

What is JAVA



ABHISHEK MAURYA

What is JAVA



1

- ▶ Java is a **programming language** and a **platform**. Java is a high level, robust, object-oriented and secure programming language.
- ▶ Java was developed by **Sun Microsystems** (which is now the subsidiary of **Oracle**) in the year 1995 and released 23 January 1996. The first version of java was JDK 1.0 and latest version of java 17.0.2
- ▶ **James Gosling is known as the father of Java.** Before Java, its name was **Oak**. Since Oak was already a registered company, so James Gosling and his team changed the name from Oak to Java. The team of java called green team and the first program name **was Greentalk which is created by James Gosling**.
- ▶ **Platform:** Any hardware or software environment in which a program runs, is known as a platform. Since Java has a runtime environment (JRE) and API, it is called a platform.

- ▶ According to Sun, 5 billion devices run Java. There are many devices where Java is currently used. Some of them are as follows:
 - Desktop Applications such as acrobat reader, media player, antivirus, etc.
 - Web Applications such as irctc.co.in, etc.
 - Enterprise Applications such as banking applications.
 - Mobile
 - Embedded System
 - Smart Card
 - Robotics
 - Games, etc.

Why Use Java ?

- Java works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc.)
- It is one of the most popular programming language in the world
- It is easy to learn and simple to use
- It is open-source and free
- It is secure, fast and powerful
- Write once run any where
- It has a huge community support (tens of millions of developers)
- Java is an object oriented language which gives a clear structure to programs and allows code to be reused, lowering development costs
- As Java is close to C++ and C#, it makes it easy for programmers to switch to Java.

Features of Java

1. Object - Oriented

4

Java is a pure Object Oriented Programming Language (OOPs). Procedures are not used in it but it is only Object based language. Java follows the concept of OOPs which simplifies the work of software development and maintenance.

2. Platform Independent

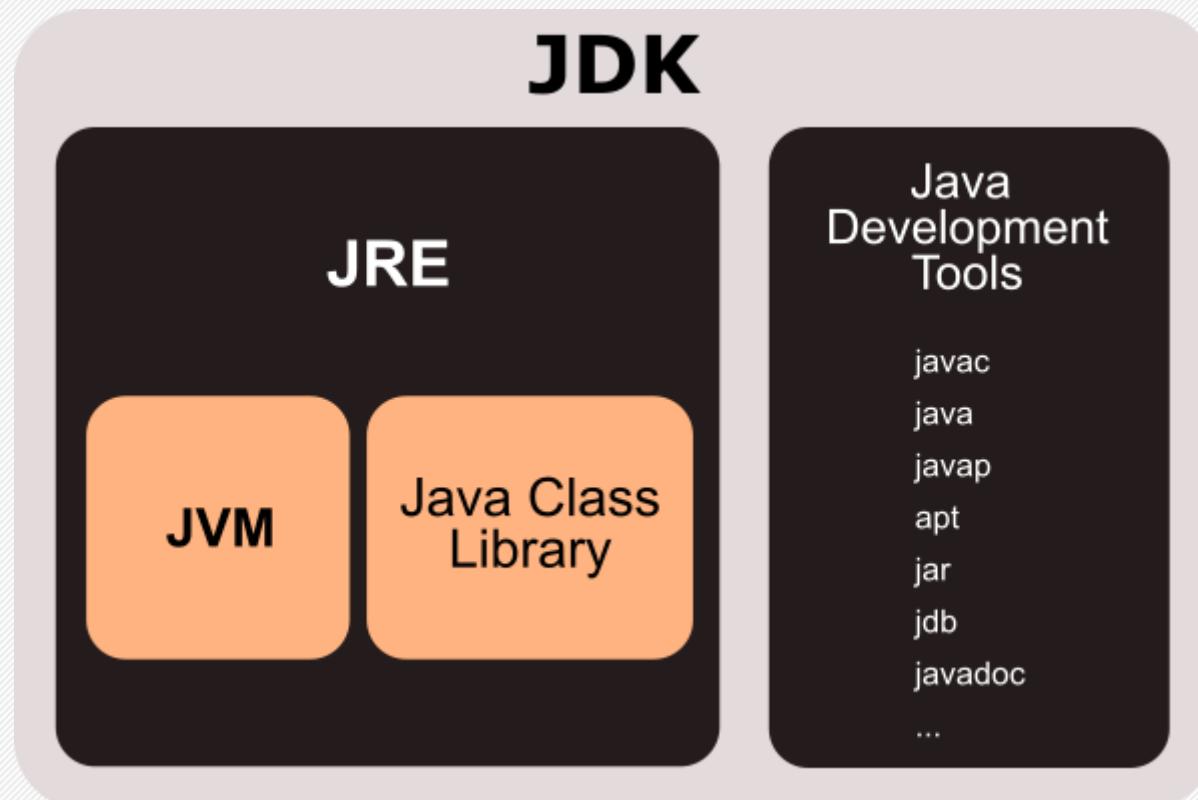
Java is Platform Independent Language. It runs in every platform like Android, Windows, Linux and Mac. Programs written in Java can be run in any operating system, such as if Java's program is written in Windows OS, then we will be able to run it easily in Linux OS as well.

3. Secure

Another great feature of Java is that it is a secure language. Java is the most secure because the Java program runs in the Java Run Time Environment, before generating the machine code, the program detects the error by running some tests on the JVM. The Java language is virus free, which keeps the programs safe.

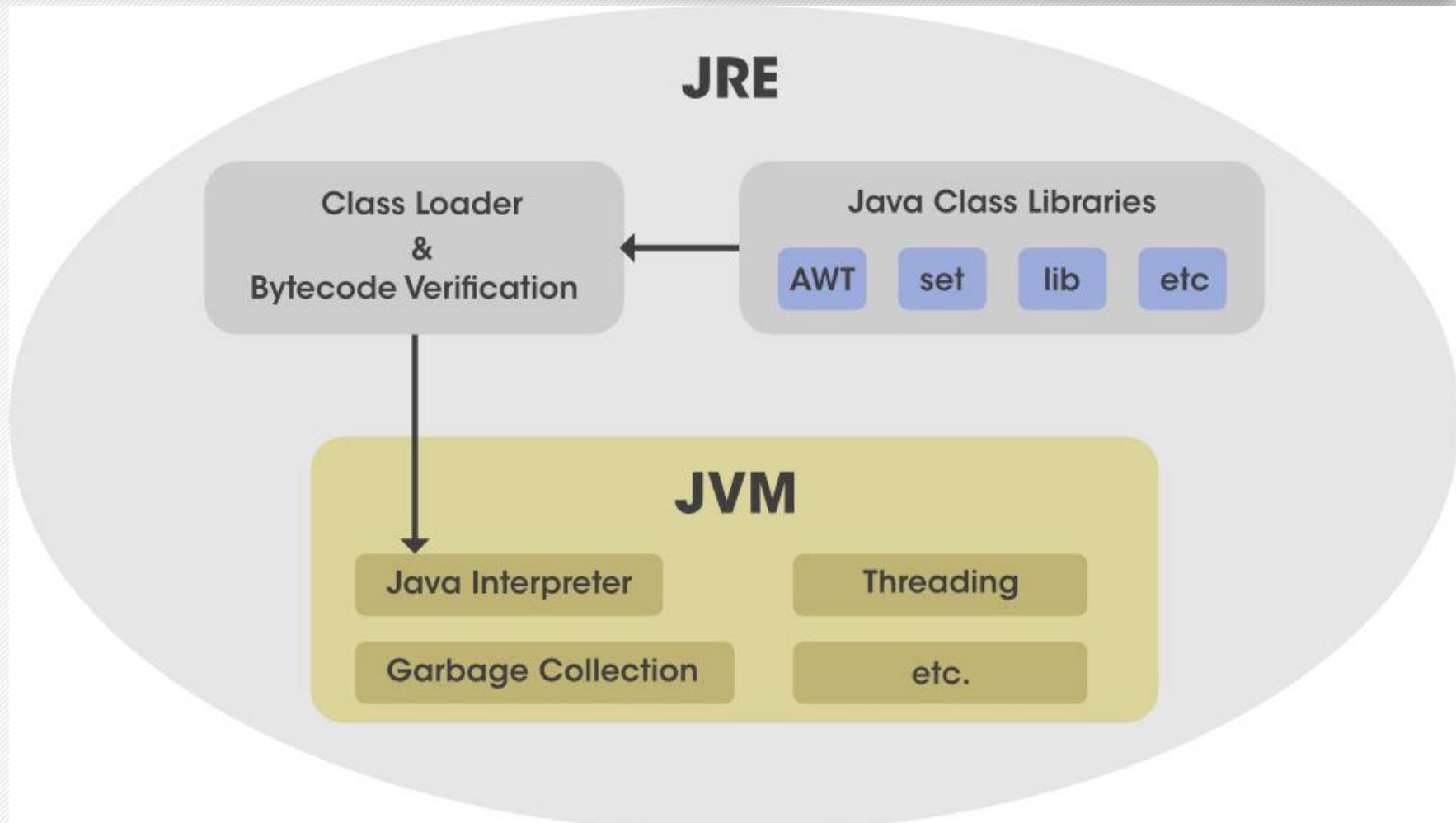
How JDK Work's ?

