



CS 2100: Data Structures & Algorithms 1

Control Flow

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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** 😊



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:

15
false

Explanation

x=5*3 evaluates to 15
Since x was set to 15 it is not equal to 5
(so answer is 'false')



Quick & Fun Survey Questions

Get to know your peers! 😊

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

Output:

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!
```

Switch Statement...??



(bad example... what's wrong?)

```
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!  
That is not a valid month!
```

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;  
}
```

Output:



Now it's REALLY cold!



Quick & Fun Survey Questions

Get to know your peers! 😊

Cake vs. Pie?

For loop ~ a classic!

```
int[] stuff = {3, 5, 7, 9};  
int total = 0;
```

```
for(int i=0; i < stuff.length; i++) {  
    total += stuff[i];  
}
```

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

Output:

Sum is: 24

No
semicolon!

Must have
semicolons

No
semicolon!

```
for (int i=0; i<10; i++) {  
    // statement(s) using i;  
}
```

// **loop control variable (lcv)**

// **initialized to zero (0)**

// **(in this ex)**

// **condition** (will loop as long as

// **this condition is TRUE)**

// **increment:** how to modify the

// **lcv** after each iteration

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;  
}
```

The colon here is important!

```
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 (i < stuff.length) {  
    total += stuff[i];  
    i++; // need to manually increment!  
}
```

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

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

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

Output:

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 own work; **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 Active Participant in
Your Learning!
Be Curious!
Ask Questions!**