Overview of Android: The Hardware Layer

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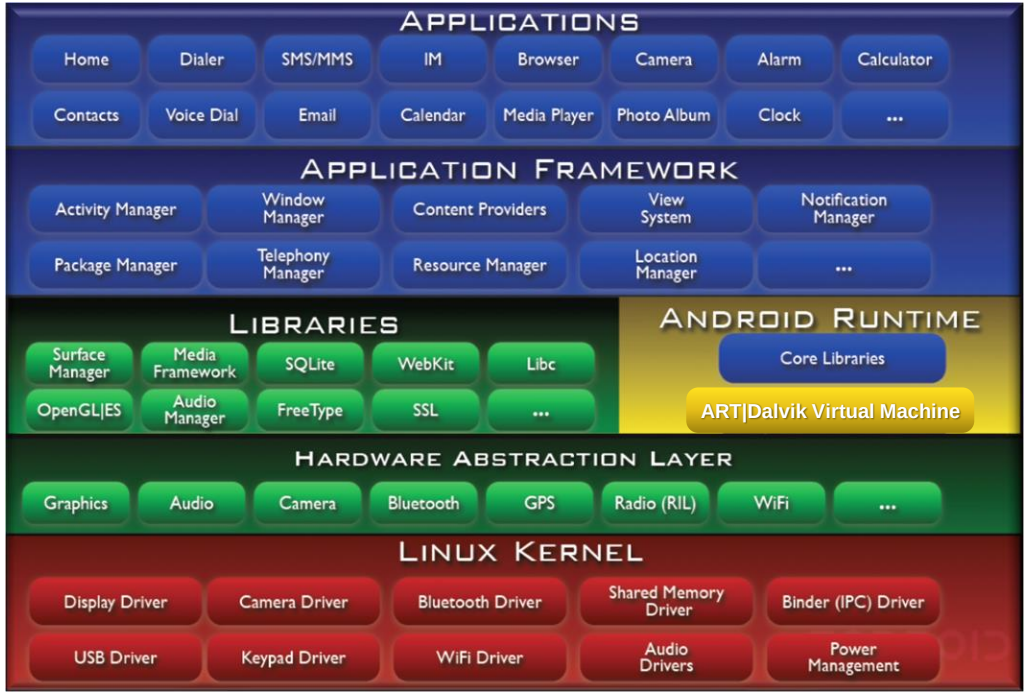
Learning Objectives in this Part of the Lesson

- Understand common hardware elements in Android
  - e.g., sensors, transceivers, storage, & processors

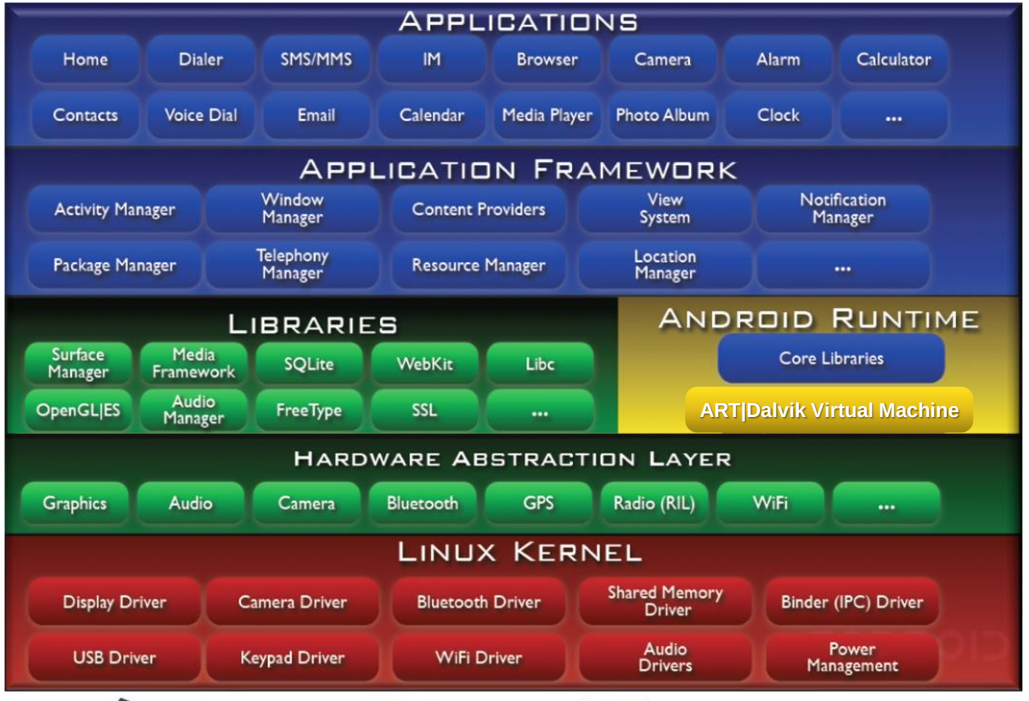


Hardware components

Overview of Android Hardware

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements

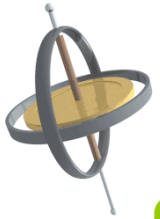


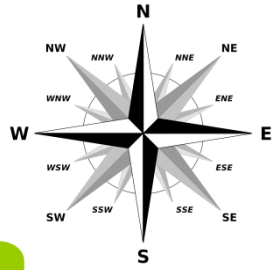
Hardware components

See static.googleusercontent.com/media/source.android.com/en/compatibility/android-cdd.pdf

