Test Name : Oct-MidTerm-T1-AY2021-22-CS513-Software-Systems

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Test Start Time	Marks Scored	Total Questions	Attempted Questions
22/10/2021, 11:28:02 AM	33.0 / 50.0	20	14

Correct Questions	Incorrect Questions	Skipped Questions	Pending Evaluation
11	3	6	0

Reevaluation application status	Actions
Not Applied	Apply for reevaluation

List of Sections

Section A Marks per question : 7.0 **Marks Scored : 28.5**

Q No.	Q. Type	Status	Marks	
1	File Upload	✔	5.5	Hide Answer

Servers can be designed to limit the number of open connections. For example, a server may wish to have only N socket connections at any point in time. As soon as N connections are made, the server will not accept another incoming connection until an existing connection is released. Explain how semaphores can be used by a server to limit the number of concurrent connections in Socket Programming.

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Original Response

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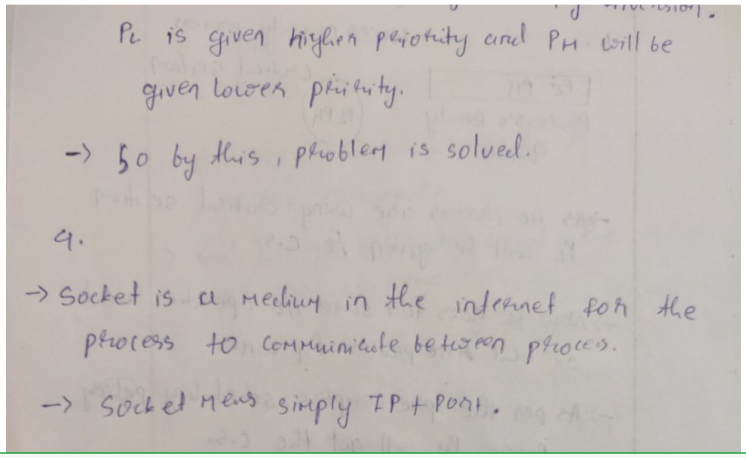

2	File Upload	✔	7.0	Hide Answer

Explain the following kernel types with suitable Architecture diagrams
a. Monolithic
b. Micro
c. Hybrid

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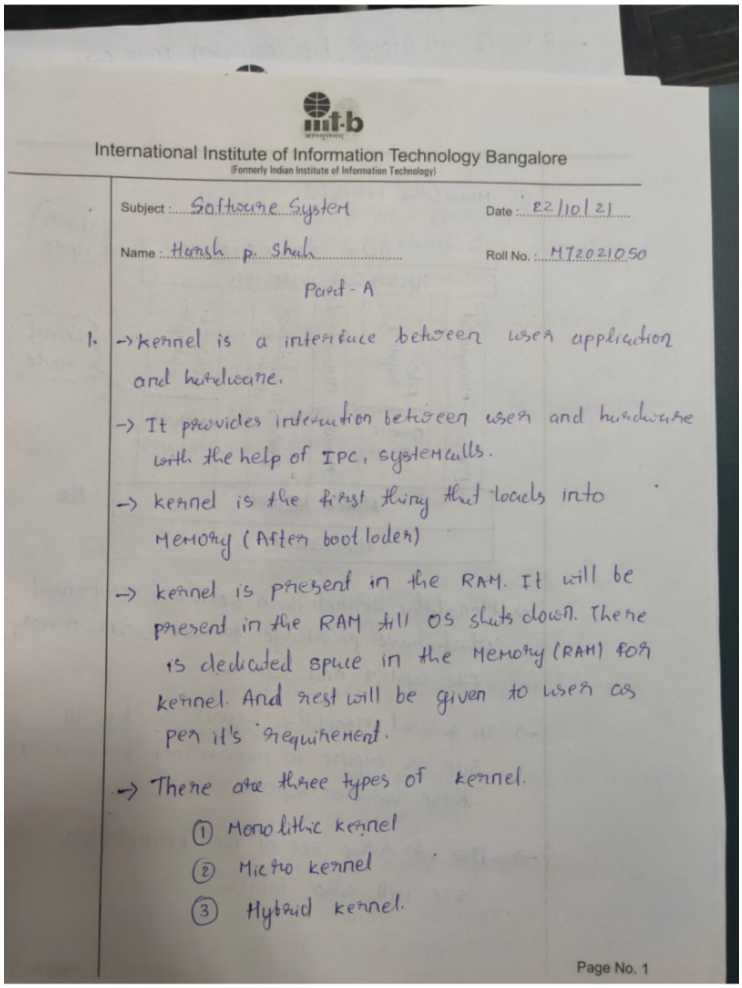

International Institute of Information Technology Bangalore
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Subject : Software System Date : 22/10/21

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Part - A

1. → Kernel is a interface between user application and hardware.
→ It provides interaction between user and hardware with the help of IPC, systemcalls.
→ Kernel is the first thing that loads into Memory (After boot loder)
→ Kernel is present in the RAM. It will be present in the RAM till OS shuts down. There is dedicated space in the Memory (RAM) for kernel. And rest will be given to user as per it's requirement.
→ There are three types of kernel.
① Monolithic kernel
② Micro kernel
③ Hybrid kernel.

