# Iteration in Programming

## Loops, compound statements

Produced by: Mairead Meagher
Dr. Siobhán Drohan

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 and
  - Iteration i.e. loops (we will look at these now).

# Repetition in Programming

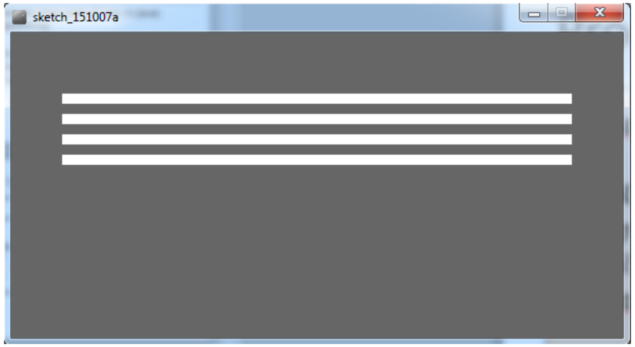
- Computers are very good at repetition.

- 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

- Draw a rectangle 4 times that has a gap of 10 pixels between each one:
  - Without loop:

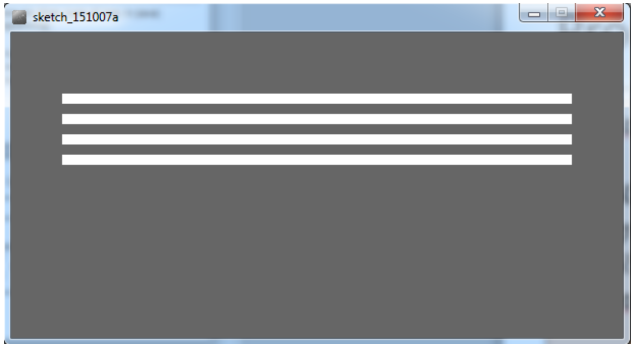
```
rect(50, 60, 500, 10);
rect(50, 80, 500, 10);
rect(50, 100, 500, 10);
rect(50, 120, 500, 10);
```



# 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

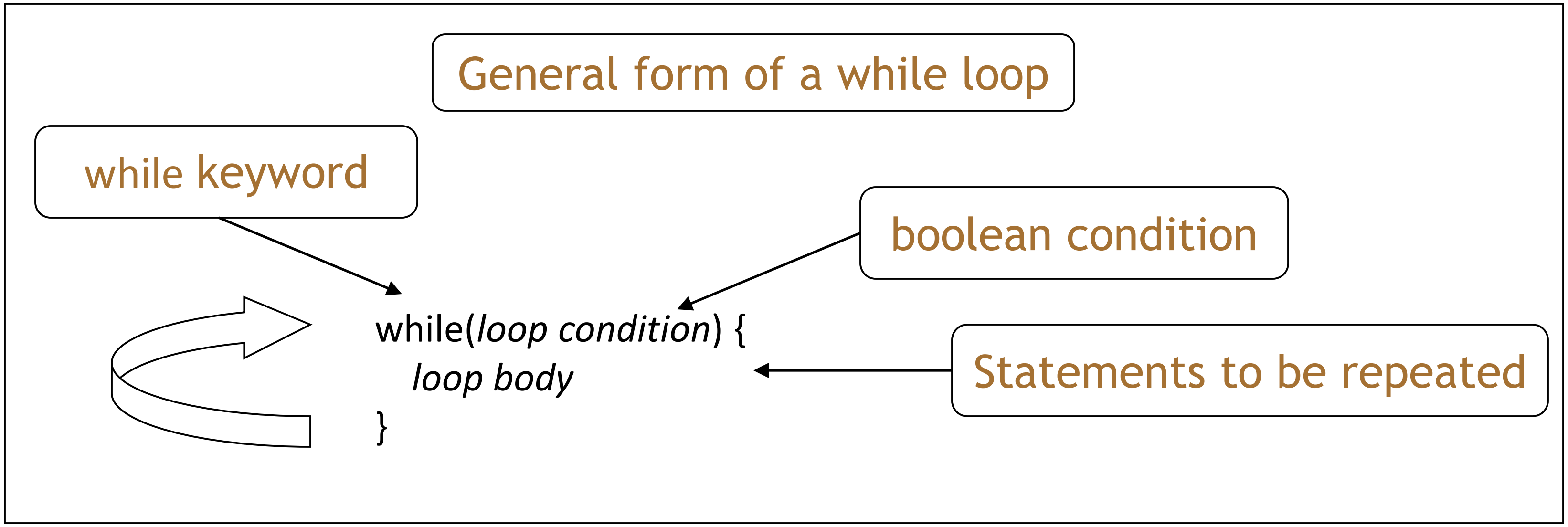
- Repetition in Programming – intro to looping
- Use of loops (while loops).

