

# National University of Computer and Emerging Sciences, Chiniot-Faisalabad Campus



Course Name:	Operating System	Course Code:	CS2006
Degree Program:	BS(CS)   BS(SE)	Semester:	Spring-2024
Exam Duration:	60 Minutes	Total Marks:	50
Paper Date:	Monday, February 26, 2024	No of Page(s):	6
Sections:	ALL		
Exam Term & Type:	1 <sup>st</sup> Sessional   Closed Book	Required Answer Book:	No

Course Instructor: Mr. Shahbaz Ayyaz, Ms. Nasreen Akhter, Ms. Sahar Ajmal, Ms. Mahzaib Younas

Student Name: \_\_\_\_\_ Roll No. \_\_\_\_\_ Section: \_\_\_\_\_ Invigilator's Signature \_\_\_\_\_

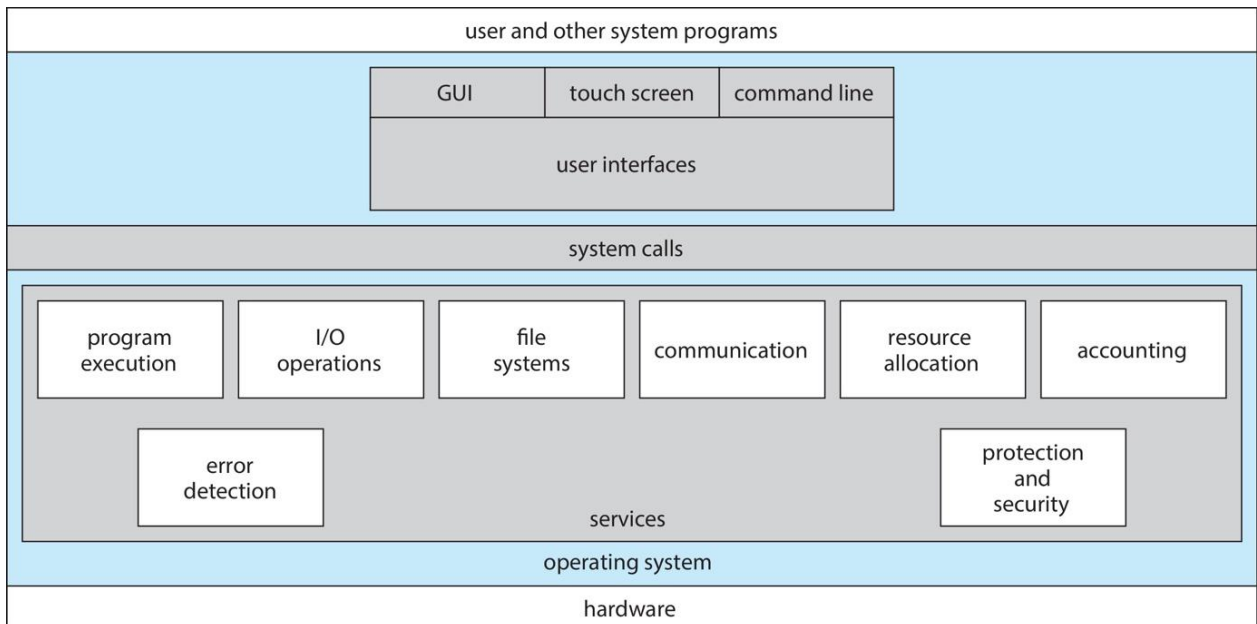
CLO	1				2			Total	Examiner Signature and Date
Q.Part#	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	50	
Total Marks	10	4	6	10	10	5	5		
Obtained Marks									

**Instruction/Notes:** Attempt all questions. Programmable calculators are not allowed.

Vetted By	Vetter Signature:
Declaration by course instructor	The question paper has an 100% dissimilarity as compared to the question papers of the same subject from the last two years.