(JDK) Java Development Kit



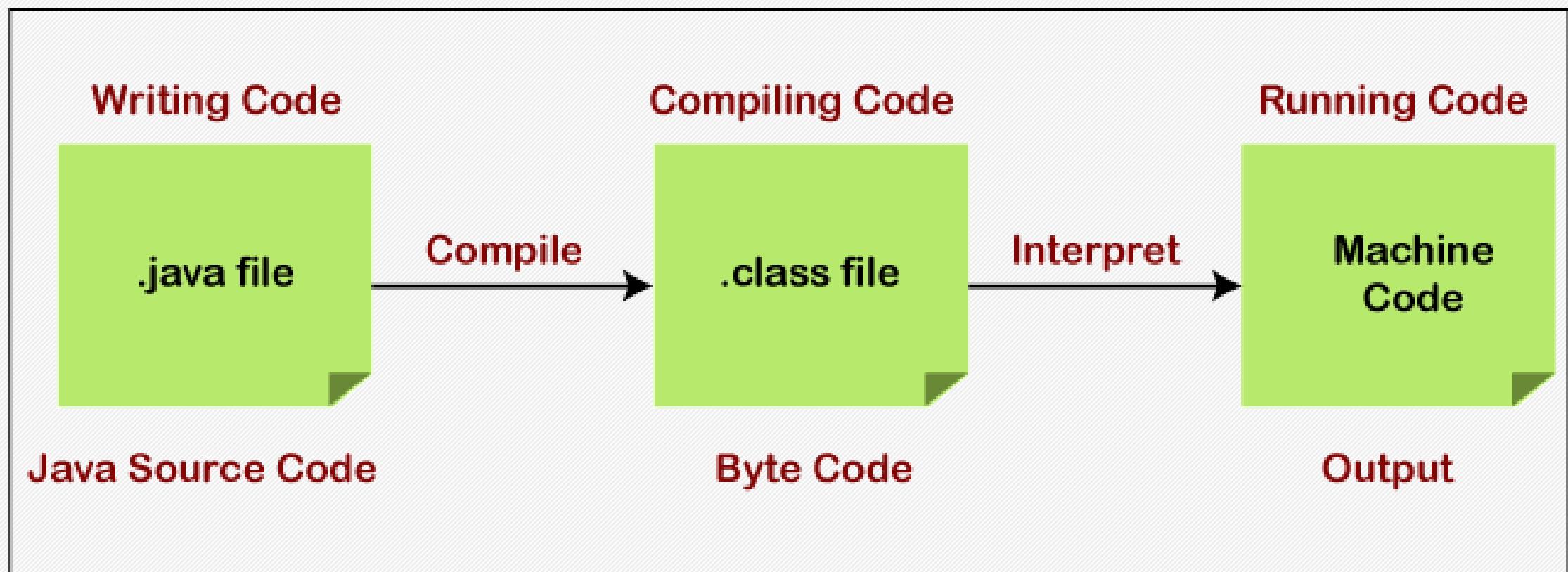
How JRE Work's ?

(JRE) Java Runtime Environment



How JVM Work's ?

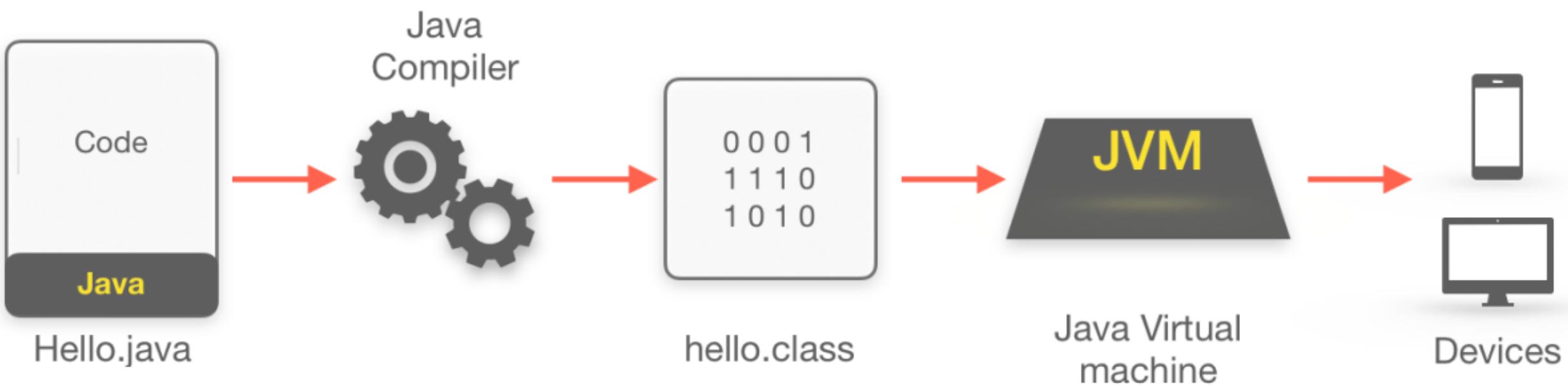
(JVM) Java Virtual Machine



How JVM Work's ?

10

(JVM) Java Virtual Machine



4. Simple Language

11

Java is an easy language because it has syntax like C++ which can be easily learned but operator overloading and header files are not used in it like C++, which makes learning even easier.

5. Portable

Java is a portable language because the source code of Java is converted into Byte Code with the help of Complier, this Byte Code can be run in any system, so it can be easily obtained.

6. Robust

13

Robust means strong. Any program made in Java can work in different environments without crashing, its programs never crash. Whatever error comes in Java, they can be easily found and solved. For all these reasons, Java is a robust language.

7. Distributed

14

Java is a Distributed, which means that Java programs are made to run in the Internet, from Java, we can create Distributed Applications, these are the applications that are distributed on different networks, but together they perform tasks. In this, http and ftp protocols are used, so that data is easily accessed in the Internet.

8. Multi Threaded

15

Java is a Multi Threaded Language, which means that in Java, big programs are divided into small sub programs and these sub programs are done sequentially, similarly. Java can complete many tasks together, this feature makes Java fast and Interactive makes this feature used in Multi Media and Web Application.

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The **JDK** includes tools for developing and testing programs written in the **Java** programming language and running on the **Java** platform. Linux; macOS; Windows.

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The JDK is a development environment for building ...

JDK 11

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1. JDK 8 and JRE 8 Installation

This page gives access to instructions for installing the .

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The JDK includes tools for developing and testing programs written in the Java programming language and running on the Java platform.

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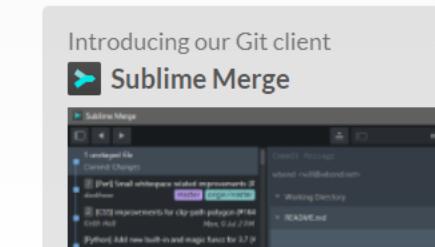
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Changelog

3.2.2 (BUILD 3211)

1 October 2019

- Mac: Added Notarization



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Size: 3.2 MB

Initial release: 22 April 1995; 26 years ago

Available in: 48 languages

Developer(s): Eugene Roshal (developer), Alexander Roshal (distributor)

