Programming Language

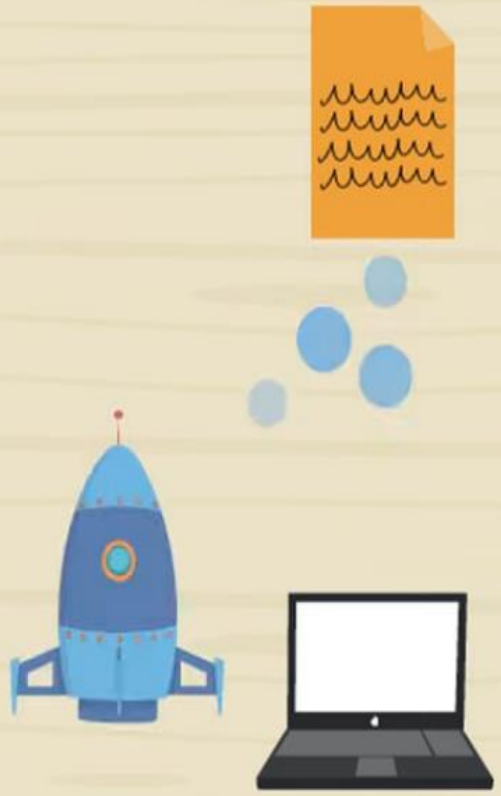
- "Put simply, programming is giving a set of instructions to a computer to execute. If you've ever cooked using a recipe before, you can think of yourself as the computer and the recipe's author as a programmer. The recipe author provides you with a set of instructions which you read and then follow. The more complex the instructions, the more complex the result!"

- And programming languages are the tools we use to write instructions for computers to follow. Computers “think” in binary — strings of 1s and 0s. Programming languages allow us to translate the 1s and 0s into something that humans can understand and write. A programming language is made up of a series of symbols that serves as a bridge that allow humans to translate our thoughts into instructions computers can understand.

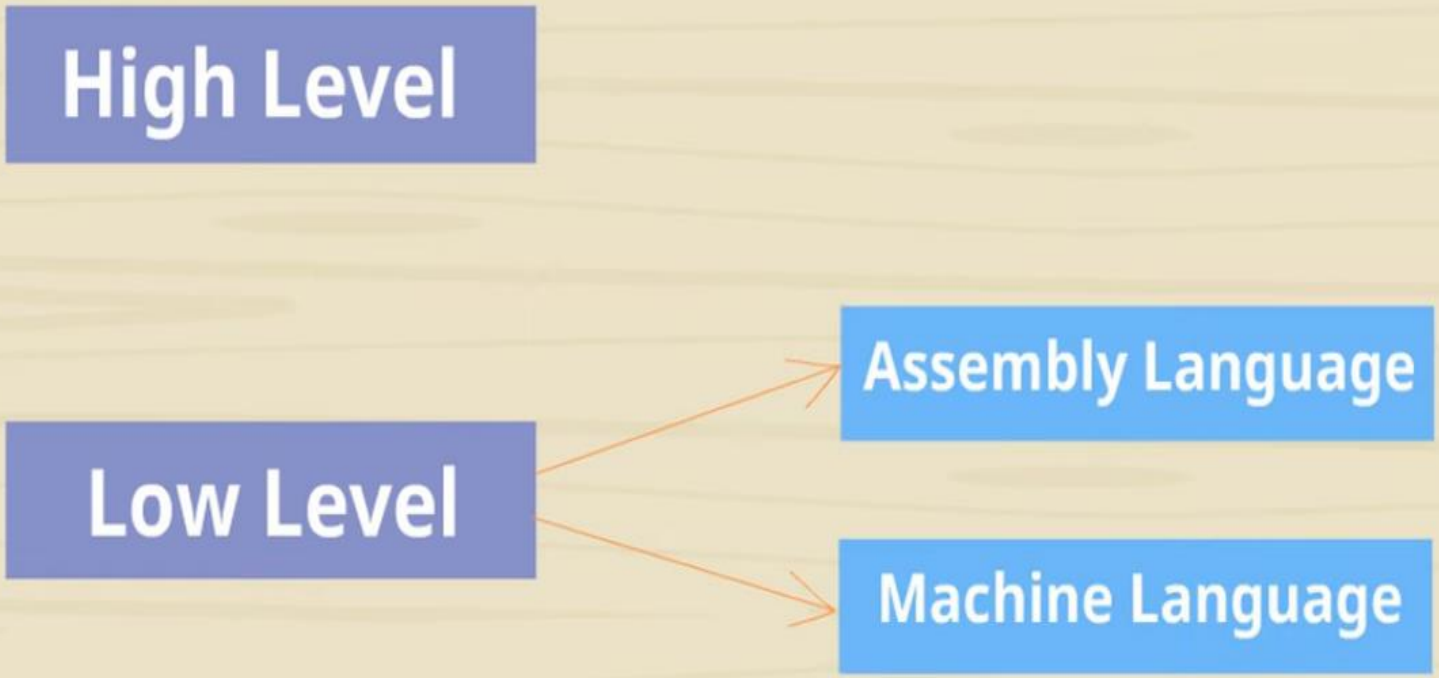
net solutions

Programming Languages

1. Artificial language
2. Designed to communicate instructions to a machine
3. Used to create programs that control the behavior of a machine.

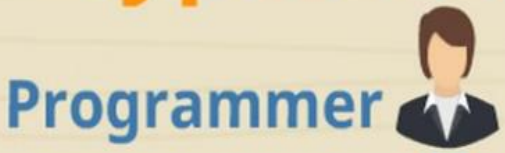


Types of Programming Languages



Hardware

Types of Programming Languages



- High Level
  - Object Oriented
  - Procedural
- Low Level
  - Assembly Language
  - Machine Language

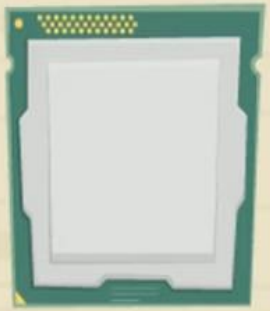
Hardware

Machine Language

1. Directly run on CPU
2. Series of bits like, 0s and 1s
3. Tedious and error prone to write code manually.
4. Not portable

10110100
10110101
01010100
01011011

10101001



Assembly Language

1. Less error-prone
2. Coding easier than machine Language
3. Replaces 1 and 0s with English instructions
4. Mnemonic codes for corresponding machine language

```
Mov A1, AA
JMP L20
CMP R0, R1
ADD R1, AH, BH
```

Procedural	Object Oriented
Program is written as sequence of instructions	**Program is an interaction of functions between objects**
1. Top down approach	1. Bottom up approach
2. It doesn't have proper way for hiding data	2. Helps in wrapping data and functions in a class
3. Data is not secure	3. Helps Building secure programs
4. Code is interdependent	4. Code is modular
5. Reuse difficult	5. Can be extended for reuse