Course Learning Outcomes	Domain/ TaxonomyLevel	PLO
1 Describe services provided by the modern Operating Systems	2	2

**Q1: Name operating system services and show them in the following diagram. [4+2+4 =10]**

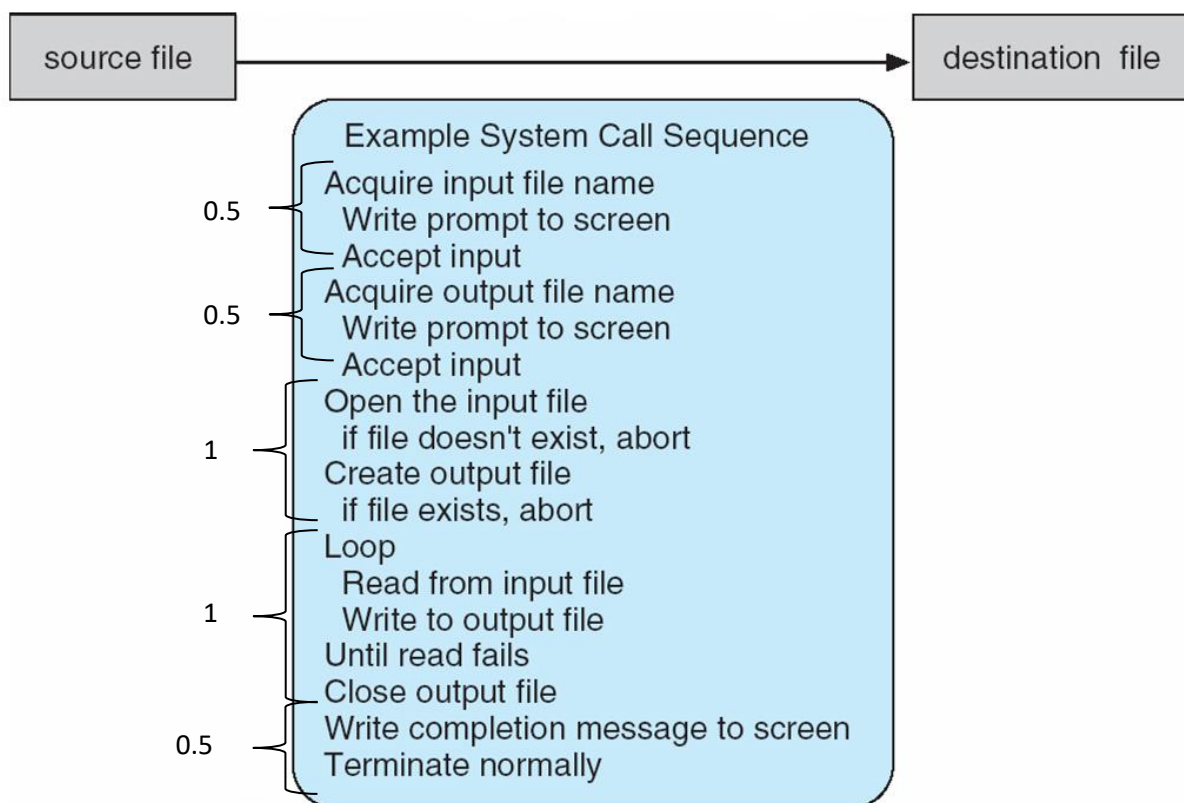


**Part B: What system calls have to be executed by a command interpreter or shell to start a new process on a UNIX system? [2]**

Fork()	(1)
Exec()	(1)

**Part C: What system call sequence is used to copy the contents of the source file to the destination file? Note down the required system calls and provide an ordered sequence of system calls in your final answer. [2+2]**