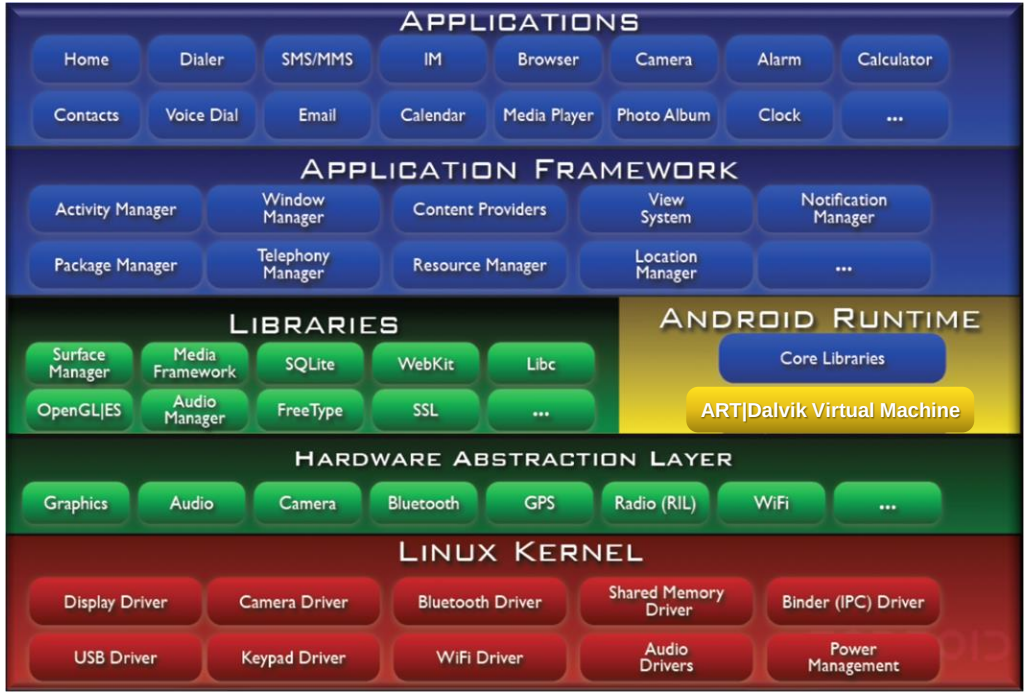
Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors





Sensors detect events or changes in the environment

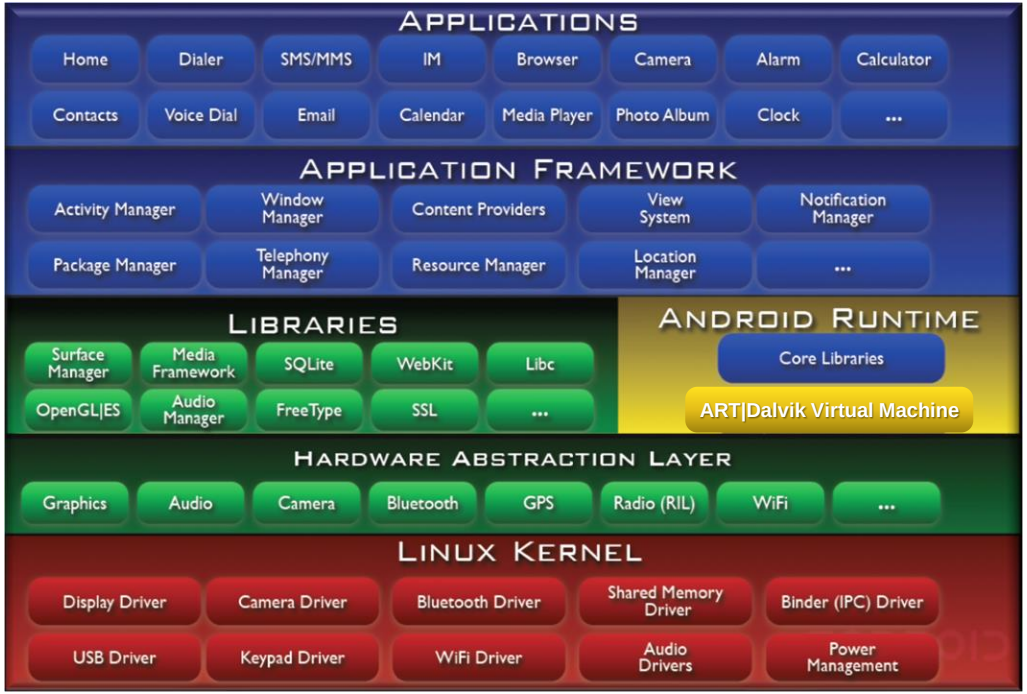


Hardware components

See developer.android.com/guide/topics/sensors/sensors_overview.html

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors, e.g.
    - Motion sensors measure acceleration forces & rotation
      - e.g., accelerometers & gyroscopes

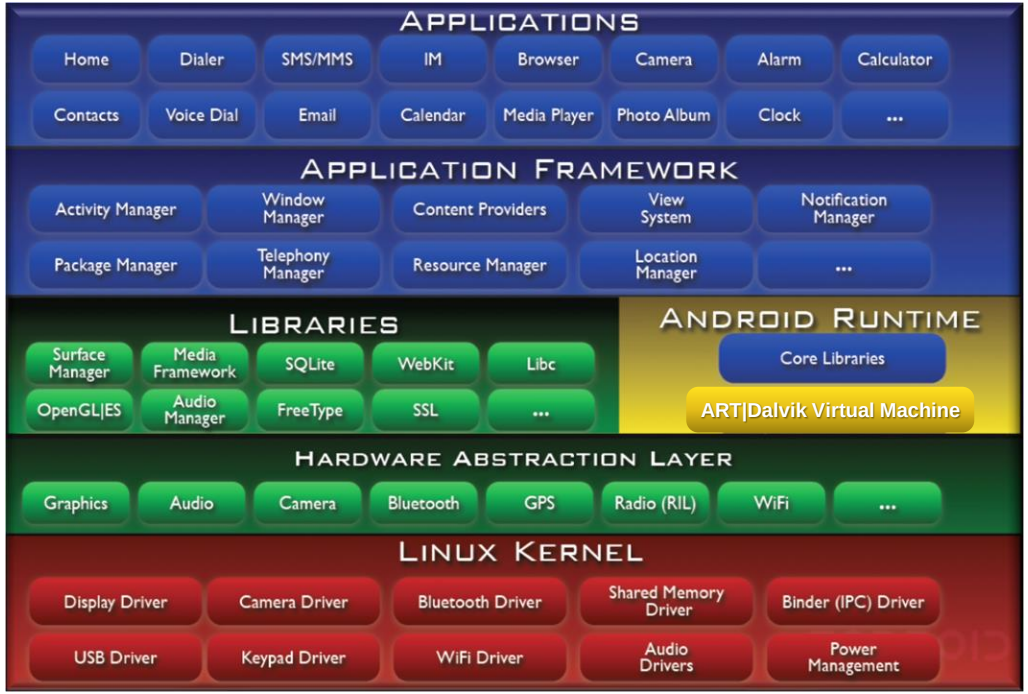


Hardware components

See developer.android.com/guide/topics/sensors/sensors_motion.html

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors, e.g.
    - Motion sensors measure acceleration forces & rotation
    - Environment sensors measure temperature, pressure, & humidity
      - e.g., thermometers & barometers