Platform: IA-32, x64

Written in: C++

Operating system: Windows XP and later

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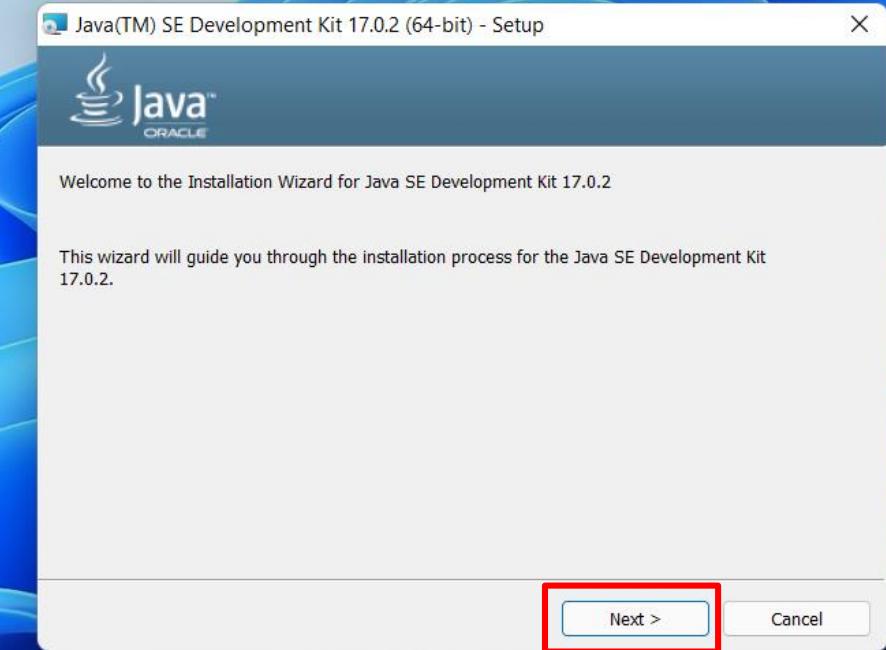
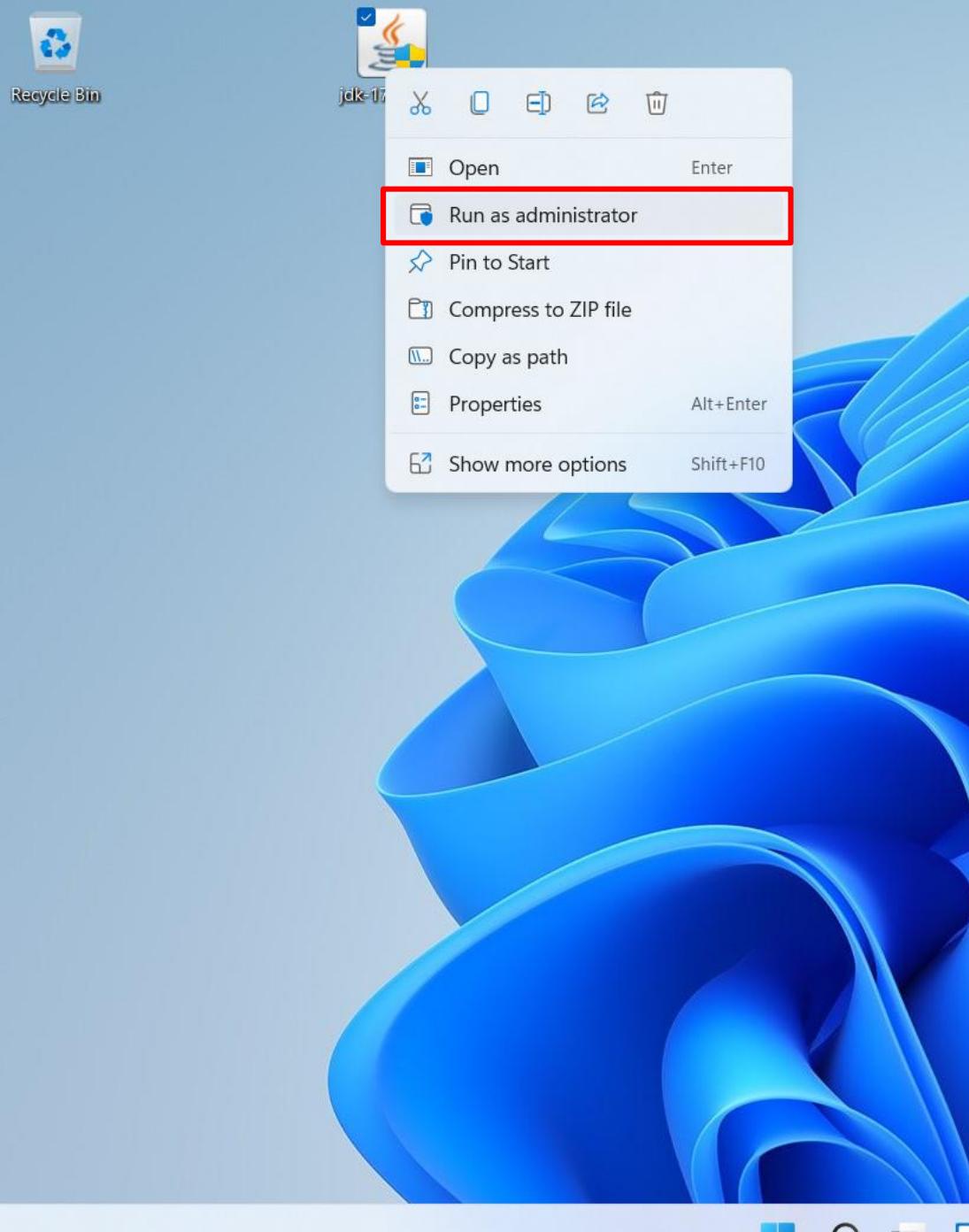
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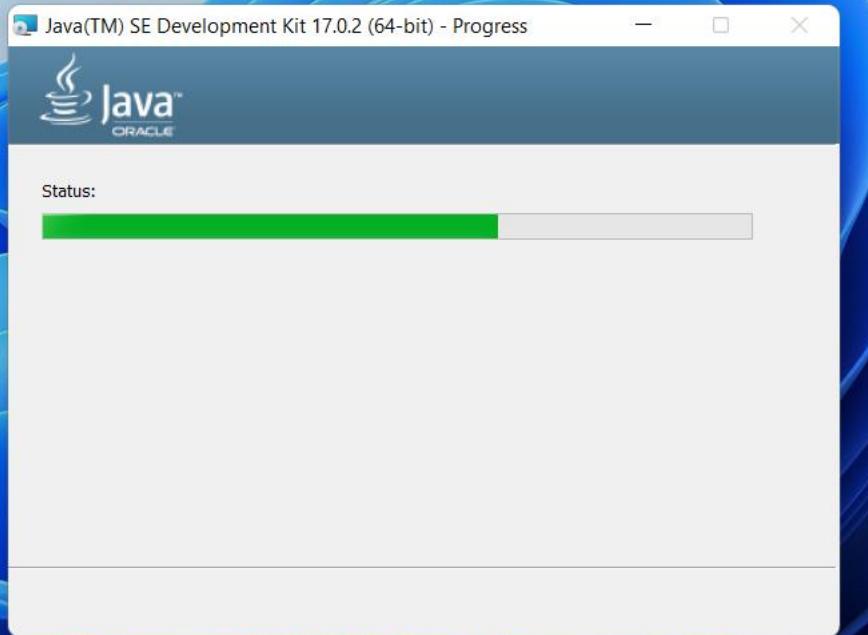
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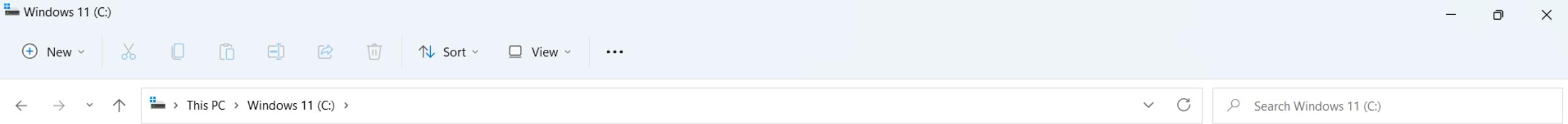
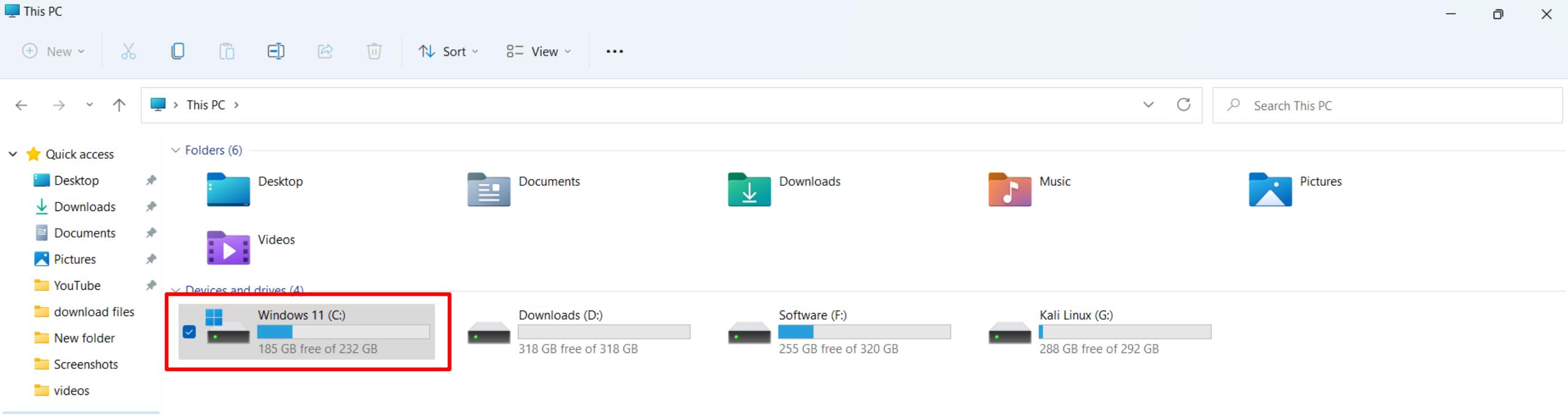
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| | Name | Date modified |
|-----------------|-------------------------------|---|
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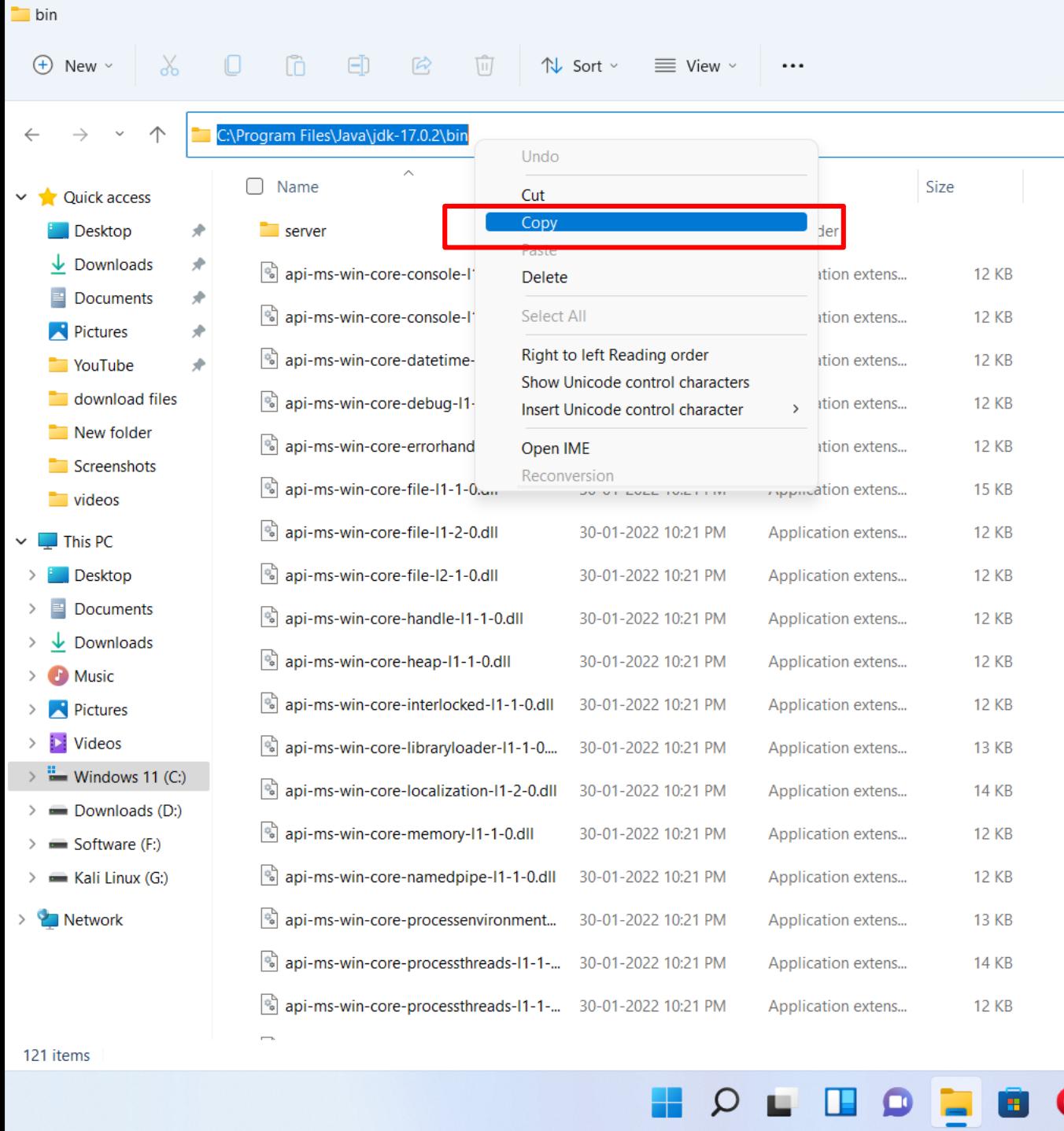
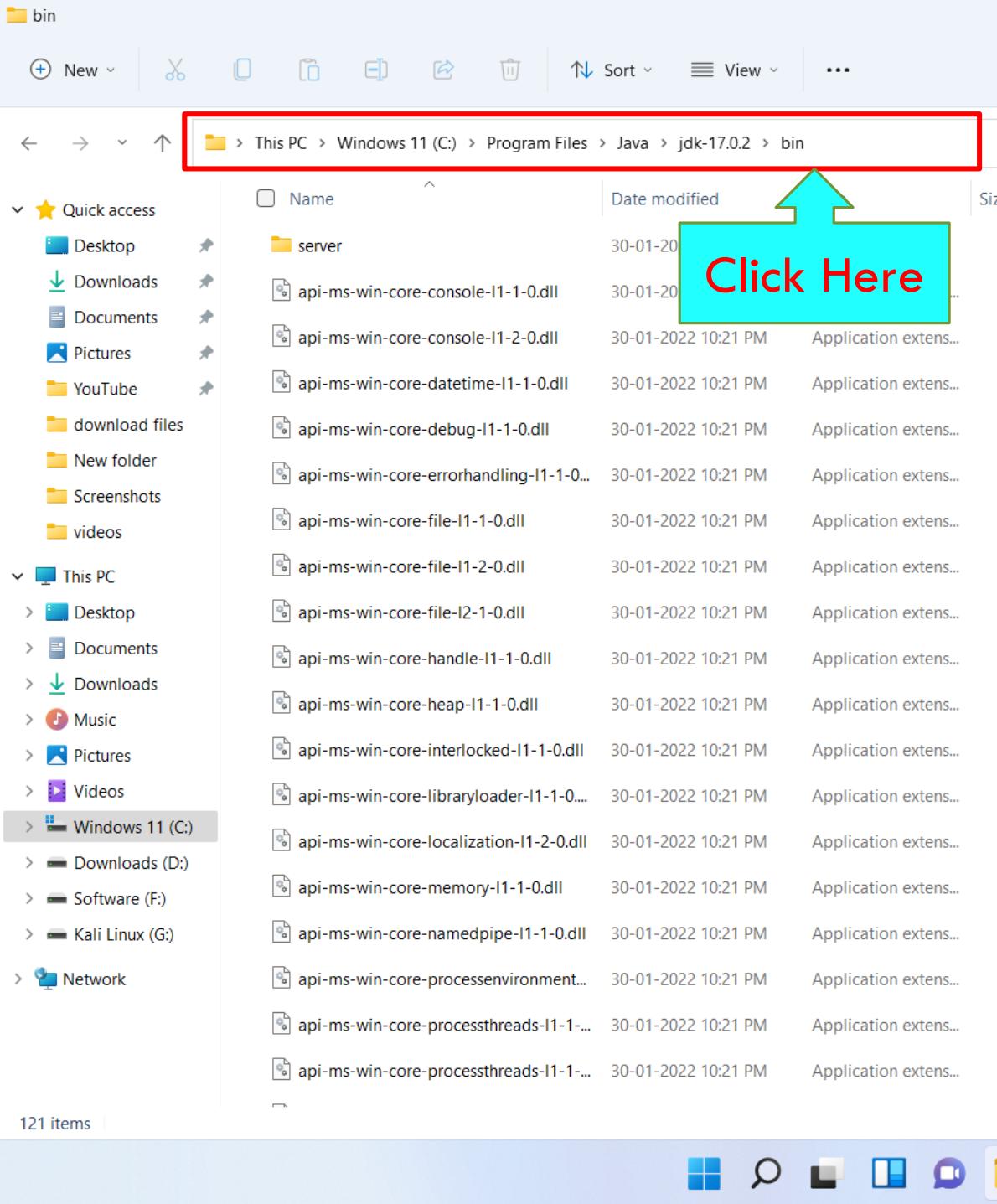
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This PC

