Operating Systems-Fall2024
Homework 2
Submission: 11:55pm 3rd October, 2024

Q1. Differentiate between an RISC-V ecall and xv6 system call? Use code to explain how do they work together to take control from user space to kernel space.

Q2. The following code implements

/bin/ls -al / | /usr/bin/tr a-z A-Z

The first command generates a long-format directory listing of the root (/) directory and the second command takes that listing and translates all lowercase characters to uppercase.

Implement this code in xv6. Give reasons why it cannot be done

Q3. Suggest ways to make the system call table inaccessible from user space

Q4. Define the usage of all the data structures found in proc.h file. Are they stored in process memory or kernel memory? Determine the file that can provide information about this data structures storage.

Q5. Find out the ways of protecting xv6's system call table from hackers.

Q6. What can be the reason to use a7 register to store the system call number? Why not t or s registers in the register file.

Q7. Differentiate between CLINT and PLIC

Q8. There are 21 system calls in xv6. Now imagine that due to hacking, everytime a system call is made, the actual system call number gets stored as x+50. Identify the code where system calling will fail