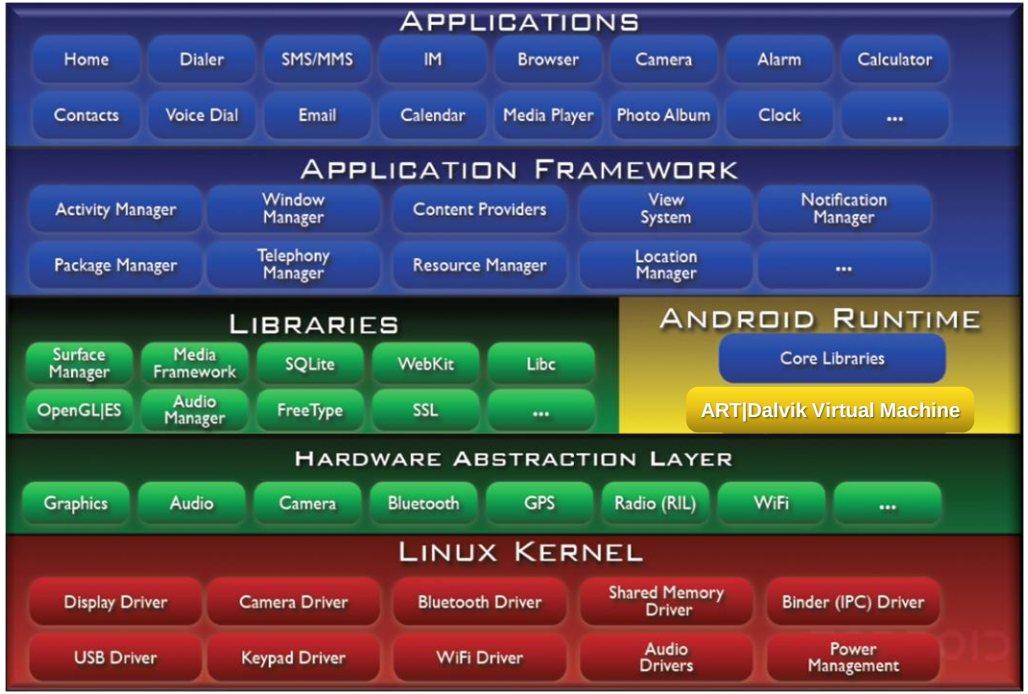


Hardware components

See hdeveloper.android.com/guide/topics/sensors/sensors_environment.html

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors, e.g.
    - Motion sensors measure acceleration forces & rotation
    - Environment sensors measure temperature, pressure, & humidity
  - Position sensors measure the physical position of a device
    - e.g., magnetometers