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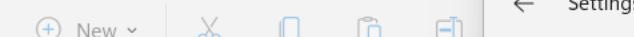
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Add a network location

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System > About

CyberPlayer

HP Pavilion Laptop 15-cs0xxx

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Device specifications

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| | |
|---------------|---|
| Device name | CyberPlayer |
| Processor | Intel(R) Core(TM) i5-8250U CPU @ 1.60GHz 1.80 GHz |
| Installed RAM | 8.00 GB (7.88 GB usable) |
| Device ID | 300768E5-13A1-4A6F-892B-E93E3046A12B |
| Product ID | 00325-96374-02917-AAOEM |
| System type | 64-bit operating system, x64-based processor |
| Pen and touch | Touch support with 10 touch points |

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Windows specifications

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| | |
|--------------|--|
| Edition | Windows 11 Home |
| Version | 21H2 |
| Installed on | 22-01-2022 |
| OS build | 22000.434 |
| Experience | Windows Feature Experience Pack 1000.22000.434.0 |

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System Properties

Computer Name | Hardware | Advanced | System Protection | Remote

You must be logged on as an Administrator to make most of these changes.

Performance

User Profiles

Startup and Recovery

Environment Variables

OK Cancel

Privacy & security Windows Update

10 items

System > About

Environment Variables

User variables for maury

| Variable | Value |
|------------------|--|
| OneDrive | C:\Users\maury\OneDrive |
| OneDriveConsumer | C:\Users\maury\OneDrive |
| Path | C:\Users\maury\AppData\Local\Microsoft\WindowsApps;C:\Users\maury\AppData\Local\Temp |
| TMP | C:\Users\maury\AppData\Local\Temp |

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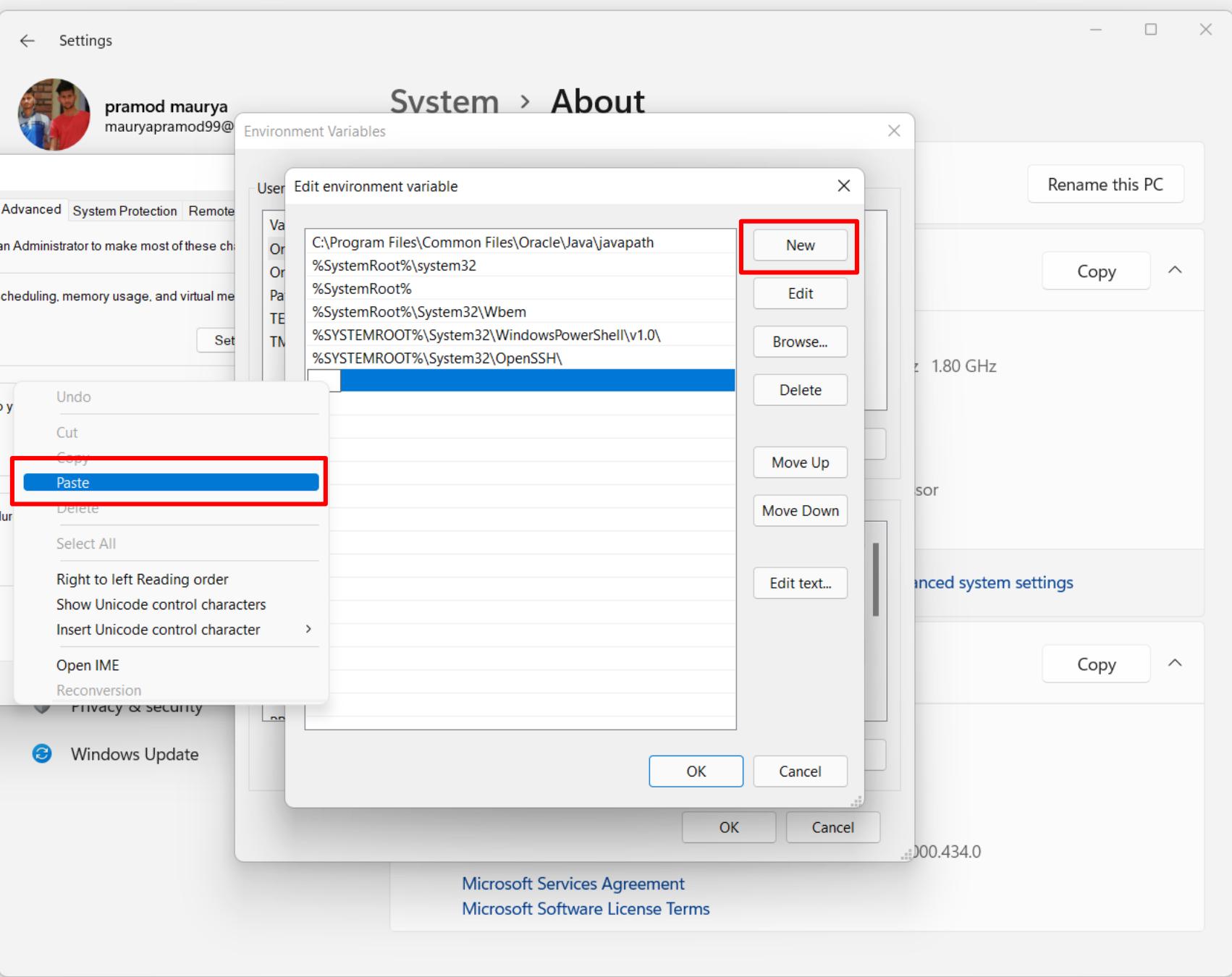
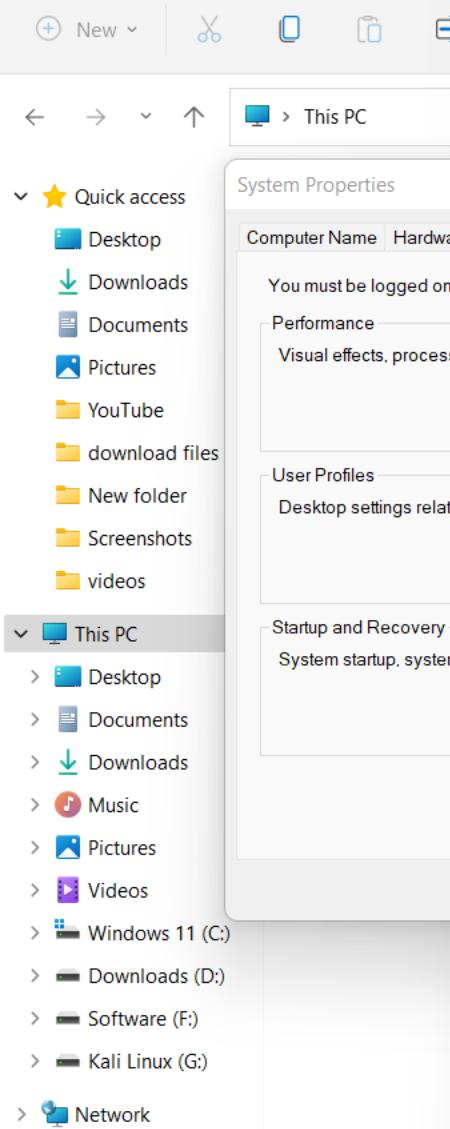
System variables

