

# PROGRAMMING HANDHELD SYSTEMS

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# THE ANDROID PLATFORM

# THE ANDROID PLATFORM

A SOFTWARE STACK FOR MOBILE DEVICES:

OS KERNEL, SYSTEM LIBRARIES, APPLICATION  
FRAMEWORKS & KEY APPS

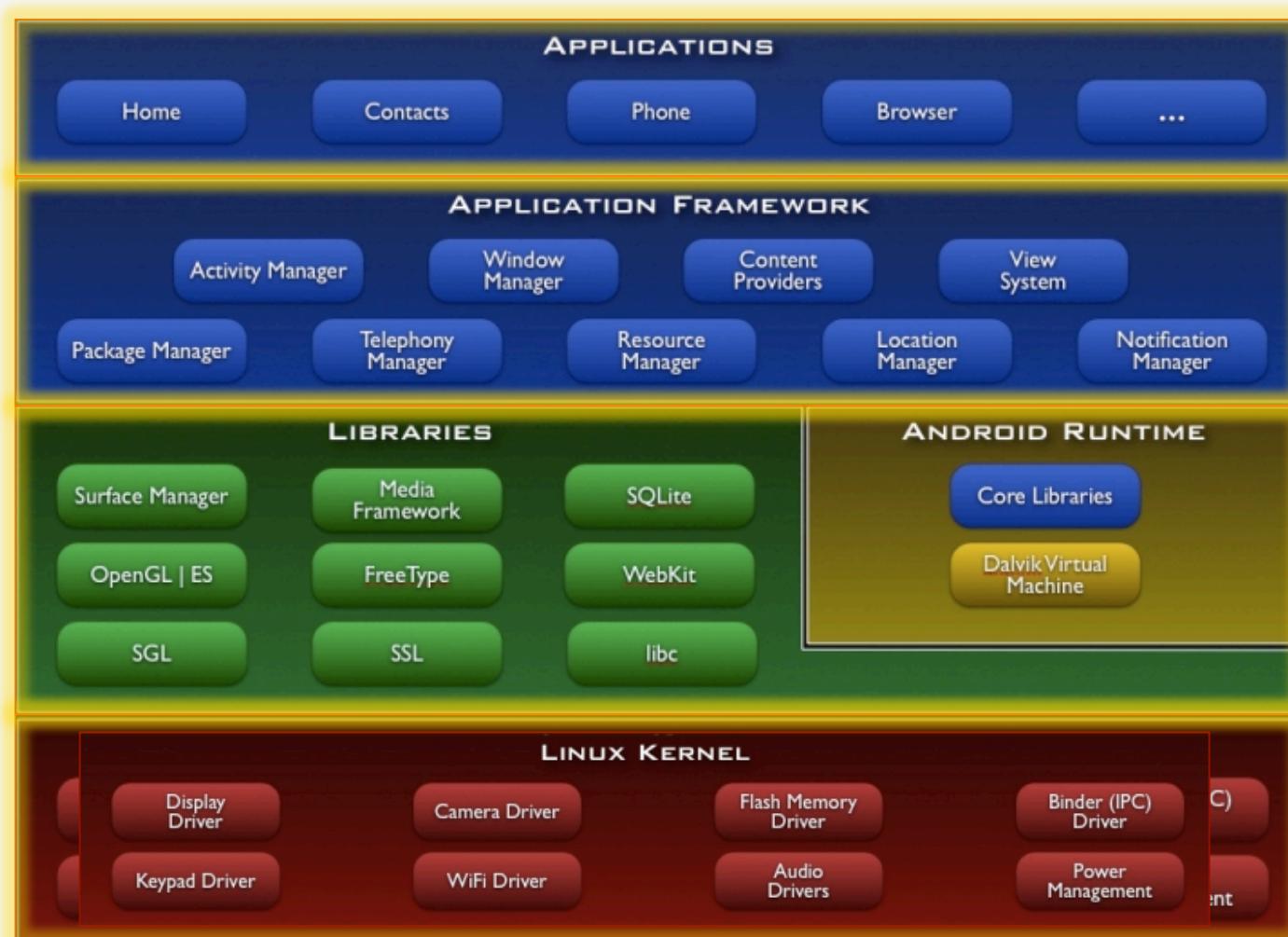
