

```
System.out.println("Hi!");
```

main() method signature



Java

CHEAT SHEET

SCALER
Topics

```
byte a = 13;
```

nextBoolean()

Basic Syntax

Class Declaration

Create a class with name: Main

```
→ A class declaration begins with the "class" keyword.  
→ After the class keyword, put the class name.  
  
class Main  
{  
    int x = 5;  
  
    void printX() {  
        System.out.println(this.x);  
    }  
}
```

Class body

Method Declaration

Create a method with name: demoMethod

```
Access Specifier → Return type → Method Signature  
Scanner class (Method Name & Parameter List)  
  
public int demoMethod (int a, int b)  
{  
    // Method body  
}
```

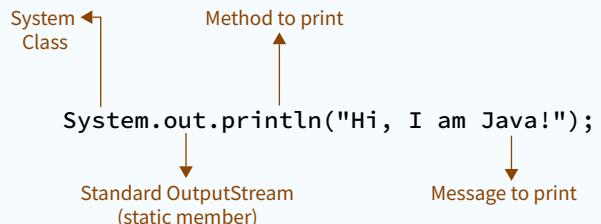
main() method signature

Create a method with name: demoMethod

```
Accessible Everywhere → Belongs to the class → Method name  
Return type → Array of String as argument  
  
public static void main (String[] args)  
{  
    // Method body  
}
```

System output

Create a method with name: demoMethod



System input

Create an object of Scanner class: myObj

```
Scanner class → new operator → Standard InputStream  
Object name  
  
Scanner myObj = new Scanner(System.in);
```

Use one of these methods to take input:

- `nextBoolean()` - Reads a boolean value from the user
- `nextByte()` - Reads a byte value from the user
- `nextDouble()` - Reads a double value from the user
- `nextFloat()` - Reads a float value from the user
- `nextInt()` - Reads an int value from the user
- `nextLine()` - Reads a String value from the user
- `nextLong()` - Reads a long value from the user
- `nextShort()` - Reads a short value from the user

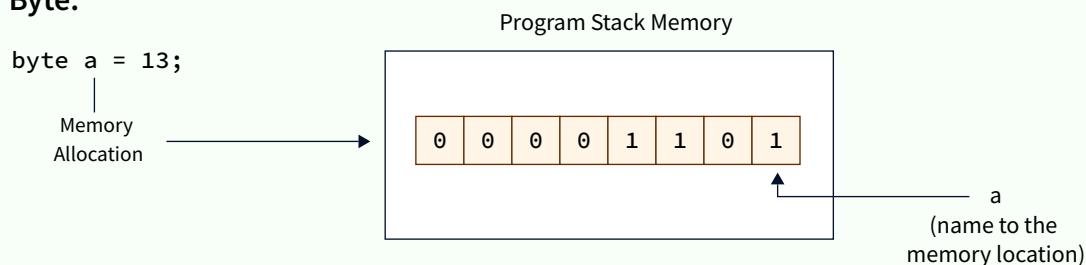
```
String username = myObj.nextLine();  
// Take the whole line as string input
```

Primitive Data Types

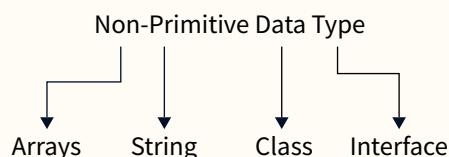


Type	Size	Range	Default Values
byte	8 bits	-128 to 127	0
short	16 bits	-32,768 to 32,767	0
int	32 bits	-2^31 to 2^31 - 1	0
long	64 bits	-2^63 to 2^63 - 1	0L
float	32 bits	1.4E-45 to 3.4028235E38	0.0f
double	64 bits	4.9E-324 to 1.797693E308	0.0d
char	16 bits	'\u0000' to '\uffff'	'\u0000'
boolean	1 bit	true or false	false

Byte:



