

Notes - Literals and Data Types

Constant values are values that do not change. Sometimes they are called **literals**.

Integer (int) constants are comprised of whole numbers. They may be positive or negative. Examples include: 123, 1, 9001, 0, -12, -200, 22

Decimal (double) constants are decimal numbers. They may be positive or negative. Examples include: 1.0, 22.33, -9.0, 0.0, 123.45, -89.0

Character (char) constants are comprised of only one letter, number, or symbol which is enclosed in single quotes.

Examples include: 'a', 'b', 'Z', '1', '\$', '!', '-', '<', '+'

Boolean (boolean) constants are either true or false.

String (String) constants are comprised of a series of characters and/or spaces enclosed in double quotes.

Examples include: "Hello", "My name is Ms. Monteiro", "1234", "#!\$@!", "asdfASDF"

Data Types allow Java to know what kind of information it will be handling. Java has **8** data types built in – these are called **primitive data types**. These include: **int, double, char, boolean, short, long, byte, and float**.

The following data types store **whole numbers**:

type	Size	Range		
name	bytes	bits	Minimum	maximum
byte	1	8	-128	+127
short	2	16	-32,768	+32,767
int	4	32	-2,147,483,648	+2,147,483,647
long	8	64	-9,223,372,036,854,775,808	+9,223,372,036,854,775,807

In this class, we will always use an **int** to store whole numbers.

The following data types store **decimal numbers**:

type	Size	Range	Precision	
name	bytes	bits	approximate	in decimal digits
float	4	32	+/- 3.4 * 10 ³⁸	6-7
double	8	64	+/- 1.8 * 10 ³⁰⁸	15

In this class, we will always use a **double** to store decimal numbers.

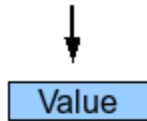
The data type used to store a character literal is **char**.

The data type used to store a boolean literal is **boolean**.

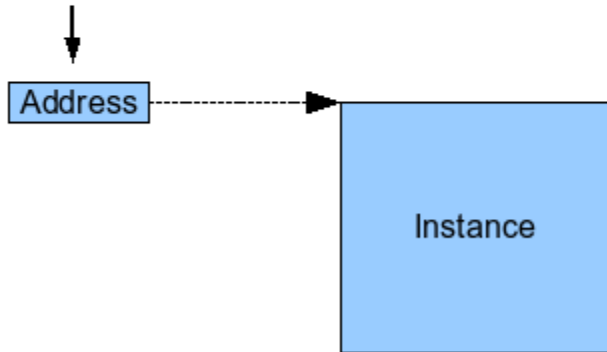
The data type used to store a String literal is **String**. String, however, is not a built-in, primitive data type. It is **reference data type**. One of the main differences between a primitive data type and a reference data type is the way that they are stored in memory.

Primitive data types are stored directly in memory, whereas reference data types are stored as pointers to a location in memory where the data is actually stored.

memory allocated for a primitive type variable



memory allocated for a reference type variable



****Be very careful when defining data types because Java is case sensitive, and `Double` is very different than `double`, etc.**

Comprehension Questions:

1. What is a constant?
2. Give an example of each of the five literal types.
3. What is the difference between a character constant and a String constant?
4. How many primitive data types does Java have? What are they?
5. What is the correlation between bits and bytes?
6. What are the possible values for a boolean?
7. What is a difference between a primitive data type and a reference data type?
8. What is one reference data type that we are now being introduced to?
9. Is `Double` the same thing as `double`?