

PROGRAMMING HANDHELD SYSTEMS

ADAM PORTER

THE ANDROID PLATFORM

THE ANDROID PLATFORM

A SOFTWARE STACK FOR MOBILE DEVICES:

OS KERNEL, SYSTEM LIBRARIES, APPLICATION
FRAMEWORKS & KEY APPS

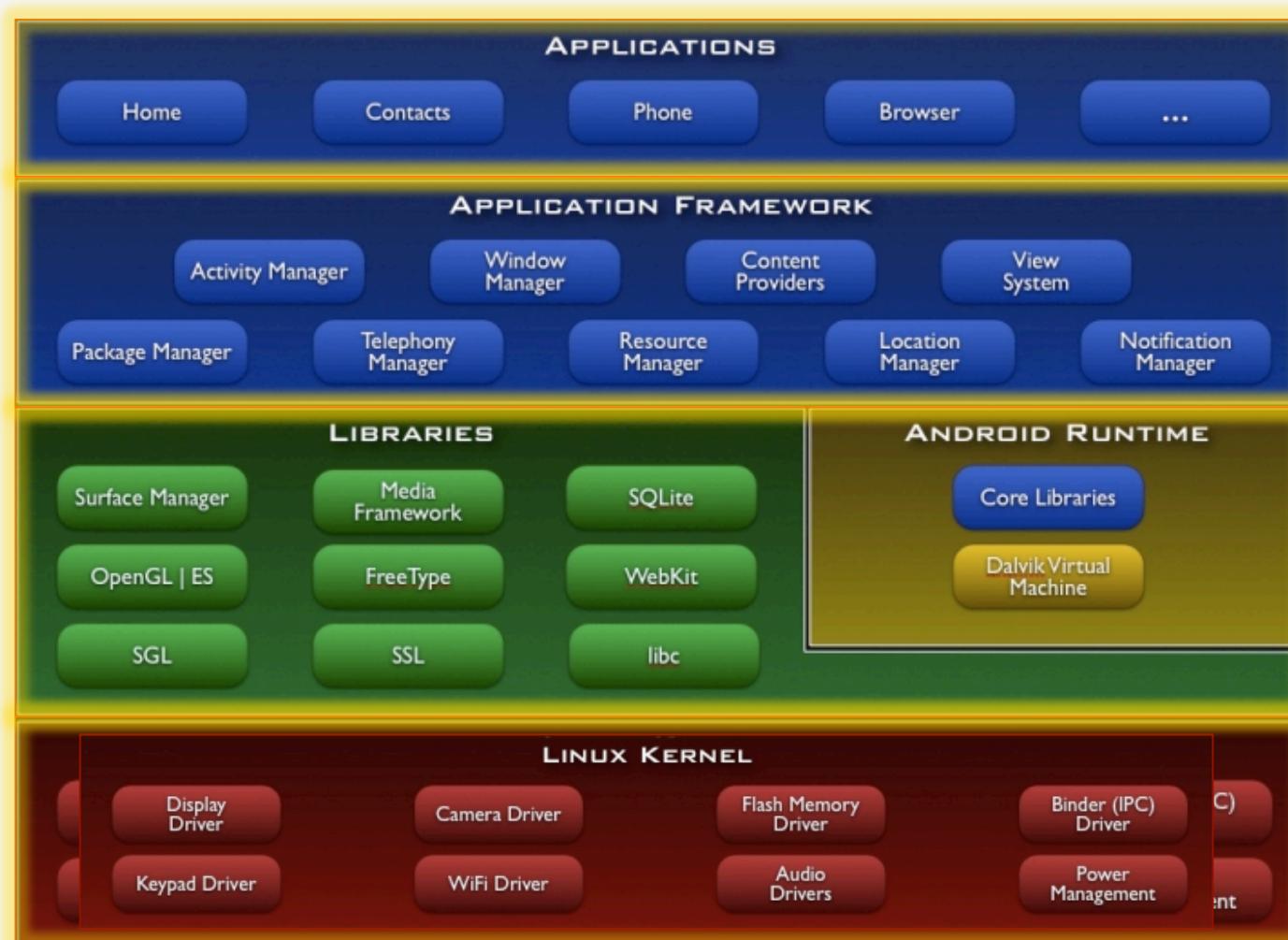
ANDROID SDK FOR CREATING APPS

LIBRARIES & DEVELOPMENT TOOLS

LOTS OF DOCUMENTATION. START BROWSING
TODAY!

SEE: [http://developer.android.com/
training](http://developer.android.com/training)

