3. Fundamentals of Java Programming

Lesson 2:
Variables and Data Types

3.5. Variables and Data Types

- Variables are locations in memory in which values can be stored

- Each Variable has a Data Type, Name and a Value

- A variable's Data Type defines what type of data it can store.

- A variable's Value is the data that it is currently storing

3.5. Variables and Data Types
3.5.1. Data Types

- The Data Type of a Variable can be either a Primitive Data Type , Reference Data Type or array Data types.

- Variables with Primitive Data Types store simple data like integers, reals, booleans and characters.

- Variables with Reference Data Types store Java objects that are instances of classes.

- Variables with array data types store data of that particular array type

3.5. Variables and Data Types
3.5.2. Primitive Data Types

- There are four primitive data types that store integers. These differ in the number of memory bits they are allocated in memory.

- Similarly, there are two primitive data types that store reals.

type	bits
byte	8
short	16
int	32
long	64

type	bits
float	32
double	64

3.5. Variables and Data Types
3.5.2.Primitive Data Types (Continued)

- The number of bits used to store an integer or a real determines the range of values the variable is capable of storing.

type	range
byte	**-128** to **127**
short	**-32,768** to **32,767**
int	**-2,147,483,648** to **2,147,483,647**
long	**-9,223,372,036,854,775,808** to **9,223,372,036,854,775,807**

type	range
float	**4.9e-324** to **1.8e+308**
double	**1.4e-45** to **3.4e-038**

3.5. Variables and Data Types
3.5.2. Primitive Data Types (continued)

- The Primitive data type **char** stores single characters.
  - For example, '1', 'a', '+'.
  - **char**s are allocated 16 bits in memory, and are hence capable of storing all 65536 Unicode characters.

- The Primitive data type **bool** stores Boolean values.
  - For example, true, false.

3.5. Variables and Data Types
3.5.3. Declaring Variables

- Before use, variables should be Declared. That is, we specify that the variable with this particular name will store data of this particular type

- Variable declarations take the form:
  VariableType VariableName
  - For example:
    - int x;
    - char a;

- Variables of the same type may be declared on the same line
  - For example,
    - Int x, y, z;

3.5. Variables and Data Types
3.5.4. Naming Variables

- Can only Start with a Letter, the Underscore _ or the Dollar Sign **$**.

- After the first letter, the name may include any letter, number, the Underscore or the Dollar Sign, but cannot include Symbols such as **%**, **@**, ***** and so on.

- Names are Case Sensitive. Hence **Value**, **VALUE**, **value**, **vALuE** may all be used as names for different variables.
  – However, it is good to use meaningful names that will not lead to confusion.

- It is a convention to start a variable name with a lower case letter
  – For example, **surname**.

- If the variable name is made up of several words, then from the second word onwards the first letter of each word is in upper case.
  – For example, **numberOfStudents**