

# Operating System Design (01KTKHT)

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# Organization

## Schedule

### Lessons and practice

- Mon 14,30-18,30 Room 14
- Tue 8,30-10,30 Room 6D
- Fri 10,30-12,30 Room 14 / LABINF

# Organization

Information, programs, tutorials, previous exam texts, labs assignments and solutions, can be found at the address:

[http://ulisse.polito.it/matdid/3ing\\_inf\\_N5030\\_TO\\_0](http://ulisse.polito.it/matdid/3ing_inf_N5030_TO_0)

Available at “Centro Stampa” student notes of the course  
Progetto di Sistemi Operativi - in Italian

# Program

- 1. Introduction**
- 2. Memory management**
  - **Swapping**
  - **Contiguous Memory Allocation**
  - **Paging**
  - **Structure of the Page Table**
  - **Segmentation**
  - **Example: The Intel Pentium**
- 3. Virtual memory**
  - **Demand Paging**
  - **Copy-on-Write**
  - **Page Replacement**
  - **Allocation of Frames**
  - **Thrashing**
  - **Memory-Mapped Files**
  - **Allocating Kernel Memory**
  - **Other Considerations**

# Program (cntd)

## **4. Job scheduling**

- **Deterministic models**
- **Little law**
- **Stochastic models**
- **FIFOScheduling**
- **Scheduling Round-Robin**
- **Unix scheduling**
- **Operational Analysis**
- **Bottleneck Analysis**

## **5. Device Management**

- **I/O Hardware**
- **Kernel I/O Subsystem**
- **Disk scheduling**
- **Unix I/O subsystem**

# Program (cntd)

## 6. File system

- **UNIX file system**
- *Normal file*
- *Directory*
- *Super block*
- *Block allocation*
- *Files system calls*
  - `open`
  - `read`
  - `write`
  - `lseek`
  - `close`
  - `creat`
  - `mknod`
  - `chdir`
  - `chroot`

# Program (cntd)

- **Files system calls**
  - `chown` and `chmod`
  - `stat` and `fstat`
  - `pipe`
  - `dup`
  - `mount`
  - `link`
  - `unlink`
- **File Locking**

# Program (cntd)

## 7. Protection

- **Goals of Protection**
- **Principles of Protection**
- **Domain of Protection**
- **Access Matrix**
- **Implementation of Access Matrix**
- **Access Control**
- **Revocation of Access Rights**
- **Capability-Based Systems**



# Program (cntd)

## 7. Synchronization in distributed systems

- **Event ordering**
- **Synchronization**
- **Mutual exclusion**
- **Remote Procedure Call**

# Practice Program

- **Linux kernel install**
- **PC booting**
- **Modules and daemons**
- **Device drivers**
- **Concurrent programming with processes and threads**

# Textbooks

- Silberschatz, Galvin, Gagne: “Operating System Concepts”, 7th Edition, John Wiley & son, 2003, ISBN: 0-471-69466-5

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Other useful textbooks:

- Maurice Bach: "The design of the UNIX Operating System", Prentice Hall
- Daniel Bovet and Marco Cesati: "Understanding the LINUX Kernel", O'REILLY, 2001
- W. R. Stevens: "Advanced programming in the UNIX Environment", Addison-Wesley Publishing Company