# Java Tutorial

1. [Java - What, Where and Why?](http://www.javatpoint.com/java-tutorial)
2. [What is Java](http://www.javatpoint.com/java-tutorial)
3. [Where Java is used](http://www.javatpoint.com/java-tutorial)
4. [Java Applications](http://www.javatpoint.com/java-tutorial)

Java technology is widely used currently. Let's start learning of java from basic questions like what is java, where it is used, what type of applications are created in java and why use java?

## What is Java?

Java is a **programming language** and a **platform**.

**Platform** Any hardware or software environment in which a program runs, known as a platform. Since Java has its own Runtime Environment (JRE) and API, it is called platform.

## Where it is used?

According to Sun, 3 billion devices run java. There are many devices where java is currently used. Some of them are as follows:

1. Desktop Applications such as acrobat reader, media player, antivirus etc.
2. Web Applications such as irctc.co.in, javatpoint.com etc.
3. Enterprise Applications such as banking applications.
4. Mobile
5. Embedded System
6. Smart Card
7. Robotics
8. Games etc.

Types of Java Applications

There are mainly 4 type of applications that can be created using java:

**1) Standalone Application**

It is also known as desktop application or window-based application. An application that we need to install on every machine such as media player, antivirus etc. AWT and Swing are used in java for creating standalone applications.

**2) Web Application**

An application that runs on the server side and creates dynamic page, is called web application. Currently, servlet, jsp, struts, jsf etc. technologies are used for creating web applications in java.

**3) Enterprise Application**

An application that is distributed in nature, such as banking applications etc. It has the advantage of high level security, load balancing and clustering. In java, EJB is used for creating enterprise applications.

**4) Mobile Application**

An application that is created for mobile devices. Currently Android and Java ME are used for creating mobile applications.

### Java Version History

There are many java versions that has been released.

1. JDK Alpha and Beta (1995)
2. JDK 1.0 (23rd Jan, 1996)
3. JDK 1.1 (19th Feb, 1997)
4. J2SE 1.2 (8th Dec, 1998)
5. J2SE 1.3 (8th May, 2000)
6. J2SE 1.4 (6th Feb, 2002)
7. J2SE 5.0 (30th Sep, 2004)
8. Java SE 6 (11th Dec, 2006)
9. Java SE 7 (28th July, 2011)

# Features of Java

1. [Features of Java](http://www.javatpoint.com/features-of-java#features)
   1. [Simple](http://www.javatpoint.com/features-of-java#featuressimple)
   2. [Object-Oriented](http://www.javatpoint.com/features-of-java#featuresobject)
   3. [Platform Independent](http://www.javatpoint.com/features-of-java#featuresplateform)
   4. [secured](http://www.javatpoint.com/features-of-java#featuressecured)
   5. [Robust](http://www.javatpoint.com/features-of-java#featuresrobust)
   6. [Architecture Neutral](http://www.javatpoint.com/features-of-java#featuresarchitecture)
   7. [Portable](http://www.javatpoint.com/features-of-java#featuresportable)
   8. [High Performance](http://www.javatpoint.com/features-of-java#featureshigh)
   9. [Distributed](http://www.javatpoint.com/features-of-java#featuresdistributed)
   10. [Multi-threaded](http://www.javatpoint.com/features-of-java#featuresmulti)

There is given many features of java. They are also known as java buzzwords.

1. Simple
2. Object-Oriented
3. Platform independent
4. Secured
5. Robust
6. Architecture neutral
7. Portable
8. Dynamic
9. Interpreted
10. High Performance
11. Multithreaded
12. Distributed

### Simple

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| According to Sun, Java language is simple because: |
| syntax is based on C++ (so easier for programmers to learn it after C++). |
| Removed many confusing and/or rarely-used features e.g., explicit pointers, operator overloading etc. |
| No need to remove unreferenced objects because there is Automatic Garbage Collection in java. |

