

# Introduction to Operating Systems

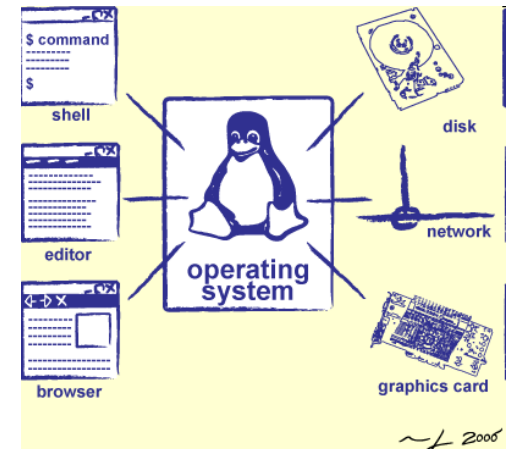
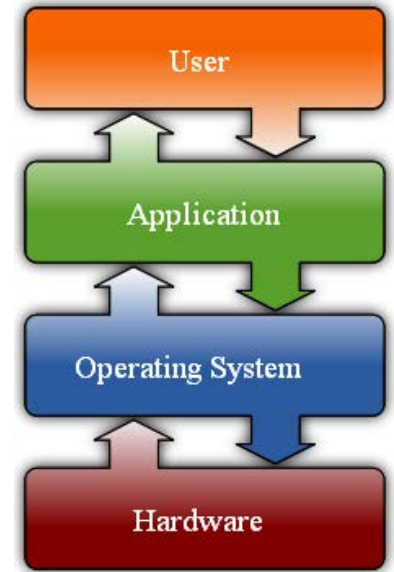
Bachelor's Degree in Computer Engineering

Second year

2016/17 course

# Objective

- The Operating System as an *interface between the computer and applications/users*
  - use it! (system programming)
- Unix model
  - files
  - processes



# Specific competences

- Identify different types of operating systems (time-sharing, real-time) and their fundamental concepts (files, access protection, processes, communication mechanisms)
- Identify the interfaces of an operating system
- Develop utilities for the Linux operating system using the system call interface

# Transversal competences

- Ability to find information and tools needed to solve the proposed problems
- Planning and organizational skills
  - both individual and teamwork
- Ability to accurately describe the functionality of the utilities developed
  - so that they can be used by other users or developers

# Topics

1. Introduction
2. System calls
3. File system and Input/Output
4. User management and security
5. Memory management
6. Process control
7. Inter-process communication and synchronization

# Laboratories

1. The *shell* as a user and administration interface
2. Routine specification in C for accessing system services
3. Input/Output and file management from the *shell*.  
Programmed Input/Output
4. Access rights management from the *shell* and by a program
5. Programming a basic *shell*
6. Process management. Multiprogrammed *shell*
7. Inter-process communication using *pipes*

# Bibliography

- C. Rodríguez, I. Alegria, J. González, A. Lafuente: *Descripción Funcional de los Sistemas Operativos*. Síntesis, 1994.
- M. Rochkind: *Advanced UNIX Programming*. Addison-Wesley, 2004
- F. Márquez: *UNIX. Programación Avanzada*. Rama, 2004
- A. Tanenbaum: *Modern Operating Systems*. Prentice-Hall, 2008
- W. Stallings. *Operating Systems: Internals and Design Principles*. Prentice-Hall, 2005
- A. Afzal: *Introducción a UNIX. Un enfoque práctico*. Prentice-Hall, 1997
- B. Kernighan, R. Pike: *The Unix Programming Environment*. Prentice-Hall, 1984

# Evaluation

- Final exam:

```
main() {  
    float grade;  
  
    May_24th_final_exam(&grade);  
    if (grade >= 5.0)  
        printf("I have to celebrate this!\n");  
    else  
        June_9th_final_exam(&grade);  
}
```

- Alternative: ***continuous assessment***



# Continuous assessment



- Based on three partial exams and deliverables:
  - **Feb 27th**: topics 1-2 (weight: 17,5%)
  - **April 3d**: topics 4-5 (weight: 17,5%)
  - **May 24th**: topics 6-7 (weight: 30%)
- Topic 3: Problem-Based Learning (weight: 35%)
- Attendance is mandatory:
  - Few exercises to deliver before and/or after each laboratory
  - Short test at the end of each laboratory/topic

# Session distribution

- 1. topic: 2 sessions
- 2. topic: 3 sessions
  - 1st partial exam (17,5%)
- 3. topic: 14 sessions (35%)
- 4. topic: 3 sessions
- 5. topic: 2 sessions
  - 2nd partial exam (17,5%, **accumulated 70%**)
- 6. topic: 6 sessions
- 7. topic: 4 sessions
  - 3rd partial exam (30%)

# Schedule (1.4 Laboratory)

	Monday	Tuesday	Wednesd.	Thursday	Friday
9:00 10:30	IOS	DB	OR	SE1	ICN
10:45 12:15	ICN	IOS	DB-1 IOS-2	OR	SE1-1 OR-2
12:30 14:00	SE1	ICN	IOS-1	DB	OR-1 SE1-2
15:00 17:30	ICN-1				
Crash time	IOS	SE1	ICN	OR	DB

# Detailed schedule 2016/17 - I

2016/2017 COURSE							INTRODUCTION TO OPERATING SYSTEMS						
January-February							Hours						
Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Lab.	Self	Total	Week		
1	23	24	25 Presentation	26	27	28	29	1,5	1,5	3,0	1		
2	30 T1	31 T1	1 T2	2	3	4	5	4,5	3,5	8,0	2		
3	6 T2	7 T2	8 T3 PBL	9	10	11	12	4,5	3,5	8,0	3		
4	13 T3 PBL	14 T3 PBL	15 T3 PBL	16	17	18	19	4,5	3,5	8,0	4		
5	20 T3 PBL	21 T3 PBL	22	23	24	25	26	3,0	5,0	8,0	5		
March													
6	27 T3 PBL 1st exam	28	1 T3 PBL	2	3	4	5	Eval. 17,50%	6,0	2,0	8,0	6	
7	6 T3 PBL	7 T3 PBL	8 T3 PBL	9	10	11	12	17,50%	4,5	3,5	8,0	7	
8	13 T3 PBL	14 T3 PBL	15 T3 PBL	16	17	18	19	Eval. 35,00%	4,5	3,5	8,0	8	
9	20 T4	21 T4	22 T4	23	24	25	26	52,50%	4,5	3,5	8,0	9	
10	27 T5	28 T5	29 T6	30	31	1	2		4,5	3,5	8,0	10	



# Practical information

- Lecturer: Mikel Larrea
  - Office: 223 (Computer Science Faculty, 2nd floor)
  - Email: [mikel.larrea@ehu.eus](mailto:mikel.larrea@ehu.eus)
- Office hours (also by appointment):
  - Monday: 14:30 – 16:30
  - Tuesday: 14:30 – 16:30
  - Wednesday: 14:30 – 16:30
- Web page (also in *eGela*):  
<http://www.sc.ehu.es/acwlaalm/ios.html>

# Your turn...



- Homework:

- What is an operating system?

- Recommended reading:

- [http://en.wikipedia.org/wiki/Operating\\_system](http://en.wikipedia.org/wiki/Operating_system)

# Printing without operating system

