Iteration in Programming

Loops

Lecturer: Caio Fonseca

Waterford Institute *of* Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

Department of Computing and Mathematics
http://www.wit.ie/

Topics List

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

Recap: Boolean Conditions

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

  mouseX < 50

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

Repetition in Programming

- Computers are very good at repetition.

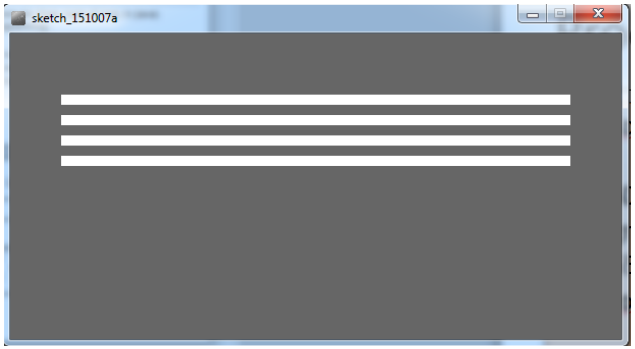
- Example:
  - calculate pay for 1000 employees.
  - You should use the same calculate pay algorithm 1000 times.
  - You don't write the calculate pay algorithm 1000 times; instead you write it once and include it in a loop.

Form of Loop

- Draw a rectangle 4 times that has a gap of 10 pixels between each one:

  – Without loop:

```
rect(50, 60, 500, 10);
rect(50, 80, 500, 10);
rect(50, 100, 500, 10);
rect(50, 120, 500, 10);
```



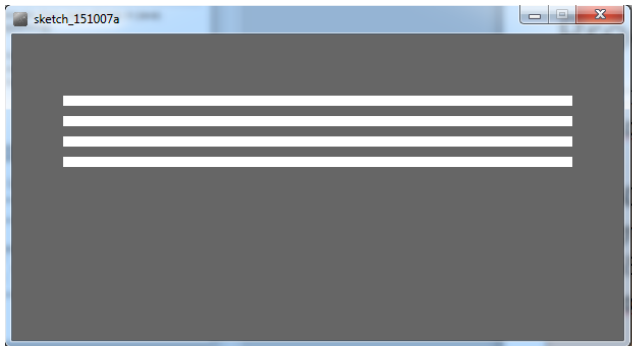
Form of Loop

- Draw a rectangle 4 times that has a gap of 10 pixels between each one:

  – With a loop:

    - do this 4 times (adding 20 onto the yCoordinate variable each time).

```
rect(50, yCoordinate, 500, 10);
```



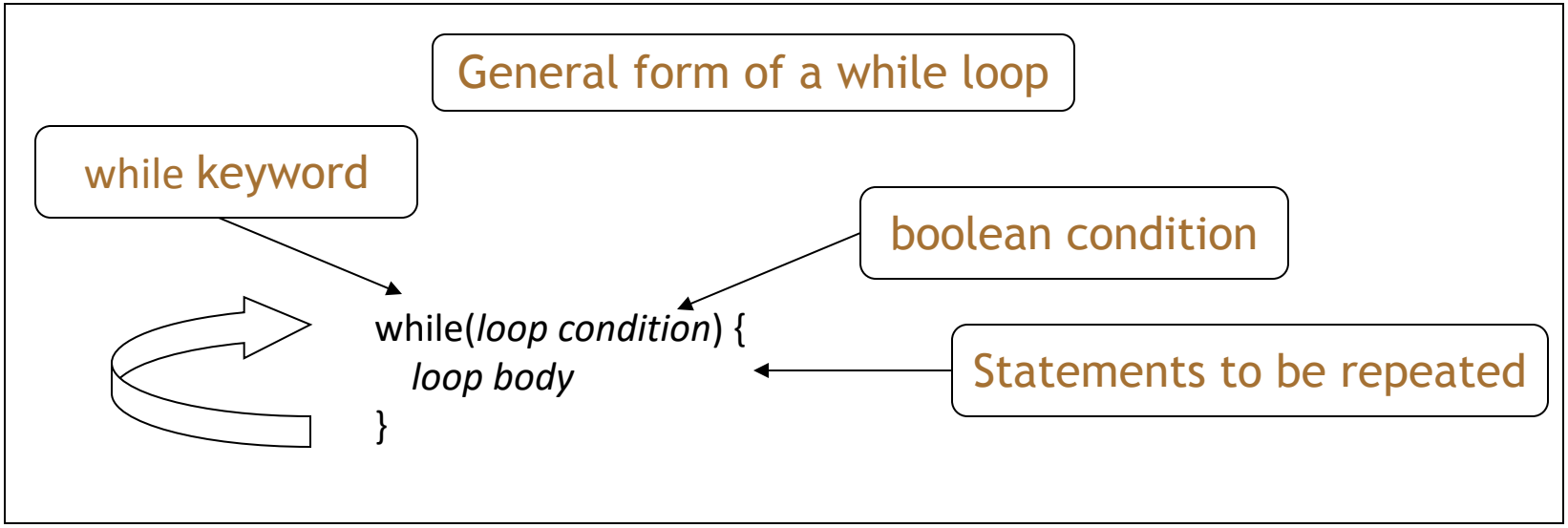
Topics List

- Repetition in Programming – Intro to Looping
- 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



