

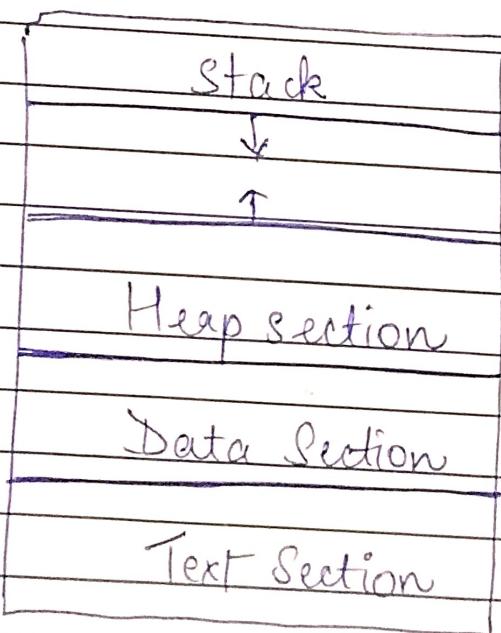
## [Process : Concept , Description &amp; Control.]

Introduction to Process Management :-

Process Management includes creating, running, terminating and assigning different process to different devices.

Concept of process :-

- Process is a program in execution
- The main difference between program and process is program is user written & process is generated by OS to run.



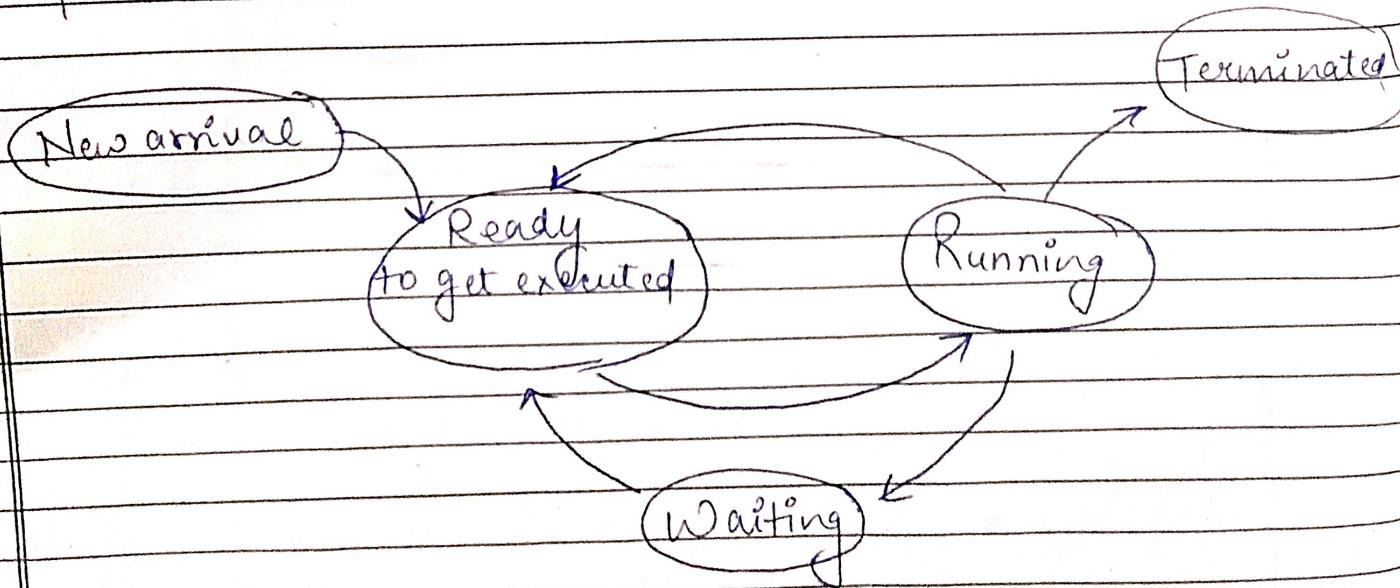
## [PROCESS IN MEMORY]

STACK → Another part of process is stack.  
 Stack is basically used to store the temporary values.  
 The temporary value can be parameter or return values of functions, local variable etc. (1)



- There is another part called Data Section.
- Data Section stores the global variable. Global variable are accessible throughout the program.
- Heap Section is used for dynamic memory allocation.
- A file contain the instruction or commands given to machine. This file is present on the disk. The file is called as executable file. In case when executable file gets loaded into memory and start executing instruction one by one, using program counter, it can be called as process.
- Two common techniques to run executable file are double clicking on the file name icon and run it or run it on the command prompt by inputting its name.

