

Developer's overview of the Android platform

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ANDROID Overview

- Vendors and licensing
- Application distribution
- Platform architecture
- Application architecture
- GUI and other components
- Inter-app communication
- Development tools

Android Devices

- Devices from multiple vendors
- Available now:
 - HTC Dream, Magic, Hero, Tattoo
 - Samsung Galaxy
 - Motorola Droid
- Others like Sony Ericsson and Acer are also planning

Samsung Galaxy



Motorola Droid



HTC Hero



HTC Tattoo



Devices, licensing , and openness

- Open Handset Alliance
- Free and open source mobile platform, including OS, middleware and key applications
- Regular retail devices can be used to test and use applications
- Android Dev Phone 1
 - SIM-unlocked and hardware-unlocked development device
 - Currently ships to 28 countries worldwide.



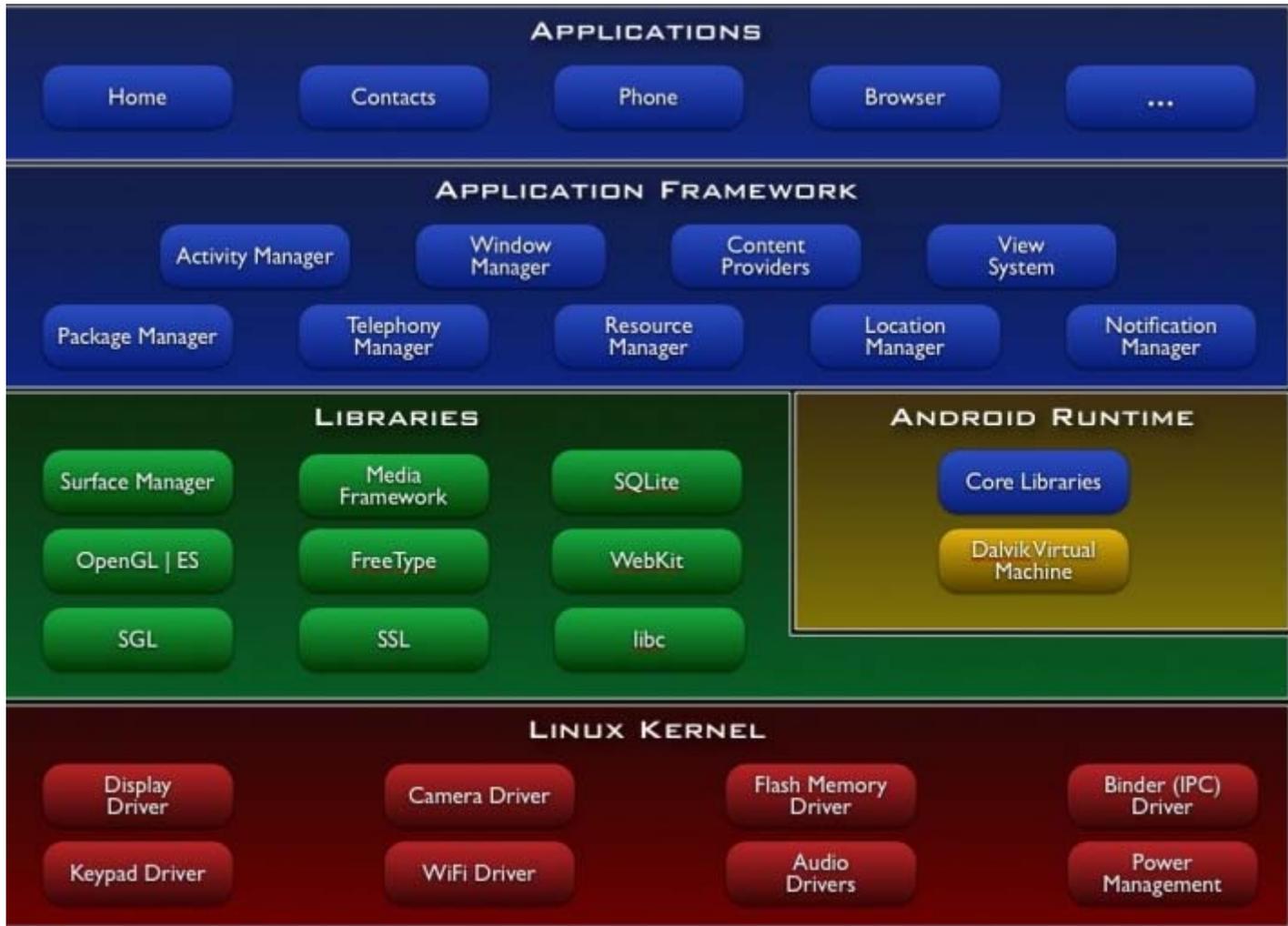
Distributing your applications

- Developers can publish their applications through Android Market
- To become a publisher of applications in the Android Market requires registration and a fee (\$25)
- Currently only developers from 9 countries can sell applications
- Publishers of free applications can be from numerous countries
- Free applications can be distributed to 25 countries and paid applications to 11 countries
- For Norway, only free applications are currently supported

Acquiring and deploying applications

- Applications can be acquired by users through Android Market
- Applications are acquired directly from Android Market to the device. Currently Market is not viewable outside the device.
- All code for an application is bundled as an Android package for distribution and deployment
- Updates to installed applications are available when visiting My Downloads under Android Market.

