

Operating system Assignment -01

1. Define operating system?

A program that acts as an intermediary between a user of a computer and the computer hardware

Ex: Windows, Linux, and Android are examples of operating systems that enable the user to use programs like MS Office, Notepad, and games on the computer or mobile phone

2. Difference between Network Operating System and Real Time Operating System and Batch Operating System and Time-Sharing Operating System?(I am not sure about this answer)

A)

<u>Network Operating System</u>	<u>Real Time Operating System</u>
<ul style="list-style-type: none">• These systems runs on a server and provides the capability to manage data, users, groups, security, applications, and other networking functions	<ul style="list-style-type: none">• The time interval required to process and respond to inputs is very small.

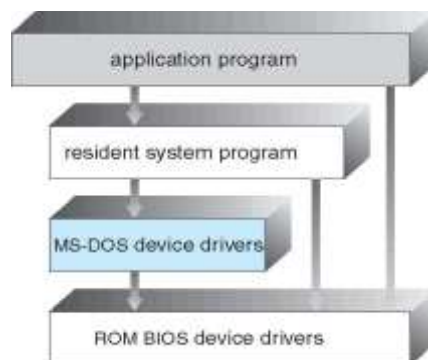
<ul style="list-style-type: none"> It is tightly coupled systems. 	<ul style="list-style-type: none"> This time interval is called response time.
<ul style="list-style-type: none"> Highly stable centralized servers 	<ul style="list-style-type: none"> Real time operating system in embedded system
<ul style="list-style-type: none"> Servers are costly 	Complex Algorithms
<ul style="list-style-type: none"> It is underlying Configuration 	<ul style="list-style-type: none"> It has two time system Hard Real Time and Soft Real Time
<u>Batch Operating System</u>	<u>Time-Sharing Operating System</u>
<ul style="list-style-type: none"> Batch operating system do not interact with the computer directly. 	Time-Sharing system execute tasks work smoothly
<ul style="list-style-type: none"> The work of Operating system is done in Batches 	Each user gets time of CPU known as Single system
<ul style="list-style-type: none"> It is the responsibility of operator to sort the jobs with similar needs. 	These system are also known as Multitasking system
<ul style="list-style-type: none"> It is easy to manage large work repeatedly in batch systems 	The time that each task gets to execute is called quantum.

<ul style="list-style-type: none"> Multiple users can share the batch systems 	After this time interval is over OS switches over to next task
<ul style="list-style-type: none"> Batch systems are hard to debug 	Each task gets an equal opportunity
<ul style="list-style-type: none"> <i>The computer operators should be well known with batch systems</i> 	CPU idle time can be reduced

3. Explain the structure of operating system And explain OS Servicers?

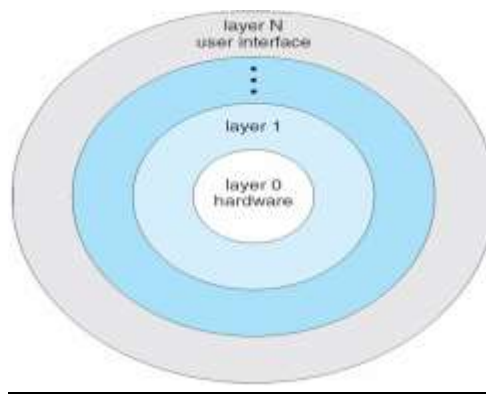
A) There are two types of Operating system

1)Simple structure – MS-DOS



- MS-DOS – written to provide the most functionality in the least space
 - It is not divided into modules
- Although MS-DOS has some structure, its interfaces and levels of functionality are not well separated

2)Layered – an abstraction



- The operating system is divided into a number of layers (levels), each built on top of lower layers. The bottom layer (layer 0), is the hardware; the highest (layer N) is the user interface.
- With modularity, layers are selected such that each uses functions (operations) and services of only lower-level layers

4. Explain the difference categories of system calls?

1) File management

- create file, delete file
- open, close file
- read, write, reposition
- get and set file attributes

2) Device management

- request device, release device
- read, write, reposition
- get device attributes, set device attributes
- logically attach or detach devices

5. What is the process ? Draw and explain process state diagram?

- A) A process can be thought of as a program in execution. A process is an active entity.