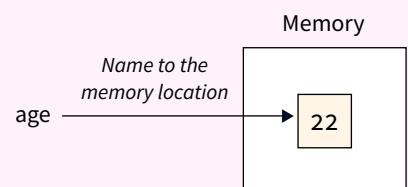
Non-Primitive Data Types



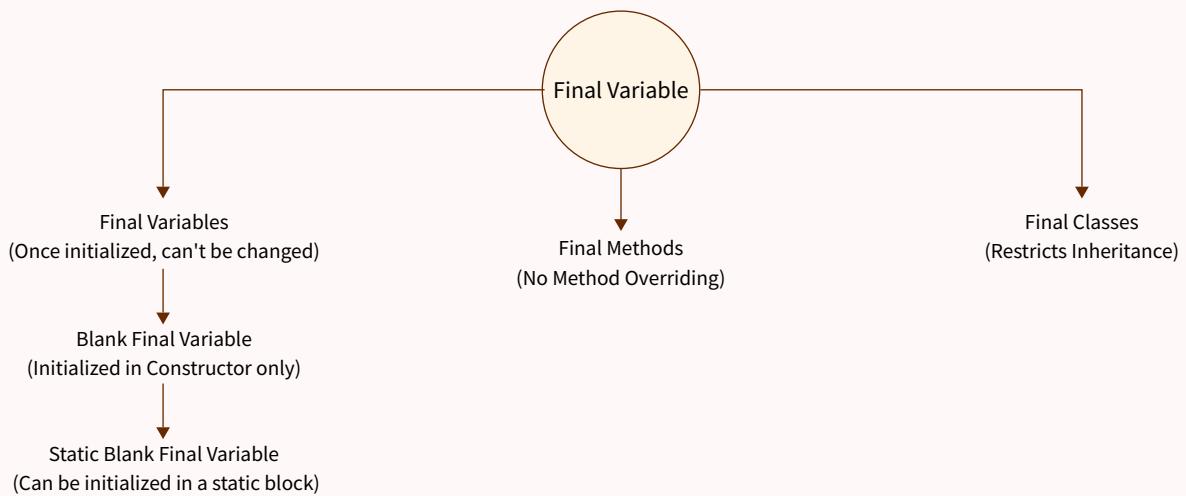
Java Variables

int age = 22;

Variables in Java are only a name to the memory location where value is stored.



Final Keyword in Java



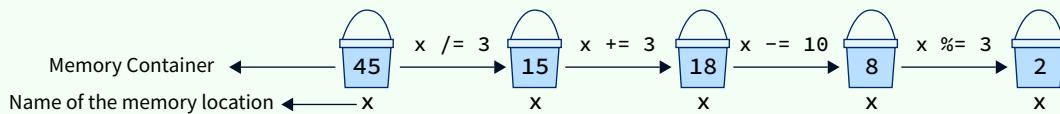
Operators

Arithmetic Operators

```
System.out.println(5 + 3); // Addition, Output: 8  
System.out.println(5 - 3); // Subtraction, Output: 2  
System.out.println(5 * 3); // Multiplication, Output: 15  
System.out.println(5 / 3); // Division, Output: 1.6666666666666667  
System.out.println(5 % 3); // Modulo, Output: 2
```

Assignment Operators

```
int x = 45; // Assignment operator  
x /= 3; // Equivalent to x=x/3;  
x += 3; // Equivalent to x=x+3;  
x -= 10; // Equivalent to x=x-10;  
x %= 3; // Equivalent to x=x%3;  
System.out.println(x); // Output: 2
```

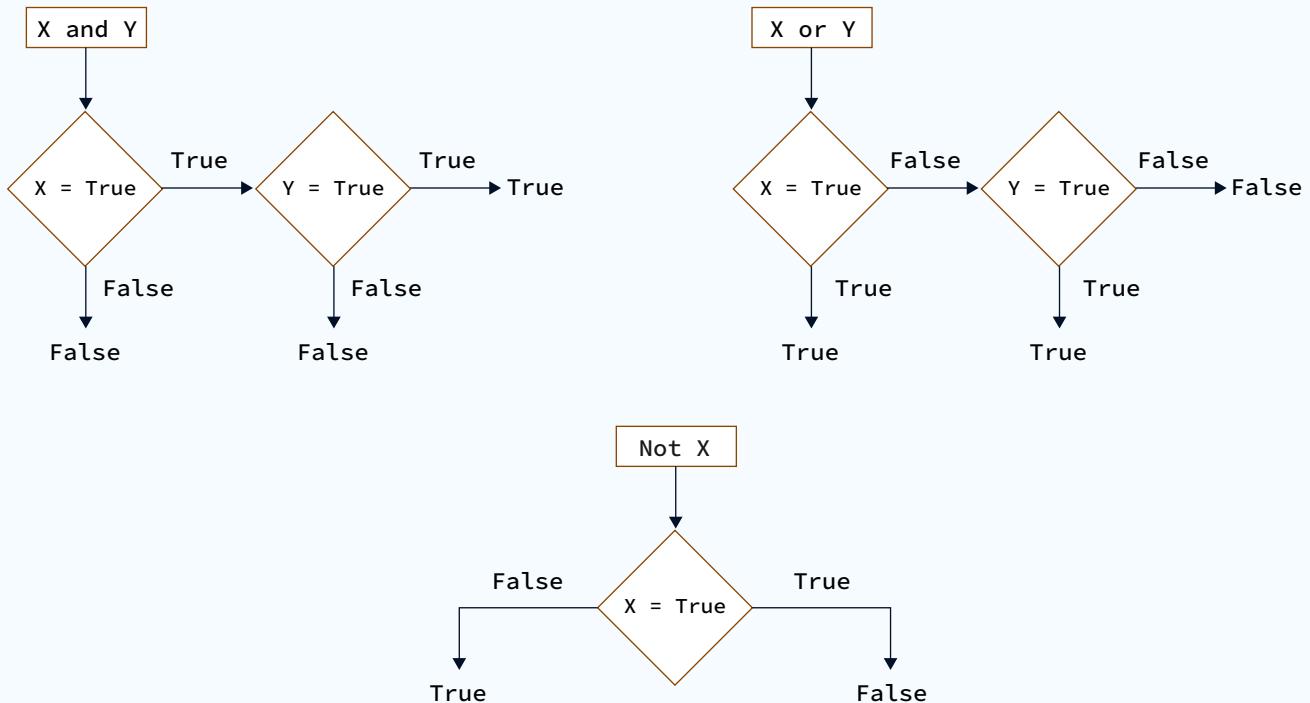


Comparison Operators

```
System.out.println(5 == 3); // Equal, Output: false  
System.out.println(5 != 3); // Not equal, Output: true  
System.out.println(5 > 3); // Greater than, Output: true  
System.out.println(5 < 3); // Less than, Output: false  
System.out.println(5 >= 3); // Greater than or equal to, Output: true  
System.out.println(5 <= 3); // Less than or equal to, Output: false
```

