UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Reti e Sistemi Operativi (blended)

2223-2-E3101Q110

Aims

The student shall learn the basic architectural elements and technical components of a modern Operating System. The student will be able to understand simple software functions which can be part of an Operating System kernel. Moreover, the student will acquire knowledge about the fundamental architecture and protocols of TCP/IP telecommunication networks.

Contents

Architecture of an Operating System, Processes and Threads, Scheduling and Synchronization, Memory Management and Virtual Memory, I/O Systems, File System, Introduction to Internet and Telecommunication Networks, Transport Layer Protocols (TCP and UDP), Network Layer Protocol (IP), Hints about Data Link Layer (LAN, WLAN, Multiple Access Protocols), Hints about Other Relevant Systems and Protocols (DNS, ICMP, ARP).

Detailed program

Operating Systems

1: The architecture of an Operating System:

- Functions of an Operating System
- Structure of an Operating System
- System calls

2: Processes and Threads:

- Processes and their management
- Interprocess communication
- Threads and multithreading programming

3: Scheduling and Synchronization:

- CPU scheduling algorithms
- Synchronization primitives

4: Memory Management and Virtual Memory:

- Main memory management and paging
- Virtual memory

5: I/O Systems

- Organization of the I/O subsystem
- Device drivers

5: File System:

- The file concept and attributes
- File system structure and organization models
- Secondary storage organization

Networks

7: Introduction to Telecommunication Networks and Internet

- Network architecture
- Definition of the term “protocol”
- Packet switching
- Layered architecture and encapsulation
- IPv4 addressing

8: Transport Layer

- Offered functionalities
- UDP protocol
- TCP Protocol

9: Network Layer

- Offered functionalities
- IP protocol
- Hints at routing algorithms and protocols

10: Hints at Data Link Layer

- Offered functionalities
- Multiple access protocols
- Hints at Local Area Networks (Ethernet) and Wireless LAN (802.11)

11: Hints at Other Relevant Systems and Protocols

- Application Layer: DNS
- Network Layer: ICMP, ARP

Prerequisites

The fundamental concepts taught in the following courses: Computer Architecture, Programming 1 and Programming 2

Teaching form

Classroom lectures, e-learning exercises and self-assessments and on-line tutoring.

The course will be held in Italian.

Textbook and teaching resource

A. Silberschatz, P. Galvin, G. Gagne, "Sistemi Operativi - concetti ed esempi", 10th Edition, Pearson, ISBN: 978-88-9190-455-3 (also available in English, entitled "Operating Systems Concepts", 10th Edition)

J. Kurose, K. Ross, "Reti di Calcolatori e Internet", 8va Edizione, Pearson, ISBN: 978-88-9191-600-6 (also available in English, entitled “Computer Networking: A Top-Down Approach”, 8th Edition)

Slides of lessons, exercises and other material will be available on-line

Semester

Second year, first semester

Assessment method

The assessment consists in a written test, with the possibility of partial intermediate tests (*in itinere*).

There are two *in itinere* tests and are held in the middle and at the end of the course. It is necessary to pass both of them to pass the exam. In the event that one of the two *in itinere* tests has not been passed or has not been sustained, it is possible to recover it in the first exam session, provided that the other test has been positively passed. Passing only one of the two *in itinere* tests does not give rise to any bonus for the subsequent full examination tests.

The tests include both multiple choice questions and open-ended questions, requiring a reasoned argument on one of the course topics. Open-ended questions are only assessed if the student has correctly answered at least 50%

of the multiple choice questions.

Office hours

Prof. Braione: by appointment via email

Prof. Savi: by appointment via email

Sustainable Development Goals