

SOA

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Goals

- Get a good OS internal understanding
- Create new functionalities for the middleware
- Follow-up of the OS course
- Always applied to real operating systems

Contents

- Introduction
 - Memory management
 - Execution context
 - Device access
 - Process communication
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- Thorough the course, Security concepts and implementation will be explained

Course structure

- 10h/week of work
 - Lecture classes (2h)
 - Lab classes (2h)
 - At home (6h)
- Lectures and labs are synchronized
- Attendance is not mandatory but recommended

Grading

- Final Grade = $(CT + CTr) * (10/11)$
- Technical Competence (CT)
 - Continuous assessment (CTc)
 - Final evaluation (CTf)
 - Only for those students that fail the continuous assessment
 - Max (CTc, CTf)
- Generic Competences (CTr)
 - Maximum of 1 point
 - G3.1.- To understand and use effectively handbooks, products specifications and other technical information written in English.

Technical competence(CTc)

- 50% Theory (T)
 - 2 mid term exams (T1, T2)
 - 50% T1 + 50% T2
- 50% Laboratory (L)
 - Basic development (S)
 - Medium development (P)
 - Advanced development (E)
 - 10% S + 50% P + 40% E

Lectures

- 2 hours per week
- Theory contents
- All the course concepts will be explained
- Expository classes
- Interesting contributions are expected from students

Labs

- 2 hours per week
- Development of an up-to-date linux kernel
- 30 minutes of concept explanation at the beginning
- Meeting point for students to asks question to the professor
- Workgroups of 2 students. Mandatory!!!

AI and copies

- AI is explicitly forbidden during the course
- It is explicitly forbidden to copy code from any Internet source
- The professor will not answer questions about AI-generated code or code copied from Internet
- Any deliverable suspicious of been totally or partially generated by AI or copied from Internet will obtain a grade of 0 (zero)
- The professor can contact any student to schedule a face-to-face review meeting in case any of his/her deliverables are suspicious of been generated by AI or copied from Internet. The student must show in that meeting that the deliverable is totally original.

Previous knowledge

- SOA is a course about OS internals and the implemented support to middleware
- As a student it is expected that you adopt the role of an OS programmer
- An OS programmer not only knows the OS he/she is developing but:
 - How the underlying hardware works (specially the CPU)
 - How the compiler works
 - What kind of services must be provided to users

OS Programmer skills

- The following skills and knowledge are needed for the course:
 - C programming (not C++/C#)
 - X86 ASM programming
 - Compiler knowledge about code generation and optimizations
 - Hardware knowledge
 - Basic OS knowledge
- It is your responsibility to review and/or acquire this knowledge

C language

- The following concepts are needed:
 - C Syntax
 - Variable definitions
 - Data types
 - Type conversion (casting)
 - Control flow
 - Structs / Unions
 - Pointers
 - Functions
- Kernighan & Ritchie are your friends
- Many tutorials in internet. Go for them!

X86 Asm language

- The following concepts are needed:
 - ASM Syntax
 - CPU registers
 - Arithmetic instructions
 - Memory access instructions
 - Control flow instructions
 - Stack management instructions
- Many tutorials all over Internet. Go for them!

Compiler

- Using the compiler:
 - Compilation of .c and .S files
 - Compiler flags
 - Makefiles
- Compiler internals:
 - X86 Calling convention
 - Assembler code generation
 - Parameter passing
 - Frame pointers
 - Dynamic links
- Courses: IC, EC and AC

Hardware

- Processor internals:
 - Basic CPU architecture and components
 - Basic CPU pipeline
 - Segmentation
 - X86 CPU registers
 - Memory access
 - Address translation (TLB)
- Courses: IC, EC and AC

OS knowledge

- Review the OS course:
 - OS subsystems and services
 - OS architecture
 - Syscalls
 - Memory management
 - File system structures