Logical Operators (and/or/not)

```
System.out.println(true && false);      // Logical AND, Output: false  
System.out.println(true || false);        // Logical OR, Output: true  
System.out.println(!true);                // Logical NOT, Output: false
```



Bitwise Operators



```
System.out.println(5 & 3); // Bitwise AND, Output: 1  
System.out.println(5 | 3); // Bitwise OR, Output: 7  
System.out.println(5 ^ 3); // Bitwise XOR, Output: 6
```

```
System.out.println(~5); // Bitwise NOT, Output: -6  
System.out.println(5 >> 1); // Bitwise Right Shift, Output: 2  
System.out.println(5 << 1); // Bitwise Left Shift, Output: 10
```

5 >> 1 → 0 0 0 0 0 1 0 1 >> 1
Convert to Binary

0 0 0 0 0 0 1 0

↑
Insert a bit
same as the leftmost bit

Pluck it out

Control Structures

if or if-else statements

```
int age = 22;  
if (age < 18) { [Condition False]  
    System.out.println("Teenager!");  
}  
else {  
    System.out.println("Adult!");  
}
```

if or else-if or if-else statements

```
int age = 22;  
if (age < 12) { [Condition False]  
    System.out.println("Child");  
}  
else if (age < 18) { [Condition False]  
    System.out.println("Teenager");  
}  
else if (age < 40) { [Condition True]  
    System.out.println("Adult");  
}  
else { [Ignored]  
    System.out.println("Old age");  
}  
System.out.println("End");
```

nested if statements

```
int age = 22;  
if (age < 18) { [Condition False]  
    if (age < 12) {  
        System.out.println("Child");  
    }  
    else {  
        System.out.println("Teenager");  
    }  
}  
else {  
    if (age < 40) { [Condition True]  
        System.out.println("Adult");  
    }  
    else {  
        System.out.println("Old Age");  
    }  
}
```

switch-case statement



```
char op = '*';
int n1 = 5, n2 = 7;
switch(op) {
    case '+': [Not Matched]
        printf("n1 + n2 = %d", n1+n2);
        break;
    case '-': [Not Matched]
        printf("n1 - n2 = %d", n1-n2);
        break;
    case '*':
        printf("n1 * n2 = %d", n1*n2);
        break;
    case '/': [Ignored]
        printf("n1 / n2 = %d", n1/n2);
        break;
    // operator doesn't match any case constant +, -, *, /
    default: [Ignored]
        printf("Error! operator is not correct");
}
```

for statement



Signature:

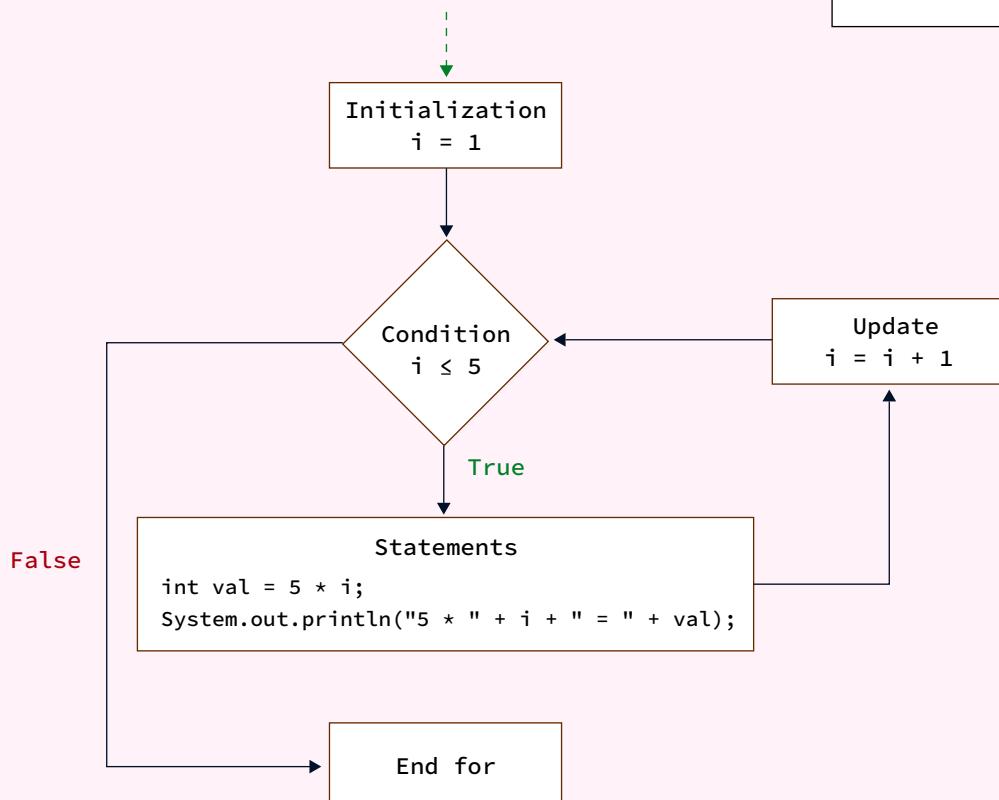
```
for (initialization; test; update) {  
    STATEMENT(s);  
}
```