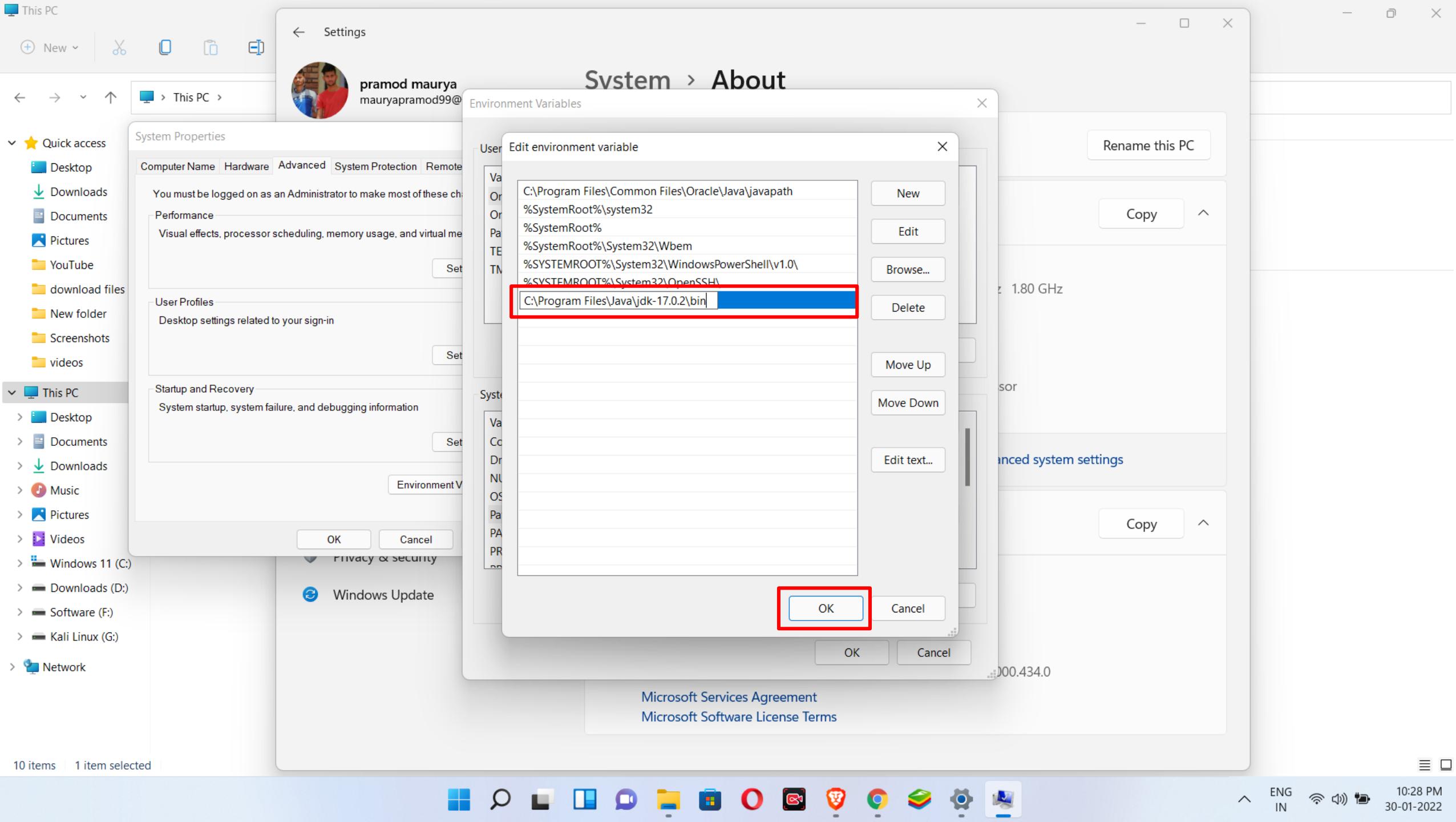
| Variable | Value |
|------------------------|--|
| ComSpec | C:\Windows\system32\cmd.exe |
| DriverData | C:\Windows\System32\Drivers\DriverData |
| NUMBER_OF_PROCESSORS | 8 |
| OS | Windows_NT |
| Path | C:\Program Files\Common Files\Oracle\Java\javapath;C:\Win... |
| PATHEXT | .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC |
| PROCESSOR_ARCHITECTURE | AMD64 |
| PROCESSOR_IDENTIFIER | Intel(R) Core(TM) i7-1165G7 CPU @ 1.70GHz |

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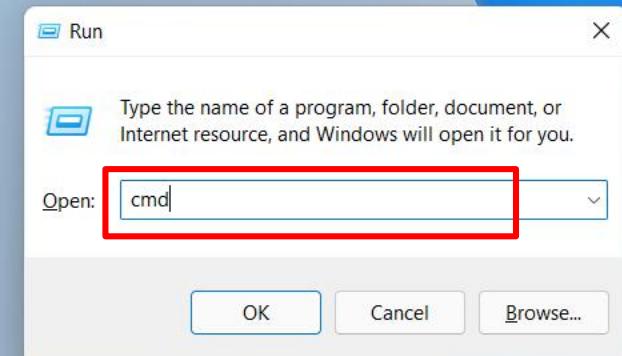


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Press Ctrl + R and Type cmd





Recycle Bin



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Command Prompt

```
C:\Users\maury>javac
```



Recycle Bin

jdk-17_windows

Command Prompt

```
-proc:{none,only}
    Control whether annotation processing and/or compilation is done.
-processor <class1>[,<class2>,<class3>...]
    Names of the annotation processors to run; bypasses default discovery process
--processor-module-path <path>
    Specify a module path where to find annotation processors
--processor-path <path>, -processorpath <path>
    Specify where to find annotation processors
-profile <profile>
    Check that API used is available in the specified profile
--release <release>
    Compile for the specified Java release
-s <directory>          Specified directory
--source <release>, -source <release>
    Provide source compatibility
, 11, 12, 13, 14, 15, 16, 17
, 15, 16, 17
--source-path <path>, -sourcepath <path>
    Specify where to find input source files
--system <jdk>|none      Override location of system modules
--target <release>, -target <release>
    Generate class files suitable for the specified Java SE release. Supported releases: 7, 8, 9, 10, 11, 12, 13, 14
, 15, 16, 17
--upgrade-module-path <path>
    Override location of upgradeable modules
-verbose                      Output messages about what the compiler is doing
--version, -version            Version information
-Werror                         Terminate compilation if warnings occur
releases: 7, 8, 9, 10, 11, 12, 13, 14
```

Successfully installed

C:\Users\maury>





Recycle Bin



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Command Prompt

```
C:\Users\maury>javac  
'javac' is not recognized as an internal or external command,  
operable program or batch file.
```

```
C:\Users\maury>
```

Java Not installed



11:19 PM
ENG
IN 30-01-2022

Java Variables ?

35

- A variable is a container which holds the value while the Java program is executed. A variable is assigned with a data type.
- Variable is a name of memory location. There are three types of variables in java: local, instance and static.
- There are two types of data types in Java: primitive and non-primitive.

Variable ?

- 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.

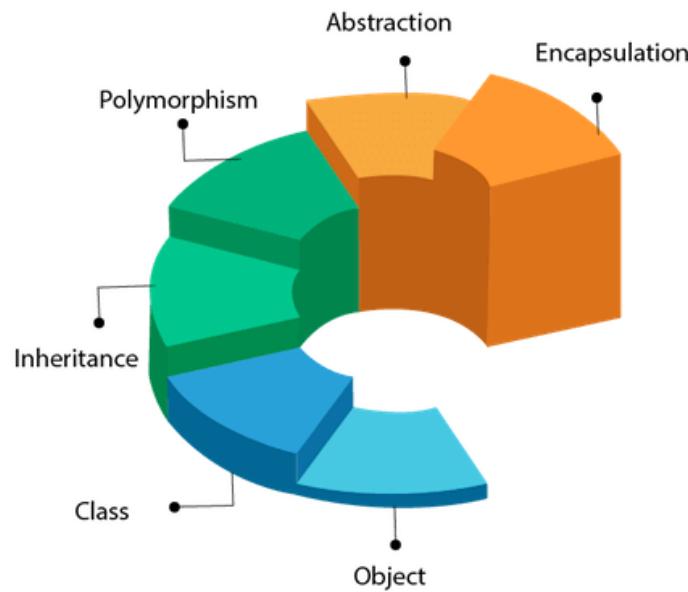
```
int data=50;//Here data is variable
```

What is OOPs ?

