Iteration in Programming

while loops and loop control variable

Produced by: Ms. Mairead Meagher
Dr. Siobhán Drohan
Ms Siobhan Roche

Ollscoil Teicneolaíochta an Oirdheiscirt
South East Technological University

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

Topics list

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

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

(We'll revisit this at the end of the slides)

Topics list

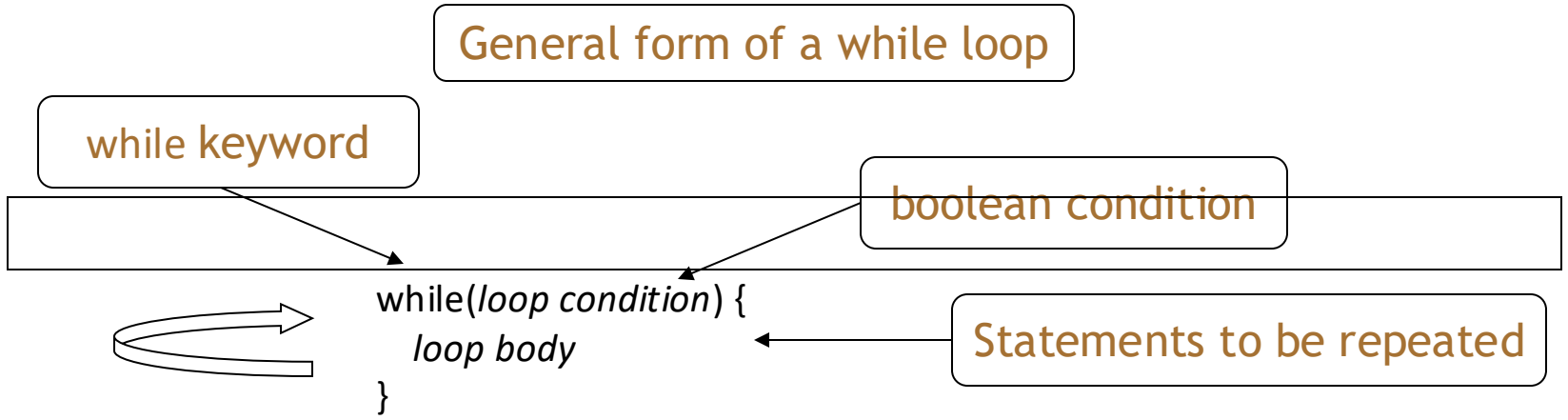
1. Repetition in Programming – Intro to looping

2. 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(boolean condition based on LCV is true)

{

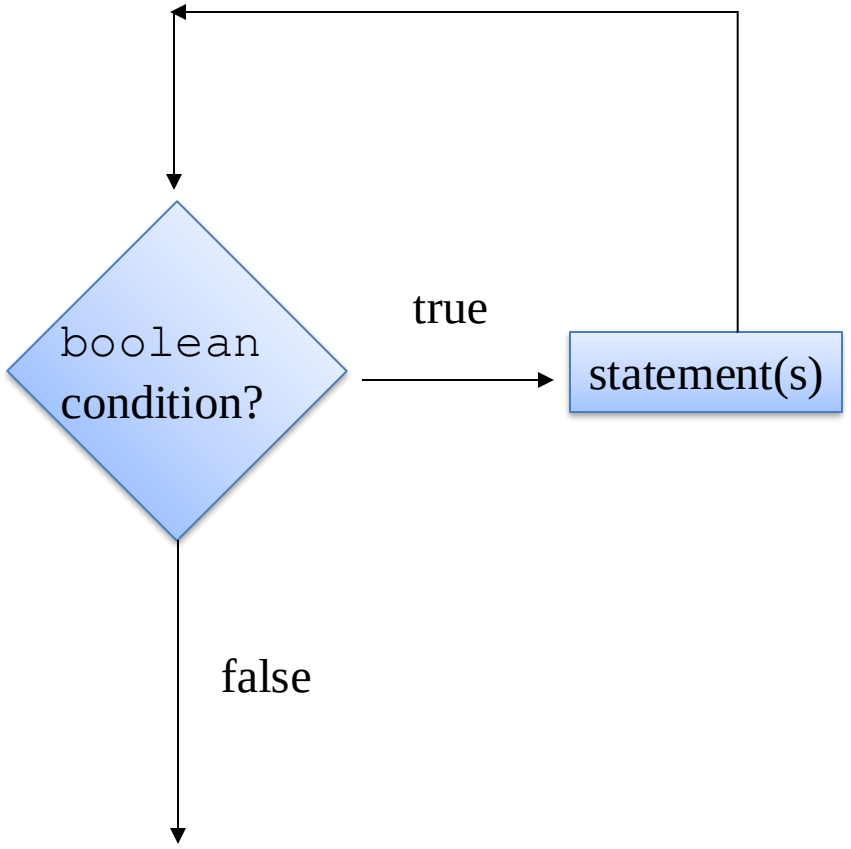
    “do the job to be repeated”