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3	File Upload	✔	7.0	Hide Answer

Assume XFS file system has 15 direct and (one) single indirect and (one) double indirect data blocks. Each data block size is 4 KiB. The single and double indirect blocks store only addresses of data blocks. Each data block's address size is 4 bytes.
a. What is the maximum size of a file that you can store in the above file system?
b. If each data block has stored a single file then how many files can be stored in the file system? What would be the maximum number of inode entries in the inode block?

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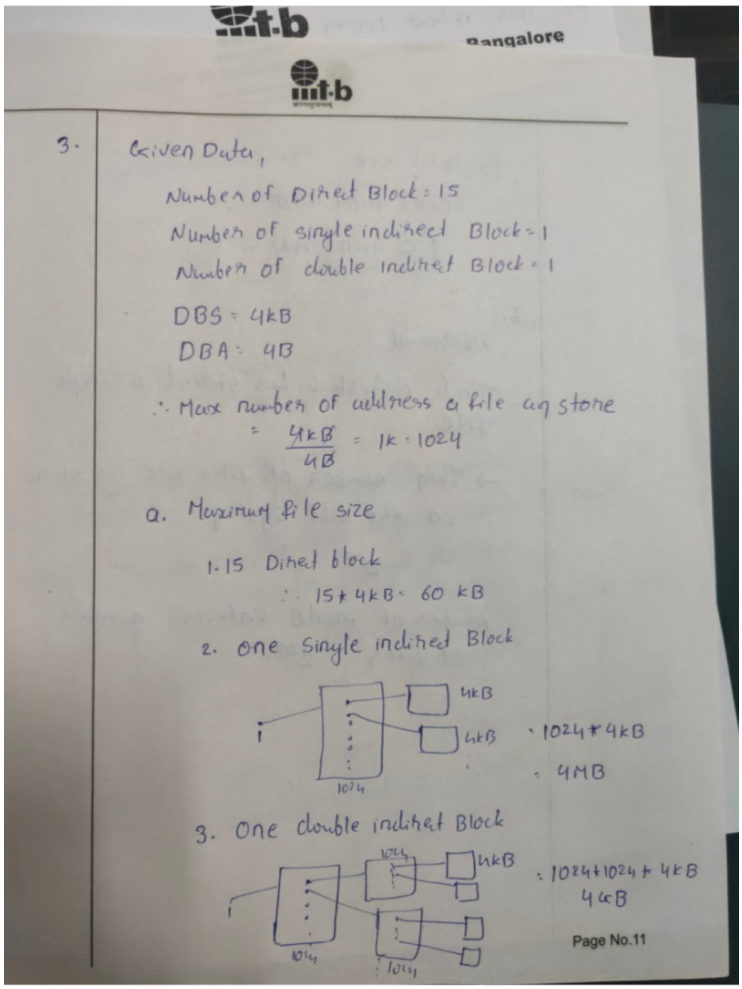

3. Given Data,

Number of Direct Block = 15

Number of single indirect Block = 1

Number of double indirect Block = 1

DBS = 4kB

DBA = 4B

∴ Max number of address a file can store

$= \frac{4kB}{4B} = 1k = 1024$

a. Maximum file size

1. 15 Direct block

∴ 15 * 4kB = 60 kB

2. One Single indirect Block

∴ 1024 * 4kB

= 4MB

3. One double indirect Block

∴ 1024 * 1024 * 4kB

4GB

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4	File Upload	✔	2.0	Hide Answer

Answer the following with suitable diagrams:
a. Explain the difference between preemptive and non-preemptive kernel.
b. In pre-emptive scheduling, when will a higher priority process can be blocked by a lower priority process and how do you overcome this problem?

