

Iteration in Programming

Loops

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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)

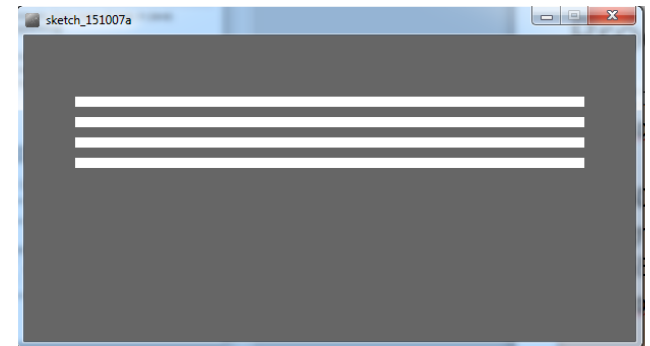
Repetition in Programming

- 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:

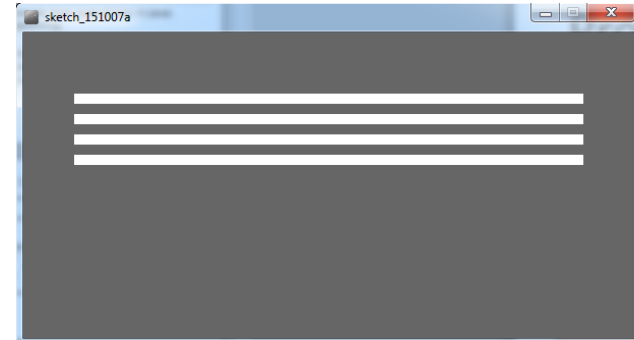
```
rect(50, 60, 500, 10);  
rect(50, 80, 500, 10);  
rect(50, 100, 500, 10);  
rect(50, 120, 500, 10);
```



