

TUTORIAL 1 (C10)

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TUTORIAL 1 (CST232/W2/CHAPTER1)

1. Can a computer run on more than one operating system (OS) at same time? Explain your answer.

Ans:

Operating System is a program that controls the execution of application programs and acts as an interface between the user of a computer and the computer hardware. Most computers can be configured to run more than one operating system. Windows, macOS, and Linux can exist on one physical computer. There are two strategies available for installing multiple operating systems on a single computer.

The first one is Dual (or multiple) boot. We can install two operating system on our hard drive and each time while booting, we will be asked to choose one of the operating systems to work upon. On dual boot, device can only be accessed to a single operating system so its performance is same as that in case of single boot. Next, Virtual machines. In this case, "virtualization" software is installed as just another program within the parent operating system. The virtualization program is then used to set up multiple "virtual" computers than run within the main operating system. Multiple operating systems may be running and accessible at the same time.

YES, 1) DUAL BOOTING need to restart ii) Install multiple OS on the same pc iii) on different partitioons on hard disk iv) different hard disk

2) virtualization or virtual machine: i) use software to emulate another machine ii) creates virtual environment for multiple operating systems ii) Each virtual machine can be loaded with different OS iv) easily switch to another OS (or VM) without restarting pc

2. Show how each of the following operating systems can be used, using common or real life examples.

- a) Batch OS
- b) Interactive OS
- c) Real time OS

Ans:

a) In the payroll system, the system must handle employees' salaries, bonuses, deduct and tax to automate employees' payroll at the end of a month. In batch operating system, the computer will be assigned jobs as a whole and in sequence. Example of the jobs is inputting employees' rough salary, deducting tax pay cut, or adding a bonus. This data will be inputted by the payroll department over a period of a month. Jobs that use the same operation will be grouped into a batch. This will cut the processing time as the computer doesn't have to allocate multiple resources for the same operation. The processing will run continuously even without a human supervisor. The computer will send the output to a printer to print the payroll.

generate monthly sales report/payroll, print daily transaction, index stored images or videos, etc

b) Interactive OS allows users to directly interact with the operating system via command terminal or graphic user interface. Multiple programs can run at the same time because the computer will share processing power. This operating system can be used in bus booking systems. The user will input the seat that he wants and the computer will reserve the seat.

i) answer customer enquiry ii) use microsoft office application ii) upload documents to server, etc ; customer service call

c) Real-time operating systems are used in time-critical environments where reliability is critical and the task must be completed before the deadline. In air traffic control, a hard real-time system is used where if a task can't be completed before its deadline, or the systems will be considered to suffer a failure. One of the features of an air traffic control system is path determining. Failure to determine airplane path in time will result in air traffic congestion. The system scheduler will assign a deadline based on the priority of the task. The highest priority task will be allocated more processing power by the computer to complete the task in time

Bank ATM, online payment, online audio, video streaming, patient monitoring in hospital especially at the ICU, etc (immediate response)

3. Explain why multiprogramming was introduced in the 1960s and how it was implemented?

Ans:

Back before 1960, there were only single-stream batch processing systems where the jobs needed to be grouped first then executed one group after another. So, to overcome this slow speed of processing, multiprogramming was introduced in late 1960 where it can execute multiple jobs at the same time which basically supported multitasking.

In a multiprogramming system, several jobs are kept in memory at the same time. Initially, all jobs are in the ready state. One of the ready jobs is selected to execute on the CPU and changes state from ready to running. Then it will be in a waiting state when making a request to I/O. Instead of just waiting on the CPU, another ready job is selected to execute on the CPU. Eventually the I/O request of the first job will be complete and the CPU will be notified by an interrupt. The cycle will keep going.

Cpu was very fast but the i/o devices were very much slower in speed, this makes the cpu become idle most of the time when the program needs the services of the i/o devices. Therefore, the multiprogramming is introduced where many programs are loaded at one time and sharing the attention of the single cpu.

Implementation: 1) active programming i) each program is allowed to use only a preset slice of cpu ii) when the time expires, the job was interrupted and another was allowed to begin execution iii) the interrupted job has to wait until it was allowed to resume execution later

2) passive programming ; program was serviced in turn, one after the other. When a program issued a print command, it generated an interrupt requesting the services of the i/o processor and the cpu was released to begin execution of the next job iii) the os did not control the interrupt but waited for each job to end an execution sequences

4. Show the steps performed by the operating system managers as they execute a user instruction to copy a file from one folder to another

Ans:

When a process wants to copy a file, it must use an operating system command to copy the file. The operating system asks the disk controller to locate the file, and the operating system saves the filename and disk address information in a file-control block in primary storage.

When a process wants to paste the file it has copied, it uses the operating system command to paste. The device driver uses the information that the operating system saved in the file-control block to tell the disk controller the precise address on the disk to paste the desired file to another folder.

When a process with a file is finished, the operating system then deletes the file-control block it held for the file.