Programming Fundamentals 1

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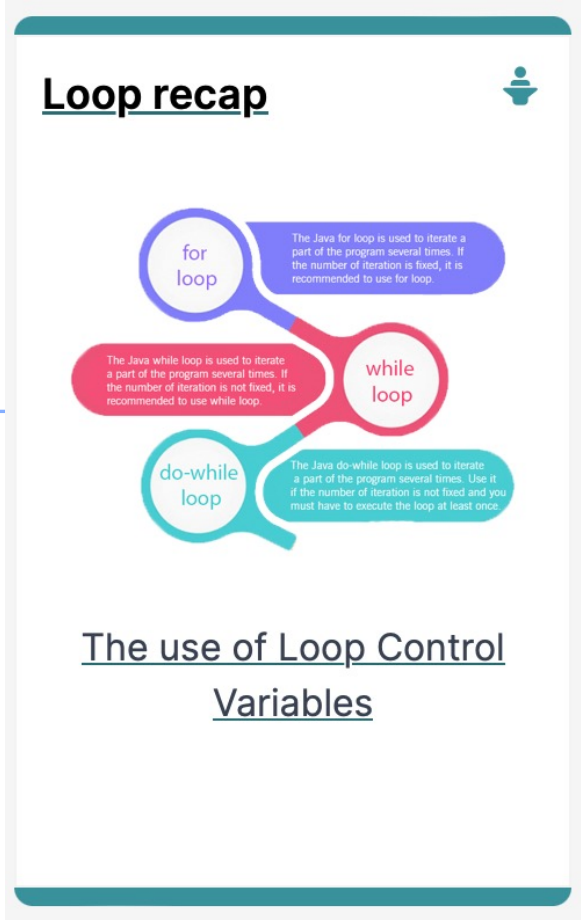
Iteration in Programming

while loops & loop control variables



Agenda

- Repetition in Programming – Intro to looping
- Use of loops (while loops)

Repetition in Programming

Intro to looping

Recap: Boolean conditions

- A `boolean` condition is an expression that evaluates to either true or false e.g.

  x<50

- Boolean conditions can be used to control:
  - Selection i.e. if statements and
  - Iteration i.e. loops (we will look at these now)

Repetition in Programming

- Computers are very good at repetition

- Example:
  - calculate pay for 1000 employees
  - You should use the same calculate pay algorithm 1000 times
  - You don't write the calculate pay algorithm 1000 times; instead you include it in a loop

Form of loop

- Write the all the numbers between 1 and 5 inclusive
  - Without loop:

```
System.out.println(1);
System.out.println(2);
System.out.println(3);
System.out.println(4);
System.out.println(5);
```

Form of loop

- Write the all the numbers between 1 and 5 inclusive
  - With a loop:
    - do this 5 times

```
System.out.println(i);
```