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);
```



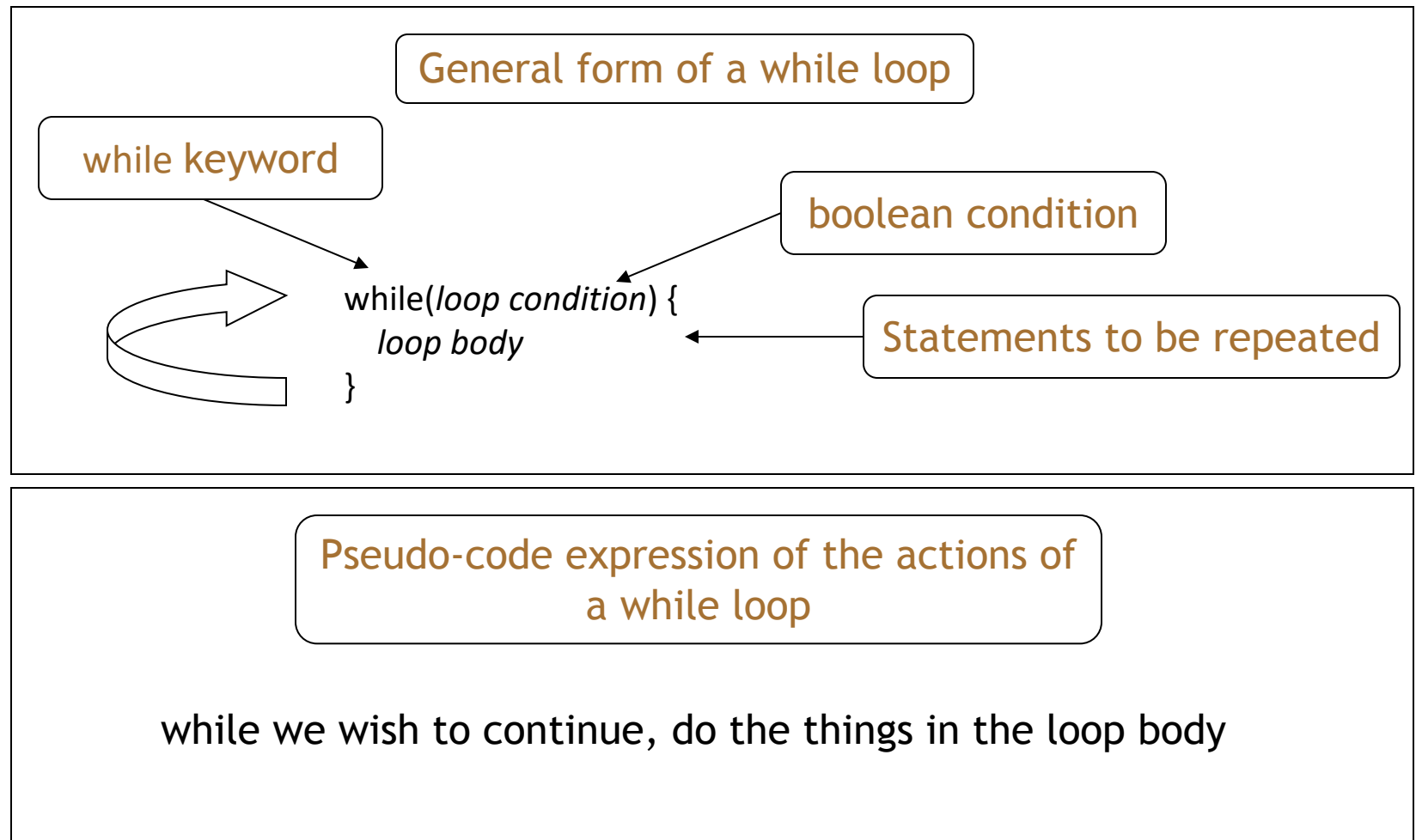
Topics List

- 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



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

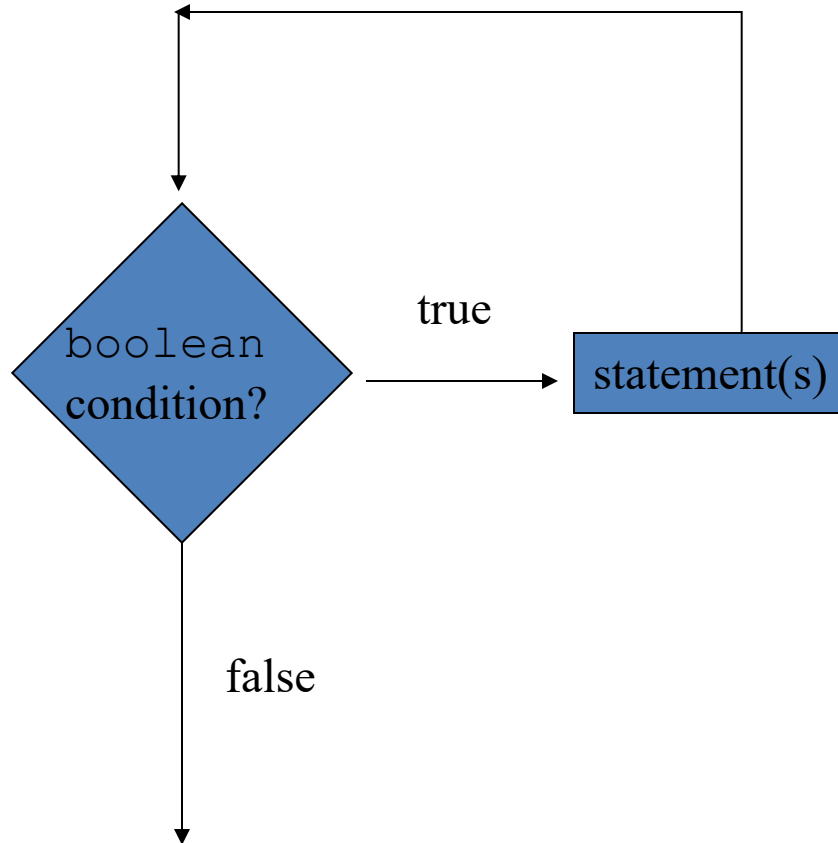
```
int i = 1;

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

A screenshot of a console window with a black background and white text. It displays five lines of "Hello World". At the bottom, there is a dark blue bar with two tabs: "Console" (active) and "Errors".

