Overview of Android (Part 2): Middleware Infrastructure Layers

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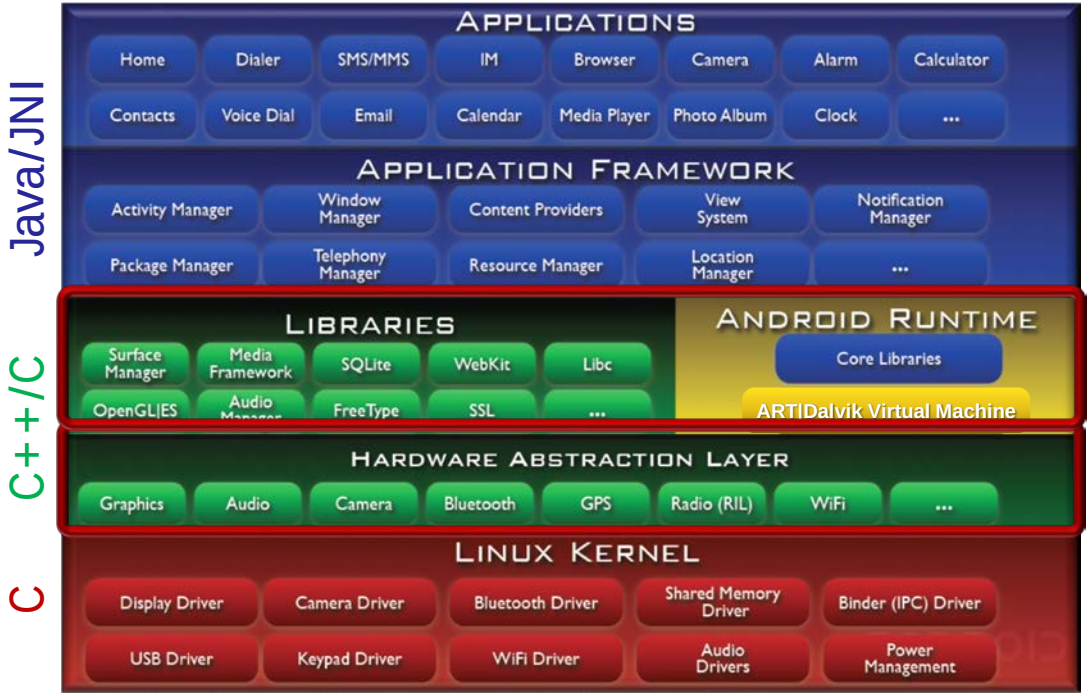
Learning Objectives in this Part of the Lesson

1. Understand key elements in Android's middleware infrastructure
   - e.g., hardware abstraction layer, Android runtime, & native libraries

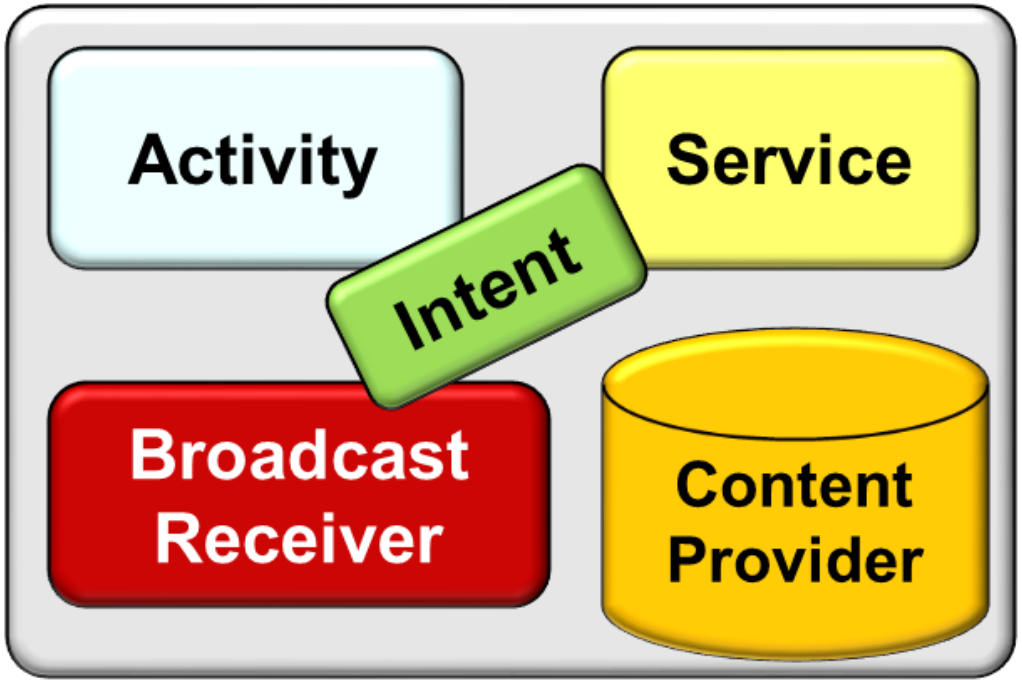


Hardware components

Middleware infrastructure resides atop the OS & below the apps et al

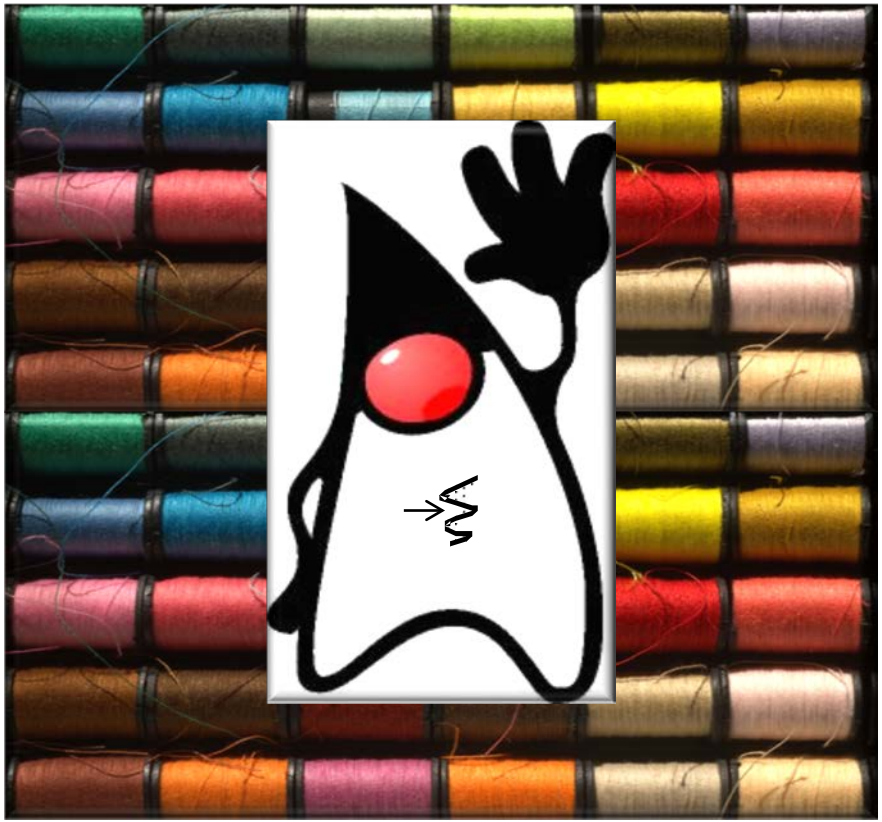
Learning Objectives in this Part of the Lesson