THE ANDROID ARCHITECTURE



LINUX KERNEL – STANDARD SERVICES

SECURITY

MEMORY & PROCESS MANAGEMENT

FILE & NETWORK I/O

DEVICE DRIVERS

LINUX KERNEL – ANDROID-SPECIFIC

POWER MANAGEMENT

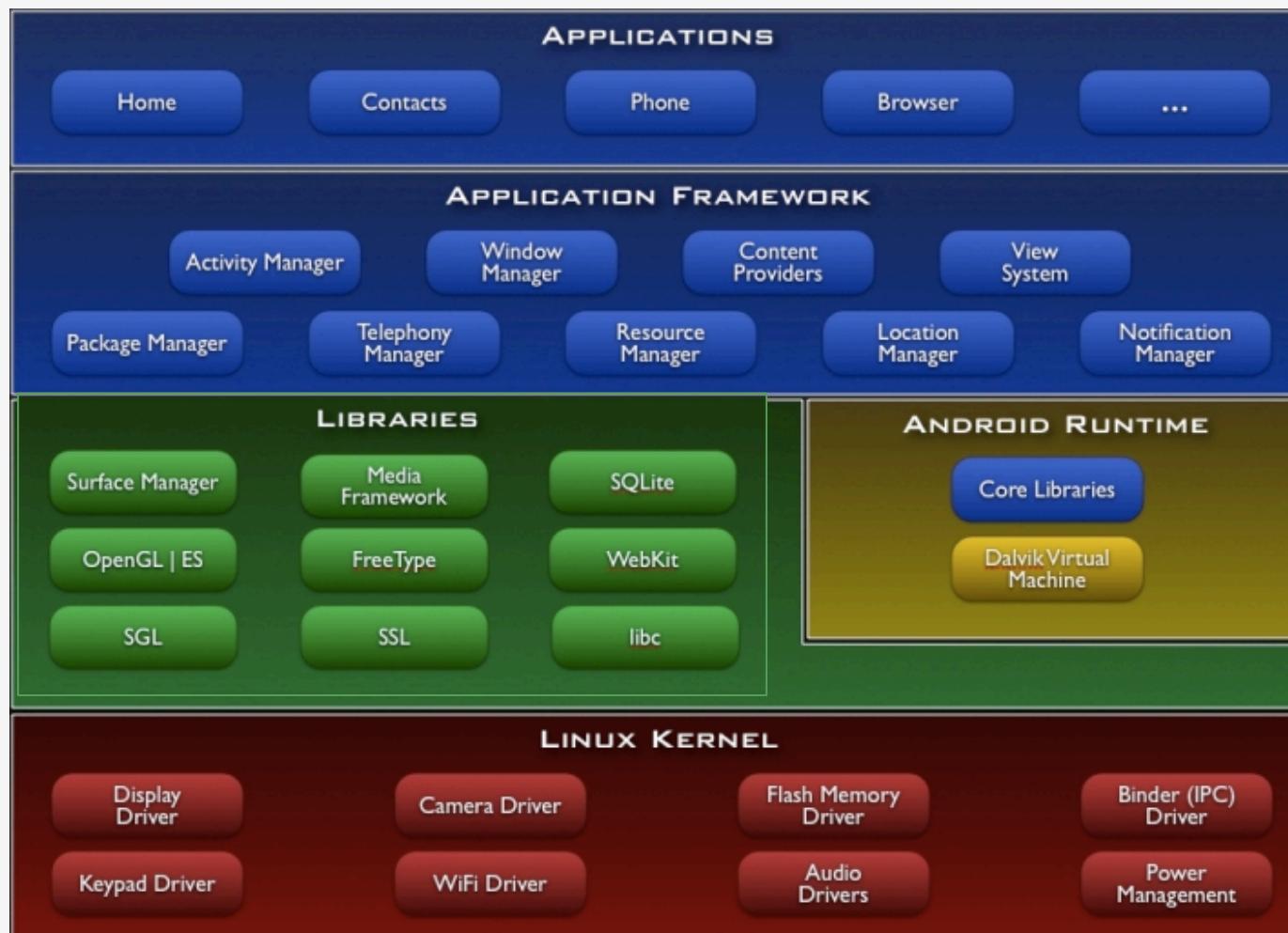
ANDROID SHARED MEMORY

LOW MEMORY KILLER

INTERPROCESS COMMUNICATION

AND MUCH MORE

THE ANDROID ARCHITECTURE



LIBRARIES

SYSTEM C LIBRARY

BIONIC LIBC

SURFACE MGR.

DISPLAY

MANAGEMENT

MEDIA

FRAMEWORK

AUDIO/ VIDEO

WEBKIT

BROWSER ENGINE

OPENGL

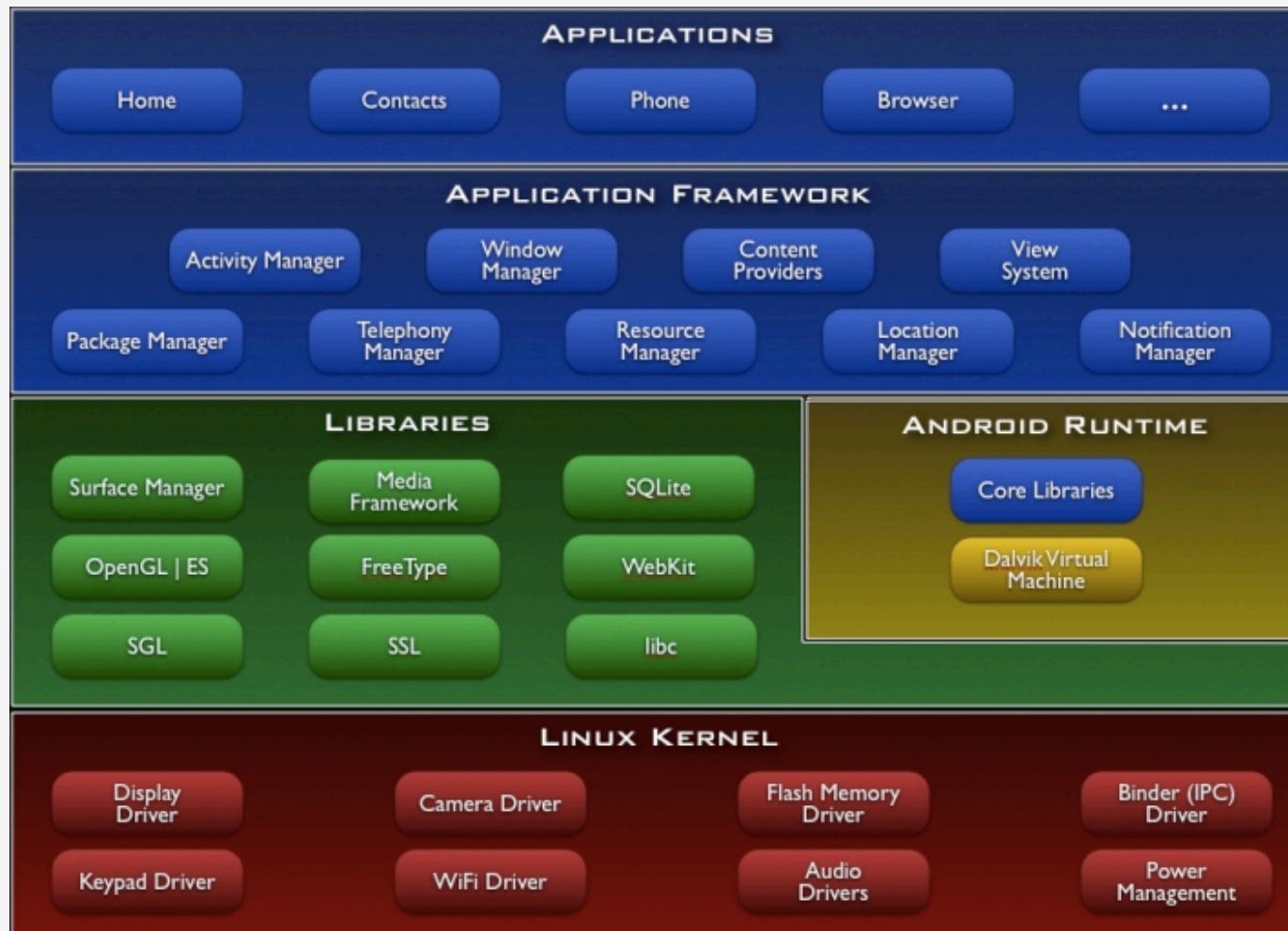
GRAPHICS ENGINES

SQLITE

RELATIONAL

DATABASE ENGINE

THE ANDROID ARCHITECTURE



ANDROID RUNTIME

TWO MAIN COMPONENTS

CORE JAVA LIBRARIES

DALVIK VIRTUAL MACHINE

CORE JAVA LIBRARIES

BASIC JAVA CLASSES -- JAVA.* , JAVAX.*

APP LIFECYCLE -- ANDROID.*

INTERNET/WEB SERVICES -- ORG. *

UNIT TESTING -- JUNIT.*

DALVIK VIRTUAL MACHINE

APPS ARE EXECUTED BY THE DALVIK
VIRTUAL MACHINE

TYPICAL WORKFLOW

APP WRITTEN IN JAVA

COMPILED TO JAVA BYTECODE FILES

DX CONVERTS JAVA BYTECODE FILES TO A
SINGLE DEX BYTECODE FILE (CLASSES.DEX)

DALVIK EXECUTES DEX BYTECODE FILE

DALVIK VIRTUAL MACHINE

DESIGNED FOR RESOURCE-CONSTRAINED
ENVIRONMENTS

SLOWER CPU

LESS RAM

LIMITED BATTERY LIFE

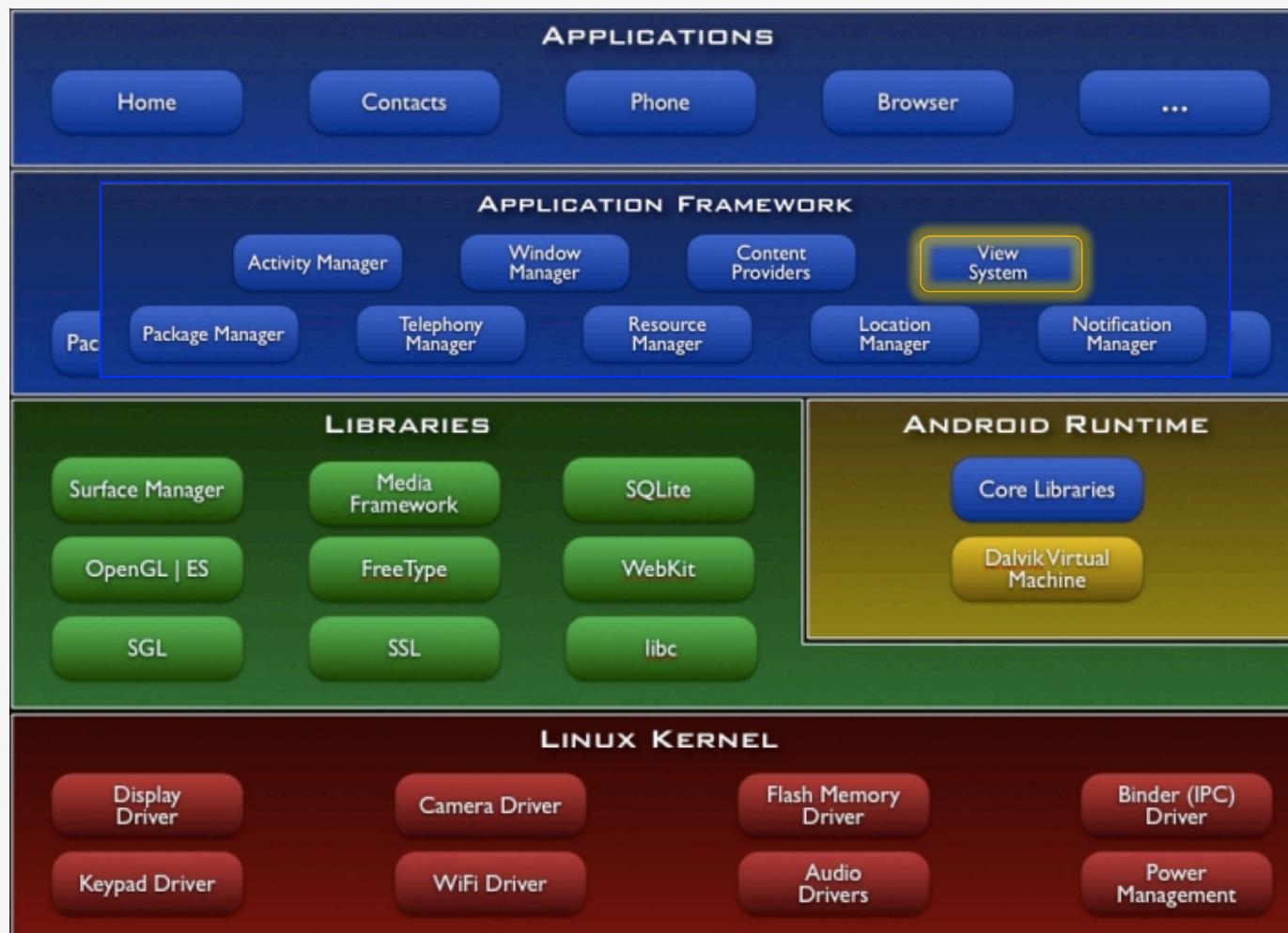
DALVIK VIRTUAL MACHINE

SEE:

DALVIK VM INTERNALS BY DAN BORNSTEIN

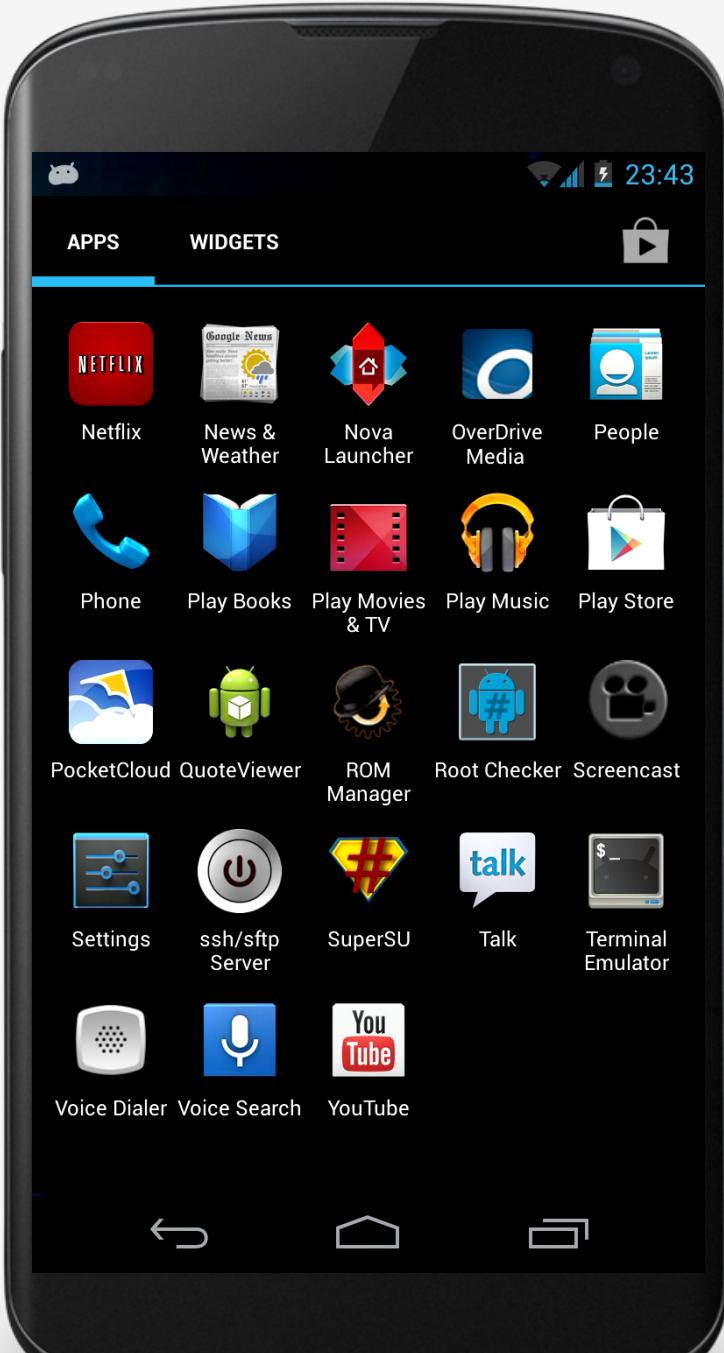
[http://www.youtube.com/watch?
v=ptjedOZEXPM](http://www.youtube.com/watch?v=ptjedOZEXPM)