ANDROID SDK FOR CREATING APPS

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

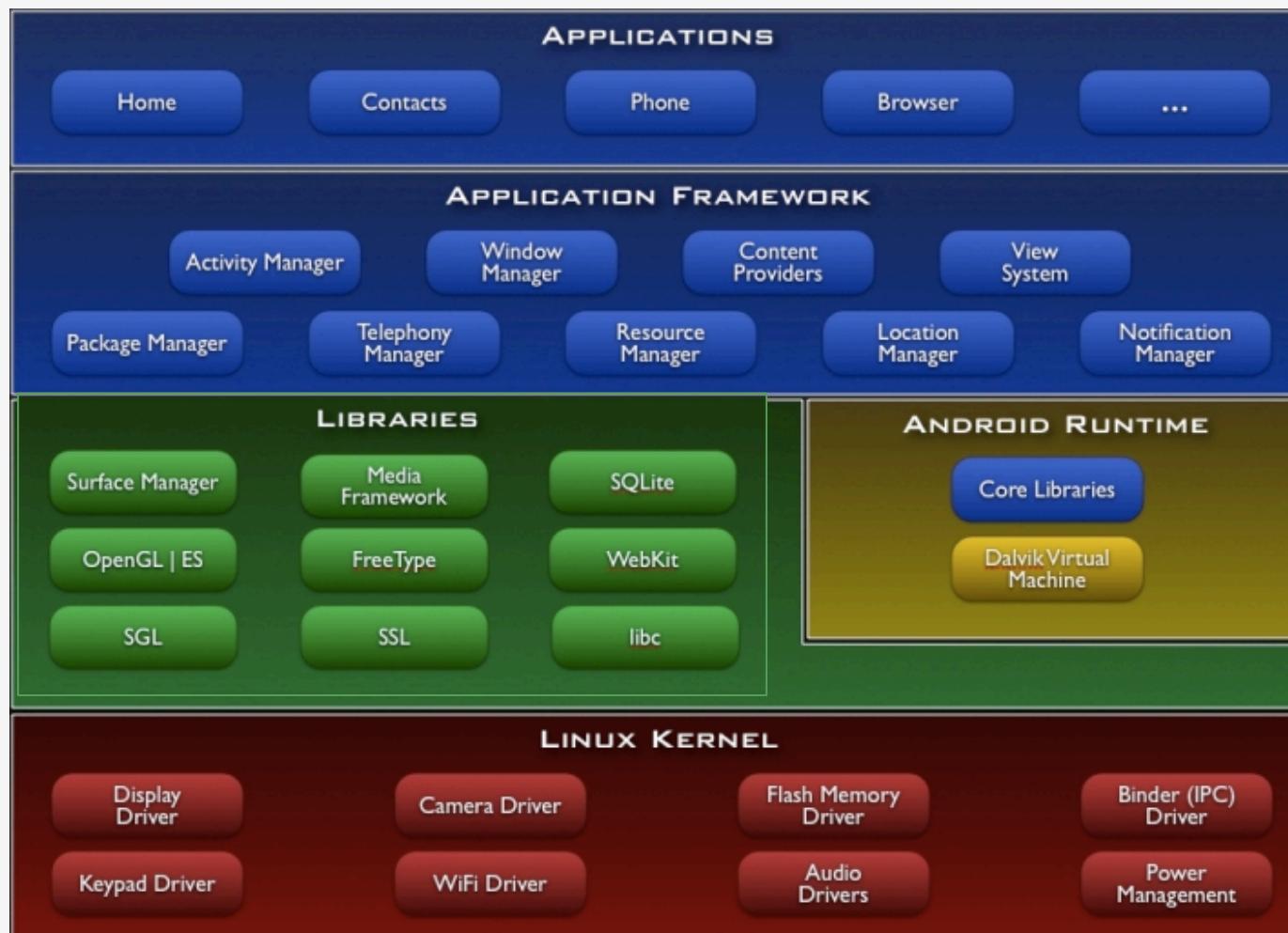
ANDROID SHARED MEMORY

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

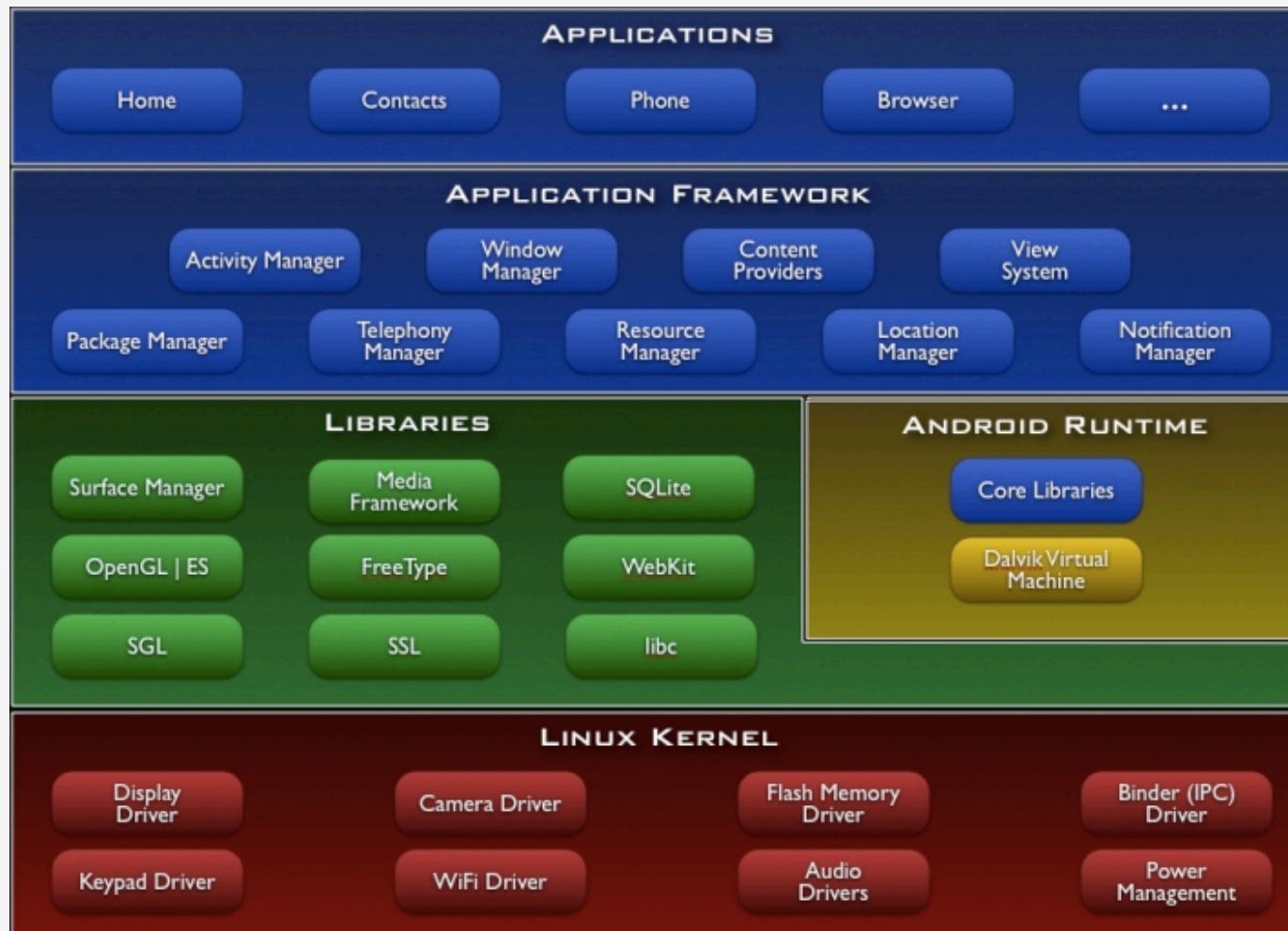
GRAPHICS ENGINES