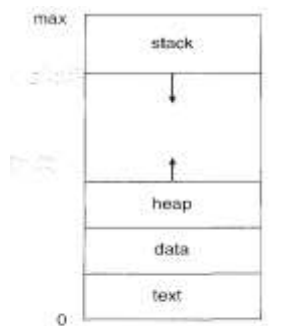


Figure 3.1 Process in memory

- Stack: Stack contains the temporary data, such as method/function parameters, return address, and local variables related to a process.
- Heap: Heap is a dynamically allocated memory to a process when a process is under execution.
- Text: Text section of the process tells about the current activity which is represented by the value of Program Counter and the contents of the processor's registers.
- Data: Data section contains the global and static variables

6. Explain process control block?

A) As the operating system supports multi-programming, it needs to keep track of all the processes.

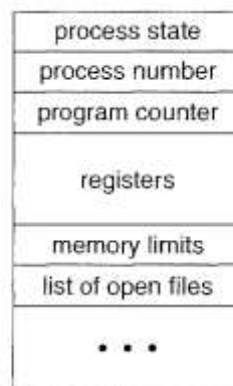


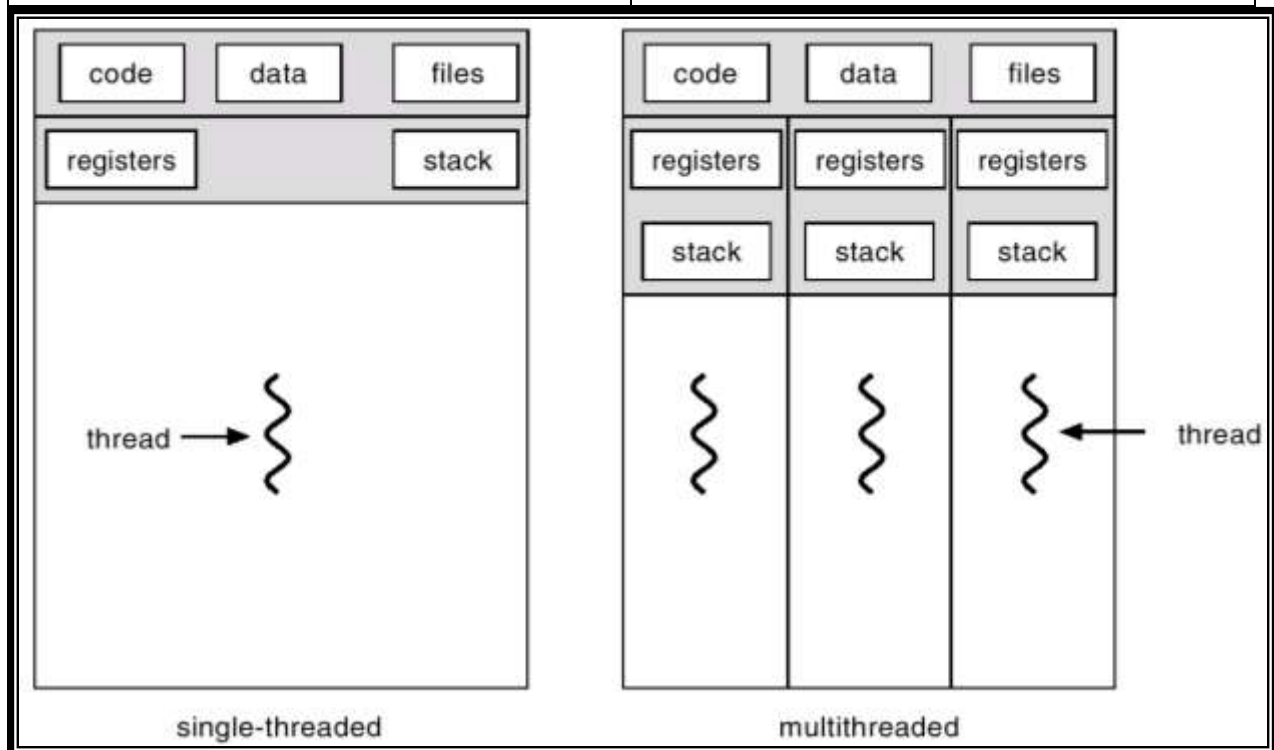
Figure 3.3 Process control block (PCB).