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)

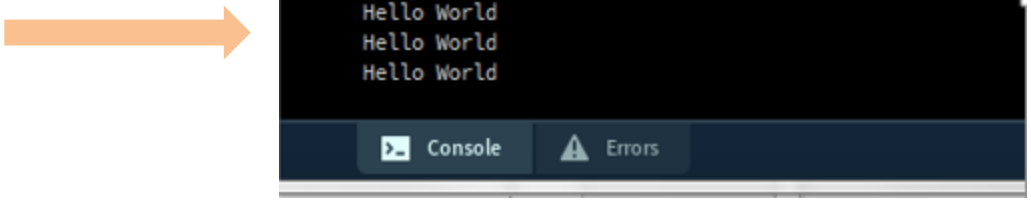
```
while(condition based on LCV)
{
    "do the job to be repeated"
    "update the LCV"
}
```

This structure should **always** be used

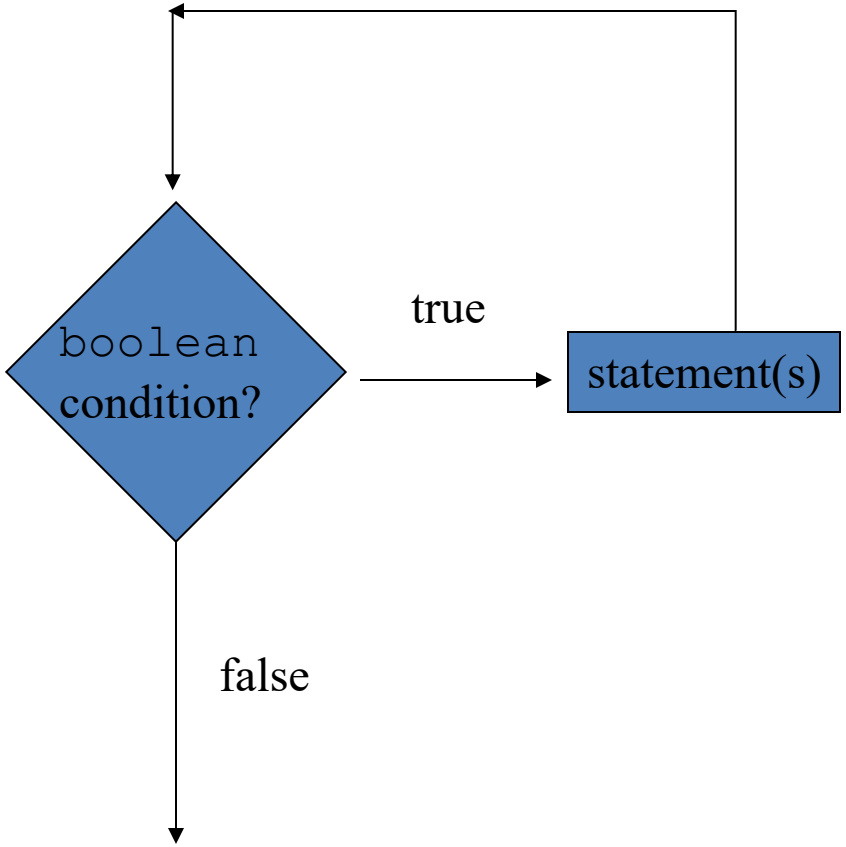
Simple while Statements

```
int i = 1;

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

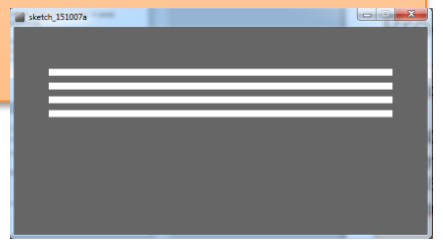


while Loop Flowchart




```
int yCoordinate = 60;

int i = 0;
while(i < 4)
{
   rect(50, yCoordinate, 500, 10);
   yCoordinate = yCoordinate + 20;
   i++;
}
```



While Loop Example 1

sketch_170609a | Processing 3.0b6

File Edit Sketch Debug Tools Help

Java ▾

sketch_170609a

```
1  size(600, 300);
2  background(102);
3  fill(255);
4  noStroke();
5
6
7  int yCoordinate = 60;
8  int i = 0;
9
10 while(i < 4)
11 {
12     rect(50, yCoordinate, 500, 10);
13     yCoordinate = yCoordinate + 20;     //yCoordinate += 20;
14     i++;
15 }
16
17
18
19
```

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?

Produced by:

Dr. Siobhán Drohan
Mairead Meagher
Sinéad Walsh

Waterford Institute *of* Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

Department of Computing and Mathematics
http://www.wit.ie/