# Section-2

**Variables and datatypes**


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# Java Variables

- A variable is the name of a reserved area allocated in memory. In other words, it is a name of the memory location. It is a combination of "vary + able" which means its value can be changed.
- There are three types of variables in java:
  - Local
  - instance
  - and static.

# 1) Local Variable

- A variable declared inside the body of the method is called local variable.
- You can use this variable only within that method and the other methods in the class aren't even aware that the variable exists.
- A local variable cannot be defined with "static" keyword.

# 2) Instance Variable

- A variable declared inside the class but outside the body of the method, is called an instance variable.
- It is not declared as static.
- It is called an instance variable because its value is instance-specific and is not shared among instances.

# 3) Static variable

- A variable that is declared as static is called a static variable. It cannot be local.
- You can create a single copy of the static variable and share it among all the instances of the class.
- Memory allocation for static variables happens only once when the class is loaded in the memory.

# Rules to Declare a Variable

- A variable name can consist of Capital letters **A-Z**, lowercase letters **a-z** digits **0-9**, and two special characters such as _ underscore and **$** dollar sign.
- The first character must not be a digit.
- Blank spaces cannot be used in variable names.
- Java keywords cannot be used as variable names.
- Variable names are case-sensitive.
- There is no limit on the length of a variable name but by convention, it should be between 4 to 15 chars.

## Example to understand the types of variables in java

```
public class A
{
    static int m=100;
    void method()
    {
        int n=90;
    }
    public static void main(String args[])
    {
        int data=50;
    }
}
```

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# Java Variable Example: Add Two Numbers

```
public class Example1{
public static void main(String[] args){
int x=20;
int y=30;
int z=x+y;
System.out.println(z);
}
}
```

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# Java Variable Example: Widening

```
public class  Example2{
public static void main(String[] args){
int i=10;
float f=i;
System.out.println(i);
System.out.println(f);
}}
```

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# Java Variable Example: Narrowing (Typecasting)

```
public class  Example3{
public static void main(String[] args){
float f=10.5f;
//int a=f;
int a=(int)f;
System.out.println(f);
System.out.println(a);
}}
```

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# Java Variable Example: Adding Lower Type

```
class  Example4{
public static void main(String[] args){
byte a=10;
byte b=10;
//byte c=a+b;
byte c=(byte)(a+b);
System.out.println(c);
}}
```

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# Data Types in Java

- Data types specify the different sizes and values that can be stored in the variable. There are two types of data types in Java:
- **1) Primitive data types:** The primitive data types include boolean, char, byte, short, int, long, float and double.
- **2) Non-primitive data types:** The non-primitive data types include Classes, Interfaces, and Arrays.

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# 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.
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# 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

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# Datatype values and size

| Data Type | Default Value | Default size |
|---|---|---|
| boolean | false | 1 bit |
| char | '\u0000' | 2 byte |
| byte | 0 | 1 byte |
| short | 0 | 2 byte |

# Con..

| Data Type | Default Value | Default size |
|---|---|---|
| int | 0 | 4 byte |
| long | 0L | 8 byte |
| float | 0.0f | 4 byte |
| double | 0.0d | 8 byte |

# Boolean Data Type

- The Boolean data type is used to store only two possible values: true and false.
- This data type is used for simple flags that track true/false conditions.
- **Example**
- Boolean one = false ;

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# Byte Data Type

- The byte data type is an example of primitive data type. It is an 8-bit signed two's complement integer.
- Its value-range lies between -128 to 127.
- Its default value is 0.
- The byte data type is used to save memory in large arrays where the memory savings is most required.
- It saves space because a byte is 4 times smaller than an integer. It can also be used in place of "int" data type. **Example:** byte a = 15, byte b = -25

# Short Data Type

- The short data type is a 16-bit signed two's complement integer. Its value-range lies between ---32,768 to 32,767 .
- The short data type can also be used to save memory just like byte data type. A short data type is 2 times smaller than an integer.
- **Example:** short s = 10000, short r = -5000
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# Int Data Type

- The int data type is a 32-bit signed two's complement integer. Its value-range lies between -2,147,483,648 (-2^31) to 2,147,483,647 (2^31 -1).
- The int data type is generally used as a default data type for integral values unless if there is no problem about memory.
- **Example:** int a = 100000, int b = -200000
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# Long Data Type

- The long data type is a 64-bit two's complement integer.
- Its value-range lies between -9,223,372,036,854,775,808(-2^63) to 9,223,372,036,854,775,807(2^63 -1).
- Its default value is 0.
- The long data type is used when you need a range of values more than those provided by int.
- **Example:** long a = 100000L, long b = -200000L

# Float Data Type

- The float data type is a single-precision 32-bit floating-point.
- It should never be used for precise values such as currency. Default value: 0.0 (0.0f)
- **Example:** float f1 = 234.5f

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# Double Data Type

- The double data type is a double-precision 64-bit floating-point.
- It should never be used for precise values such as currency. Default value: 0.0 (0.0d)
- **Example:** double d1 = 12.3

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# Char Data Type

- The char data type is a single 16-bit Unicode character. Its value-range lies between '\u0000' (or 0) to '\uffff' (or 65,535 inclusive).
- The char data type is used to store characters.
- **Example:** char letterA = 'A' ;

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# Any Question?

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# Thank You