

# Summary of Android System

# OUTLINE

- Android license
- Android architecture
- Application
- Wireless connection
- Application development

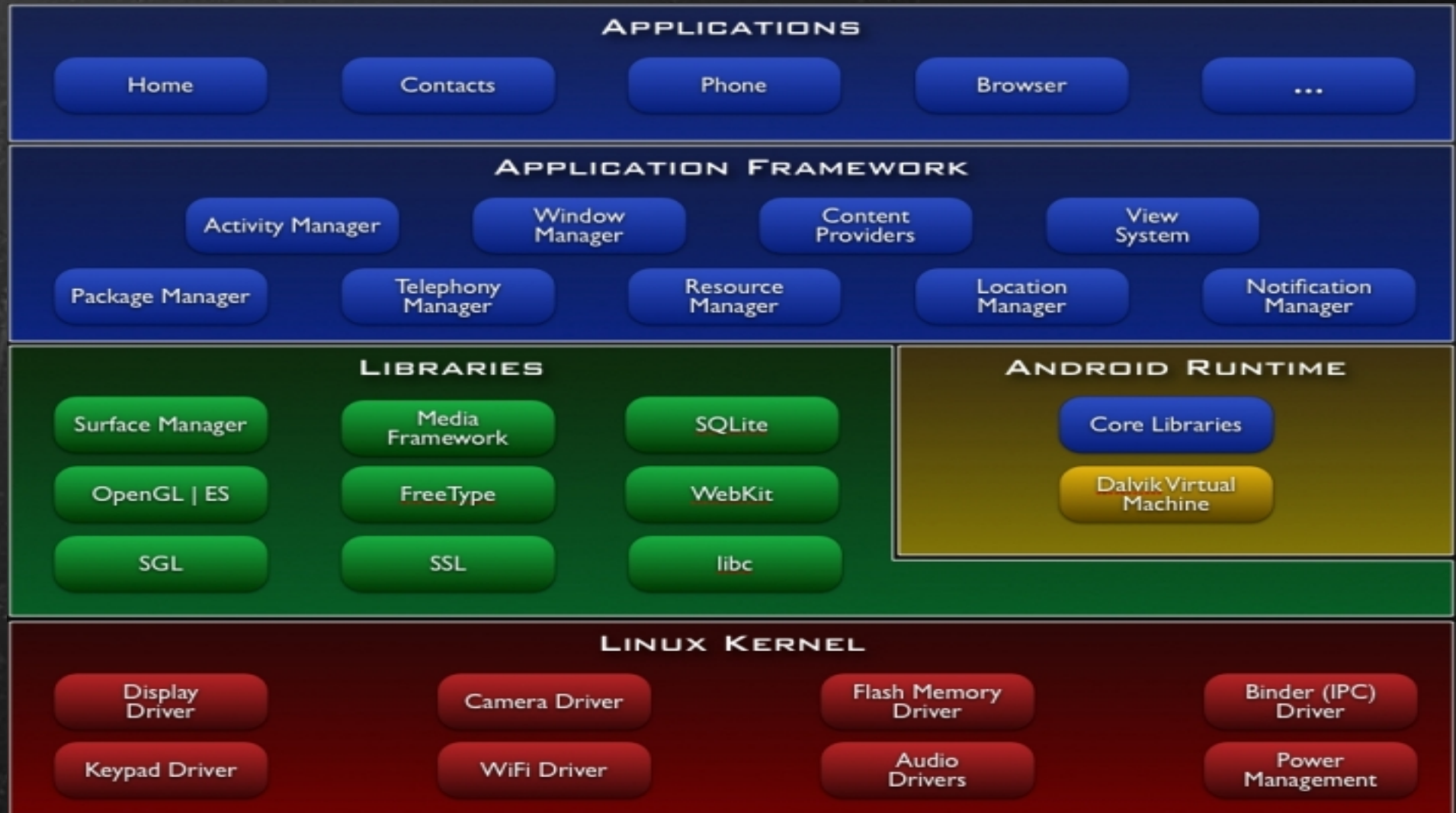
# Android license

- open source
  - the entire source code including network and telephony stacks available
- under an Apache License