THE ANDROID ARCHITECTURE



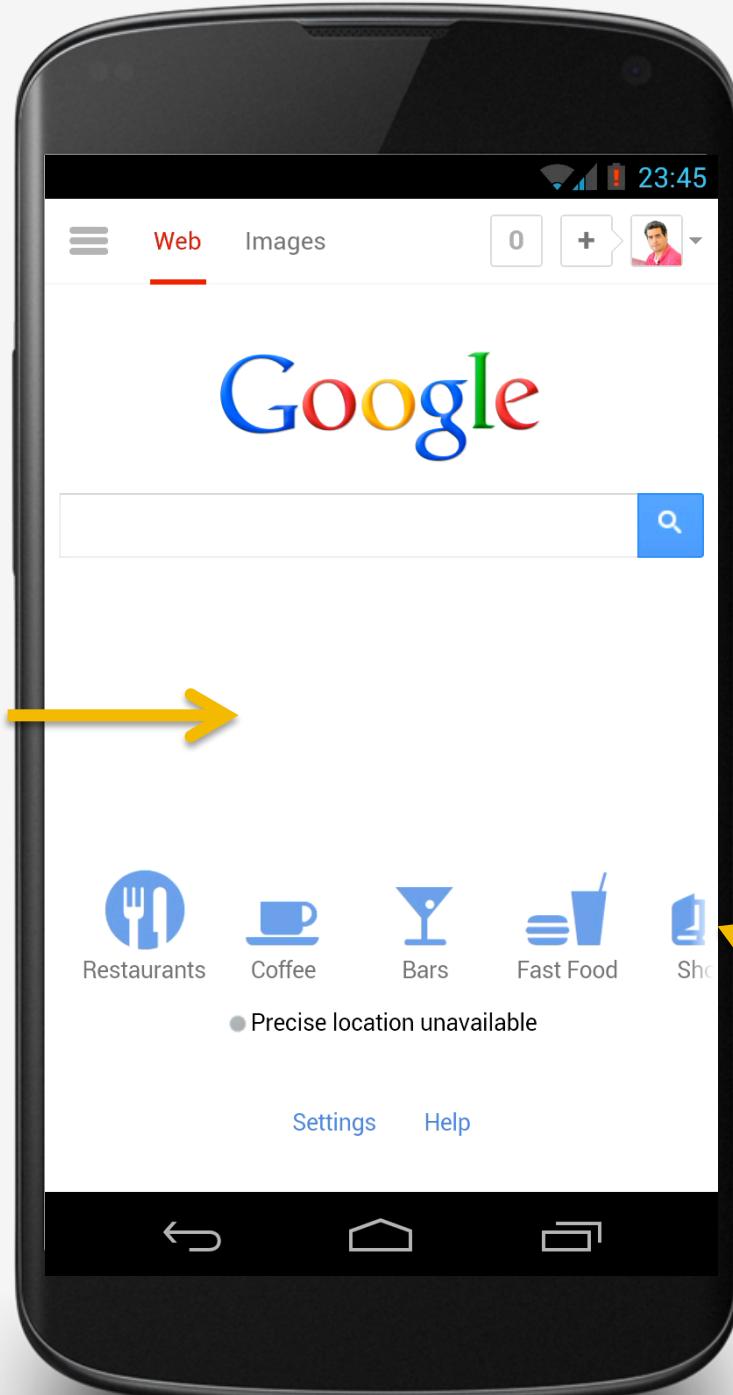
PACKAGE MANAGER

KEEPS TRACK OF APP PACKAGES ON
DEVICE



WINDOW MANAGER

MANAGES THE WINDOWS COMPRISING
AN APP



Subwindow

Notification
Bar

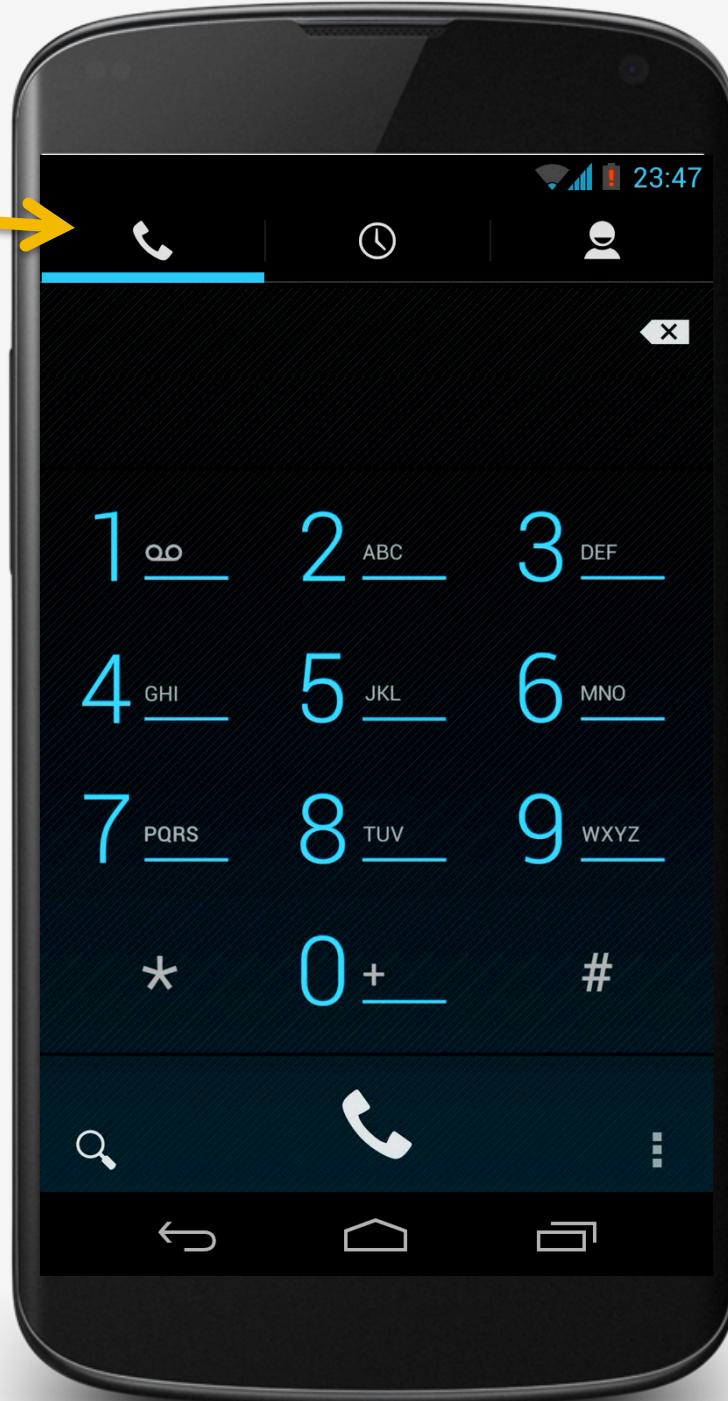
Main
Window

VIEW SYSTEM

PROVIDES COMMON USER INTERFACE ELEMENTS

E.G., ICONS, TEXT ENTRY BOXES, BUTTONS AND MORE

TABS



