OPERATING SYSTEMS: SESSION1

JANUARY 2023

TecnoCampus Escuela Superior Politécnica

Centro adscrito a la upf. Universitat Pompeu Fabra Barcelona

TecnoCampus 10 años

- Why do we need an Operating System to?
  - **Manage** disk and others
  - Have an **interface** (GUI)… manage user input/output
  - **Simplify** users' tasks
  - Use protocols (L7) DHCP
  - Manage **programs**

- What is an Operating System?
  - **SW** that communicates the HW with SW

INTRODUCTION: WHAT IS AN OS?

- An **Operating System (OS)** is a software that acts as an interface between computer hardware components and the user.
- Every computer system must have at least one operating system to run other programs: Applications need some environment to run and perform its tasks.
- The OS helps you to communicate with the computer without knowing how to speak the computer's language. It is not EASY for the user to use any computer or mobile device without having an operating system.

INTRODUCTION

- OS FEATURES?

OS FEATURES: PROCESS MANAGEMENT

- Create/delete processes
- Manage processes:
  - Synchronization mechanisms among processes
  - Communication mechanisms among processes

- What is a process?
  - A running program

- What is a program?
  - A list of instructions:::: something to be done

INTRODUCTION: PROCESS SCHEDULING/DISPATCHING/SWITCHING

- SCHEDULING
  - Select the next process to be executed on a multiprocess environment

- DISPATCHING
  - Prepare the next process to be executed (make the process ready for execution)

OS FEATURES: HARDWARE/DEVICE MANAGEMENT

- Keep track of all devices
- Could be known as I/O Controller
- Devices setting

OS FEATURES: MEMORY MANAGEMENT

- Memory **allocation** and deallocation to programs in need of this memory resources
- Memory **mapping**: pagination…

- Why do we need to allocate/deallocate memory?
- Which is the memory allocated bind to?
  - A process/program

- What is a program?

OS FEATURES: PROCESS MANAGEMENT: WHAT IS A PROCESS/PROGRAM?

- A **process** is the instance of a computer **program** that is **being executed** by one or many **threads**.
- It contains the **program code** and its **activity**.
- Depending on the **operating system** (OS), a **process** may be made up of multiple threads of execution that execute instructions concurrently.

OS FEATURES: PERFORMANCE MANAGEMENT

- How do we guarantee the best available performance of the system

- How do we assign resources?
- Do we assign resources to what/who?

- How do we keep track of time and resources used/available?

OS FEATURES: USER INTERFACE

- Which is the way to send commands to the system?

- Through a COMMAND INTERPRETATION module?
  - GUI
  - CLI
  - SHELL
  - POWERSHELL …

- Which is the role of a command interpreter?

OS FEATURES: ERROR HANDLING/FAULT TOLERANCE

- To handle and rectify the errors … the sooner the better
- To inform ALWAYS if an action has been done correctly or not (if not, inform about the code/cause/reason)
  - Developer must take care of that information provided by the OS
  - When using a system call: ALWAYS CHECK ERRORS before proceeding

OS FEATURES: FILES MANAGEMENT

- Manage all the file-related activities on the system:
  - Storage organization… **FORMAT**
  - File retrieval
  - File naming
  - File sharing
  - File protection
  - …

  - What is a file?
    - JUST INFORMATION, store somewhere in a non-volatile way
    - Not just only the content: information … EVERYTHING… NAME, PERMISSIONS, LOCATION, …. METADATA INFORMATION

OS FEATURES: I/O SYSTEM MANAGEMENT

- To act as a gateway, intermediary, broker in between the devices and the user
- To hide devices peculiarities to the user

- What is a user?
- All the users have to do the same tasks with devices? And so have the same requirements from the I/O System Management?

OS FEATURES: STORAGE MANAGEMENT

- Which storage do I have on a system?
  - Primary Storage?
  - Cache Storage?
  - Secondary Storage?

- Which is the purpose of each level?

- What should I write at each level

OS FEATURES: USER MANAGEMENT

- Is there more than one user on the system?
- What is a user?
- All the users have the same requirements?
- All the users have the same policies to be configured?
- Should we account user activity?

OS FEATURES: SECURITY MANAGEMENT

- To protect data and information of the computer system

- Which kind of protection should the OS provide?
- To whom/what the protection must be provided?
- Against what/who the protection must be provided?

- The OS acts as SUPERVISOR MODE

OS FEATURES: NETWORKING/COMMUNICATION MANAGEMENT

- The system is almost never an isolated environment
- Do we need to get resources outside the computer/system?
- Do the system must work together (collaboratively) with any other system?

OS FEATURES: OS FUNCTIONS