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 = new Short(sh);
       Short aShort3 = new Short("34");
       System.out.println("sh=" + sh);
       System.out.println("aShort=" + aShort);
       System.out.println("aShort2=" + aShort2);
       System.out.println("aShort3=" + aShort3);
    }
}
```

Output:

```
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. **Loop while**

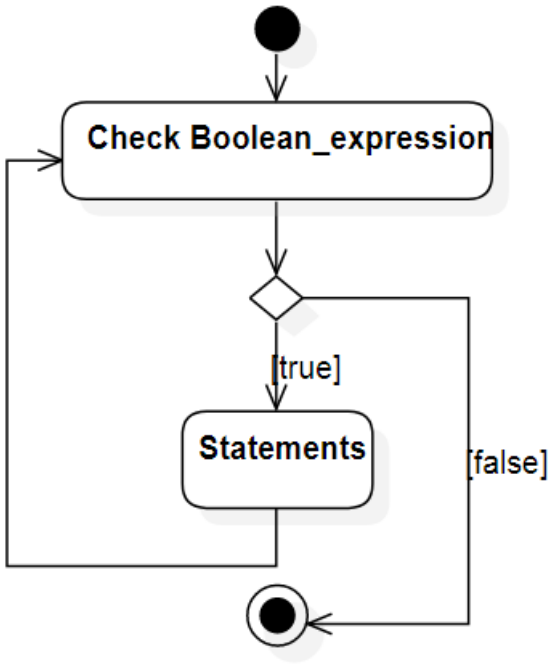
Syntax:

```
while(Boolean_expression) {

   // Statements

}
```

While Loop Activity Diagram



Example:

```
public class TestWhile {

   public static void main(String[] args) {
      int x = 10;

      while (x < 20) {
         System.out.print("value of x : " + x);
         x++;
         System.out.print("\n");
      }
   }
}
```

Output:

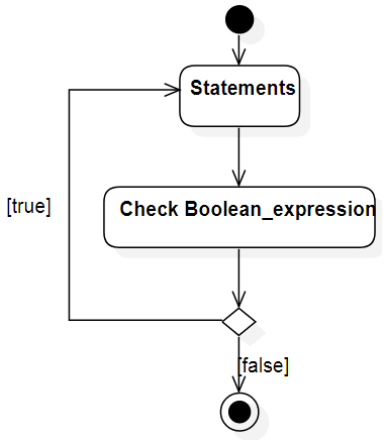
```
value of x : 10
value of x : 11
value of x : 12
value of x : 13
value of x : 14
value of x : 15
value of x : 16
value of x : 17
value of x : 18
value of x : 19
```

4. Loop: do … while

Syntax:

```
do {
   // Statements
}while(Boolean_expression);
```

Do…While Activity Diagram



Example:

```
public class TestDoWhile {

   public static void main(String[] args) {
      int x = 10;

      do {
         System.out.print("value of x : " + x);
         x++;
         System.out.print("\n");
      } while (x < 20)
   }
}
```

5. Loop for

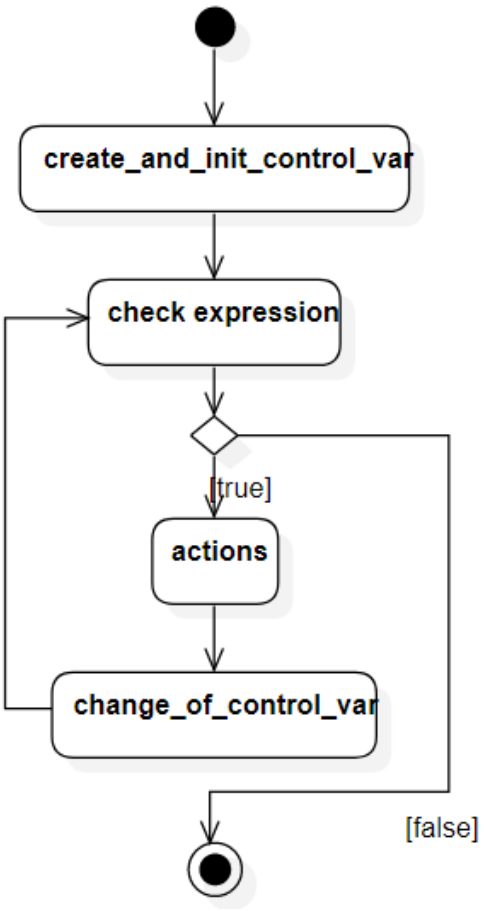
Syntax:

```
for(create_and_init_control_var; expression; change_of_control_var) action;
```

Or

```
for(create_and_init_control_var; expression; change_of_control_var){
   actions;
}
```

Activity Diagram of Loop for



Example:

```
public class ForTest {
   public static void main(String[] args) {
      for (int x = 10; x < 20; x = x + 1) {
         System.out.print("value of x : " + x);
         System.out.print("\n");
      }
   }
}
```

Output:

```
value of x : 10
value of x : 11
value of x : 12
value of x : 13
value of x : 14
value of x : 15
value of x : 16
value of x : 17
value of x : 18
value of x : 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
```

_____SECTION BELOW IS BEGINNING OF CHALLENGE EXERCISES (+10% ABOVE THE TOTAL SCORES)_____

TP03.CE.1. Tasks Runner

Write a program in Java to display a menu containing 5 exercises in TP03 and 1 exit option. When user select an option, the program will call main method of the corresponding class. Example: if class of TP03.1. is **TP03_1_SecondsToTime**, then when user choose option 1, it calls **TP03_1_SecondsToTime.main(null)** as example below:

```
-------- Menu ---------
 1. Seconds to Time
 2. Time to Seconds
 3. Calling Cost
 4. Riels to Dollar
 5. Traveling Duration
 0. Exit
Choose an option: 1
----------------------
Input number of seconds: 1259
Time corresponding to 1259seconds is 00:20:59.
```

The program will continue to ask user questions until user choose option 0 (Exit).