1. Understand key elements in Android's middleware infrastructure
2. Name all the key app components in Android



Learning Objectives in this Part of the Lesson

1. Understand key elements in Android's middleware infrastructure
2. Name all the key app components in Android
3. Know what Java threads are in the context of Android



Overview of Android's Middleware Infrastructure

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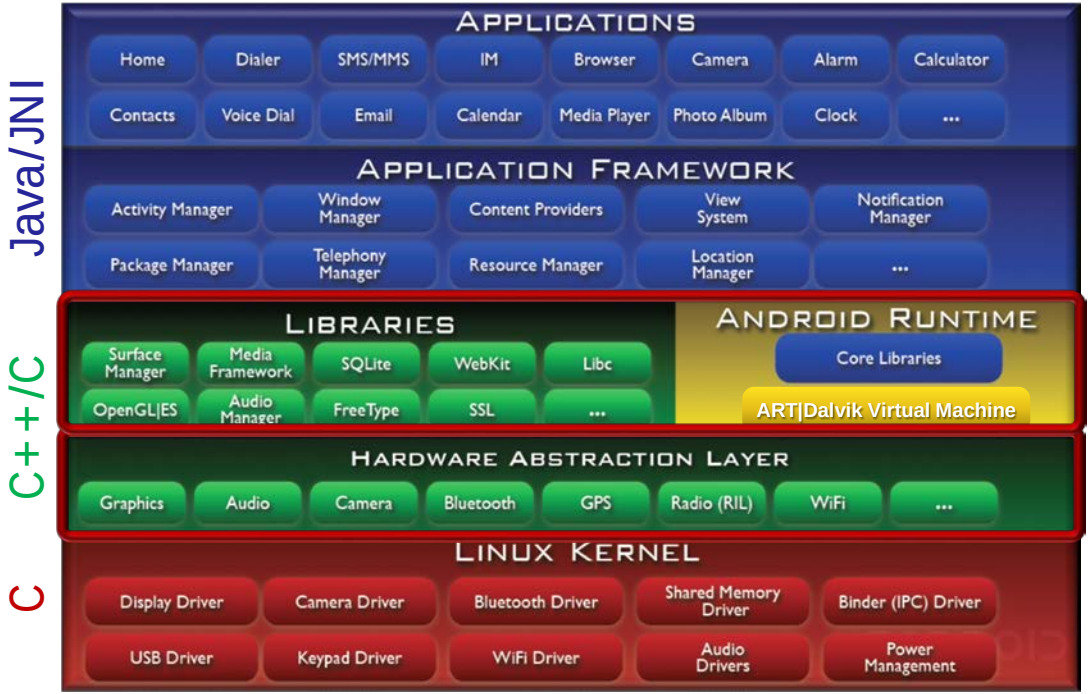
- Android's *middleware infrastructure* provides reusable capabilities that extend hardware-centric OS kernel & protocol mechanisms



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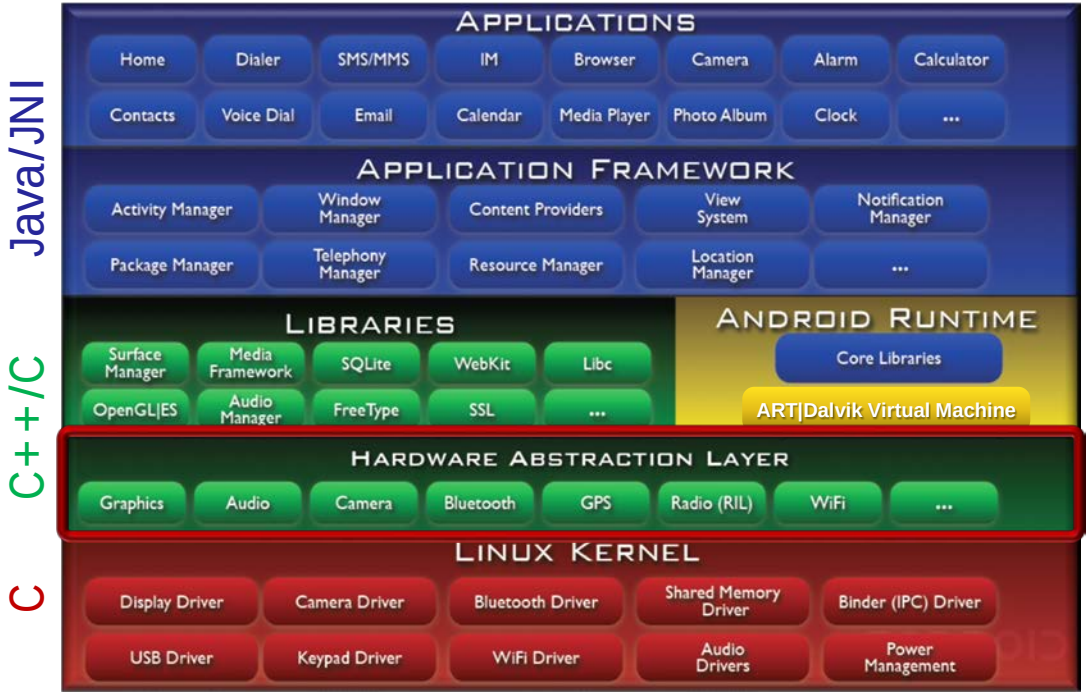
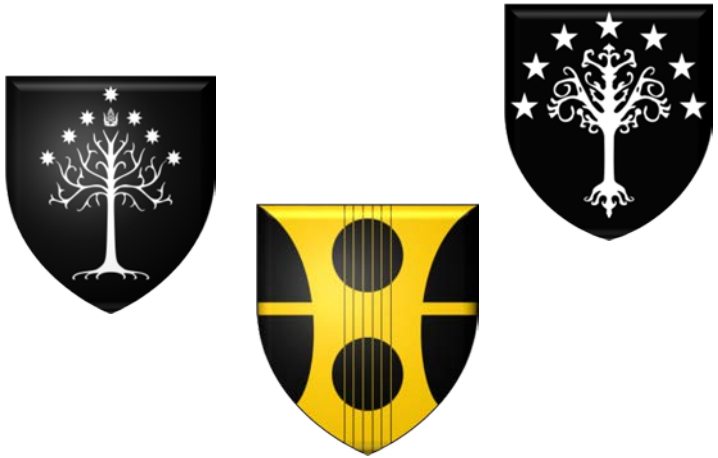
- Android's *middleware infrastructure* provides reusable capabilities that extend hardware-centric OS kernel & protocol mechanisms
  - Hardware abstraction layer