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

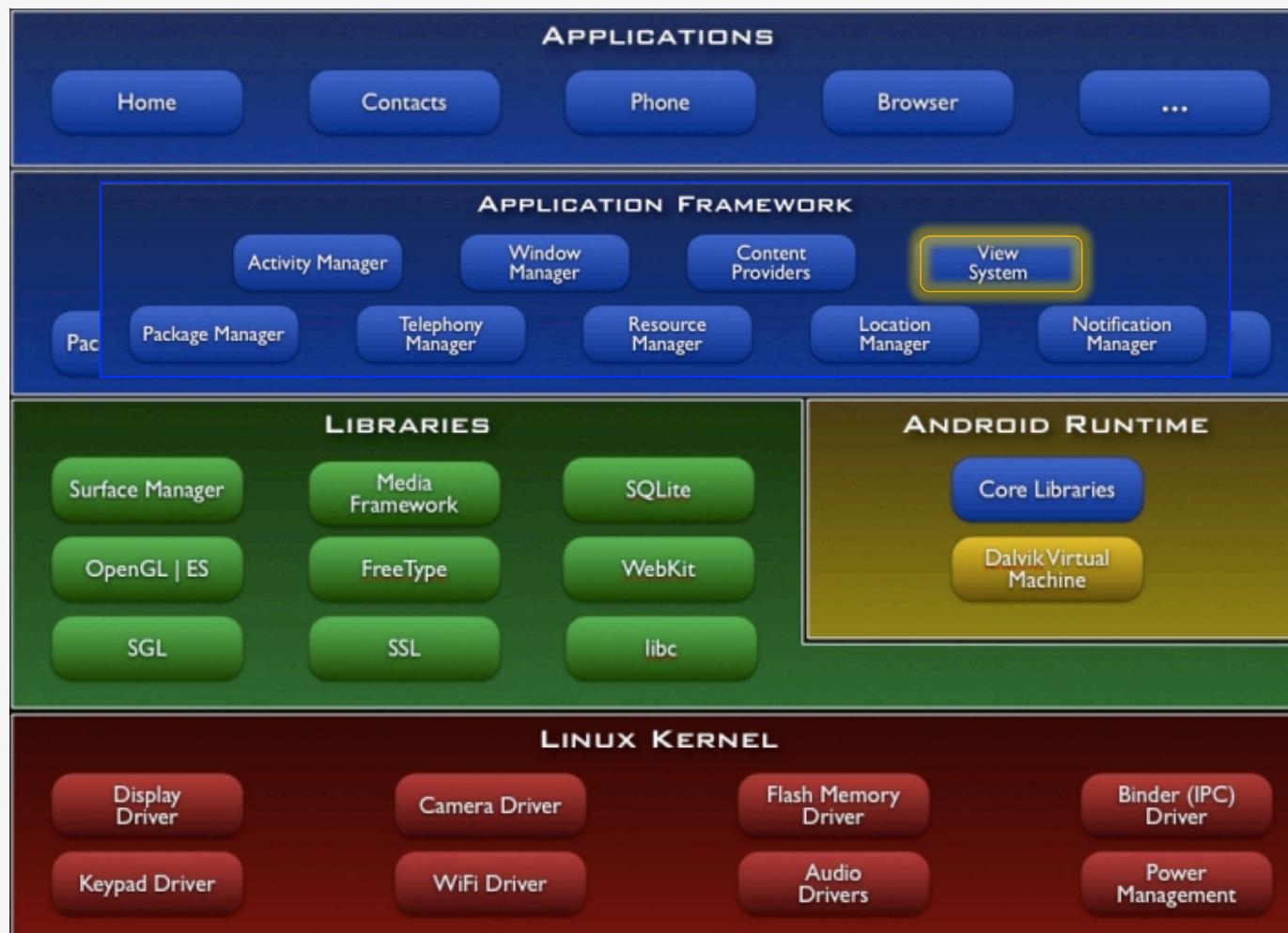
# DALVIK VIRTUAL MACHINE

SEE:

DALVIK VM INTERNALS BY DAN BORNSTEIN

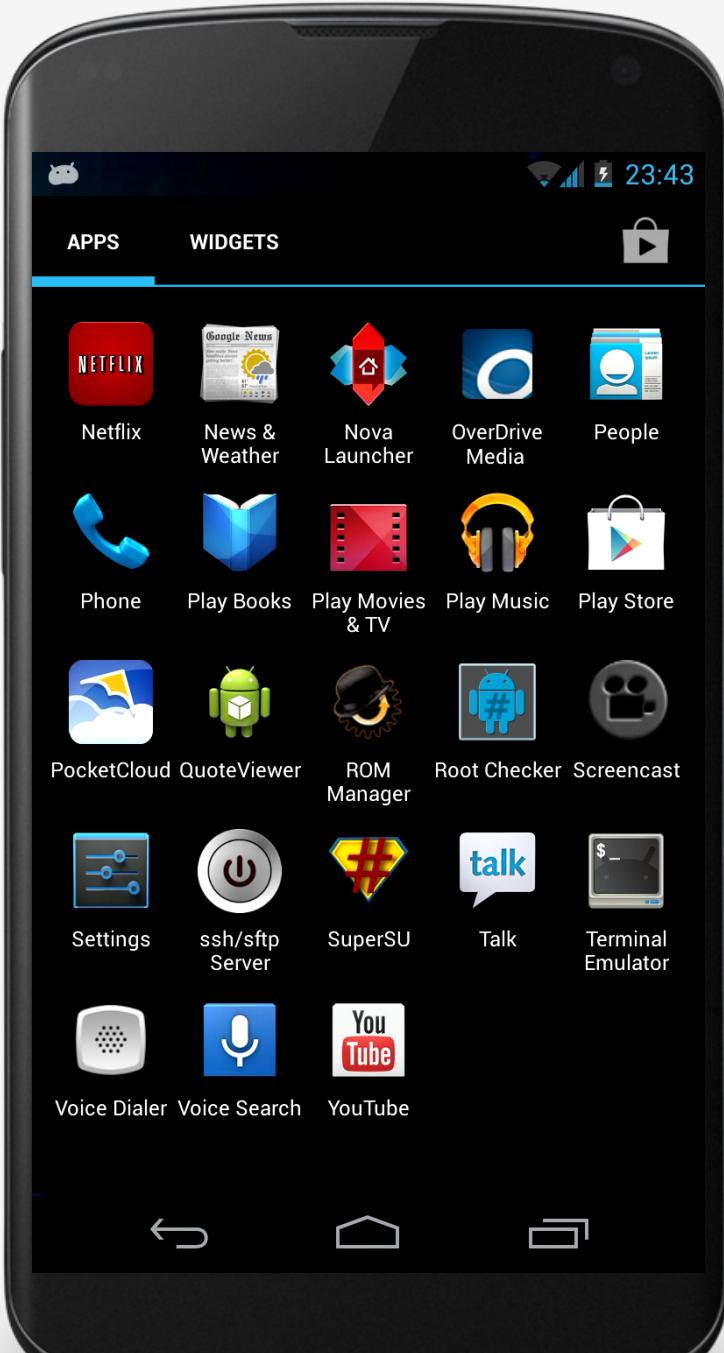
[http://www.youtube.com/watch?  
v=ptjedOZEXPM](http://www.youtube.com/watch?v=ptjedOZEXPM)