Procedural

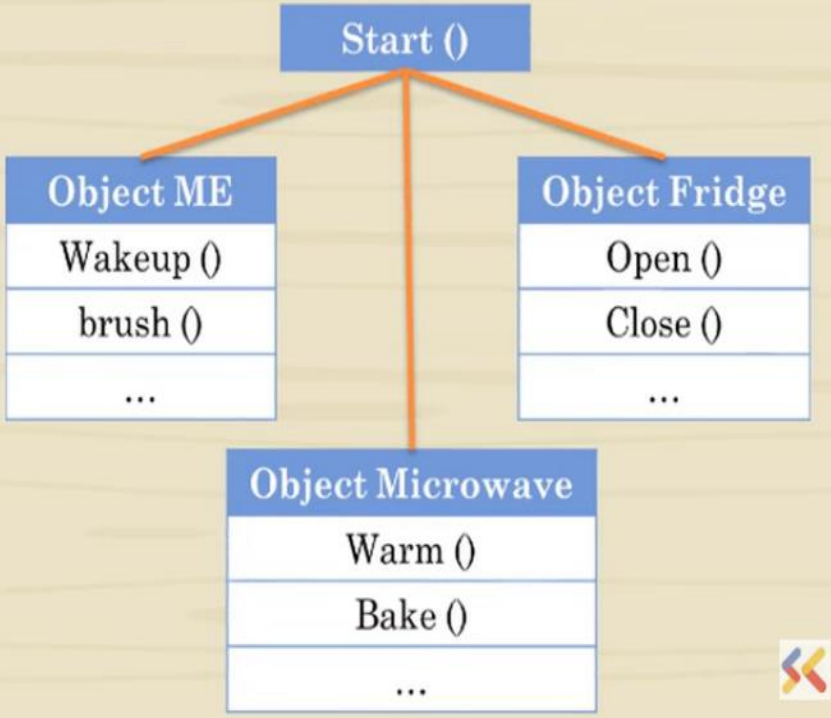
Program is written as sequence of instructions

e.g.: Recipes,
Morning Steps:

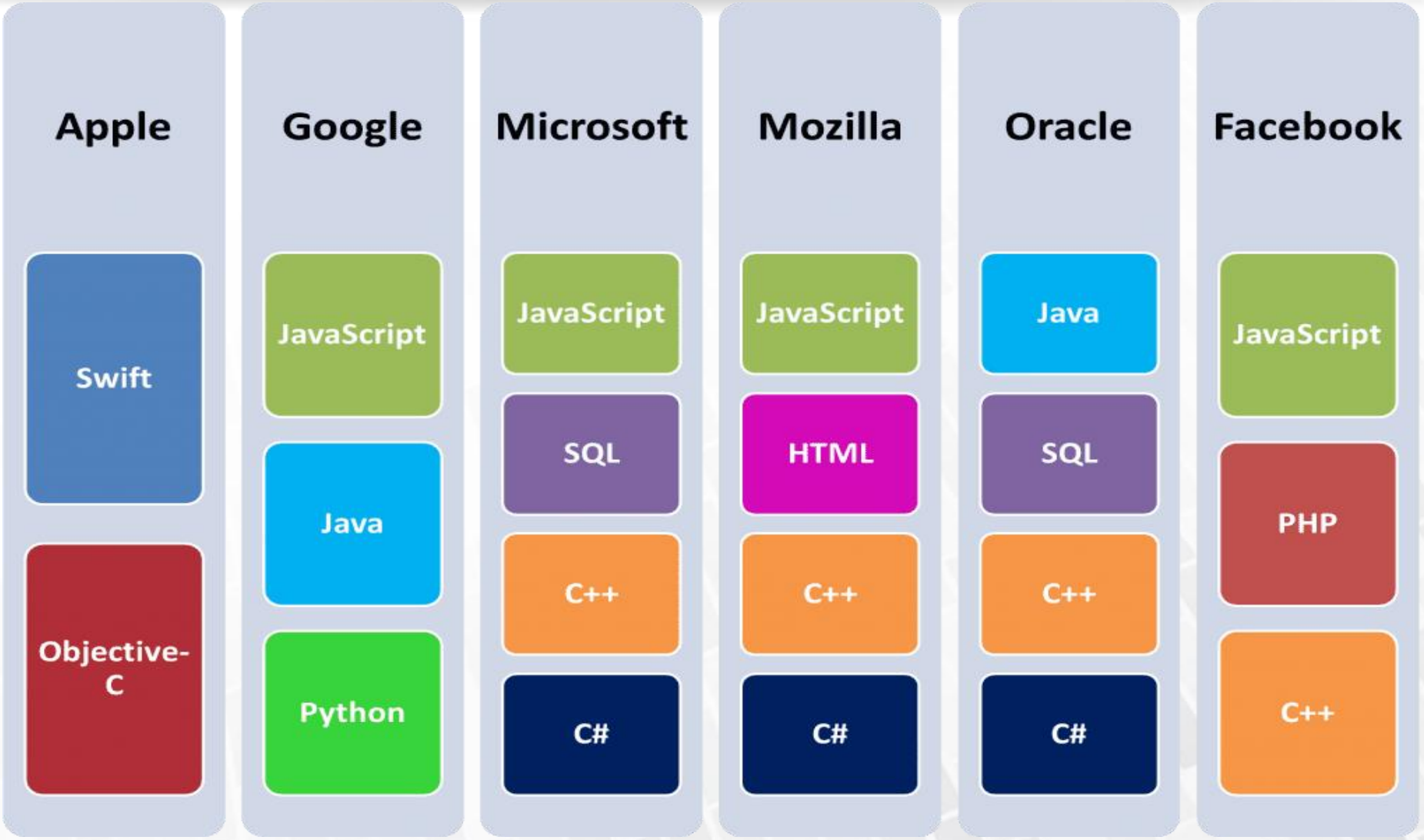
Start ()
I wake up
I brush my teeth
I open fridge
I take milk
I warm it in microwave

Object Oriented

Program is an interaction of functions between objects




R
COBOL
GO
Basic
perl
Fortran
C
C++


Apple
Swift
Objective-C
Google
JavaScript
Java
Python
Microsoft
JavaScript
SQL
C++
C#
Mozilla
JavaScript
HTML
C++
C#
Oracle
Java
SQL
C++
C#
Facebook
JavaScript
PHP
C++

Languages Used

Youtube - JavaScript, C, C++, Python, Java, Go
Google - JavaScript, C, C++, Go, Java, Python
Yahoo - JavaScript, PHP
Amazon - JavaScript, Java, C++, Perl
Microsoft - JavaScript, ASP.NET
Wikipedia - JavaScript, PHP, Hack
eBay.com - JavaScript, Java, Scala
Pinrest - JavaScript, Django (Python), Erlang
MSN - JavaScript, ASP.NET
Twitter - JavaScript, C++, Java, Scala, Ruby on Rails
Facebook - JavaScript, Hack, PHP, Python, C++, Java, Erlang, D, Xhp, Haskell

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JAVA Programming Language

What is JAVA?

Java

Object Oriented

Secure

- Execution inside Virtual Machine
- No pointers

Simple

- High-level
- Easy to learn

Architecture Neutral and Portable

- Platform Independent
- Write Once, Run Anywhere

Robust

- Improved Memory Management
- Exception Handling Mechanism
- Type Checking Mechanism

Multi-threaded

Before going to know what is java we will discuses at the first what are the uses of java and why its most popular programming language?

Where is Java used in Real World?

- **If you are a beginner and just started learning Java, you might be thinking about where correctly Java is used? You don't see many games written in Java except Minecraft, desktop tools like Adobe Acrobat, Microsoft Office are not written in Java, neither are your operating systems like Linux or Windows, so where exactly do people use Java? Does it have any real-world application or not? Well, you are not alone, many programmers ask this question before starting with Java, or after picking Java as one of the programming languages of choice at the graduate level.**

Read more: https://javarevisited.blogspot.com/2014/12/where-does-java-used-in-real-world.html#ixzz7SZZ7FFJh

- **By the way, you can get a clue of where Java is used by installing Java on your desktop, Oracle says more than 3 billion devices run Java, that's a huge number, isn't it? Most major companies use Java in one way or another.**

  Many server-side applications are written in Java which processes tens of millions of requests per day. High-frequency trading applications are also written in Java like LMAX trading applications, which is built over their path-breaking inter-thread communication library, Disruptor.

