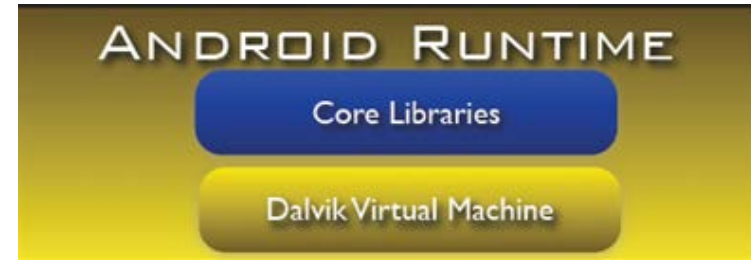# Overview of the Android Runtime: Java Virtual Machine

Android Runtime

- Supports concurrently executing Java apps on mobile devices
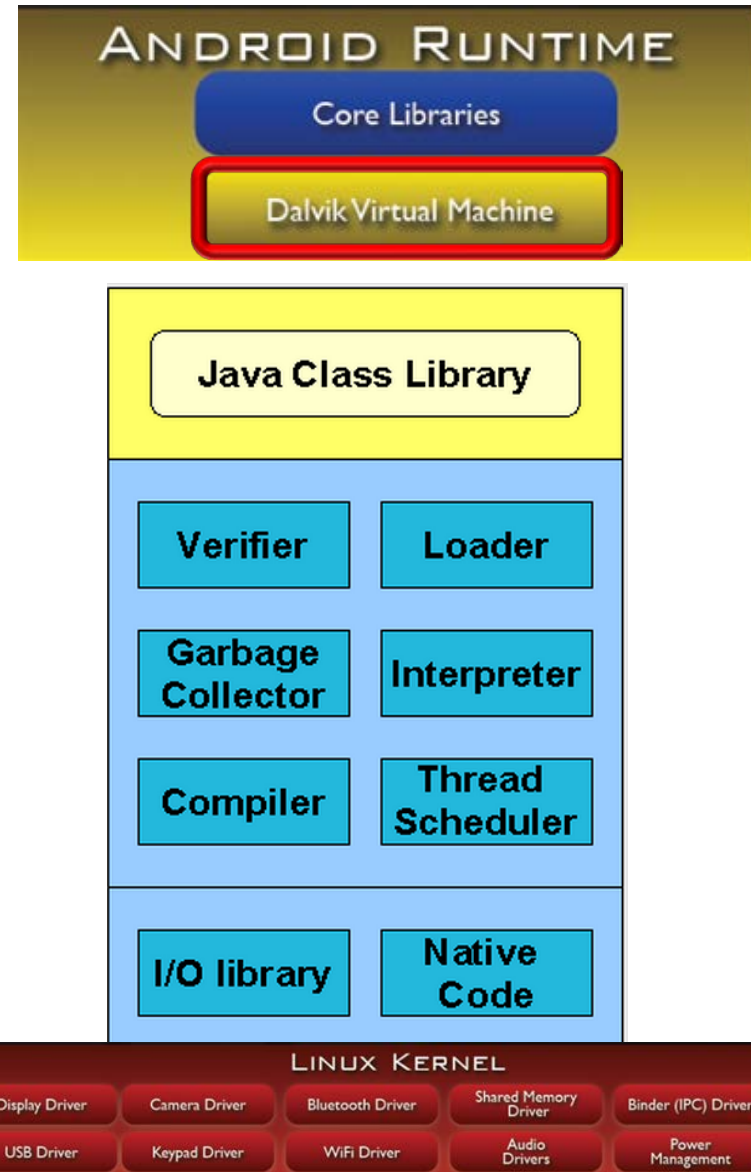

C/Java/JNI

ANDROID RUNTIME

Core Libraries

Dalvik Virtual Machine

Android Runtime

- Supports concurrently executing Java apps on mobile devices
  - **Virtual Machine (VM)**
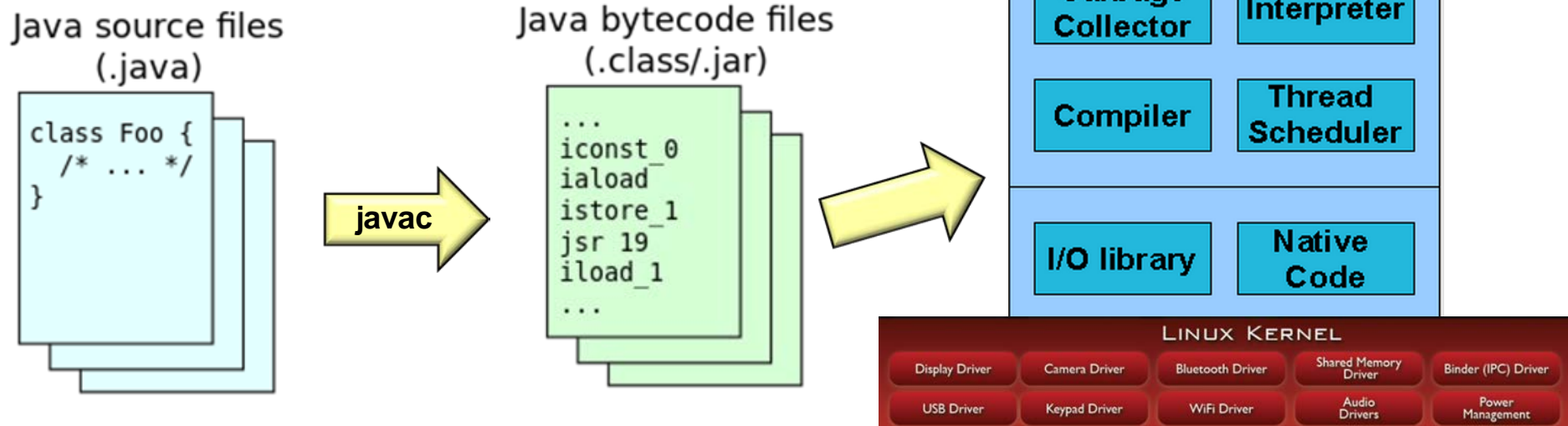   - Provides a managed runtime platform

C/Java/JNI

ANDROID RUNTIME

Core Libraries

Dalvik Virtual Machine

Java Class Library

Verifier	Loader
Garbage Collector	Interpreter
Compiler	Thread Scheduler
I/O library	Native Code

LINUX KERNEL

| Display Driver | Camera Driver | Bluetooth Driver | Shared Memory Driver | Binder (IPC) Driver |
| USB Driver | Keypad Driver | WiFi Driver | Audio Drivers | Power Management |

See en.wikipedia.org/wiki/Virtual_machine

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    - Provides a managed runtime platform