# Android license

- Apache license
  - in every licensed file, any original copyright, patent, trademark, and attribution notices in redistributed code must be preserved
  - in every licensed file changed, a notification must be added stating that changes have been made to that file

# Architecture





# Linux Kernel

- Android relies on Linux version 2.6 for core system services
- security, memory management, process management, network stack, and driver model

# Libraries

- **System C library**
  - a BSD-derived implementation of the standard C system library
- **Media Libraries**
  - based on PacketVideo's OpenCORE
  - support playback and recording of many popular audio and video formats
- **Surface Manager**
  - manages access to the display subsystem
  - seamlessly composites 2D and 3D graphic layers from multiple applications

# Library (cont)

- **LibWebCore**
  - a modern web browser engine
- **SGL**
  - the underlying 2D graphics engine
- **FreeType**
  - bitmap and vector font rendering
- **SQLite**
  - a powerful and lightweight relational database engine



# Android Runtime

- core libraries
  - provides most of the functionality available in the core libraries of the Java programming language
- Dalvik virtual machine
  - Every process runs on its own Dalvik virtual machine

# Application Framework

- Developers have full access to the same framework APIs used by the core application
- View
  - build lists, grids, text boxes, buttons, embeddable web browser
- Content Providers
  - enable applications to access data from other applications

# Application Framework (cont)

- Resource Manager
  - providing access to non-code resources such as localized strings, graphics, and layout files
- Notification Manager
  - enables all applications to display custom alerts
- Activity Manager
  - manages the lifecycle of applications
  - provides a common navigation back stack

# Application

- email client, SMS program, calendar, maps, browser, contacts...
- characters
  - written using the Java programming language
  - every application runs in its own Linux process
  - each application is assigned a unique Linux user ID
  - one application can make use of elements of other applications

# Application Components

- Activities
  - present a visual user interface for one focused endeavor the user can undertake
- Services
  - do not have a visual user interface
  - run in the background
- Broadcast receivers
  - receive and react to broadcast announcements
- Content providers
  - make a specific set of the application's data available to other applications



# Application Components (cont)

- Activating components: intents
  - active activities, services, and broadcast receivers when they're targeted by a request from a `ContentResolver`
- Shutting down components
  - shut down activities

# Wireless connection

- Bluetooth
  - Package: `android.bluetooth`
  - Provide classes that manage Bluetooth functionality
    - Scan for other Bluetooth device
    - Query the local Bluetooth adapter for paired Bluetooth devices
    - Establish RFCOMM channels/sockets
    - Connect to specified sockets on other devices
    - Transfer data to and from other devices

# Wireless connection (cont)

- Bluetooth
  - classes needed to create Bluetooth connections
    - BluetoothAdapter
    - BluetoothDevice
    - BluetoothSocket
    - BluetoothServerSocket
    - BluetoothClass
  - Bluetooth permissions needed to be declared
    - BLUETOOTH
    - BLUETOOTH\_ADMIN.

# Wireless connection (cont)

- Wi-Fi
  - Package: `android.net.wifi`
  - applications communicate with the lower-level wireless stack that provides Wi-Fi network access through Wi-Fi APIs
  - almost all information from the device supplicant is available

# Wireless connection (cont)

- Wi-Fi
  - Classes
    - ScanResult
    - WifiConfiguration
    - WifiConfiguration.AuthAlgorithm
    - WifiConfiguration.Status
    - WifiManager
    - WifiInfo
    - ...