- Pointer – It is a stack pointer which is required to be saved when the process is switched from one state to another to retain the current position of the process.
- Process state – It stores the respective state of the process.
- Process number – Every process is assigned with a unique id known as process ID or PID which stores the process identifier.
- Program counter – It stores the counter which contains the address of the next instruction that is to be executed for the process.
- Register – These are the CPU registers which includes: accumulator, base, registers and general purpose registers.
- Memory limits – This field contains the information about memory management system used by operating system. This may include the page tables, segment tables etc.
- Open files list – This information includes the list of files opened for a process.

7. What is difference between single and multi-threading process explain with diagram?

A)

<i>Single threading</i>	<i>Multi-threading</i>
Single-threaded" means that we open a single connection and measure the speeds from that	Multi-threaded" means that we're using multiple connections - usually anywhere from 3 to 8 - at the same time, and measure the total speed across them all
There is only single thread present	There are multi-thread present
There is only one register present	There are many registers present
There is only one stack present	There are many stack present



8. Explain inter-process communication?

A) Processes within a system may be independent or cooperating

Reasons for cooperating processes:

- Information sharing
- Computation speedup
- Modularity
- Convenience

Cooperating processes need inter-process communication (IPC)

Two models of IPC

A) Shared memory:

An area of memory shared among the processes that wish to communicate .The communication is under the control of the user's processes not the operating system. Major issues is to provide mechanism that will allow the user processes to synchronize(responding each other immediately) their actions . When they access shared memory.

B) Message passing:

- a) Mechanism for processes to communicate and to synchronize their actions
- b) Message system – processes communicate with each other without resorting (going) to shared variables
- c) IPC facility provides two operations:
- d) **send**(*message*)
- e) **receive**(*message*)
- f) The *message* size is either fixed or variable

C)

9. Explain scheduling criteria?

1. CPU utilization- keep the CPU as busy as possible
2. Throughput- of processes that complete their execution per time unit
3. Turnaround time- amount of time to execute a particular process (finishing time – arrival time)
4. Waiting time- amount of time a process has been waiting in the ready queue
5. Response time-amount of time it takes from when a request was submitted until the first response is produced, not output (for time-sharing environment)

10. Define Threading Explain thread models with diagram?

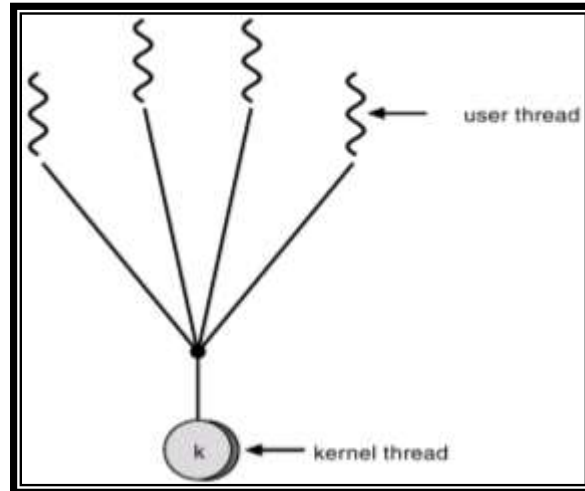
A) Thread is a basic unit of CPU utilization