- In this article, we will see more precisely what kind of projects are done in Java, which domain or sector Java is dominating, and where exactly Java is used in the real world? But, if you are already convinced about Java's power and reach and just want to learn Java then I suggest you join these Java Programming courses to learn Java from scratch. This includes the best and most up-to-date courses to learn Java.

Real-World Java Applications.

There are many places where Java is used in the real world, starting from a commercial e-commerce website to android apps, from scientific application to financial applications like electronic trading systems, from games like Minecraft to desktop applications like Eclipse, NetBeans, and IntelliJ, from an open-source library to J2ME apps, etc. Let's see each of them in more detail.

- **1. Android Apps**

If you want to see where Java is used, you are not too far away. Open your Android phone and any app, they are actually written in Java programming language, with Google's Android API, which is similar to JDK.

2. Server Apps at the Financial Services Industry.

Java is very big in Financial Services. Lots of global Investment banks like Goldman Sachs, Citigroup, Barclays, Standard Charted, and other banks use Java for writing front and back office electronic trading systems, writing settlement and confirmation systems, data processing projects, and several others.

Top 10 Mobile Banking Apps in India

IDBI Go Mobile+ App

YONO LITE SBI

CANDI- Mobile App

ICICI iMobile App

HDFC Mobile App

Kotak- 811 & Mobile App

HDFC PayZapp

Axis Mobile App

Bank of Baroda M-Connect Plus App

PNB ONE Mobile App

paisabazaar.com

3. Java Web applications

Java is also big in the E-commerce and web application space. You have a lot of RESTful services being created using Spring MVC, Struts 2.0, and similar frameworks. Even simple Servlet, JSP, and Struts-based web applications are quite popular on various government projects. Many governments, healthcare, insurance, education, defense, and several other departments have their web application built in Java.


e!

4. Software Tools

Many useful software and development tools are written and developed in Java, like Eclipse IDE, IntelliJ Idea, and NetBeans IDE. I think they are also the most used desktop applications written in Java.

Though there was a time when Swing was very popular to write thick clients, mostly in the financial service sector and Investment banks. Nowadays, Java FX is gaining popularity, but still, it is not a replacement for Swing, and C# has almost replaced Swing in Finance domain.

Top Java IDE Tools

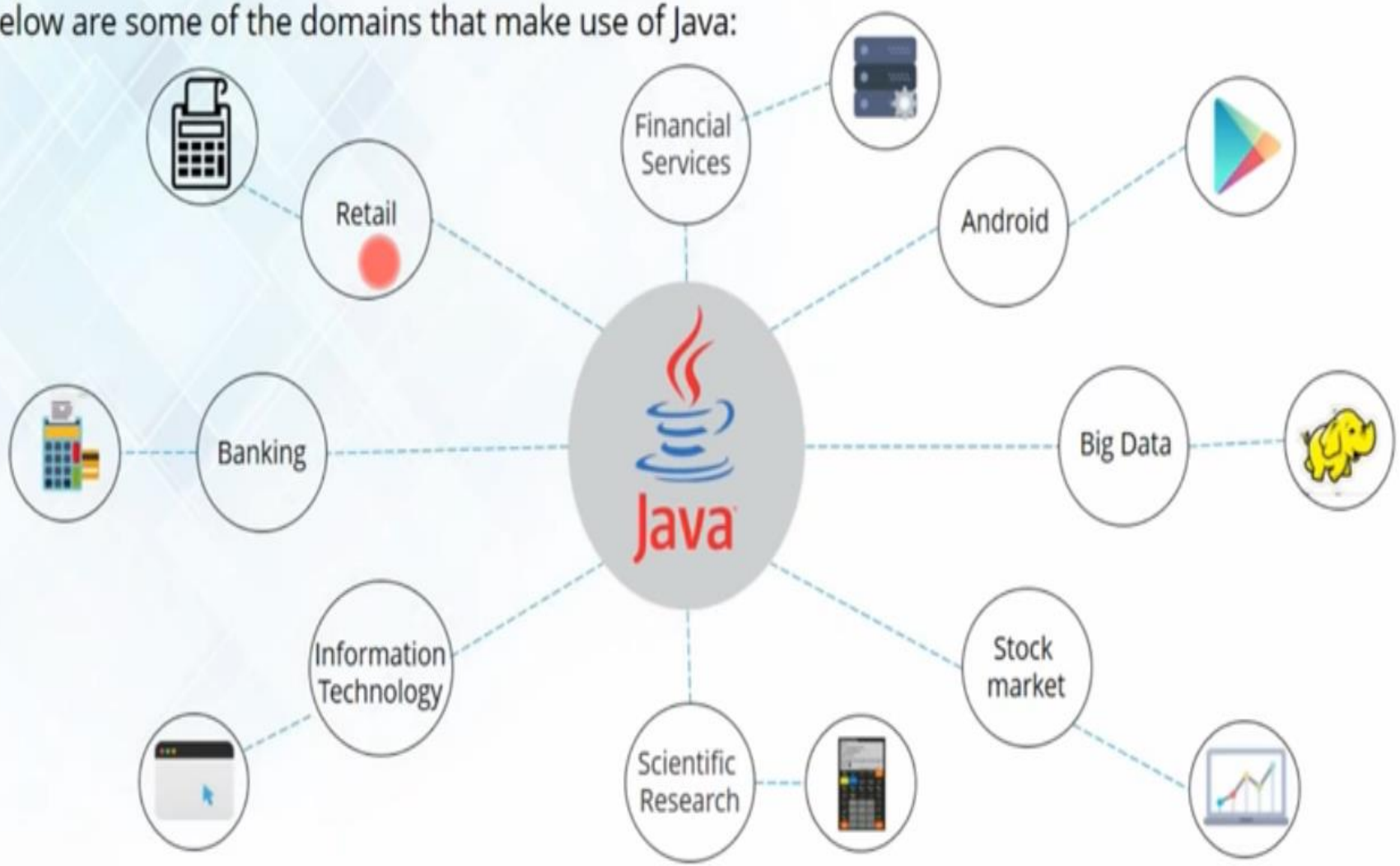
What Makes Java Most Popular Programming Language ?

- Java Is Simple .
- Java Is Powerful And Secure .
- Java Is Object Oriented .
- Java Is Platform Independent.
- Java Is Versatile.
- Java Supported By Huge Community.


Java Web Application Development
Java Application Maintenance & Support
Java Enterprise Application Development
Java
Java Application Migration & Integration
Java Desktop Application Development
Java CMS Services
Java Web Services Development
Java Mobile Application Development

Why Learn Java?

