Java

Control Structures

FSR Informatik

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Overview

Statements

A statement can be **true** or **false**. You can use a boolean variable to save the value of a statement.

```
1       boolean x1 = (17 < 20);  // true
2       boolean x2 = (17 >= 20); // false
3       boolean x3 = (17 == 20); // false
4       boolean x4 = (17 != 20); // true
5
```

Relational Operators

Some relational operators for your statements:

$A < B$	A smaller B
$A <= B$	A smaller or equal B
$A > B$	A greater B
$A >= B$	A greater or euqal B
$A == B$	A equal B
$A != B$	A not equal B

Logic

You can combine statements with logic operators like **NOT**, **AND** and **OR**.

!A	not A - is true if A is false
A && B	A and B - is true if both statements are true
A || B	A or B - is true if one statement is true or both

Examples

```
1       boolean x1 = (17 < 20) && (4 < 16);  // true
2       boolean x2 = (17 >= 20) || (4 < 16); // true
3       boolean x3 = (17 == 20) && (4 == 4); // false
4       boolean x4 = !(17 != 20);            // false
5       boolean x5 = !(4 == 16) || (((17 == 20) && (4 ==
        4)));
6       // x5 is true
7
```

If

```
1       public class PostOffice {
2
3           public static void main(String[] args) {
4
5               int letterWeight = 46; // in grams
6               int postage = 90; // in ct
7
8               if(letterWeight <= 20) {
9                   postage = 60;
10              }
11          }
12      }
13
```

If

If the statement is true the body inside the curly brackets will be executed. If the statement is false the body will not be executed.

```
1       int letterWeight = 53; // in grams
2       int postage = 90; // in ct
3
4       if(letterWeight <= 20) {
5           postage = 60;
6       }
7
```

If - Example

```
1   public class PostOffice {
2
3       public static void main(String[] args) {
4
5           int letterWeight = 46;
6           int postage = 90;
7
8           if(letterWeight <= 20) { // false
9               postage = 60;
10          }
11
12          System.out.println(postage + "ct");
13          // prints: 90ct
14      }
15  }
16
```

If - Counter Example

```
1   public class PostOffice {
2
3       public static void main(String[] args) {
4
5           int letterWeight = 17;
6           int postage = 90;
7
8           if(letterWeight <= 20) { // true
9               postage = 60;
10          }
11
12          System.out.println(postage + "ct");
13          // prints: 60ct
14      }
15  }
16
```

Else

```
1       public class PostOffice {
2
3           public static void main(String[] args) {
4
5               int letterWeight = 17;
6               int postage = 0;
7
8               if(letterWeight <= 20) { // true
9                   postage = 60;
10              } else {
11                  postage = 90;
12              }
13
14              System.out.println(postage + "ct");
15              // prints: 60ct
16          }
17      }
18
```

Else If

```
1       public class PostOffice {
2
3           public static void main(String[] args) {
4
5               int letterWeight = 37;
6               int postage = 0;
7
8               if(letterWeight <= 20) { // false
9                   postage = 60;
10              } else if (letterWeight <= 50) { // true
11                  postage = 90;
12              }
13
14              System.out.println(postage + "ct");
15              // prints: 90ct
16          }
17      }
18
```

Multiple Else If

```
1       public static void main(String[] args) {
2
3           int letterWeight = 37;
4           int postage = 0;
5
6           if(letterWeight <= 20) { // false
7               postage = 60;
8           } else if (letterWeight <= 50) { // true
9               postage = 90;
10          } else if (letterWeight <= 500 ) { // true
11              postage = 145;
12          }
13
14          System.out.println(postage + "ct");
15          // prints: 90ct
16      }
17
```

Multiple Else If

You can use as many *else if* as you want. If multiple conditions are true, only the first one is relevant.

Warning: Other programing languages may handle this case differently.

For Loop

The for loop starts with an assignment: `int i = 4`.
Every lap the body will be executed and prints the changing variable i.
After each lap the i will be incremented via `i++`.
The loop will stop if the condition `i <= 10` becomes false. It will never start if the condition is false at begin.

```
1       public static void main(String[] args) {
2
3           for ( int i = 4; i <= 10; i++) {
4               System.out.print(i + " ");
5           }
6           //prints: 4 5 6 7 8 9 10
7       }
8
```

Endless Loop

If you need an endless loop. Use **for** with empty parameters.

```
1       public static void main(String[] args) {
2
3           for (;;) {
4               System.out.println("I am still running");
5           }
6       }
7
```

While Loop

The while loop will be executed *while* the condition is true.

```
1       public static void main(String[] args) {
2
3           int i = 1;
4           while (i < 5) {
5               i++;
6               System.out.print(i + " ");
7           }
8           // prints: 2 3 4 5
9       }
10
```

Do-While Loop

The do-while loop will be executed until the condition becomes false.

```
1       public static void main(String[] args) {
2
3           int i = 1;
4           do {
5               i++;
6               System.out.print(i + " ");
7           } while (i < 5);
8           // prints: 2 3 4 5
9       }
10
```

Do not forget the semicolon at the end.

While vs. Do-While

There is a difference between the while and the do-while loop.

If the loop condition false at start:

- the while loop will not start at all
- the do-while loop will run one time, if the condition stays false

? Operator

```
condition ?  case1 :  case2 ;
```

If the condition is true case1 will be executed. If not case2 will be executed instead.

? Operator - Example

Both methods do the same.

```
1       public String boolToString1(boolean blub) {
2           return blub ? "yes" : "nope";
3       }
4
5       public String boolToString2(boolean blub) {
6           if (blub) {
7               return "yes";
8           } else {
9               return "nope";
10          }
11      }
12
```