Mid Semester Examination Spring 2020

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Answer to the question no: 1(a)

Design goals of an operating system are given below-

→Convenience, abstraction of hardware resources for user programs.

→Efficiency of usage of CPU, memory etc.

→Isolation between multiple processes.

This will be my design goals if I design an Operating System.

Computer System Structure:

(1) Users- People, machines, other computers.

(2) Application programs- defines the ways in which the system resources are used to solve the computing problems of the users.

(3) Operating system- Control and co-ordinates use of hardware among various applications and users.

(4) Hardware- provides basic computing resources -CPU, memory, I/O devices.

The role of OS are given below:

(1) OS manages program memory:

—Loads program executable (code, data) from disk to memory.

(2) OS manages CPU:

—Initialize program counter (PC) and other registers to begin execution.

(3) OS manages external devices:

—Read/write files from disk.

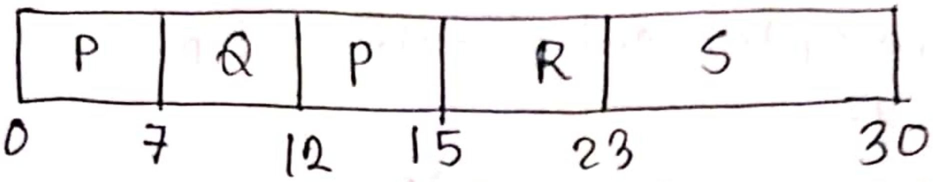
Answer to the question no: 1(b)

I think Asymmetric multi-processing system is better. as assymmetric multi processing is much cheaper.

Differences between them are given below-

Symmetric multiprocessing	Assymmetric multiprocessing
(1) Share a common operating system and memory.	(1) It has a master-slave relationship.
(2) All processors are treated equally.	(2) Processors are not treated equally.
(3) Processors take processes from ready queue-each processor can have seperate ready queue.	(3) Master processor assigns processes to the slave processors.
(4) Processors communicate with each other by shared memory.	(4) Processors communicate with the master processor.
(5) All processors has same architecture.	(5) Architecture can be different for. each processor.
(6) Not as easy to design or handle.	(6) Easier to design and handle
(7) Comparatively costly	(7) Cheaper.

Answer to the question no: 2(a)



This is the grant chart.

Waiting time $P = 0+(12-7)-0 = 5$

$Q = 7-7 = 0$

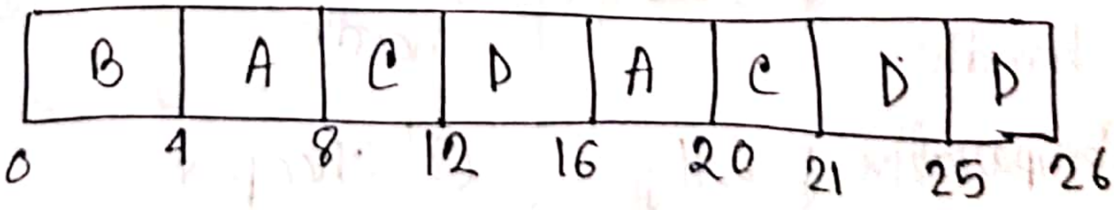
$R = 15-9 = 6$

$S = 23-10 = 13$

Average waiting time $= (5+0+6+13)/4$

$= 6$ms

Answer to the question no: 2(b)



Waiting time, $B = 0-0$

$A = 4+(16-8)-3 = 9$

$C = 8+(20-12)-4 = 12$

$D = 12+(21-16)-5 = 12$

~~Answe~~

∴ Average waiting time = $(0+9+12+12)/4$
$= 8.25$ ms

(Ans)

Answer to the question no: 3(a)

There are five different states of a process—

(1) Running: The process is currently executing on CPU.

(2) Ready: Waiting to be scheduled, the process is waiting to be assigned to a processor.

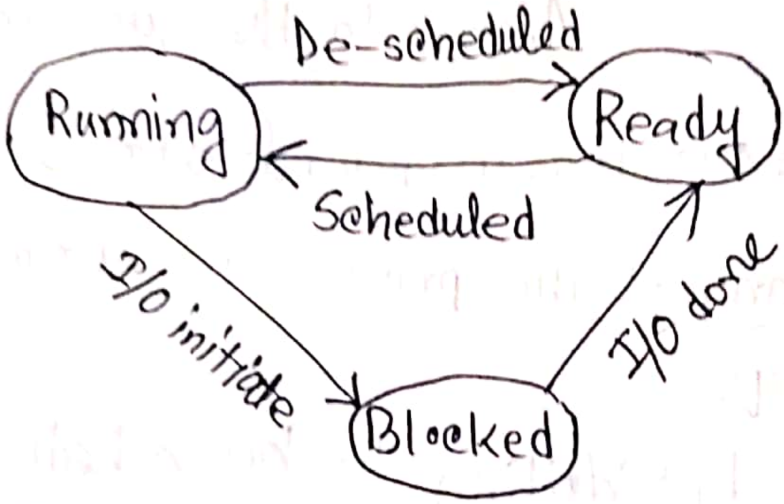
(3) Blocked: suspended, not ready to run. Reasons can be — Waiting for some event to occur; eg. process issues a read from disk.
—Disk issues an interrupt when data is ready.

(4) New—The process is being created, yet to run.

(5) Dead—Terminated, the process has finished execution.

Answer to the question no: 3(b)

Process State Transition Diagram:



At first process come to the ready state. Then it goes to the running state. Next if the process needs an I/O operation then it goes to the Blocked state. After I/O done the process goes to the ready state. And then from ready state it can go to the running state. Process can also be de-scheduled and come to the ready state from the running state.

Answer to the question no: 3(c)

```
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>

int main()
{
    for(int i=0; i<n ; i++)
    {
        int c = fork();
        if (c==0)
        {
         printf("I am child of "%d" and my id is "%d",
                              getppid(), getpid());
         exit(0);
        }
    }
   for (int i=0 ;i<n; i++){
      wait (NULL);
      printf("I am parent of "%d" number of
            child and my id is "%d". ",i, getpid());
   }
}
```