ESE112

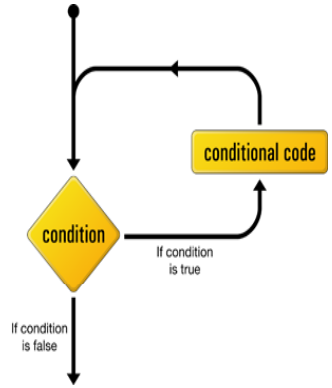
Java Programming:
Loops (while & for)

How can we help Bart?

A "Loop"

- A simple but powerful mechanism for "making lots of things happen!"
- Performs a statement (or block) over & over
- Usually set up to repeat an action until some condition is satisfied
- Computing Scenarios Examples
  - Run an application until user hits "quit" button
  - Deal card hands until game over

Flowchart View of a Loop



Syntax of the *while* statement

```
while (condition){
    statement(s)
}
```

- ***condition*** is a true/false (boolean) expression
- If ***condition*** is initially false, the statement is never executed
- If ***condition*** is true, ***statement*** is executed and ***condition*** is re-evaluated
- The ***statement*** should eventually make the loop stop

A *while* Loop to Print Numbers

```
// Print the numbers 1 thru 10
int x = 1;
while (x <= 10){
   System.out.println(x);
   x = x + 1;
}
```

- **What happens if you forget the statement x = x + 1 ?**
  - **We print value 1 forever**
  - **Known as *infinite* loop**

More *Infinite* Loops

```
// Some infinte loops are intentional
boolean notQuitKey = true;
while (notQuitKey){
   statement(s)
}
```

Note: if the boe-bot needs to continuously read/output something then it will be in a while(true){ } loop

- To stop the action simply bring the switch to 0 position

```
// Others are not
int x = 5;
while (x < 10){
   statement(s) which don't change x
}
```


Compute Square of first 5 numbers

```
//In Square.java
int num = 1;
int sqNum = 0;
while (num <= 5) {
   sqNum = num * num;
   System.out.println(num + "  " + sqNum);
   num = num + 1;
}
```

For Loop

```
for (init; end-test; re-init){
   statement
}
```

- Executes loop body (statements within {}) as long as *end-test* evaluates to TRUE
- Initialization and re-initialization code included in loop statement
- Note: Test is evaluated **before** executing loop body

While vs. For

Code	Explanation

`int x = 1;`
`while (x <= 10){`
`  System.out.println(x);`
`  x = x + 1;`
`}`
	An example of a while loop that has this pattern

`for (int x = 1; x <= 10; x = x + 1){`
`  System.out.println(x);`
`}`
	A for loop that does the same thing

Note: *For* loops are used generally for bounded iteration

Summary of Loops

Type of Loop	Syntax

`while`	`while (condition){`
	`  statement(s)`
	`}`

`for`	`for (expr1; condition; expr3){`
	`  statement(s)`
	`}`