Adding Storage to a VM LAB – Resizing VM Disks Homework: The Essentials and Beyond, Task 1 - 4 Page 149 The Essentials and Beyond, Task 1 Page 168
6	Virtual Networking	Lecture - Chapter 10 Read – Chapter 11 LAB – Change Networking Types LAB – Download and Install Workstation LAB – Build Windows 7 in Workstation Homework The Essentials and Beyond, Task 1 Page 189
7	Copying a Virtual Machine	Quiz Chap 8, 9, 10 Lecture - Chapter 11 Read – Chapter 12 LAB – Manually Clone a VM LAB – Cloning a VM with Workstation Homework:
8	Managing Virtual Devices Understanding Availability	Lecture - Chapter 12 Read – Chapter 13 Lecture – Chapter 13 Read – Chapter 14 LAB – The Essentials and Beyond, Task 1 Page 225

		Homework: The Essentials and Beyond, Task 3 Page 241
9	Applications	<p>Quiz Chap 11, 12, & 13 Lecture - Chapter 14</p> <p>LAB – The Essentials and Beyond, Task 1 Page 225 LAB – Export & Import an OVF with Workstation</p> <p>Homework: The Essentials and Beyond, Task 3 Page 241</p>
10	Task Evaluations: Type 2 Hypervisors	
11	Hyper-V	<p>Lecture - Introduction to Windows Server 2012 and Hyper-V</p> <p>Lecture - Windows Server 2012 Roles and Features</p> <p>LAB: Familiarization with Windows Server 2012R2</p> <p>LAB: Add Hyper-V role to lab servers</p>
12	Hyper-V	<p>Lecture: Hyper-V Manager MMC</p> <p>Lecture: Creating VMs in Hyper-V</p> <p>LAB: Hyper-V Components and Settings LAB: Create a Windows 7 VM in Hyper-V LAB: Hyper-V Virtual Hardware & Guest Files</p>
13	Hyper-V	<p>Lecture: Hyper-V Availability Features LAB: Export & Import VMs LAB: Checkpoints LAB: Replication</p>

		Task Evaluations: Hyper-V
14	Introduction to ESXi	
15	Open Discussion / Final Review	Final Review
16	Final	Chapters 1 – 14, Hyper-V

Course Requirements

Students will need to complete weekly readings, weekly Lab exercises, four quizzes, Task Evaluations, and a Final Exam.

Student Evaluation and Grading

Measure	% of total	Basis
Lab Assignments	30	Attendance
Written Assignments	5	Percent Correct
Quizzes	20	Percent Correct
Task Evaluations	30	Rubric
Final exam	15	Percent Correct

Total = 100 points

Text, Tools and / or Supplies

Required Text:

Required - Virtualization Essentials Matthew Portnoy / Wiley & Sons Inc.
ISBN 978-1-118-17671-9

Supplemental Materials:

White Papers and Hand-outs provided by instructor

It would benefit the student if they had Internet access for class communication purposes.

Attendance Policy

Regular and prompt attendance is required. Excessive lateness and absences will affect the final course grade.

- More than three absences throughout the semester = -10 points
- Three or more consecutive absences throughout the semester = Academic Failure
- Five absences throughout the semester = Academic Failure
- Two lates = 1 absence

Expectations:

Students are expected to attend classes regularly and to engage in all classroom/lab activities. Exercises should be done during class time if possible, but extra time can be made available if a student needs it. Notebooks are necessary for notes. Please Email me if you have any problems being in attendance or if you need help or if you would like to arrange a conference.

End-of-Course Evaluation

Students complete evaluations for each course attended at SMCC. Evaluations are submitted online and can be accessed through the student portal. Students can access the course evaluations beginning one week before the end of classes. The deadline for submission of evaluations occurs Monday at 5 PM following the last day of the class. You will receive an email to your student email account when course evaluations are available.

ADA Syllabus Statement

Southern Maine Community College is an equal opportunity/affirmative action institution and employer. For more information, please call 207-741-5798. If you have a disabling condition and wish to request accommodations in order to have reasonable access to the programs and services offered by SMCC, you must register with the Disability Services Coordinator, Sandra Lynham, who can be reached at 741-5923. Further information about services for students with disabilities and the accommodation process is available upon request at this number. Course policies about online testing are modified to suit each individual's accommodations.