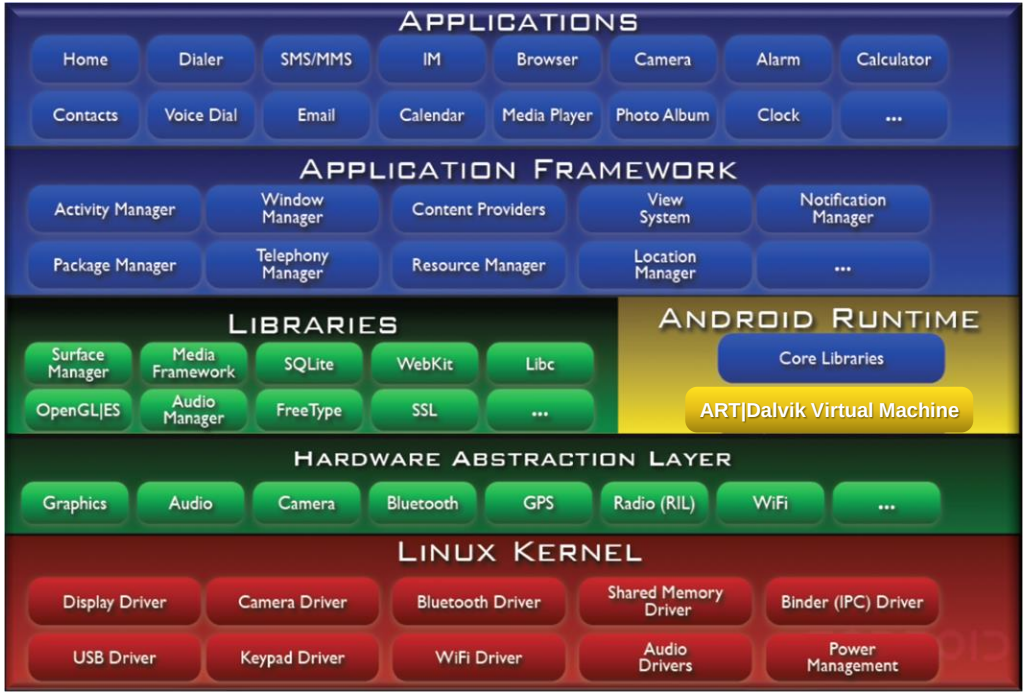
Hardware components

See developer.android.com/guide/topics/sensors/sensors_position.html

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers

A transceiver comprises both a transmitter & a receiver

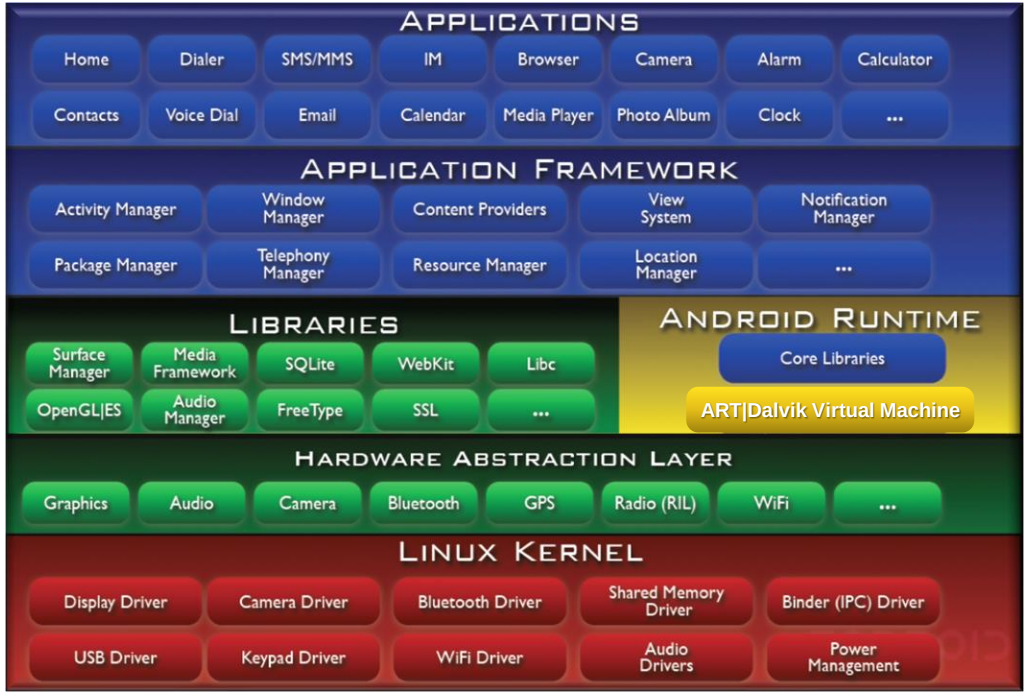


Hardware components

See en.wikipedia.org/wiki/Transceiver

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers, e.g.
    - Cellular radio
      - Make & receive calls over a radio frequency link

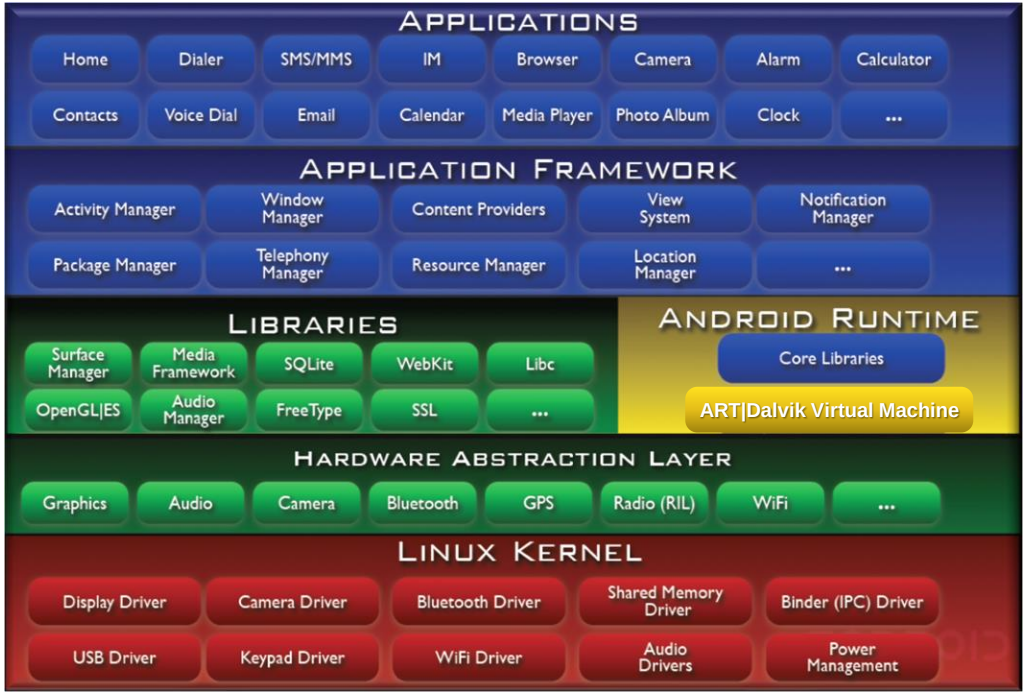


Hardware components

See en.wikipedia.org/wiki/Mobile_phone

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers, e.g.
    - Cellular radio
    - WiFi
      - Provides a wireless local area network

