**OS Tutorial 1**

1. The OS allows the user to interact with the computer like create, modify, delete files.
2. Command line interface, compiler , OS
3. No, because the user needs the OS to use application programs which can do what the user wants.
4. Space, Time, Space, Space, Time, Time
5. CPU speed, Primary memory space
6. When no human-computer interaction is needed, maximise utilization of resources

Timesharing- need to interact. Emphasizes equitable sharing of hardware resources.

**OS Tutorial 2**

1. OS hides the actual task and allows user programs to access resources by using simpler commands.
2. The kernel uses supervisor mode. Because it needs to execute privileged commands on behalf of the user programs.
3. When a program calls its own procedure, it doesn’t need to change modes.

A system call requires the processor to change mode. Thus it requires more operations.

1. A monolithic kernel combines all its manager into a single module. This reduces redundant codes and increase efficiency.
2. Privileged because the OS manages the memory and I/O. By having these as privileged instructions, user programs cannot directly manipulate the device.

**OS Tutorial 3**

1. The Von Neumann architecture. The architecture uses a fixed set of components which is manipulated to perform various tasks by programs. It consists of a CPU, Primary memory, I/O and Bus.
2. The control unit follows the fetch-execute algorithm. In the fetch phase, the instructions are retrieved from the memory. In the execute phase, the ALU executes the instruction.
3. Memory Address Register, Memory Data Register, Command register
4. The CPU is faster than the I/O. As the CPU is waiting for the I/O process to be completed, it is effectively waiting which is inefficient and wasting precious CPU time. By having it to overlap, we reduce the overall time to complete all the processes.
5. Polling and Interrupt request flag
6. DMA is direct memory access. I/O, amount of data, memory location.

**OS Tutorial 4**