The Process States → As the process run it changes its states. Process state are the different stages through which it passes.





- 1) New :- The process is being Created.
- 2) Running :- The process is currently running in CPU.
- 3) Waiting :- The process is currently able to run but must wait until a CPU becomes available or may be I/O devices available.
- 4) Ready :- The process is in memory and will be assigned to the CPU.
- 5) Terminated :- The process has finished execution.

### Process Control Block → (PCB)

→ If the OS supports multiprogramming then, it is necessary to keep track of all the processes. For each process, its PCB is used to track the process's execution status.

Process State (PS)
Process number (ID)
Program counter (PC)
Registers
[ PCB ]

Process State :- The process state could be one of these -  
New, Ready, Running, Waiting, Terminated



Program Counter :- The program counter is used to indicate the address of next instruction which is going to get execute.

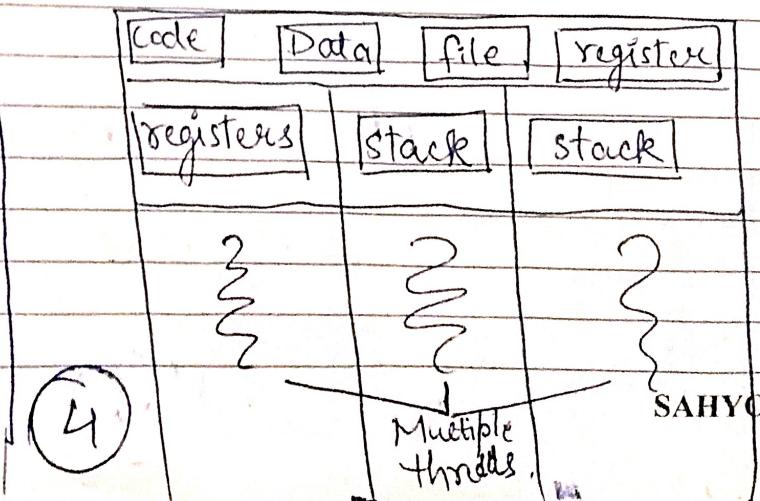
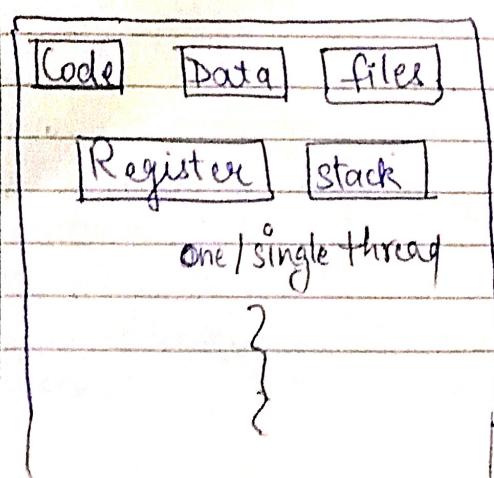
CPU Register :- memory location used by CPU for the temporary usage. The type of CPU registers are as follows -

- Accumulators
- Index Registers
- Stack Pointers
- General purpose registers
- Condition code inf. register.

Threads :- Thread is a basic unit of CPU utilization. Thread is associated with thread ID, a program counter, a register set, and stack.

→ Thread share its code section, data section, and other OS resources (files).

→ Generally a traditional process has single thread but process can be multithreaded also. If the system is multithreaded control system it is very powerful as it can perform multiple task at a time.





## Benefits of Multithreaded Programming →

- ① Responsiveness.
- ② Resource Sharing
- ③ Economy
- ④ Utilization of multiprocessor architecture

① RESPONSIVENESS → this allows program to execute or run continuously even if the part of it is blocked.

② RESOURCE SHARING → Thread belong a particular process. The resources allotted or allocated to the process can be used by its threads. So many threads can share resources of its process to which they belong.

