2019年3月20日 星期三

# CS Chapter 6.1.5-6.1.9

## 6.1.5

## Explain the role of the operating system in terms of managing memory, peripherals and hardware interfaces.

**FOR EXAMPLE, ALLOCATING STORAGE AND KEEPING TRACK OF PROGRAMS IN MEMORY, SWAPPING BETWEEN PROGRAMS ON TIME-SLICING, PRIORITY OR WHEN ONE IS WAITING FOR INPUT.**

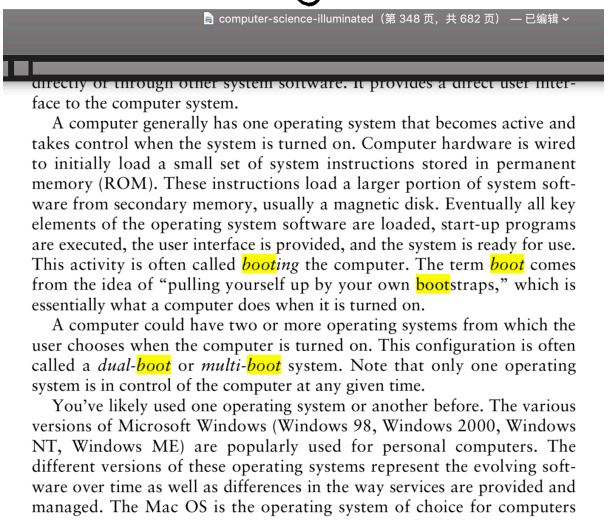
**Application software**
Programs that help us solve real-world problems

**System software**
Programs that manage a computer system and interact with hardware

**Operating system**
System software that manages computer resources and provides an interface for system interaction

- Through use of drivers can use and control the peripheral devices
- Managing primary memory: The OS has to ensure that each process runs in its own allocated memory rate.
- Virtual memory is a feature of an operating system (OS) that allows a computer to compensate for shortages of physical memory by temporarily transferring pages of data from random access memory (RAM) to disk storage.
- Managing secondary storage: The OS manages the secondary storage by providing structure and access methods to these structures (folder-structure/directory structure)
- Provides an interface: User interface is used to interact with the computer to performs various tasks. User gives commands to computer and enters the data into computer. The operating system then translates the input/output and sends it to the correct memory address/folder address to be processed.
- Time-slicing: With a single-user system, a time-slice is the set amount of processing time each program gets.
- An interrupt handler is a function in of the OS or a device driver, whose execution is triggered by the reception of an interrupt.

Boot system



6.1.7

## Outline OS resource management techniques: scheduling, policies, multitasking, virtual memory, paging, interrupt, polling.

Technical details as to how these are carried out will not be required, but it is expected that students will be familiar with these techniques and understand when and why they are used.

- ***Scheduling*** is the method by which work is assigned to resources that complete the work.

The work could be processes which are in turn scheduled onto hardware resources such as processors, network links or expansion cards.

Maximize the use of the whole of the computer system

Be fair to all programs

Provide a reasonable response time

Ensure that the system is consistent by giving similar response times to similar activities

-JOB status

All currently jobs are in one of the following status

-ready-the job is waiting or us e of the processor

-running-the job is currently using the processor

-blocked-the job is unable to use the processor art present

Shorted job first

Round robin

Shortest remaining time

- The ***policies*** what is to be done while the ***mechanism*** specifies how it is to be done.

provide flexibility

For instance, the timer construct (limiting the time a process can use the CPU for) thereby ensuring CPU protection is **mechanism**.

On the other hand, the decision of how long the timer is set for a particular user is a **policy decision**.

- ***Multitasking***, in an operating system, is allowing a user to perform more than one computer task (such as the operation of an application program) at a time.

**When** you open your Web browser and then open Word at the same time, you are causing the operating system to do multitasking.

Why:The operating system is able to keep track of where you are in these tasks and go from one to the other without losing information.

- ***Virtual memory*** is a feature of an operating system (OS) that allows a computer to compensate for shortages of physical memory by temporarily transferring pages of data from random access memory (RAM) to disk storage.

**Why**: Eventually, the OS will need to retrieve the data that was moved to temporarily to disk storage

- ***Paging or swapping*** is the process of The operating system will need to move other pages to hard disk so it has room to bring back the pages it needs right away from temporary disk storage.

- An ***interrupt*** is a signal to the processor emitted by hardware or software indicating an event that needs immediate attention.

(hardware - , software -)

An interrupt alerts the OS to a high-priority condition requiring the interruption of the current code the processor is executing.

Interrupt service routine(ISR)

- The content of all the registers in the processor are save so that the OS can later restore them to carry on with the execution of the interrupted program.

Simplest solution: place the interrupts in a queue and only allow return to the originally interrupted program the the queue is empty

Priority queue: the position is determined by the importance.

用stack储存后interrupt之后再储存回来

i.e

I/O

Timer

Hardware

Program

Priority

The OS responds by suspending its current activities, saving its state, and executing a function called an ***interrupt handler*** to deal with the event.

Memory management

Jobs loaded into the main memory

To use the processor, the job must be loaded into the computer's main memory

When several job loaded. The programs and their data must be processed form these jobs in the computing.

- ***Polling*** is the process where the computer or controlling device waits for an external device to check for its readiness or state, often with low-level hardware.

# Single Contiguous Memory Manag

**Multiprogramming** The technique of keeping multiple programs in main memory at the same time, competing for the CPU

**Memory management** The act of keeping track of how and where programs are loaded in main memory

**Process** The dynamic representation of a program during execution

**Process management** The act of keeping track of information for active processes

**CPU scheduling** The act of determining which process in memory is given access to the CPU so that it may execute

representation of a program during execution

***split***

***Page:***

***the***

6.1.8

Discuss the advantages of producing a dedicated operating system for a device.

**Advantages related to size, speed and customization should be considered.**

**For example, using a dedicated operating system for a cell phone rather than using a pre-existing operating system.**

**-Security: A dedicated operating system ensures a higher level of security.**

**-Example: Banks would require a dedicated operating system to prevent cyber attacks on financial transactions**

**-Customizability: Dedicated operating systems custom made to do a specific function at maximum efficiency.**

**-Example: A 'dumb phone' OS**

- **Modify priorities: can make running some devices easier to use or better suited to their audience. By having a custom OS you can eliminate certain aspects of the OS which are not needed, reducing the size of the OS, therefore reducing the amount of secondary memory and RAM being used**
  - **Example: Raspbian Linux on Raspberry Pi**

6.1.9

Outline how an operating system hides the complexity of the hardware from users and applications.

**Students should be aware of a range of examples where operating systems virtualize real devices, such as drive letters, virtual memory, input devices, the Java virtual machine.**

Abstraction leads to simplicity: