SRN PES1UG20CS606

PES UNIVERSITY

PES University, Bengaluru
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UE20CS254

MAY 2022: END SEMESTER ASSESSMENT (ESA) BTech 4th SEMESTER
UE20CS254 - Operating Systems

Time: 3 Hrs	Answer All Questions	Max Marks: 100

1	a	Briefly explain how a system call is executed by the operating system	4
	b	What is a Process Control Block?	5
	c	Explain the various execution states of a process	5
	d	Consider a set of 5 processes whose arrival time and burst time are given below	6

Process	Arrival Time (ms)	Burst Time (ms)
P1	3	4
P2	5	3
P3	0	2
P4	5	1
P5	4	3

If the CPU scheduling policy is SRTF, calculate the average waiting time, average turnaround time and draw the Gantt chart. In case of a tie, prioritize the process with a lower process id.

2	a	What is a **Thread**? What will be the output of the below code?	6

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <pthread.h>
int g = 0;
void *myThreadFunction(void *vargp)
{
    int *myid = (int *)vargp;
    static int s = 0;

    int l = 0;
    ++l; ++s; ++g;
    printf("Thread ID: %d, Local: %d, Static: %d, Global: %d\n", *myid, l, s, g);
    pthread_exit(NULL);
}

int main()
{
    int i;
    pthread_t tid;

    for (i = 0; i < 3; i++)
    {
        pthread_create(&tid, NULL, myThreadFunction, (void *)&tid);
        pthread_join(tid, NULL);
    }
    return 0;
}
```

	b	Briefly explain **Semaphores**	4
	c	What is a **Critical Section** problem?	4
	d	Explain solution for **Critical Section problem** using **mutex locks**	6
3	a	Explain **Paging** memory management scheme	5
	b	Briefly explain memory management scheme in Intel IA-32 architecture	5
	c	Consider a reference string of 1,2,3,4,1,2,5,1,2 and 3 frames. How many page faults would occur if Optimal page replacement algorithm is used	5
	d	Briefly explain Virtual Memory Management in Windows	5
4	a	Describe the most common schemes for defining the logical structure of a directory	5
	b	Explain the in-memory file system structures provided by the OS to support a read operation on a file	6
	c	Consider a file system with 4096-byte blocks. Assume a two level index allocation strategy and a 4 byte pointer. What is the maximum file size that can be supported by such a file system?	4
	d	What is a File Allocation Table (FAT)? Explain how FAT is used for allocating disk space to the files.	5
5	a	Briefly describe the structure of a protection domain	4
	b	Describe the characteristics of a RAID-5 disk volume	4
	c	Explain the lock-key scheme of checking access rights	6
	d	Consider a disk with 200 cylinders and disk queue with requests for I/O to blocks on cylinders 99, 180, 36, 126, 15 and the initial position of the head is at cylinder 100. Recommend the best algorithm (minimum seek time) among FCFS, Shortest Seek Time First and SCAN disk scheduling algorithms for this case. If needed, assume the initial direction will be towards the end such that maximum number of requests can be serviced	6