③ Economy → Process creation is costly due to memory allocation and resource allocation. As threads shares all resources required from its process to which they belong it is economical.

→ The overhead of creating & managing processes is much more than creating & managing threads.

④ UTILISATION OF MULTIPROCESSOR ARCHITECTURES →

The advantage of multithreading can be to the great extent in multiprocessor environment or architecture.



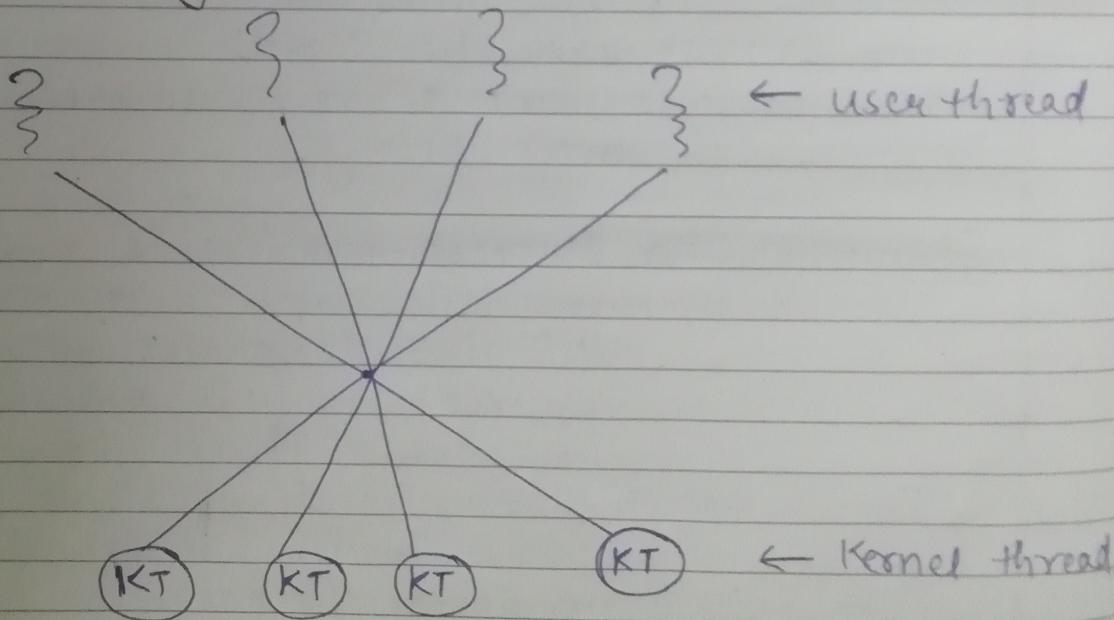
## User Thread & Kernel Thread

Support may be provided either at the user level called user threads

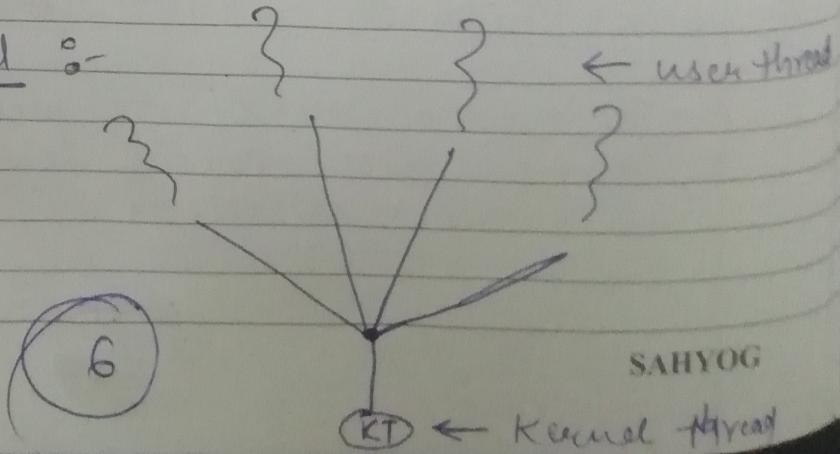
or Support may be provided either <sup>by</sup> the OS are called Kernel threads

### Multithreading Models :- Three models :-

#### ① Many to Many Model :-



#### ② Many to one Model :-





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③ One to One Model :-