# THE ANDROID ARCHITECTURE



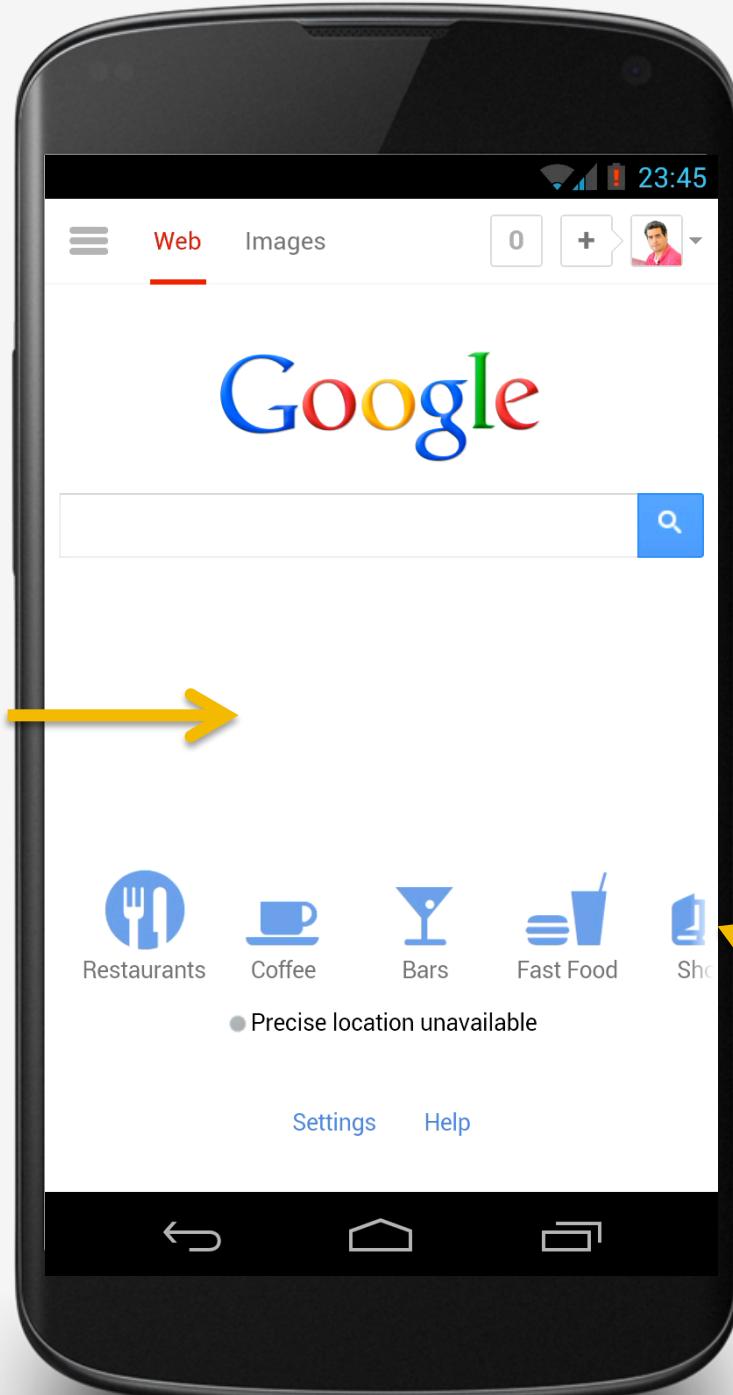
# PACKAGE MANAGER

KEEPS TRACK OF APP PACKAGES ON  
DEVICE



# WINDOW MANAGER

MANAGES THE WINDOWS COMPRISING  
AN APP



Subwindow

Notification  
