

Introduction to Programming I

Lab 5

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Introduction to Java

What is Java?

Java is a cross-platform object-oriented programming language and computing platform first released by Sun Microsystems in 1995.

It is designed to have as few implementation dependencies as possible.

Developing in Java

To develop in Java you need an IDE such as IntelliJ IDEA and Java SDK (JDK). A JDK is a software package that contains libraries, tools for developing and testing Java applications (development tools), and tools for running applications on the Java platform (Java Runtime Environment — JRE).

Source: <https://www.jetbrains.com/help/idea/sdk.html#jdk>

Example: HelloWorld.java

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

Object Oriented Programming

Object Oriented programming (OOP) is a programming paradigm that relies on the concept of **classes** and **objects**.

It is used to structure a software program into simple, reusable pieces of code blueprints (usually called classes), which are used to create individual instances of objects.

Object Oriented Programming example

```
abstract class Animal { // Abstract parent class
    // Private attributes
    private String name;
    // Constructor class
    public Animal(String name) { this.name = name; }
    // Getter and Setter methods
    public String getName() { return name; }
    public void setName(String name) { this.name = name; }
    // Abstract method
    public abstract void sound();
}

public class Dog extends Animal {
    public void sound() { System.out.println("The dog barks."); }
}

public class Cat extends Animal {
    public void sound() { System.out.println("The cat mews."); }
}

public class App {
    public static void main(String args[]){
        Animal myDog = new Dog("Rex");
        myDog.sound();
        Animal myCat = new Cat("Luna");
        myCat.sound();
    }
}
```

Exercise 1

- a) Write a program to swap two numbers in Java.
- b) Write a program which finds an ASCII value of a character.
- c) Write a Java program to get the index of all the characters of the alphabet.
- d) Write a Java program to compare 2 strings lexicographically.
Hint: 2 strings are lexicographically equal if they have the same length and contain the same characters in the same order
- e) Write a Java method to count all vowels in the string.

Exercise 1a: Solution

```
public class SwapNumbers {  
    public static void main(String[] args) {  
        float first = 1.20f, second = 2.45f;  
  
        System.out.println("--Before swap--");  
        System.out.println("First number = " + first);  
        System.out.println("Second number = " + second);  
  
        // Value of first is assigned to temporary  
        float temporary = first;  
  
        // Value of second is assigned to first  
        first = second;  
  
        // Value of temporary (which contains the initial value of first) is assigned to second  
        second = temporary;  
  
        System.out.println("--After swap--");  
        System.out.println("First number = " + first);  
        System.out.println("Second number = " + second);  
    }  
}
```

Exercise 1b: Solution

```
public class AsciiValue {  
  
    public static void main(String[] args) {  
  
        char ch = 'a';  
        int ascii = ch;  
        // You can also cast char to int  
        int castAscii = (int) ch;  
  
        System.out.println("The ASCII value of " + ch + " is: " + ascii);  
        System.out.println("The ASCII value of " + ch + " is: " + castAscii);  
    }  
}
```

Exercise 2

- a) Write a Java program to convert temperature from Fahrenheit to Celsius degree.
- b) Calculate Difference Between two Time periods by creating a class Time.
- c) Write a Java program to convert binary, decimal and hexadecimal numbers

Exercise 2b: Solution (1/2)

```
public class Time {

    int seconds;
    int minutes;
    int hours;

    public Time(int hours, int minutes, int seconds) {
        this.hours = hours;
        this.minutes = minutes;
        this.seconds = seconds;
    }

    public static void main(String[] args) {

        // create objects of Time class
        Time start = new Time(8, 12, 15);
        Time stop = new Time(12, 34, 55);
        Time diff;

        // call difference method
        diff = difference(start, stop);

        System.out.printf("TIME DIFFERENCE: %d:%d:%d - ", start.hours, start.minutes, start.seconds);
        System.out.printf("%d:%d:%d ", stop.hours, stop.minutes, stop.seconds);
        System.out.printf("= %d:%d:%d\n", diff.hours, diff.minutes, diff.seconds);
    }
}
```

Exercise 2b: Solution (2/2)

```
public static Time difference(Time start, Time stop) {
    Time diff = new Time(0, 0, 0);

    // if start second is greater
    // convert minute of stop into seconds
    // and add seconds to stop second
    if(start.seconds > stop.seconds){
        --stop.minutes;
        stop.seconds += 60;
    }

    diff.seconds = stop.seconds - start.seconds;

    // if start minute is greater
    // convert stop hour into minutes
    // and add minutes to stop minutes
    if(start.minutes > stop.minutes){
        --stop.hours;
        stop.minutes += 60;
    }

    diff.minutes = stop.minutes - start.minutes;
    diff.hours = stop.hours - start.hours;

    // return the difference time
    return(diff);
}
```

Exercise 3

- a) Write a program to calculate the average value of integer array elements.
- b) Write a program to insert an element (specific position) into the array.
- c) Write a program to find the duplicate values of an array of integer values.

Exercise 4

- a) Write a program to check whether a file or directory specified by pathname exists or not.
- b) Write a Java program to check if given pathname is a directory or a file.
- c) Write a program that reads the data from a text file and writes it into another text file

References

1. Java Code Conventions
<https://www.oracle.com/technetwork/java/codeconventions-150003.pdf>
2. JavaDoc <https://www.oracle.com/java/technologies/javase/javadoc-tool.html>
3. JVM Java SE 8 Edition
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4. IntelliJ IDEA <https://www.jetbrains.com/idea/>