Applications of Java

(Scope of Java)

We know that Java is the "King of all programming languages". Since its foundation, this language has become a backbone for billions of devices and applications.

This language is continually ranked first in the rankings of software developers as the best choice of programming languages. Java is used in the majority of applications, from mobile phones to enterprise servers and computing platforms.

Currently, about 3 billion mobile phones are implemented in Java, as well as about 125 million TV sets and each Blu-ray player use Java. Every big organization uses Java in one way or another.

More than 64,000 companies are using Java in the World. For example, Google uses Java to build and develop Google Docs applications.

1. Desktop GUI Applications of Java

Desktop applications can be easily developed using Java. We use APIs like AWT, Swing, JavaFX to build these applications.

AWT (Abstract Windowing Toolkit) is an interface used to develop window-based applications in Java. It is "not totally Java-based" as it uses window user interface functionalities such as a menu, button, list, etc.
Swing is a GUI widget toolkit, which uses AWT and provides certain advanced components like trees, tables, scroll panes, tabbed panels and, lists. Swing is" totally java-based" and uses Swing packages of Java to develop applications. It responds to all the mouse-click events, key entries, etc.,

JavaFX is a modern way to develop a desktop application in Java, it is graph-based and totally different from AWT and Swings.

Examples of desktop GUI applications are Acrobat Reader, ThinkFree, Media Player, Antiviruses, etc.

2. Mobile Applications of Java

A mobile application is an application created for mobile phones and tablets. In today's era, the majority of phones and smart devices have Android OS and Android development is not possible without Java.

Java Micro Edition (Java ME or J2ME) is a popular cross-platform framework that is used to build applications that run across all feature phones and smartphones.Moreover, Java is compatible with AndroidStudio.

Now, you must be thinking why only for Android mobile app development?

The reason is that Java compiler compiles the Java classes into bytecode and this bytecode runs on **Dalvik Virtual Machine (DVM)**, which is a specialized **virtual machine (VM)** for Android.
Examples of mobile applications are Photo and video gallery apps, Simple Calendar, Netflix, Tinder, QRReader, Google Earth, Uber, etc.

3. Enterprise Applications of Java

An enterprise application is a large software system which operates in a corporate environment, to satisfy the needs of an organization, rather than of individual users.

Java becomes the first choice for the development of enterprise applications because of its ***robust features*** that match the requirements for the same. In today's era, most of the enterprise organizations are based on the applications of Java only because it is the most secure, powerful, scalable language.
Oracle Corporation claims that *"about 97% of enterprise applications use Java for development of large-scale software"*. Java EE (Java Enterprise Edition) is an API that is used to provide the tools necessary to develop large-scale, multi-tiered, scalable, reliable, distributed and secured network applications in enterprises.

- Java fulfills the most essential need of these enterprises, which is **security**, as Java runs inside the JVM (Java Virtual Machine), which verifies the bytecode coming from the external systems, which ultimately prevents the security breaches. This is the reason why most of the banking applications are developed on the Java platform.
- Moreover, Java improves the **performance** of these applications, as it comes with strong memory management, which automatically deletes the unused memory.
- Applications of Java can easily be made **scalable** in order to increase the number of users on the enterprise application site.
- Companies like Naukri, Jabong, Google, Myntra, Flipkart, Trivago, ibibo, TripAdvisor, Spotify, Uber, TCS, Infosys, HCL, Wipro, Pinterest, eBay, etc use Java.

Examples of enterprise applications are Business corporations, schools, banks, ERP (Enterprise Resource Planning) and CRM (Customer Resource Management) systems, clubs, charities, governments, interest-based user groups, etc.

4. Scientific Applications of Java

A scientific application is an application that affects real-world activities using mathematics. Java supports the development of scientific applications, because of its powerful features.

- Java becomes the best choice for writing scientific applications involving scientific calculations and mathematical operations. It provides a fast, **secure and highly portable** environment to these applications, which is the basic requirement for these applications.
- It has powerful mathematical calculations which have to give the **same results on different platforms**, this makes the choice for the developers to opt Java for scientific applications.
- **MATLAB (Mathematical Laboratory)** which is one of the most popular scientific applications, uses Java for developing both front-end (interactive user-interface) and back-end (a core part of the system).
- The front-end and back-end of the scientific applications are both based on Java. For the front-end, Java provides struts, JSP (Java Server Pages), servlets. For the back-end, core Java can be used in servlets.

Examples of scientific applications are applications related to research, science, medical science, space, aeronautics, etc.

5. Web-based Applications of Java

A web application is a client-server program that is delivered on the Internet through a browser interface.

- Java supports the **development of web-applications** with the help of servlets, struts, JSP (Java Server Pages) and JSF (Java Server Faces), Spring, Hibernate and web-servers like Apache Tomcat, Apache HTTP web-server, Resin, adobe JRun, etc.
- With the help of these technologies, we can develop any kind of web-based application.
- Servlets and JSPs are the server-side components that help to **develop the business logic** of the web application. JSP is an extension of the Servlet as it has more features as compared to the servlet.
- E-commerce web applications also use Java with the help of open-source eCommerce platforms, such as **Broadleaf**.