SMCC Pay-for-Print Policy

Per Page Costs

Each semester students receive a \$20 printing credit. The balance resets at the end of the semester and any remaining credits are removed. The cost varies depending upon page size and whether printing is done in black and white or color.

- a. There is a \$0.10 per page fee for standard 8.5" by 11" black and white documents.
- b. The reverse sides of duplex (double-sided) documents are free.
- c. There is a \$.50 per page fee for standard 8.5" by 11" color documents.
- d. There is a \$.20 per page fee for 8.5" by 14" (legal) or 11" by 17" (tabloid) black and white documents.
- e. There is a \$1.00 per page fee for 8.5" by 14" (legal) or 11" by 17" (tabloid) color documents.

Duplex charges (printing on both sides of a page) work in the following fashion: One page is \$0.10, two pages are \$0.10, three pages are \$0.20, and four pages are \$0.20, etc. The flipsides are free, but another sheet of paper is \$0.10. Please be aware that a document with any color at all (when printed to a color printer) will by default be printed in color. You are responsible for setting the print job to print black and white if you do not need color. For directions, please go to the IT Help tab in My SMCC.

How does it work?

The College's pay-for-print system monitors printing on all printers (including those in general access labs, library printers, the Academic Achievement Center, Noisy Lounge and technology labs). Students can check the number of pages they have printed by using the Printing Balance tool available on SMCC computers (located in the lower right corner of the screen, near the clock). Departments with work study students who need to print documents for the department should contact the Help Desk at 741-5696 to have a special account set up.

Refunds

Print jobs are eligible for a refund in the event of mechanical or electronic error on the part of the printer, print server, or software used to submit the job. Jobs are not eligible for a refund in cases where the job was not set up correctly, was submitted multiple times, or the student is not satisfied with the result. To

request a refund, please bring the offending print to the IT Department in the basement of the Ross Technology Center. Refunds will be granted in the form of a credit to the student's account.

Why is SMCC charging for printing?

The pay-for-print system is an effort to control escalating printing costs. Charging for printing helps offset the increasing cost of supplies and encourages students to conserve resources. To find ways to reduce your printing charges, please go to the IT Help tab on My SMCC. If you have questions about the pay-for-printing policy or your printing charges, please contact the Help Desk at 741-5696 or send an email to helpdesk@smccme.edu.

Be sure to log OUT of the system when you've finished your printing, to prevent unauthorized access to your account.

Add-Drop Policy

Students who drop a course during the one-week "add/drop" period in the fall and spring semesters and the first three days of summer sessions receive a 100% refund of the tuition and associated fees for that course. Please note any course that meets for less than the traditional semester length, i.e., 15 weeks, has a pro-rated add/drop period. There is no refund for non-attendance.

Withdrawal Policy

A student may withdraw from a course only during the semester in which s/he is registered for that course. The withdrawal period is the second through twelfth week of the fall and spring semesters and the second through ninth week of twelve-week summer courses. This period is pro-rated for shorter-length courses. To withdraw from a course, a student must complete and submit the appropriate course withdrawal form, available at the Enrollment Service Center (no phone calls, please). The designation "W" will appear on the transcript after a student has officially withdrawn. A course withdrawal is an uncompleted course and may adversely affect financial aid eligibility. Failure to attend or ceasing to attend class does not constitute withdrawal from the course. There is no refund associated with a withdrawal.

Plagiarism Statement

Adherence to ethical academic standards is obligatory. Cheating is a serious offense, whether it consists of taking credit for work done by another person or doing work for which another person will receive credit. Taking and using the ideas or writings of another person without clearly and fully crediting the source is plagiarism and violates the academic code as well as the Student Code of Conduct. If it is suspected that a student in any course in which s/he is enrolled has knowingly committed such a violation, the faculty member should refer the matter to the College's Disciplinary Officer and appropriate action will be taken under the Student Code of Conduct. Sanctions may include suspension from the course and a failing grade in the course. Students have the right to appeal these actions to the Disciplinary Committee under the terms outlined in the Student Code of Conduct.