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Operating systems

1.**Scenario analysis**

Memory management is a key function of an operating system that ensures programs run efficiently without interfering with each other. For example, when a user opens a wen browser, music player, and word processor at the same time, the operating system must decide how much RAM each receives. The OS uses techniques such as paging and virtual memory to manage limited physical memory. If RAM becomes full, less-used data is moved to secondary storage (disk) to free space. This prevents system crashes and allows multitasking. Memory protection is also important because it stops one program from accessing another program's memory, improving security and stability. Without proper memory management, systems would slow down, freeze, or crash frequently. Therefore, memory management helps improve performance, enables multitasking, and ensure that applications run smoothly on a computer.

2.**Concept research**

Virtual memory is an operating system concept that allows a computer to use hard disk space as an extension of RAM. When physical memory is full, the OS moves inactive data from the RAM to the disk storage in a process called paging. This allows larger programs to run even if the system has limited RAM. Virtual memory improves multitasking and system stability but is slower. The OS manages this process automatically, ensuring programs continue running without user interruption.

3.**Tool practice**

Process monitoring allows users to view and manage running programs an operating system. In VirtualBox, this can be simulated by running a virtual machine with Linux or Windows and opening tools like task manager or system monitor. These tools display active processes, CPU usage, memory usage, and active background tasks. Process monitoring helps identify programs that consume too many resources or cause system slowdowns. It also allows users to stop unresponsive processes. This is important for maintaining system performance and understanding how the OS manages tasks.

4.**OS diagrams**

This diagram shows the life cycle of a process in an operating system. A process starts in the New state when it is created. It moves to Ready when it is waiting for CPU time. When the CPU is assigned, it enters the Running state. If the process needs I/O, it goes to waiting. Once the task is complete, it returns to Ready or ends in the Terminated state. This cycle allows efficient multitasking.