ICT1009 Object-oriented Programming – Lab 1

AY2021/2022

Topics:

1. Familiarize with Eclipse IDE
2. Understanding Java programming fundamentals

Warm up exercises:

The following lab assignment requires the use of all topics discussed so far in the module. You may wish to practice some of the concepts with simple exercises before attempting the lab assignment. You are not required to include these exercises in your submission, though you may wish to do so, to help you in the test.

1. Try the examples in lecture 1 to learn how to use CASE, DO-WHILE/WHILE, and FOR loops in JAVA.
2. Develop one java program to evaluate the following expressions.

```
System.out.println(2 * (5 / 2 + 5 / 2));
System.out.println(2 * 5 / 2 + 2 * 5 / 2);
System.out.println(2 * (5 / 2));
System.out.println(2 * 5 / 2);
```

```
System.out.println("25 / 4 is " + 25 / 4);
System.out.println("25 / 4.0 is " + 25 / 4.0);
System.out.println("3 * 2 / 4 is " + 3 * 2 / 4);
System.out.println("3.0 * 2 / 4 is " + 3.0 * 2 / 4);
```

3. Read numbers from keyboard. Java provide APIs to read input from the keyboard. One of the most important API is the java.util.Scanner. You can use nextDouble() method in the Scanner class to read one double value and other methods to read different type of numbers. Please create one program. Understand and improve the following code and then modify the program to print out all the input numbers out.

```
1  Scanner input = new Scanner(System.in);
2  System.out.print("Enter a byte value: ");
3  byte byteValue = input.nextByte();
4
5  System.out.print("Enter a short value: ");
6  short shortValue = input.nextShort();
7
8  System.out.print("Enter an int value: ");
9  int intValue = input.nextInt();
10
11 System.out.print("Enter a long value: ");
12 long longValue = input.nextLong();
13
14 System.out.print("Enter a float value: ");
15 float floatValue = input.nextFloat();
```

4. Develop one program to accept the radius of one circle from the console and output the area of the circle. Note that to compute the area, the following formula can be used:
   Area = radius * radius * PI
   Please define PI as one constant variable with a fixed value 3.14159
   HINT: to read input form the console, the java API (i.e. java.util.Scanner) can be used here.

   The example output is provided as follows:

```
Enter a number for radius:  2.5 Enter
The area for the circle of radius 2.5 is 19.6349375
```

```
Enter a number for radius:  23 Enter
The area for the circle of radius 23.0 is 1661.90111
```

5. Average calculation for multiple input from keyboard. In this question, you need to write one program to accept three numbers by user input and display the average of it.

The example execution is provided as follows:

```
Enter three numbers: 1 2 3 Enter
The average of 1.0 2.0 3.0 is 2.0
```

```
Enter three numbers: 10.5 Enter
11 Enter
11.5 Enter
The average of 10.5 11.0 11.5 is 11.0
```

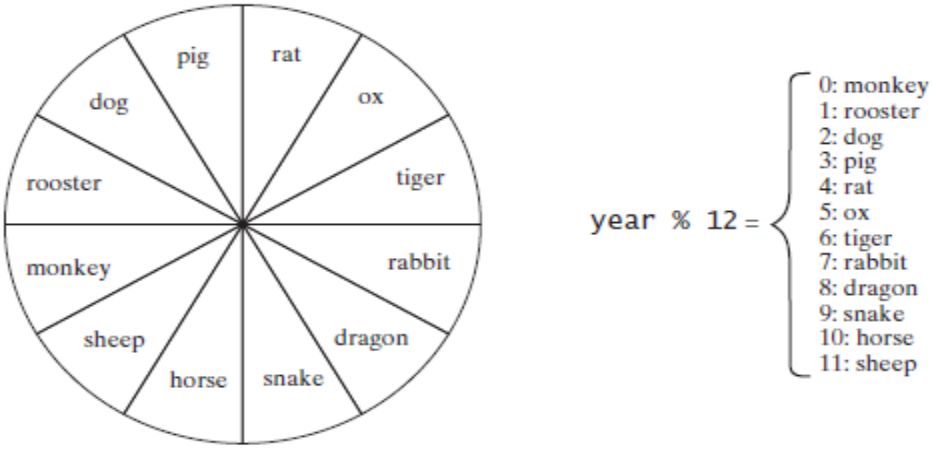
Lab Assignment

Task 1: Chinese Zodiac Calculation

Write a program to find out the Chinese Zodiac sign for a given year. The Chinese Zodiac is based on a twelve-year cycle, with each year represented by an animal- monkey, rooster, dog, pig, rat, ox, tiger, rabbit, dragon, snake, horse, or sheep—in this cycle, as shown in figure below.