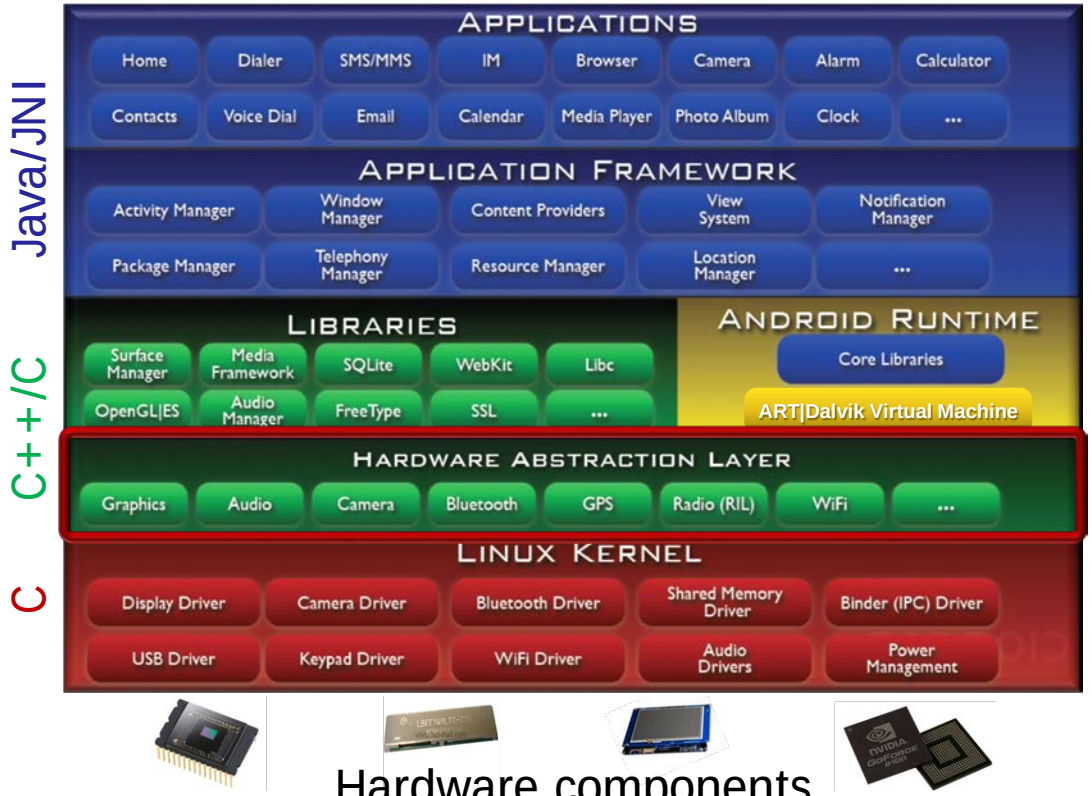


See source.android.com/devices/#Hardware Abstraction Layer

Overview of Android's Middleware Infrastructure

- Android's *middleware infrastructure* provides reusable capabilities that extend hardware-centric OS kernel & protocol mechanisms
  - Hardware abstraction layer
    - Shields Android stack from low-level hardware details





Hardware components

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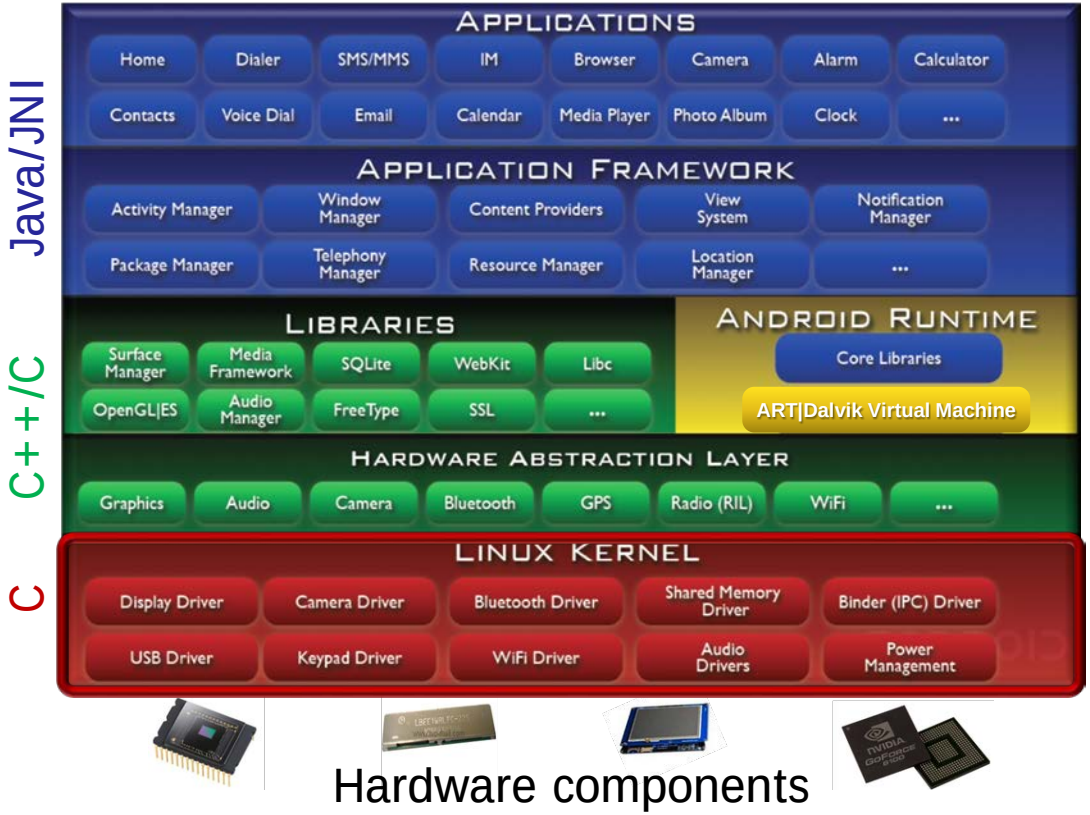
- Android's *middleware infrastructure* provides reusable capabilities that extend hardware-centric OS kernel & protocol mechanisms
  - Hardware abstraction layer
    - Shields Android stack from low-level hardware details
  - Shields OEMs from GNU Public License "virality"



