Assignment 2

1. What is the purpose of system calls?
   - System calls gives an interface for the services provided by the operating system to the user interface. Also can be defined as a translator which translates user interface commands into low level tasks (kernel).

2. What is the purpose of the command interpreter? Why is it usually separate from the kernel?
   - Command interpreter which is also known as shell, is a part of operating system that executes the commands entered by user. Command interface is loaded with particular low level code which would execute the user command. Therefore, shells can be designed even by the users.
   - Designing shells in our own way is impossible if command interpreter is a part of a kernel as kernel can't be modified. Also, if the command interpreter is a part of a kernel, then malicious process can gain access to the particular part of the kernel, which could be a severe security issue. Therefore usually command interpreter is separated from the kernel.

3. What is the purpose of system programs?
   - According to the logical computer hierarchy, system programs works as an interface between operating system and application program which executes operations such as file management, communication, program loading and execution, programming language support (compilers, assemblers, debuggers) and etc.

4. What is the main advantage of layered approach to system design? What are the disadvantages of the layered approach?
   - Main advantage is simplicity of construction and debugging. Each layer doesn't need to know the implementation of the underneath layer neither for its implementation nor debugging. Therefore debugging and construction is made easy.
   - Difficult to define and plan layer structure appropriately without conflictions, tend to be less efficient as each layer need to have interactions in order to perform an action (each layer add overheads to the process time).

5. Why do some systems store the operating system in firmware, while others store it on disk?
   - Systems that stored in firmware is usually small as the firmware used in systems are small in size usually. This is because firmware is relatively expensive. (e.g. Systems like game consoles, tablets, phones) Also these kind of operation systems are less preferable to updates and modifications.
   - But in larger operating systems firmware is used to store the bootstrap loader and operating system in the disk. As the operating system is in the disk it's easy to update and writing new versions for the OS. In this scenario OS is loaded to the RAM from the disks, therefore it's faster than the OS stored in ROM (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.
   - Providing an interface to hardware and providing isolation between processes are the main two categories.

- OS doesn't let user (program or person) to directly access the hardware. There are middleware programs such as File management system, Program language supporters (compilers, assemblers, debuggers). To provide an isolation of processes OS maintain some rule set. Processes are only allowed to access the memory locations that associated with their address space. Device accessing of processes also are only done with the intervention of the OS.

7. Describe three general methods for passing parameters to the operating system.
   - Passing the parameters straightly to the registers
   - Parameters are stored in the memory as blocks and address of the block is passed to the register
   - Parameters are pushed into a stack and popping out when needed

8. What are the advantages and disadvantages of using the same system call interface for manipulating both files and devices?
   - Advantages - Most of the kernels works with the devices with the help of file management system. Hence, device drivers can be added as a new code file. This process is relatively easy and both files and devices can be accessed in same manner.
   - Disadvantages – The functionality of the some devices can't be identified with the file managing system. Therefore this method could result a loss of performance of the particular device.

9. What are the two models of inter-process communication? What are the strengths and weaknesses of the two approaches?
   - Two models are message passing and memory sharing
   - Message passing model –
     - Strengths – Easier to implement
     - Weaknesses – Speed is slower than shared memory
   - Memory sharing model –
     - Strengths – Speeder and efficient
     - Weaknesses – Protection issues and synchronizing issues are there as same memory location can be accessed by many processes

10. Why is the separation of mechanism and policy desirable?
    - Mechanism and policy should be separable in order to have easy modifications. (more flexible) If a change of policy affects the whole system that could lead towards system instability.

11. What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in a microkernel architecture? What are the disadvantages of using the microkernel approach?
    - In microkernel approach kernel performs only basic tasks such as scheduling, virtual memory and etc. Therefore adding new service doesn't require any modification to kernel. This can be given as a plus point. Also more secure as more operations are performed in the user mode.
    - Interaction of user programs and system services are done by shared memory or message passing method.
    - Disadvantage could be the decrement of performance due to the increased system function overhead.

12. What are the advantages of using loadable kernel modules?
    - Functionalities can be added to the base kernel, therefore loadable kernel modules make kernel more flexible. Even users can add new functionality without rebuilding and rebooting the base kernel.

13. Explain why Java programs running on Android systems do not use the standard Java API and virtual machine
    - That's because of standard APIs and VMs are designed for desktop and servers, not mobile devices. But there are ways such as 'Dalvik' virtual machines designed for androids.