TEXTVIEW



(555) 555-5555

23:50

(+) Add to contacts

1 QWERTY 2 ABC 3 DEF

4 GHI 5 JKL 6 MNO

7 PQRS 8 TUV 9 WXYZ

0 + #

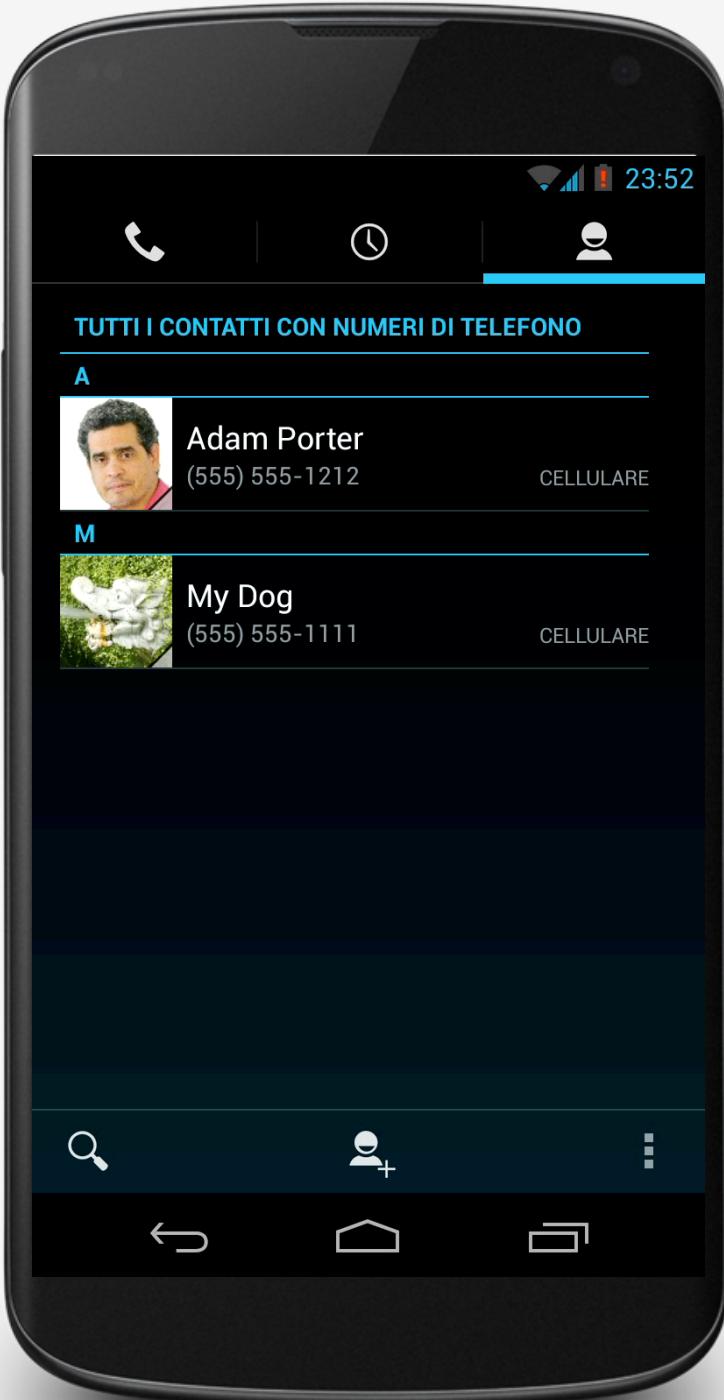
BUTTONS



RESOURCE MANAGER

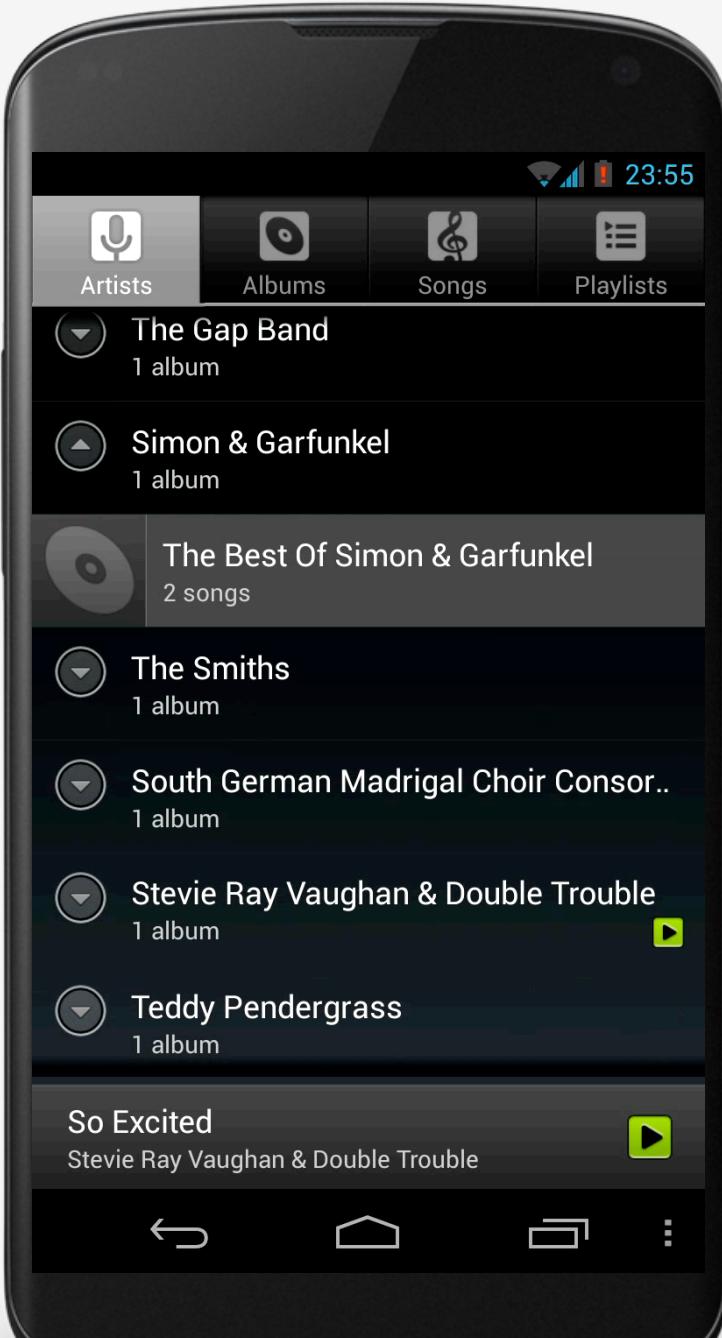
MANAGES NON-COMPILED RESOURCES

E.G., STRINGS, GRAPHICS, & LAYOUT FILES



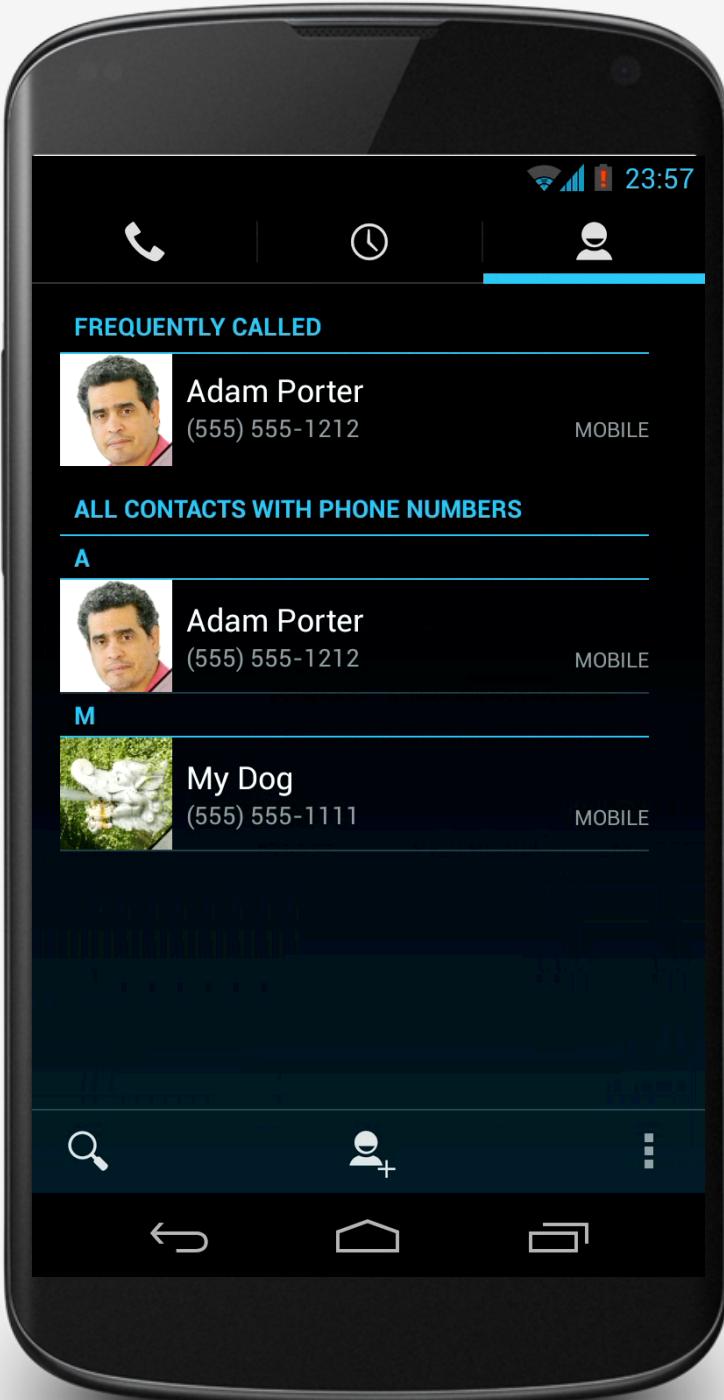
ACTIVITY MANAGER

