THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

COMP 110
Introduction to Programming

Fall 2015

Time: TR 9:30 – 10:45

Room: AR 121 (Hanes Art Center)

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Previous Class

- What did we discuss?

Today

- Announcements
  - Quiz today – boolean logic and if-else
  - Assignment 1 : Due Tuesday, Sep 22 @ 11:55 PM

    http://cs.unc.edu/~aikat/courses/comp110/assignments/Assignment1

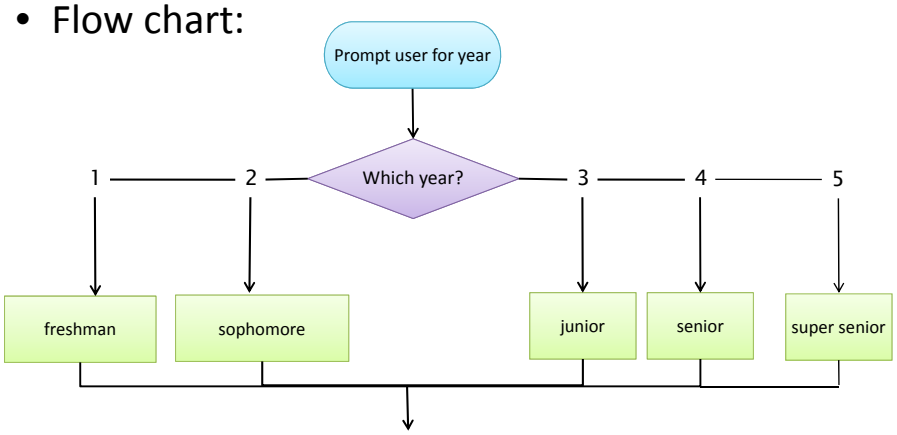
  - **HACKER110: goto → http://comp110.com/hacker**
- More If-else

Multibranch If-Else Statement

- Example
  - Write a program that takes as input your year in college (as an integer) and outputs your year as freshman, sophomore, junior, senior, or super senior

Multibranch If-Else Statement

- Flow chart:



Multibranch If-Else Statement

- We can write a program like this

```
if (year == 1)
System.out.println("freshman");
          else {
                    if (year == 2)
                              System.out.println("sophomore");
                    else {
                              if (year == 3)
                                        System.out.println("junior");
                              else {
                                        if (year == 4)
                                                  System.out.println("senior");
                                        else {
                                                  if (year == 5)
                                                            System.out.println("super senior");
                                                  else
                                                            System.out.println("huh?");
                                                  }
                                        }
                              }
                    }
```

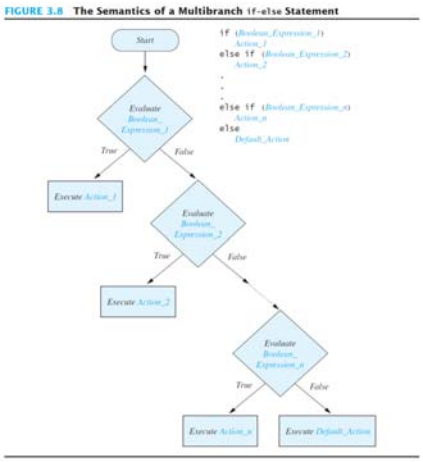
Multibranch If-Else Statement

- Because the previous version is too tedious, we use the **multibranch** statement instead
  - It is not a new syntax rule. We only ignore the brackets so that the logical structure is clear.

```
if (year == 1)
          System.out.println("freshman");
else if (year == 2)
          System.out.println("sophomore");
else if (year == 3)
          System.out.println("junior");
else if (year == 4)
          System.out.println("senior");
else if (year == 5)
          System.out.println("super
senior");
else
          System.out.println("huh?");
```


Multibranch If-Else Statement

- Though all the branches look equal, there is a precedence order among them
  - Only the **first** satisfied branch will be executed



Multibranch If-Else Statement

- What's wrong with this piece of code?

```
if (num < 50)
    System.out.println("Number is less than 50");
else if (num < 25)
    System.out.println("Number is less than 25");
else
    System.out.println("Number is greater than 50");
```


Multibranch If-Else Statement

- What's wrong with this piece of code?

```
if (num < 50)
    System.out.println("Number is less than 50");
else if (time < 25)
    System.out.println("Number is less than 25");
else
    System.out.println("Number is greater than 50");
```

Will this branch get executed?

Nested If and Else

```
if (time < 7){
   if (time < 6){
      go to the gym;
   }
   else{   // note the corresponding "if"
      have brkfst and leave;
   }
}
else{
   go to school;
}
```

- What's the logic flow?
  - If the time is less than 6, we go to the gym;
  - If the time is between 6 and 7, we eat breakfast and leave
  - If the time is greater than 7, we simply sprint to school!

