1.3 Variables and Data Types

Variables

A name associated with a memory location in the computer where you can store a value that can change or vary.

Variable Types in Java

There are two types of variables in Java:

Primitive variables: These hold primitive data types like integers, doubles, and booleans.

Object or Reference variables: These hold reference to an object of a class. For example, strings. A reference is a way to find the object (like the tracking number on a package).

Primitive Data Types in Java

Byte (1byte): Store whole numbers from -128 to 127

Short (2bytes): Store whole numbers from -32,768 to 32,767

Integer (4bytes): Store whole numbers from -2,147,483,648 to 2,147,483,647

Float (4bytes): Stores fractional numbers. Sufficient for storing 6 to 7 decimal digits

Double (8bytes): Stores fractional numbers. Sufficient for storing 15 decimal digits

Long (8bytes): Store whole numbers -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807

Boolean (1bit): Stores true or false values

Char (2bytes): Stores a single character/letter

Declaring Variables in Java

To create variables you need its data type and name. This is called declaring a variable.

Syntax:

```
type variableName;
```

*notice lowercase type, camelCase name, semicolon at the end

Declaring and Assigning Variables in Java

You can declare AND assign variables.

Syntax:

```
type variableName = value;
```

*notice lowercase type, camelCase name, equal sign to assign value, semicolon at the end

Integer: `int myInt = 31;`

Float: `float myFloatNum = 5.99f;`

Double: `double myDouble = 5.5;`

Boolean: `bool myBool = true;`

Char: `char myletter = 'M';`

Assignment Operator

Unlike in math, ‘=’ does not mean both sides are equal to each other. It means set the value in the memory location associated to the variable on the left to a copy of the value on the right.

We can change the value of a variable by assigning it a different value.

EX:

```
int myInt = 10;

System.out.println(myInt);

myInt = 5;

System.out.println(myInt);
```

We are assigning the value 10 in the memory location for `myInt`.

We then change the value to 5.

Console output:

10

5

Keyword `Final`

The keyword `final` can be used in front of a variable declaration to make it a constant that cannot be changed. Constants are traditionally capitalized.

Syntax:

```
final type NAME = value;
```

EX:

```
final double PI = 3.14;
```

Naming your Variables

You can give variables *almost* any name. Names must start with a lowercase letter and can include letters, numbers, underscores. It must all be one word with no spaces, camelCase to easily read longer names. Names should describe the data it holds, keep it short and sweet. You want your code to be easy to understand.

*keywords are off limits (`for`, `if`, `class`, `double`, `static`, `int`, …etc)

The String Concatenation Operator (+)

- Same symbol as addition
- Used to combine strings and other data types into strings

EX.

```
System.out.print("hello " + " friend");
Will print out: hello friend

System.out.print("your score: " + 100)
Will print out: your score: 100
```

Lets Practice!

On Repl.it: studentTranscript

Write a program that stores the student information. Then prints all information like a transcript. USE COMMENTS in your code!

Algebra 1	84.5	El Camino High School
Biology	75	Jane Doe
English 1	93.7	Grade 9
History 1	86	GPA: 2.6
P.E	64.9	Class rank: 342

```
El Camino High School
Student Name: Jane Doe
Grade: 9

Algebra 1: 84.5 B
Biology: 75 C
English 1: 93.7 A
History 1: 86 B
P.E: 64.9 D

GPA: 2.6

Class Rank: 342
```