Example:

```
for(int i = 1; i <= 5; i = i + 1) {  
    int val = 5 * i;  
    System.out.println("5 * " + i + " = " + val);  
}
```

Output

```
5 * 1 = 5  
5 * 2 = 10  
5 * 3 = 15  
5 * 4 = 20  
5 * 5 = 25
```



while statement

(i)

Signature:

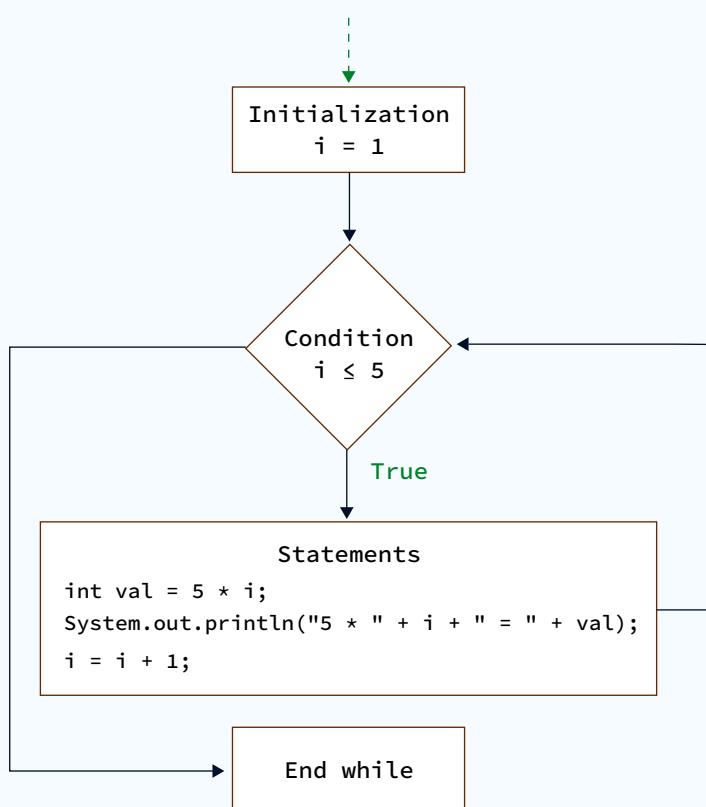
```
while(test) {  
    STATEMENT(s);  
}
```

Example:

```
int i = 1;  
while (i <= 5) {  
    int val = 5 * i;  
    System.out.println("5 * " + i + " = " + val);  
  
    i = i + 1;  
}
```

Output

```
5 * 1 = 5  
5 * 2 = 10  
5 * 3 = 15  
5 * 4 = 20  
5 * 5 = 25
```



do-while statement

(i)

Signature:

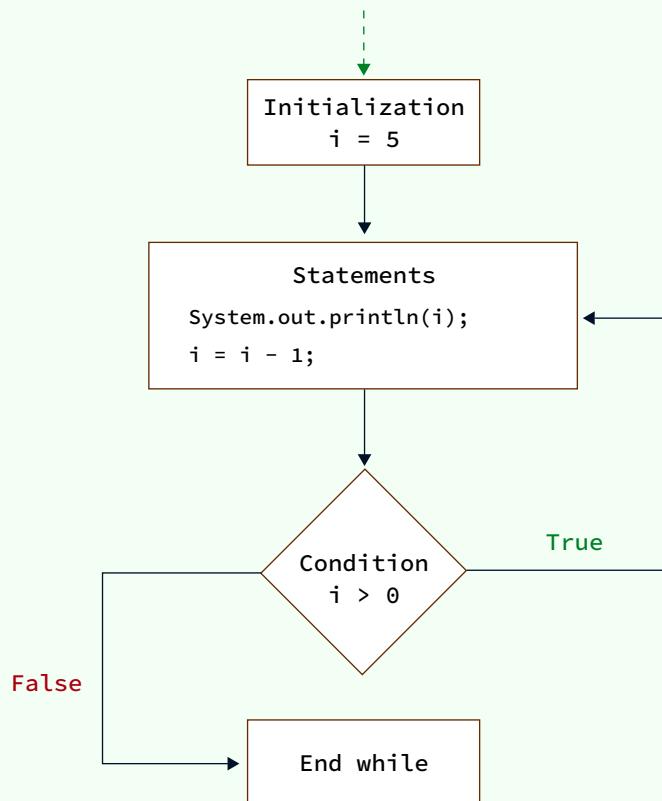
```
do {  
    STATEMENT(s);  
  
} while(test);
```

Example:

```
int i = 5;  
do{  
    System.out.println(i);  
    i = i - 1;  
  
} while(i > 0);
```

