Module 4 - Repetition Structures

There are three types of loops that we will cover:

- For Loops
- While Loops
- Do While Loops

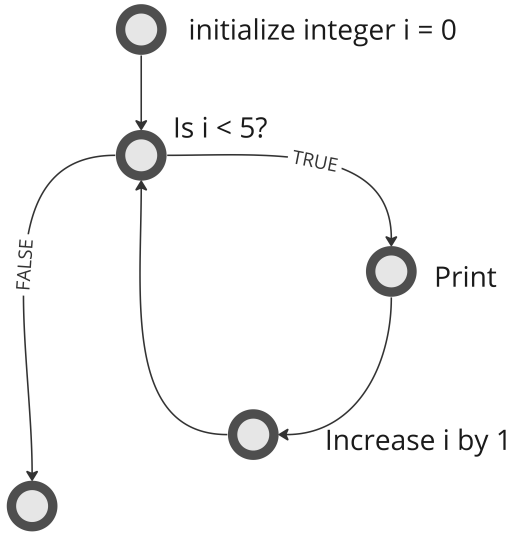
Although each type of loops can be potentially used interchangeably, some loops are best fitted to some scenarios.

For Loops

- For loops are used when we know how many iterations we will do.

```
for(int i = 0; i < 5; i++){
  System.out.println("Iteration number " + i);
}
```

ExampleA.java



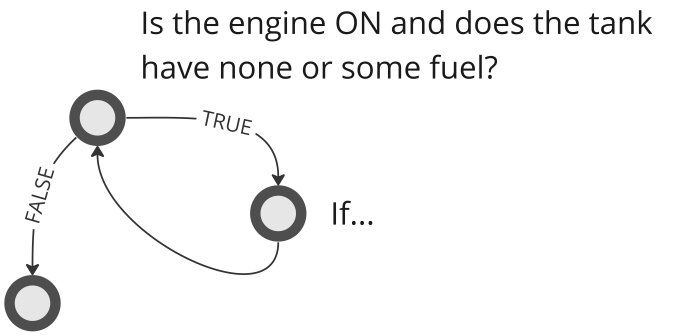
While Loops

- While loops are used to iterate over a condition, and keep iterating if that condition is true.
- You can read this as *“Keep looping while (condition) is true.”*

```
boolean engine = true;
float tank = 1.0f;
int count = 1;

// Are there any errors or bugs in our program?
while(engine && tank >= 0){
    if(tank > 0){
        System.out.println("Iteration #" + (count++) + " & Tank : " + (tank * 100) + "%");
    }
    else{
        System.out.println("Tank is empty");
    }
}
```

ExampleB.java



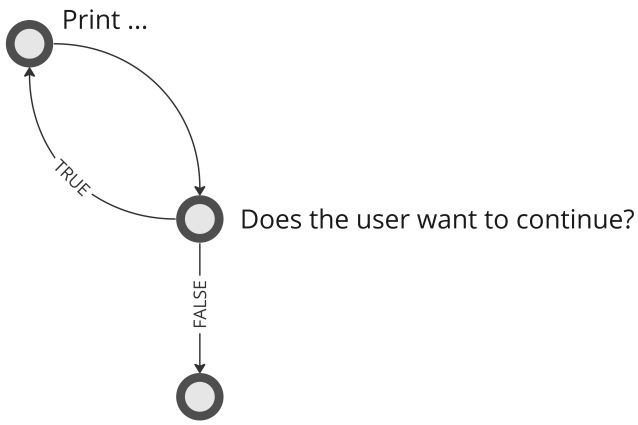
Do While Loops

- Do While loops are used we want to ensure that we run at least 1 iteration.
- Compared to a While loop, we check the condition AFTER running the code inside the Do block.
- You can read this as “*Do (code) and while (condition) is true keep looping*”

```
char choice;

do {
    System.out.print("Do you want to continue (Y/N): ");
    choice = sc.nextLine().charAt(0);
}
while (choice == 'Y');
```

ExampleC.java



RNG — Random Number Generator (Not a repetition structure)

In java, we can generate a random number by specifying its range.

For example:

- Generate a random number from 1 to 5

To work with an RNG, we need to:

1. Import the Random java library

```
import java.util.Random;
```

2. Create a random object (similar to our scanner)

```
Random rand = new Random(); // You can name the random object any name, in this case it is called "rand"
```

3. After we have a random object, we can generate a number like this

```
int randomNumber = rand.nextInt();
```

   - Inside the parentheses in `nextInt` we will declare the range by placing a number.
   - How the range works is by generating a number from 0 to the specified number exclusive.

     ```
     int randomNumber = rand.nextInt(100);
     ```

     In this case, the computer will generate a random number from 0 to 99
   - Since we want to generate a number from 1 to 5, we can do the following:

- Generate a number from 0 to 4, where 0 is the lowest value we can get and 4 is the highest.
- After that number has been generated, we will add 1 to it, so the lowest value becomes 1 and the highest 5.

```
int randomNumber = rand.nextInt(5) + 1; // Remember that rand.nextInt(5) is just an expression for a number
```

The finalized code should look something like this

```
import java.util.Random;

public class ExampleD {
    public static void main(String[] args) {
        Random rand = new Random();

        int randomNumber = rand.nextInt();

        System.out.println(randomNumber);
    }
}
```

Tips regarding RNG and Loops

- If you are working with loops, create the random object outside and before the loop.
  - Do you know why?