Hardware components

See en.wikipedia.org/wiki/Linux_kernel#Licensing_terms

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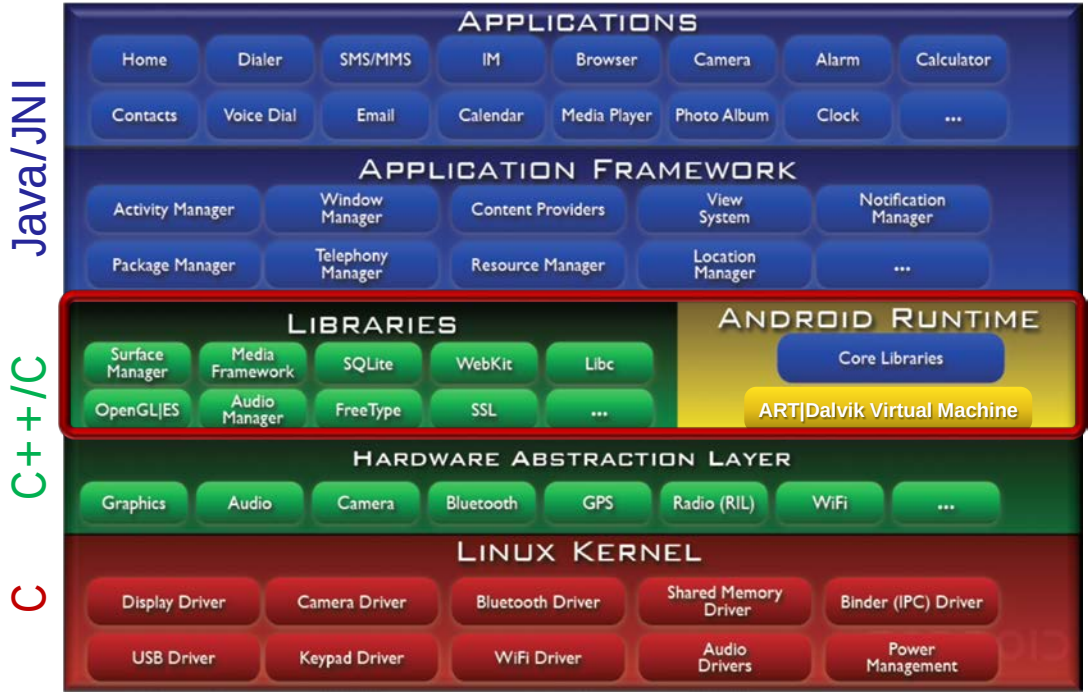
- Android's *middleware infrastructure* provides reusable capabilities that extend hardware-centric OS kernel & protocol mechanisms
  - Hardware abstraction layer
  - Runtime & libraries layer



Hardware components

This layer is composed of several middleware elements

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- Android's *middleware infrastructure* provides reusable capabilities that extend hardware-centric OS kernel & protocol mechanisms
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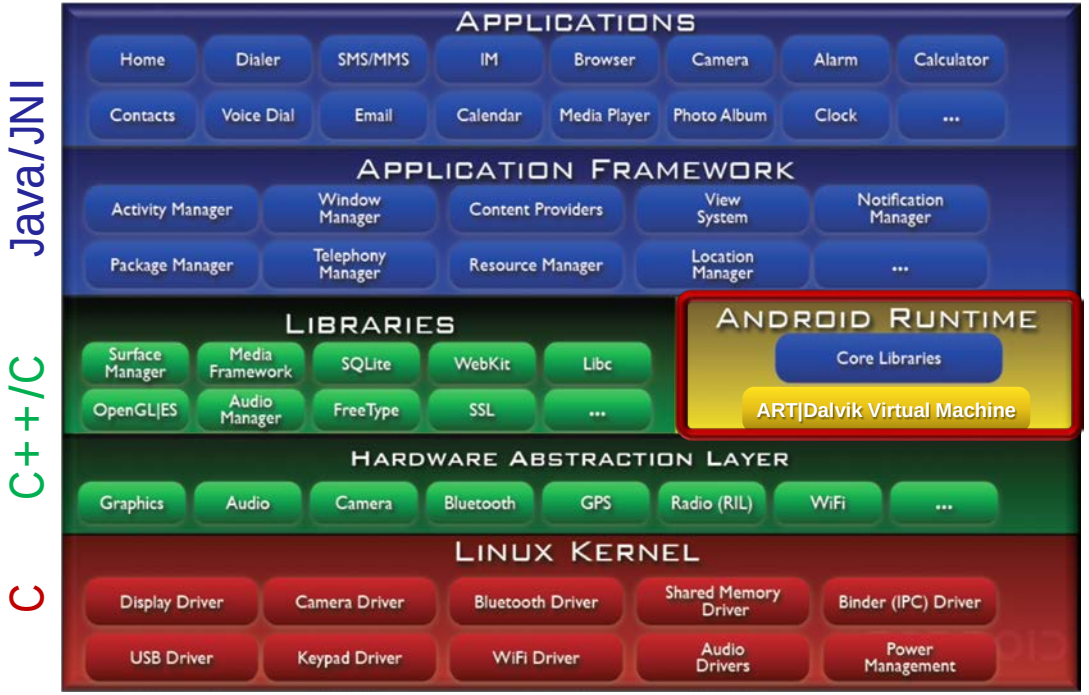
  - Runtime & libraries layer
    - Android runtime



This element is composed of two parts

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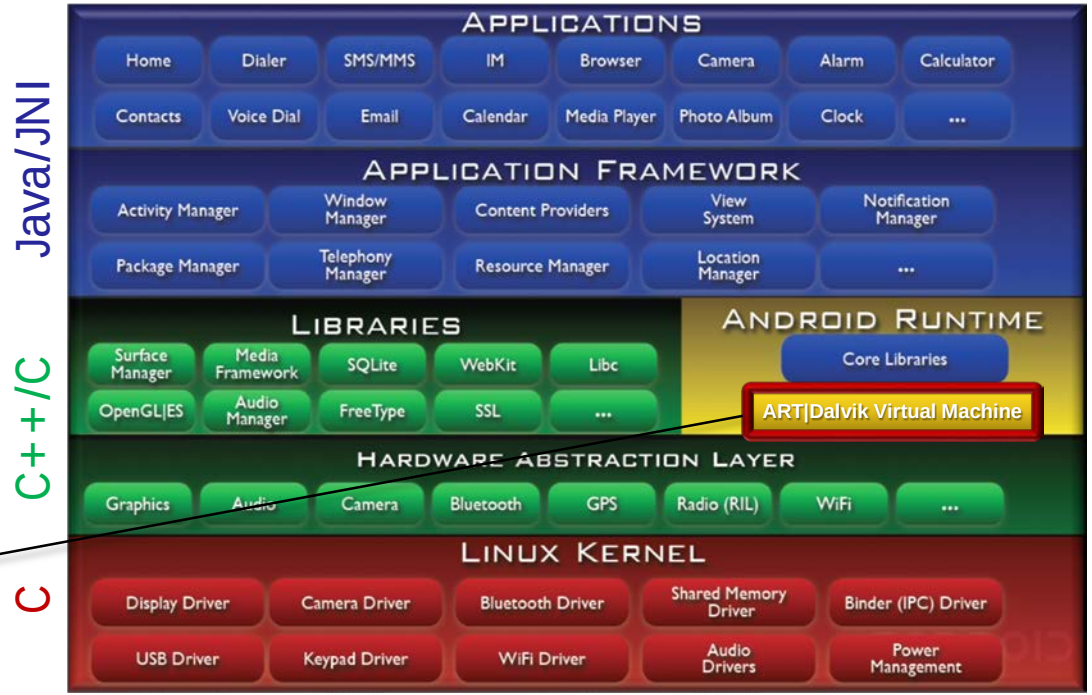

A managed execution environment that efficiently runs Java-based apps & some Android system services