Output

```
5  
4  
3  
2  
1
```



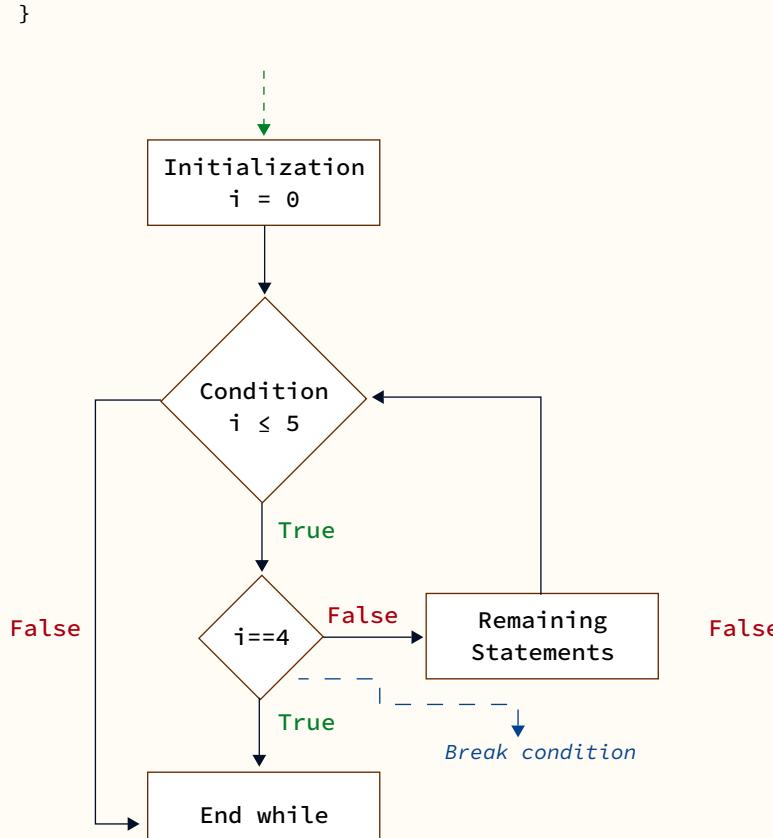
Break and Continue

```

int i = 0;
while (i <= 5) {
    if (i == 4) {           Output
        break;
    }
    System.out.println(i);
    i = i + 1;
}

```

0
1
2
3

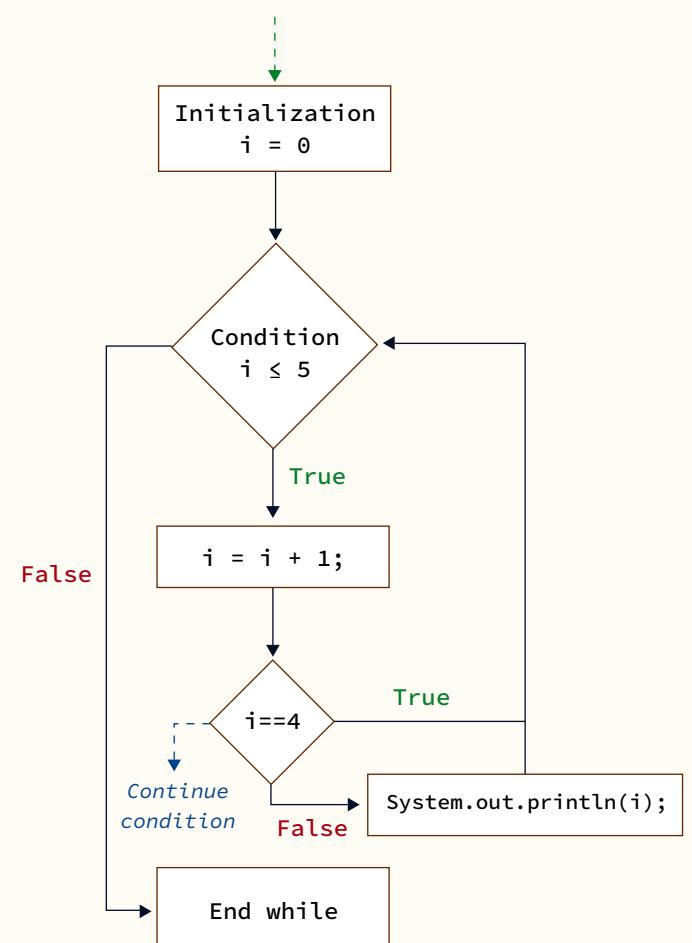


```

int i = 0;
while (i <= 5) {
    i = i + 1;           Output
    if (i == 4) {
        continue;
    }
    System.out.println(i);
}

```

1
2
3
5
6



Arrays



Declaration:

Method 1:

```
int[] arr = new int[5];
```

Method 2:

```
int[] arr = new int[]{3, 5, 1, 2, 3};
```

```
int[] arr = new int[]{1, 4, 21, 13, 55};
```



Indices

1	4	21	13	55
0	1	2	3	4

Four Pillars of OOP

Inheritance



1. Inheritance is the process by which an object of one class acquires the properties of another class.
2. Reusable code
3. It resembles real life models.
4. Base class: The class which is inherited is called the base class.
5. Derived class: The class which inherits is called derived class.