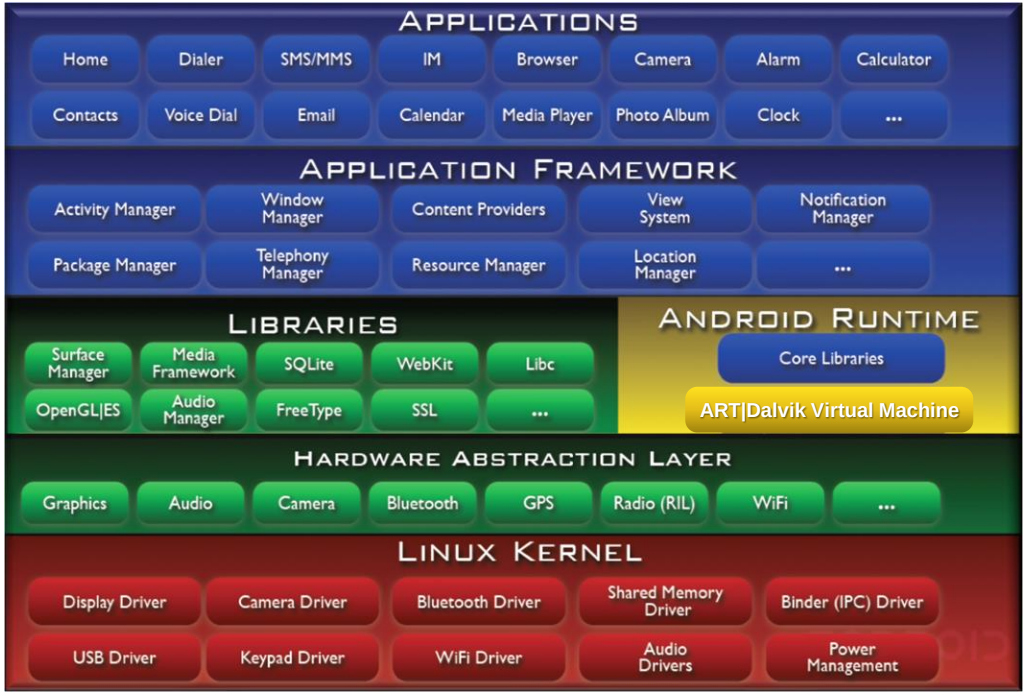


Hardware components

See en.wikipedia.org/wiki/Wi-Fi

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers, e.g.
    - Cellular radio
    - WiFi
    - Bluetooth
      - Exchange data over short distances in a "personal area network"

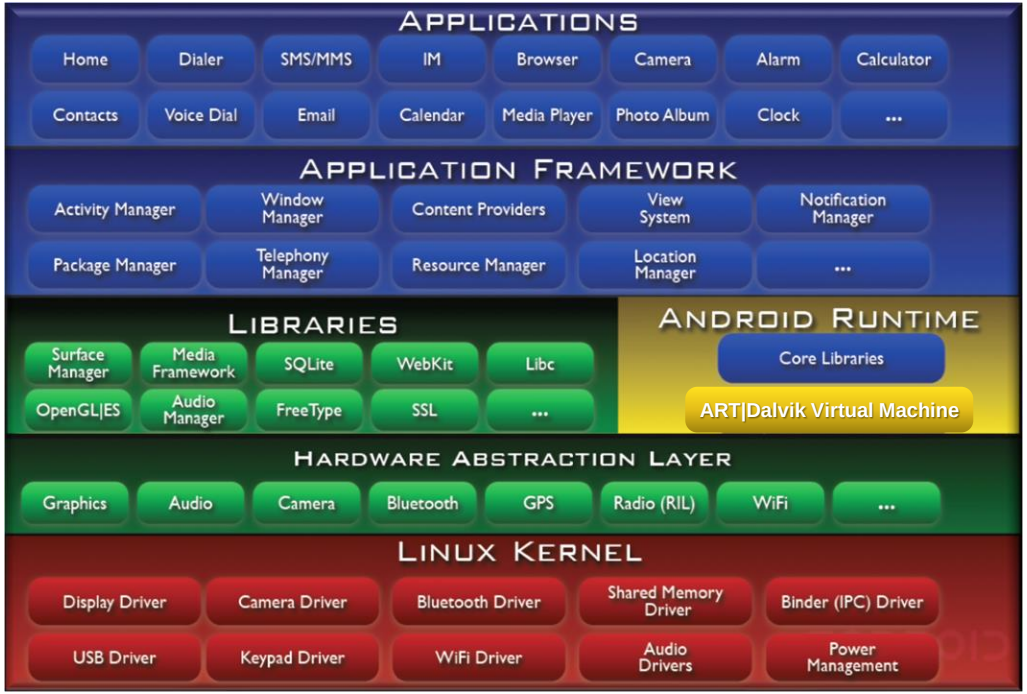


Hardware components

See en.wikipedia.org/wiki/Bluetooth

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers, e.g.
    - Cellular radio
    - WiFi
    - Bluetooth
    - Near-field communication (NFC)
      - Enable 2 electronic devices to communicate by placing them within 2 inches