    “update the LCV”

}

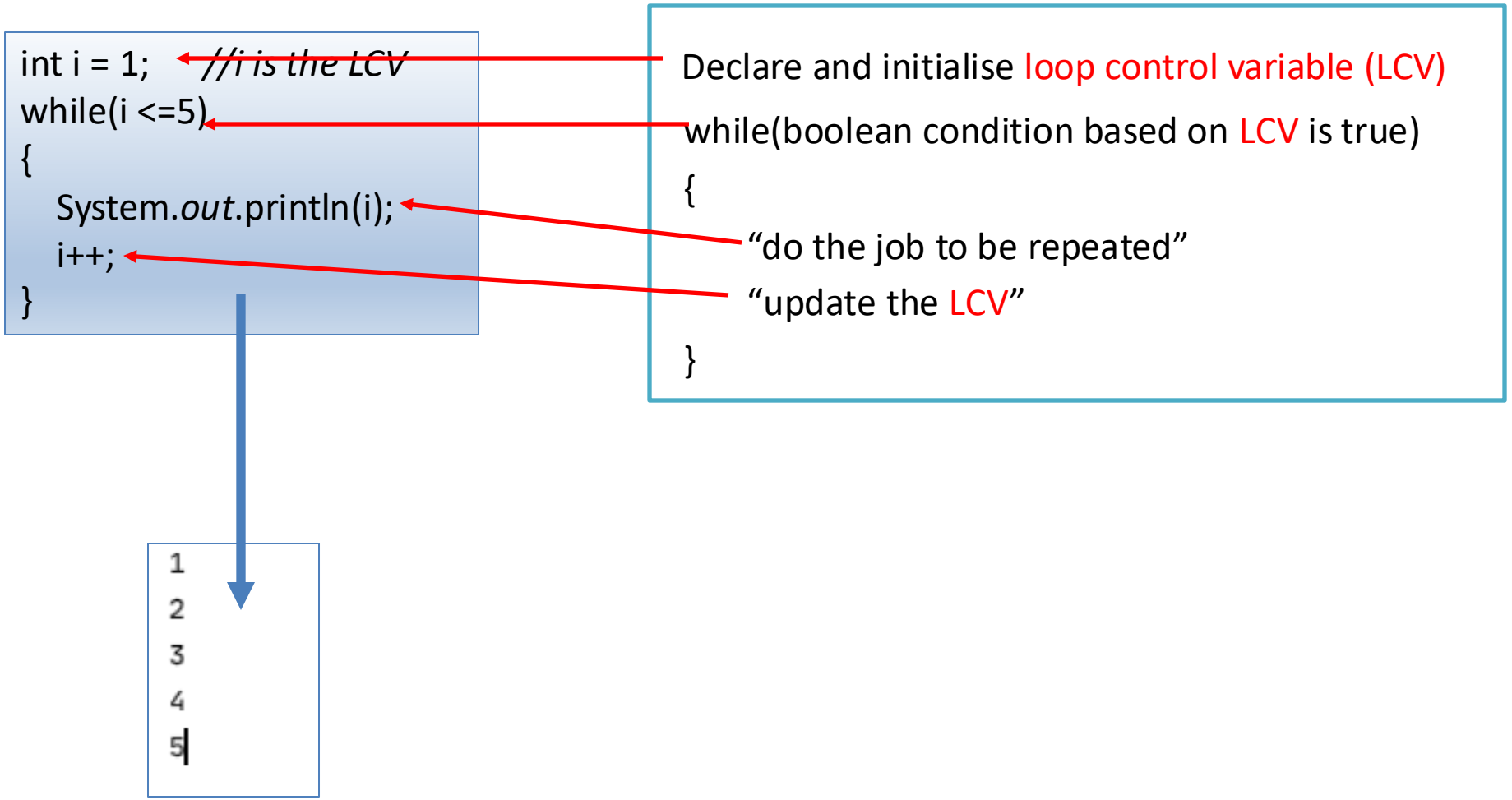
This structure should always be used

`while` loop Flowchart

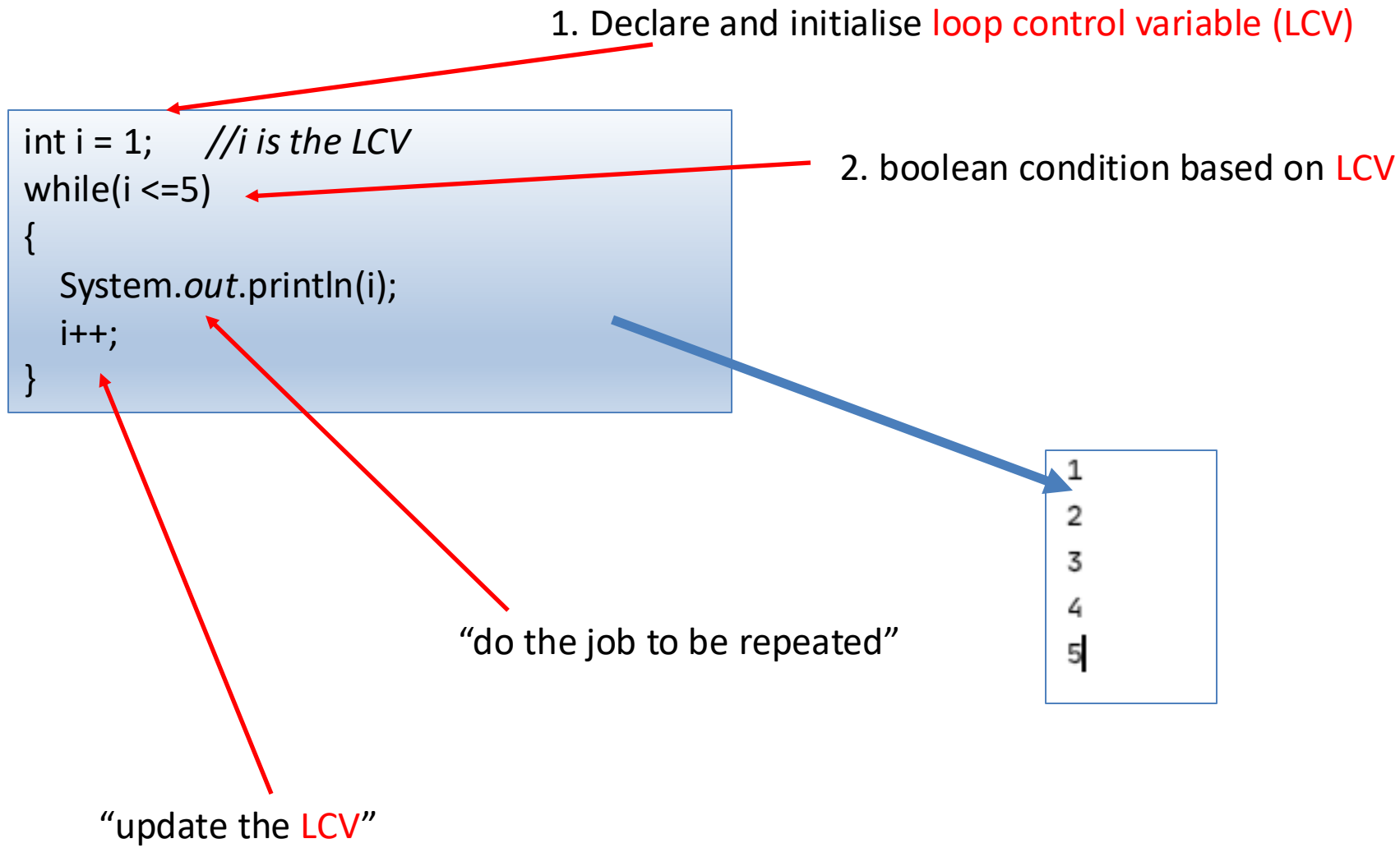



```
int i = 1;          //i is the LCV
while(i <=5)
{
   System.out.println(i);
    i++;
}
```

Example - while



Example – while

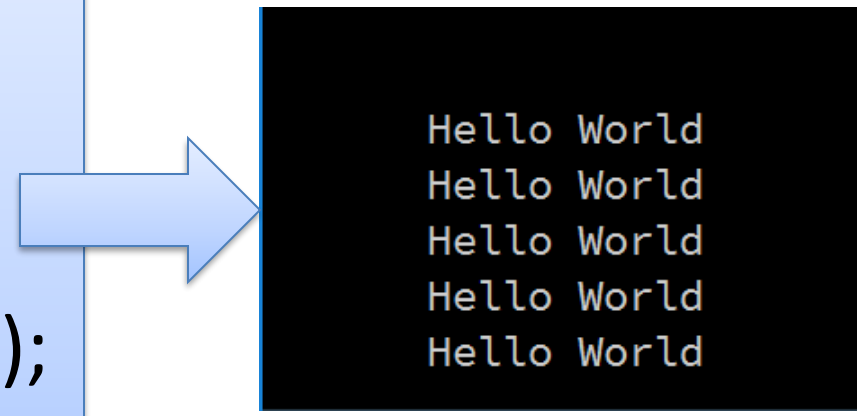


Some Study Exercises

This basic while loop,
produces this output.

```
int i = 1;

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



Form of loop - revisited

- 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

Solution – Whats the difference?

```java
public class Driver {

    public static void main(String args[]){

        for(int i = 1; i<=5; i++){
            System.out.println(i);
        }

        int i = 0;
        while(i < 5){
            System.out.println(i+1);
            i++;
        }

        i=1;
        do{
            System.out.println(i);
            i++;
        }while(i<6);

    }
}
```

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?