

1. What is the difference between kernel mode and user mode? Why is the difference important to an operating system?

简答题 (10 分) 6分

硬件通过一个模式位来表示当前模式：内核模式（0），用户模式（1）。模式可以用来区分操作系统执行的任务和为用户执行的任务。在执行用户应用时为用户模式，在发生陷阱和中断时（包括被视为软件中断的系统调用），会切换到内核模式。只有在内核模式下才能执行特权指令，切换到用户模式的指令也是特权的。双重模式提供了一种保护机制，防止操作系统和其他用户程序收到错误用户程序的影响，区别特权和非特权指令可以防止用户执行非法操作，在内核模式下执行系统调用可以检查用户请求是否合法。

答案解析:

In Kernel mode, the executing code has complete and unrestricted access to the underlying hardware. It can execute any CPU instruction and reference any memory address.

In User mode, the executing code has no ability to directly access hardware or reference memory. Code running in user mode must delegate to system APIs to access hardware or memory.

The difference rather protect the computer system resources, while preventing from errant users.

2. Name three ways in which the processor can transition from user mode to kernel mode?

简答题 (10 分) 10分

系统调用，执行非法指令，程序出错（e.g. 除0，无效内存访问）

答案解析:

1) The user process can execute a trap instruction (e.g. system call). A trap is known as a synchronous software interrupt.

2) The user process can cause an exception (divide by zero, access bad address, bad instruction, page fault, etc).

3) The processor can transition into kernel mode when receiving an interrupt.

3. Which of the following instructions should be privileged (in kernel mode)? 回答错误

多选题 (10 分) 0分

- A. Set value of timer
- B. Read the clock.
- C. Clear memory.
- D. Issue a trap instruction.
- E. Turn off interrupts.
- F. Modify entries in device-status table.
- G. Switch from user to kernel mode.

H. Access I/O device.

正确答案: A C E F H

4. 为了在通用操作系统管理下的计算机上运行一个程序, 需要经历几个步骤。但是,___不一定需要。

单选题 (5 分) 5分

- A. 向操作系统预定运行时间
- B. 将程序装入内存
- C. 确定起始地址, 并从这个地址开始执行
- D. 用控制台监控程序执行过程

正确答案: A

5. 我们知道, 有些CPU指令只能授权给操作系统内核运行,不允许普通用户程序使用。但是在以下操作中,_____可以不必具有此种特权。

单选题 (5 分) 5分

- A. 设置定时器的初值
- B. 触发trap(系统调用)指令
- C. 内存单元复位
- D. 关闭中断允许

正确答案: B

6. 一个多道批处理系统中仅有P1和P2两个作业, P2比P1晚5ms到达, 它们的计算和I/O操作顺序如下:

P1: 计算60ms, I/O80ms, 计算20ms

P2: 计算120ms, I/O40ms, 计算40ms

若不考虑调度和切换时间, 则完成两个作业需要的时间最少是()

单选题 (5 分) 5分

- A. 240ms
- B. 260ms
- C. 340ms
- D. 360ms

正确答案: B

7. Which is not the service that the operating system should provide?

单选题 (5 分) 5分

- A. I/O operation

- B. Game engine
- C. Inter-ProcessCommunication
- D. File-systemmanipulation

正确答案: B

8. Thefirst program that a computer runs when it is powered on or rebooted is a ____ ?

单选题 (5 分) 5分

- A. applicationprogram
- B. monitorprogram
- C. kernel
- D. bootstrap program

正确答案: D

9. A system call is ____ ?

单选题 (5 分) 5分

- A. auser written sub-program
- B. alibrary program in advanced language
- C. acommand in operating system
- D. an interface provided by OS for user program

正确答案: D

10. Aprogram can be executed as a process only after it is loaded into ____?

单选题 (5 分) 5分

- A. harddisk
- B. main memory
- C. floppydisk
- D. cache

正确答案: B

11. Whichof the following functionalities in an operating system does not need specialhardware support?

单选题 (5 分) 5分

- A. process scheduling
- B. clockmanagement

C. address mapping

D. interrupt system

正确答案: A

12. The main disadvantage of the batch system is ____ ? 回答错误

单选题 (5 分) 0分

A. low CPU utilization

B. lack of concurrency

C. lack of interaction

D. none of the above

正确答案: C

13. ____ is not an advantage that the microkernel structure has compared with the monolithic structure?

单选题 (5 分) 5分

A. to make the system more efficient

B. no need to modify the kernel in order to add new services

C. to make the system more secure

D. to make the system more reliable

正确答案: A

14. Which of the following activities is not what an operating system concerns?

单选题 (5 分) 5分

A. To manage the computer hardware

B. To provide an interface between the user and the system

C. To manage system resources

D. To provide user application software

正确答案: D