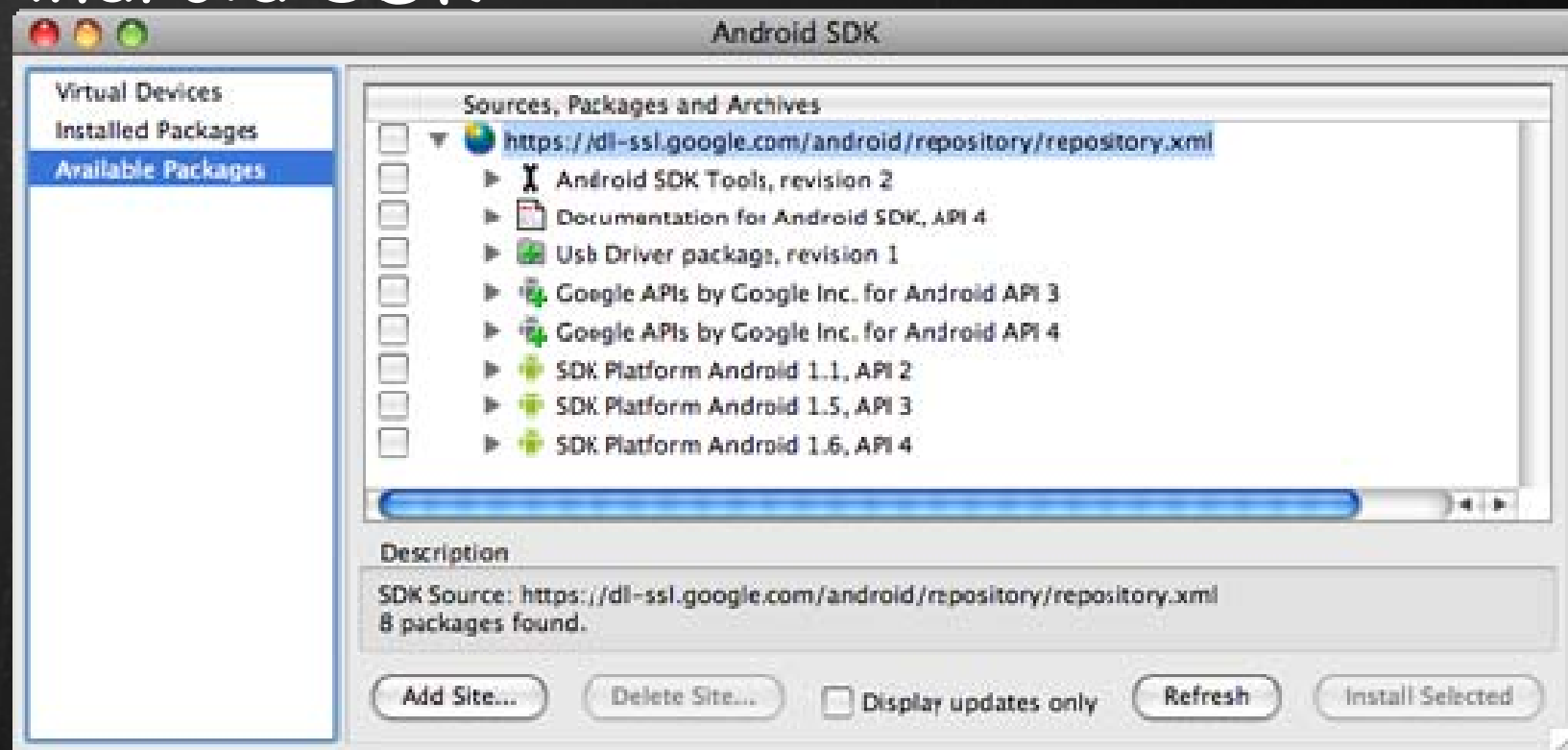


# Application development

- Android SDK
  - provides the tools and APIs necessary to begin developing applications on the Android platform
  - debugger
  - libraries
  - handset emulator (based on QEMU),
  - documentation, sample code, and tutorials

# Application development (cont)

- Android SDK



A sample picture of SDK components