Java Control Statements

An introduction to the Java Programming Language

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Essential Java

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  - Commonly used Classes
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Overview: Road Map

- Control Statement Types
- If, else, switch
- For, while, do-while

What are Control Statements?

- Control statements are statements that control execution of other statements
  - These other statements can be either selection or repetition statements
  - Also called conditional and looping statements

Control Statement Types

- There are two general types of control statements:
  - Selection (conditional) statements
    - if, if-else, and switch statements
  - Repetition (looping) statements
    - for, while, and do-while statements
- There are also some other control statements specific to Java
  - break, continue, and labels

Overview: Road Map

- Control Statement Types
- If, else, switch
- For, while, do-while

if statement syntax

'if' keyword

boolean condition to be tested

actions if condition is true

```
if(perform some test)
{
    Do these statements if the test gave a true result
}
```

Example if Statement

```
int i = 1;
if(i > 0)
{
   System.out.println("Greater than zero");
}
```

=

```
int i = 1;
if(i > 0)
   System.out.println("Greater than zero");
```

```
int i = 3;
if(i > 2)
{
   System.out.println("Greater than zero");
   System.out.println("Greater than one");
   System.out.println("Greater than two");
}
```

if-else statement syntax

‘if’ keyword

boolean condition to be tested

actions if condition is true

```
if(perform some test) {
    Do these statements if the test gave a true result
}
else {
    Do these statements if the test gave a false result
}
```

‘else’ keyword

actions if condition is false

Example if-else Statement

```
int i = 1;
if(i > 0)
   System.out.println("Greater than zero");
else
   System.out.println("Not greater than zero");
```

Braces can be omitted if single statements used.

```
int i = 3;
if(i > 2)
{
   System.out.println("Greater than zero");
   System.out.println("Greater than one");
   System.out.println("Greater than two");
}
else
{
   System.out.println("Either equal to two");
   System.out.println("Or less than two");
}
```

Nested if statements

- Any form of if statement can be nested
  - There can be other if statements within of if statements

```
if (condition)
{
  if(nested_condition1)
  {
    nested_action1;
  }
  else
  {
    if(nested_condition2)
    {
      nested_action2;
    }
    else
    {
      nested_action3;
    }
  }
}
else
{
  action2;
}
```

Example Nested Statement

```
int i = 3;
if(i > 2)
{
  System.out.println("Greater than zero");
  System.out.println("Greater than one");
  System.out.println("Greater than two");
}
else
{
   if(i == 2)
     System.out.println("Equal to two");
   else
     System.out.println("Less than two");
}
```

More if statement syntax

```
if(condition1…perform some test)
{
    Do these statements if condition1 gave a true result
}
else if(condition2…perform some test)
{
    Do these statements if condition1 gave a false
    result and condition2 gave a true result
}
else
{
    Do these statements if both condition1 and
    condition2 gave a false result
}
```

The switch statement

- The switch statement works in exactly the same way as a set of if statements, but is more compact and readable.
- The *switch statement* switches on a single value to one of an arbitrary number of cases.
- Two possible patterns of use are…

The switch statement

- One possible pattern of use

```
switch(expression) {
    case value: statements;
                break;
    case value: statements;
                break;
    further cases possible
    default: statements;
             break;
}
```

A *switch* statement can have any number of **case** labels.

The switch statement

- Second possible pattern of use

```
switch(expression) {
      case value1:
      case value2:
      case value3:
          statements;
          break;
      case value4:
      case value5:
          statements;
          break;
      further cases possible
      default:
          statements;
          break;
 }
```

The **break** statement after every case is needed, otherwise the execution “falls through” into the next label’s statements.

In this pattern, all three of the first values will execute the first *statements* section, whereas values four and five will execute the second *statements* section.

The switch statement

- The **default** case is optional. If no default is given, it may happen that no case is executed.

- The **break** statement after the default (or the last case, if there is no default) is not needed but is considered good style.

- From Java 7, the expression used to switch on and the case labels may be strings. Previous versions switched on int and char only.

The switch statement - example

```
switch(day) {
    case 1:  dayString = "Monday";
             break;
    case 2:  dayString = "Tuesday";
             break;
    case 3:  dayString = "Wednesday";
             break;
    case 4:  dayString = "Thursday";
             break;
    case 5:  dayString = "Friday";
             break;
    case 6:  dayString = "Saturday";
             break;
    case 7:  dayString = "Sunday";
             break;
    default: dayString = "invalid day";
             break;
}
```

The switch statement - example

```
switch(dow.toLowerCase()) {
    case "mon":
    case "tue":
    case "wed":
    case "thu":
    case "fri":
        goToWork();
        break;
    case "sat":
    case "sun":
        stayInBed();
        break;
}
```

The switch statement - example

```
switch (group){
    case 'A':
        System.out.println("10.00 a.m ");
        break;
    case 'B':
        System.out.println("1.00 p.m ");
        break;
    case 'C':
        System.out.println("11.00 a.m ");
        break;
   default:
        System.out.println(“Enter option A, B or C only!");
}
```

Example switch statement…

```
int i = 2;
switch(i)
{
   case 1: System.out.println("1");
   case 2: System.out.println("2");
   case 3: System.out.println("3");
   default: System.out.println("default");
}
```

