

# Iteration in Programming

while loops

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# Topics list

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1. Repetition in Programming – Intro to looping

2. Use of loops (while loops).

# Recap: Boolean conditions

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- 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

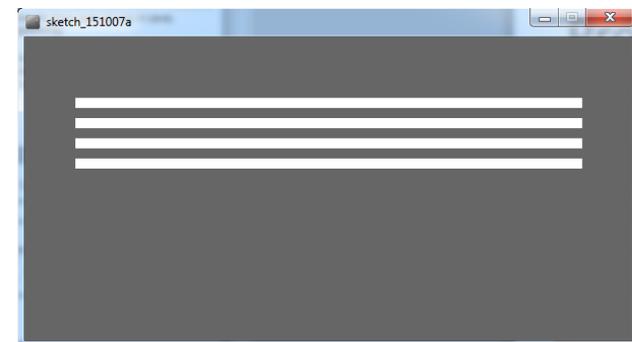
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- Computers are very good at repetition.
- Example:
  - `calculate pay` for 1000 employees.
  - You should use the same `calculate pay` algorithm 1000 times.
  - You don't write the `calculate pay` algorithm 1000 times; instead you include it in a loop.

# Form of loop

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



# Form of loop

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- 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

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- 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);
```



# Form of loop

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- 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);
```

- *We will learn a little more about loops and then we will write the code to solve this problem.*



# Topics list

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1. Repetition in Programming – Intro to looping
2. Use of loops (while loops).

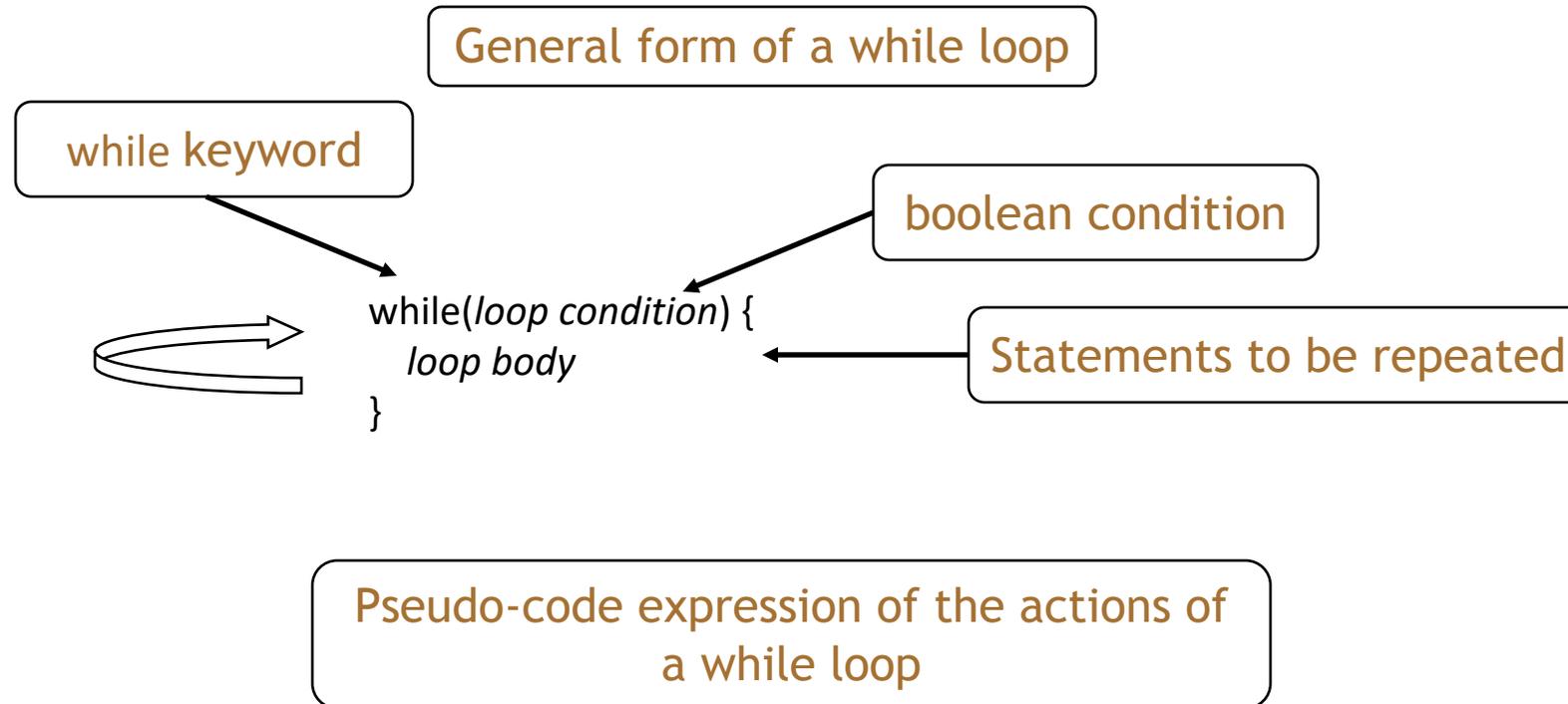
# Loops in Programming

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- There are three types of loop in (Java) programming:
  - **While** loops
  - **For** loops
  - **Do While** loops

