

Presentation

First steps into the Android world



Outline

- Let me introduce myself
- The state of the competitive marketplace
- Android Architecture
- Operating System
- Programming language
- Database
- Educational links
- Books
- Conclusion & my contact information

**** text in [yellow](#) is a web link and text in [green](#) is a local file ****

Your presenter



John A. Mahady

Andrew Information Services

Wheaton, IL

On November 5, 2007 Andy Rubin announced:

“[The] Android [Platform] – is more significant and ambitious than a single phone.”

Google within the Open Handset Alliance (OHA) has delivered a complete set of software for mobile devices: an operating system, middleware and key mobile applications.

Top Mobile OEMs

Top Mobile OEMs

3 Month Avg. Ending Jul. 2011 vs. 3 Month Avg. Ending Apr. 2011

Total U.S. Mobile Subscribers (Smartphone & Non-Smartphone) Ages 13+

Source: comScore MobiLens

	Share (%) of Mobile Subscribers		
	Apr-11	Jul-11	Point Change
<i>Total Mobile Subscribers</i>	<i>100.0%</i>	<i>100.0%</i>	<i>N/A</i>
Samsung	24.5%	25.5%	1.0
LG	20.9%	20.9%	0.0
Motorola	15.6%	14.1%	-1.5
Apple	8.3%	9.5%	1.2
RIM	8.2%	7.6%	-0.6

Mobile Content Usage

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Source: comScore MobiLens

	Share (%) of Mobile Subscribers		
	Apr-11	Jul-11	Point Change
<i>Total Mobile Subscribers</i>	100.0%	100.0%	N/A
Sent text message to another phone	68.8%	70.0%	1.2
Used browser	39.1%	41.1%	2.0
Used downloaded apps	37.8%	40.6%	2.8
Accessed social networking site or blog	28.0%	30.1%	2.1
Played Games	26.2%	27.8%	1.6
Listened to music on mobile phone	18.0%	20.3%	2.3

Top Smartphone Platforms

Top Smartphone Platforms

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Total U.S. Smartphone Subscribers Ages 13+











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<i>Total Smartphone Subscribers</i>	<i>100.0%</i>	<i>100.0%</i>	<i>N/A</i>
Google	36.4%	41.8%	5.4
Apple	26.0%	27.0%	1.0
RIM	25.7%	21.7%	-4.0
Microsoft	6.7%	5.7%	-1.0
Symbian	2.3%	1.9%	-0.4

