Module 1 - Lecture 3

Expressions, Statements, Blocks, and Branches

Review

- Java overview
- IntelliJ overview
- Variables
  - Declaration vs Initialization
  - Naming best practices
- Arithmetic operators and expressions
- Type conversion

Binary!

What is a Program?

- Data
- **Behavior** -> Today's focus

Expressions and Statements

- An **expression** is a construct made up of variables, operators, and method invocations.
- An expression **evaluates to a single value**.

- A **statement** forms a complete unit of execution.

- Think of expressions as words and statements as sentences. In that case, **code blocks** are paragraphs.

Code Blocks

- Code that belongs together can be written in blocks.
- What does this do?

```
{
    int length = 5;
    int width = 10;
    int area = length * width;
}
```

Scope

A variable's **scope** defines where in the program that the variable is exists (i.e. can be referenced). When code execution reaches a point where a variable is no longer referenceable, the variable is said to be **out of scope**.

Rules of Scope:

1. Variables declared inside of a method or block `{..}` are local variables and only available within that block.
2. Blocks can be nested within other blocks. Therefore, if a variable is declared outside of a block, it is accessible within the inner block.

Methods

- A **method** is a named block of code.
- A method can take multiple parameters and return zero or one result.
- A method has a declaration, which is made up of a few components in a certain order.
    - The name and parameters make up a **method signature**.

<Access Modifier> <Return Type> <Name> <Parameters>
Examples:

public double divide (int num1, int num2)
public void main (String[] args)

Let's Code!

Boolean Expressions

In programming, we often want to conditionally execute sections of code. Before we can do that we need to know how to check when we should run a section of code.

A **boolean expression** is an expression that produces a boolean value (**true** or **false**) when evaluated.

Comparison Operators

Given X = 5

OPERATOR	DESCRIPTION	COMPARING	YIELDS
==	IS EQUAL TO	X == 8	FALSE
		X == 5	TRUE
!=	IS NOT EQUAL TO	X != 8	TRUE
		X != 5	FALSE
>	IS GREATER THAN	X > 8	FALSE
<	IS LESS THAN	X < 8	TRUE
>=	GREATER THAN OR EQUAL TO	X >= 8	FALSE
<=	LESS THAN OR EQUAL TO	X <= 8	TRUE

Boolean (Logical) Operators

NOT

A	!A
FALSE	TRUE
TRUE	FALSE

AND

A	B	A && B
FALSE	FALSE	FALSE
FALSE	TRUE	FALSE
TRUE	FALSE	FALSE
TRUE	TRUE	TRUE

OR

A	B	A || B
FALSE	FALSE	FALSE
FALSE	TRUE	TRUE
TRUE	FALSE	TRUE
TRUE	TRUE	TRUE

BOOLEAN EXPRESSION

A statement which evaluates to a single boolean value.

Given A is TRUE and B is FALSE,
Evaluate the expression

(A && B) || (A && !B)

↓

(TRUE && FALSE) || (TRUE && !FALSE)

↓

(TRUE && FALSE) || (TRUE && **TRUE**)

↓

FALSE || (TRUE && TRUE)

↓

FALSE || **TRUE**

↓

TRUE

Boolean (Logical) Operators cont...

BOOLEAN EXPRESSION

A statement which evaluates to a single boolean value.

XOR

A	B	A ^ B
FALSE	FALSE	FALSE
FALSE	TRUE	TRUE
TRUE	FALSE	TRUE
TRUE	TRUE	FALSE

Challenge (breakout)

Let’s assume a car can be powered by gasoline, diesel, or electricity.

Using boolean expressions, how would you determine if a car is a hybrid i.e. at least two power sources are used?

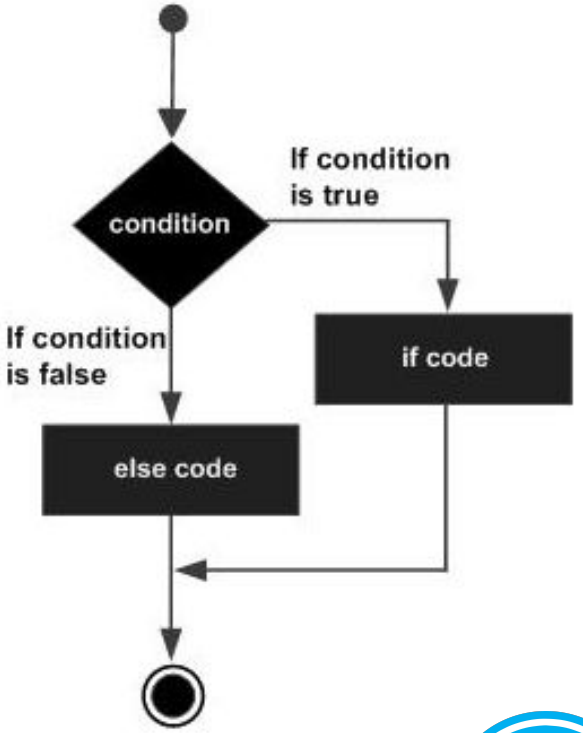
No conditional logic allowed!

If Statements

Conditional blocks allow a program to take a different path depending on some condition(s) determined while the program runs.

Syntax:

```
if (boolean expression) {
    <if_code_here>
}
else {
    <else_code_here>
}
```



Let's Code!

QUESTIONS?