See source.android.com/devices/tech/dalvik

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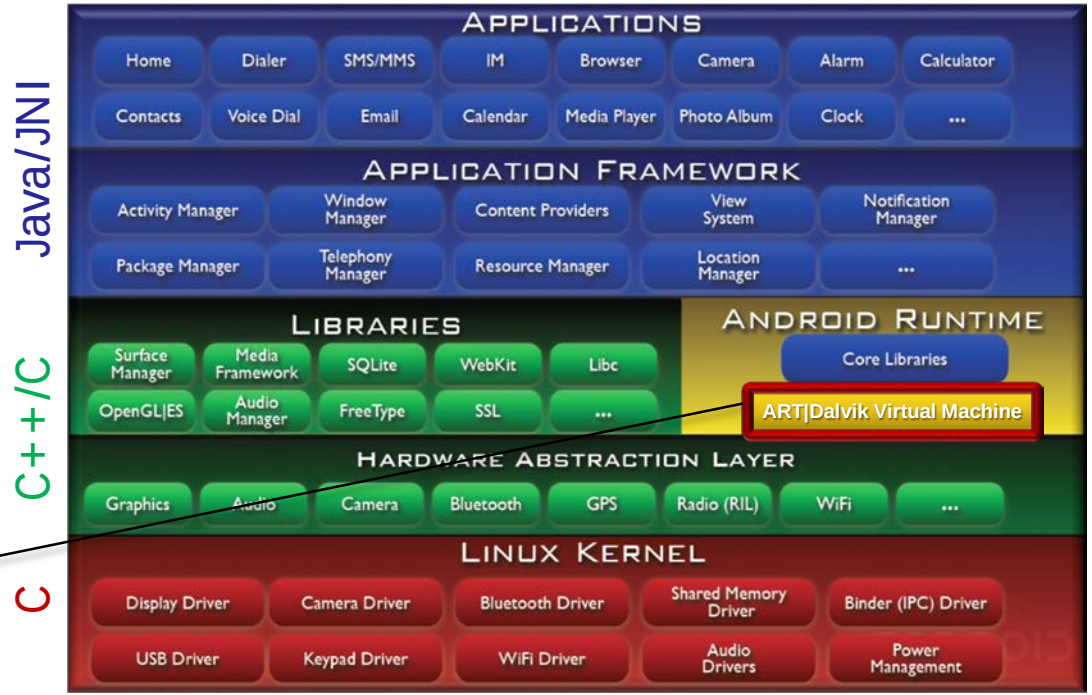

This managed execution environment is optimized for mobile device constraints

See sites.google.com/site/io/dalvik-vm-internals

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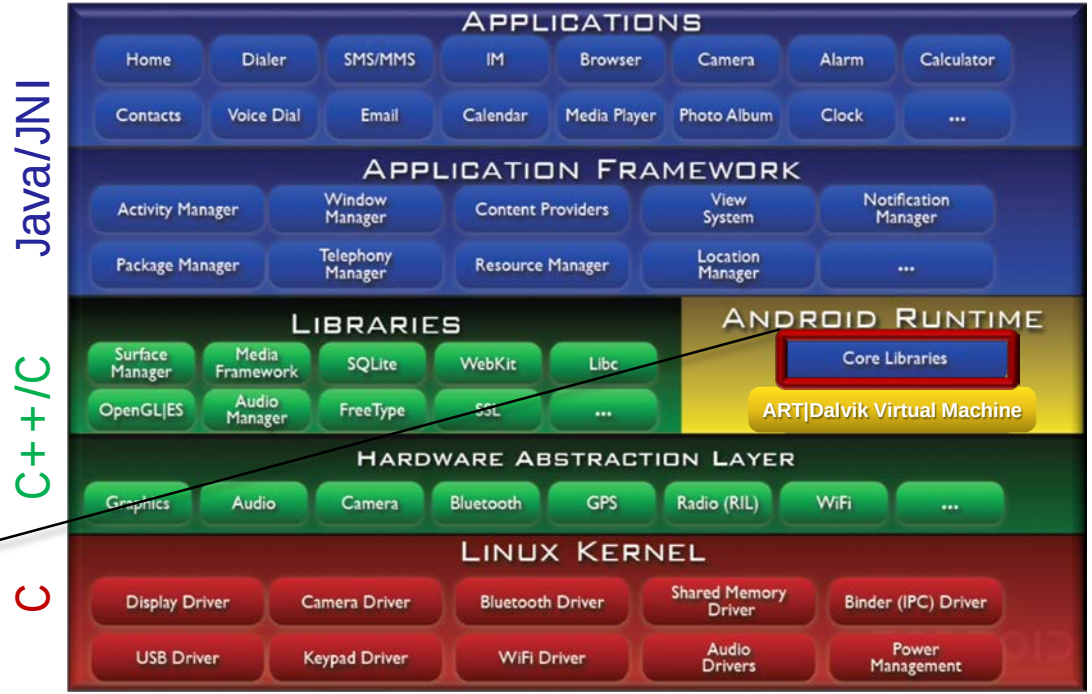

A copy of core Java class libraries & core Android class libraries

See en.wikipedia.org/wiki/Comparison_of_Java_and_Android_API

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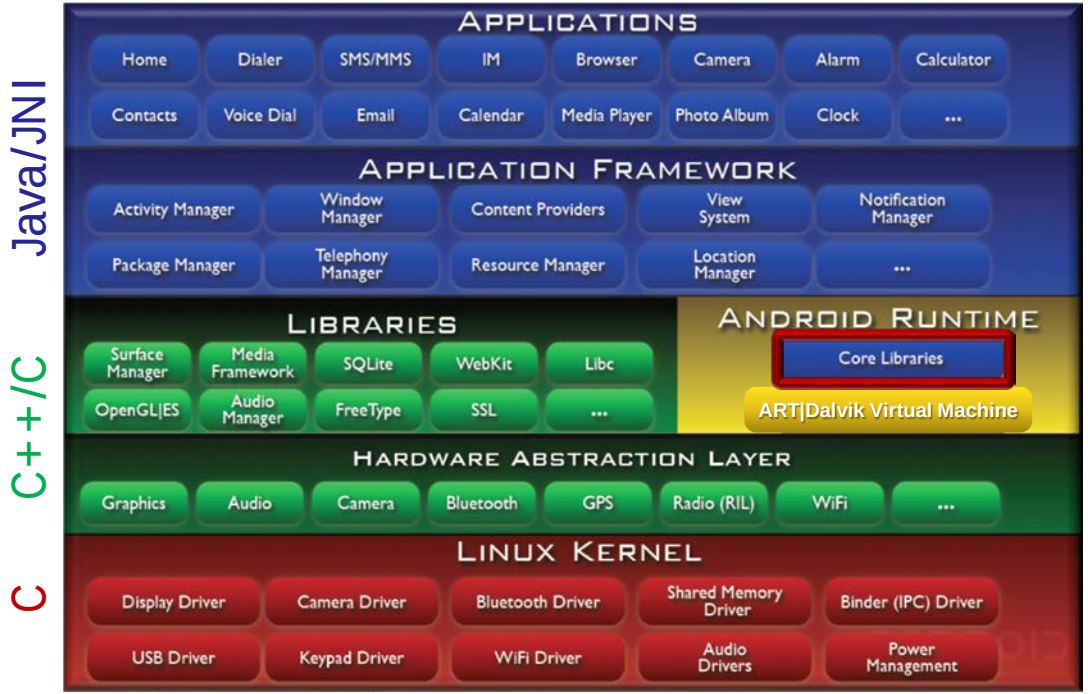