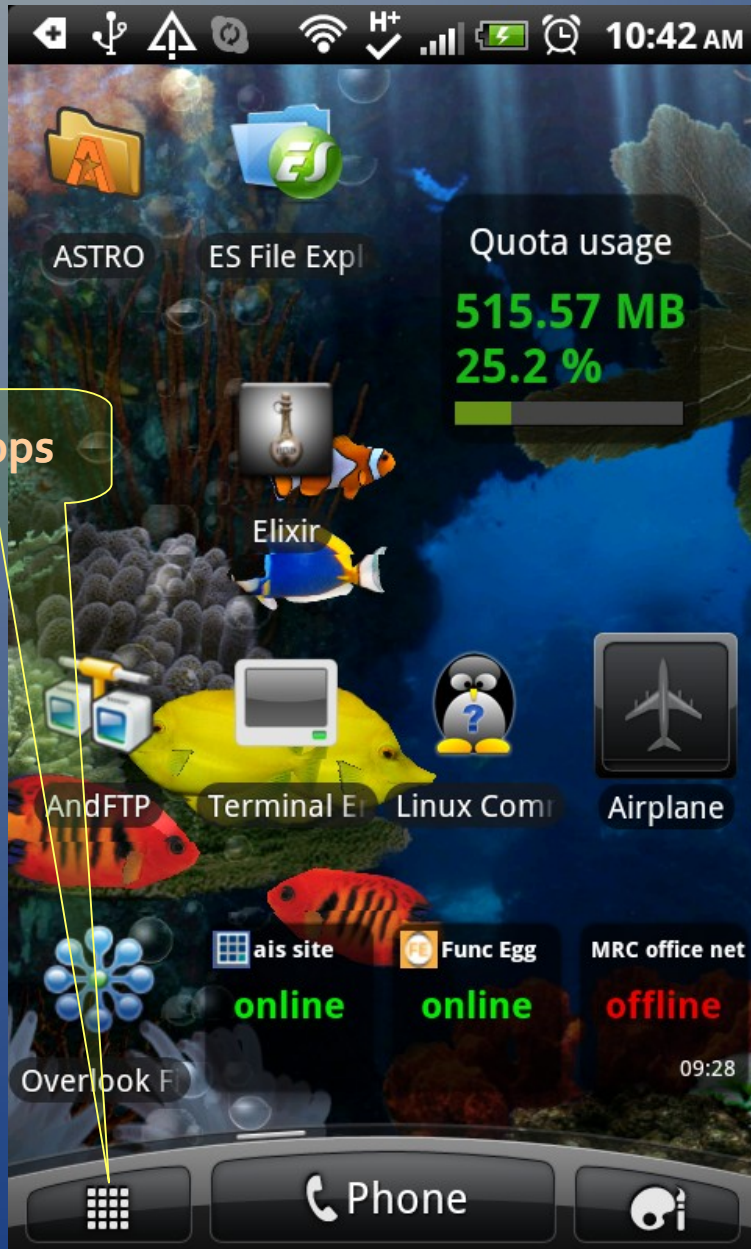
My phone - HTC Inspire 4G

- 4.3” touch screen, speaker and mic
- Hard buttons – power, volume.
- Soft buttons – home, menu, previous, search.
- Touch screen keyboard
- 8 MP camera with 720p HD video
- USB port and stereo audio jack.
- 1 GHz Qualcomm Snapdragon™ processor with 4 GB internal memory and 8 GB of SD card storage
- HTC Sense GUI
- Notifications and Quick Settings

Lifestyle changes - Apps

- Movie selection   eBay 
- Online banking: pay bills & check scans 
- Games   Translators  Tasks/ToDo 
- Email -always on  Meetup.com 
- Ron Paul  Lotto Results  Google Mobile 
- Barcodes  Voice Google  PhotoShop 

