Biyani Girls College

I Internal Examination Sept. 2019

Class: - BCA II

Subject: - Operating System (BCA 203)

MM: 40 Set: A Time: 1 ½ Hrs.

[I]Very short answer questions (Max 40 words) (5 * 2 = 10)

1. Define Operating System?
   An operating system (OS) is system software that manages computer hardware, software resources, and provides common services for computer programs. ... Operating systems are found on many devices that contain a computer – from cellular phones and video game consoles to web servers and supercomputers.
2. Define Multiprogramming?
   Multiprogramming is a rudimentary form of parallel processing in which several programs are run at the same time on a uniprocessor. Since there is only one processor, there can be no true simultaneous execution of different programs. ... To the user it appears that all programs are executing at the same time.
3. What is Batch Operating System?

Batch processing is a technique in which an Operating System collects the programs and data together in a batch before processing starts. An operating system does the following activities related to batch processing −

- The OS defines a job which has predefined sequence of commands, programs and data as a single unit.
- The OS keeps a number a jobs in memory and executes them without any manual information.
- Jobs are processed in the order of submission, i.e., first come first served fashion.
- When a job completes its execution, its memory is released and the output for the job gets copied into an output spool for later printing or processing.

4. What do you mean by process management?
   Process Management refers to aligning processes with an organization's strategic goals, designing and implementing process architectures, establishing process measurement systems that align with organizational goals, and educating and organizing managers so that they will manage processes effectively.
5. Define Buffering?
   Buffer : a buffer is a region of memory used to temporarily hold data while it is being moved from one place to another. That would be the most simple yet sensible definition for a buffer irrespective of where it may appear. Computers often have different devices in it that work at different speeds.

[II]Short answer questions (Max 80 words) (2 * 5 = 10)

1. Explain the device management and Characteristics?
2. Device management in operating system implies the management of the I/O devices such as a keyboard, magnetic tape, disk, printer, microphone, USB ports, scanner, camcorder

etc.as well as the supporting units like control channels. The basics of I/O devices can fall into 3 categories:

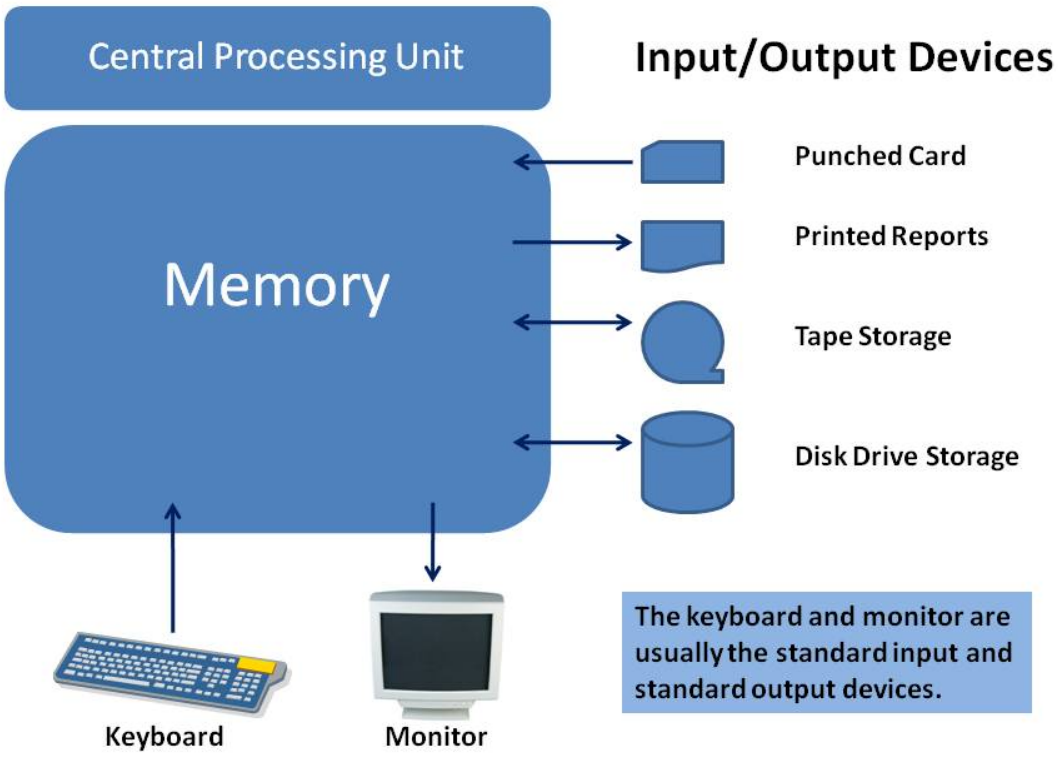
3. **Block device:** it stores information in fixed-size block, each one with its own address.Fr example, disks.
   Character device: delivers or accepts a stream of characters. The individual characters are not addressable. For example printers, keyboards etc.
   Network device: For transmitting data packets.
4. The main functions of the device manager are: 1. Monitor the status of all devices, including storage drives, printers and other peripherals 2. Enforce pre-set policies on which process gets which device for how long 3. Deal with the allocation of devices to processes