Architecture overview



Source: <http://developer.android.com/guide/basics/what-is-android.html>

Runtime model / processes for application

- Full multitasking
- Default: every application has separate Linux process
- Each process has its own Java VM
- To conserve resources it is possible to allow applications to run in the same process, sharing the same VM
- These YouTube videos shows how [home screen](#) and [home button](#) is used to switch between applications

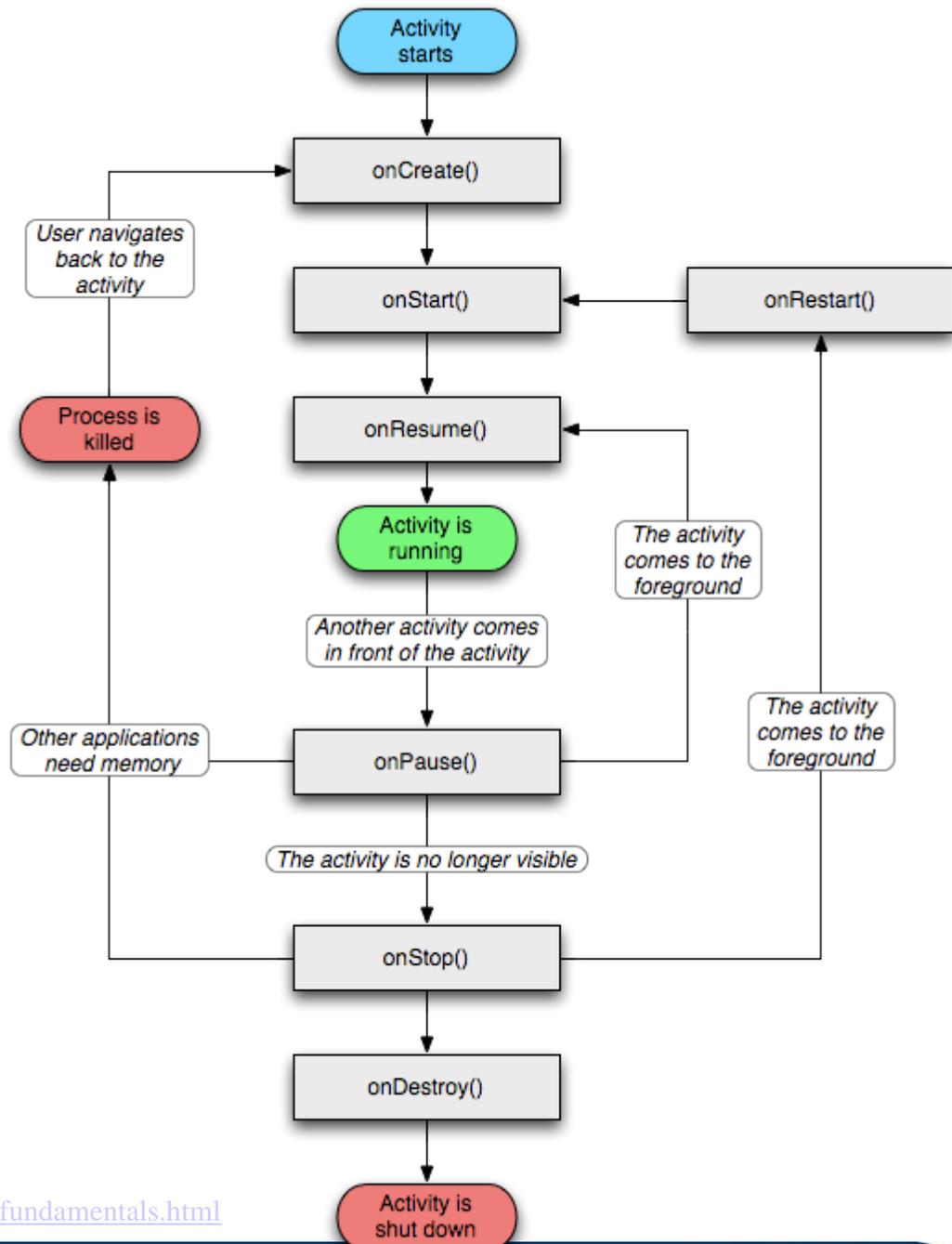
Application Architecture

- No main() function for applications
- Four kinds of components, an application may have multiple of each.
- Activity:
 - presents user interface
- Service:
 - runs in background without user interface
- Broadcast receivers:
 - only receives and reacts to broadcast announcements
- Content providers:
 - makes set of application data available to other applications