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

while Loop Flowchart



```
int yCoordinate = 60;
```

```
int i = 0;
```

```
while(i < 4)
```

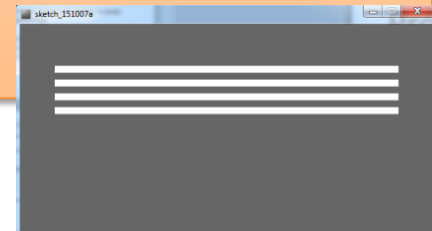
```
{
```

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

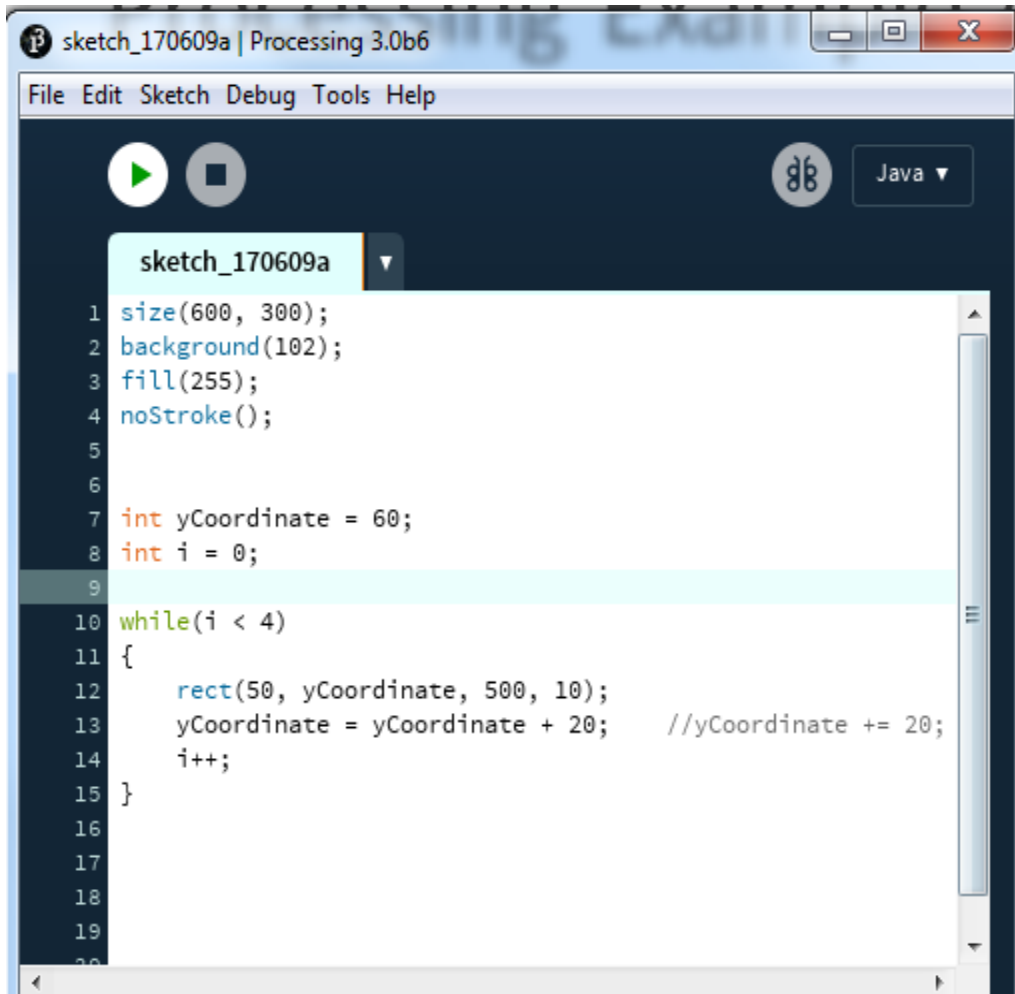
```
    yCoordinate = yCoordinate + 20;
```

```
    i++;
```

```
}
```



While Loop Example 1



The image shows a Processing IDE window titled "sketch_170609a | Processing 3.0b6". The menu bar includes "File", "Edit", "Sketch", "Debug", "Tools", and "Help". Below the menu bar are icons for running (a green play button) and stopping (a grey square button), a logo, and a language dropdown set to "Java". The sketch name "sketch_170609a" is displayed in a dropdown menu. The code editor contains the following code:

```
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
20
```



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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