There are two types of threads: User Threads and Kernel Threads

Many to one model

Many user-level threads mapped to single kernel thread

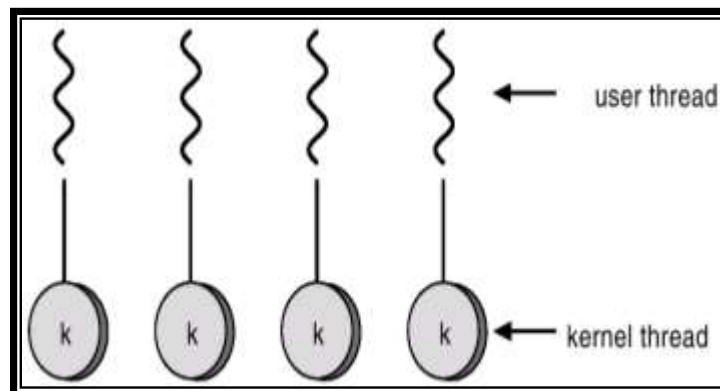
Used on systems that do not support kernel threads



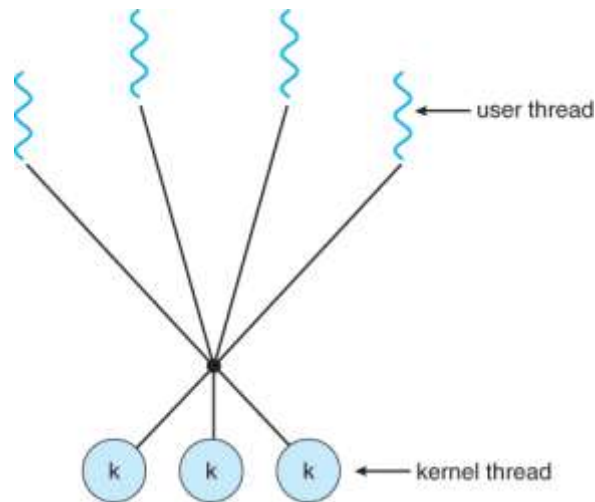
One-to-One Model

Each user-level thread maps to kernel thread.

It provides more concurrency than many to one model by allowing another thread.



Many-to-Many Model



The many to many model multiplexes any number of user threads onto an equal or smaller number of kernel threads

It combines the best features of the one-to-one and many-to-one models

Also can create any number of the threads

11)Difference between Network Operating System and Real Time Operating System and Batch Operating System and Time-Sharing Operating System(I am not sure about this answer)

BASIS FOR COMPARISON	TIME SHARING OPERATING SYSTEM	REAL-TIME OPERATING SYSTEM
Basic	Emphasis on providing a quick response to a request.	It focuses on accomplishing a computational task before its specified deadline.
Computer resources	Shared between the user.	No sharing takes place and events are external to the system.
Process deals with	More than one application simultaneously.	Single application at a time.
Modification of the program	The programs can be modified and written by the users.	No modification is possible.
Response	The response is generated within the second, but there is no compulsion.	User must get the response within the defined time constraint.
Switching	Takes place among the processes.	Does not present

SR.NO.	Batch Processing System	Real Time Processing System
1	In batch processing processor only needs to busy when work is assigned to it.	In real time processing processor needs to very responsive and active all the time.
2	Jobs with similar requirements are batched together and run through the computer as a group.	In this system, events mostly external to computer system are accepted and processed within certain deadlines.
3	Completion time is not critical in batch processing.	Time to complete the task is very critical in real-time
4	It provides most economical and simplest processing method for business applications.	Complex and costly processing requires unique hardware and software to handle complex operating system programs.
5	Normal computer specification can also work with batch processing.	Real-time processing needs high computer architecture and high hardware specification.
6	In this processing there is no time limit.	It has to handle a process within the specified time limit otherwise the system fails.
7	It is measurement oriented.	It is action or event oriented.
8	In this system sorting is performed before processing.	No sorting is required.
9	In this system data is collected for defined period of time and is processed in batches.	Supports random data input at random time.
10	Examples of batch processing are transactions of credit cards, generation of bills, processing of input and output in the operating system etc.	Examples of real-time processing are bank ATM transactions, customer services, radar system, weather forecasts, temperature measurement etc.

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Ex: Artisoft's LANtastic, Novell's NetWare, and Microsoft's LAN Manager

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SYSTEM**

An operating system that manages a group of distinct computers and makes them appear to be a single computer

Helps to share resources and collaborate via a shared network to accomplish tasks

Ex: LOCUS and MICROS

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