      - Executes bytecode generated from Java source code as a application inside a single process in a host OS
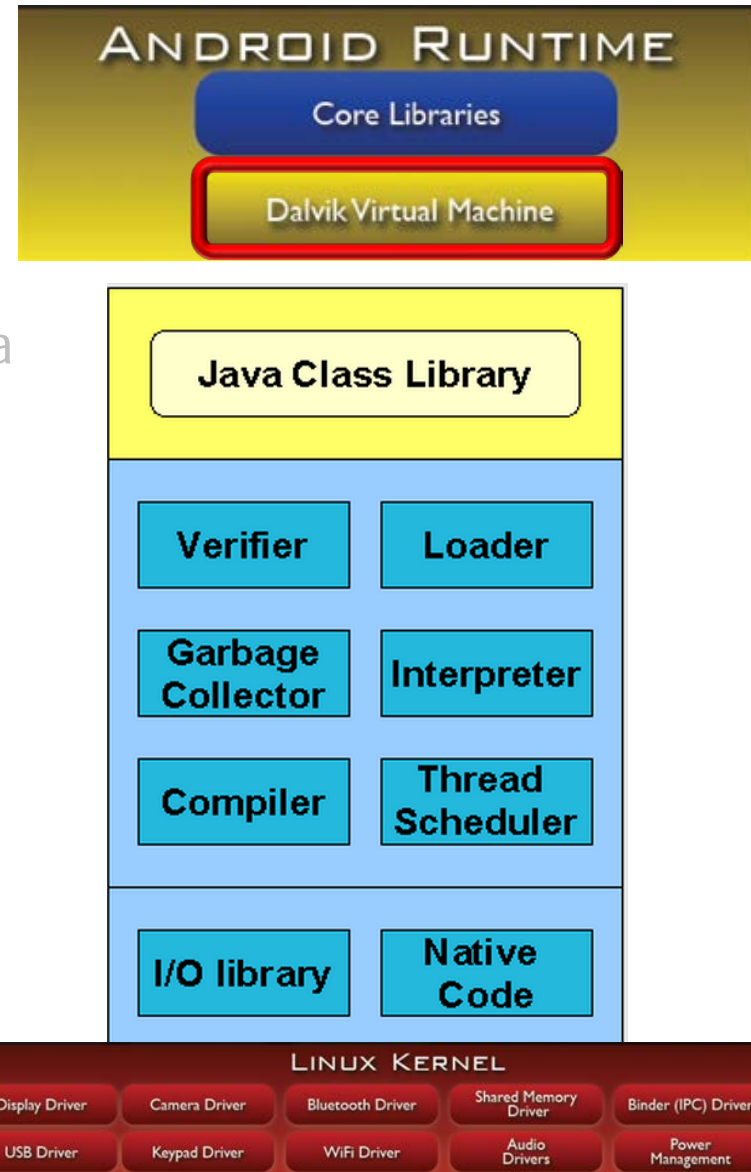

See en.wikipedia.org/wiki/Virtual_machine#Process_virtual_machines

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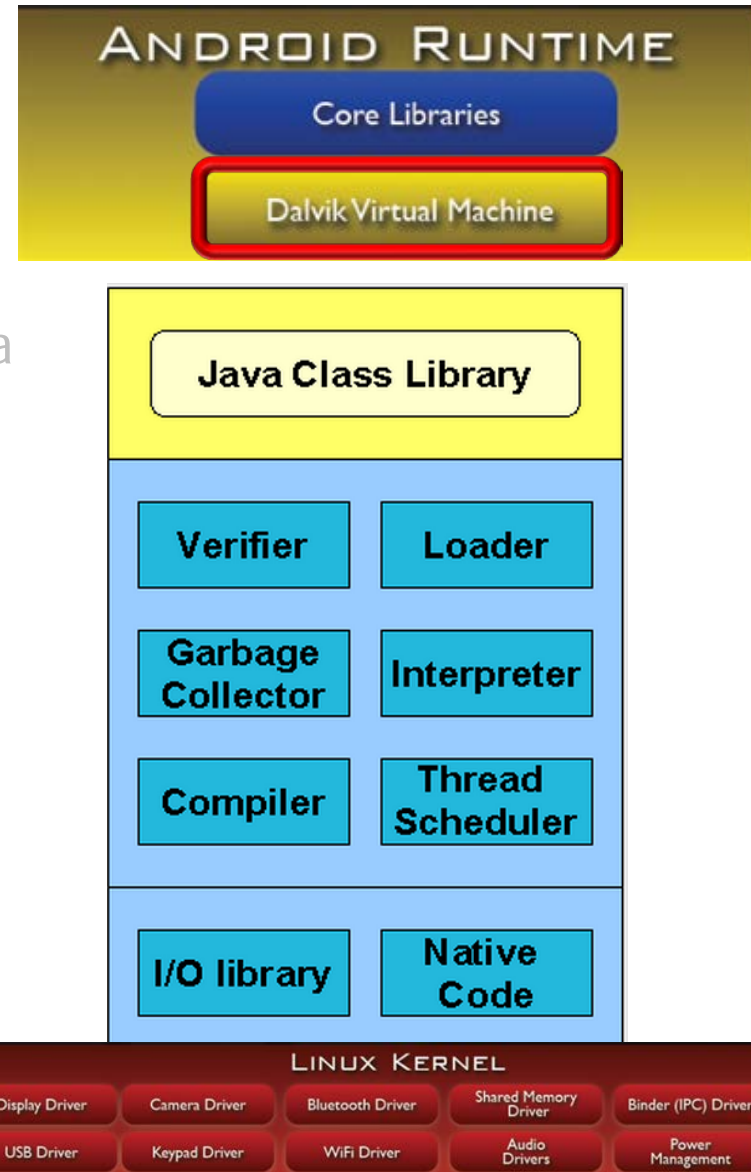   - Created when a process is started & destroyed when it exits

