# JAVA: A Force to Reckon

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*Abstract*— In this paper, I have done the audit of the Java programming language for the students. I will discuss various aspects of Java and show several opportunity windows that this programming language opens for a student. This paper surveys key features of Java that a student must know and understand before he or she learn this language. In today's time students are misguided about the fact that Java's popularity and usage as a programming language is decreasing as compared to other programming languages but the primary goal of this paper is to provide a clear picture of today's scenario. Applications and 'simplicity in execution' of this programming language is discussed, in the simplest way, in this paper. Conclusions from this study is that Java is a programming language with exceptional opportunities in today's industry and this "Evergreen Language" deserves all the due respect from all corners of industry.

***Keywords:*** Java, Security, Applications, Features, Programming Language

## I. INTRODUCTION

The creator of Java is the Sun Microsystems' chief programmer, James Gosling. In 1991, he and his team started a project to develop software for controlling and programming consumer electronic devices, such as televisions, by using a device, a handheld remote control. Gosling liked the basic syntax and object-oriented features of C++. Therefore, he framed his new language on the same lines as that of C++. The result was a new programming language called Oak,later renamed as Java, which could run on heterogeneous platforms.

Today, there are varied electronic devices available in the market. To work with these electronic devices, different applications are used. These applications are built using C, C++, C#, etc. However, the applications developed by using C and C++ do not support cross-platform portability whereas Java is an object-oriented programming language that helps to develop real-life portable applications. We can create both, CUI-based application and GUI-based application, by using Java. The code reusability feature of Java enables software developers to upgrade the existing applications without rewriting the entire code of application. In this paper, we will further enhance the likability factor which Java possess. Java itself is such a vast language but still it is very easy to understand and execute. It is an open-source and free to use language. It is secure, fast and powerful. It has a huge community support (tens of millions of developers). Because of Java's robustness (Java provides various features, such as memory management and exception handling, which make it a robust programming language), ease of use, cross-platform capabilities and security features, it has become a language of choice for providing worldwide Internet solutions. It is a language which still is asked in interviews of many large technical firms. Many MNCs like Oracle, HCL, Tech Mahindra, IBM, Technosoft, NIIT Technology, Google and many more still hire freshers which are good in Java. Countries like USA, Switzerland, India, Germany, Australia and United Kingdom are some top countries for Java developer. According to PayScale, Java developer with J2EE skills can earn an average salary of $78,346, with a reported salary range of $52,075 to $104,806 per year.

## II. FEATURES THAT MAKE IT UNIQUE

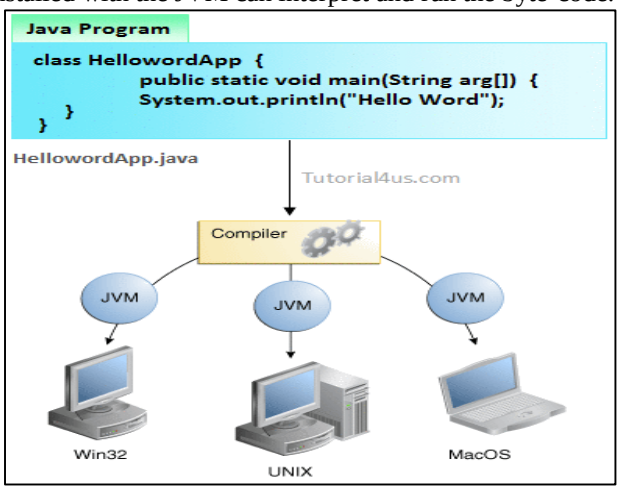
Java is a statically typed general purpose programming language, it is an object-oriented and concurrent language. Java was meant to be WORA (Write Once Run Anywhere) language, it was designed to run on any platform and with as few dependencies as possible, with the help of the Java Virtual Machine (JVM).

### *A. Doesn't Support Pointers!*

One of the major problem areas in most of object-oriented languages is to handle memory allocation. Programmers need to handle memory in the program explicitly for optimum utilization. To handle memory allocation, they use pointers that enable a program to refer to a memory location of the computer. However, Java doesn't support pointers and consist of the built-in functionality to manage memory. In Java, memory allocation and deallocation happens automatically.

### *B. Platform Independent*

In Java, when we compile an error free code, the compiler converts the program to a platform independent code, known as the 'byte-code'. Thereafter, the JVM interprets this byte-code into the machine code that can be run on that machine. Converting a Java program into byte-code makes a Java program platform independent because any computer installed with the JVM can interpret and run the byte-code.