Console

```
2
3
default
```

```
int i = 2;
switch(i)
{
   case 1: System.out.println("1"); break;
   case 2: System.out.println("2"); break;
   case 3: System.out.println("3"); break;
   default: System.out.println("default");
}
```

Console

```
2
```

…Example switch statement

```
int i = 2;
switch(i)
{
   case 1:
        System.out.println("1");
        break;
   case 2:
   case 3:
        System.out.println("2");
        System.out.println("or");
        System.out.println("3");
        break;
   default:
        System.out.println("default");
}
```

Console

```
2
or
3
```

Overview: Road Map

- Control Statement Types
- If, else, switch
- For, while, do-while

For loop pseudo-code

General form of a for loop

for(*initialization*; *boolean condition*; *post-body action*)
{
    statements to be repeated
}

For loop syntax

```
for(int i = 0;  i < 4;  i++)
```

```
for(initialization; boolean condition; post-body action)
{
    statements to be repeated
}
```

Example for Statement

```
for(int i=1; i<5; i++)
{
   System.out.println("Index is equal to " + i);
}
```

Console

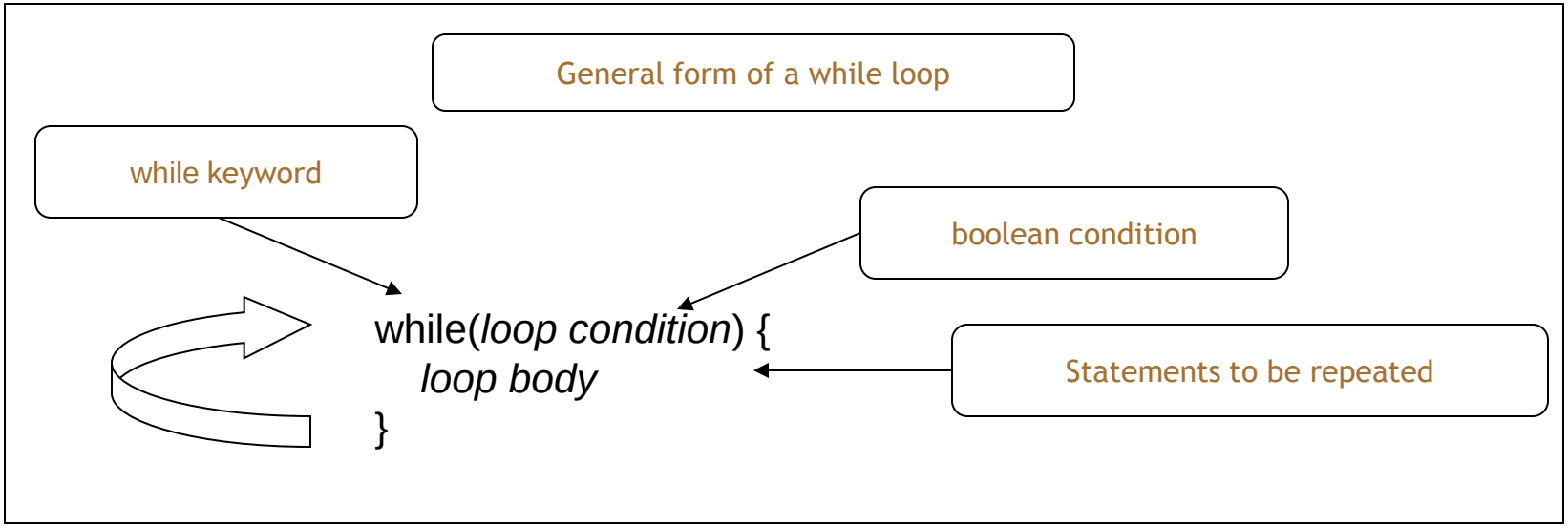
```
Index is equal to 1
Index is equal to 2
Index is equal to 3
Index is equal to 4
```

```
int i=1;
for(;;)
{
   System.out.println("Infinite loop");
   if(i==2) break;
   i++;
}
```

Console

```
Infinite loop
Infinite loop
```

While loop pseudo code



Pseudo-code expression of the actions of a while loop

while we wish to continue, do the things in the loop body

Construction of while loop

Declare and initialise loop control variable (LCV)

while(condition based on LCV)

{

“do the job to be repeated”

“update the LCV”

}

This structure should <u>always</u> be used

Using while Statement

- while statement is used for repeating statements while some condition applies
- Condition is evaluated before the statement
  - Condition evaluates to either true or false
    - If condition evaluates to true statement executes
    - If condition evaluates to false statement does not execute, and evaluation proceeds after the block

Example while Statement

```
int i=1;
while(i < 5)
{
   System.out.println(i);
   i++;
}
```

Console

```
1
2
3
4
```

```
int i=5;
while(i < 5)
{
   System.out.println(i);
   i++;
}
```

Console

Using do-while Statement

- Similar to the while statement
  - Condition is evaluated at the end of the statement
  - Block is executed at least once
- Uses do and while keywords

```
do
{
   statement;
} while(condition);
```

Example do-while Statement

```
int i=1;
do
{
   System.out.println(i);
   i++;
}while(i < 5);
```

Console

```
1
2
3
4
```

```
int i=5;
do
{
   System.out.println(i);
   i++;
}while(i < 5);
```

Console

```
5
```

Summary

- Control Statement Types
- If, else, switch
- For, while, do-while