Bar

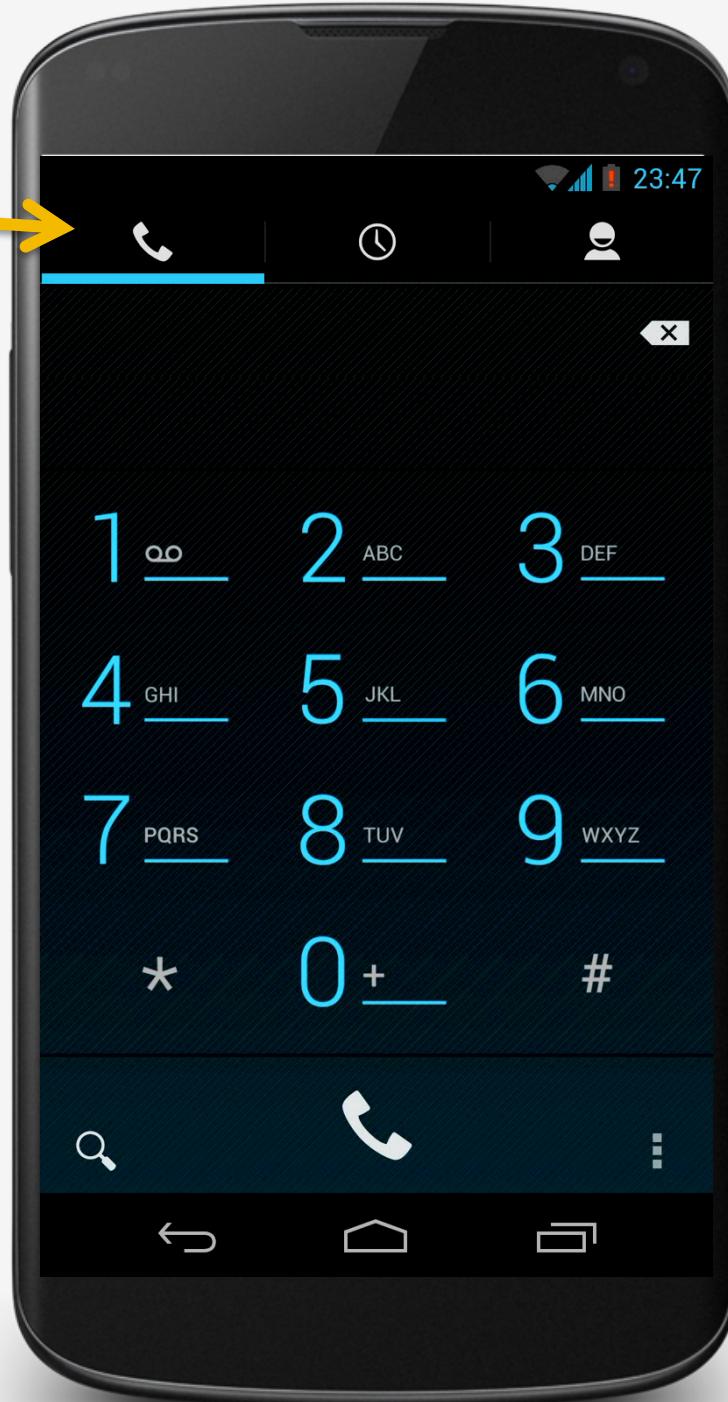
Main  
Window

# 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 + #

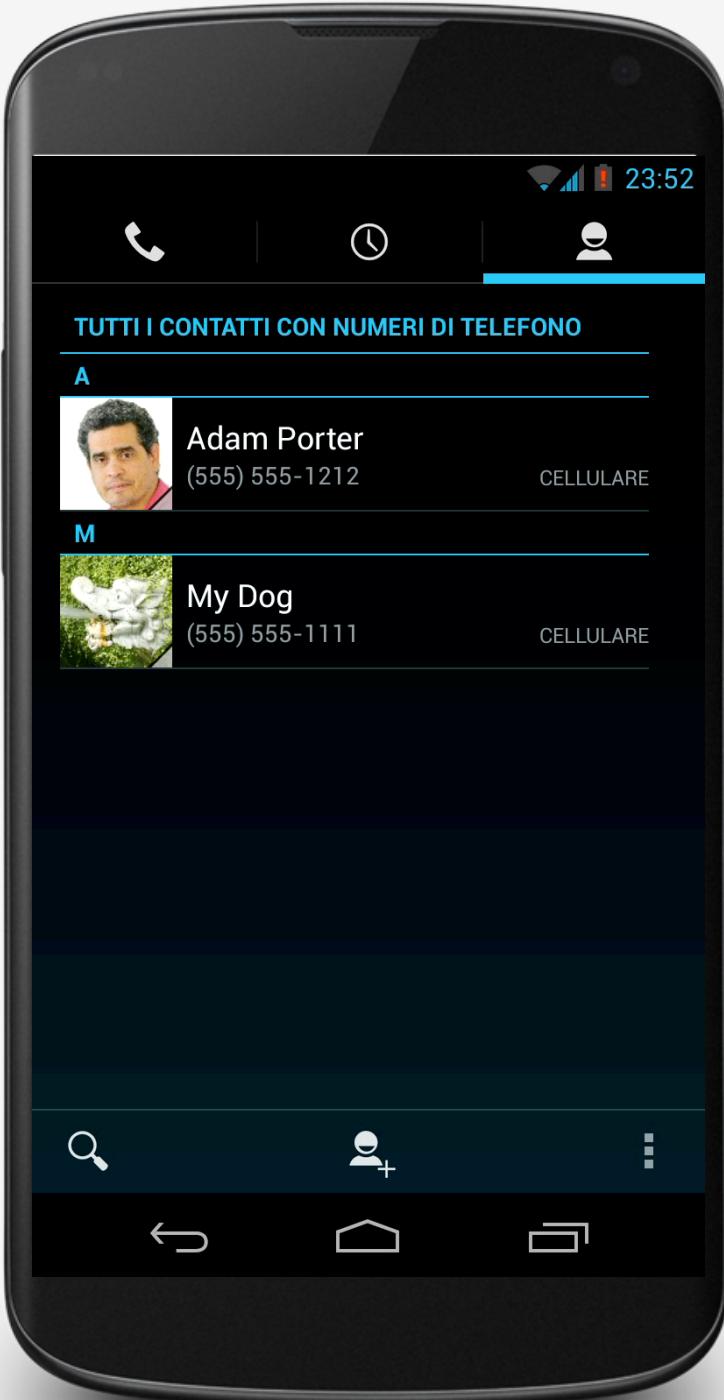
BUTTONS



# RESOURCE MANAGER

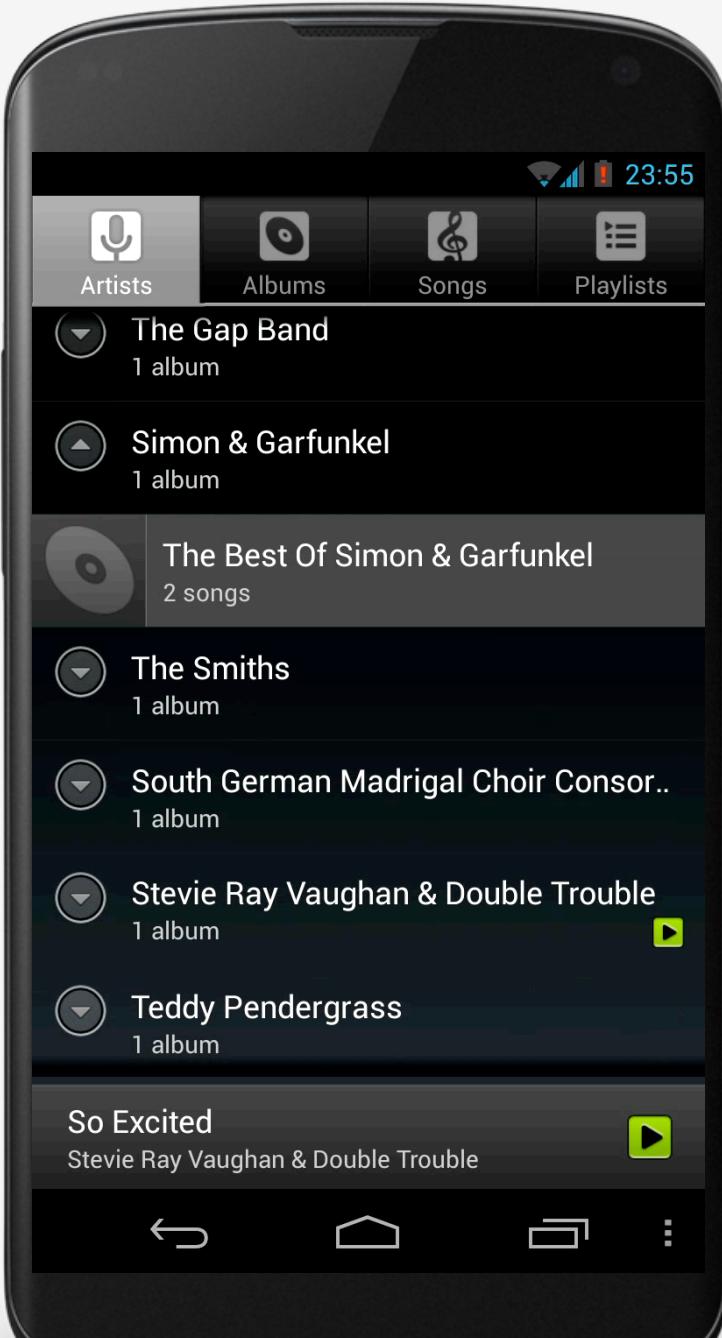
