CS 340
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Lecture #4

Ch 3 - Operating System Structure
Read: Web lecture and in-class lecture notes
Textbook
Topics:
Operating System Components
Command Interpreter System Program
CI - Singletasking system (MS-DOS), TSR
CI - Multitasking system (UNIX)

Operating System Components

The Operating system is partitioned into system components with very specific tasks.

Process Management
Main-Memory Management
File Management
I/O System Management
Secondary-Storage Management
Networking
Protection System
Command-Interpreter System

Command-Interpreter System/Program

The command interpreter is the **interface between the user and the operating system**.
can be either:
- included in the kernel
- a special program that runs when a job is initiated.

Commands can come: - from files
- directly from a terminal

Command implementation:
1. The command interpreter contains the code to execute the command.
2. Commands are implemented by special programs.

CI - Single tasking system (MS-DOS)

- the command interpreter is invoked when the computer is started.
- MS-DOS loads the program to be run into main memory, overwriting part of the command interpreter.
- PC is set to the first instruction of the loaded program.
- the program runs and either an error causes a trap or the program executes a system call to terminate.
- the command interpreter resumes execution.
- the residual piece of the command interpreter reloads the rest of the command interpreter from the disk.

Fig MSDOS - at boot time **MSDOS - running a program**

MSDOS can provide a method for limited concurrent execution.

Terminate and Stay Resident call

CI - Multitasking system - (Berkeley) UNIX

Fig. 3.4 Unix running multiple programs

The Command Interpreter in Unix is a process that runs in user mode.
In UNIX each line of the shell is parsed to obtain strings that contain the name of the command and the parameters.
The shell of the user's choice (command interpreter) is run when a user logs onto the system.
The shell either waits for the process to finish, or runs the process in the 'background'.
The user is free to ask the shell to run other programs.

System Structure

Simple Structure:

The system structure is limited by the hardware. In the beginning MS-DOS and UNIX had a **simple structure.**
The interfaces and levels of functionality were not well separated.

MS-DOS

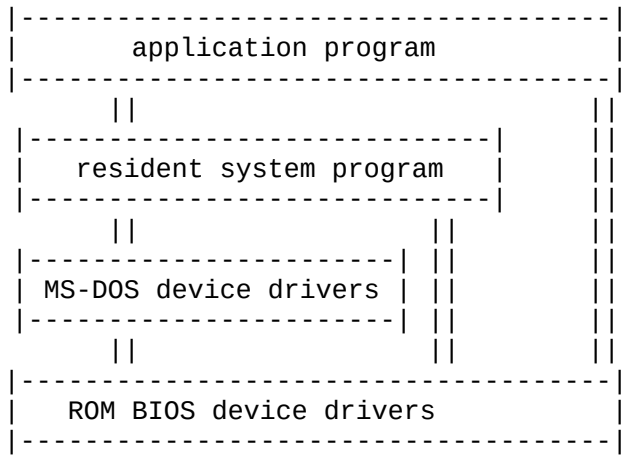

Fig. MS-DOS simple structure

MS-DOS - application programs are able to access the basic I/O routines.
This makes MS-DOS vulnerable to errant programs.

Unix

The original UNIX was limited to two separable parts: the kernel and the system programs. The main idea was that the kernel represented a whole indivisible part with a huge responsibility.

(the users)		
shells and commands compilers and interpreters system libraries		
system-call interface to the kernel		
signals terminal handling character I/O system terminal drivers	file system swapping block I/O system disk and tape drivers	CPU scheduling page replacement demand paging virtual memory
kernel interface to the hardware		
Terminal controllers terminal	device controllers disks and tapes	memory controllers physical memory

Fig. Unix Simple Structure