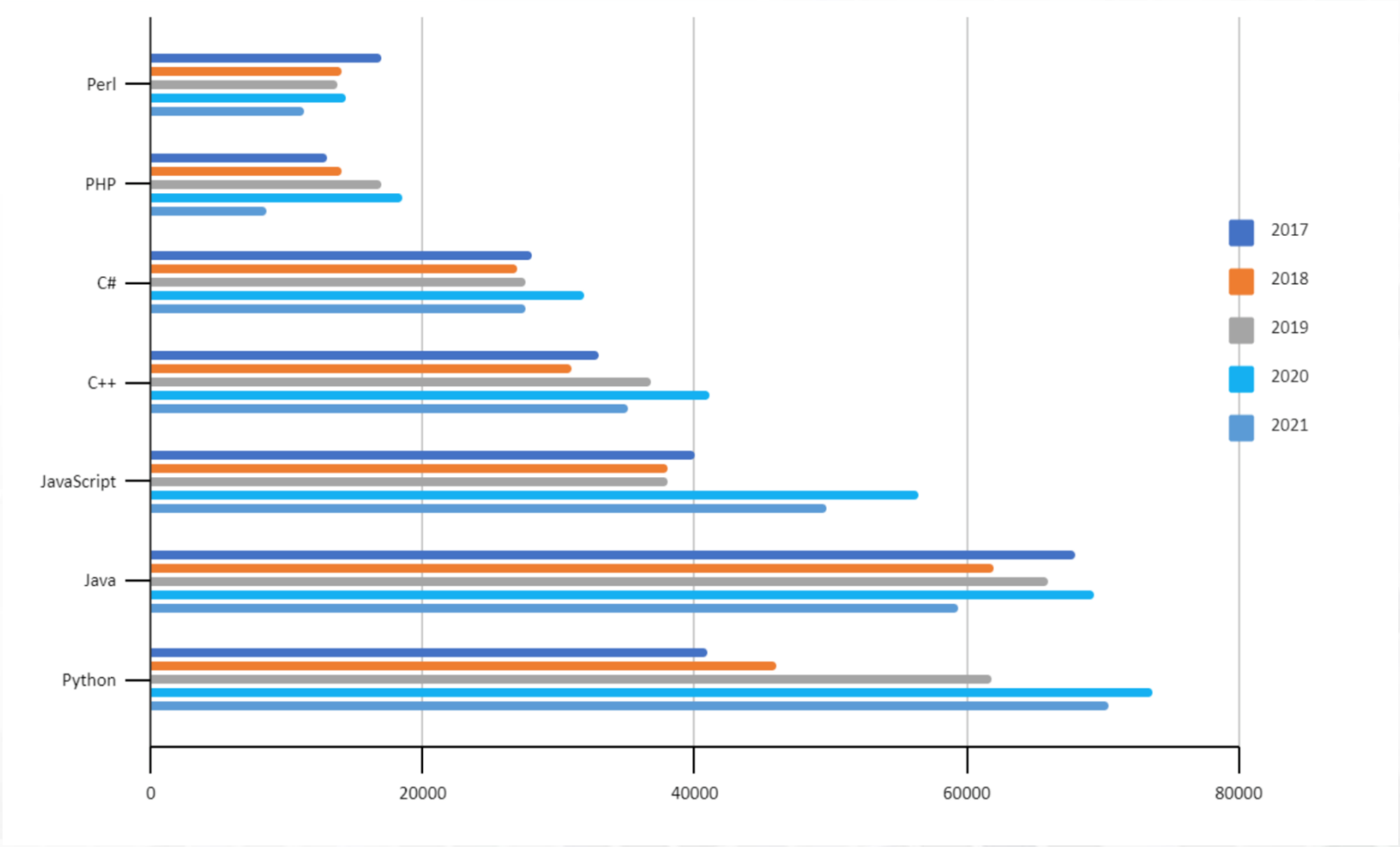
Below are some of the domains that make use of Java:



Why Java?

- Java is a high – level, General purpose ,Object – oriented programming language.
- Very popular Programming language in terms no. of java developers, no of vacancies posted by job search portals and of average salary .
- Used for develop software that run on desktop, mobile,Web and servers.
- Contains lots of library (API) that we can use to develop java programs
- Easy and efficient Programming language.

No. of Job positions posted by employers in **indeed.com**



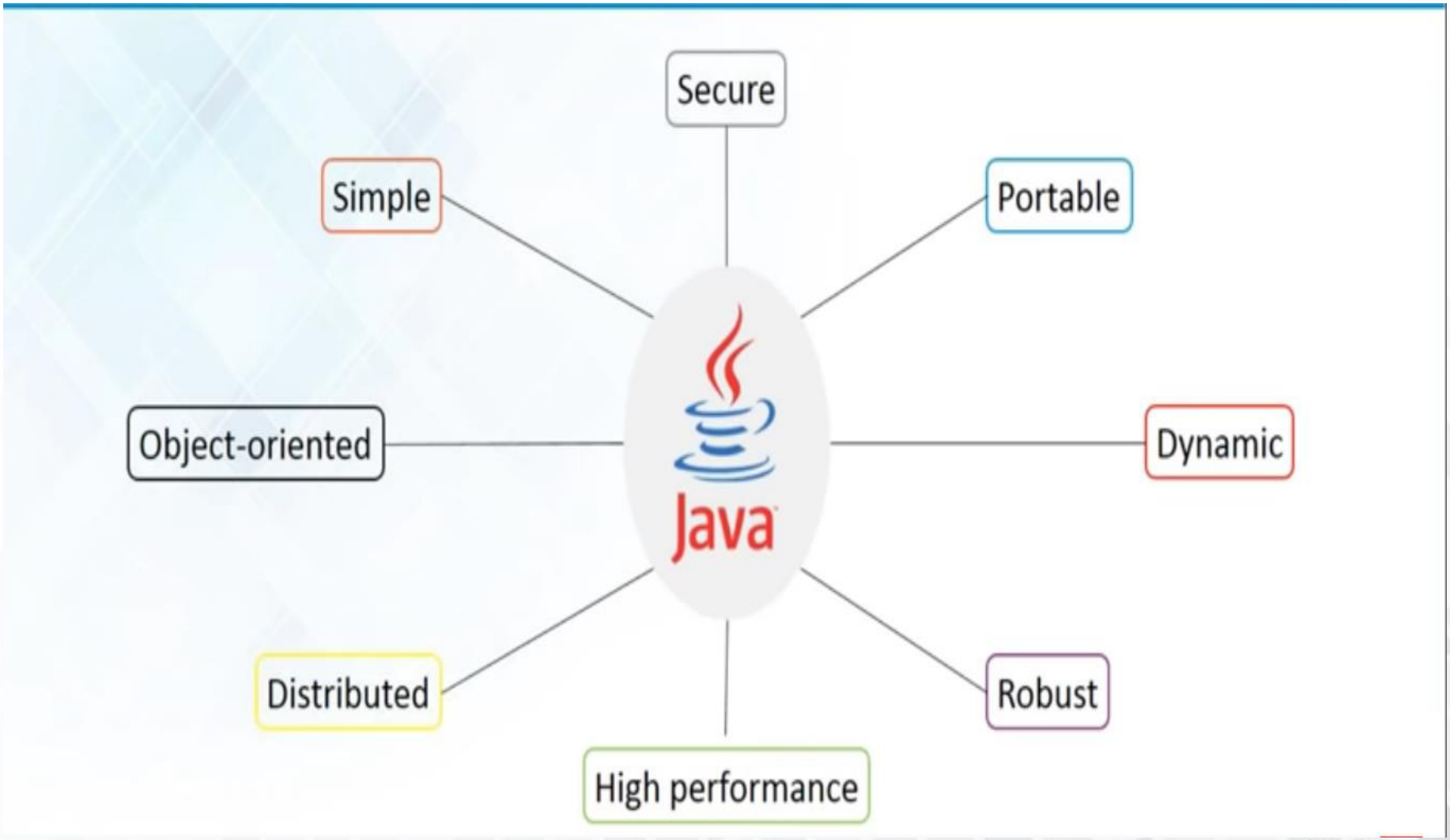
History of Java

- Java was originally developed by James Gosling at Sun Microsystems and released in 1995 as a core component of Sun Microsystems' Java platform.
- **James Gosling**, **Mike Sheridan**, and **Patrick Naughton** initiated the Java language project in June 1991. The small team of sun engineers called **Green Team**.
- Initially designed for small, embedded systems in electronic appliances like set-top boxes.
- Firstly, it was called **"Greentalk"** by James Gosling, and the file extension was .gt.
- After that, it was called **Oak** and was developed as a part of the Green project.
- In 1995, Oak was renamed as **"Java"** because it was already a trademark by Oak Technologies.
- ***JDK 1.0 released in(January 23, 1996). After the first release of Java, there have been many additional features added to the language. Now Java is being used in Windows applications, Web applications, enterprise applications, mobile applications etc. Each new version adds the new features in Java.***

History of Java

- **The latest version of Java is Java 15** or JDK 15 released on September, 15th 2020
- ***Java was purchased by Oracle corporation in 2010 from sun Microsystems.***

Features of Java


Secure
Simple
Portable
Object-oriented
Java
Dynamic
Distributed
Robust
High performance

Features of Java:

- **Object Oriented**
- **Platform Independent**
- **Simple**
- **Secure**
- **Multithreaded**
- **Distributed**
- **Garbage Collection..etc**

Simple

Java was designed to be easy for professional programmer to learn and use effectively.