MANAGES NON-COMPILED RESOURCES

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



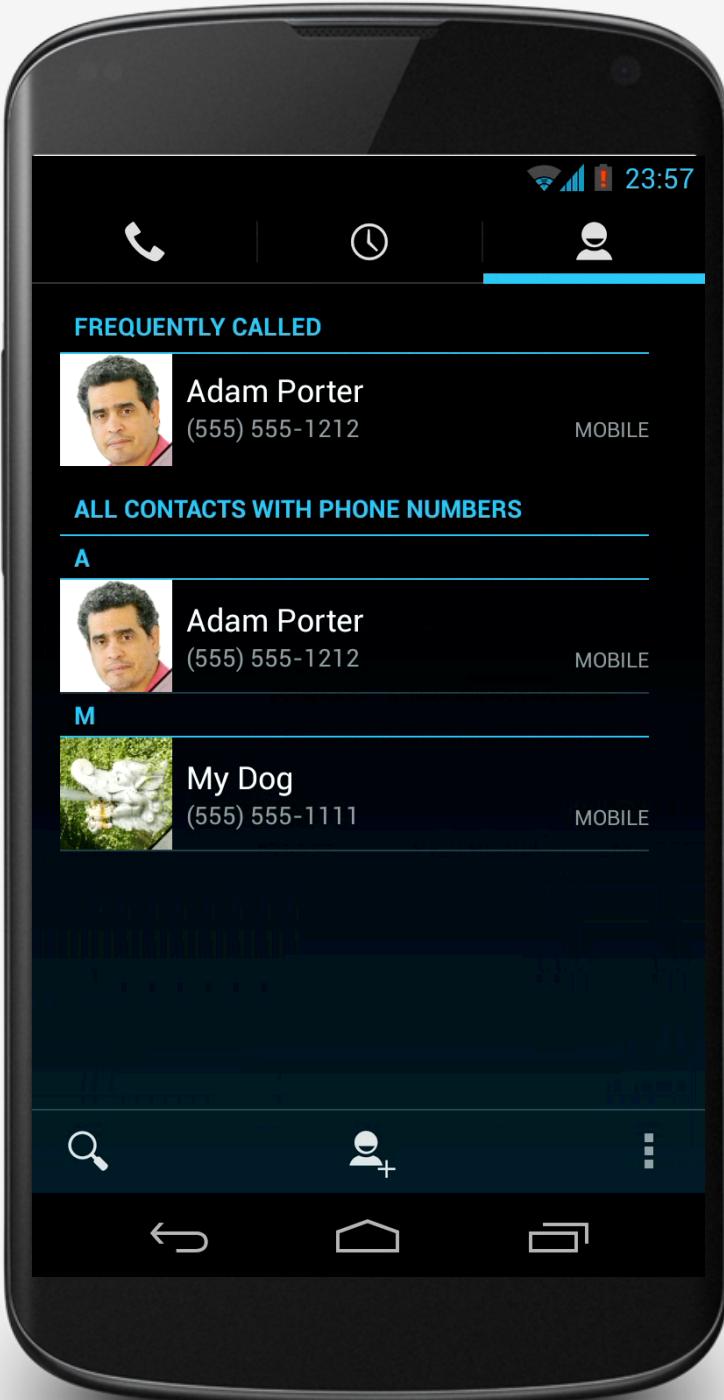
# ACTIVITY MANAGER

MANAGES APP LIFECYCLE AND  
NAVIGATION STACK