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C/Java/JNI

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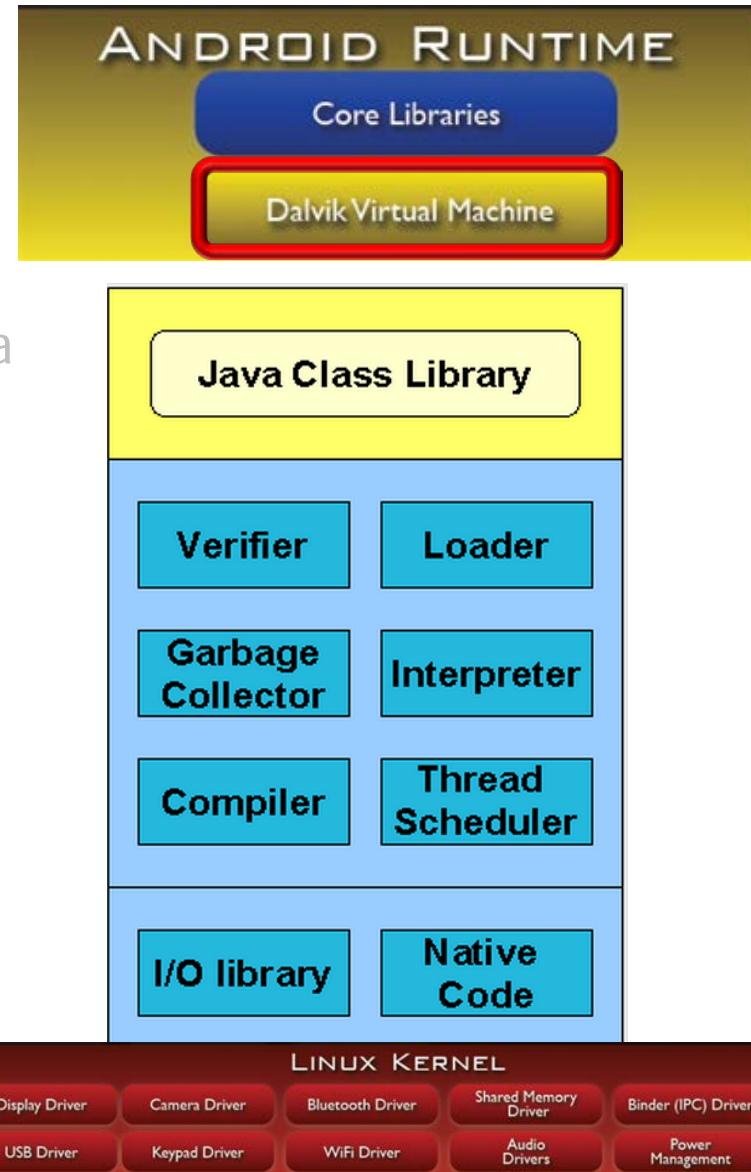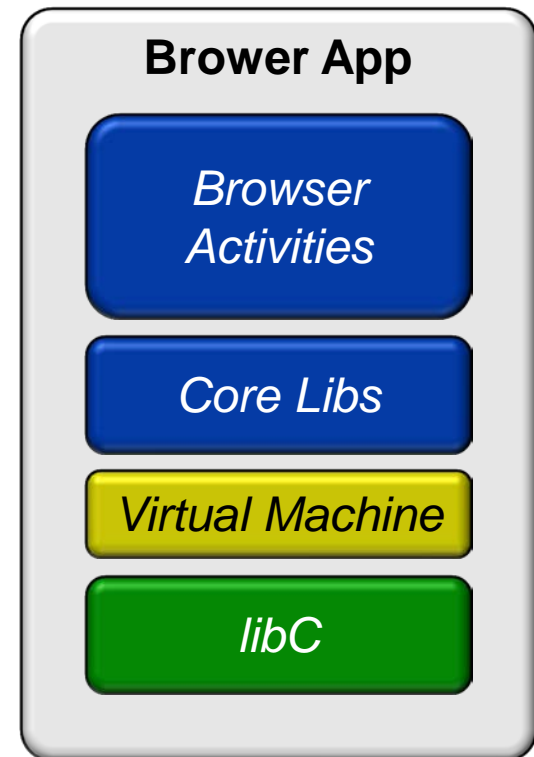
      - e.g., Intel x86, ARM, emulator, etc.

