**CS 3343 Operating Systems Assignment 2 12 points**

**Due February 5 at 5pm**

**One homework assignment submission per student. Microsoft Word format only. No AI or GPT use. Cite all references.**

**Email your answers to me at** [**harringp@nsuok.edu**](mailto:harringp@nsuok.edu)

**Send emails exclusively via** [**https://mail.google.com/**](https://mail.google.com/)

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**Chapter 2**

**Part 1 : Use the slides or textbook definitions to answer the following (8 points)**

1. The services and functions provided by an operating system can be divided into two main categories. Briefly describe the two categories. **(Book 56-57)**
   1. One category is to help aid the user. Things like user interface, program execution, I/O operations, file-system manipulation, etc. are part of this category. The other category is for ensuring the efficient operation of the system itself. These include things like resource allocation, accounting, and protection/security.
2. List three services provided by an operating system that are designed to make it more convenient for users to use the computer system. **(Ch 2 Slides – 4)**
   1. The first service is user interface which are things like a command-line or a GUI. The second service is program execution which allows for programs to load and execute. The third service is I/O operations. The OS needs to be able to take in I/O whether it be a file or I/O from a device.
3. What is the purpose of the command interpreter and why is it separate from the kernel? **(Book 6 & 58, Ch 2 Slides – 8)**
   1. A command interpreter allows you to directly enter commands to be performed by the operating system. Sometimes the command interpreter can be implemented in the kernel. Other times it is implemented in system programs. I would have to say that it is separate because the kernel is the program that is always running on an OS, and the command interpreter allows for entry of commands to be performed by the OS.
4. Who originated the GUI concept? **(Ch2 Slides – 9)**
   1. According to the slides, Xerox PARC originated the GUI concept.
5. How is using the API functions better than using a system call? **(Book 63, Ch 2 Slides – 12)**
   1. Systems can execute up to thousands of system calls. Using an API can help streamline usage by specifying a set of functions that are available to an application programmer.
6. What is the main advantage of the microkernel approach to system design? **(Ch 2 Slides – 35)**
   1. It moves as much from the kernel into “user space” as possible. The benefits of this according to the slides is that it is easier to extend a microkernel, easier to port the OS to new architectures, it’s more reliable, and finally more secure.
7. What organization is credited with originating the virtual-machine concept in OS design? **(Ch 2 Slides – 40)**
   1. According to the slides, it appears to be IBM, and they used it in IBM mainframes starting in 1972.
8. What are the three essential components of the Java technology? **(Ch 2 Slides – 45)**
   1. According to the slides, Java consists of programming language specification, an API, and virtual machine specification.

**Part 2: Java programming (4 points):**

Write a java program with a main function to create a ProcessBuilder class. Call the start() function. Modify the process’ working directory to the local directory of your java file; be sure to use the File class. Also, use the Scanner class to read a string from the keyboard.

import java.util.Scanner;

import java.io.File;

public class Assignment2

{

    public static void main(String[] args)

    {

        //Assignment 2 - Part 2 - Question 1

        try

        {

            //Process Builder

            System.out.println("Assignment 2 - Part 2 - Question 1");

            System.out.println();

            //I emailed you on this issue, but I played around with the Process Builder and its command/arguments.

            //I couldn't quite figure out how to tackle the ProcessBuilder, but I did update the directories as specified in the assignment.

            ProcessBuilder pb = new ProcessBuilder("Assignment2.java");

            //The oracle docs show that directory() returns the current working directory and that it may be NULL. In my case it is.

            System.out.println(pb.directory());

            pb.directory(new File("C:/Users/XzXCo/OneDrive/NSU College/Computer Science Work/Spring 2024/Operating Systems"));

            //To validate that the directory has indeed changed, I again called directory() and it shows the directory has changed.

            System.out.println(pb.directory());

            System.out.println();

            pb.start();

        }

        catch(Exception e)

        {

            System.out.println("Error Ocurred: " + e);

        }

        //Assignment 2 - Part 2 - Question 2

        try

        {

            //Scanner Input

            System.out.println();

            System.out.println("------------------------------------");

            System.out.println("Assignment 2 - Part 2 - Question 2");

            System.out.println();

            Scanner in = new Scanner(System.in);

            System.out.println("Please enter a sentence from the keyboard.");

            System.out.println();

            System.out.print("Enter: " );

            String sentence = in.nextLine();

            System.out.println();

            System.out.println("The sentence you entered was: " + sentence);

            in.close();

        }

        catch(Exception e)

        {

            System.out.println("Error Ocurred: " + e);

        }

    }

}

**A screenshot of a computer screen

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