Lifestyle changes - Widgets

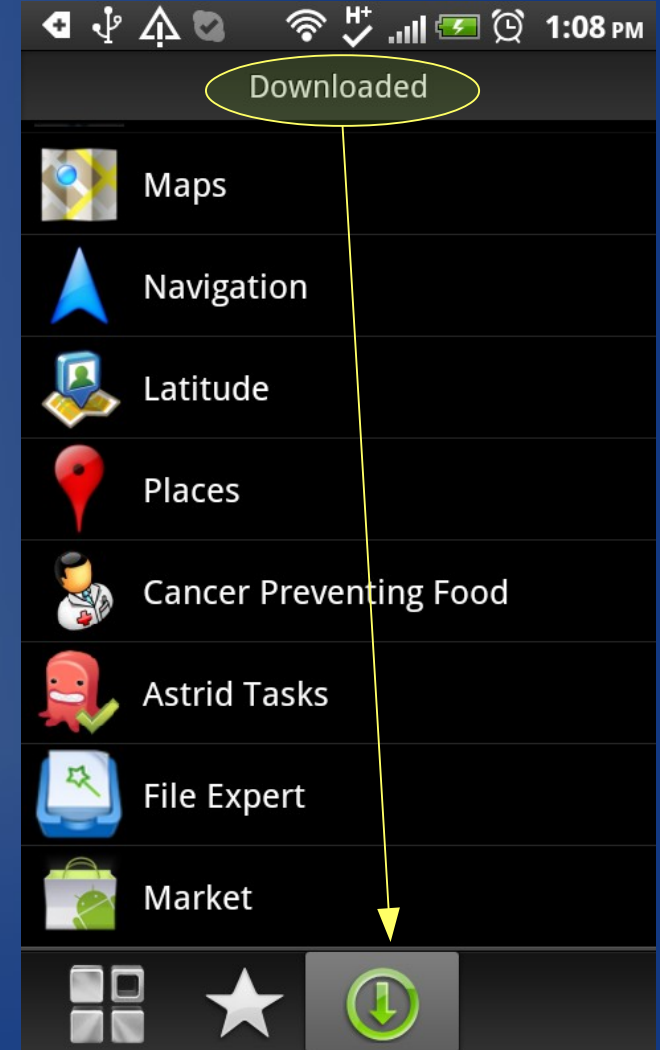
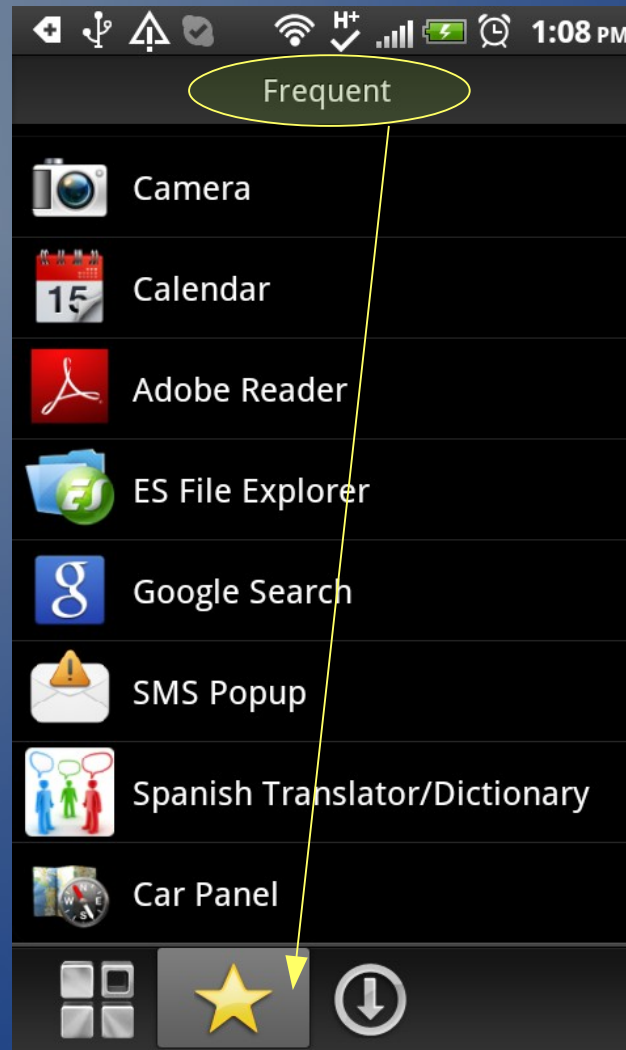
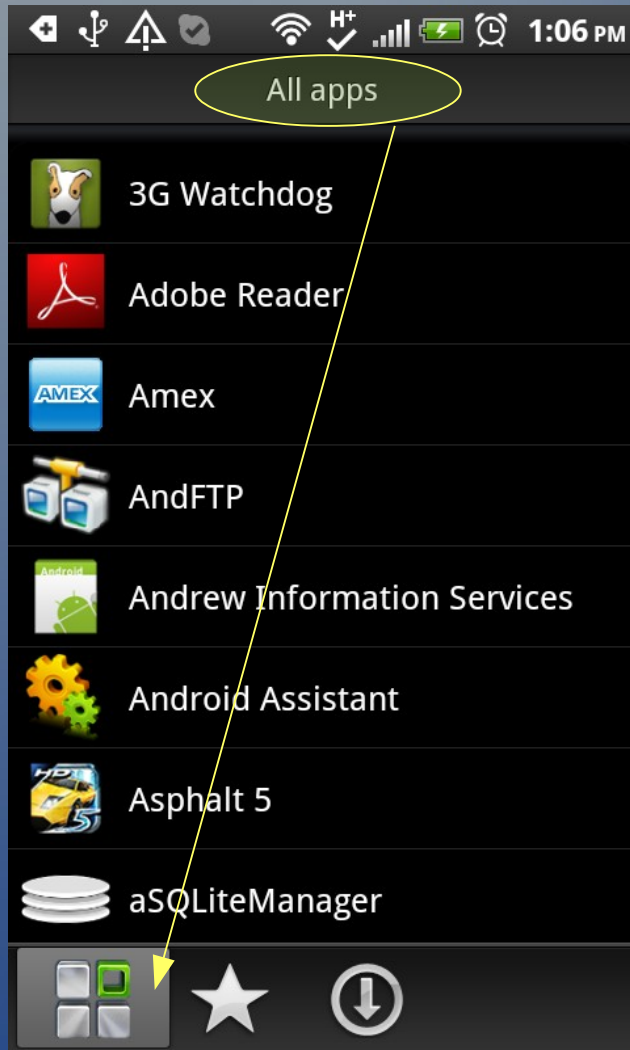


All Apps



Personalize

Place more frequently used apps on the desktop



Android Car

- Android Car (China only)
- Available April, 2010
- 10k – 19k USD
- Android 2.1
- Features
 - Real-time traffic
 - Directions
 - Internet
 - On-line chatting

Android vs iOS goals

- Not written to run on proprietary hardware.
- Open Source beats proprietary; no center!
- Android designed to run on many different devices from phones and tablets to refrigerators, automobiles, etc
- Android can be customized for private dedicated products.

