* [**操作系统 第一次作业**](https://bb.xjtu.edu.cn/webapps/assignment/uploadAssignment?content_id=_243535_1&course_id=_13345_1&group_id=&mode=cpview)

**1**  What is the main advantage of multiprogramming?  
Multiprogramming operating system allows to execute multiple processes by monitoring their process states and switching in between processes. It executes multiple programs to avoid CPU and memory underutilization. It is also called as Multiprogram Task System. It is faster in processing than Batch Processing system.

**2**  Define the essential properties of the following types of operating systems:

     a. Batch           b. Time sharing

     c. Real time     d. Network

     e. Distributed

1. To speed up processing, jobs with similar needs are batched together and run as a group by an operator or automatic job sequencer.
2. A time sharing system allows many users to share the computer resources simultaneously. In other words, time sharing refers to the allocation of computer resources in time slots to several programs simultaneously.
3. A real-time operating system (RTOS) is an operating system that guarantees a certain capability within a specified time constraint.
4. Network operating systems typically are used to run computers that act as servers. They provide the capabilities required for network operation. Network operating systems are also designed for client computers and provide functions so the distinction between network operating systems and stand alone operating systems is not always obvious..
5. A distributed operating system is system software over a collection of independent, networked, communicating, and physically separate computational nodes. They handle jobs which are serviced by multiple CPUs.

3  下面哪些指令是特权指令？

   A．设置定时器的值   B. 读时钟

   C. 清除内存        D 关闭中断

   E．从用户模式切换到监督模式

ACDE

**4**What is the purpose of system calls?

System call provides the services of the operating system to the user programs via API. It provides an interface between a process and operating system to allow user-level processes to request services of the operating system. System calls are the only entry points into the kernel system.

**5**  What is the main advantage of the layered approach to system design?

This approach breaks up the operating system into different layers.

This allows implementers to change the inner workings, and increases modularity.

As long as the external interface of the routines don’t change, developers have more freedom to change the inner workings of the routines.

With the layered approach, the bottom layer is the hardware, while the highest layer is the user interface.

**6**  What is the main advantage of the microkernel approach to system design?

Service does not require modifying the kernel

It is more secure as more operations are done in user mode than in kernel mode,

A simpler kernel design and functionality typically results in a more reliable operating system.

**7**  Describe the differences among short-term, medium-term, and long-term scheduling.

Long-term scheduler is also called job scheduler. Short-term scheduler is also called CPU scheduler. Medium-term scheduling is part of the swapping.  
The speed of Long Term Scheduler is slow, the speed of Short Term Scheduler is fast, and the Medium term scheduling is between oth.

**8**  Describe the actions taken by a kernel to context-switch between processes.

In response to a clock interrupt, the OS saves the PC and user stack pointer of the currently executing process, and transfers control to the kernel clock interrupt handler.

The clock interrupt handler saves the rest of the registers, as well as other machine state, such as the state of the floating-point registers, in the process PCB.

The OS invokes the scheduler to determine the next process to execute.

The OS then retrieves the state of the next process from its PCB, and restores the registers. This restore operation takes the processor back to the state in which this process was previously interrupted, executing in user code with user mode privileges.