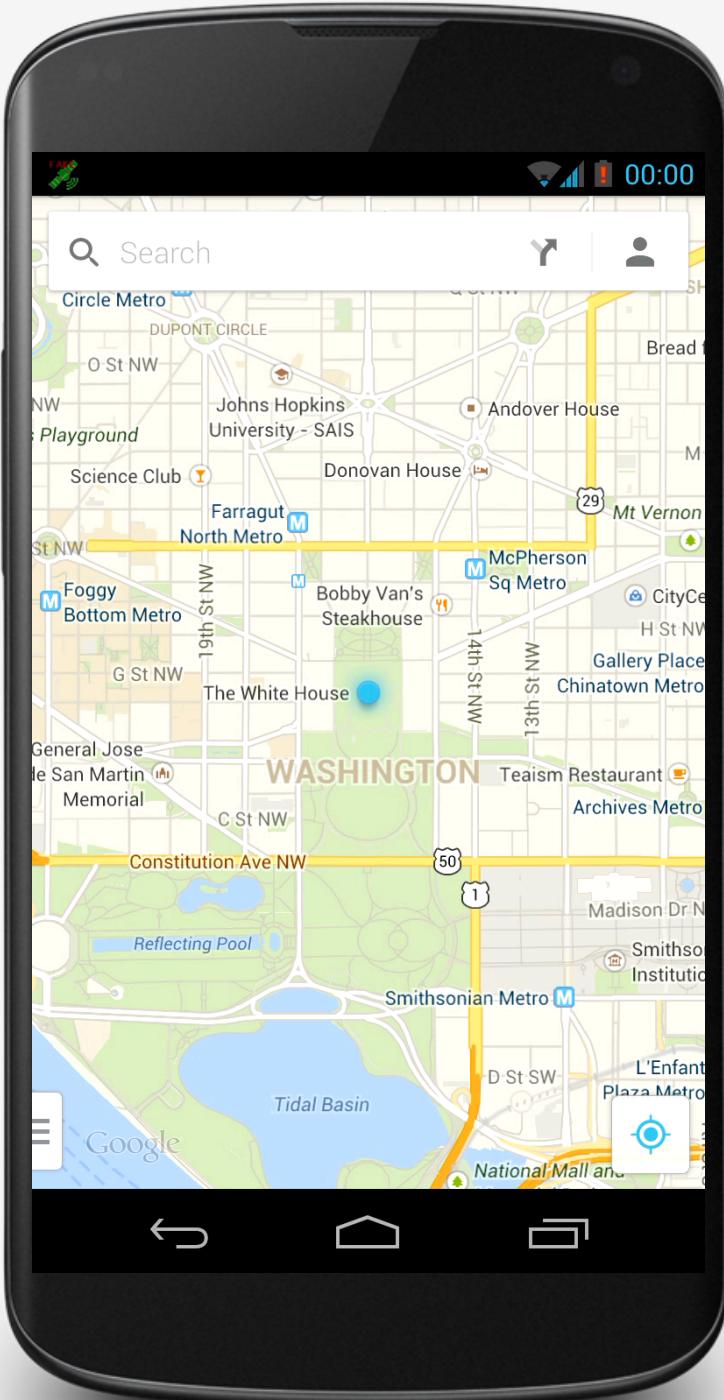
# CONTENT PROVIDER

## INTER-APPLICATION DATA SHARING



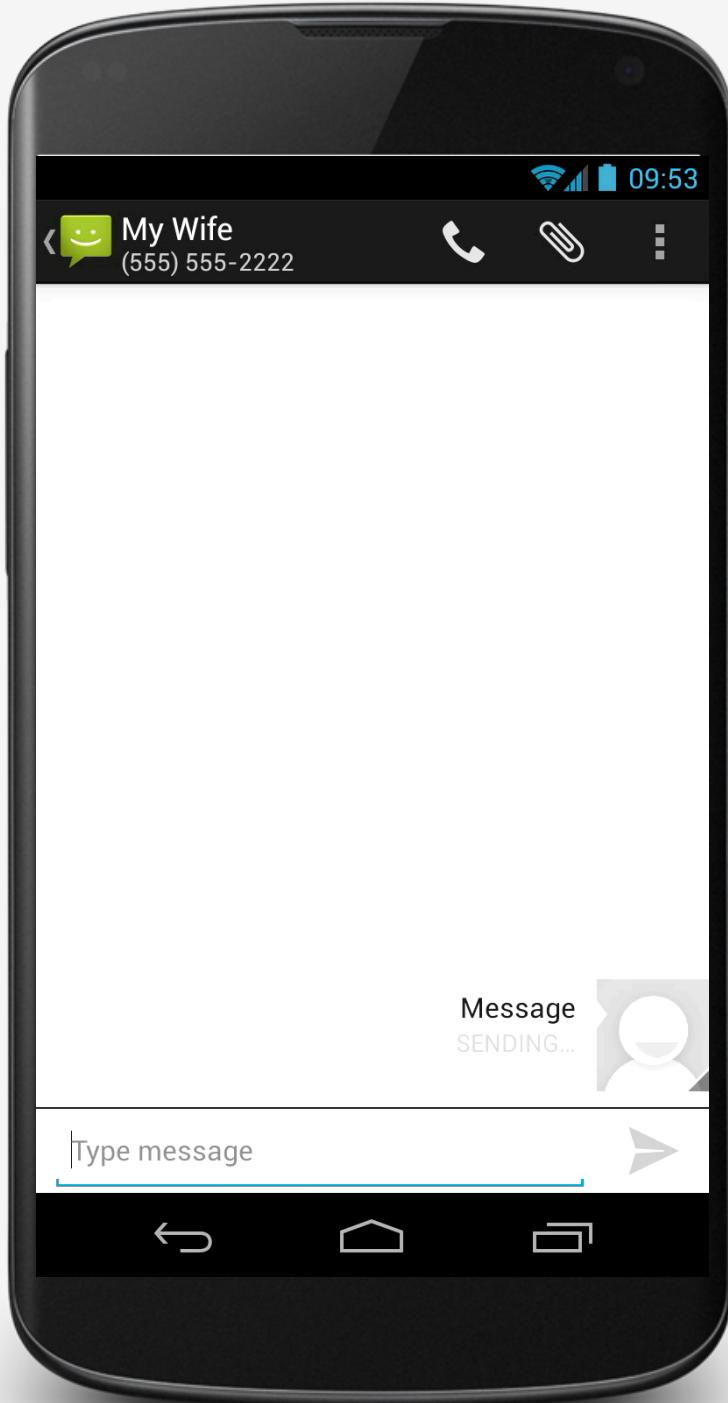
# LOCATIONMANAGER

PROVIDES LOCATION & MOVEMENT  
INFORMATION

