Miami Dade College

Course Description

CGS1700 | Introduction to Operating Systems | 4.00 credits

This course examines the role of operating systems as the interface between the hardware, the software and the users of a computer system. It explores the concepts such as processes and threads, file systems, virtual memory, interrupt handling, virtualization and security.

Course Competencies:

Competency 1: The student will demonstrate an understanding of the role of operating systems by:
1. Listing the key functions of an operating system
2. Describing the types of operating systems
3. Identifying modern operating systems and their uses
4. Comparing the features of modern operating systems
5. Describing real time systems and their requirements

Competency 2: The student will demonstrate an understanding of the computer system hardware by:
1. Describing the basic architecture of a computer system
2. Explaining the function and features of the Central Processing Unit (CPU)
3. Discussing processor modes (user/kernel)
4. Describing the computer memory hierarchy
5. Explaining the purpose of interrupts and interrupt handling
6. Describing the computer booting process

Competency 3: The student will demonstrate an understanding of file systems by:
1. Listing the basic functions common to all file systems
2. Describing the structure of various file systems
3. Explaining how various file systems store data on storage devices
4. Comparing various modern file systems
5. Describing and managing system partitions

Competency 4: The student will demonstrate an understanding of process management by:
1. Explaining the notion of a "process"
2. Listing the resources necessary for a process to execute
3. Describing process scheduling and context switching
4. Comparing processes and threads
5. Describing process isolation

Competency 5: The student will demonstrate an understanding of memory management by:
1. Explaining the concept of memory partition
2. Explaining the concept of memory segmentation
3. Explaining the concept of paging
4. Explaining how virtual memory is supported by the operating system

Competency 6: The student will demonstrate an understanding of virtualization by:
1. Describing the components of virtualization
2. Explaining the role of a hypervisor
3. Listing the types of virtualization
4. Describing cloud computing
5. Comparing and contrasting machine virtualization and containers
6. Operating virtualization technology

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Competency 7: The student will demonstrate an understanding of the role of the operating system in security by:
1. Comparing data security states: in transmission, at rest, in processing
2. Discussing security issues and principles pertaining to operating systems, such as domain separation, process isolation, resource encapsulation, least privilege
3. Explaining attacks on operating systems including race conditions, buffer overflows and library manipulation
4. Discussing various levels of access control provided by the operating system, including file access control and memory access control
5. Using encryption and digital signatures
6. Describing various methods of user, data and program authentication
7. Discussing system vulnerabilities and the importance of patching operating systems and applications.
8. Using operating system hardening techniques
9. Using host-based intrusion detection techniques and tools

Learning Outcomes:
- Use quantitative analytical skills to evaluate and process numerical data
- Use computer and emerging technologies effectively