# Operating Systems – Assignment 1

**Question 1:**

For the kernel to perform context switching it must save the state of the current process and restore the saved state of the next scheduled process. The information saved of the process being switched out is the current value of all CPU registers and memory allocations. The specific operations that must be done to complete the switch are instruction caches and data flushing.

**Question 2: C** Shared memory segments

Shared memory segments are shared between the parent process and the child process because the stack and heaps are duplicated from the parent process. Changes made to these duplicates inside the child process are not shared with the parent. The shared memory segments are accessed by both the parent and any child processes.

**Question 3:**

Long-term scheduling is considered the job scheduler. It selects which new process to load to memory next.

Medium-term scheduling is used for process swapping. In the case of performance slowing it will decided to suspend a process to be performed in secondary memory.

Short-term scheduling is also known as the CPU scheduler. The CPU scheduler selects the next process to be executed.

**Question 4:**

1. **Synchronous and Asynchronous Communication**

Synchronous communication is beneficial because it provides a common connection point for both listener and receiver. At a system level, implementation is fast and easier for applications to utilize. The disadvantage is that a blocking send does not necessarily need a common connection point and can be delivered asynchronously. Asynchronous communication is slower and more complex for both systems and applications. Since there are unique needs for both forms of communications, they are often both included in communication systems.

1. **Automatic and Explicit Buffering**

The benefit of automatic buffering is that it is easy to program the application, but the required storage is much more because it is utilizing an infinite queue. Explicit buffering offers performance optimizations because the queue size is predetermined, which reduces copying and is easier for the system. Harder to program because you must check if the size of the message will fit in the predetermined queue.

1. **Send by Copy and Send by Reference**

Sending by copy is easy to program but can be strenuous on the system due to the multiple copies created. Sending by reference means that no copies will be created but is harder to program because you must know exactly what you are referencing and where it is.

1. **Fixed-Sized and Variable-Sized Messages**

Because the messages are fixed-sized they can be easily copied into each other without having know the size which makes it easy for the system. It is harder for the programmer because they will have to know the message size when they are programming, to make it easy for the system to handle. Variable-sized messages means the programmer doesn’t have to work about the size of each message, but it makes it harder for the system because it can’t copy the message content as easily.

**Question 5:**

The current register set points then change to point to the set containing a new context (fast). If the context is loaded in memory a context from the register set is loaded into memory and the context previously in memory is moved to the register set. This process takes longer for the system to complete.