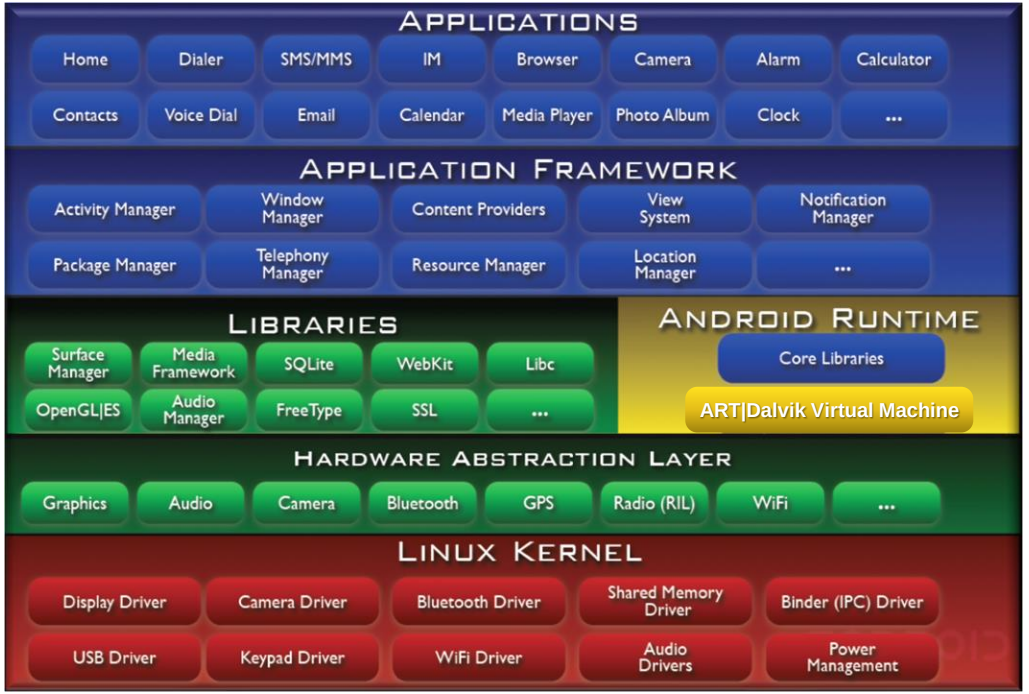


Hardware components

See en.wikipedia.org/wiki/Near_field_communication

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers
  - Storage



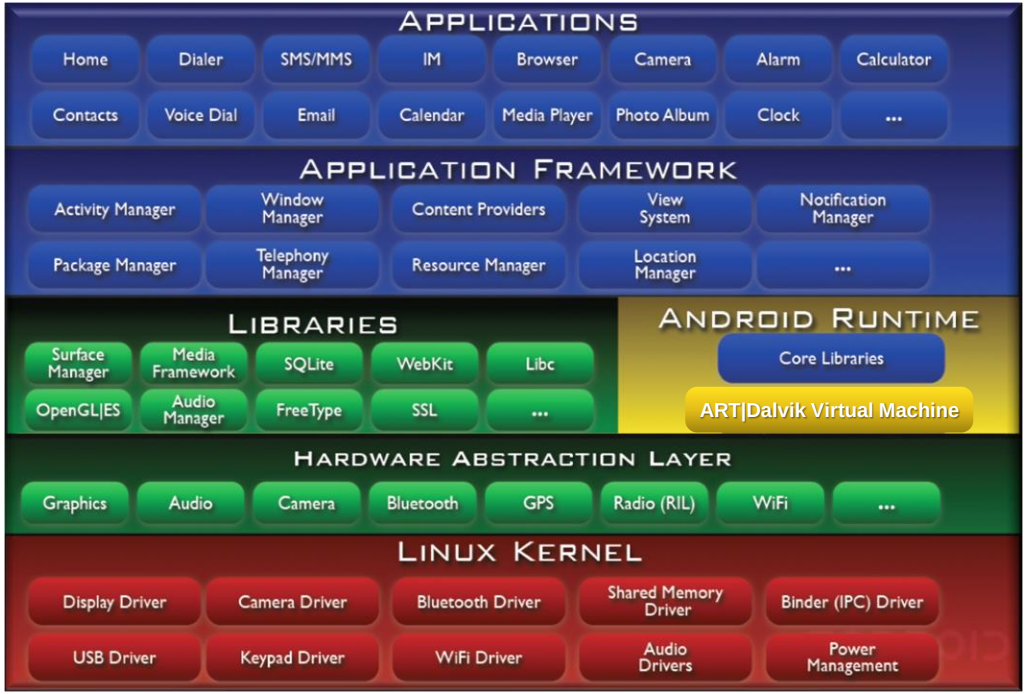
Storage is used to retain digital data

Hardware components

See en.wikipedia.org/wiki/Computer_data_storage

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers
  - Storage, e.g.
    - Random access memory (RAM)
      - Allows read/write access to data in ~same amount of time irrespective of location

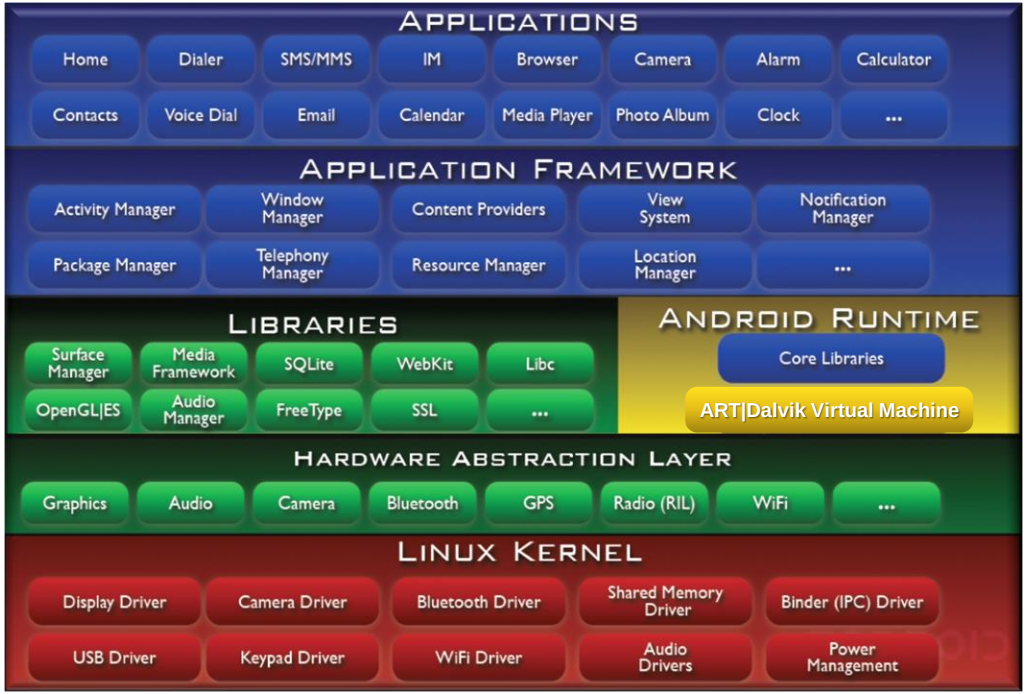


Hardware components

See en.wikipedia.org/wiki/Random-access_memory

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers
  - Storage, e.g.
    - Random access memory (RAM)
    - Flash memory
      - Non-volatile memory that can be electrically erased & reprogrammed