5. Define Input Output Programming Concepts?

Input and output, or I/O is the communication between an information processing system, such as a computer, and the outside world, possibly a human or another information processing system. Inputs are the signals or data received by the system and outputs are the signals or data sent from it.[1]

Discussion

Every task we have the computer do happens inside the central processing unit (CPU) and the associated memory. Once our program is loaded into memory and the operating system directs the CPU to start executing our programming statements the computer looks like this:



CPU – Memory – Input/Output Devices

Our program now loaded into memory has basically two areas:

- Machine instructions – our instructions for what we want done

- Data storage – our variables that we using in our program

Often our program contains instructions to interact with the input/output devices. We need to move data into (read) and/or out of (write) the memory data area. A **device** is a piece of equipment that is electronically connected to the memory so that data can be transferred between the memory and the device. Historically this was done with punched cards and printouts. Tape drives were used for electronic storage. With time we migrated to using disk drives for storage with keyboards and monitors (with monitor output called soft copy) replacing punch cards and printouts (called hard copy).

Most computer operating systems and by extension programming languages have identified the keyboard as the **standard input device** and the monitor as the **standard output device**. Often the keyboard and monitor are treated as the default device when no other specific device is indicated.

[III]Long answer questions (Max 150 words). (2 * 10 = 20)

1. Explain types of Operating system?

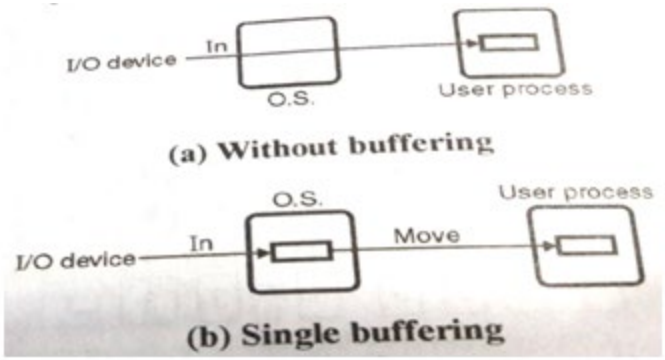
The various I/O buffering techniques are as follows:

1. Single buffering:

- When a user process issues an I/O request, the O.S assigns a buffer in the system portion of main memory to the operation.
- In the block oriented devices, the techniques can be used as follows: Input transfers are made to the system buffer. When the transfer is complete, the process moves the block into user space and request another block. This is called reading ahead, it is done in the expectation that the block will be needed sometimes in future.
- This approach will generally provide a speed up compared to the lack of system buffering. The O.S must keep track of the assignment of system buffers to user processes.
- Similar considerations apply to block oriented output. When data are being transmitted to a device, they are first copied from user space into the system buffer, from which they will ultimately be written. The requesting process is now free to continue.
- Suppose T is the time required to input one block and C is the computation time required for input request.
    - Without buffering: Execution time is T+C.
    - Without buffering: Execution time is max [C,T]+M, where M is time requied to move the data from system buffer to user memory.

In stream oriented I/O, it can be used in two ways,

- Line-at a time fashion. Line- at a time operation is used for scroll made terminals. User inputs one line at a time, with a carriage return signaling at the end of a line.
- Byte-at a time fashion. Byte-at a time operation is used on forms mode, terminals when each keystroke is significant.

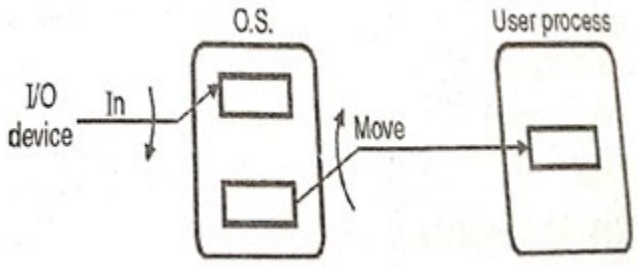


2. Double buffering

- An improvement over single buffering is by assigning two system buffers to the operations.
- A process transfers data to one buffer while operating system empties the other as shown in fig.
- For block oriented transfer execution time is Max[C,T]. It is possible to keep the block oriented device going at full speed.
    - If C<=T, i.e. computation time is less than the time required to input one block.
    - If C>T, i.e. computation time is greater than the time required to input one block, then double buffering ensures that the process will not have to wait on I/O.

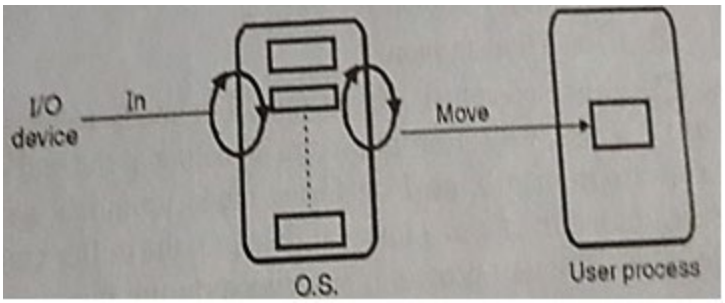
For Stream oriented input again two types.