- Java provides **easy coding and high security** which enables the development of a large number of applications for health, social security, education, and insurance.

Examples of web-based applications are irctc.co.in, online forms, shopping carts, Gmail, Google Sheets, Google Slides and many more.

6. Embedded Systems

An **embedded system**, also known as an **integrated system**, is a combination of many small computing units that assemble together to perform dedicated functions for the larger systems.
Embedded systems are present everywhere. Don't believe it? Most of us use them without knowing. *For example, a motor system, entertainment and multimedia in a car, E-commerce, wireless communication, mobile computing and networking use an embedded system.*
Embedded systems use Java for development. Originally, Java was designed for the purpose of developing embedded systems.

- Java shows how efficient its platform is, for which there is a need of just 130 KBs to use it on **smart cards or sensors**.
- Java is **fast** which can be important when using low-power/low-speed processors, and its **robustness** which means handles exceptions safely.
- SIM (Subscriber Identity Module) cards in our phones have been running a variant of the JVM (Java Card) for nearly 20 years.
- Other devices like BlueRay Disc players, utility meters and televisions use Java technology. According to Oracle Corporation, "100% of Blu-ray Disc Players and 125 million TV devices use Java".

7. Big Data Technologies

The term big data is defined as "extremely large and complex datasets that may be analyzed to extract patterns, trends, and useful information. It is one of the most popular topics in the world of the latest technology.

Java is the perspective of big data. Today, many developers are switching their careers to Big Data Technology.

- An open-source framework, called ***Hadoop***, associated with big data, is written in Java. Moreover, the Automatic Garbage Collection and strong memory management give it higher priority over the other programming languages.
- Many prominent big data technologies like Apache Hadoop, Apache Spark, Apache Mahout, etc are the **sub-projects of Java**.

- Also, the most powerful programming languages like **Scala (Scalable Language)**, a pure object-oriented language, is based on Java. Scala programs are easily convertible into bytecode; which can run on the **JVM**.
- Hadoop and other big data technologies are also using Java in one way or the other. *For example, Apache's Java-based HBase and Accumulo (open source), and ElasticSearch as well.*

8. Distributed Applications of Java

A distributed application is an application or software that executes or runs on multiple computers within a network.

- Distributed applications or systems have many common requirements that occur especially because of the distributed and dynamic nature of the platforms they operate on. Java offers options to realize these applications.
- **RMI (Remote Procedure Invocation)** and **CORBA (Common Object Request Broker Architecture)** are the APIs to develop distributed applications.
- The **Jini (Java Intelligent Networking Infrastructure)** gives an infrastructure to provide, register, and find distributed services based on its specifications. An essential part of Jini is JavaSpaces, that supports distribution, persistence, and migration of objects in a distributed environment.

9. Cloud-based Applications of Java

Cloud computing means on-demand delivery of IT resources via the Internet, including storage, servers, databases, networking, and software with a pay-as-you-go pricing model.

It provides a solution for IT infrastructure at a low cost, as we can save files on remote databases and retrieve them on demand.

No doubt you're curious how Java programming fits into the cloud computing picture.

- Java has long been the programming language that provides a structure for web applications, and now it has reached **cloud applications**, because of its **distributed** nature.
- Java provides us with features that can help us build applications used in **SaaS** (Software-as-a-service), **IaaS** (Infrastructure-as-a-service) and **PaaS** (Platform-as-a-service) development.

- There are many Java cloud development tools. *For example, Oracle Java cloud service provides a platform to develop and configure the Oracle servers.*
- Java can serve the companies to build their applications remotely or help them share data with others, according to their needs.

10. Web Servers and Application Servers

A web server is a computer program that uses **HTTP (Hypertext Transfer Protocol)** and other protocols, to store, process, and respond to client requests made over **WWW (World Wide Web)**. A web server is a system that runs websites and delivers web pages to users.
An application server (or app server) is a software framework that stores the **business logic** for an application program and handles all operations between the client-end and the back-end of organizations. It is not limited to HTTP but can do a bunch of other stuff.

- Java ecosystem contains multiple Java **web servers** and **application servers**.
- *Java provides web servers including Apache Tomcat, Simple, Jo!, Rimfaxe Web Server (RWS) Apache HTTP server, Resin, Adobe JRun, and Project Jigsaw.*
- *WebLogic, GlassFish, WildFly, WebSphere, and JBoss EAP occupy commercial application server space.*

11. Software Tools

A software tool is a **set of computer programs** that developers use to develop, analyze, maintain, debug, or support other applications and programs. Many developers use Java to write and develop useful software tools.
Examples of software tools are Eclipse, IntelliJ Idea, and NetBeans IDE.

12. Gaming Applications

Java proves to be one of the best platforms for developing 2-Dimensional games. Today almost every person has an Android phone that has Android games in it. Android games cannot be built without Java.

- Java supports **jMonkeyEngine** which is the most powerful open-source 3D-Engine and has the capacity to design 3-Dimensional games.
- **Android games** use Java as a primary language because Java supports the **Dalvik Virtual Machine (DVM)** which is specially designed to run on the Android platform.