Better, worse or just different ?

Developer Markets

- Retail
- Utilities e.g. CamScanner, ES File Explorer
- Business apps to support customers e.g. Chase, Skype
- Internal business processes e.g. sales, warehouse
- Who is paying and who owns it
- Lite Free and Pro \$\$
- New markets new apps - Create your own demand model
- Smartphones = new market vs. Tablets =replacement

Versions matter?

- Android 2.2 just-in-time compiler = 2x FASTER
- Android 1.5 no Blue-tooth support = disable it so your app still works on that older o/s version
- Android 2.3 needs at least 1gig memory.
- Android name = API number = Nickname (alphabetical bakery items)
- Old hardware may not support update to operating system.
- When does your cell phone contract expire, 2 years?
- Add-ons from companies or you. Google, Cisco, HTC.
- No one has a generic Android phone. ex. HTC Sense

What is Android?

- Android is a software stack for mobile devices that includes an:
 - *operating system*
 - *middle ware / libraries*
 - *key applications*
- The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language.

Android architecture

- **Linux** - operating system from Bell Labs
- Java - the application language from Sun
- JVM - Dalvik Virtual Machine
- Libraries - Android and Java
- SQLite - embedded database from US Navy
- Phone - the hardware
- Service - your voice and data plan
- Apps - included, downloaded, etc
- Sites - www designed for phones/tablets

APPLICATIONS

Home

Contacts

Phone

Browser

...