- For line- at a time I/O, the user process need not be suspendeds for input or output, unless process runs ahead of double buffer.
- For byte- at a time operations, double buffer offers no advantage over a single buffer of twice the length.



3. Circular buffer

- Double buffering may be inadequate, if the process performs rapid burst of I/O. When two or more buffers are used.
- The collection of buffers is called as a circular buffer, with each buffer being one unit in the circular buffer.



2. What is Buffering? Explain the techniques of Buffering?

Types of Operating Systems

An Operating System performs all the basic tasks like managing file,process, and memory. Thus operating system acts as manager of all the resources, i.e. **resource manager**. Thus operating system becomes an interface between user and machine.

Types of Operating Systems: Some of the widely used operating systems are as follows-

1. Batch Operating System –

This type of operating system does not interact with the computer directly. There is an operator which takes similar jobs having same requirement and group them into batches. It is the responsibility of operator to sort the jobs with similar Advantages of Batch Operating System:

- It is very difficult to guess or know the time required by any job to complete. Processors of the batch systems know how long the job would be when it is in queue
- Multiple users can share the batch systems
- The idle time for batch system is very less
- It is easy to manage large work repeatedly in batch systems

Disadvantages of Batch Operating System:

- The computer operators should be well known with batch systems
- Batch systems are hard to debug
- It is sometime costly
- The other jobs will have to wait for an unknown time if any job fails

Examples of Batch based Operating System: Payroll System, Bank Statements etc.

2. Time-Sharing Operating Systems –

Each task is given some time to execute, so that all the tasks work smoothly. Each user gets time of CPU as they use single system. These systems are also known as Multitasking Systems. The task can be from single user or from different users also. The time that each task gets to execute is called quantum. After this time interval is over OS switches over to next task.

Advantages of Time-Sharing OS:

- Each task gets an equal opportunity
- Less chances of duplication of software
- CPU idle time can be reduced

Disadvantages of Time-Sharing OS:

- Reliability problem
- One must have to take care of security and integrity of user programs and data
- Data communication problem

Examples of Time-Sharing OSs are: Multics, Unix etc.

3. Distributed Operating System –

These types of operating system is a recent advancement in the world of computer technology and are being widely accepted all-over the world and, that too, with a great pace. Various autonomous interconnected computers communicate each other using a shared communication network. Independent systems possess their own memory unit and CPU. These are referred as loosely coupled systems or distributed systems. These system's processors differ in size and function. The major benefit of working with these types of operating system is that it is always possible that one user can access the files or

software which are not actually present on his system but on some other system connected within this network i.e., remote access is enabled within the devices connected in that network. Advantages of Distributed Operating System:
Failure of one will not affect the other network communication, as all systems are independent from each other
Electronic mail increases the data exchange speed
Since resources are being shared, computation is highly fast and durable
Load on host computer reduces
These systems are easily scalable as many systems can be easily added to the network
Delay in data processing reduces
Disadvantages of Distributed Operating System:

Failure of the main network will stop the entire communication
To establish distributed systems the language which are used are not well defined yet
These types of systems are not readily available as they are very expensive. Not only that the underlying software is highly complex and not understood well yet
Examples of Distributed Operating System are- LOCUS etc.

4. Network Operating System –
These systems run on a server and provide the capability to manage data, users, groups, security, applications, and other networking functions. These type of operating systems allow shared access of files, printers, security, applications, and other networking functions over a small private network. One more important aspect of Network Operating Systems is that all the users are well aware of the underlying configuration, of all other users within the network, their individual connections etc. and that's why these computers are popularly known as tightly coupled systems.

Advantages of Network Operating System:

Highly stable centralized servers
Security concerns are handled through servers
New technologies and hardware up-gradation are easily integrated to the system
Server access are possible remotely from different locations and types of systems
Disadvantages of Network Operating System:

Servers are costly
User has to depend on central location for most operations
Maintenance and updates are required regularly
Examples of Network Operating System are: Microsoft Windows Server 2003, Microsoft Windows Server 2008, UNIX, Linux, Mac OS X, Novell NetWare, and BSD etc.

5. Real-Time Operating System –
These types of OSs serves the real-time systems. The time interval required to process and respond to inputs is very small. This time interval is called response time.
Real-time systems are used when there are time requirements are very strict like missile systems, air traffic control systems, robots etc.

Two types of Real-Time Operating System which are as follows:

Hard Real-Time Systems:
These OSs are meant for the applications where time constraints are very strict and even the shortest possible delay is not acceptable. These systems are built for saving life like automatic parachutes or air bags which are required to be readily available in case of any accident. Virtual memory is almost never found in these systems.
Soft Real-Time Systems: