# TP03

Java Datatypes

## Remark

1. In Java, there are 2 types of basic datatypes:
   a. Primitive Types
   b. Class Types

Sometimes, we need to use Class Type instead of Primitive Type. In Java, each Primitive Type has corresponding wrapper Class Type as shown in table below:

| Primitive type | Wrapper class | Constructor Arguments |
|---|---|---|
| byte | Byte | byte or String |
| short | Short | short or String |
| int | Integer | int or String |
| long | Long | long or String |
| float | Float | float, double or String |
| double | Double | double or String |
| char | Character | char |
| boolean | Boolean | boolean or String |

Example:

```
public class TestWrapper {
   public static void main(String[] args) {
       byte b = 8;
       Byte B = Byte.valueOf(b);
       System.out.println("b="+b);
       System.out.println("B="+B);
       b = 20;
       System.out.println("b="+b);
       System.out.println("B="+B);// won't change
   }
}
```

Output:

```
b=8
B=8
b=20
B=8
```

Example 02:
Short is range from -32768 to 32767 (2 bytes, $-2^{15}$ to $2^{15}-1$):

```
public class TestShortWrapper {
    public static void main(String[] args) {
       short sh = 120;
       Short aShort = sh;
       Short aShort2 = Short.valueOf(sh);
       Short aShort3 = Short.valueOf("34");
       System.out.println("sh=" + sh);
       System.out.println("aShort=" + aShort);
       System.out.println("aShort2=" + aShort2);
       System.out.println("aShort3=" + aShort3);
    }
}
```

```
sh=120
aShort=120
aShort2=120
aShort3=34
```

2. Datatype Conversion types:
    a. Widening conversions
        i. `byte` to short, int, long, float, or double
        ii. `short` to int, long, float, or double
        iii. `char` to int, long, float, or double
        iv. `int` to long, float, or double
        v. `long` to float or double
        vi. `float` to double
    b. Narrowing conversions
        i. Converting from bigger to smaller size, there must be lost something. Example double to int, there must be lost the floating point.
        ii. Conversion must be done explicitly using casting
        Example:

```
int doubleToInt = (int)aDoubleValue;
byte doubleToByte = (byte)aDoubleValue;
```

3. Operators:
    a. Arithmetic Operators
    b. Relational Operators
    c. Bitwise Operators
    d. Logical Operators
    e. Assignment Operators
    f. Miscellaneous Operators

**3.a. The Arithmetic Operators**

Assume that integer variable A = 10 and variable B = 20, then:

| Operator | Description | Example |
|---|---|---|
| + (Addition) | Adds values on either side of the operator. | A + B will give 30 |
| - (Subtraction) | Subtracts right-hand operand from left-hand operand. | A - B will give -10 |
| * (Multiplication) | Multiplies values on either side of the operator. | A * B will give 200 |
| / (Division) | Divides left-hand operand by right-hand operand. | B / A will give 2 |
| % (Modulus) | Divides left-hand operand by right-hand operand and returns remainder. | B % A will give 0 |
| ++ (Increment) | Increases the value of operand by 1. | B++ gives 21 |
| -- (Decrement) | Decreases the value of operand by 1. | B-- gives 19 |

## TP03.1. Seconds to Time

Implement an application Java that take a given number of seconds for converting into time with format `Hours:Minutes:Seconds`. Example

```
Input number of seconds: 1259
Time corresponding to 1259seconds is 00:20:59.
```

## TP03.2. Time to Seconds

Write a program in Java to a Time (hours, minutes, seconds) to number of seconds. Hours, minutes and seconds are inputted from keyboard. Example:

```
Program for converting time to seconds.
Please input hours: 20
Please input minutes: 30
Please input seconds: 50

Number of seconds = 20x3600 + 30x60 + 50 = 73850
```

## TP03.3. Calling Cost

Write a program in Java to calculate cost of calling with given Time Start (hours, minutes, and seconds) and Time End (hours, minutes, and seconds). The cost of call per minute is 0.05$. The program will display total number of minutes called and total cost of the call. Example:

```
Program for calculating cost of a call.
Please input start hours: 20
Please input start minutes: 30
Please input start seconds: 50
Please input end hours: 20
Please input end minutes: 35
Please input end seconds: 5
Total call duration: 0h 4mn 15s
Total cost of this call: 0.2125$
```

## TP03.4. Riels to Dollar

Write a program in Java to money in Riels to Dollar. Suppose that conversion rate is 1$ = 4000៛. Example:

```
Program for converting money in Riels to Dollars.
Conversion rate is: 1 USD = 4000 RIELS
Please input money in Riels: 2200

2200 RIELS = 0.55 USD
```

## TP03.5. Traveling Duration

Write a program in Java to calculate duration of travel from ITC to Airport. The distance is 7 km and the average speed is 30km/h. The traffic jam factor is given as percentages of the average speed. After the calculation, display duration in format HH:mm:ss. Example:

```
Program for calculating duration of travel from ITC to Airport.
Please input traffic jam factor (in percentage [0-100]): 50

Travelling Duration = 00:28:00
```

## TP03.6. Float Digit Counter

Write a Java program that takes a floating-point number as input and counts the number of digits in both the integral and fractional parts of the number.

```
Please input a floating-point number: 12.4556

Number of digits in the integral part: 2
Number of digits in the fractional part: 4
```

## TP03.7. Word Finder

Write a Java program that takes two inputs from the user:

1. A piece of text.
2. Specific letters.

The program should then count and list the words in the text that contain the specified letter.

```
Enter the text: Do what you think is right, try your best, and don’t care
about other people’s thoughts. Everything happens for a reason.
Enter the letter to find in words: e

List of words containing letter e:
|best|care|other|people|Everything|happens|reasons
There are 7 words containing letter “e”

Enter the text: Try your best, and don’t care about other people’s
thoughts. Everything happens for a reason.
Enter the letter to find in words: on

List of words containing letter on:
|don’t|reasons
There are 2 words containing letter “on”
```