Code

```
class Parent {  
    public void print() {  
        System.out.println("This is a function of Parent class.");  
    }  
}  
  
class Child extends Parent {  
    int x = 4;  
}  
  
public class Hello {  
  
    public static void main(String args[]) {  
        Child ch = new Child();  
  
        ch.print();  
    }  
}
```

→ extends keyword is used to establish "Parent-Child" Relationship.

The print() is not defined in the Child class.
It is defined in the Parent class.

Encapsulation



1. Data and the methods which operate on that data are defined inside a single unit.
This concept is called encapsulation.
2. No manipulation or access is allowed directly from outside the capsule or class.

Code

```
public class Person {  
  
    // Private instance variable  
    private String name;  
  
    // Constructor  
    public Person(String name) {  
        this.name = name;  
    }  
  
    // Public getter for name  
    public String getName() {  
        return name;  
    }  
  
    // Public setter for name  
    public void setName(String name) {  
        this.name = name;  
    }  
  
    public static void main(String[] args) {  
        Person person = new Person("Alice");  
        System.out.println(person.getName()); // Alice  
  
        person.setName("Bob");  
  
        System.out.println(person.getName()); // Bob  
    }  
}
```

Any access/modification to the "name" attribute must happen through these two methods. No other way!!

Polymorphism



1. Polymorphism is the capability of a method, class, or object to take on multiple forms.
2. It primarily manifests through:
 - a. Inheritance
 - b. Interfaces
 - c. Method Overriding & Overloading

Code

```
interface Animal {  
    String sound();  
}  
  
public static void makeSound(Animal animal) {  
    System.out.println(animal.sound());  
}  
  
class Cat implements Animal {  
    @Override  
    public String sound() {  
        return "meow";  
    }  
}  
  
class Dog implements Animal {  
    @Override  
    public String sound() {  
        return "woof";  
    }  
}  
  
public class Main {  
  
    public static void main(String[] args) {  
        Animal catObj = new Cat();  
        Animal dogObj = new Dog();  
  
        Animal.makeSound(catObj); // Output: meow  
        Animal.makeSound(dogObj); // Output: woof  
    }  
}
```

The diagram illustrates the polymorphism of the `makeSound` method. It shows a central box labeled `make_sound` with two arrows pointing downwards to two separate boxes. The left arrow points to a box labeled `catObj`, which contains the text `meow`. The right arrow points to a box labeled `dogObj`, which contains the text `woof`.

Errors and Exception Handling

Syntax Errors

Code

```
public class HelloWorld
    public static void main(String[] args) { ----- ➔ error: '{' expected
        System.out.println("Hello, World!");
    }
}                                     * Detected at Compile time.
```

Exceptions

Code

```
public class DivisionException {

    public static void main(String[] args) {
        int num = 10;   -----
        int divisor = 0;
        int result = num / divisor;           ↓
                                            java.lang.ArithmaticException: / by zero
    }
}                                         * Detected at run time. Cannot detect at Compile time.
```

Try...Catch

Code

```
int num = 10;
int divisor = 0;

try {
    int result = num / divisor;
    System.out.println("Result: " + result);
}
catch (ArithmaticException e) {
    System.out.println("Cannot divide by zero!");
}

java.lang.ArithmaticException occurs ← ----- and control moves to catch block.
```

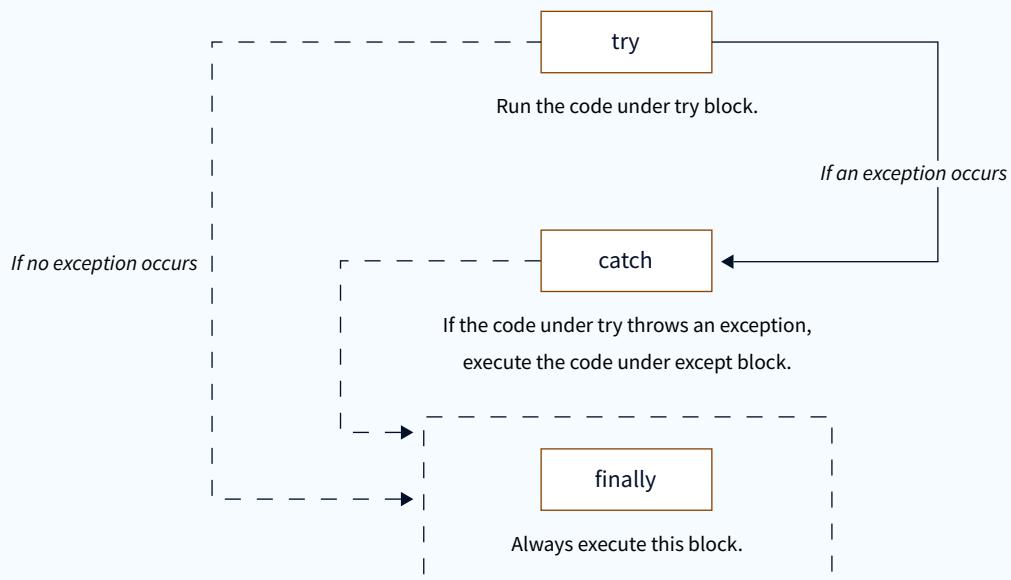
The Finally Clause



The code block under finally is always executed.

