## 操作系统

## 第一次作业

**Introduction**

**1**  What is the main advantage of multiprogramming?

The main advantage of multiprogramming is high resource utilization and high throughput, as multiple jobs share resources such as CPU, memory and peripherals. Multiprogramming increases CPU utilization by organizing jobs such that the CPU always has one to execute.

多道程序设计的优点是资源利用率高、系统吞吐量大。多道程序设计通过组织作业使得CPU总在执行其中一个作业，从而提高了CPU的利用率。

**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. 批处理（batch）系统：将脱机输入的作业分类，每批作业由专门监督程序自动处理，缺点是无交互能力、用户响应时间长；
2. 分时（time-sharing）系统：多个用户分享使用同一台计算机、多个程序分时共享硬件和软件资源（前台和后台程序分时），其人机交互性好、及时性强；
3. 实时（real time）系统：具有严格确定的时间限制，对外部事件能够迅速响应，具有高可靠性、高安全性和高冗余；
4. 网络（network）系统：在通常操作系统功能的基础上提供网络通信和网络服务功能；
5. 分布式（distributed）系统：计算分布在若干物理处理器上，每个处理器有自身的本地存储器，它们之间通过高速总线等进行通信。操作系统将一个大任务划分成若干个并行执行的子任务，动态分配给各个计算机执行，并管理资源分配、运行、通信等；

**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

ACD

特权指令只能在管态（监督模式）下执行。

**OS structures**

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

System calls provide the interface between a running program and the operating system.

系统调用提供在运行程序和操作系统之间的接口。

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

The main advantages of the layered approach to system design are that the lower and higher layer can be implemented separately, errors in the higher layer will not affect the lower one, and layers uses functions and services of only lower layers. This helps ensure the correctness of design and implementation, and makes it easy to debug and modify functions.

层次化系统设计的优点是低层和高层可分别实现、高层错误不会影响到低层、调用关系清晰（高层对低层单向依赖）。这有利于保证设计和实现的正确性，且便于调试和功能的修改。

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

The advantages of microkernel are that it is easy to expand and transplant, improves the reliability of the system, provides a variety of operating environments and facilitates distributed computing.

微内核的优点是易于扩充，易于移植、提高系统的可靠性、提供多种操作环境和便于实现分布计算。