We'll discuss Java threading shortly

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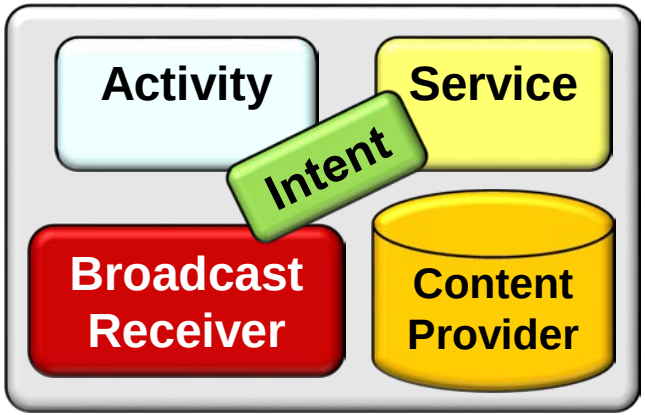

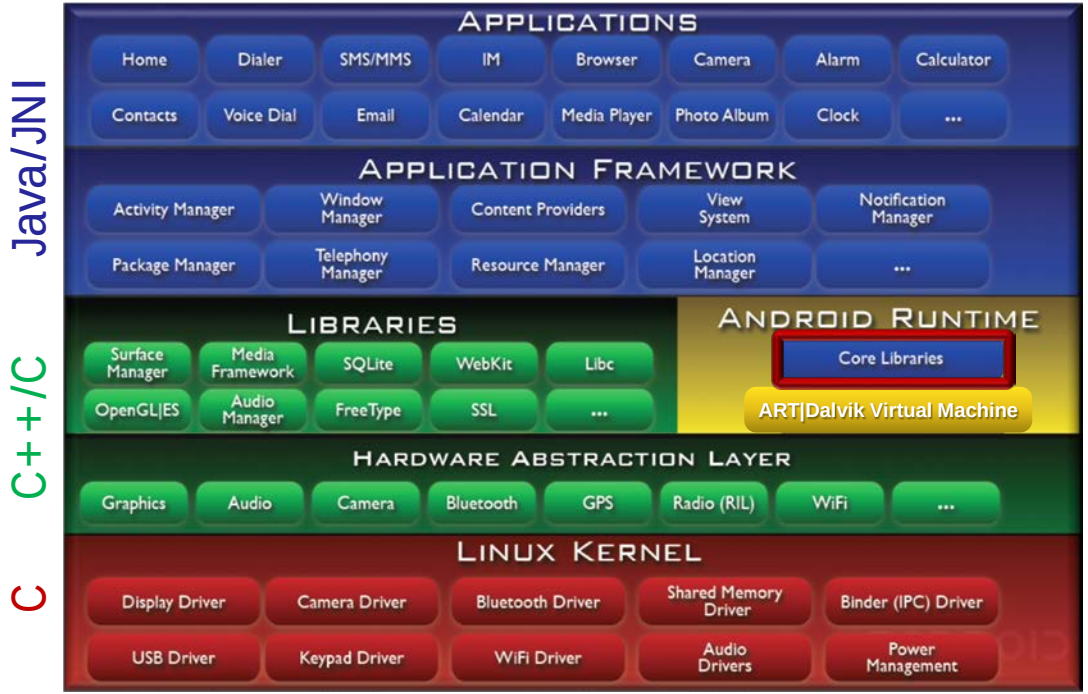

Android's core libraries provide key components that we'll also cover shortly

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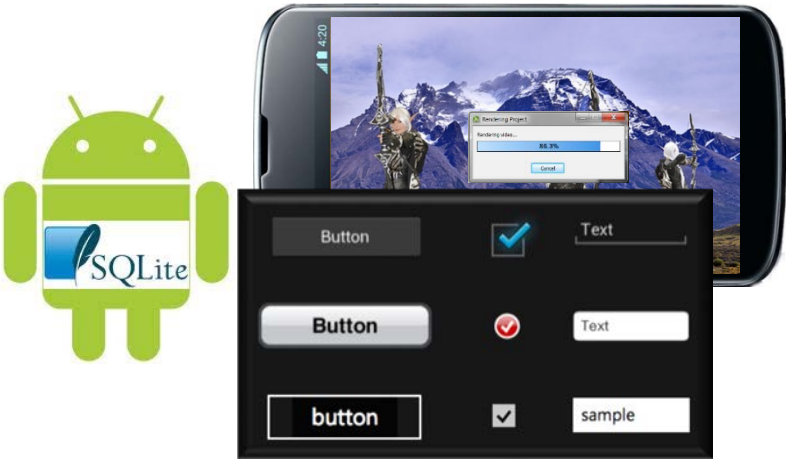

