Topic 6

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

- Through the use of drivers, 'translation' programs, the other programs (and ultimately the user) can use and control peripheral devices (like a keyboard, mouse, printer, etc.)
- Manage primary, virtual, and secondary memeory
  - Primary
    - ensure that each process (program) runs in its own allocated memory space.
  - Virtual memory
    - allows a computer to compensate for shortages of physical memory by temporarily transferring pages of data from random access memory (RAM) to disk storage.
    - scheduler and dispatcher
  - Secondary
    - manages the secondary storage by providing structure and access methods to these structures
- Provides an interface
  - User interface is used to interact with the computer to performs various tasks.
    - Graphical User Interface Operating System (Windows)
    - Command Line Operating System (Linux Terminal)
- Interrupt handling
  - handle high-priority conditions that require the interruption of the current code the processor is executing.

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

Scheduling

assigned to (hardware) resources that complete the work.

Policies

Ensure what is to be done while the mechanism specifies how it is to be done.

Multitasking

allowing a user to perform more than one computer task at a time

Virtual memory

compensate for shortages of physical memory by temporarily transferring pages of data from random access memory (RAM) to disk storage.

Paging/Swapping

move other pages to hard disk so it has room to bring back the pages it needs right away from temporary disk storage.

Interrupt

- An interrupt is a signal to the processor emitted by hardware or software indicating an event that needs immediate attention.
- OS responds by suspending its current activities, saving its state, and executing a function called an interrupt handler to deal with the interrupt

CPU receives interrupt
Interrupt stores program counter
Interrupt invokes handler
Handler saves rest of state of the CUP for the process
Handler does its business
Handler invokes the scheduler
Scheduler selects a process to run
Scheduler restores state of the CPU for that process
Scheduler jumps execution to that process

Polling

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.

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

Security:

A dedicated operating system ensures a higher level of security.

Customisability:

do a specific function at maximum efficiency.

Modify priorities:

can make running some devices easier to use or better suited to their audience

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

Abstraction leads to simplicity

hide certain hardware details from users and applications

make related devices appear the same from the user's point of view

e,g,

Drive letters

Java Virtual Machine