Introduction to Programming

with Java, for Beginners

Conditionals(If statements)

Limitations of sequential programming

- Cannot choose whether or not to perform a command/instruction
- Cannot perform the same command more than once
- Such programs are extremely limited!

Control Structures

- Allow a program to base its behavior on certain conditions
- Two kinds:
  - Conditional (If) Statements
  - Loop Structures

Recap: Boolean

- Boolean is one of the eight primitive types
  - Only 2 values: true, or false
  - Booleans are used to make yes or no decisions
  - All control structures use Booleans
- The following expression each give a Boolean result:
  (25 > 24) && (12 == 13) //results to *false*
  (25 > 24) || (12 == 13) //results to *true*
- Thus based on certain conditions we can alter the outcome or flow of the program

Conditionals ("if" statements)

- An "if" statement is a *flow control* statement
- It is also called a *conditional*, or a branch
- We'll see several "flavors"
  - An "if" all by itself
  - An "if" with an "else" part
  - An "if" with an "else if" part

"if" statement

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

If the condition is true, then the statement(s) (i.e. instructions) will be executed. Otherwise, it/they won't.

```
//Assume x is an integer
if(x > 10) {
  x = x * 2;
  System.out.println("x = " + x);
}
```


If statement (contd..)

- { } indicates the block of code that will get executed given the condition is true
- You can avoid the curly brace after condition if only one statement is to be performed
  - If using Dr Java Interaction pane, best to use { }

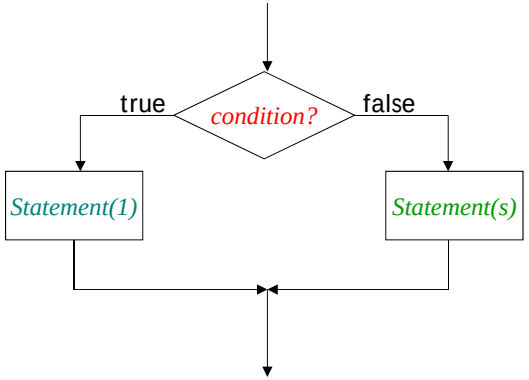
```
//Assume x is an integer
if(x > 0)
  System.out.println(x + " is positive");
```


"if-else" statement

```
if (condition){
  statement(s)
}
else{
 statement(s)
}
```

```
//Assume x is an integer
if(x > 0) {
  System.out.println(x + " is positive");
}
else {
  System.out.println(x + " is negative");
}
```

If-else Flow chart



Style Rule: Indentation and Spacing

- Recommended indentation is from 2 to 4 spaces, but *must be consistent* throughout the program
  - In Dr Java you can set the indent level:
    Edit > Preferences >Miscellaneous
- Single space around every binary operator, including comparisons and assignment (=)

```
if (x < 10) {
   x = x + 1;
}
else {
   x = x - 1;
}
```

Indentation

Spacing

Cascading "if-else"

Example

```
//Assume variable score is entered by user
if (score > 90)
  System.out.println("Grade A");
else if (score > 80)
  System.out.println("Grade B");
else if (score > 65)
  System.out.println("Grade C");
   .
   .
else
  System.out.println("F");

//Note: You can avoid the curly brace after
condition if only one statement is to be performed
```


Nested if-statements

An if within an if

```
if (condition1){
  if (condition2){
    statement(s) A
  }
  else{
    statement(s) B
  }
}
else {
  statements(s) C
}
```

Truth Table

What values must the conditions have in order for block A to run? B? C?

	A	B	C
condition1	T		
condition2			

The infamous "dangling else"

Code	Notes

`if (x > y)`
`  if (y < z)`
`  statementA;`
`else`
`  statementB;`
	When is statementB executed?
	
	In other words, which if is the else paired with?

- An else is paired with the last else-less if, regardless of spacing, unless { } dictate otherwise.

```
if (x > y){
   if (y < z){
      statementA;
   }
}
else{
   statementB;
}
```