0.5 marks for following order



**Q2: Define cloud computing? Write down the name of its types and services.**

**[4]**

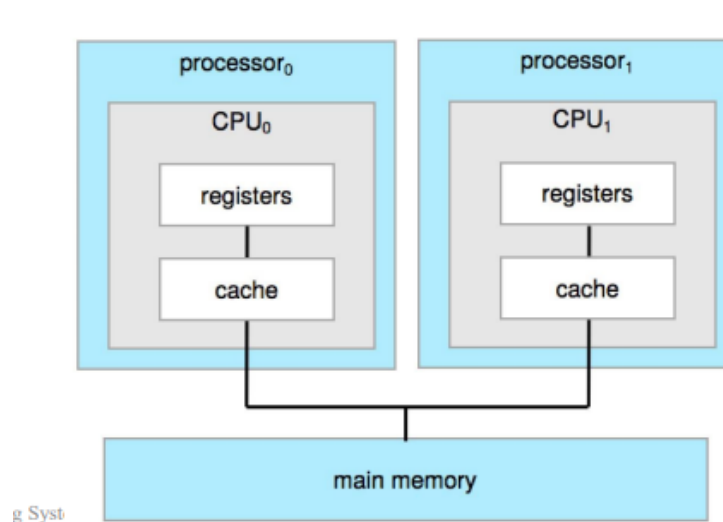
Cloud computing is the delivery of different services through the Internet, including data storage, servers, databases, networking, and software **[1 marks of definition]**

Types of cloud Computing	[0.5 x 3 = 1.5]	Services of cloud computing	[0.5 x 3 = 1.5]
Private Cloud		Software as service	
Public Cloud		Infrastructure as service	
Hybird Cloud		Platform as service	

**Q3: Define the role of Symmetric Multi-Processing (SMP)? Explain It's with the help of its architecture? [1.5 (definition)+1.5(explanation)+3(Diagram)]**

SMP (symmetric multiprocessing) is computer processing done by multiple processors that share a common operating system (OS) and memory.

Each Processor perform all task



In this design, each core has its own register set, as well as its own local cache, often known as a level 1, or L1, cache. Notice, too, that a level 2 (L2) cache is local to the chip but is shared by the two processing cores. Most architectures adopt this approach, combining local and shared caches, where local, lower-level caches are generally smaller and faster than higher-level shared caches.

**Q4: Select True or Fall option and justify your choice?**

**[2.5\*4=10]**

**Part A: All multitasking operating systems are multi programming but the reverse is not true [T/F]**

Reason: because multiprogramming concept is used to efficient CPU utilization. So in multitasking time is share among processes. So each process takes its assign time slot and after that time expire it wait for it's next turn. On the other hand in multiprogramming the process may wait for i/o or child process completion or may wait for it's next turn if time expire. So multiprogramming is broader concepts. That contain one concepts of time slice.

**Part B: Application programmers write applications program according to System calls. [T/F]**

Reason: System calls are different for different operating system. Application programs are not portable if design according to system calls.

**PART C: Interrupt and trap generated to get OS attention [T/F]**

Reasons: Interrupt is hardware generated signal. So when hardware wants to send data it generates signal that get the attention of os in order to complete the transfer. On the other hand trap is software generated signal that inform the operating system about certain errors, or some services to be required.

**PART D: Modular structure of Operating system is more appropriate than Layer structure: [T/F]**

Reasons: modular and layer structure are similar but modular is more better. As in layer every layer is connected with other layer so any modification in on layer cause to update the other layer. Where in modular every modules are connected but are independent.

Course Learning Outcomes		Domain/ Taxonomy Level	PLO
2	Implement solutions employing concepts of Processes and Threads	3	3

**Q5: Consider the given program. You are given four choices. Consider the given program you need to encircle exactly one choice which you thinks is correct** [5+5=10]

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
int main()
{
    int arr[] = { 1, 2, 3, 4};
    int n = sizeof(arr) / sizeof(arr[0]);
    int pid = fork();
    if (pid == 0)
    {
        // Child process
        printf("Child process:\n");
        for (int i = 0; i < n; i++)
        { if (arr[i] % 2 != 0)
            { // Odd number
                int result = 1;
                for (int j = 0; j < arr[i]; j++)
                { result *= arr[i]; }
                printf("%d^%d = %d\n", arr[i], arr[i], result)    /*Line A*/
            }
        }
    }
}
Else
if (pid > 0)
{ // Parent process
    printf("Parent process:\n");
    for (int i = 0; i < n; i++)
    {
        int result = -i * arr[i] - 1;
        printf("(%d * -%d) - 1 = %d\n", arr[i], arr[i], result);    /*Line B*/
    }
}
else { fprintf(stderr, "Fork failed\n"); return 1; }
return 0;
}
```

**Part A: What will be the output of line A** [2.5]

- 1,2,3,4
- 1,3
- 1,4,27,256
- 1, 27

**Part B: What will be the output of line B** [2.5]

- 1,2,3,4

- b. 1,3
- c. 1,4,27,256
- d. 1, 3

Note:

-2,-5,-10,-1

If someone write this answer and write none of them mark true.