# While loop pseudo code

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

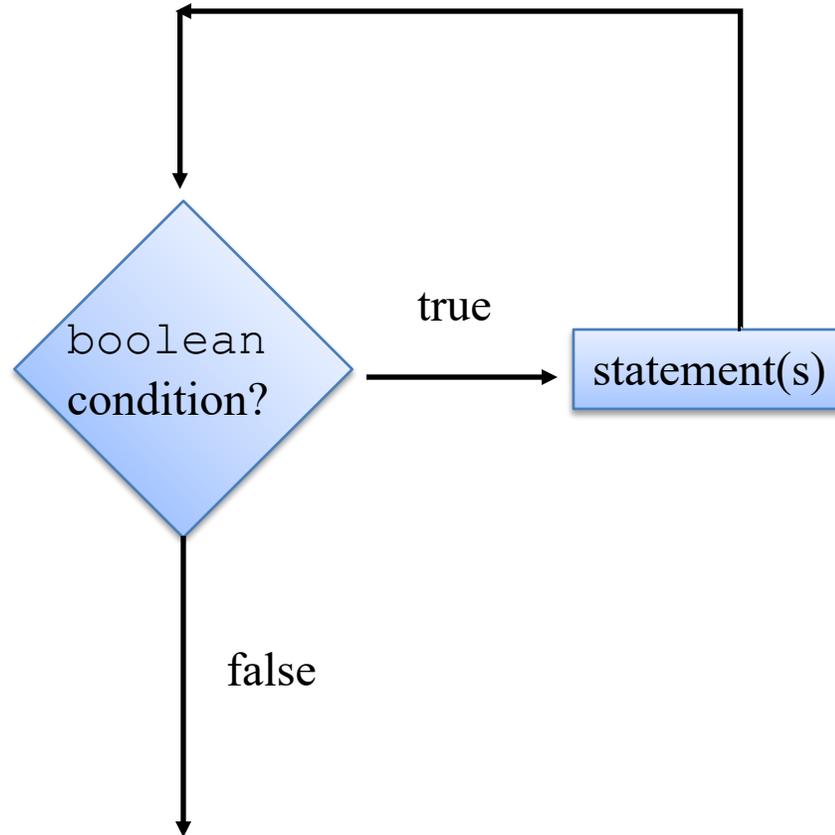
# Construction of while loop

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```
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 yCoordinate = 60;
int i = 0; //i is the LCV
while(i < 4)
{
  rect(50, yCoordinate, 500, 10);
  yCoordinate += 20;
  i++;
}
```

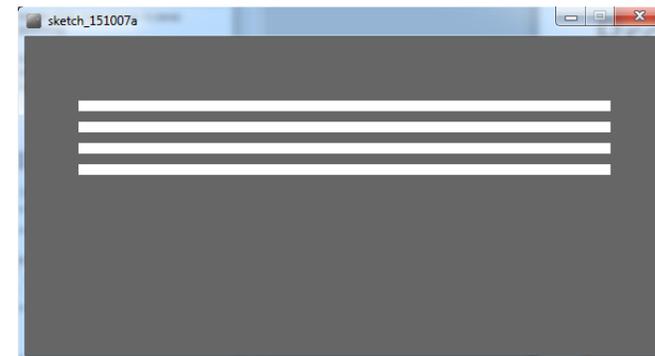


# Processing Example 2.13

```
Example_2_13 | Processing 3.3.6
File Edit Sketch Debug Tools Help

Example_2_13
1 int yCoordinate = 60;
2
3 size(600, 300);
4 background(102);
5 fill(255);
6 noStroke();
7
8 int i = 0;
9 while(i < 4)
10 {
11     rect(50, yCoordinate, 500, 10);
12     yCoordinate += 20;
13     i++;
14 }
15
```

**Q:** Could we remove the **yCoordinate** variable and rework the code to still produce the four lines using the while loop?



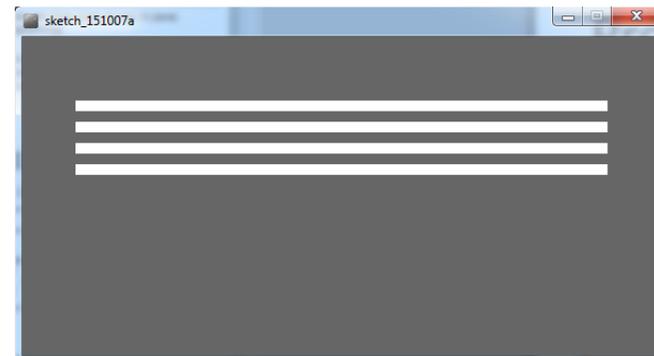
# Processing Example 2.14

```
Example_2_13 | Processing 3.3.6
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Example_2_13
1 size(600, 300);
2 background(102);
3 fill(255);
4 noStroke();
5
6 int i = 60;
7 while(i <= 120)
8 {
9     rect(50, i, 500, 10);
10    i += 20;
11 }
```

**A:** Yes.

Here is the solution with *no yCoordinate* variable.



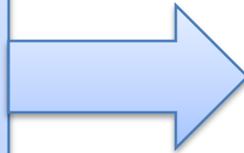
# Some Study Exercises

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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

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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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