APPLICATION FRAMEWORK

Activity Manager

Window Manager

Content Providers

View System

Package Manager

Telephony Manager

Resource Manager

Location Manager

Notification Manager

LIBRARIES

Surface Manager

Media Framework

SQLite

OpenGL | ES

FreeType

WebKit

SGL

SSL

libc

ANDROID RUNTIME

Core Libraries

Dalvik Virtual Machine

LINUX KERNEL

Display Driver

Camera Driver

Flash Memory Driver

Binder (IPC) Driver

Keypad Driver

WiFi Driver

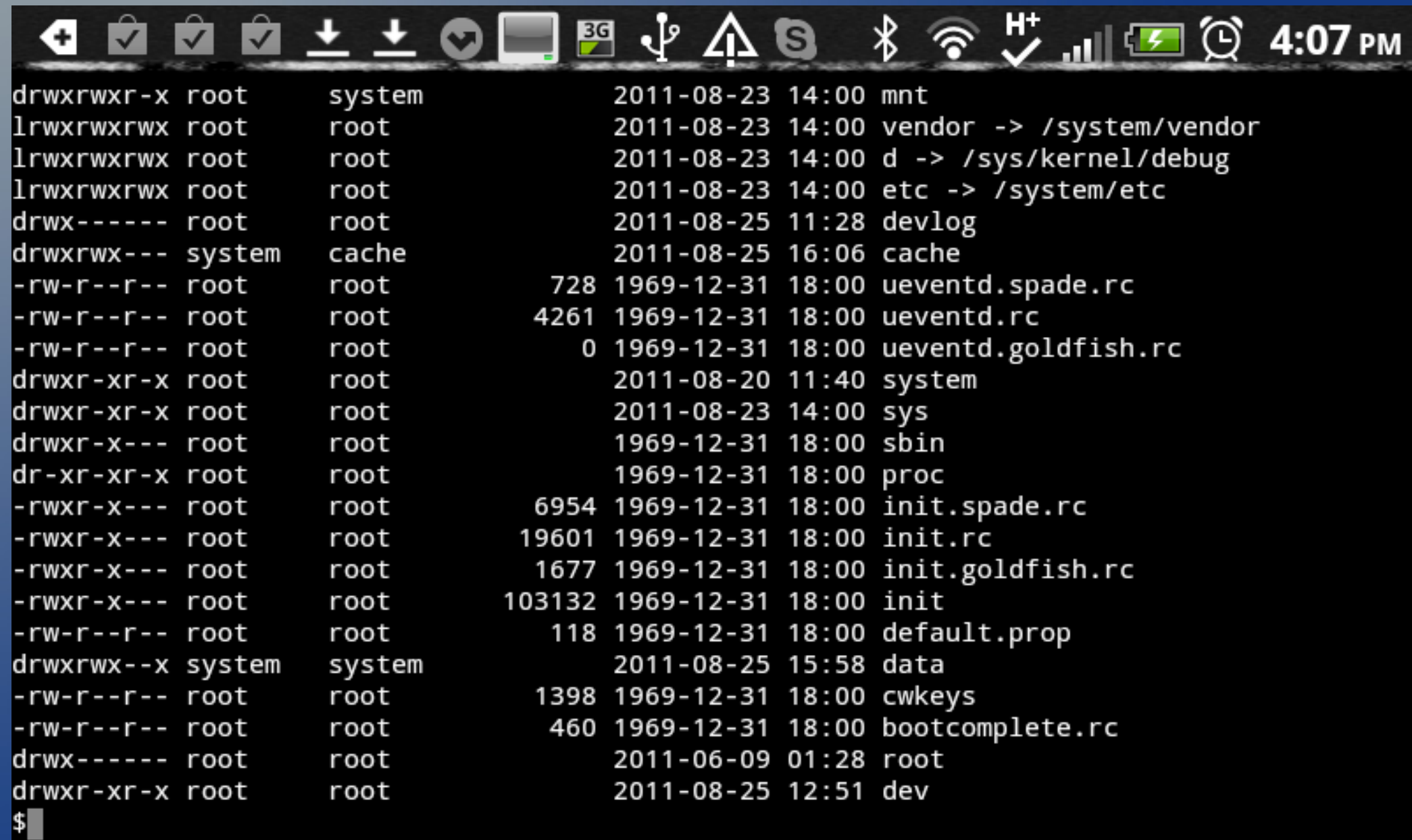
Audio Drivers

Power Management

What is Linux ?

- Linux is a UNIX clone written by Linus Torvalds
- License and cost are free – You can download it and read the source from the Internet or redistribute it under GNU licenses.
- User-friendly – Apple OS X is UNIX *NOT* Linux
- Linux has open source netfilter/iptables based firewall tool
- Linux is just a kernel. All Linux distributions include a GUI system + GNU utilities (such as cp, mv, ls,date, bash etc) + installation & management tools + GNU c/c++ Compilers + Editors (vi) + and various applications such as OpenOffice, Firefox, MySQL. However, most UNIX operating systems are considered a complete operating system as everything come from a single source or vendor.
- **More detailed info** or google “**nixcraft**” for linux sys admins

Linux command line environment



A screenshot of a Linux terminal window. The top status bar shows various system icons including a home button, three checkmarks, two download arrows, a refresh icon, a monitor, 3G signal, USB, a warning triangle, a speech bubble, Bluetooth, Wi-Fi, H+ signal, cellular signal, battery, and alarm clock. The time is 4:07 PM. The terminal displays the output of a file listing command, showing permissions, owner, group, size, date, time, and file name for various system files and directories.

```
drwxrwxr-x root system 2011-08-23 14:00 mnt
lrwxrwxrwx root root 2011-08-23 14:00 vendor -> /system/vendor
lrwxrwxrwx root root 2011-08-23 14:00 d -> /sys/kernel/debug
lrwxrwxrwx root root 2011-08-23 14:00 etc -> /system/etc
drwx----- root root 2011-08-25 11:28 devlog
drwxrwx--- system cache 2011-08-25 16:06 cache
-rw-r--r-- root root 728 1969-12-31 18:00 ueventd.spade.rc
-rw-r--r-- root root 4261 1969-12-31 18:00 ueventd.rc
-rw-r--r-- root root 0 1969-12-31 18:00 ueventd.goldfish.rc
drwxr-xr-x root root 2011-08-20 11:40 system
drwxr-xr-x root root 2011-08-23 14:00 sys
drwxr-x--- root root 1969-12-31 18:00 sbin
dr-xr-xr-x root root 1969-12-31 18:00 proc
-rwxr-x--- root root 6954 1969-12-31 18:00 init.spade.rc
-rwxr-x--- root root 19601 1969-12-31 18:00 init.rc
-rwxr-x--- root root 1677 1969-12-31 18:00 init.goldfish.rc
-rwxr-x--- root root 103132 1969-12-31 18:00 init
-rw-r--r-- root root 118 1969-12-31 18:00 default.prop
drwxrwx--x system system 2011-08-25 15:58 data
-rw-r--r-- root root 1398 1969-12-31 18:00 cwkeys
-rw-r--r-- root root 460 1969-12-31 18:00 bootcomplete.rc
drwx----- root root 2011-06-09 01:28 root
drwxr-xr-x root root 2011-08-25 12:51 dev
$
```

Your future desktop?