### *C. It's Dynamic!*

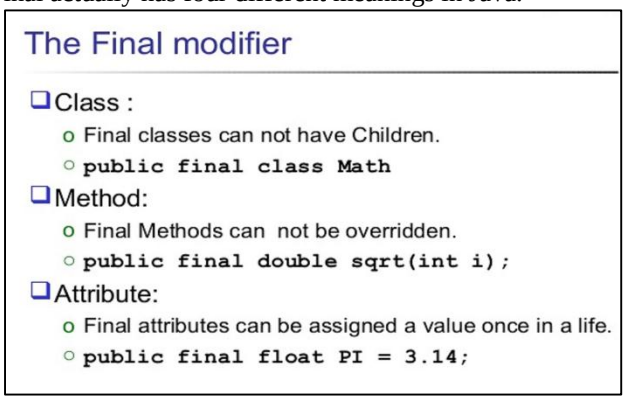
One of the most interesting Java unknown facts is just how dynamic it is. This can be divided into two categories: Java instrumentations and Java reflections. The first category enables you to modify already compiled classes which will come in handy if you decide to change the code at run time. Open-source libraries such as AspectJ, ASM, and many others allow for Java instrumentations. Reflection enables

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you to visit the private variable of a class. All of this is very helpful when programming software.

*D. Final is not final in Java*

Final actually has four different meanings in Java.




*E. Learning Curve*

There is an extremely short learning curve with Java as it is easy to write, compile, debug, than other major programming languages. That's a huge benefit, because this ensures that Java programmers become productive in an extremely short span of time.

## III. Applications

Java programming language opens up a wide variety of options for one who masters it. The language has become the backbone of millions of applications across multiple platforms including Windows, Macintosh and UNIX-based desktops, Android-based mobiles, embedded systems and enterprise solutions. According to Oracle (that acquired Sun Microsystems in 2010), Java now runs on more than 3 billion devices.

*A. Android Apps Development*

You will be surprised to note that a lot of the apps you use on your Android phone are written in Java programming language. That tells you a lot about the potential that still waits to be realized. Most popular apps in Google PlayStore are Whatsapp, Facebook, Linkedin, FlipKart. In your Android phone open any app, they are actually written in Java programming language, with Google's Android API, which is similar to JDK. Java is mostly used to write server side application, mostly without any front end, which receives data form one server (upstream), process it and sends it other process (downstream). The apps developed are Android-oss, Word-Press, Plaid, etc.

*B. Web Application Development*

Another industry where Java finds its heavy use and application is the writing of web apps and E-Commerce apps / websites. With the advancement of E-Commerce, the scope has only broaden. Java provides support for web applications through Servlets, Struts or JSPs. The easy programming and higher security offered by the programming language has allowed a large number of government applications for health, social security, education and insurance to be based on Java. E.g. SAP, NetSuite, Alfresco, Liferay, Youtube, Google, Netflix, Mifox (Banking solution) etc.

*C. Big Data*

Companies are now juggling with large amounts of data. Big Data Management tools like Hadoop make use of Java in several ways. E.g. Apache Spark, Elastic Search (ELK), Cassandra, HBASE etc.

*D. Scientific Application*

Java is the choice of many software developers for writing applications involving scientific calculations and mathematical operations. These programs are generally considered to be fast and secure, have a higher degree of portability and low maintenance. Applications like MATLAB use Java both for interacting user interface and as part of the core system

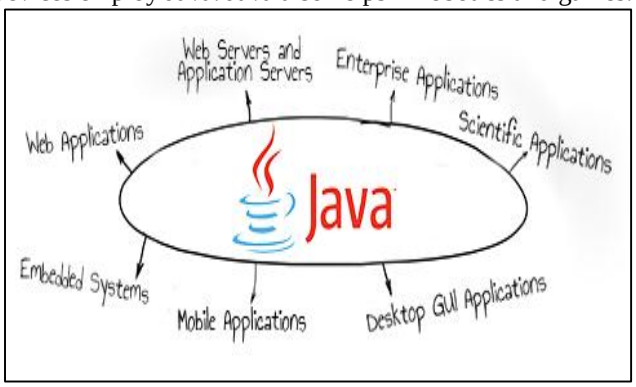
*E. Desktop GUI Applications*

An interface is the layer between a user and an application. It helps the user to interact with the application. The application can contain the Graphical User Interface (GUI) that consists of images, texts, graphs and graphics.

To create the windows-based applications, you need to understand the features of GUI for creating an interactive and effective interface. For this, Java provides the Swing toolkit and Abstract Window Toolkit (AWT). The Swing toolkit and AWT contain the various classes and interfaces to create the GUI-based applications. The user's actions are represented through events in the Java programming language. To handle these events, Java also provides a mechanism known as event model.

*F. Embedded System*

Embedded systems, ranging from tiny chips to specialized computers, are components of larger electromechanical systems performing dedicated tasks. Several devices, such as SIM cards, blue-ray disk players, utility meters and televisions, use embedded Java technologies. According to Oracle, 100% of Blu-ray Disc Players and 125 million TV devices employ Java. Java also helps in robotics and games.




## IV. Reasons to Learn Java

The advantages of Java over other programming languages are numerous. First of all, programming in the Java programming language is one of the highest degree of programming. Large numbers of open-source development tools that use Java have made Java an even more powerful option for developers i.e. Eclipse and Netbeans. They are extremely strong platforms and have contributed effectively in making Java what is today.