Code

```
try {  
    int result = num / divisor;  
    System.out.println("Result: " + result);  
}  
--- catch (ArithmetricException e) {  
    System.out.println("Cannot divide by zero!");  
}  
--> finally {  
    System.out.println("This block is always executed");  
}  
-----> "finally" block is always executed!!
```

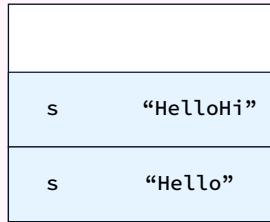


String, StringBuffer and StringBuilder

Immutable
-cannot be changed

```
String s=new String  
("Hello"); s+="Hi";
```

String

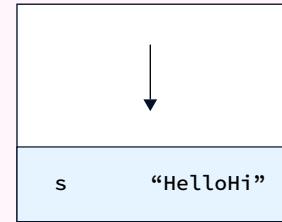


Memory

Mutable
-can be changed

```
StringBuffer s=new  
StringBuffer("Hello");  
  
s.append("Hi");
```

StringBuffer/
StringBuilder



Memory

Index	String	String Buffer	String Builder
Storage Area	Constant String Pool	Heap	Heap
Modifiable	No(Immutable)	Yes(mutable)	Yes(mutable)
Thread Safe	Yes	Yes	No
Thread Safe	Fast	Very slow	Fast

For more details, visit: <https://www.scaler.com/topics/string-class-in-java/>
<https://www.scaler.com/topics/java/stringbuffer-in-java/>
<https://www.scaler.com/topics/java/stringbuilder-in-java/>

1. A stream represents a sequence of elements and supports various operations on these elements.
2. Intermediate Operations: Transform a stream into another stream, e.g., filter, map, and sorted. They are always lazily executed.
3. Terminal Operations: When the intermediate operation is complete, the resultant stream is produced using methods like collect, reduce, toArray, etc.
4. One of the significant advantages of the Stream API is its inherent ability to parallelize operations.

```
List<Integer> numbers = Arrays.asList(1, 2, 3, 4, 5, 6, 7, 8, 9, 10);

List<Integer> evenNumbers = numbers.stream()
    .filter(n -> n % 2 == 0) -----> Lambda expression
    .collect(Collectors.toList());

    .stream()
numbers -----> 1 2 3 4 5 6 7 8 9 10
(as a List)           (as a stream)
|
|
|
filter:
Lambda expression: n -> n % 2 == 0
|
|
|
    .collect()
2 4 6 8 10 -----> evenNumbers
(as a stream)   As a list   (as a List)
```

Synchronized Method & Blocks

Synchronized Method

- * A method that is declared as synchronized ensures that at most one thread can execute this method at any given time on the same object.
- * It's achieved by putting a lock on the object for which the method is called.

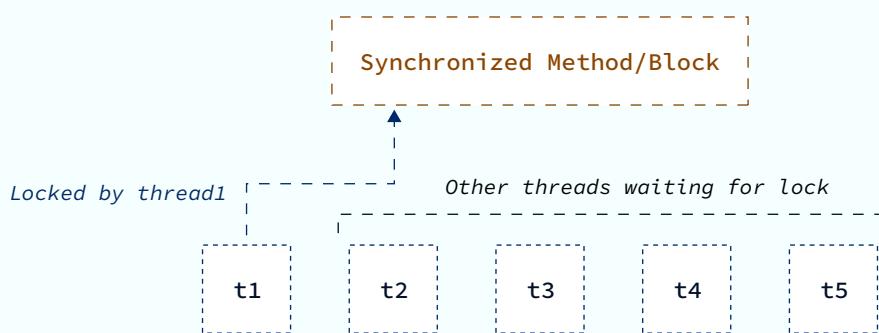
```
public synchronized void synchronizedMethod() {
    // method body
}
```

Synchronized Block

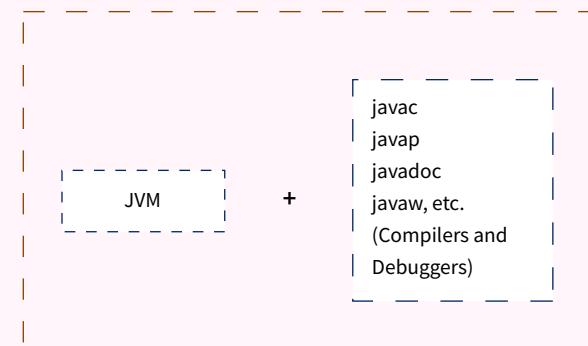
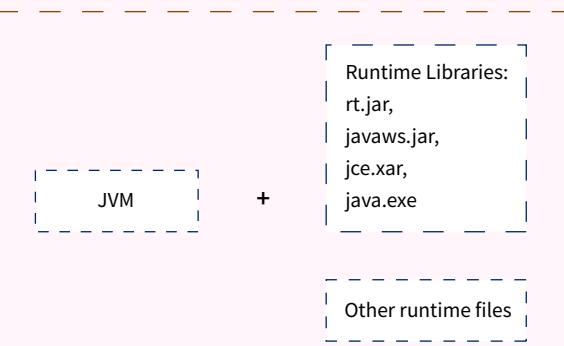
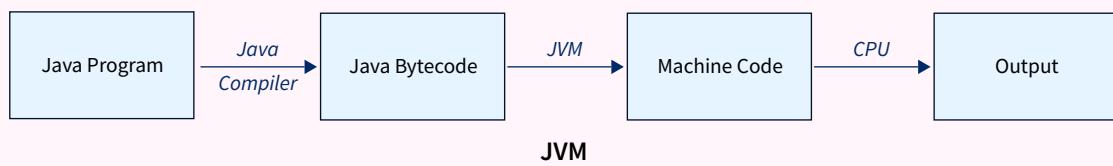