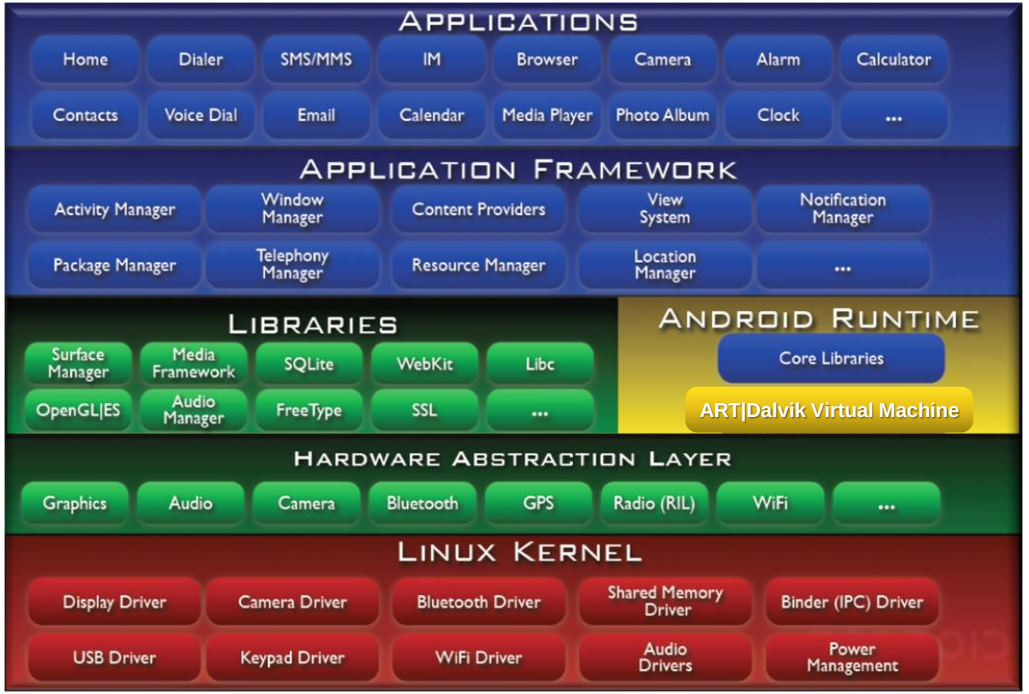


Hardware components

See en.wikipedia.org/wiki/Flash_memory

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers
  - Storage
  - Processors

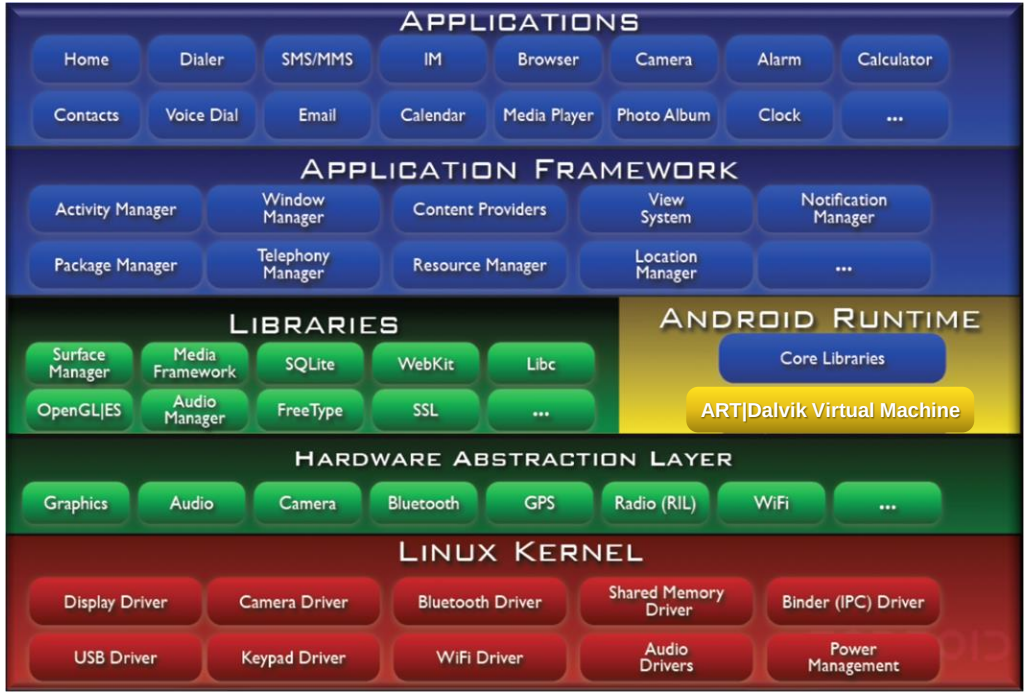


Processors perform computer program instructions

Hardware components

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers
  - Storage
  - Processors, e.g.,
    - Central processing units
      - Basic arithmetic, logical, control, & I/O operations

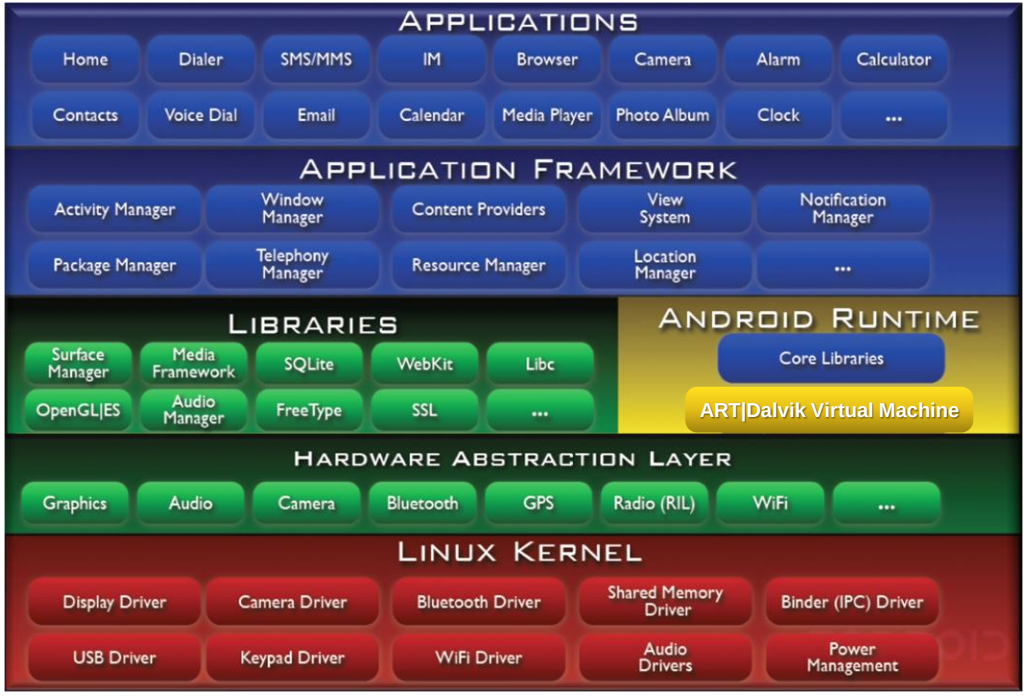


Hardware components

See en.wikipedia.org/wiki/Central_processing_unit

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers
  - Storage
  - Processors, e.g.,
    - Central processing units
      - Basic arithmetic, logical, control, & I/O operations
      - Increasingly multi-core