OOPs (Object-Oriented Programming System)

Object means a real-world entity such as a pen, chair, table, computer, watch, etc. **Object-Oriented Programming** is a methodology or paradigm to design a program using classes and objects. It simplifies software development and maintenance by providing some concepts:

- **Object**
- **Class**
- **Inheritance**
- **Polymorphism**
- **Abstraction**
- **Encapsulation**



```
class Book{  
    public static void main(String[] args) {  
        System.out.println("Hello Abhi");  
    }  
}
```

37

NOTE:

A class should always start with an uppercase first letter, and that the name of the java file should match the class name.

Public: It is a Access Specifier used to public the Function .

Static: When java runtime starts, there is no object of the class present. That's why the main method has to be static so that JVM can load the class into memory and call the main method.

Void: It is used to Non Return Type

Main: It is a Brain of the Program.

String: It is a Class which is used to accept a single argument of type String array.

Args: it is a Object of String class

Creating Object With Class.

Before Object

```
class Desk{  
    int x=10;  
    public static void main(String[] args) {  
        System.out.println(a);  
    }  
}
```

After Object

```
class Desk{  
    int x=10;  
    public static void main(String[] args) {  
        Desk D1=new Desk();  
        System.out.println(D1.x);  
    }  
}
```

```
C:\Users\IICS\Desktop>javac 1.java  
1.java:4: error: cannot find symbol  
          System.out.println(a);  
                           ^  
symbol:   variable a  
location: class Desk  
1 error
```

```
C:\Users\IICS\Desktop>javac 1.java  
  
C:\Users\IICS\Desktop>java Book  
Hello Abhi
```

Class Methods Static Vs Public

39

```
class Method{  
    static void print(){  
        System.out.println("I am Print Function..!");  
    }  
    public void Display(){  
        System.out.println("I am Display Function..!");  
    }  
    public static void main(String[] args) {  
        print();  
        // Display(); //it create Error  
        Method D1=new Method();  
        D1.Display();  
    }  
}
```

```
C:\Users\IICS\Desktop>javac Method.java  
Method.java:10: error: non-static method Display()  
    Display();  
    ^  
1 error
```

```
C:\Users\IICS\Desktop>javac Method.java  
  
C:\Users\IICS\Desktop>java Method  
I am Print Function..!  
I am Display Function..!
```

Constructors

44

A constructor in Java is a special method that is used to initialize objects. The constructor is called when an object of a class is created. It can be used to set initial values for object attributes:

```
class Cons{  
    public Cons(){  
        System.out.print("Hello");  
    }  
    public static void main(String[] args) {  
        Cons a=new Cons();  
    }  
}
```

```
C:\Users\IICS\Desktop>java Cons  
Hello
```

It is Automatically Call
When Object is Created

```
class Cons{  
    String n;  
    public Cons(){  
        n="Maurya";  
    }  
    public static void main(String[] args) {  
        Cons a=new Cons();  
        System.out.print("your name is:"+a.n);  
    }  
}
```

Constructors is used to
Set the initial value for
the class attribute x

```
C:\Users\IICS\Desktop>java Cons  
your name is:Maurya
```

Encapsulation

46

- Encapsulation is a mechanism through which we can wrap the data member and member method of class in a single unit called Encapsulation
- Note:
 - 1) Declare the class Variable as a private
 - 2) Declare the class Method as a public

```
class Box{  
    private int a; //data hidding  
}  
class A{  
    public static void main(String[] args) {  
        Box a1=new Box();  
        a1.a=12;  
        System.out.print(a1.a);  
    }  
}
```

```
C:\Users\MM-6\Desktop>javac a.java  
C:\Users\MM-6\Desktop>java A  
12  
C:\Users\MM-6\Desktop>
```

```
C:\Users\MM-6\Desktop>javac a.java  
a.java:13: error: a has private access in Box  
    a1.a=12;  
          ^  
a.java:14: error: a has private access in Box  
    System.out.print(a1.a);  
                                ^
```

```
class Box{  
    private int a; //data hidding  
    public void Setvalue(int x){  
        a=x;  
    }  
    public int Getvalue(){  
        return a;  
    }  
}  
class A{  
    public static void main(String[] args) {  
        Box a1=new Box();  
        a1.Setvalue(12);  
        System.out.print(a1.Getvalue());  
    }  
}
```

Packages

A package in Java is used to group related classes. Think of it as a folder in a file directory. We use packages to avoid name conflicts, and to write a better maintainable code. Packages are divided into two categories:

- Built-in Packages (packages from the Java API)
- User-defined Packages (create your own packages)

Built-in Packages

Syntax

```
import package.name.Class; // Import a single class  
import package.name.*; // Import the whole package
```

- The Java API is a library of prewritten classes, that are free to use, included in the Java Development Environment.
- The library contains components for managing input, database programming, and much much more
- The library is divided into packages and classes. Meaning you can either import a single class (along with its methods and attributes), or a whole package that contain all the classes that belong to the specified package.

```
import java.util.Scanner;
class main{
    public static void main(String[] args) {
        Scanner d=new Scanner(System.in);
        Scanner d1=new Scanner(System.in);
        System.out.print("Enter your name:");
        String name=d.nextLine();
        System.out.print("Enter your AGE:");
        int age=d1.nextInt();
        System.out.print("Your name is:"+name);
        System.out.print("Your age is:"+age);
    }
}
```

C:\Users\MM-6\Desktop>java main
Enter your name:abhi
Enter your AGE:54
Your name is:abhi Your age is:54
C:\Users\MM-6\Desktop>

Inheritance

51

it is possible to inherit attributes and methods from one class to another. We group the "inheritance concept" into two categories:

- subclass (child) - the class that inherits from another class
 - superclass (parent) - the class being inherited from
- To inherit from a class, use the extends keyword.

Types of inheritance in java

Single Inheritance:



```
C:\Users\pc\Desktop>javac pop.java
C:\Users\pc\Desktop>java Main
I am boss..!
C:\Users\pc\Desktop>
```

The terminal window shows the command to compile the Java file 'pop.java' followed by the execution of the 'Main' class. The output 'I am boss..!' is displayed, confirming the inheritance relationship.

```
class Boss{
    public Boss(){
        System.out.print("I am boss..!");
    }
}
class Main extends Boss{
    public static void main(String[] args) {
        Main m1=new Main();
    }
}
```

The code illustrates single inheritance. It defines a base class 'Boss' with a constructor that prints "I am boss..!". It then defines a derived class 'Main' that extends 'Boss'. The 'main' method creates an instance of 'Main', demonstrating that 'Main' inherits the constructor of 'Boss'.

```
import java.util.Scanner;
class Emp{
    int id;
    String name;
    public void getinfo(){
        Scanner obj=new Scanner(System.in);
        Scanner obj1=new Scanner(System.in);
        System.out.print("Enter your Id and Name :");
        id=obj.nextInt();
        name=obj1.nextLine();
    }
}
class Payrol extends Emp{
    public static void main(String[] args) {
        Payrol p=new Payrol();
        p.getinfo();
        System.out.println("your id is :" +p.id);
        System.out.println("your name is :" +p.name);
    }
}
```

```
C:\Users\pc\Desktop>javac pop.java
C:\Users\pc\Desktop>java Payrol
Enter your Id and Name :101
name
your id is :101
your name is :name
```

Multilevel Inheritance

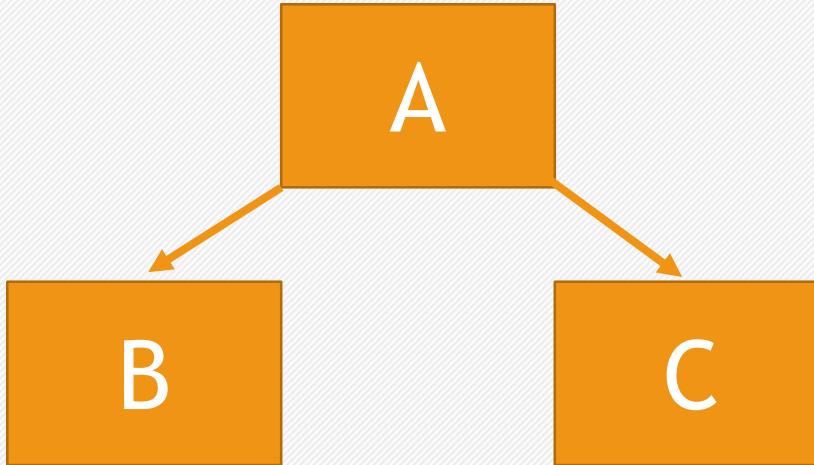


```
class A{
    int a=10;
}
class B extends A{
    int b=100;
}
class C extends B{
    int c=1000;
    public static void main(String[] args) {
        C obj=new C();
        System.out.println("value of class A:"+obj.a);
        System.out.println("value of class B:"+obj.b);
        System.out.println("value of class C:"+obj.c);
    }
}
```

```
C:\Users\pc\Desktop>javac pop.java
C:\Users\pc\Desktop>java C
value of class A:10
value of class B:100
value of class C:1000
```

Hierarchical Inheritance

55



In Hierarchical Inheritance One class Provide their property to more than one class in the above Diagram
Class A provide property to class B and class C

```
class Food{
    public void Hungry(){
        System.out.println("I am Hungry for Food");
    }
}
class Raj extends Food{
    public void play(){
        System.out.println("i am playing football");
    }
}
class Harshit extends Food{
    public void project(){
        System.out.println("i doing something new");
    }
}
class Test{
    public static void main(String[] args) {
        Harshit h1=new Harshit();
        h1.project();
        h1.Hungry();
        Raj r1=new Raj();
        r1.play();
        r1.Hungry();|
    }
}
```

C:\Users\IICS\Desktop>javac test.java

C:\Users\IICS\Desktop>java Test
i doing something new
I am Hungry for Food
i am playing football
I am Hungry for Food

Polymorphism

- The word polymorphism means having many forms. In simple words, we can define polymorphism as the ability of a message to be displayed in more than one form.
- Polymorphism is considered one of the important features of Object-Oriented Programming. Polymorphism allows us to perform a single action in different ways. In other words, polymorphism allows you to define one interface and have multiple implementations. The word “poly” means many and “morphs” means forms, So it means many forms.

