System and Device Programming (OS internals) a.y. 2021/2022



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Course structure

Part I (5 credits, Cabodi):

Operating System Design (Operating System internals)

Part II (5 credits, Quer):

system calls, C++ language, concurrent programming)

The two parts (independend each other) are done in parallel.

Operating Systems

Possible topics

- How to design/implement an OS
- How to do System Management
- How to interact with an OS
 - Script languages (e.g. bash)
 - API software (win32, Linux system calls)



Operating Systems

Part I (Cabodi)

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- How to design/implement an OS
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- How to interact with an OS
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 - API software (win32, Linux system calls)

Part II (Quer)

Syllabus (Operating System Internals)

- MEMORY MANAGEMENT
- FILE SYSTEM
- MASS STORAGE MANAGEMENT
- I/O SUBSYSTEM
- Examples from Unix/Linux
- OS161 teaching operating system (simplified, inspired to unix/linux)



Syllabus (lab)

OS161:

Introduction, compiling/making and debugging the kernel

Handling kernel threads

Memory management

User processes and system calls

File system

other...

Warning: C language !!!

OS/161

Teaching operating system:

http://os161.eecs.harvard.edu

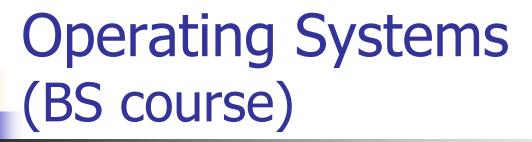
- Simple, editable source code, debuggable kernel
- Includes empty parts: TODOs to be completed/implemented by students!
- Why not LINUX ?
 - Too complex
 - Efficiency dominates on readability
 - Further complexity arises from multi-platform support

Prerequisites

- Operating Systems
- Computer Architectures
- C language



- Low uniformity (high diversification) in previous knowledge and skills
- The (mandatory) course is closer to some areas/tracks of the MS programme (e.g. Automation, Cybersecurity, Embedded Systems, Graphics, ...) than to other ones.
- Problems hidden «from theory to practice», «from saying to doing» (labs, projects)
- The «percieved» workload (hours/credit) could be highly related to personal/individual aspects, especially when related to missing/partial prerequisites.



Assumed as already done (partly revised by Prof. Quer)

- Architecture of an Operating System
- System Calls
- File System
- Processes and Threads
- Process and Thread Synchronization
- Process (CPU) scheduling

Text book (Op. Syst. Des.)

- Silbershatz A., Galvin. P. "Operating Systems", Addison-Wesley Publishing Company, 10th Ed.
- www.os-book.com (includes ppt slides used in lectures)
- Additional book (for extra reading): Tanenbaum, "Modern Operating Systems", Pearson

Course material

On personal student's page (portale):

- Teaching material
- Examination rules
- Syllabus.

Dynamically updated: additional material, infos, exercices and old exams, etc.

Material

Slides taken from www.os-book.com
Other slides and files
Text and solutions of labs

Instructor



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Use Slack for better interaction