# Assignment1

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

System calls provide a programming interface to the services provided by the operating services. Users interact with the services provided by the operating system through system calls. They allow the user programs to ask OS to do some stuff on behalf of the user program.

**2. What is the purpose of the command interpreter? Why is it usually separate from the kernel?**

The main function of the command interpreter is to get and execute the next user - specified command. It can manipulate user files. Command interpreter understands and executes commands which it turns into system calls.

The command interpreter is usually separate from the kernel because its purpose differs from that of the kernel. The kernel's job is to allow multiple programs, multiple users in multi-user systems to access the hardware as if each program had its own computer. And also because the kernel and command interpreter is separated, it allows different command interpreters to be run without kernel modification.

**3. What is the purpose of system programs?**

System programs, also known as system utilities, provide a convenient environment for program development and execution. Some of them are simply user interfaces to system calls. Others are considerably more complex.

**4. What is the main advantage of layered approach to system design? What are the disadvantages of the layered approach?**

**Advantages**: The system is easier to debug and modify because changes affect only limited sections of the system rather than touching all sections of the operating system. Information is kept only where it is needed and is accessible only within a defined and restricted area, so any bugs affecting that data must be limited to a specific module or layer.

**Disadvantages**: The main difficulty is defining the various layers

It is difficult to exactly assign of functionalities to the correct and appropriate layer. Because of having too many layers, performance of the system is degraded

**5. Why do some systems store the operating system in firmware, while others store it on disk?**

For certain devices, such as handheld PDAs and cellular telephones, a disk with a file system may not be available for the device. In this situation, the operating system must be stored in firmware.

**6. The services and functions provided by an operating system can be divided into two main categories. Briefly describe the two categories, and discuss how they differ.**

One class of services provided by an operating system is to enforce protection between different processes running concurrently in the system. Processes are allowed to access only those memory locations that are associated with their address spaces. Also, processes are not allowed to corrupt files associated with other users. A process is also not allowed to access devices directly without operating system intervention.

The second class of services provided by an operating system is to provide new functionality that is not supported directly by the underlying hardware. Virtual memory and file systems are two such examples of new services provided by an operating system.

**7. Describe three general methods for passing parameters to the operating system.**

- Simplest one is passing the parameters in registers
  In some cases, there may be more parameters than registers
- Parameters stored in a block , or table, in memory, and address block passed as a parameter in a register – This approach is used by Linux and Solaris
  Do not limit the number or length of parameters being used
- Parameters placed or pushed on to the stack by the program and popped off the stack by operating systems
  Do not limit the number or length of parameters being used

**8. What are the advantages and disadvantages of using the same system call interface for manipulating both files and devices?**

Disadvantages

- Difficult to capture functionality of certain devices, which can result in loss of functionality or loss of performance

Advantages

- When connecting any devices, they are recognized as a file in the file system and kernel works with devices through file interface, so it is easy to add new devices and implement them on system.

**9. What are the two models of inter process communication? What are the strengths and weaknesses of the two approaches?**

Message-passing model: the process exchanges messages with another to transfer information. Messages can be exchanged between the processes either directly or indirectly through a common mail box.

Strength: easy to implement

Weakness: communication is slow because of the time involved in connection setup

Shared-memory model: process uses shared memory to create and attaches system calls to create and gain access to regions of memory owned by other processes. Multiple processes can exchange information by reading and write data in the shared areas.

Strength: communication process is fast.

Weaknesses: different processes can access to same memory locations simultaneously cause loss of data or incorrect information. We need to ensure that processes using this communication style need to be executed properly to avoid this problem

**10. Why is the separation of mechanism and policy desirable?**

The separation of mechanism and policy is important to provide flexibility to a system. If the interface between mechanism and policy is well defined, the change of policy may affect only a few parameters. On the other hand, if interface between these two is vague or not well defined, it might involve much deeper change to the system.

**11. What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in microkernel architecture? What are the disadvantages of using the microkernel approach?**

Benefits

- Adding a new 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.

User programs and system services interact in microkernel architecture by using inter process communication mechanisms such as messaging. These messages are conveyed by the operating system.

The primary disadvantages of the microkernel architecture are the overheads associated with inter process communication and the frequent use of the operating system's messaging functions in order to enable the user process and the system service to interact with each other.

**12. What are the advantages of using loadable kernel modules?**

It is difficult to predict what features an operating system will need when it is being designed. The advantage of using loadable kernel modules is that functionality can be added to and removed from the kernel while it is running. There is no need to either recompile or reboot the kernel.

**13. Explain why Java programs running on Android systems do not use the standard Java API and virtual machine.**

It is because the standard API and virtual machine are designed for desktop and server systems, not mobile devices. Google developed a separate API and virtual machine for mobile devices.