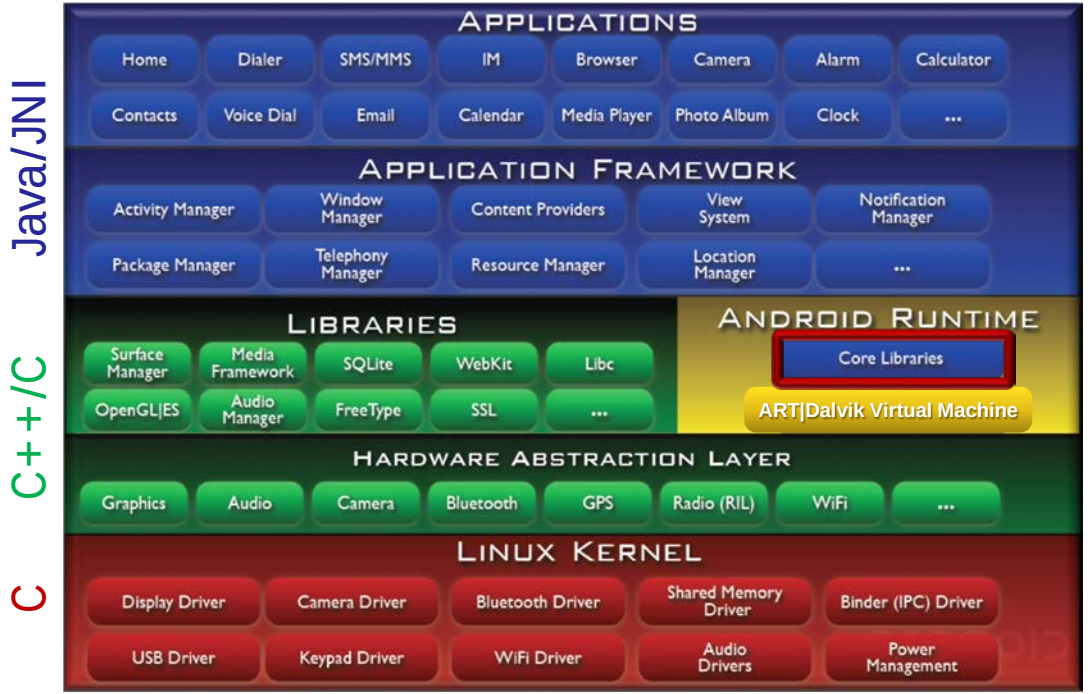

Android's core libraries provide many other UI & persistence components

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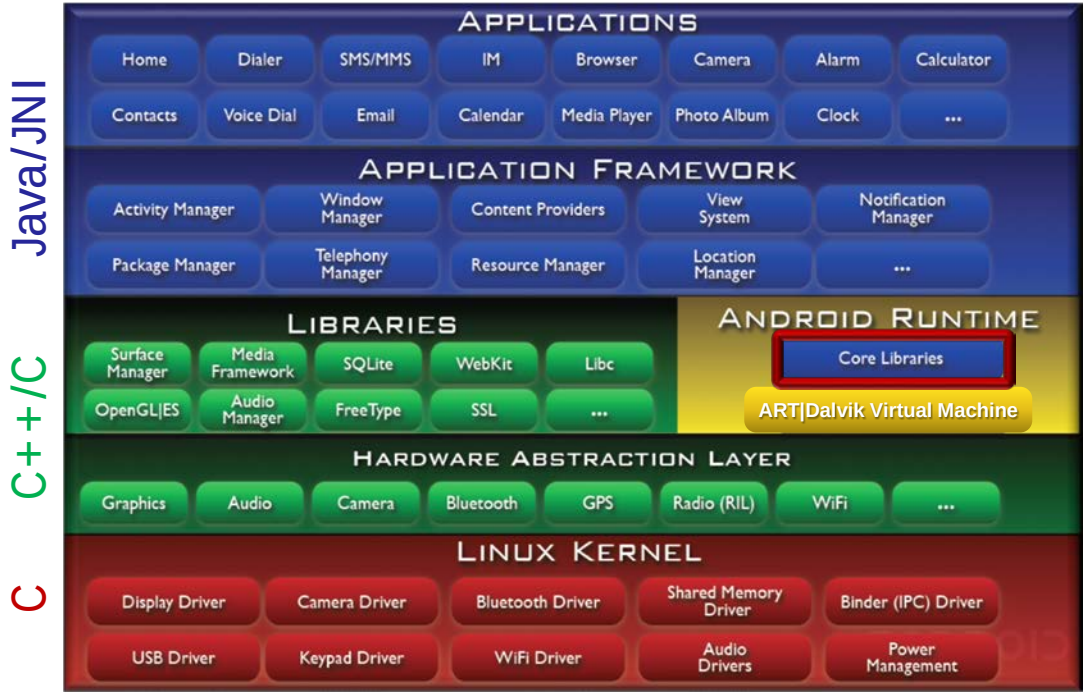

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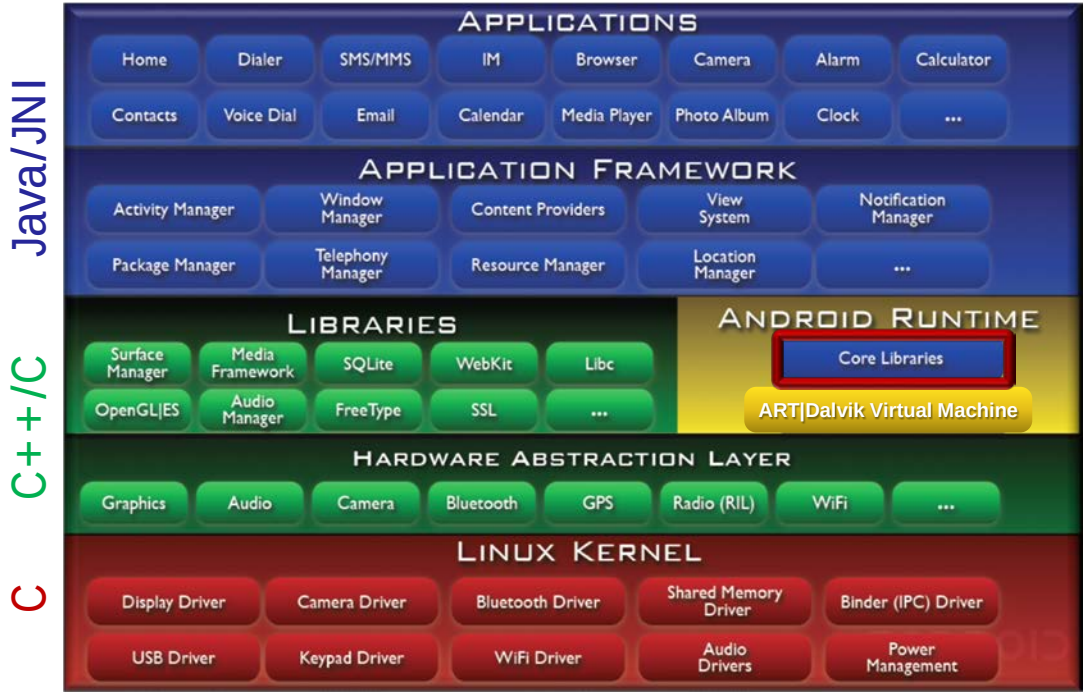

We cover Android's core libraries in the *Android App Development* Specialization

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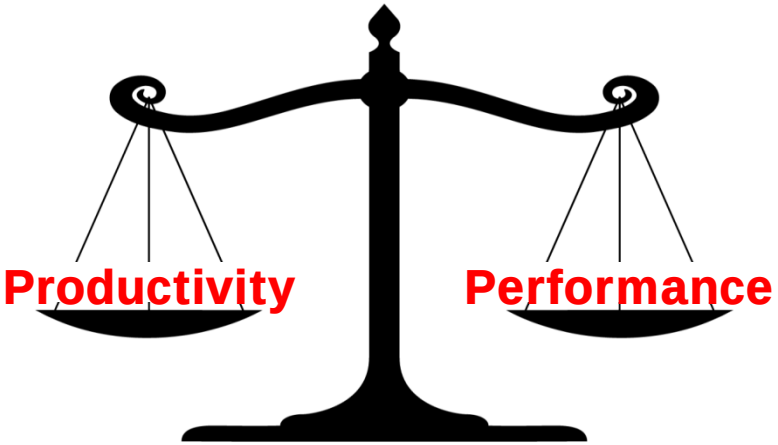