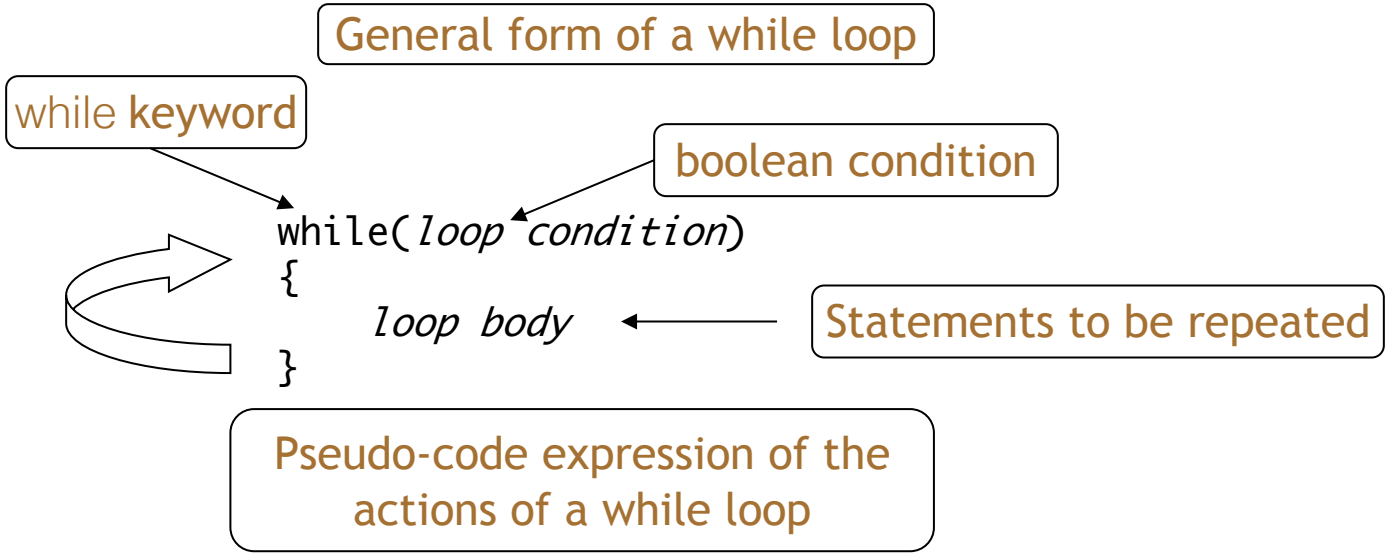
With the value of i going from 1 to 5

Use of loops (while loops)

Loops in Programming

- There are three types of loop in (Java) programming:
  - `while` loops
  - `for` loops
  - `do while` loops

while loop pseudo code



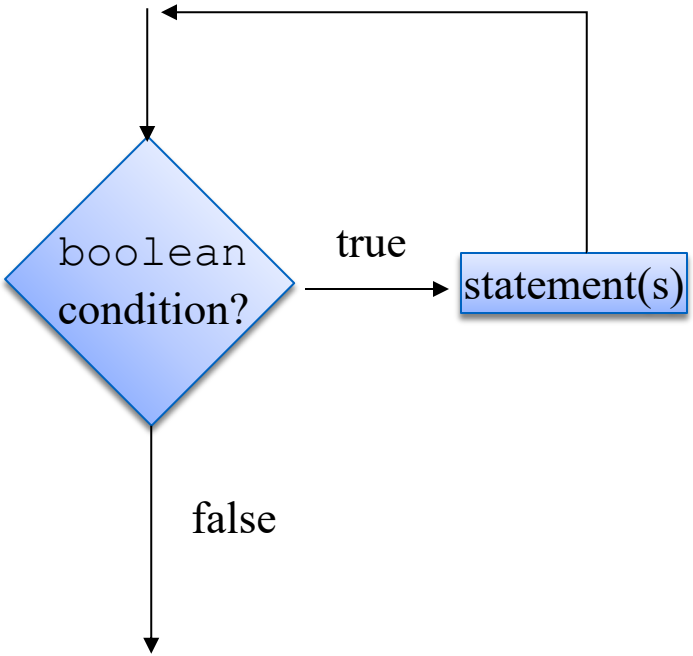
while we wish to continue, do the things in the loop body

Construction of while loop

Declare and initialise loop control variable (LCV)
while(boolean condition based on LCV is true)
{
    “do the job to be repeated”
    “update the LCV”
}

This structure should always be used

`while` loop Flowchart




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

Processing Example 4.5

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

Declare and initialise loop control variable (LCV)

while(boolean condition based on LCV is true)

{

"do the job to be repeated"

"update the LCV"

}

```
1
2
3
4
5
```

Some Study Exercises

This basic while loop,
produces this output.

```
int i = 1;

while (i <=5)
  {
    println("Hello World");
    i++;
  }
```

```
Hello World
Hello World
Hello World
Hello World
Hello World
```

Some Study Exercises

1. Change the code so that “Hello World” is printed out 10 times.
2. Change the code so that the numbers from 1 to 10 (inclusive) are printed out, one line at a time.
3. Change the code so that the numbers from 10 to 1 are printed out.

Questions?

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Thanks.