Types of polymorphism

1. Compile-time Polymorphism
2. Runtime Polymorphism

Compile Time Polymorphism

It is also known as static polymorphism. This type of polymorphism is achieved by function overloading or operator overloading.

Note: But Java doesn't support the Operator Overloading.

Method Overloading

- When there are multiple functions with the same name but different parameters then these functions are said to be overloaded. Functions can be overloaded by change in the number of arguments or/and a change in the type of arguments.

```
C:\Users\IICS\Desktop>javac dem.java
```

```
C:\Users\IICS\Desktop>java dem
```

```
100.0
```

```
C:\Users\IICS\Desktop>
```

```
class pop{
    int msg(int a){
        return a;
    }
    int msg(int a,int b){
        return a*a;
    }
    double msg(int a,double b){
        return a*a;
    }
}
class dem{
    public static void main(String[] args) {
        pop d1=new pop();
        System.out.print(d1.msg(10,10.2));
    }
}
```

Runtime polymorphism

- It is also known as Dynamic Method Dispatch. It is a process in which a function call to the overridden method is resolved at Runtime. This type of polymorphism is achieved by Method Overriding. **Method overriding**, on the other hand, occurs when a derived class has a definition for one of the member functions of the base class. That base function is said to be **overridden**.

```
class A{  
    void print(){  
        System.out.println("I am Class A:");  
    }  
}  
  
class B extends A{  
    @Override// keyword to show override  
    void print(){  
        System.out.println("I am Class B:");  
    }  
}  
  
class Dem{  
    public static void main(String[] args) {  
        A b1=new A();  
        b1.print();  
    }  
}
```

User Define Packages

- The package which are created by java programmer or user for their own use are classed user defined package
- Syntax: package package name;
- Rule 1)package statement must be first line of the program.
2)The way of compilation of these classes would be different.
Java -d . Classname.java

```
package abhi;  
class A{  
    public void print(){  
        System.out.print("Hello i am package...!");  
    }  
    public static void main(String[] args) {  
        A a1=new A();  
        a1.print();  
    }  
}
```

```
C:\Users\IICS\Desktop\pop>javac -d . desk.java
```

```
C:\Users\IICS\Desktop\pop>java abhi.A  
Hello i am package...!  
C:\Users\IICS\Desktop\pop>
```

Inner Classes

- In Java, it is also possible to nest classes (a class within a class). The purpose of nested classes is to group classes that belong together, which makes your code more readable and maintainable.

```
C:\Users\IICS\Desktop>javac main1.java
```

```
C:\Users\IICS\Desktop>java main1  
70
```

```
C:\Users\IICS\Desktop>
```

```
class Father{  
    int age1=48;  
    class son{  
        int age=22;  
    }  
}  
class main1{  
    public static void main(String[] args) {  
        Father f1=new Father();  
        Father.son s1=f1.new son();  
        System.out.print(s1.age+f1.age1);  
    }  
}
```

Private Inner Class

Unlike a "regular" class, an inner class can be private or protected. If you don't want outside objects to access the inner class, declare the class as private:

```
C:\Users\IICS\Desktop>javac main1.java
main1.java:10: error: A.B has private access in A
    A.B b1=a1.new B();
           ^
main1.java:10: error: A.B has private access in A
    A.B b1=a1.new B();
           ^
2 errors
```

```
class A{
    int x=12;
    private class B{
        int y=3;
    }
}
class main1{
    public static void main(String[] args) {
        A a1=new A();
        A.B b1=a1.new B();
        System.out.print(b1.y+a1.x);
    }
}
```

Static Inner Class

An inner class can also be static, which means that you can access it without creating an object of the outer class:

```
C:\Users\IICS\Desktop>java main1  
12
```

```
class A{  
    int a=12;  
    static class B{  
        int b=12;  
    }  
}  
class main1{  
    public static void main(String[] args) {  
        A.B b1=new A.B();  
        System.out.print(b1.b);  
    }  
}
```

Access Outer Class From Inner Class

- One advantage of inner classes, is that they can access attributes and methods of the outer class:

```
C:\Users\IICS\Desktop>java main1  
20
```

```
class mainclass{  
    int n=20;  
    class subclass{  
        int show(){  
            return n;  
        }  
    }  
}  
class main1{  
    public static void main(String[] args) {  
        mainclass m1=new mainclass();  
        mainclass.subclass s1=m1.new subclass();  
        System.out.print(s1.show());  
    }  
}
```

Abstract Classes and Methods

Data **abstraction** is the process of hiding certain details and showing only essential information to the user.

Abstraction can be achieved with either **abstract classes** or **interfaces**. The abstract keyword is a non-access modifier, used for classes and methods:

- **Abstract class:** is a restricted class that cannot be used to create objects (to access it, it must be inherited from another class).
- **Abstract method:** can only be used in an abstract class, and it does not have a body. The body is provided by the subclass (inherited from).

```
// Abstract class
abstract class Animal {
    // Abstract method (does not have a body)
    public abstract void animalSound();
    // Regular method
    public void sleep() {
        System.out.println("Zzz");
    }
}
// Subclass (inherit from Animal)
class Pig extends Animal {
    public void animalSound() {
        // The body of animalSound() is provided here
        System.out.println("The pig says: wee wee");
    }
}
class Main {
    public static void main(String[] args) {
        Pig myPig = new Pig(); // Create a Pig object
        myPig.animalSound();
        myPig.sleep();
    }
}
```

Interface

69

Another way to achieve abstraction in Java, is with interfaces. An interface is a completely "abstract class" that is used to group related methods with empty bodies:

To access the interface methods, the interface must be "implemented" (**kinda like inherited**) by another class with the implements keyword (instead of extends). The body of the interface method is provided by the "implement" class:

```
// Interface
interface Animal {
    public void animalSound(); // interface method (does not have a body)
    public void sleep(); // interface method (does not have a body)
}
// Pig "implements" the Animal interface
class Pig implements Animal {
    public void animalSound() {
        // The body of animalSound() is provided here
        System.out.println("The pig says: wee wee");
    }
    public void sleep() {
        // The body of sleep() is provided here
        System.out.println("Zzz");
    }
}
class Main {
    public static void main(String[] args) {
        Pig myPig = new Pig(); // Create a Pig object
        myPig.animalSound();
        myPig.sleep();
    }
}
```

Enum

71

An enum is a special "class" that represents a group of constants (unchangeable variables, like final variables).

To create an enum, use the enum keyword (instead of class or interface), and separate the constants with a comma. Note that they should be in uppercase letters:

```
class Test{
    enum Level{
        Low, Mid, High
    }
    public static void main(String[] args) {
        Level D1=Level.Mid;
        System.out.print(D1);
    }
}
```

You can access enum constants with the **dot** syntax:

Dates

72

Java does not have a built-in Date class, but we can import the java. Time package to work with the date and time API. The package includes many date and time classes.

| Class | Description |
|---------------|--|
| LocalDate | Represents a date (year, month, day (yyyy-MM-dd)) |
| LocalTime | Represents a time (hour, minute, second and nanoseconds (HH-mm-ss-ns)) |
| LocalDateTime | Represents both a date and a time (yyyy-MM-dd-HH-mm-ss-ns) |
| | |

Display Current Date

73

```
import java.time.LocalDate;
class main{
    public static void main(String[] args) {
        LocalDate ld=LocalDate.now();
        System.out.print(ld);
    }
}
```

```
C:\Users\abhis\OneDrive\Desktop>java main
2022-05-01
C:\Users\abhis\OneDrive\Desktop>
```

Display Current Time

```
import java.time.LocalTime;
class main{
    public static void main(String[] args) {
        LocalTime ld=LocalTime.now();
        System.out.print(ld);
    }
}
```

```
C:\Users\abhis\OneDrive\Desktop>java main
19:18:54.146218600
C:\Users\abhis\OneDrive\Desktop>
```

Display Current Date and Time

75

```
import java.time.LocalDateTime;
class main{
    public static void main(String[] args) {
        LocalDateTime ld=LocalDateTime.now();
        System.out.print(ld);
    }
}
```

```
C:\Users\abhis\OneDrive\Desktop>java main
2022-05-01T19:22:40.657211900
C:\Users\abhis\OneDrive\Desktop>
```

Array List

The Array List class is a resizable [array](#), which can be found in the `java.util` package.

The difference between a built-in array and an `ArrayList` in Java, is that the size of an array cannot be modified (if you want to add or remove elements to/from an array, you have to create a new one). While elements can be added and removed from an `ArrayList` whenever you want.

