



## Understanding the Android Software Stack

The Android software stack is composed of the elements shown in Figure 1-1 and described in further detail below it. Put simply, a Linux kernel and a collection of C/C++ libraries are exposed through an application framework that provides services for, and management of, the run time and applications.

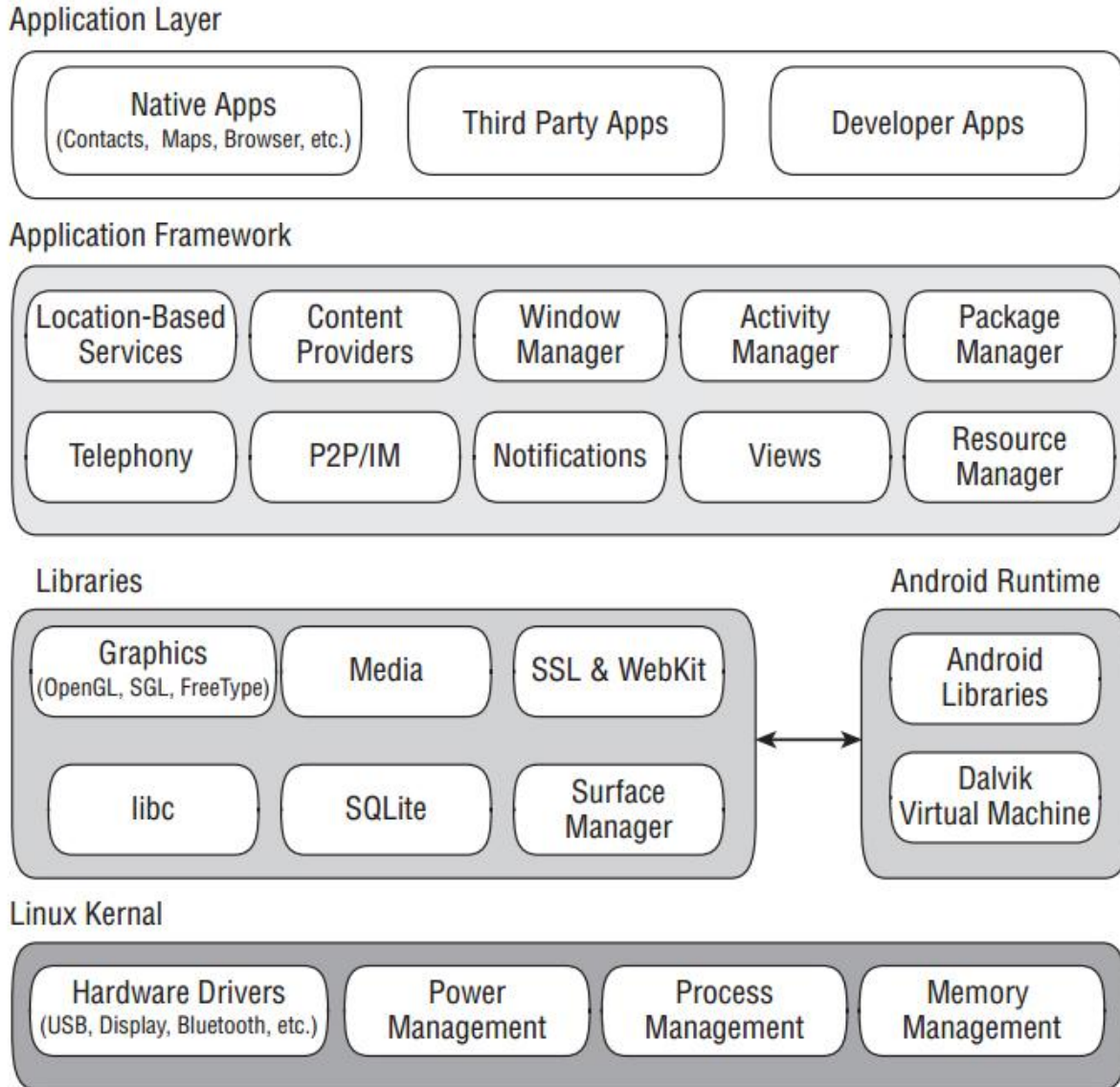


Figure 1-1

- ❑ **Linux Kernel** Core services (including hardware drivers, process and memory management, security, network, and power management) are handled by a Linux 2.6 kernel. The kernel also provides an abstraction layer between the hardware and the remainder of the stack.
- ❑ **Libraries** Running on top of the kernel, Android includes various C/C++ core libraries such as libc and SSL, as well as:
  - ❑ A media library for playback of audio and video media
  - ❑ A Surface manager to provide display management
  - ❑ Graphics libraries that include SGL and OpenGL for 2D and 3D graphics



- ❑ SQLite for native database support
- ❑ SSL and WebKit for integrated web browser and Internet security

❑ **Android Run Time** What makes an Android phone an Android phone rather than a mobile Linux implementation is the Android run time. Including the core libraries and the Dalvik virtual machine, the Android run time is the engine that powers your applications and, along with the libraries, forms the basis for the application framework.

❑ **Core Libraries** While Android development is done in Java, Dalvik is not a Java VM. The core Android libraries provide most of the functionality available in the core Java libraries as well as the Android-specific libraries.

❑ **Dalvik Virtual Machine** Dalvik is a register-based virtual machine that's been optimized to ensure that a device can run multiple instances efficiently. It relies on the Linux kernel for threading and low-level memory management.

❑ **Application Framework** The application framework provides the classes used to create Android applications. It also provides a generic abstraction for hardware access and manages the user interface and application resources.

❑ **Application Layer** All applications, both native and third party, are built on the application layer using the same API libraries. The application layer runs within the Android run time using the classes and services made available from the application framework.