Note that **year % 12** determines the Zodiac sign. 1900 is the year of the rat because **1900 % 12** is **4**. Listing 3.9 gives a program that prompts the user to enter a year and displays the animal for the year.

Read numbers from keyboard. Java provide APIs to read input from the keyboard. One of the most important API is the java.util.Scanner. You can use nextDouble() method in the Scanner class to read one double value and other methods to read different type of numbers.



The Chinese Zodiac is based on 12-year cycle

The example execution is provided as follows:

```
Enter a year: 1963 Enter
rabbit
```

```
Enter a year: 1877 Enter
ox
```

Task 2: Currency Convertor

Develop a program that coverts United States Dollar (USD) to Singapore Dollar (SGD). Ask user to enter the amount/quantity of USD that they want to convert to SGD. Then the final output should display the amount in SGD.

The user can enter multiple times. To stop the calculator, user should input a negative number.

You can use 1 USD = 1.35 SGD.

The example execution is as follows:

```
Enter the amount in USD
54
The final amount in SGD 72.9
Enter the amount in USD
87
The final amount in SGD 117.45
Enter the amount in USD
90
The final amount in SGD 121.50000000000001
Enter the amount in USD
-1
```

Task 3: Displaying the Current Time.

Develop a program that displays the current time in GMT (Greenwich Mean Time) in the format hour:minute:second, such as 13:19:8.

The CurrentTimeMillis method in the System class returns the current time in milliseconds elapsed since midnight, January 1, 1970 GMT, as shown in Figure 1. This time is known as the UNIX epoch. The epoch is the point when time starts, and 1970 was the year when the UNIX operating system was formally introduced.

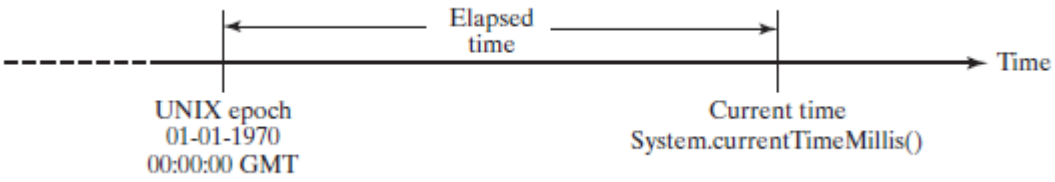


Figure 1: The System.currentTimeMillis() returns the number of milliseconds since the UNIX epoch.

You can use this method to obtain the current time, and then compute the current second, Minute, and hour as follows.

1. Obtain the total milliseconds since midnight, January 1, 1970, in **totalMilliseconds** by invoking **System.currentTimeMillis()** (e.g., **1203183068328** milliseconds).
2. Obtain the total seconds **totalSeconds** by dividing **totalMilliseconds** by **1000** (e.g., **1203183068328** milliseconds / **1000** = **1203183068** seconds).
3. Compute the current second from **totalSeconds % 60** (e.g., **1203183068** seconds % **60** = **8**, which is the current second).
4. Obtain the total minutes **totalMinutes** by dividing **totalSeconds** by **60** (e.g., **1203183068** seconds / **60** = **20053051** minutes).
5. Compute the current minute from **totalMinutes % 60** (e.g., **20053051** minutes % **60** = **31**, which is the current minute).
6. Obtain the total hours **totalHours** by dividing **totalMinutes** by **60** (e.g., **20053051** minutes / **60** = **334217** hours).
7. Compute the current hour from **totalHours % 24** (e.g., **334217** hours % **24** = **17**, which is the current hour).

The example execution is provided as follows:

```
Current time is 17:31:8 GMT
```

Submission Instructions

You need to submit your program of the following lab assignments at https://repl.it/. The assignments will be released in repl.it before every lab and you can submit your code for each of the assignment exercise. Instruction for joining the online portal can be seen on LMS.

Deadline: Friday 14th Jan 2022 11:59 pm