C/Java/JNI

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C/Java/JNI

Brower App

- Browser Activities
- Core Libs
- Virtual Machine
- libC

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C/Java/JNI

See en.wikipedia.org/wiki/Dalvik_(software)

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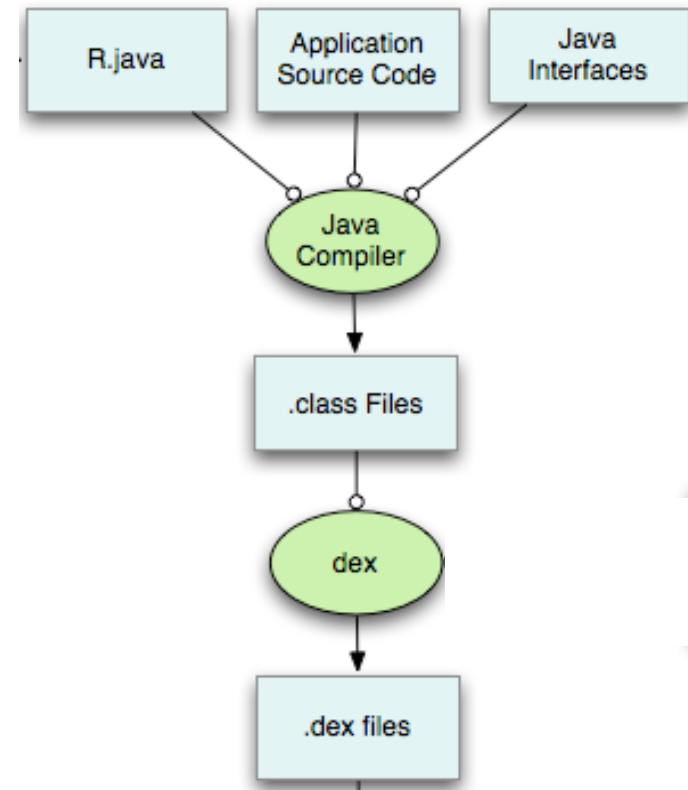
C/Java/JNI