Portable

Applications written on one platform of Java can be easily ported to another platform as it is platform independent.

Object-oriented

Java is an object oriented programming language. Everything is considered to be an "object" and all operations are performed using these objects.

Secure

Java does not use explicit pointer and runs its programs inside the sandbox to prevents any activities from untrusted sources.

Distributed

Java has a feature called Remote Method Invocation (RMI) using which a program can invoke method of another program across a network and get the output.

Dynamic

Java programs carry with them substantial amounts of run-time type information that is used to verify and resolve accesses to objects at run time.

Robust

- Java checks the code during the compilation time and run time also.
- Java completely takes care of memory allocation and releasing, which makes the Java program more robust.

High performance

Java achieves high performance through the use of bytecode which can easily translated into native machine code.

Platform Independent:

→ Java is platform independent because it is different from other languages like C, C++, etc. which are compiled into platform specific machines

→Java is a write once, run anywhere language.

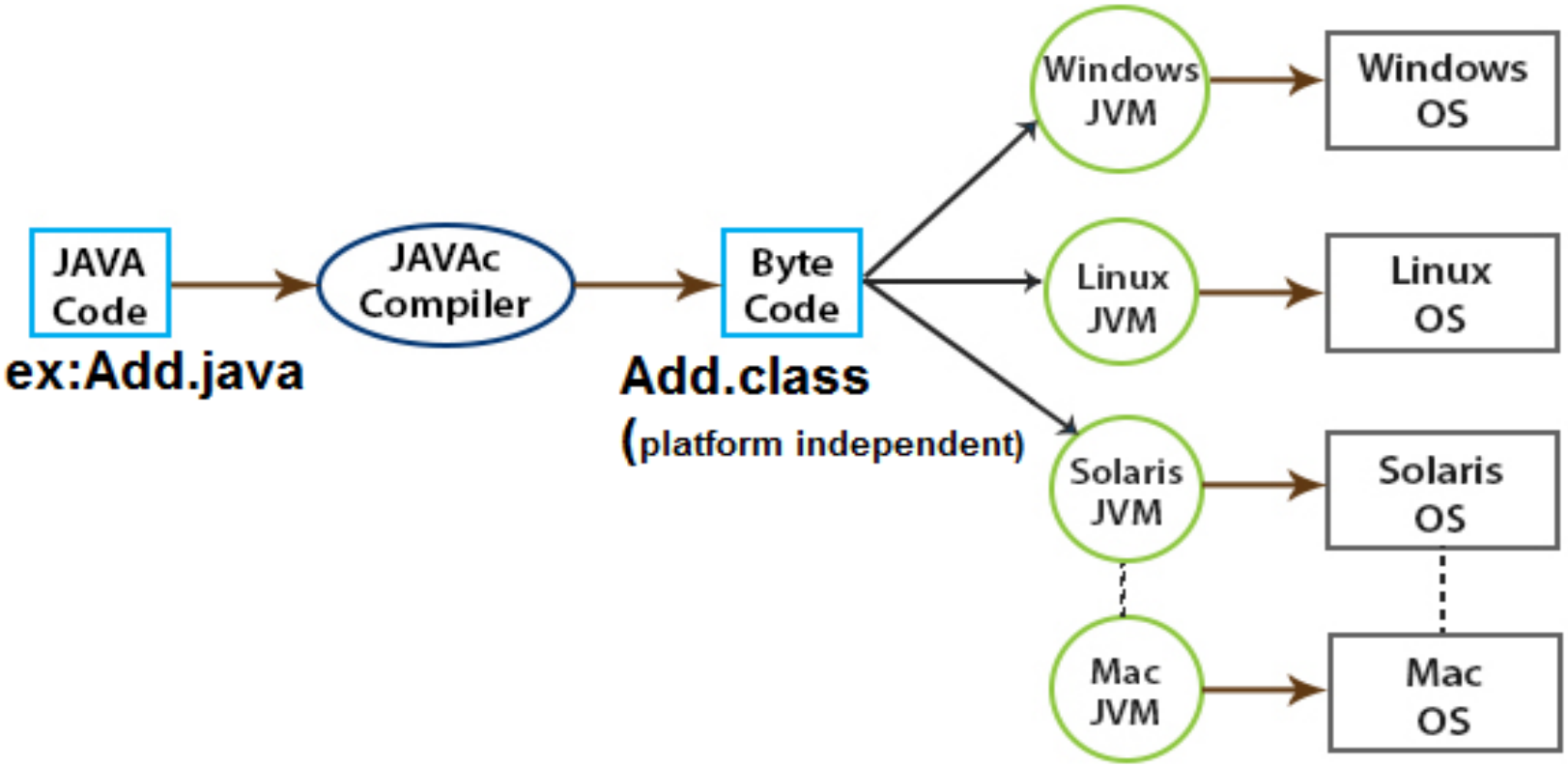
→A platform is the hardware or software environment in which a program runs.

→***Java code can be run on multiple platforms, for example, Windows, Linux, Sun Solaris, Mac/OS, etc.***

→ ***Java code is compiled by the compiler and converted into bytecode.***

→**This bytecode is a platform-independent code because it can be run on multiple platforms, i.e., Write Once and Run Anywhere(WORA).**

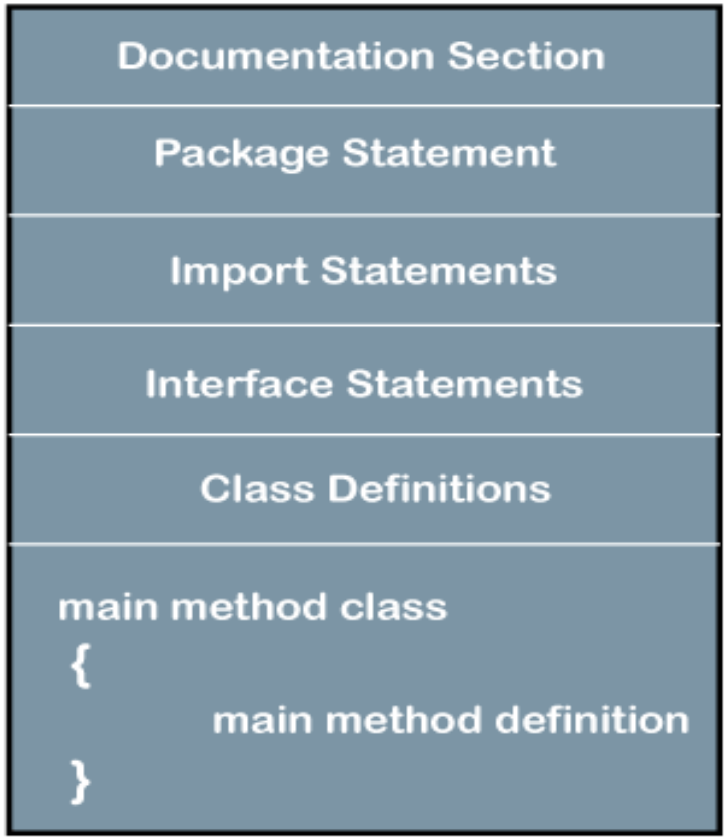
Platform Independence in Java



Structure in Java

- Java is a very popular language and used on 7 billion devices worldwide. It is one of the most secured, platform-independent, and object oriented programming languages that's why it is necessary to be familiar with the basic structure of Java program. A typical Java program consists of the following sections:

* A typical structure of a Java program contains the following elements



Structure of Java Program

1.Documentation section:

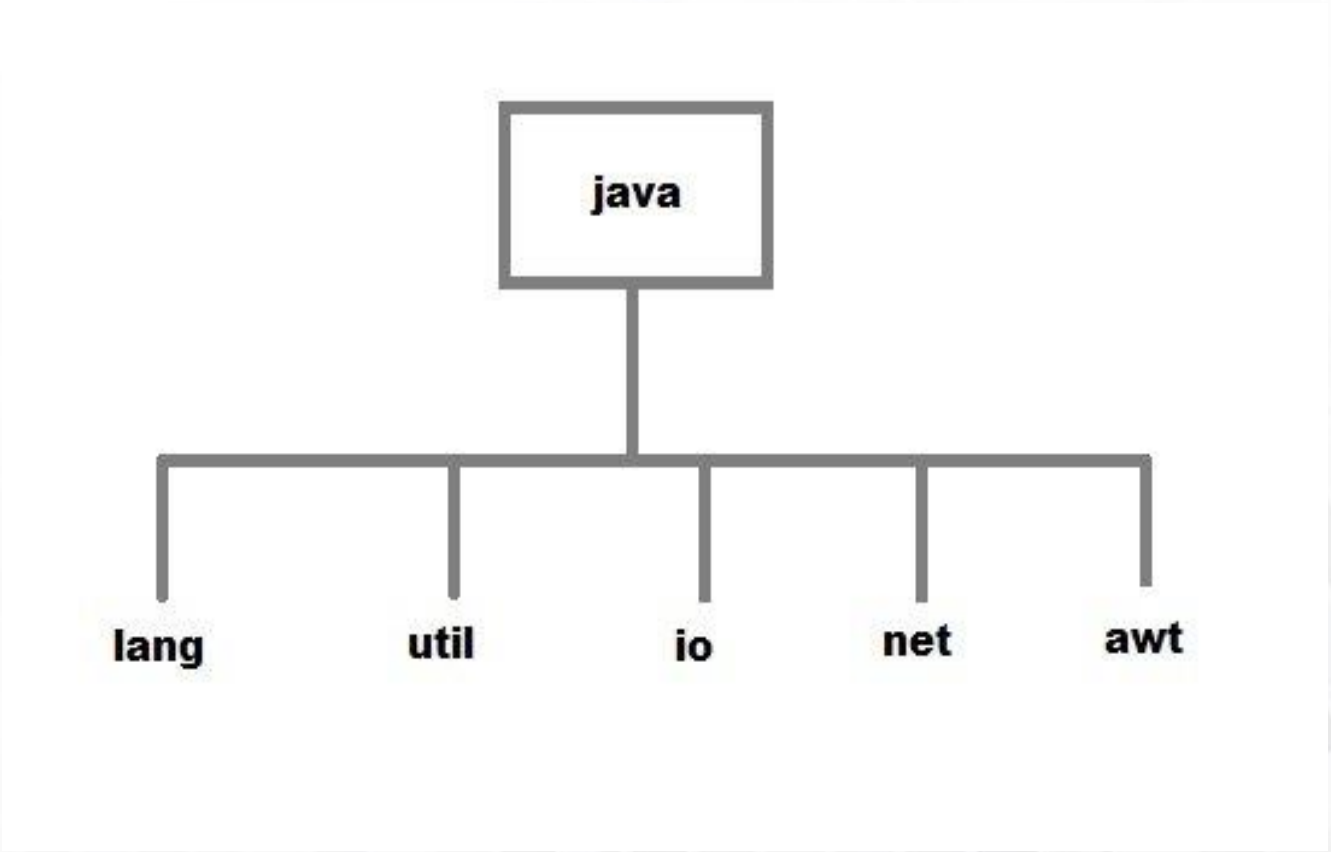
The documentation section consists of a set of comment lines giving the name of the program, the author and other details, which the programmer would like to use later.

```
// single comment

/* Multi line comment

        ------------------ ------------------ -------
        ------------------ ------------ ------------ ----   */
```

2.Package

- A java package is **a group of similar types of classes, interfaces and sub-packages.** Package in java can be categorized in two form, built-in package and user-defined package. There are many built-in packages such as java, lang, awt, javax, swing, net, io, util, sql etc.

3.Import



4.interface


It is used to achieve abstraction.
1
2
By interface, we can support the functionality of multiple inheritance.
It can be used to achieve loose coupling.
3

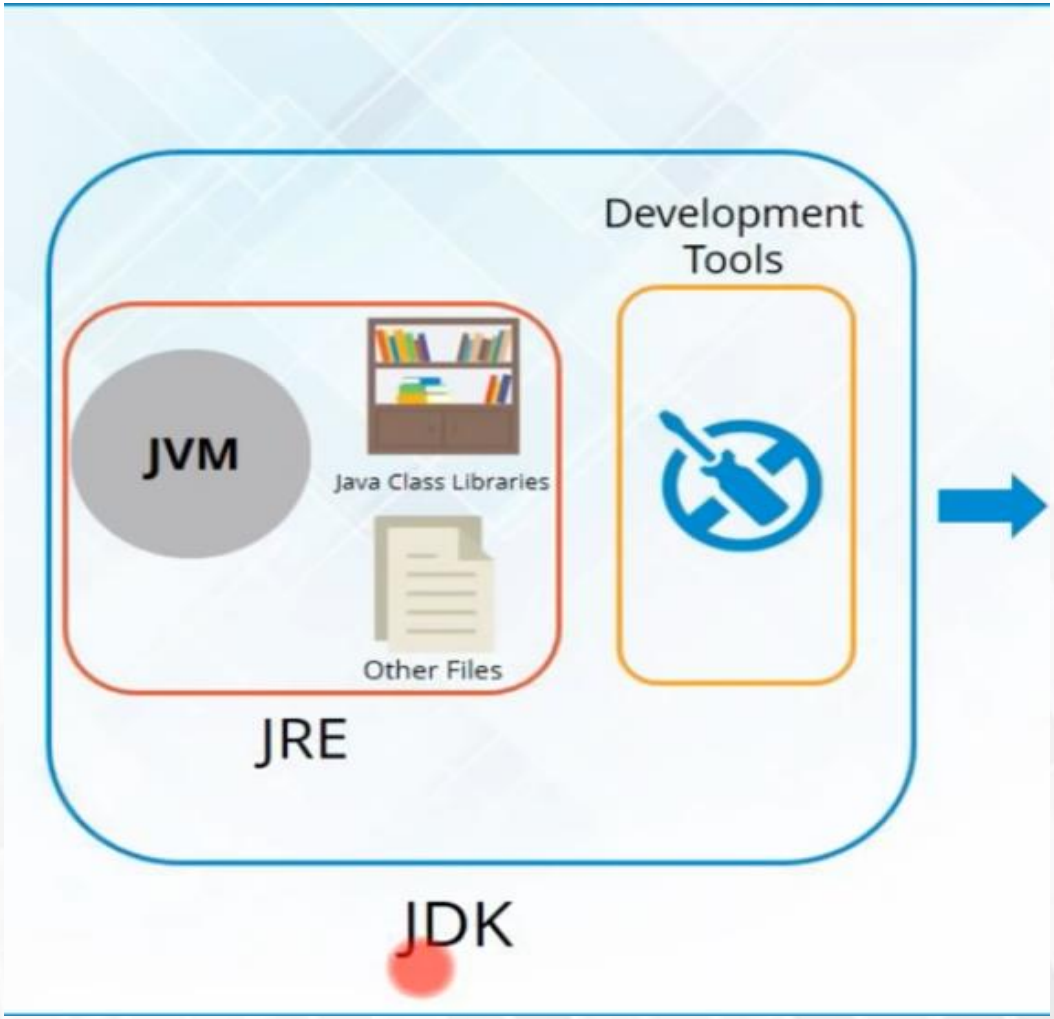
5. Class

- What is a class in Java with example?
- Everything in Java is associated with classes and objects, along with its attributes and methods. For example: in real life, a car is an object. The car has attributes, such as weight and color, and methods, such as drive and brake. **A Class is like an object constructor, or a "blueprint" for creating objects**.

