

CS 2100: Data Structures & Algorithms 1

Control Flow

Dr. Nada Basit // basit@virginia.edu Spring 2022

Friendly Reminders

- Masks are **required** at all times during class (University Policy)
- If you forget your mask (or mask is lost/broken), I have a few available
 - Just come up to me at the start of class and ask!
- No eating or drinking in the classroom, please
- Our lectures will be recorded (see Collab) please allow 24-48 hrs to post
- If you feel **unwell**, or think you are, please stay home
 - We will work with you!
 - At home: eye mask instead! Get some rest ③



Control Flow

- Execution through your program is linear: starting at the first line in main and executing one line at a time until the end
- Control allows for non-linear execution of your code:
 - Executing some statements of code, but not executing other statements of code
 - Repeating lines of code multiple times

Types of Control Flow

- If statements
 - Standard if statements
 - Switch statements
- Loops
 - For loop
 - For each loop
 - While loop

• There are others, but this is what we plan to cover

Assignment vs. Comparison

```
= vs. ==
```

```
public class CompareExample {
   public static void main(String[] args) {
      /* = is assignment. Evaluate right side and set to left */
      int x = (5*3);
```

/* == is compare. Whole expression evaluates to true/false */
boolean b = (x == 5); // also works: boolean b = x == 5;

System.out.println((x = 5*3)); // seems weird
System.out.println(x==5); // expression is evaluated

Output:	Explanation		
15 false	<pre>x=5*3 evaluates to 15 Since x was set to 15 it is not equal to 5 (so answer is 'false')</pre>		



Quick & Fun Survey Questions

Get to know your peers! \odot

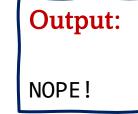
Mountain view vs. Ocean view?

Comparing Objects: cannot be compared with ==, <, >, etc.

```
public class CompareExample {
  public static void main(String[] args) {
    /* Objects cannot be compared with ==, <, >, etc. */
    String s1 = new String("Hey");
    String s2 = new String("Hey");
    if(s1 == s2) {
       System.out.println("EQUAL!");
                                             Output:
    }
```

```
else {
   System.out.println("NOPE!");
```

}



public class Review_ControlStructures {

public static void main(String[] args) {

Standard If-Statement

```
int grade = 82; // change this value to see various outputs
if (grade > 90) {
  System.out.println("Letter Grade: A");
  System.out.println("Well done!");
}
else if (grade > 80) {
  System.out.println("Letter Grade: B");
  System.out.println("Very good!");
}
else if (grade > 70 && grade > 60) { // ex of AND
  System.out.println("Letter Grade: C");
}
else
  System.out.println("Fail");
```

Output:

Letter Grade: B Very good!

Notes about If-Statements

- Can have as many else if blocks as you would like
- Content within the if() MUST evaluate to a Boolean i.e., true or false
- You can leave off the curly braces { }
 - BUT, if no braces, then only the very next line of code is considered inside the if block
 - Probably a good habit to always put the curly braces for now

```
if (conditionalStatement) {
    // condition was true
    // statement(s);
}
// if condition was false,
// execution continues here
```

```
if (conditionalStatement) {
    // statement(s) executed if condition was true
}
else {
    // statement(s) executed if condition was false
}
// execution continues here
// only ONE of the two code blocks above will run!
```



```
String month = "February";
```

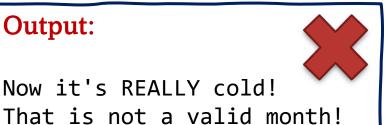
```
switch(month) {
  case "January":
    System.out.println("It is COLD outside!");
case "February":
    System.out.println("Now it's REALLY cold!");
/* ...More cases here removed for space */
```

default:

```
System.out.println("That is not a valid month!");
```

Output:

Now it's REALLY cold!





