Operating Systems

Beamer version 0.2

Fabricio Bortoluzzi[1]

[1]Computer Networks Laboratory
in collaboration with
Laboratory of Embedded and Distributed Systems

www.univali.br
leds.acad.univali.br

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Hardware review

- A modern computer consists of one or more processors, some main memory, disks, printers, a keyboard, a mouse, a display, network interfaces, and various other input/output devices.
- All in all, a complex system.
- If every application programmer had to understand how all these things work in detail, no code would ever get written.

Wider definition of an Operating Systems

The operating system (OS) is a layer inserted between the hardware/software interface in order to provide a

- better
- simpler
- cleaner

model of the computer.

Hardware support

Hardware must give proper support for protection. Minimal requirements are

- Processor Modes: Kernel and User
- MMU: Memory Management Unit
- I/O handling via interrupts

Hardware support: Processor Modes

Processor Modes

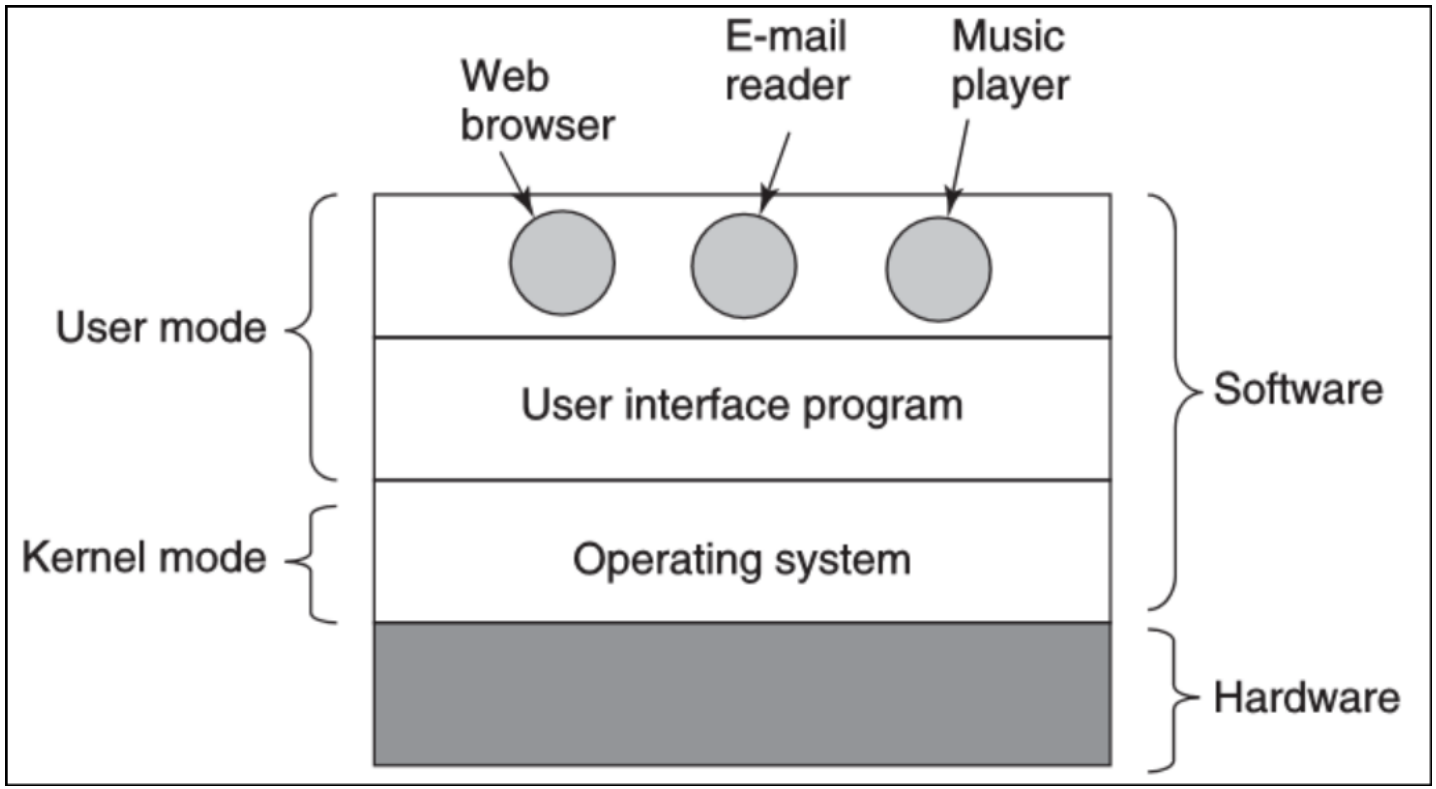

Figure: The problem!

Continuing to processor mode

Hardware support: MMU

MMU: Memory Management Unit

Hardware support: I/O Interrupts

I/O Interrupts

The shell is not the OS

Users interact with the shell, either via

- a Text Console; and/or
- the GUI - Graphical User Interface.

Quiz

- 1. What are the two main functions of an operating system?
- 3. What is the difference between timesharing and multiprogramming systems?
- 5. On early computers, e very byte of data read or written w as handled by the CPU (i.e., there was no DMA). What implications does this have for multiprogramming?

Quiz

- 6. Instructions related to accessing I/O de vices are typically pri vileged instructions, that is, they can be executed in kernel mode but not in user mode. Give a reason why these instructions are privileged.
- 10. What is the difference between kernel and user mode? Explain how having two distinct modes aids in designing an operating system.
- 12. Which of the following instructions should be allowed only in kernel mode? (a) Disable all interrupts. (b) Read the time-of-day clock. (c) Set the time-of-day clock. (d) Change the memory map.

Quiz

- 17. What is a trap instruction? Explain its use in operating systems.
- 25. What is the essential dif ference between a block special f ile and a character special file?
- 27. Modern operating systems decouple a process address space from the machine's physi- cal memory. List two advantages of this design.

Quiz

- 29. Figure 1-23 sho ws that a number of UNIX system calls ha ve no Win32 API equi v- alents. For each of the calls listed as ha ving no Win32 equivalent, what are the conse- quences for a programmer of converting a UNIX program to run under Windows?
- 30. A portable operating system is one that can be ported from one system architecture to another without any modification. Explain why it is infeasible to build an operating system that is completely portable. Describe two high-level layers that you will have in designing an operating system that is highly portable.

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First Frame of Memory Management

Text of the first frame of memory management.

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First Frame of File Systems

Text of the first frame of file systems.

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First Frame of I/O

Text of the first frame of I/O.

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Deadlocks

Text of the first frame of Deadlocks.