### Object-oriented

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| Object-oriented means we organize our software as a combination of different types of objects that incorporates both data and behaviour. |
| Object-oriented programming(OOPs) is a methodology that simplify software development and maintenance by providing some rules. |
| Basic concepts of OOPs are: |
| 1. Object 2. Class 3. Inheritance 4. Polymorphism 5. Abstraction 6. Encapsulation |

### Platform Independent

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| A platform is the hardware or software environment in which a program runs. There are two types of platforms software-based and hardware-based. Java provides software-based platform. The Java platform differs from most other platforms in the sense that it's a software-based platform that runs on top of other hardware-based platforms. It has two components:   1. Runtime Environment 2. API(Application Programming Interface) |

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| java is platform independent  Java code can be run on multiple platforms e.g. 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). |

### Secured

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| Java is secured because: |
| * No explicit pointer * Programs run inside virtual machine sandbox. |

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| how java is secured | how java is secured |

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| * **Classloader-** adds security by separating the package for the classes of the local file system from those that are imported from network sources. * **Bytecode Verifier-** checks the code fragments for illegal code that can violate access right to objects. * **Security Manager-** determines what resources a class can access such as reading and writing to the local disk. |
| These security are provided by java language. Some security can also be provided by application developer through SSL,JAAS,cryptography etc. |

### Robust

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| Robust simply means strong. Java uses strong memory management. There are lack of pointers that avoids security problem. There is automatic garbage collection in java. There is exception handling and type checking mechanism in java. All these points make java robust. |

### Architecture-neutral

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| There is no implementation dependent feature e.g. size of primitive types is set. |

### Portable

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| We may carry the java bytecode to any platform. |

### High-performance

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| Java is faster than traditional interpretation since byte code is "close" to native code still somewhat slower than a compiled language (e.g., C++) |

### Distributed

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| We can create distributed applications in java. RMI and EJB are used for creating distributed applications. We may access files by calling the methods from any machine on the internet. |

### Multi-threaded

A thread is like a separate program, executing concurrently. We can write Java programs that deal with many tasks at once by defining multiple threads. The main advantage of multi-threading is that it shares the same memory. Threads are important for multi-media, Web applications etc.

### Creating hello java example

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| Let's create the hello java program: |

1. **class** Simple{
2. **public** **static** **void** main(String args[]){
3. System.out.println("Hello Java");
4. }
5. }

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| save this file as Simple.java |

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| **To compile:** | javac Simple.java |
| **To execute:** | java Simple |

**Output:**Hello Java

### Understanding first java program

Let's see what is the meaning of class, public, static, void, main, String[], System.out.println().

* **class** keyword is used to declare a class in java.
* **public** keyword is an access modifier which represents visibility, it means it is visible to all.
* ***static****is a keyword, if we declare any method as static, it is known as static method. The core advantage of static method is that there is no need to create object to invoke the static method. The main method is executed by the JVM, so it doesn't require to create object to invoke the main method. So it saves memory.*
* **void** is the return type of the method, it means it doesn't return any value.
* **main** represents startup of the program.
* **String[] args** is used for command line argument. We will learn it later.
* **System.out.println()** is used print statement. We will learn about the internal working of System.out.println statement later.

How many ways, we can write a java program?

**There are many ways to write a java program. The modifications that can be done in a java program are given below:**

**1)By changing sequence of the modifiers, method prototype is not changed.**

**Let's see the simple code of main method.**

1. **static** **public** **void** main(String args[])

**2)subscript notation in java array can be used after type, before variable or after variable.**

Let's see the different codes to write the main method.

1. **public** **static** **void** main(String[] args)
2. **public** **static** **void** main(String []args)
3. **public** **static** **void** main(String args[])

**3)You can provide var-args support to main method by passing 3 ellipses (dots)**

Let's see the simple code of using var-args in main method. We will learn about var-args later in Java New Features chapter.

1. **public** **static** **void** main(String... args)

**4)Having semicolon at the end of class in java is optional.**

Let's see the simple code.

1. **class** A{
2. **static** **public** **void** main(String... args){
3. System.out.println("hello java4");
4. }
5. };