Switch Statement: checks several equalities

```
String month = "February";
switch(month) {
  case "January":
    System.out.println("It is COLD outside!");
    break;
  case "February":
    System.out.println("Now it's REALLY cold!");
    break;
  /* ...More cases here removed for space */
  default:
    System.out.println("That is not a valid month!");
    break;
```

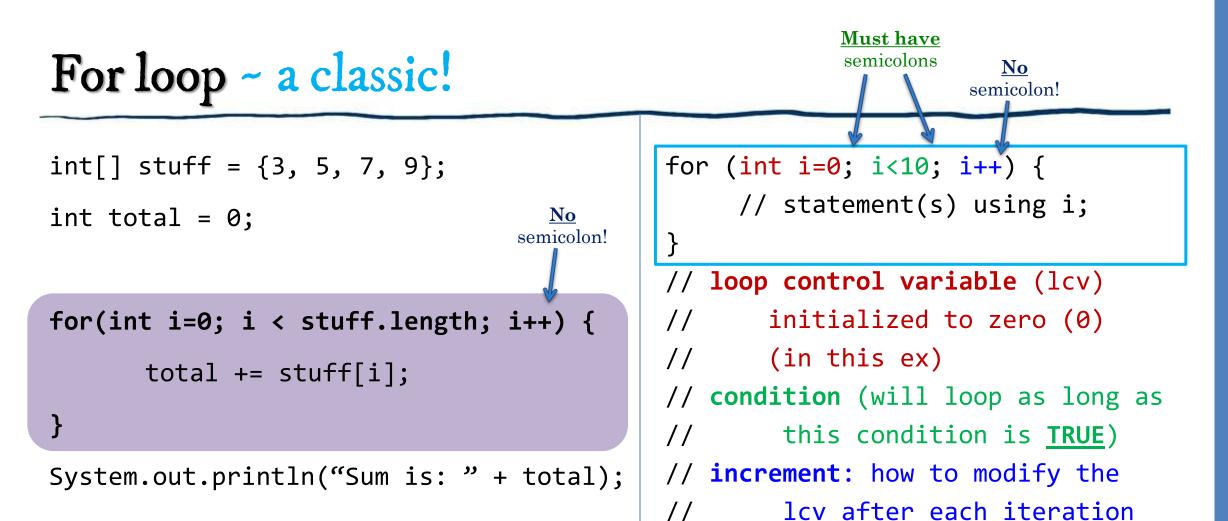




Quick & Fun Survey Questions

Get to know your peers! \bigcirc

Cake vs. Pie?



Output:		
Sum	is:	24

For-Each Loop: a nice compact way to do a standard for-loop

```
// The previous for-loop could be re-written as:
for (int x : stuff) {
    total += x;
}
for (datatype var : list) {
    // statement(s) using var;
}
```

// Another example:
String[] foods = {"steak", "eggs", "cheese"}; // array of Strings

for (String food : foods) { // food has to be of the same type as foods
 System.out.println("I like to eat: " + food);

Output: I like to eat: steak I like to eat: eggs I like to eat: cheese

While loop ~ another classic! (sometimes easier to write)

}

int[] stuff = {3, 5, 7, 9};

int total = 0;

int i = 0;

```
while (conditional_statement_is_true) {
    // statement(s);
```

// as soon as condition becomes false,
// execution resumes after the while loop

```
while (i < stuff.length) {
   total += stuff[i];
   i++: // need to manually in</pre>
```

i++; // need to manually increment!

System.out.println("Sum is: " + total);

Out	put:	
Sum	is:	24

Reminders



Syllabus Quiz

• *Mandatory!* Take by **Feb. 4 @ 11:59pm**. Must get **100%** to stay in the course! May take it as many times as needed. *Take it early!* (Located on Collab)

Regrades

• Request within **7 days** for hand-graded assignments

Academic Integrity

 Collaboration: discuss within your cohort but do your <u>own work</u>; single source at a time; ability to explain

Deadlines are at 11:59pm ET!



Quick & Fun Survey Questions Got any Toggle Questions you would like me to ask the class? If so, send me email and I'll ask in class next time!



Be an <u>Active</u> Participant in Your Learning! Be Curious! Ask Questions!