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### A. Popularity

We all know that Java is extremely popular, but can we quantify it? First of all, there are more than 9 million Java developers in the world, and it gets downloaded more than a billion times each year. This part of paper also include comparitive analysis with other programming languages. The research was conducted using the Tiobe portal which ranks programming languages based on share in the programming of commercial web applications.

| Position Jan 2011 | Position Jan 2010 | Delta in Position | Programming Language | Ratings Jan 2011 | Delta Jan 2010 | Status |
|---|---|---|---|---|---|---|
| 1 | 1 | = | Java | 17.773% | +0.29% | A |
| 2 | 2 | = | C | 15.822% | -0.39% | A |
| 3 | 4 | ↑ | C++ | 8.783% | -0.93% | A |
| 4 | 3 | ↓ | PHP | 7.835% | -2.24% | A |
| 5 | 7 | ↑↑ | Python | 6.265% | +1.81% | A |
| 6 | 6 | = | C# | 6.226% | +0.46% | A |
| 7 | 5 | ↓↓ | (Visual) Basic | 5.867% | -1.49% | A |
| 8 | 12 | ↑↑↑↑ | Objective-C | 3.011% | +1.63% | A |
| 9 | 8 | ↓ | Perl | 2.857% | -0.71% | A |
| 10 | 10 | = | Ruby | 1.784% | -0.69% | A |
| 11 | 9 | ↓↓ | JavaScript | 1.589% | -1.12% | A |
| 12 | 11 | ↓ | Delphi | 1.287% | -1.10% | A |
| 13 | 18 | ↑↑↑↑↑ | Lisp | 1.109% | +0.53% | A |
| 14 | 17 | ↑↑↑ | Pascal | 0.919% | +0.29% | A |
| 15 | - | ↑↑↑↑↑↑↑↑↑ | Assembly | 0.864% | +0.86% | A- |
| 16 | 14 | ↓↓ | SAS | 0.771% | -0.04% | A- |
| 17 | 30 | ↑↑↑↑↑↑↑↑↑ | Transact-SQL | 0.758% | +0.38% | A |
| 18 | 33 | ↑↑↑↑↑↑↑↑↑ | RPG (OS/400) | 0.717% | +0.40% | A- |
| 19 | 20 | ↑ | MATLAB | 0.706% | +0.17% | A- |
| 20 | 28 | ↑↑↑↑↑↑↑ | Ada | 0.679% | +0.29% | B |

| Apr 2019 | Apr 2018 | Change | Programming Language | Ratings |
|---|---|---|---|---|
| 1 | 1 | | Java | 15.035% |
| 2 | 2 | | C | 14.076% |
| 3 | 3 | | C++ | 8.838% |
| 4 | 4 | | Python | 8.166% |
| 5 | 6 | ^ | Visual Basic .NET | 5.795% |
| 6 | 5 | v | C# | 3.515% |
| 7 | 8 | ^ | JavaScript | 2.507% |
| 8 | 9 | ^ | SQL | 2.272% |
| 9 | 7 | v | PHP | 2.239% |
| 10 | 14 | ^^ | Assembly language | 1.710% |

As we can see, both the images are covering a decade approximately.

Java is the clear winner over other programming languages in both the images.

### B. Job Opportunities

Now that the language is popular, more companies are making use of this programming language. That in turn means that some of the top companies are always looking to hire Java programmers be it in-house or offshore or onshore. More than 64,000 companies are using Java in the US. Coming specifically to the big companies, Airbnb is using Java, Uber is based on Java, LinkedIn is a Microsoft product now yet it is sporting Java. eBay is based on Java, Pinterest, Groupon, Spotify, Pandora, Square are based on Java mostly. In fact, according to one of the most popular job search sites out there, indeed.com, Java is the top language for new job postings. In fact, there were more than 60,000 vacancies for Java developers last year.

Java is the most demanded language with 15-20% share in the market. As a result, the odds of getting a Job are higher.

### C. Diversification

Java is a very easy language as compared to other languages. As mentioned earlier that the learning curve with Java is short. Hence, you become more productive sooner. Once you learn Java, you can diversify into the programming world by learning new languages. Learning Java properly will also help one to easily understand and learn other programming languages. We can even say that Java forms base for many programming languages.

## V. Conclusion

There are tons of programming languages existing in the real world but still Java, as a programming language, emerged as a most prominent demanding programming language.

With the escalation in Android users in the market, solid progress of its developers base, and the basic fundamental features of Java makes it worthy to learn. The most advantageous point of Java is that it is simple, readable language used by almost scores of developers and devices in the world. Java is so much accepted that all the native Android Apps are built with Java and almost all the fortune 500 companies exploit Java as a server side language for backend development.

This paper also presented an aspect which shows why Java is considered to be as the future of software development. Java is also an extremely successful language even in the internet world when it comes to developing web applications. Programmers worldwide prefer Java to design highly interactive web applications. Simply put, this is one language that has a perfect balance between the software, mobile and web world.

In conclusion, Java is turning out to be the language of choice. As a new programmer, it is just the right stepping stone for you. Not only it is easy to learn, it opens up job opportunities for you too. Most clients love to have their software tools and apps written in Java, and you could be the skilled developer that this industry needs. Java was, is and always will be the number one language and is rightly titled as the "Evergreen Language" of all times.

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