MANAGES APP LIFECYCLE AND
NAVIGATION STACK



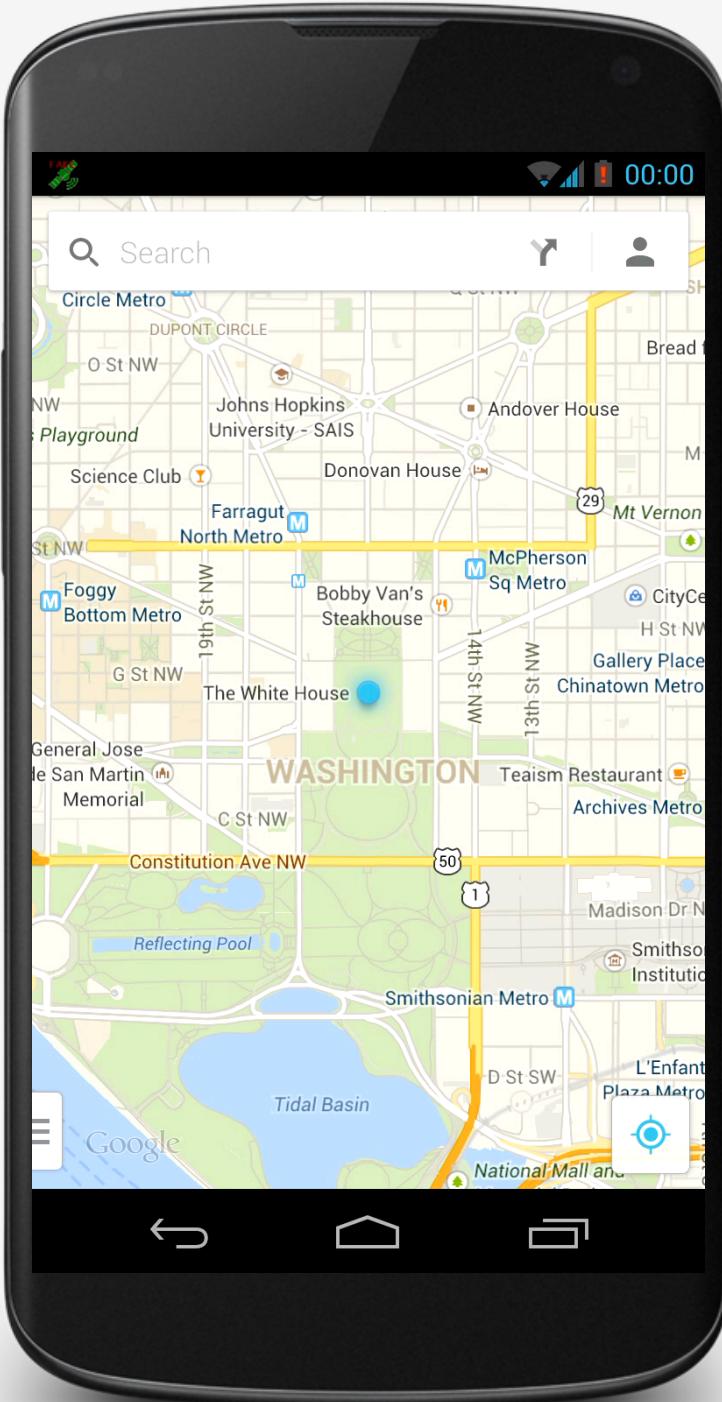
CONTENT PROVIDER

INTER-APPLICATION DATA SHARING



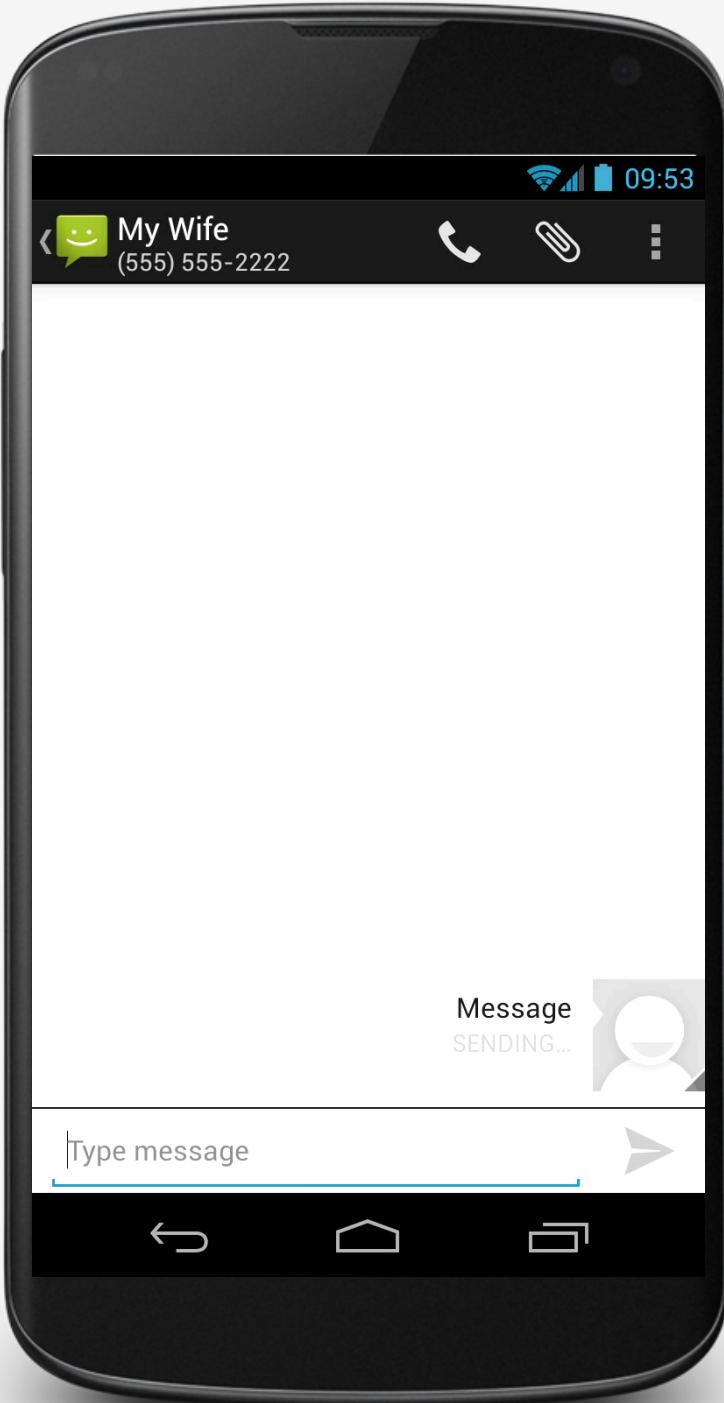
LOCATIONMANAGER

PROVIDES LOCATION & MOVEMENT
INFORMATION



NOTIFICATIONMANAGER

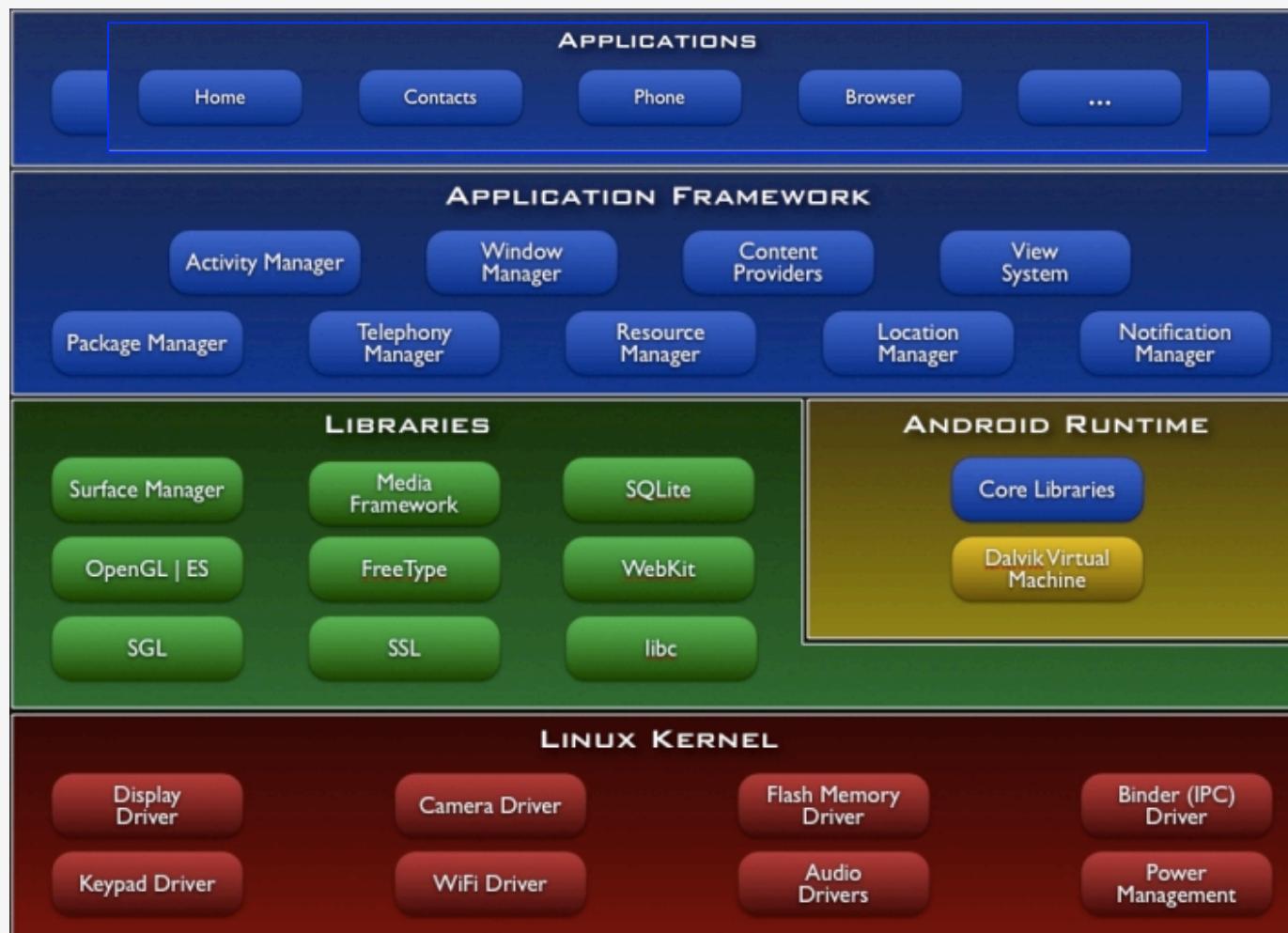
PLACE NOTIFICATION ICONS IN THE STATUS
BAR WHEN IMPORTANT EVENTS OCCUR



NOTIFICATION



THE ANDROID ARCHITECTURE



APPLICATIONS



STANDARD APPS INCLUDE:

HOME – MAIN SCREEN

CONTACTS – CONTACTS DATABASE

PHONE – DIAL PHONE NUMBERS

BROWSER – VIEW WEB PAGES

EMAIL READER – COMPOSE & READ EMAIL
MESSAGES

APPLICATIONS

NOTHING SPECIAL ABOUT THESE APPS

YOU CAN SUBSTITUTE YOUR OWN OR 3RD
PARTY APP FOR ANY OF THEM

NEXT TIME

ANDROID DEVELOPMENT ENVIRONMENT