Nested If and Else

```
if (time < 6){
   go to the gym;
}
else{
   if (time < 7){
      have brkfst and leave;
   }
   else{
      go to school;
   }
}
```

- What's the logic flow?
  - If the time is less than 6, we cook breakfast;
  - If the time is between 6 and 7, we get something cold
  - If the time is greater than 7, we go to school

Same Logic, Different Code

```
if (time < 6){
    go to the gym;
}
else{
   if (time < 7){
       have brkfst and leave;
   }
   else{
      go to school;
   }
}
```

```
if (time < 7){
   if (time < 6){
       go to the gym;
   }
   else{
      have brkfst and leave;
   }
}
else{
   go to school;
}
```


Nested If-Else Statement

- Without brackets, every ***else*** will automatically match the nearest ***if***

```
if ( num < 50 )
     if ( num < 25 )
          System.out.println("Number is less than 25");
else
     System.out.println("Number is greater than 50");
```

- Is this piece of code correct?

Nested If-Else Statement

- Without brackets, every ***else*** will automatically match the nearest ***if***

```
if ( num < 50 ) {
    if ( num < 25 )
        System.out.println("Number is less than 25");
    else
        System.out.println("Number is between 25 and 50");
}
```

- **Use brackets and indentation to avoid such errors**

Nested If-Else Statement

- Without brackets, every ***else*** will automatically match the nearest ***if***

```
if ( num < 50 ) {
    if ( num < 25 )
        System.out.println("Number is less than 25");
}
else
    System.out.println("Number is greater than 50");
```

- **Use brackets and indentation to avoid such errors**

Notes…

- Note: To exit your program before end of main method

  System.exit (0);

LOOPS

- Loops are designed to repeat instructions
  - Think about the requirement: Print number 1 to 10
    - It's easy
      - System.out.println("1");
      - System.out.println("2");
      - ……
  - Think about the requirement: Print number 1 to 100
    - We can still do this
  - Let the user input a value n, then print 1 to n
    - We are in trouble……

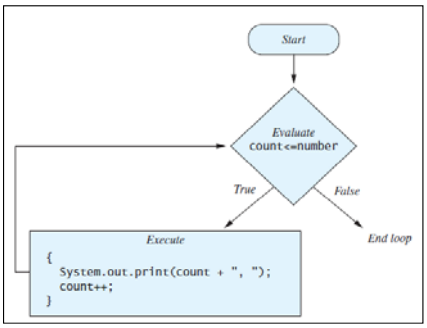
Loop Statement

- What is the pseudo code to fulfill the requirement?
  - Count to 1, if 1<=n, write it down, otherwise stop
  - Count to 2, if 2<=n, write it down, otherwise stop
  - Count to 3, if 3<=n, write it down, otherwise stop
  - ……
  - Count to i, if i<=n, write it down, otherwise stop
  - Count to i+1, if i+1<=n, write it down, otherwise stop
  - ……
  - While a counter<=n, write it down, increase the counter. Otherwise stop

While Statement

- Flow of while statement
  - Start from expression evaluation
  - As long as it's true, repeat instructions in brackets

```
while (count <= number) {
  System.out.println(count);
  count++;
}
```



While Statement

- You have to do some initialization before the statement
- The loop body typically contains an action that ultimately causes the controlling boolean expression to become false.

```
number = keyboard.nextInt();
count = 1;
while (count <= number) {
  System.out.println(count);
  count++;
}
```


While Statement

- Usually there is a counter variable in the statement
  - You can use it in different ways
- Requirement: print the odd numbers from 1 to 10000

```
int count = 1;
while (count < 10000) {
  System.out.println(count);
  count += 2;
}
```

```
int count = 1;
while (count * 2 - 1 < 10000) {
  System.out.println(count * 2 - 1);
  count++;
}
```

Infinite Loops

- Always make sure that your loop will end
  - Never forget to change the counter

```
while (count <= number) {
  System.out.println(count);
}
```

```
while (count <= number); {
  System.out.println(count);
}
```

==

```
while (count <= number)
{  ; }
  System.out.println(count);
```


Infinite Loops

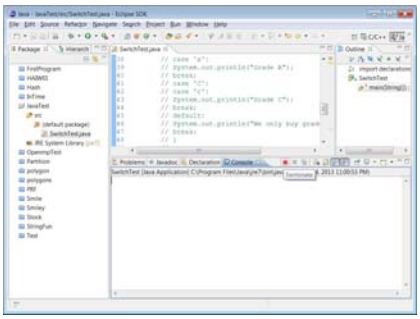
- Always make sure that your loop will end
  - Never forget to change the counter
  - Use comparison rather than "==" or "!="in the control expression
  - Know whether your counter is increasing or decreasing

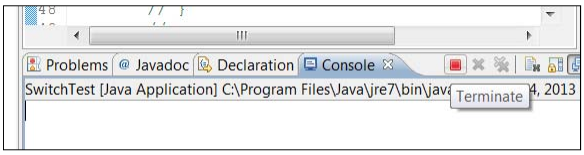
```
while (count != number) {
  System.out.println(count);
  count+=2;
}
```

```
while (count < number) {
  System.out.println(count);
  count--;
}
```

Infinite Loops

- If you wrote an infinite loop and executed it
- Use the **terminate** button of eclipse
  - If it is red, the program is running





Infinite Loops

- Infinite loop is not a syntax error. It's a logical error
- eclipse will not help you in this case
- Write pseudo code, think, and rethink before coding

Next class

- More loops

→ Reading Assignment: Chapter 4