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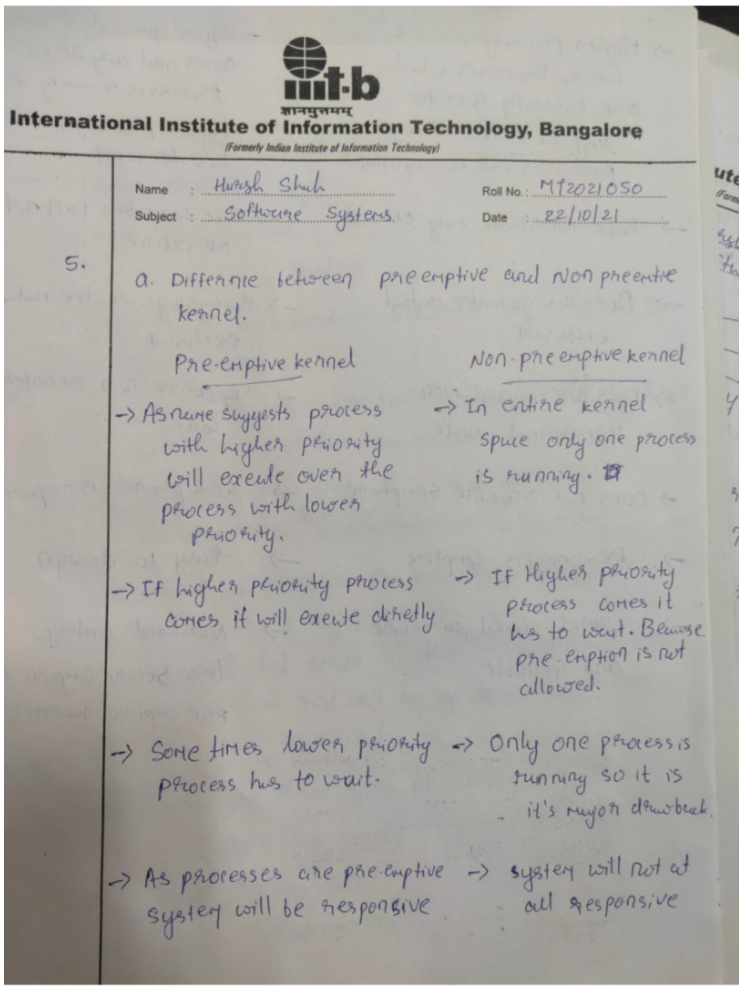

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Subject : Software Systems Date : 22/10/21

5. a. Differnce between preemptive and Non preemtive kernel.

Pre-emptive kernel	Non-pre emptive kernel
-> As name suggests process with higher priority will execute over the process with lower priority.	-> In entire kernel space only one process is running.
-> If higher priority process comes it will execute directly	-> If Higher priority process comes it has to wait. Because pre-emption is not allowed.
-> Some times lower priority process has to wait.	-> Only one process is running so it is it's major drawback.
-> As processes are pre-emptive system will be responsive	-> system will not at all responsive

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Evaluator Comments

part b not attempted

5 File Upload ✔ 7.0 Hide Answer

Explain the following process states with process state diagram :
a. TASK_RUNNING
b. TASK_INTERRUPTIBLE
c. TASK_UNINTERRUPTIBLE
d. TASK_STOPPED
e. TASK_ZOMBIE

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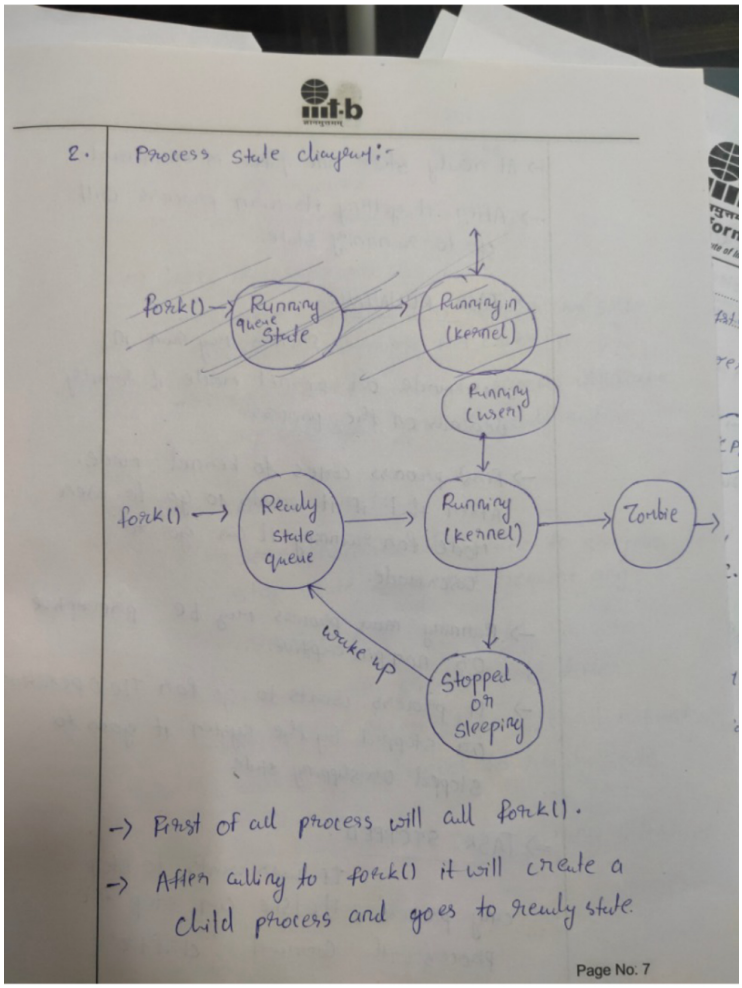