Activities, tasks, intents

- A task is a group of activities arranged as a stack (seen from the user as an application)
- One activity can start other activities
- Activities from different applications can part of the same task (but belong to different processes)
- Activities, services and broadcast receivers are activated through asynchronous messages called *intents*
- An intent names an action and a data URI
- Intents supported by components are declared in the application's manifest
- See this [YouTube video](#) for illustration

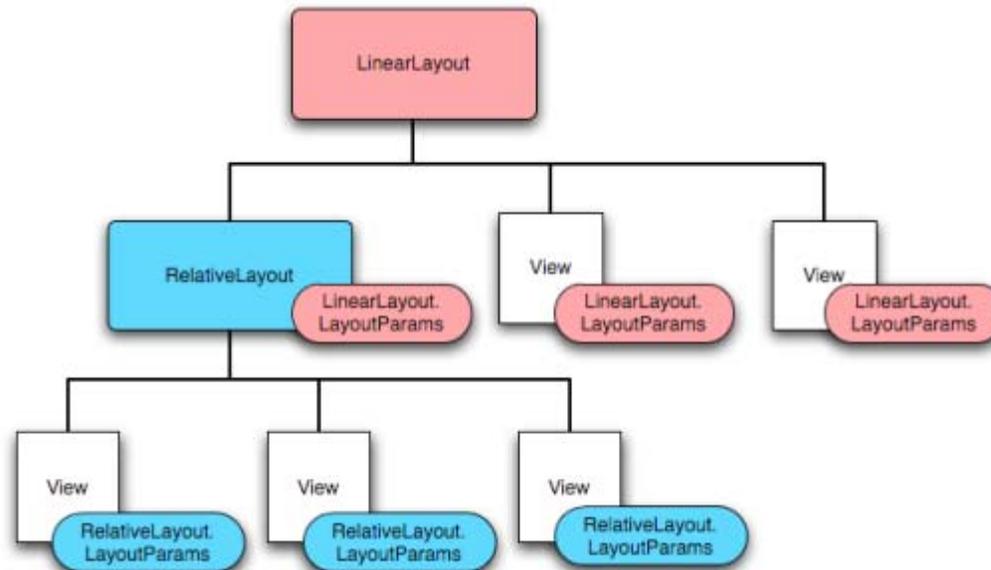
Lifecycle of activities



Source: <http://developer.android.com/guide/topics/fundamentals.html>

User interfaces

- Views are basic units of UI, view groups
- View groups, such as layouts, provide hierarchy and organization such as linear, tabular, etc.
- Rich set of widgets (concrete views such as buttons, text view, image view, etc)
- Activities have a content view



Source: <http://developer.android.com/guide/topics/ui/declaring-layout.html>

High level components

- Map View (as add-on), supports overlays
- Web View
- Video View
- Media Controller

- In addition activities from other applications are integrated through intents

ANDROID Inter-application communication

- Launch other activities using intents with action and URI
- Components register intent filters they react to
- Copy / paste between applications
- Content Providers gives access to data from other applications
- Components can bind to services also of other applications, and perform remote procedure calls to interfaces declared using an IDL

Examples of URLs and intent actions

- ACTION_SEND
- CALL tel:2125551212
- ACTION_EDIT content://contacts/1
- VIEW http://web_address
- VIEW geo:0,0?q=my+street+address
- ACTION_GET_CONTENT
- ACTION_REBOOT

- List of intents for Google apps:
<http://developer.android.com/guide/appendix/g-app-intents.html>

ANDROID Device access

- Sensors including accelerometer, proximity, light, temperature, ...
- Positioning, location provides, GPS status
- Camera including settings, preview, snap picture
- Bluetooth API added in Android 2.0
- API for accessing current state and listening to state changes for in telephone (network type, cell ids, calls, data traffic...)

אנדרואיד File management

- Default: each application has a unique Linux user id, and application files are only visible to that user id

ANDROID Programming languages

- All applications are developed in Android's Java – also the built-in applications that come with the phone
- Dalvik VM specific to Android
- Android-specific bytecode optimized for minimal memory footprint
- Libraries do not match any of the standard Java profiles, but covers most of J2ME CDC

- Free SDK available for Windows, Mac, and Linux development
- Any Java development environment can be used, although Eclipse has most support
- Free tools include:
 - Android Development Tools plugin for Eclipse
 - Android Emulator
 - Memory and performance profiling
 - Debugging tools
 - UI stress-test tools

ANDROID References

- Android's developer guide
 - Site: <http://developer.android.com/guide/>
 - Illustrations from:
 - [What is Android?](#)
 - [Application Fundamentals](#)
 - [User Interface – Declaring Layouts](#)