Android operating system is a stack of software components which is roughly divided into five sections and four main layers.

Linux kernel

At the bottom of the layers is Linux - Linux 3.6 with approximately 115 patches. This provides a level of abstraction between the device hardware and it contains all the essential hardware drivers like camera, keypad, display etc.

Libraries

On top of Linux kernel there is a set of libraries including open-source Web browser engine WebKit, well known library libc, SQLite database which is a useful repository for storage and sharing of application data, libraries to play and record audio and video, SSL libraries responsible for Internet security etc.

Android Libraries

Java-based libraries that are specific to Android development. A summary of some key core Android libraries available to the Android developer is as follows −

* **android.app** − Provides access to the application model and is the cornerstone of all Android applications.
* **android.content** − Facilitates content access, publishing and messaging between applications and application components.
* **android.database** − Used to access data published by content providers and includes SQLite database management classes.
* **android.opengl** − A Java interface to the OpenGL ES 3D graphics rendering API.
* **android.os** − Provides applications with access to standard operating system services including messages, system services and inter-process communication.
* **android.text** − Used to render and manipulate text on a device display.
* **android.view** − The fundamental building blocks of application user interfaces.
* **android.widget** − A rich collection of pre-built user interface components such as buttons, labels, list views, layout managers, radio buttons etc.
* **android.webkit** − A set of classes intended to allow web-browsing capabilities to be built into applications.

Having covered the Java-based core libraries in the Android runtime, it is now time to turn our attention to the C/C++ based libraries contained in this layer of the Android software stack.

Android Runtime

This is the third section of the architecture and available on the second layer from the bottom. This section provides a key component called **Dalvik Virtual Machine** which is a kind of Java Virtual Machine specially designed and optimized for Android.

The Dalvik VM makes use of Linux core features like memory management and multi-threading, which is intrinsic in the Java language.

Application Framework

The Application Framework layer provides many higher-level services to applications in the form of Java classes. Application developers are allowed to make use of these services in their applications.

The Android framework includes the following key services −

* **Activity Manager** − Controls all aspects of the application lifecycle and activity stack.
* **Content Providers** − Allows applications to publish and share data with other applications.
* **Resource Manager** − Provides access to non-code embedded resources such as strings, color settings and user interface layouts.
* **Notifications Manager** − Allows applications to display alerts and notifications to the user.
* **View System** − An extensible set of views used to create application user interfaces.

Applications

You will find all the Android application at the top layer. You will write your application to be installed on this layer only. Examples of such applications are Contacts Books, Browser, Games etc.

**THE BASIC OOP CONCEPTS**

If you are new to object-oriented programming languages, you will need to know a few basics before you can get started with code. The following Webopedia definitions will help you better understand object-oriented programming:

* [**Abstraction**](https://www.webopedia.com/definitions/abstraction/)**:** The process of picking out (abstracting) common features of objects and procedures.
* [**Class**](https://www.webopedia.com/definitions/class/)**:** A category of objects. The class defines all the common properties of the different objects that belong to it.
* [**Encapsulation**](https://www.webopedia.com/definitions/encapsulation/)**:** The process of combining elements to create a new entity. A procedure is a type of encapsulation because it combines a series of computer instructions.
* [**Information hiding**](https://www.webopedia.com/definitions/information-hiding/)**:** The process of hiding details of an object or function. Information hiding is a powerful programming technique because it reduces complexity.
* [**Inheritance**](https://www.webopedia.com/definitions/inheritance/)**:** a feature that represents the “is a” relationship between different classes.
* [**Interface**](https://www.webopedia.com/definitions/interface/)**:** the languages and codes that the applications use to communicate with each other and with the hardware.
* [**Messaging**](https://www.webopedia.com/definitions/message-passing/)**:** Message passing is a form of communication used in parallel programming and object-oriented programming.
* [**Object**](https://www.webopedia.com/definitions/object/)**:** a self-contained entity that consists of both data and procedures to manipulate the data.
* [**Polymorphism**](https://www.webopedia.com/definitions/polymorphism/)**:** A programming language’s ability to process objects differently depending on their data type or class.
* [**Procedure**](https://www.webopedia.com/definitions/routine/)**:** a section of a program that performs a specific task.

# JVM (Java Virtual Machine) Architecture

1. [Java Virtual Machine](https://www.javatpoint.com/jvm-java-virtual-machine)
2. [Internal Architecture of JVM](https://www.javatpoint.com/jvm-java-virtual-machine#jvminternalarch)

JVM (Java Virtual Machine) is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed.

JVMs are available for many hardware and software platforms (i.e. JVM is platform dependent).

### What is JVM

It is:

1. **A specification** where working of Java Virtual Machine is specified. But implementation provider is independent to choose the algorithm. Its implementation has been provided by Oracle and other companies.
2. **An implementation** Its implementation is known as JRE (Java Runtime Environment).
3. **Runtime Instance** Whenever you write java command on the command prompt to run the java class, an instance of JVM is created.