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Section B Marks per question : 1.0 | **Marks Scored : 4.5** | Negative marks per question : 50%

Q No.	Q. Type	Status	Marks	
1	Multiple	✖	-0.5	Hide Answer

Choice - Single Answer

When a process is executing in kernel mode, if it receives any signal the signal will be executed:

- when it returns to user mode
- immediately
- when it is in protected mode
- not predictable

2 Multiple Choice - Single Answer ✔ 1.0 Hide Answer

Orphan process's pid is ----------.

- init pid.
- systemd pid
- its own pid
- 1

3 Multiple Choice - Single Answer ⚠ 0.0 Hide Answer

If a process exits without unlocking a semaphore, which one of the following should be assigned in the sem_flg (in the sembuf structure) to release the semaphore?

- SEM_EXIT
- IPC_NOWAIT
- SEM_RELEASE
- SEM_UNDO

4 Multiple Choice - Single Answer ✔ 1.0 Hide Answer

Which functionality is handled by the architecture-dependent code of the kernel?

Network communication support

Terminal-interface driver

IPC

Input-Output Runtime Support

5 Multiple Choice - Single Answer ⚠ 0.0 Hide Answer

Which one of the following is never set as value of backlog argument in the listen ( ) system call?

5

0

1

3

6 Multiple Choice - Single Answer ✖ -0.5 Hide Answer

Which of the following is false regarding shared memory?

shmget ( ) is used to create a shared memory segment.

Shared Memory is a much faster method of communication than either semaphores or message queues.

Shared Memory does not require an intermediate buffer.

On success, shmget ( ) returns 1 else return -1.

7 Multiple Choice - Single Answer ⚠ 0.0 Hide Answer

On the expiration of ITIMER_REAL will generate the ---------- signal.

SIGVTALRM

SIGALRM

SIGHUP

SIGTSTP

8 | Multiple Choice - Single Answer | ✖ | -0.5 | Hide Answer

Which of the following command /system call is used to change the real-time attributes of a process?

- nice
- chmod
- chrt
- sched_get_priority_max

9 | Multiple Choice - Single Answer | ✔ | 1.0 | Hide Answer

What is buffer/cache?

- It is an on-disk memory that stores the recently accessed data from a file system.
- It is another caching device like the primary cache to improve paging performance.
- It is an in-memory store that stores the recently accessed data from a filesystem.
- None of the above.

10 | Multiple Choice - Single Answer | ✔ | 1.0 | Hide Answer

Which one of the following is the disadvantage of a message queue?

- All of the options
- very expensive for large data transfer
- during message sending, the message is copied from the user buffer into the kernel buffer
- a message in a queue cannot be reused

11 | Multiple Choice - Single Answer | ⚠ | 0.0 | Hide Answer

In the msgrcv function, if the msgtype argument is some negative integer value means, the message will be retrieved in:

- the exact value of the message type

FIFO order

first message or <= to the absolute value

depends on the priority of the messages

12 | Multiple Choice - Single Answer | ✔ | 1.0 | Hide Answer

Which one of the following is false regarding a FIFO?

zero buffering capacity.

communicate between only related processes.

half-duplex.

uses circular buffer.

13 | Multiple Choice - Single Answer | ⚠ | 0.0 | Hide Answer

A successful execl() call changes (choose more appropriate one)

Address space, process image, resetting pending signals, pid.

only the address space and process image and files.

Address space, process image, reset pending signals and dropping existing memory locks.

Address space, process image, resetting pending signals.

14 | Multiple Choice - Single Answer | ⚠ | 0.0 | Hide Answer

Which of the signals cannot be caught or ignored:

SIGILL

SIGSTOP

SIGSEGV

SIGFPE

15 | 1.0 | Hide Answer

Multiple Choice - Single Answer

Hide Answer

How many times getpid ( ) will be executed?

```
#include<stdio.h>
main()
 {
    int i;
    for (i = 1; i <= 5; i++)
      fork();
    printf("my pid = %d\n", getpid());
}
```

- 32
- 16
- 31
- 5