

ASSIGNMENT- 1

Operating Systems (TCS-502)

Submission date: On or before 6th September, 2023 by 12 pm on link to be shared. After this date and time, assignments will not be submitted and evaluated and will be awarded zero marks.

INSTRUCTIONS:

File Naming Convention:

<ClassRollNo_YourFirstName_LastName_<Section>

Ex: 25_Hari_Singh_D.

Any other Naming convention will lead to deduction of your marks straightaway.

- 1. Assignment marks will be taken towards sessional marks calculation.**

Q1) When a system call is executed, it is typically treated by the hardware as a software interrupt. So explain How this Interrupt is handled or serviced. In your explanation, mention the role of various entities (like CPU, OS etc.) involved clearly.

Q2) Why do we need to use the Library function, can't we use system calls directly in our programs/applications?

Q3) Some CPUs provide for more than two modes of operation. What are two possible uses of these multiple modes?

Q4) Some computer systems do not provide a privileged mode of operation in hardware. Is it possible to construct a secure operating system for these computers? Give arguments both that it is and that it is not possible.

Q5) What are kernels, explain different types of kernels and differentiate between them?

Q6) List two challenges an operating system faces when passing parameters between user and kernel mode (e.g., consider the differences between passing parameters via procedures in the same process versus between processes/applications). Describe how an operating system can overcome them.

Q7) Write the 3 examples each of Linux Bootloader and Windows Bootloader.

Q8) What is firmware? Why do some systems store the OS in Firmware while others store it on Disk?

Q9) How could a system be designed to allow a choice of operating systems to boot from? What would the bootstrap program need to do?

Q10) Most operating systems are designed for general purpose computation. A proposal has been put forth for designing a OS called MathOs which is optimized for math intensive programs. In MathOs, the kernel includes system calls for many useful operations like matrix arithmetic, Bessel functions, $\sin()$, $\cos()$ etc.. Is this concept for MathOs a good idea. Explain why or why not.

Q11) What is primary bootloader and secondary bootloader? What is the need of secondary bootloader? What is cold booting and warm booting?

Q12) Write in brief about the following wrt. Unix Based OS:

- Internal Commands
- External Commands
- Filters
- vi Editor

Q13) Show the commands on terminal with their options needed to achieve the below tasks. You have to do all the tasks below using Linux commands on Linux terminal. Paste the screenshot of commands written on terminal as answer for this question.

1. Make a directory with the name ***OS_LAB inside your home directory.***
2. ***Create 2 files inside this directory with name 1.txt and 2.txt***
3. Write 10 lines of text inside 1.txt. The text should contain the word “operating” at some of the places inside 1.txt.
4. Now Copy the first 5 lines from 1.txt into 2.txt
5. Now count the occurrence of word “operating” inside 2.txt and store this count inside a new file count.3xt
6. Now delete this directory ***OS_LAB***

Do not first make the directory empty and delete. Delete the directory when the directory is not empty (it contains 1.txt and 2.txt)

Q.14) Below are mentioned three mechanisms, which support dual mode operation: Privileged instructions, memory protection, and timer interrupts. Now explain what might go wrong without that mechanism, assuming the system only had the other two that means Privileged instructions, memory protection is there but timer interrupts is not there and so on.

Q15) Describe some of the challenges of designing operating systems for mobile devices compared with designing operating systems for traditional PCs.

Q16) Some early computers protected the operating system by placing it in a memory partition that could not be modified by either the user job or the operating system itself. Describe two difficulties that you think could arise with such a scheme.

Q 17) What is POSIX and Win32 ? Write the name of POSIX based system call and corresponding system call as per Win 32 with 1-2 lines of description of system call to tell the function of that system call.
One example is given for you.

POSIX System call	Win32 System call	Description of system call
fork()	CreateProcess	Create a new process