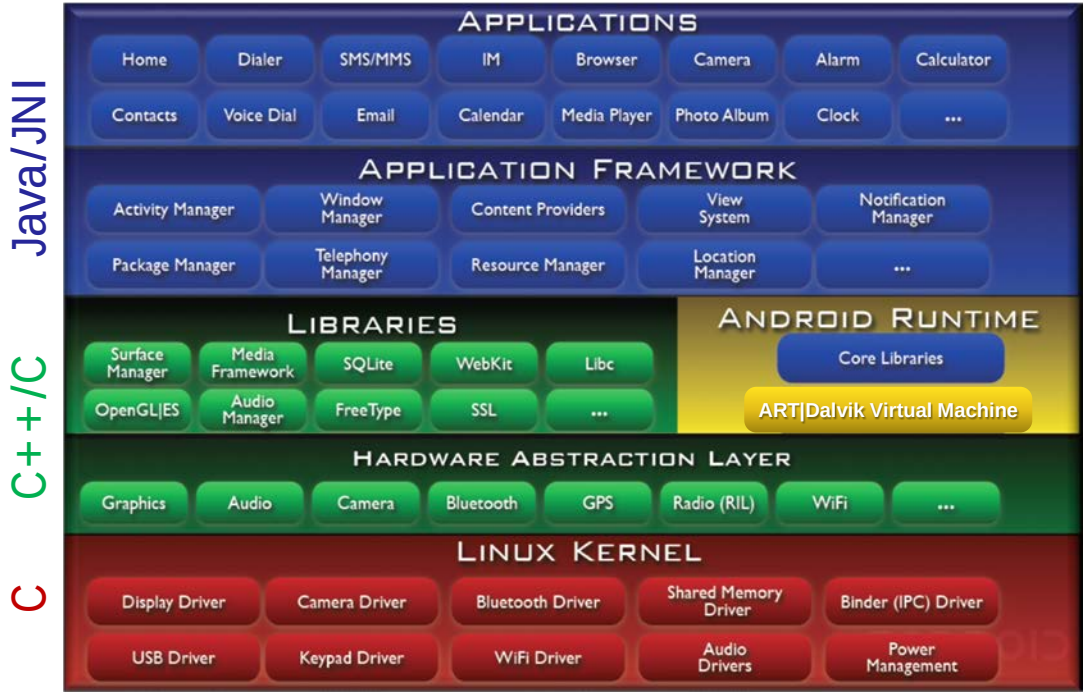

Android—like Java—balances run-time performance & developer productivity

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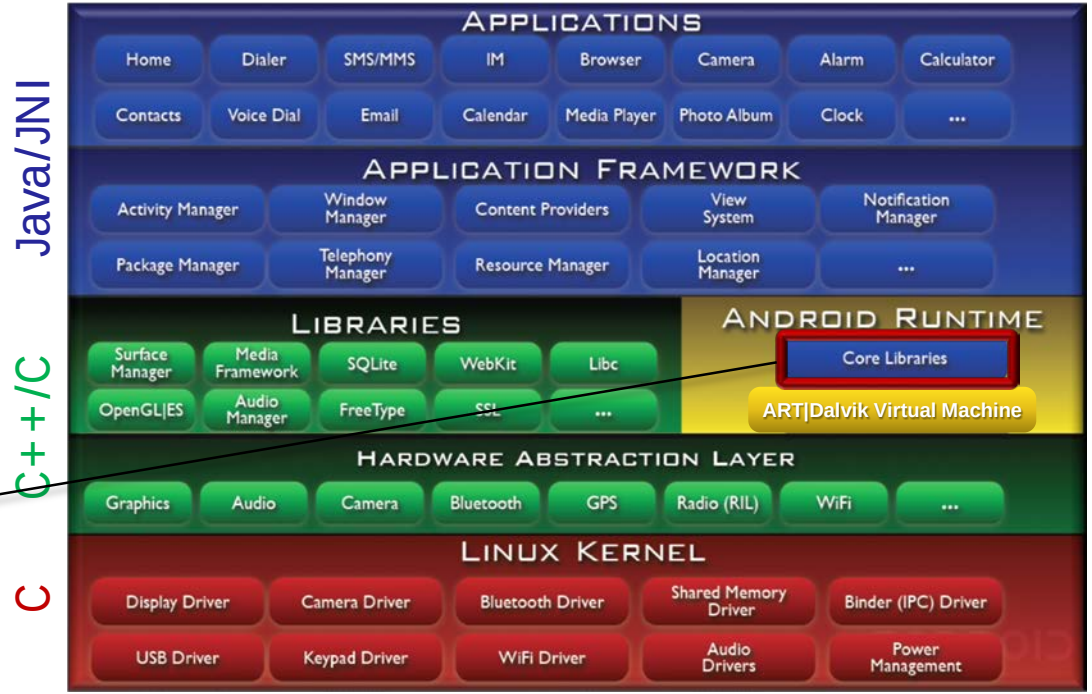

Android's core libraries are often implemented as wrapper facades

See www.dre.vanderbilt.edu/~schmidt/PDF/wrapper-facade.pdf

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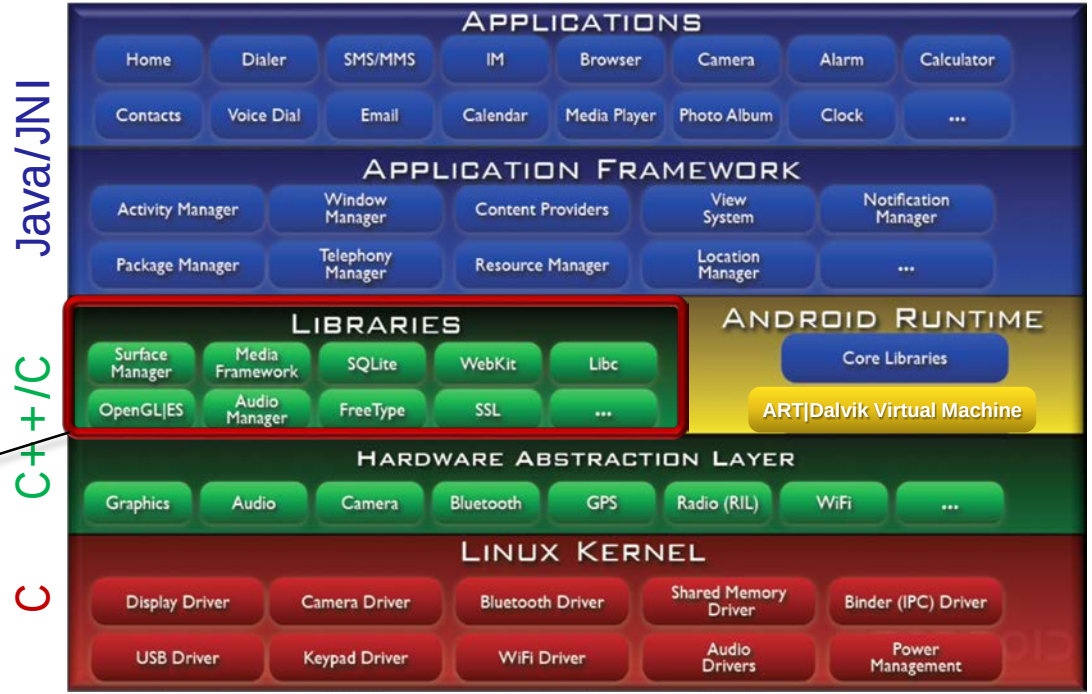
    - Native C/C++ libraries



These Java wrapper façade are implemented via native C/C++ code

See developer.android.com/tools/sdk/ndk