- * Sometimes, synchronizing the entire method might be overkill. In such cases, you can use a synchronized block to only lock that specific section of the code.
- * A synchronized block requires an object. The object's lock will be acquired by the block.

```
public void someMethod() {  
    // non-critical section  
  
    synchronized(lockObject) {  
        // critical section  
    }  
  
    // other non-critical section  
}
```



JVM, JRE and JDK



Garbage Collection

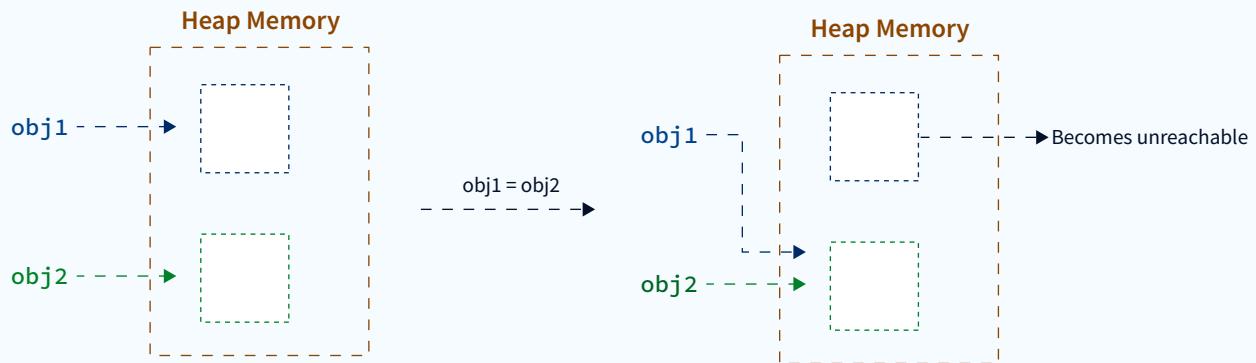


1. Automatic Memory Reclamation: Frees memory from unreferenced objects automatically.
2. Performance Overhead: Can introduce occasional application pauses.
3. Memory Efficiency: Garbage collection ensures that non-reachable allocated memory is freed.

Code

```
MyClass obj1 = new MyClass("Object 1");  
MyClass obj2 = new MyClass("Object 2");
```

```
obj1 = obj2;  
|  
|  
|  
|-----> After this, original "obj1" object becomes unreachable.
```

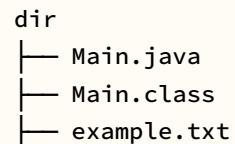


File Handling

Create a file

Code

```
try {
    File file = new File("example.txt");
    file.createNewFile();
} catch (IOException e) {
    e.printStackTrace();
}
```



Writing to a file

Code

```
try {
    FileWriter writer = new FileWriter("example.txt");
    writer.write("Hello, World!");
    writer.close();
}
catch (IOException e) {
    e.printStackTrace();
}
```



Reading from a file



Code

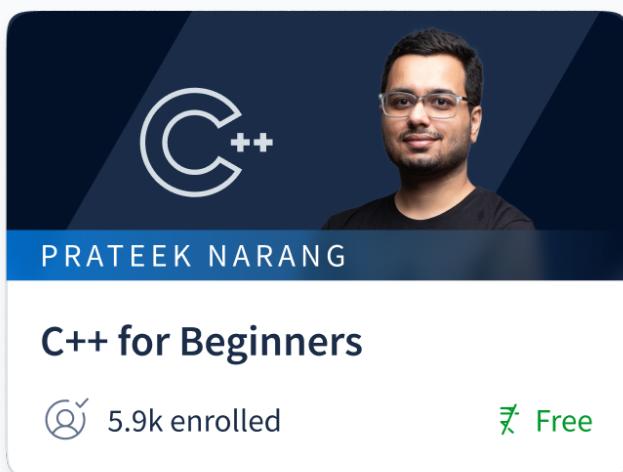
```
try {
    File file = new File("example.txt");
    BufferedReader br = new BufferedReader(new FileReader(file));
    String line;
    while ((line = br.readLine()) != null) {
        System.out.println(line);
    }
    br.close();
}
catch (IOException e) {
    e.printStackTrace();
}
```



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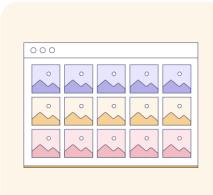
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