SWE 4201 - OBJECT ORIENTED CONCEPTS I

LAB 01 HANDOUT AND TASKS

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1 JDK INSTALLATION

Java Development Kit (JDK) 21 is the latest long-term support (LTS) release of Java. However, we will use JDK 17 version. This guide will walk you through the installation process step by step.

1.1 Downloading JDK 17

1. Open your web browser and go to the Oracle website: https://www.oracle.com/java/technologies/javase/jdk17-archive-downloads.html.
2. Download the appropriate JDK 17 installer for your operating system (e.g., Windows, macOS, Linux). For Windows OS, download the 64-bit .exe file. For macOS, download the 64-bit .dmg file and for Linux, download the 64-bit .rpm file.

1.2 Installing JDK 17 on Windows

1. Double-click the downloaded installer file (e.g., `jdk-17.0.1_windows-x64_bin.exe`) to start the installation process.
2. Follow the on-screen instructions to complete the installation. You may need to specify the installation directory and agree to the license terms.
3. Once the installation is complete, open a command prompt and type `java -version` to verify that JDK 17 has been installed successfully.

1.3 Installing JDK 17 on macOS

1. Double-click the downloaded disk image file (e.g., `jdk-17.0.1_osx-x64_bin.dmg`) to mount it.
2. Double-click the mounted disk image to open it.
3. Double-click the JDK 17 package file (e.g., `JDK 17.pkg`) to start the installation.

4. Follow the on-screen instructions to complete the installation. You may need to enter your administrator password.

5. Once the installation is complete, open a terminal and type `java -version` to verify that JDK 17 has been installed successfully.

1.4 Installing JDK 17 on Linux

1. Open a terminal and navigate to the directory where the downloaded installer file is located.

2. Make the installer file executable by running the command:
   `chmod +x <installer_file_name>`

3. Run the installer with root privileges:
   `sudo ./<installer_file_name>`

4. Follow the on-screen instructions to complete the installation.

5. Once the installation is complete, open a terminal and type `java -version` to verify that JDK 17 has been installed successfully.

1.5 Step 2: Set up Environment Variables (Windows)

(a) If you're using Windows, you may need to set up the `JAVA_HOME` and `PATH` environment variables.

(b) `JAVA_HOME` should point to the directory where JDK is installed (e.g., `C:\Program Files\Java\jdk-17`).

(c) `PATH` should include the `bin` directory of the JDK installation (e.g., `%JAVA_HOME%\bin`).

This document provides a step-by-step guide to installing IntelliJ IDEA.

2 JAVA IDE INSTALLATION

1. **Download IntelliJ IDEA**
   (a) Open a web browser and navigate to the IntelliJ IDEA website.
   (b) Click on the "Download" button for the edition (Community or Ultimate) you want to install. You can use the community edition for free. The ultimate edition requires you to sign up using your institutional email. Every year you have to redeem your credential.
   (c) Choose the appropriate download for your operating system (Windows, macOS, Linux).
2. **Run the Installer**
   (a) Once the download is complete, locate the downloaded installer file.
   (b) Double-click on the installer file to run it.
   (c) Follow the on-screen instructions to install IntelliJ IDEA.

3 JAVA PROGRAM EXECUTION

To run a simple Java program the following steps need to be performed.

1. Open a text editor (e.g., Notepad, Visual Studio Code, IntelliJ IDEA).
2. Write your Java program. For example, create a file named `HelloWorld.java` with the following content:

```
1  public class HelloWorld {
2      public static void main(String[] args) {
3          System.out.println("Hello, World!");
4      }
5  }
6
```

Listing 1: Hello World Java Code

3. Save the file with a `.java` extension (e.g., `HelloWorld.java`).

4. To Compile and Run the Java Program:

   (a) Open Command Prompt (Windows) or Terminal (macOS/Linux).

   (b) Navigate to the directory with the Java program using the `cd` command.

   (c) Compile the Java program using the `javac` command:

```
javac HelloWorld.java
```

5. Run the compiled Java program using the `java` command:

```
java HelloWorld
```

6. If the program runs successfully, you should see the output printed to the console:

```
Hello, World!
```

4 UNDERSTAND A JAVA PROGRAM

Listing 1 shows a simple Java program that prints "Hello, World!". Let's break down the different parts of this program:

- **Class Declaration:** The program starts with the declaration of a class named `HelloWorld`. In Java, the name of the class must match the filename.
- **Main Method:** Inside the `HelloWorld` class, there is a method named `main`. This is the entry point of the program, and it's where the execution begins. It takes an array of strings (`args`) as its parameter.
- **Print Statement:** Within the `main` method, there is a single statement that uses the `System.out.println` method to print "Hello, World!" to the console.

When you run this program, it will output:

```
Hello, World!
```

This simple program demonstrates the basic structure of a Java program and how to use the `System.out.println` method to print text to the console.

4.1 Another Example

```java
public class Rectangle {
    // Attributes
    private int length;
    private int width;

    // Constructor
    public Rectangle(int length, int width) {
        this.length = length;
        this.width = width;
    }

    // Method to calculate area
    public int calculateArea() {
        return length * width;
    }

    public static void main(String[] args) {
        // Creating an object of the Rectangle class
        Rectangle rectangle = new Rectangle(5, 3);

        // Calling the calculateArea method
        int area = rectangle.calculateArea();

        // Printing the result
        System.out.println("The area of the rectangle is: " + area);
    }
```

```
}
```

Listing 2: Java Example: Rectangle Class

Listing 2 shows a simple Java program that defines a `Rectangle` class with attributes, a constructor, a method, and an example of creating an object of the class.

Explanation

- **Class Declaration:** The `Rectangle` class represents a geometric rectangle with attributes `length` and `width`.
- **Constructor:** The constructor initializes the `length` and `width` attributes when a `Rectangle` object is created.
- **Method:** The `calculateArea` method calculates the area of the rectangle.
- **Object Creation:** In the `main` method, an object of the `Rectangle` class is created with a length of 5 and a width of 3.
- **Output:** When the program is run, it prints the area of the rectangle, which is 15 in this case.

5 C# Environment Setup

1. **Download Visual Studio 2022**
   (a) Open a web browser and navigate to the Visual Studio website.
   (b) Click on the "Download Community 2022" button.
   (c) Follow the on-screen instructions to download the installer.
2. **Run the Installer**
   (a) Once the installer is downloaded, double-click on the downloaded file to run it.
   (b) If prompted, grant administrative privileges to the installer.

(c) You can follow this page as well.

(d) You do not need other components to select. Just proceed to install with the default selected options. If you click the install button, the installer will "install while downloading".

(e) The installer will download and install the selected components. This may take some time depending on your internet connection speed and the selected components. You can change the option to "Download all, then install". This will be installed after downloading all required components.

3. **Complete Installation**

(a) Once the installation is complete, you will be prompted to restart your computer.

(b) After restarting, you can launch Visual Studio 2022 and start using it for your development projects.

6 First C# Program

1. You can follow the instruction of Get started to write your first program in C#.

This is a simple program in C#