**Homework Assignment #1**

***Due Date: 2/9, 11:59 p.m., please submit a soft copy via Blackboard. Late submissions are accepted till 2/12, 11:59 p.m., with 10% penalty each day.***

***Please name your submission file starting with “LastName\_FirstName\_HW1”.***

**Q1.** **(Chapter 1, Problem 1)** What are the two main functions of an operating system?

The first one is source management and second one is extending machine.

**Q2.** What type of multiplexing (time or space) is mostly suitable for sharing the following resources, respectively: CPU, memory, disk, network card, printer, and keyboard?

For time multiplexing:

CPU, network card, printer, and keyboard

For space multiplexing:

Memory and disk

**Q3.** What are Program Counter (PC), Stack Pointer (SP), and Program Status Word (PSW) registers?

Program Counter register is a register containing the memory address of  
the next instruction to be fetched.

Stack Pointer register is a register containing the address of the top of the current  
stack in memory.

Program Status Word register is a register containing the condition code bits.

**Q4. (Chapter 1, Problem 17)** What is a trap instruction? Explain its use in operating systems.

A trap instruction switches from user mode to kernel mode to execute a system call.

**Q5.** What is a shell? Please name two shells.

shell is a command-line user interface which offer user can interact with the operation system.

In Unix, there are two major types of shells:

Bourne shell and C shell.

**Q6.** What is the purpose of a system call in an operating system?

The system call allows users to interact with operation system, it offers an interface to end-users and users can call system functions when they needed.

**Q7. (Chapter 1, Problem 23)** A file whose file descriptor is *fd* contains the following sequence of bytes: 3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5. The following system calls are made:

*lseek(fd, 3, SEEK\_SET);*

*read(fd, &buffer, 4);*

where the *lseek* call makes a seek to byte 3 of the file (note the file byte offset starts from 0). What does *buffer* contain after the read has completed?

1,5,9,2

**Q8.** Based on Fig. 1-17, please briefly discuss these 11 steps involved in making the system call *read(fd, buffer, nbytes)*.

Push parameters

Call function read

The function reads from register

Call trap instruction

Kernel handle the system call

System call handler runs

Returns to the user space

The procedure returns to the user program

The SP incremented to clean up the stack

**Q9. (Chapter 1, Problem 26)** In the example given in Fig. 1-17, the library procedure is called read and the system call itself is also called read. Is it essential that both of these have the same name? If not, which one is more important?

Not essential.

The name of the library procedure is more important because that is what appears in the program.

**Q10.** Please list two disadvantages of a monolithic operating system structure and two advantages of a microkernel operating system structure.

Disadvantages of a monolithic operating system structure:

1. Hard to manage due to its monolithic structure.
2. Security issue.

Advantage of a microkernel OS:

1. Less problems as the kernel minimized.
2. More reliable and more secure.

THE END.