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

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    - **dx** program transforms java classes into .dex-formatted bytecodes
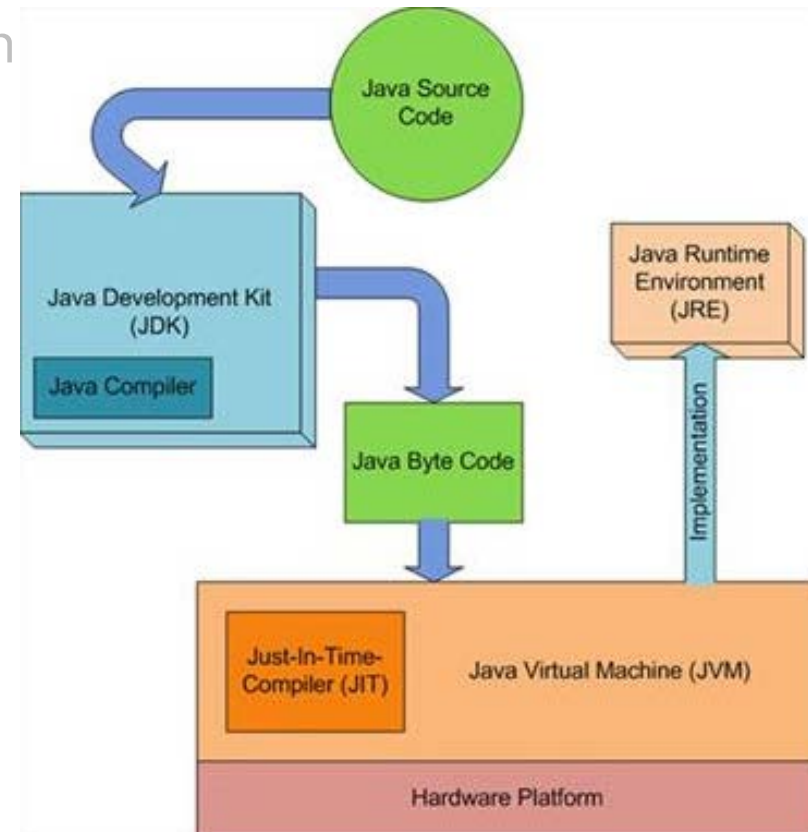
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    - Just-in-time (JIT) compiler available

C/Java/JNI

See en.wikipedia.org/wiki/
Just-in-time_compilation

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See www.youtube.com/ watch?v=EBITzQsUoOw

Android Runtime

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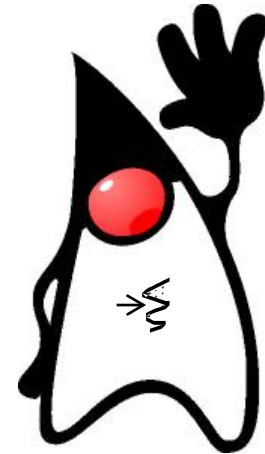   - ART uses an "ahead-of-time" compiler & has better garbage collection

ART

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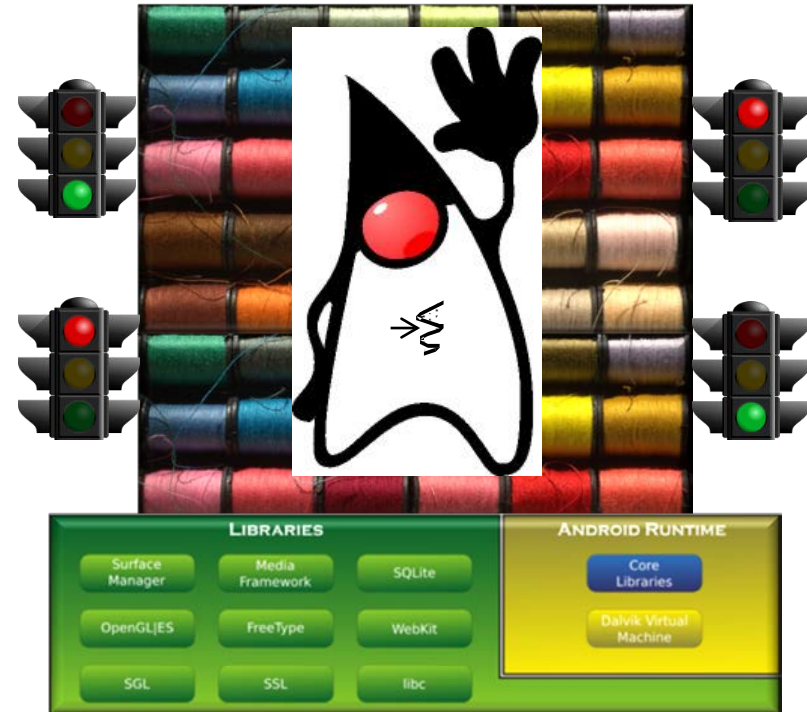 - Android's VM implements Java's concurrency features

See www.dre.vanderbilt.edu/ ~schmidt/LiveLessons/CPiJava

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    - Multi-threading & synchronization

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