

## Assignment #1

[10 points]

To succeed in this assignment, prioritize conciseness—convey your ideas in as few words as possible. Embrace open-ended questions, where there's no single correct answer. Instead, make reasonable assumptions and respond as a wireless network designer or researcher would. Best of luck! Each question has a value of 1 pt.

1. How does the distinction between kernel mode and user mode function as a rudimentary form of protection (security) system?
2. What is the purpose of system calls?
3. Describe the actions taken by a kernel to context-switch between processes.
4. What are common commands and their respective functionalities in the Unix/Linux command shell, and how can they be used effectively to manage files and directories? Please list at least five of them.
5. Consider the following C code snippet that demonstrates the use of the fork system call, and answer the questions below.

```
#include <stdio.h>
#include <unistd.h>

int main() {
    pid_t pid = fork();

    if (pid == -1) {
        // Error handling
        perror("fork");
        return 1;
    } else if (pid == 0) {
        // Child process
        printf("Child process: My PID is %d\n", getpid());
    } else {
        // Parent process
        printf("Parent process: My PID is %d\n", getpid());
        printf("Parent process: Child PID is %d\n", pid);
    }

    return 0;
}
```

- a) **Explain the purpose of the fork system call in this code. How does it facilitate the creation of a new process?**
- b) **Describe the behavior of the child process and the parent process after the fork call. What information does each process print?**
- c) **What are the potential return values of the fork system call? How does the code handle each possible scenario?**
- d) **Discuss the concept of copy-on-write memory as it relates to the memory management of the child process. How does it optimize memory usage in this context?**
- e) **How are file descriptors handled between the parent and child processes? Are they shared or copied? Explain your answer.**
- f) **What potential issues or considerations should be taken into account when managing shared resources between parent and child processes in a multi-process environment?**