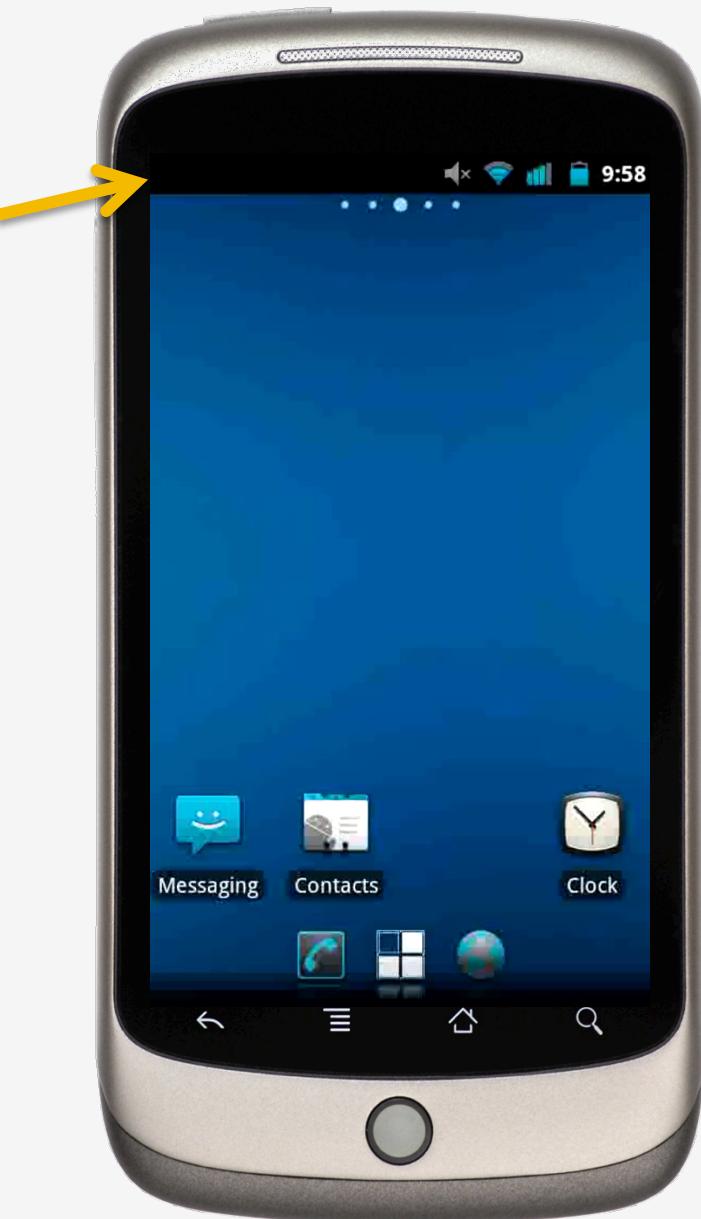


# NOTIFICATIONMANAGER

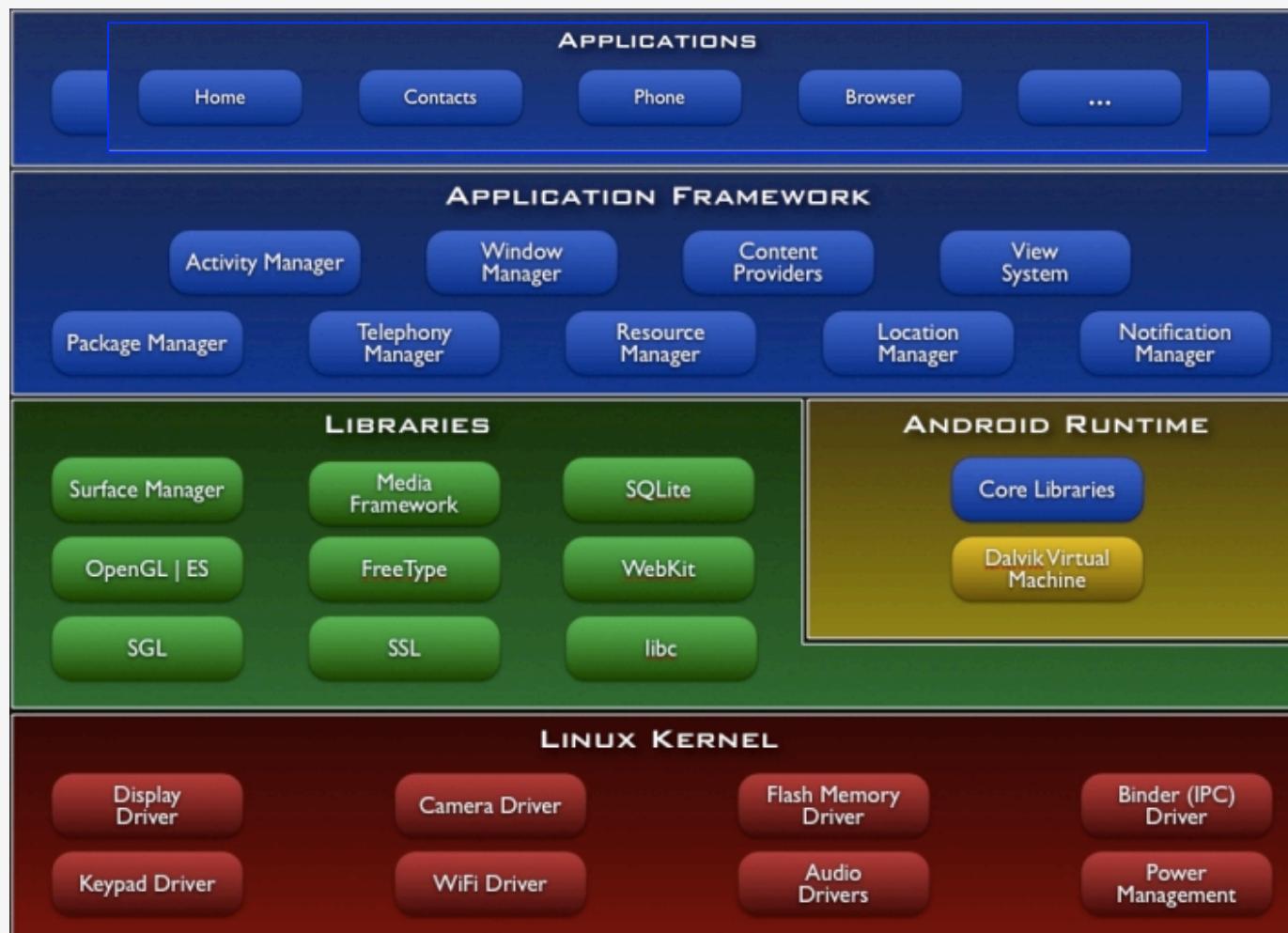
PLACE NOTIFICATION ICONS IN THE STATUS  
BAR WHEN IMPORTANT EVENTS OCCUR



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