Syntax

```
import java.util.ArrayList; // import the ArrayList class  
ArrayList<String> cars = new ArrayList<String>(); // Create an ArrayList
```

```
import java.util.ArrayList;
class Main{
    public static void main(String[] args) {
        ArrayList<String> Names=new ArrayList<String>();
        Names.add("abhi"); ADD is used to insert element
        Names.add("ajay");
        System.out.println(Names.get(0));
        System.out.print(Names.get(1)); GET is used to access element
    }
}
```

```
C:\Users\abhis\OneDrive\Desktop>java Main
abhi
ajay
C:\Users\abhis\OneDrive\Desktop>
```

```
import java.util.ArrayList;
class main{
    public static void main(String[] args) {
        ArrayList<Integer> Number=new ArrayList<Integer>();
        Number.add(12);
        Number.add(13);
        System.out.println(Number.get(0));
    }
}
```

Update ArrayList using Set function

79

```
import java.util.ArrayList;
import java.util.Scanner;
import java.util.Collection;//used to short
class main{
    public static void main(String[] args) {
        ArrayList<Integer> num=new ArrayList<Integer>();
        Scanner obj=new Scanner(System.in);
        Scanner obj1=new Scanner(System.in);
        System.out.print("Enter total no of values:");
        int size=obj.nextInt();
        System.out.println("Enter values:");
        for(int i=0;i<size;i++){
            int val=obj1.nextInt();
            num.add(val);
        }
    }
}
```

```
System.out.print(num);
Scanner obj2=new Scanner(System.in);
System.out.println("Enter Index no to Update value");
int ind=obj2.nextInt();
if(ind<size){
    int val1=obj2.nextInt();
    num.set(ind,val1);
    System.out.println(num);
    num.sort();
    System.out.println(num); //after sort
}
else{
    System.out.print("Index not Found");
}
}
```

```
import java.util.ArrayList;
class Main {
    public static void main(String[] args) {
        ArrayList<String> cars = new ArrayList<String>();
        cars.add("Volvo");
        cars.add("BMW");
        cars.add("Ford");
        cars.add("Mazda");
        System.out.println(cars);
        // remove element
        cars.remove(0); //0 is index
        System.out.println(cars);
        cars.clear(); // to delete complete Arraylist
        System.out.println(cars);
    }
}
```

REMOVE AND CLEAR FUNCTION

Java AWT (Abstract Window Toolkit) is an API to develop Graphical User Interface (GUI) or windows-based applications in Java.

Java AWT components are platform-dependent i.e. components are displayed according to the view of operating system. AWT is heavy weight i.e. its components are using the resources of underlying operating system (OS).

The `java.awt` [package](#)

provides [classes](#)

for AWT API such as `TextField`, `Label`, `TextArea`, `RadioButton`, `CheckBox`, `Choice`, `List` etc.

The AWT tutorial will help the user to understand Java GUI programming in simple and easy steps.

Why AWT is platform independent?

Java AWT calls the native platform calls the native platform (operating systems) subroutine for creating API components like TextField, CheckBox, button, etc.

For example, an AWT GUI with components like TextField, label and button will have different look and feel for the different platforms like Windows, MAC OS, and Unix. The reason for this is the platforms have different view for their native components and AWT directly calls the native subroutine that creates those components.

In simple words, an AWT application will look like a windows application in Windows OS whereas it will look like a Mac application in the MAC OS.

Java Swing

84

Java Swing tutorial is a part of Java Foundation Classes (JFC) that is used to create window-based applications. It is built on the top of AWT (Abstract Windowing Toolkit) API and entirely written in java.

Unlike AWT, Java Swing provides platform-independent and lightweight components.

The javax.swing package provides classes for java swing API such as JButton, JTextField, JTextArea, JRadioButton, JCheckbox, JMenu, JColorChooser etc.

Difference between AWT and Swing

| No. | Java AWT | Java Swing |
|-----|--|--|
| 1) | AWT components are platform-dependent . | Java swing components are platform-independent . |
| 2) | AWT components are heavyweight . | Swing components are lightweight . |
| 3) | AWT doesn't support pluggable look and feel . | Swing supports pluggable look and feel . |
| 4) | AWT provides less components than Swing. | Swing provides more powerful components such as tables, lists, scrollpanes, colorchooser, tabbedPane etc. |
| 5) | AWT doesn't follows MVC (Model View Controller) where model represents data, view represents presentation and controller acts as an interface between model and view. | Swing follows MVC . |

Login Page Project Using Netbeans (Jframe , AWT, Swing)

Login Form

UserName → Variable Name: name

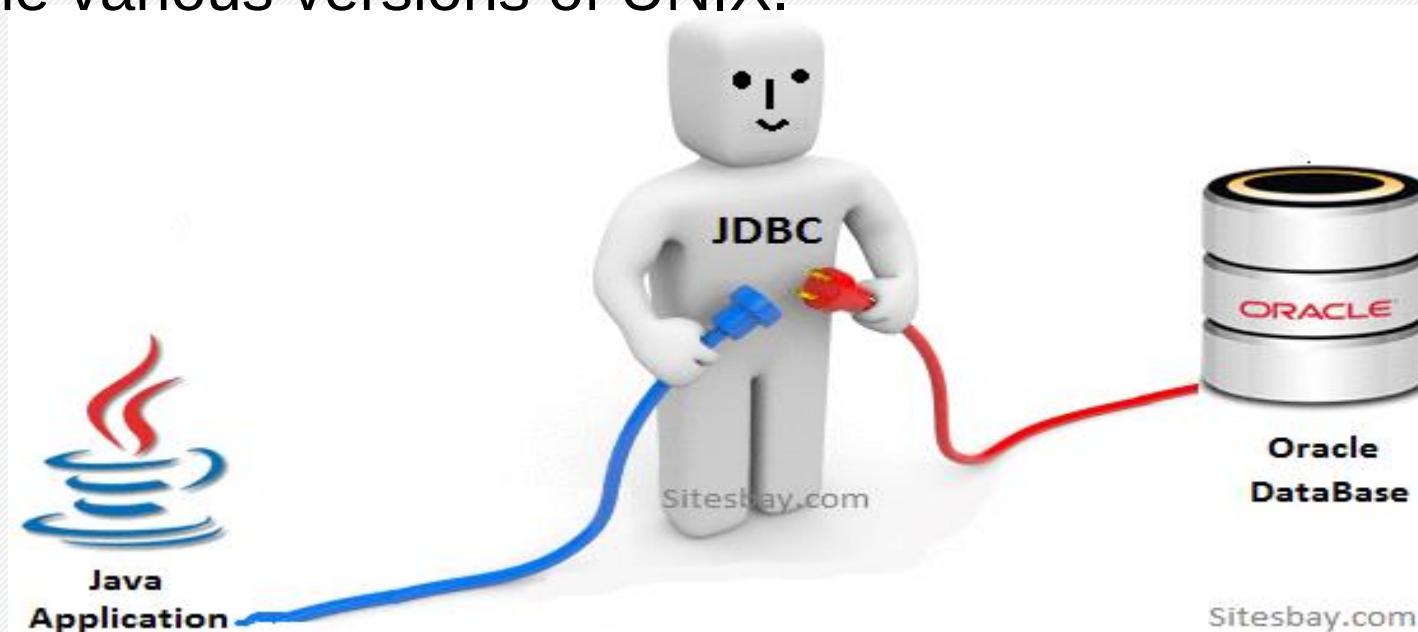
Password → Variable Name: pass



```
private void loginbtnActionPerformed(java.awt.event.ActionEvent evt) {  
    String Name=name.getText();   getText is used to receive data in entry box and t/f to  
    String Pass=pass.getText();  variable  
    if(Name.contains("101") && Pass.contains("Abhi")) {  
        name.setText(Name);  
        pass.setText(Pass);  
        newpage np=new newpage();  
        np.setVisible(true);  
    }  
    else{  
        loginp lp=new loginp();  
        lp.setVisible(true);  
    }  
}
```

Calling new file to afterlogin page
Visible is used to show file

JDBC API is a Java API that can access any kind of tabular data, especially data stored in a Relational Database. JDBC works with Java on a variety of platforms, such as Windows, Mac OS, and the various versions of UNIX.



Why to Learn JDBC?

JDBC stands for **Java Database Connectivity**, which is a standard Java API for database-independent connectivity between the Java programming language and a wide range of databases.

The JDBC library includes APIs for each of the tasks mentioned below that are commonly associated with database usage.

- Making a connection to a database.
- Creating SQL or MySQL statements.
- Executing SQL or MySQL queries in the database.
- Viewing & Modifying the resulting records.

Applications of JDBC

Fundamentally, JDBC is a specification that provides a complete set of interfaces that allows for portable access to an underlying database. Java can be used to write different types of executables, such as –

- Java Applications
- Java Applets
- Java Servlets
- Java Server Pages (JSPs)
- Enterprise JavaBeans (EJBs).

Java Database Connectivity with MySQL

To connect Java application with the MySQL database, we need to follow 5 following steps.

In this example we are using MySql as the database. So we need to know following informations for the mysql database:

- 1.Driver class:** The driver class for the mysql database is **com.mysql.jdbc.Driver**.
- 2.Connection URL:** The connection URL for the mysql database is **jdbc:mysql://localhost:3306/sonoo** where jdbc is the API, mysql is the database, localhost is the server name on which mysql is running, we may also use IP address, 3306 is the port number and sonoo is the database name. We may use any database, in such case, we need to replace the sonoo with our database name.
- 3.Username:** The default username for the mysql database is **root**.
- 4.Password:** It is the password given by the user at the time of installing the mysql database. In this example, we are going to use root as the password.

```
1.import java.sql.*;  
2.class MysqlCon{  
3.public static void main(String args[]){  
4.try{  
5.Class.forName("com.mysql.jdbc.Driver");  
6.Connection con=DriverManager.getConnection(  
7."jdbc:mysql://localhost:3306/sonoo","root","root");  
8./here sonoo is database name, root is username and password  
9.Statement stmt=con.createStatement();  
10.ResultSet rs=stmt.executeQuery("select * from emp");  
11.while(rs.next())  
12.System.out.println(rs.getInt(1)+" "+rs.getString(2)+" "+rs.getString(3));  
13.con.close();  
14.}catch(Exception e){ System.out.println(e);}  
15.  
16.}
```