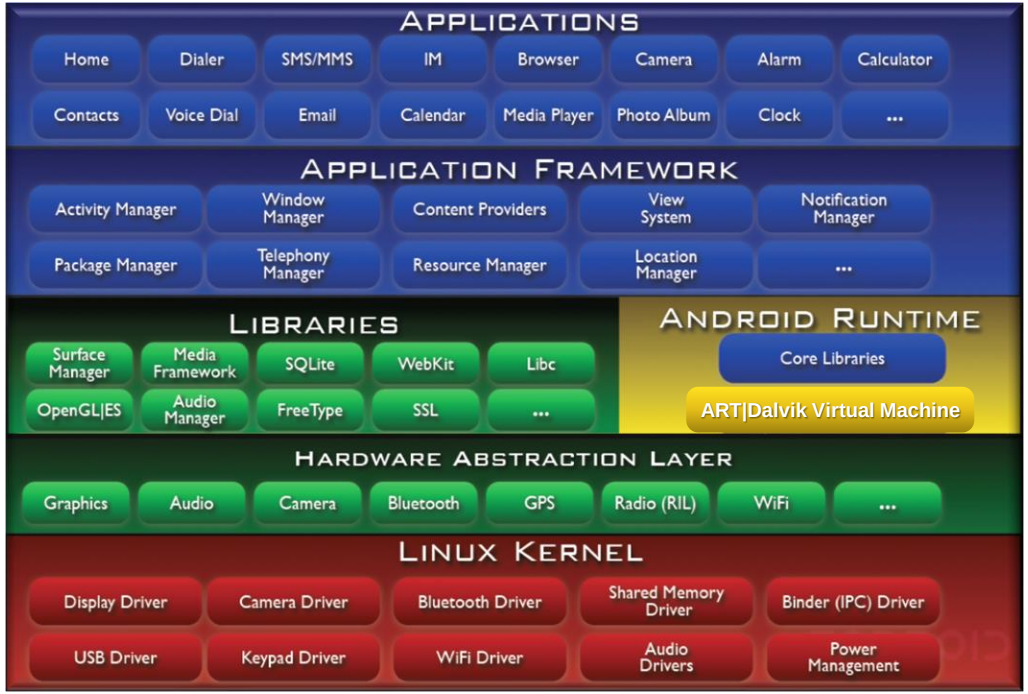


Hardware components

See www.androidauthority.com/fact-or-fiction-android-apps-only-use-one-cpu-core-610352

Overview of Android Layers: Hardware

- Android devices are built upon a range of hardware elements, e.g.
  - Sensors
  - Transceivers
  - Storage
  - Processors, e.g.,
    - Central processing units
    - Graphics processing units
      - More efficient than CPUs for processing of large blocks of data in parallel



Hardware components

See en.wikipedia.org/wiki/Graphics_processing_unit

Overview of Android Layers: Hardware

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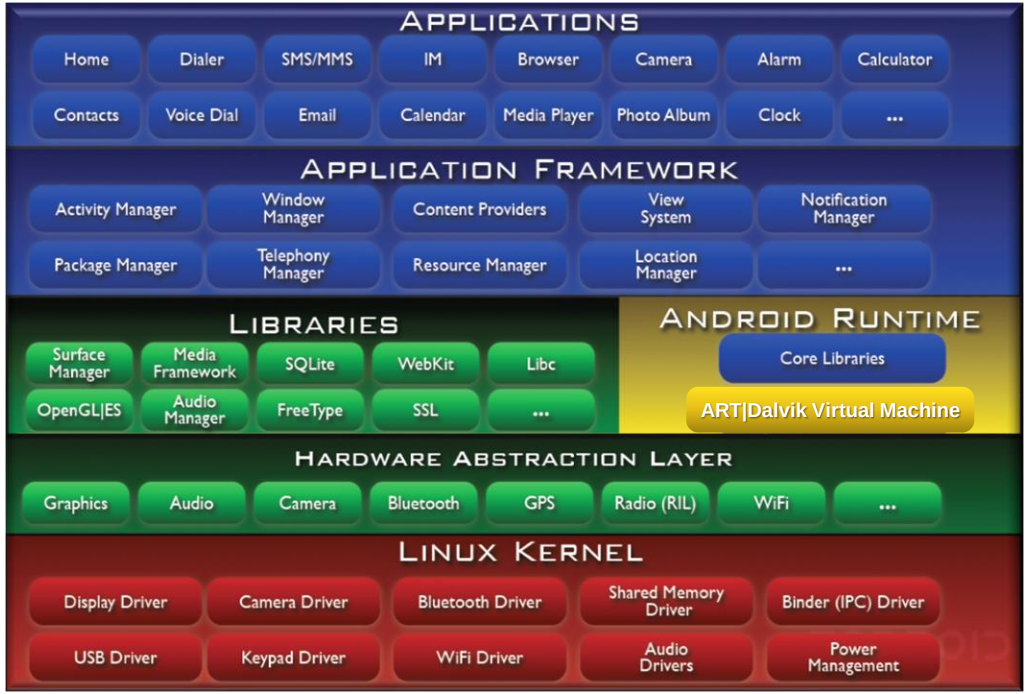
  - Sensors
  - Transceivers
  - Storage
  - Processors, e.g.,
    - Central processing units
    - Graphics processing units
    - Digital signal processors
      - Efficiently measure, filter & compress continuous analog signals



Hardware components

See en.wikipedia.org/wiki/Digital_signal_processor

End of the Overview of Android: The Hardware Layer