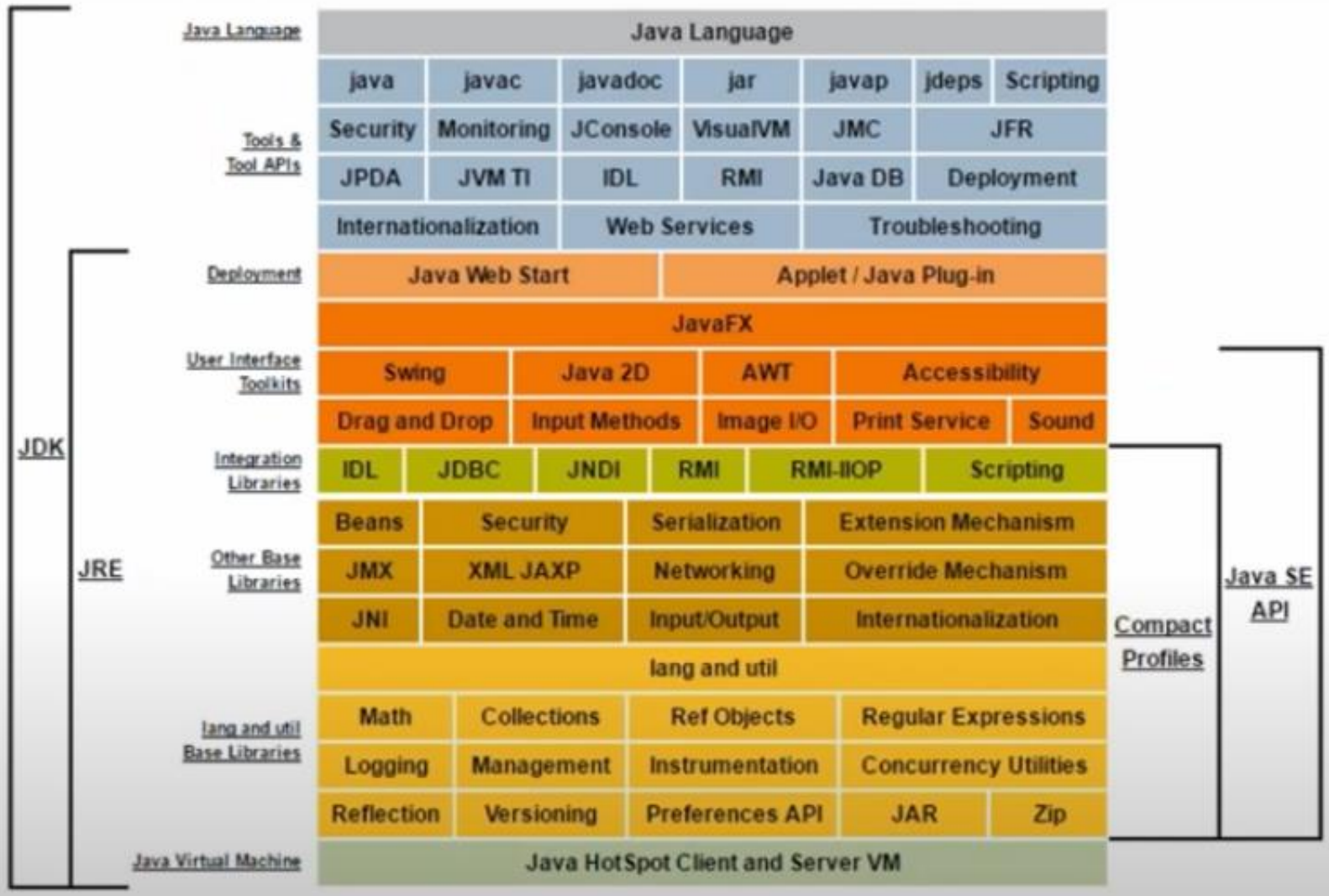
6. Method

- What is a method in Java with example?
- A method is **a block of code which only runs when it is called**. You can pass data, known as parameters, into a method. Methods are used to perform certain actions, and they are also known as functions.