# Loops in Programming

- There are three types of loop in (Java) programming:

  - While loops
  - For loops
  - Do While loops

# While loop pseudo code



General form of a while loop

while keyword

boolean condition

Statements to be repeated

```
while(loop condition) {
   loop body
}
```

Pseudo-code expression of the actions of a while loop

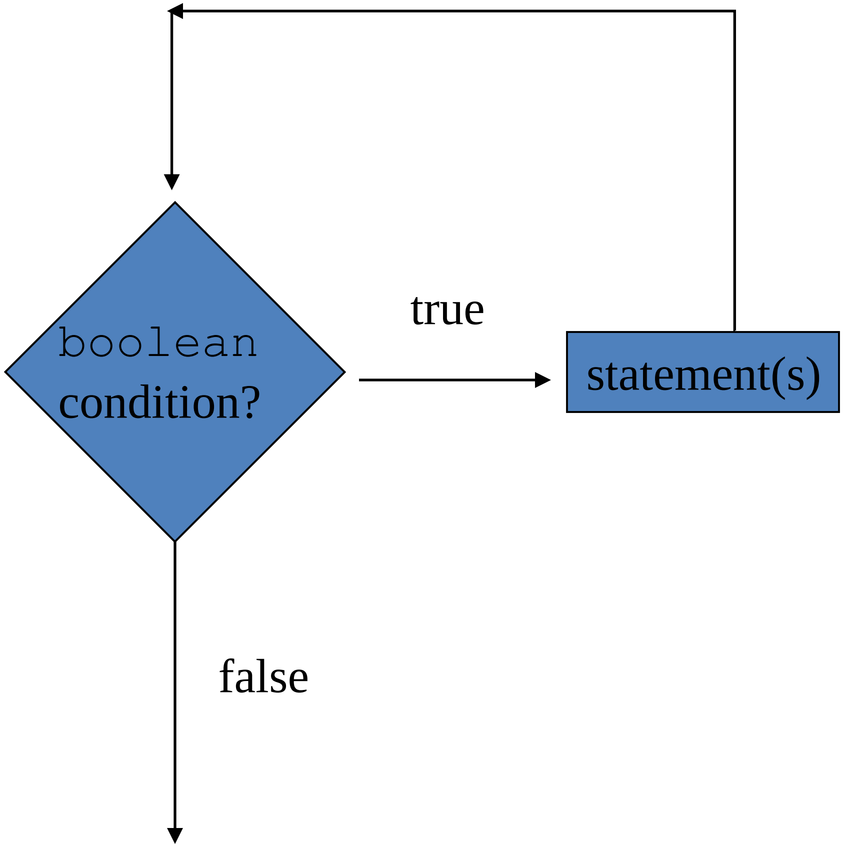
while we wish to continue, do the things in the loop body

# 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”
}
```

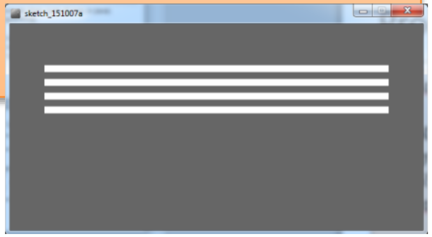
This structure should always be used

# while loop Flowchart



```
int yCoordinate = 60;

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



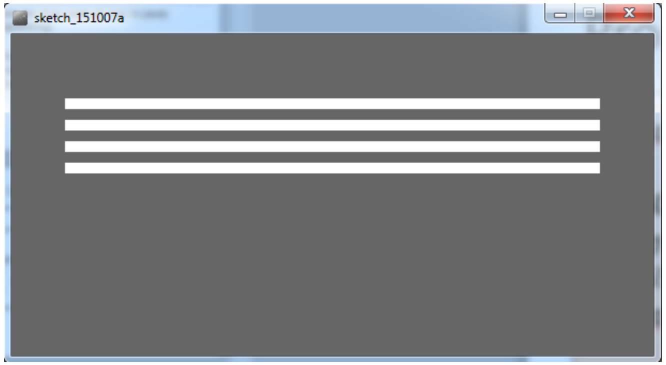
# Processing Example 4.5

```
int yCoordinate = 60;

size(600, 300);
background(102);
fill(255);
noStroke();

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

As we did with the for loop, can we remove the **yCoordinate** variable?

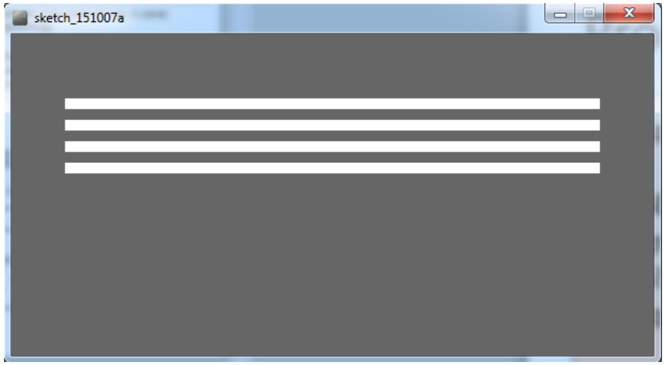


# Updated:  Processing Example 4.5

```
size(600, 300);
background(102);
fill(255);
noStroke();

int i = 60;
while(i  <= 120)
{
   rect(50, i, 500, 10);
   i += 20;
}
```

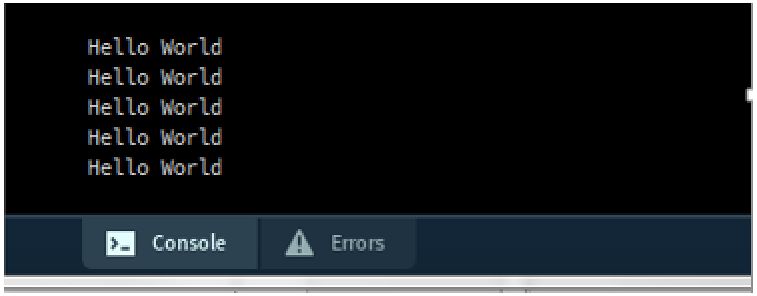
Solution with no **yCoordinate** variable.



# Simple while statements

```
int i = 1;

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



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

# 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?