Operating Systems

So now coming to this operating systems which is basically the interface between hardware and the user and thus have number of things to do and loads first when computer starts with the help of bootloader.

The work done by operating system are:

1. Memory Management
   1. In case of memory management, we need to manage the amount of memory given to which and whom and the place from where to where is for that process.
2. File System Management
3. Processor Management
4. Device Management
5. Security Control Over Performance

Real Time Operating Systems: In these systems the response time for the output is very less and thus we called them as real time operating systems and these are used in the places like virtual reality and so on…

Program is the code or the binary code written and when the binary code runs then it leads to the process to incur. And there are many section which are to be required by process.

1. Text Section: where the code lies.
2. Stack: This contains the local variables, return addresses etc and this vanishes as soon as the function call ends.
3. Heap: It contains the dynamically allocated variables.
4. Data Section: Contains the global variables.

And now coming to the various states of program which could be the

1. New State: In this state, the process is about to create and it is present in main memory.
2. Ready State: In this state, the process is created and is present in main memory but not yet assigned any cpu to be worked on!
3. Run State: In this state, it is running and cpu is assigned to the process.
4. Blocked: in this when there is some I/O work to be done then the process is put into the Blocked state and then the cpu is free for that time.
5. Completed: in this all the resources would be given by the process and can be reused.
6. Suspend Ready: In this if they would have been in the ready state but due to lack of memory they are in suspend ready state.
7. Suspend blocked:

There are two types of bounds in the processing

1. CPU bound operations: In these CPU time is more and I/O time is less.
2. I/O bound operations: In these I/O time taken is more.

Types of scheduler

1. Long term- selecting the processes to put in the main memory.
2. Short term-selecting between run and ready state.
3. Medium term: selecting between running and suspended state.

PCB: It means that process control block, it means that the information which is carried by a running process in order to go to the wait or blocked state and then come back.

1. Stack pointer, Program counter.
2. Process state, process number.

Different scheduling algorithms:

1. First Come First Serve: this has the problem of starvation as first one coming may be taking more time so the starvation of one’s coming later would increase.
2. Shortest Job First: In this starvation is less.
3. Shortest Remaining Time First: it is preemptive version of above one as in this one with the less remaining time will be taken so basically one with the shortest job (left)
4. Round Robin: In this there is a specific time based on which the preemption took place and say if the time taken is bigger than it will be same as FCFS
5. Priority based scheduling: No logic anything could happen anyone can starve!!!

Schedulers and dispatchers

1. Long term schedulers: These are first of all system software which are used to judge which are the programs which are to be taken from the secondary memory and put them into the ready state as the processes
2. Short term Schedulers: these are used for making the processes in the ready state to the run state as we are having a CPU and that can be used by one at a time so we need to be decisive which is taken by the scheduler and put that into the run state.
3. Medium term schedulers: whenever there is some I/O operation to be performed then we can put the current running into the blocked state so that cpu can be used by others, this is all done by medium term schedulers

Dispatcher: this is the software program which is to be run to get the process to the CPU to get it start working.

For this 1. Context switch would be there, then switching to the user mode, jump to proper location.

So basically the work of scheduler is till getting a process in the ready queue and from there small term will select one from the ready queue and then dispatcher comes into the picture and it will provide CPU to the process to be run.

Canvoy effect: as in the case of first come first serve, we cannot preempt any of the processes so due to this there is a lot of waste of CPU and other devices that is why we need other ways of scheduling and this is called convoy effect.

Bellady anomaly: In general cases, number of page faults should decrease upon increasing the number of pages but no, in some cases of replacement algos such as first come first out there could be increase in the number of page faults as pages increases, this is called bellady’s anomaly, so at the end this bellady’s anamoly will occur only in the case of FIFO algo’s but in case of Stack based algo’s this maynot come as the stack based algo are not dependent on the number of page frames but FIFO ones do.