The Learning House
427 S. 4th Street #300
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Java Basics Unit

Lesson 5 – Boolean Expressions and Controlling Program Flow

SOFTWARE GUILD

Objectives

- Understand how to make decisions in code
  - If statements
  - Switch statements
- Understand how to repeat ourselves in code
  - Loops
- Understand boolean expressions
- Understand how to use relational operators
- Understand how to use boolean operators

So...what can we do in computer programs?

Only three things:

1. Execute statements straight through
2. Make a choice (one path or another)
3. Repeat ourselves based on some criteria

All programs are built with these blocks...

Boolean Expressions

- Important — they help us make decisions and control the flow of the program
- Used to test conditions:
  - Whether something is true or false
  - Whether a value equals another value
  - Whether a value is less than or greater than another value

Conditional and Relational Operators

- Equal To: ==
- Not Equal To: !=
- Less Than: <
- Greater Than: >
- Less Than or Equal To: <=
- Greater Than or Equal To: >=
- Negation (Not): !
- And: &&
- Or: ||

Boolean Truth Table

A	B	A && B	A || B
F	F	F	F
T	F	F	T
F	T	F	T
T	T	T	T

Conditional Execution: The If Statement

```
if (condition) {
  // execute code if condition is true
} else {
  // execute code if condition is false
}
```

Conditional Execution
The Switch Statement

```
switch (expression) {
   case constant:
        // execute code if expression == constant
        break;
   case constant2:
        //execute code if expression == constant2
        break;
   default:
        //execute code if no match found
        break;
}
```

Conditional Execution Example

- Day of week converter
- Simple command line menu system
- Implement with if statements
- Implement with switch statement

Constants

- Sometimes you need constants or “magic” numbers
  - Ex. Pi or a min/max value
- When defining constants, use all caps
- Use *final* keyword
- Example:
  - `final double PI = 3.14;`
  - `final double MAX_HEIGHT = 14.75;`
- While we’re here, let’s look at other Java conventions...

Refactor WindowMaster

- Add constants for max and min values
  - 25.5 for max height
  - 18.75 for max width
  - 1.0 for min height and min width
- Add conditional statements to check values
- What should we do if values are out of bounds?
  - We'll keep it simple for now

Do-while Loop

```
do {
   // code I want to repeat while condition is true
} while (condition);
```

While Loop

```
while (condition) {
   // code I want to repeat while condition is true
}
```

For Loop

```
for (initialization; termination; increment) {
   // code I want to repeat a given number of times
}
```

Flowcharts

- How to describe our solutions or algorithms? Flowcharts are a good tool for this.
- What do flowcharts look like?
- What are some of the constructs?
- How do you represent decisions?
- How do you represent loops?

Flowcharts (2)

- Install Dia Open Source Flowcharting Tool

Exercise

- Modify WindowMaster so that it will keep asking for input until the user gives valid values for height and width
- Pair up
- Flowchart your solution, then check with me
- Implement and test

A Slight Detour

- Additional info you might find handy:
  - o Java Strings
    - Look at Javadoc
  - o Random numbers
    - Look at Javadoc

Look at Labs

- Mileage Calculator
- Lucky 7's
- Interest Calculator
- Factorizor
- Rock, Paper, Scissors

Programming by Doing

- If statements
- Do-while loops
- For loops
- Random numbers