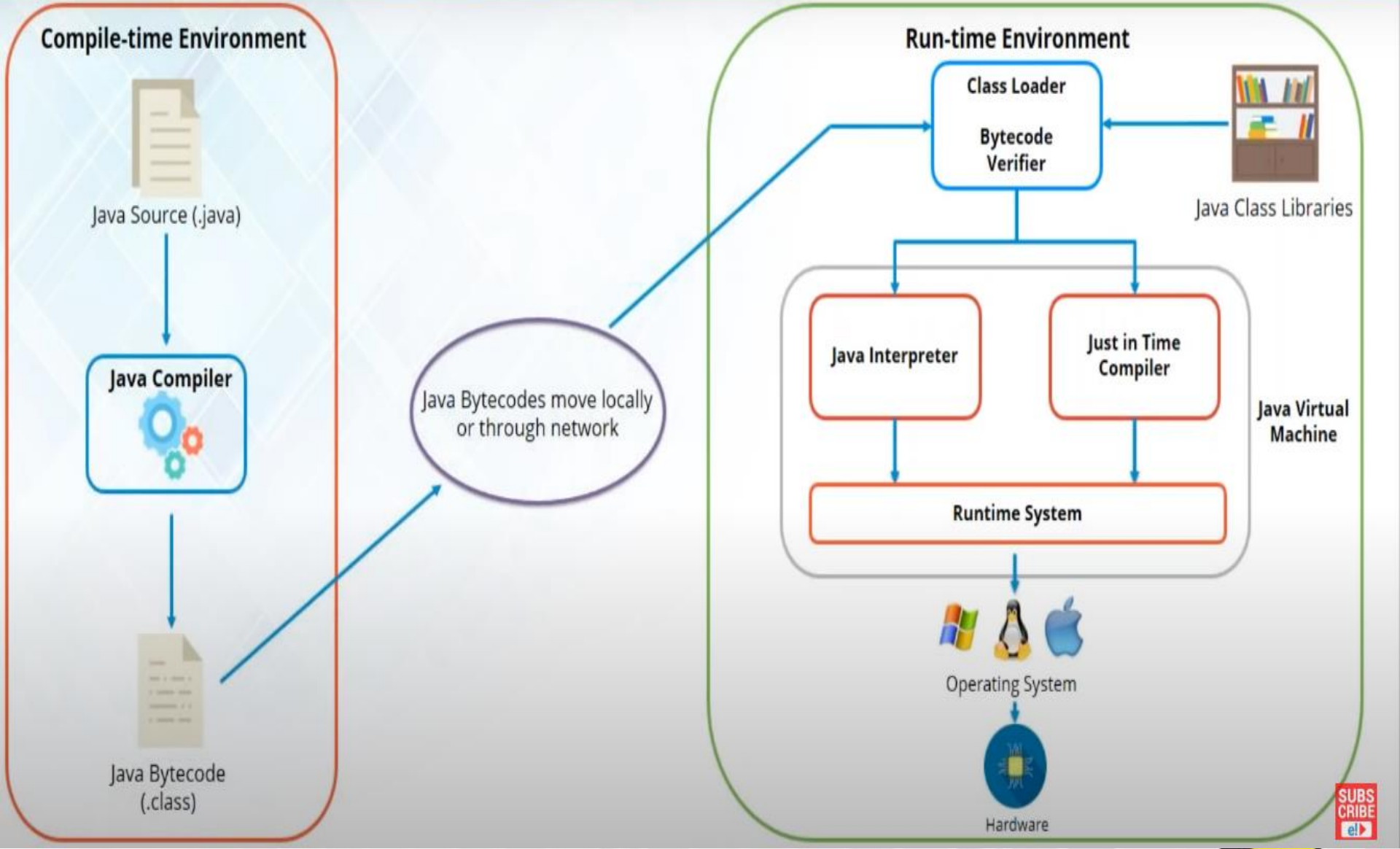
JAVA Development kit



JDK


JDK
JRE
Java Language
Java Language
java
javac
javadoc
jar
javap
jdeps
Scripting
Tools & Tool APIs
Security
Monitoring
JConsole
VisualVM
JMC
JFR
JPDA
JVM TI
IDL
RMI
Java DB
Deployment
Internationalization
Web Services
Troubleshooting
Deployment
Java Web Start
Applet / Java Plug-in
JavaFX
User Interface Toolkits
Swing
Java 2D
AWT
Accessibility
Drag and Drop
Input Methods
Image I/O
Print Service
Sound
Integration Libraries
IDL
JDBC
JNDI
RMI
RMI-IIOP
Scripting
Other Base Libraries
Beans
Security
Serialization
Extension Mechanism
JMX
XML JAXP
Networking
Override Mechanism
JNI
Date and Time
Input/Output
Internationalization
lang and util
lang and util Base Libraries
Math
Collections
Ref Objects
Regular Expressions
Logging
Management
Instrumentation
Concurrency Utilities
Reflection
Versioning
Preferences API
JAR
Zip
Java Virtual Machine
Java HotSpot Client and Server VM
Compact Profiles
Java SE API

How does Java work?


Compile-time Environment
Java Source (.java)
Java Compiler
Java Bytecode (.class)
Java Bytecodes move locally or through network
Run-time Environment
Class Loader
Bytecode Verifier
Java Class Libraries
Java Interpreter
Just in Time Compiler
Java Virtual Machine
Runtime System
Operating System
Hardware

A Java Program: Example 1

File name: Addition.java

```
public class  Addition
{
   public static void main(String args[])
   {
     int a=10;
     int b=20;
     int c=a+b;
     System.out.println("The sum is:"+c);
   }
}
```

OUTPUT:

```
The sum is:30
```

A Java Program: Example 2

File name: MyClass.java

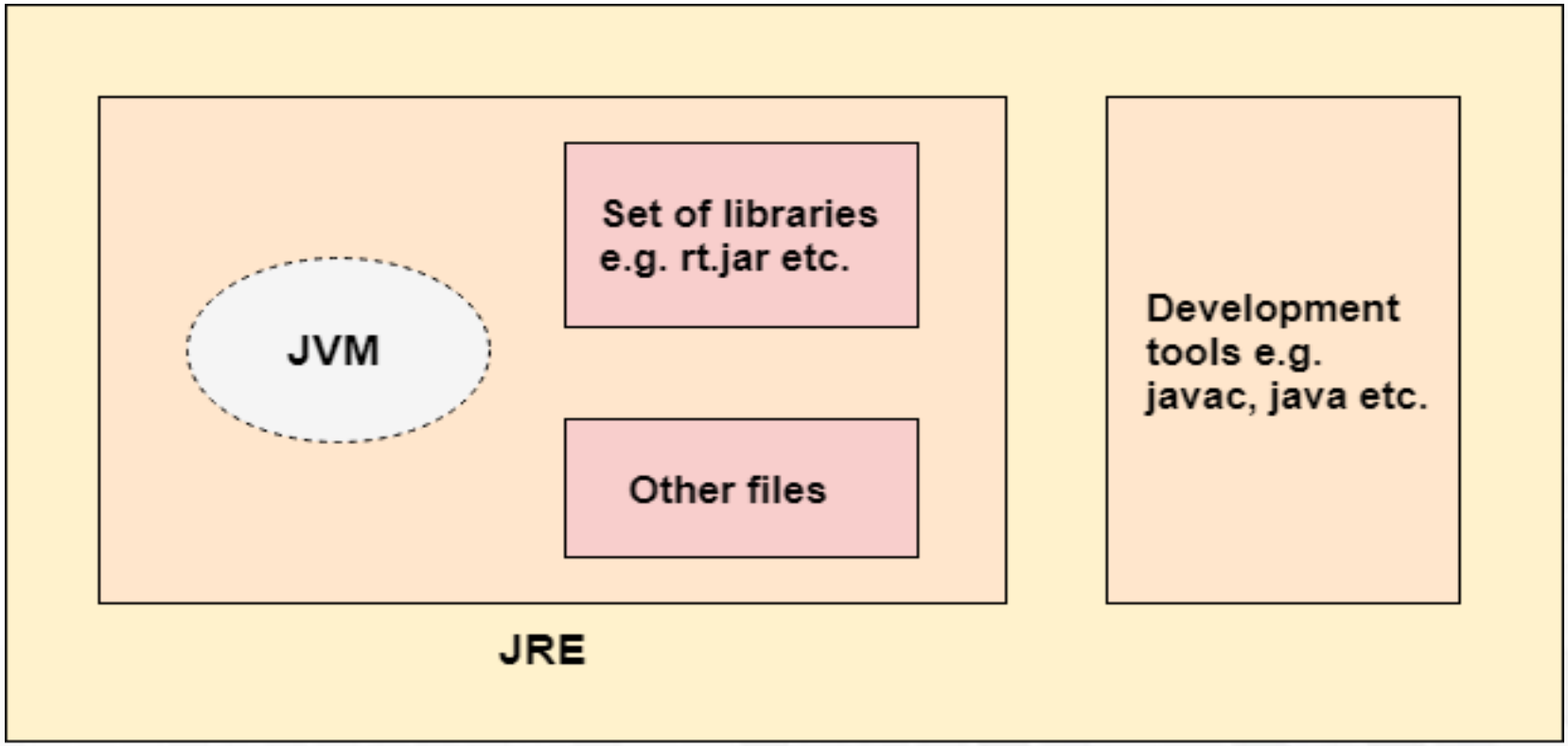
```
class Add
{
   int a=10;
   int b=20;
   int c;
   void sum1()
   {
      c=a+b;
      System.out.println("The sum is:"+c);
   }
}
public class MyClass
{
   public static void main(String args[])
   {
     Add obj=new Add();
     obj.sum1();
   }
}
```

OUTPUT:

```
The sum is:30
```

JDK vs JRE vs JVM

- JVM → JVM is an engine that provides a runtime environment to drive the Java Code or applications. It converts Java bytecode into machine language. JVM is a part of Java Run Environment (JRE).
- JRE→ The Java Runtime Environment(JRE/RTE) is a set of software tools which are used for developing Java applications. It is used to provide the runtime environment. JRE contains class libraries, JVM, and other supporting files.
- JDK→ he Java Development Kit (JDK) is a software development environment which is used to develop Java applications.
- It contains JRE + development tools.



JDK→JRE+Development tools(javac,javadoc..etc)

JRE→Library files + JVM

Editions of JAVA:

Java SE(Standard Edition) →used to develop application that runs on Computer System

Java EE(Enterprise Edition) → used to develop Server-side Application

Java ME(Micro Edition) → used to develop Mobile Application.

Java SE is the foundation for all other editions.

- How to Install JDK?
- How to Set class path?
- Run Java Program

Thank you