

BCA – 401: Java Programming

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In today's Class we have discussed on Data types, Literals and Identifier used in Java.

Data Types in Java:-

Variables are nothing but reserved memory locations to store values. This means that when you create a variable you reserve some space in the memory.

Based on the data type of a variable, the operating system allocates memory and decides what can be stored in the reserved memory. Therefore, by assigning different data types to variables, you can store integers, decimals, or characters in these variables.

Data types specify the different sizes and values that can be stored in the variable.

There are two types of data types in Java.

- Primitive data types.
- Non-primitive data types (Reference/Object Data Types).

Java Primitive Data Types:-

In Java language, primitive data types are the building blocks of data manipulation. These are the most basic data types available in Java language.

Java is a statically-typed programming language. It means,

all variables must be declared before its use. That is why we need to declare variable's type and name.

There are eight primitive datatypes supported by Java. Primitive datatypes are predefined by the language and named by a keyword.

There are 8 types of primitive data types:

boolean data type

byte data type

char data type

short data type

int data type

long data type

float data type

double data type

Boolean Data Type:-

- boolean data type represents one bit of information
- There are only two possible values: true and false
- This data type is used for simple flags that track true/false conditions.
- Default value is false
- Example: boolean one = true

byte data type:-

- Byte data type is an 8-bit signed two's complement integer.
- Minimum value is -128 (-2^7)
- Maximum value is 127 (inclusive) ($2^7 - 1$)
- Default value is 0
- Byte data type is used to save space in large arrays, mainly in place of integers, since a byte is four times smaller than an integer.
- Example: byte a = 100, byte b = -50

Short Data Type:-

- Short data type is a 16-bit signed two's complement integer.
- Minimum value is -32,768 (-2^{15})
- Maximum value is 32,767 (inclusive) ($2^{15} - 1$)
- Short data type can also be used to save memory as byte data type. A short is 2 times smaller than an integer.
- Default value is 0.
- Example: short s = 10000, short r = -20000

Int Data Type:-

- Int data type is a 32-bit signed two's complement integer.
- Minimum value is - 2,147,483,648 (-2^{31})
- Maximum value is 2,147,483,647(inclusive) ($2^{31} - 1$)
- Integer is generally used as the default data type for integral values unless there is a concern about memory.
- The default value is 0
- Example: `int a = 100000, int b = -200000`

Long Data Type:-

- Long data type is a 64-bit signed two's complement integer.
- Minimum value is -9,223,372,036,854,775,808(-2^{63})
- Maximum value is 9,223,372,036,854,775,807 (inclusive)($2^{63} - 1$)
- This type is used when a wider range than int is needed
- Default value is 0L
- Example: `long a = 100000L, long b = -200000L`

Float Data Type:-

- Float data type is a single-precision 32-bit IEEE 754

floating point.

- Float is mainly used to save memory in large arrays of floating point numbers.
- Default value is 0.0f
- Float data type is never used for precise values such as currency.
- Example: float f1 = 234.5f

Double Data Type:-

- double data type is a double-precision 64-bit IEEE 754 floating point.
- This data type is generally used as the default data type for decimal values, generally the default choice
- Double data type should never be used for precise values such as currency.
- Default value is 0.0d
- Example: double d1 = 123.4

Char Data Type:-

- char data type is a single 16-bit Unicode character.
- Minimum value is '\u0000' (or 0). Java uses Unicode system not ASCII code system. The \u0000 is the

lowest range of Unicode system.

- Maximum value is '\uffff' (or 65,535 inclusive)
- Char data type is used to store any character.
- Example: `char letterA = 'A'`

Non-primitive data types (Reference/Object Data Types):-

- The non-primitive data types include Classes, Interfaces, and Arrays.
- Reference variables are created using defined constructors of the classes. They are used to access objects. These variables are declared to be of a specific type that cannot be changed. For example, Employee, Puppy, etc.
- Class objects and various type of array variables come under reference datatype.
- Default value of any reference variable is null.
- A reference variable can be used to refer any object of the declared type or any compatible type.
- Example: `Animal animal = new Animal("ziraffe");`

Java Literals:-

A literal is a source code representation of a fixed value. They are represented directly in the code without any

computation.

Literals can be assigned to any primitive type variable. For example –

```
byte a = 68;
```

```
char a = 'A';
```

byte, int, long, and short can be expressed in decimal(base 10), hexadecimal(base 16) or octal(base 8) number systems as well.

Prefix 0 is used to indicate octal, and prefix 0x indicates hexadecimal when using these number systems for literals. For example –

```
int decimal = 100;
```

```
int octal = 0144;
```

```
int hexa = 0x64;
```

String literals in Java are specified like they are in most other languages by enclosing a sequence of characters between a pair of double quotes. Examples of string literals are –

Example

```
"Hello World"
```

```
"two\nlines"
```

```
"\"This is in quotes\""
```

String and char types of literals can contain any Unicode

characters. For example –

```
char a = '\u0001';
```

```
String a = "\u0001";
```

Java language supports few special escape sequences for String and char literals as well. They are –

Notation	Character represented
\n	Newline (0x0a)
\r	Carriage return (0x0d)
\f	Formfeed (0x0c)
\b	Backspace (0x08)
\s	Space (0x20)
\t	tab
\"	Double quote
\'	Single quote
\\	backslash
\ddd	Octal character (ddd)
\uxxxx	Hexadecimal UNICODE character (xxxx)

Java Identifiers:-

All Java variables must be identified with unique names.

These unique names are called identifiers.

Identifiers can be short names (like x and y) or more descriptive names (age, sum, totalVolume).

It is recommended to use descriptive names in order to create understandable and maintainable code.

For Example:-

```
// Good
```

```
int minutesPerHour = 60;
```

```
// OK, but not so easy to understand what m actually is
```

```
int m = 60;
```

The general rules for naming variables are:

Names can contain letters, digits, underscores, and dollar signs

Names must begin with a letter

Names should start with a lowercase letter and it cannot contain whitespace

Names can also begin with \$ and _

Names are case sensitive ("myVar" and "myvar" are different variables)

Reserved words (like Java keywords, such as int or boolean) cannot be used as names