```
int main() {
    pid_t pid;
    pid = fork();
    printf("The process creates child process");
    if (pid == 0) {

        printf("This is child process")
        pid_t p=fork();
        printf(" Child process has been created");
        if(p==0)
        {
            printf("Grand Child process");
        }
        Else
        Printf("Child process);
    }
    Else
    if(pid>0)
        printf("This is parent process");
    Return 0;
}
```

**Part C: What will be the output of the above-mentioned program?**

**[5]**

- The process creates child process.
- This is parent process.
- This is child process.
- Child process has been created.
- Grand child process.

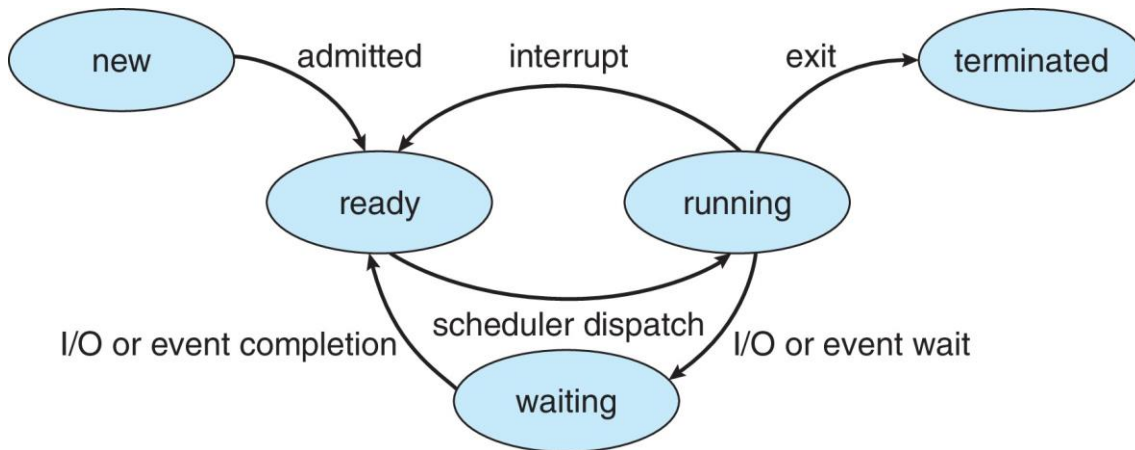
**Q6: Define Process? Explain the States of Process with the help of diagram?**

**[5]**

(1)

A program in execution is called process. A process is the unit of work in a modern computing system.

(2)



(2)

- New. The process is being created.
- Running. Instructions are being executed.
- Waiting. The process is waiting for some event to occur (such as an I/O completion or reception of a signal).
- Ready. The process is waiting to be assigned to a processor.
- Terminated. The process has finished execution.

**Q7: Define Context switching. Why are cooperative processes allowed in an operating system?**

[5]

(2)

Switching the CPU core to another process requires performing a state save of the current process and a state restore of a different process. This task is known as a context switch.

There are several reasons for providing an environment that allows process cooperation:

(3)

- Information sharing. Since several applications may be interested in the same piece of information (for instance, copying and pasting), we must provide an environment to allow concurrent access to such information.
- Computation speedup. If we want a particular task to run faster, we must break it into subtasks, each of which will be executing in parallel with the others. Notice that such a speedup can be achieved only if the computer has multiple processing cores.
- Modularity. We may want to construct the system in a modular fashion, dividing the system functions into separate processes or threads