Since Android is Linux ...

- Canonical Ltd has created Ubuntu on Android, a full build of the distro powered by your phone.
- Boots and runs simultaneously.
- Shares the same Linux kernel.
- All the productivity tools and apps of the full Ubuntu desktop available to smart phone docked with a keyboard and monitor.
- All phone data and services are shared, e.g. contacts, telephony and SMS/MMS messaging in the Ubuntu environment.
- Can launch phone apps within Ubuntu environment.

www.ubuntu.com/devices/android

What is Android Java ?

- Java is object oriented where code is contained in classes that contain values and actions or properties and methods. Created so the same code can run on any platform by use of a Virtual Machine for each OS.
- Android uses the Dalvik Virtual Machine rather than the Java Virtual Machine.
- Java classes are compiled into Dalvik executables and run on the DVM.
- DVM has been written to run multiple instances efficiently.
- Android classes are specific for the platform.

Dalvik Virtual Machine

- Virtual Machines are software
- Dalvik is a **Process VM** or *application virtual machine* like Flash Player, .NET, Visual Basic, PHP. It is different than a *system virtual machine* like VMware or VirtualBox where an operating system is loaded.
- A **Process VM** runs as a normal application inside a host operating system rather than having its own operating system separate from the one on the platform. The VM is created when the process starts and destroyed when it ends.
- **Process VMs** are implemented using an interpreter for just-in-time compilation for performance comparable to code compiled to machine code.

Android dangers

- Malware on Android devices
- Rooting your smartPhone = jailbreaking iPhone.
- Is your hardware warranty null and void ?
- Installing Custom ROM software.
- Unrooting harder than un-jailbreaking. Single hardware vendor advantage.
- Get a test machine and back it up first.

Security issues

- Symantec **Image**
- Permissions and
- 3rd party download markets with rewrapped apps
- Antivirus software needed?
- Is your wifi on? Bluetooth?
- Symantec's white paper: Mobile Device Security
 - Examines the security approaches employed in Apple's iOS and Google's Android. **WWW** or **local**
- Battleground: Apps, mobile website, email/sms

Android's Security Model

- Traditional access control e.g. login, password, idle-time screen locking.
- Isolation of data, apps and operating system kernel
- Permission-based security model. **Buyer beware!**
- *Weak*: Application Provenance by author digital signature. No examination of authenticity.
- Hardware Encryption of data only in Android 3.0+
Can be done by app developer.

“Google releases the programming source code for the entire Android project, enabling scrutiny from the broader security community “

PDF article A Window Into Mobile Device Security

by Carey Nachenburg, Symantec

Overview 1/4

- Android applications are composed of one or more application components :
 - activities
 - services
 - content providers
 - broadcast receivers – an Intent-based publish-subscribe system, examples: SMS, battery-low, snooze alarm.
- *Intent* = an action or event that connect activities, etc.

Overview 2/4

- Each component performs a different role in the overall application behavior, and each one can be activated individually (even by other applications).

Overview 3/4

- The *manifest file* must declare all components in the application and should also declare all application requirements, such as the minimum version of Android required and any hardware configurations required.
- This XML file is where Permissions are declared.

Eclipse demo in “Hello World” app

- Show AndroidManifest.xml
- Add permissions and show in emulator

Overview 4/4

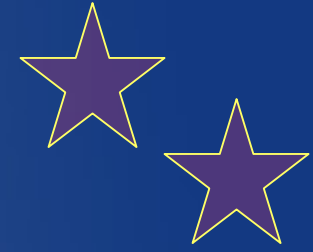
- Non-code application resources (*images, strings, layout files, etc.*) should include alternatives for different device configurations (such as different strings for different languages and different layouts for different screen sizes).

Multitasking

- services and broadcast receivers
- Applications can run in the background as long as memory management doesn't kill the process to grab memory critical for higher priority processes.
- Linux kernel supports background processes
- Bundles = state saving mechanism
- Services = supports persistent background apps like IM and music. These Server apps are like Unix daemons and are not killed in least-recently-used order when memory is low.
- iPad and iPhone don't support multitasking
- How android multitasks



Development



The environment and software tools

don't forget you need that important

- USB power/data cable

That recharges your phone while transferring data

A low-end app development tool

- *App Inventor* for Android from Google Labs

appinventor.googlelabs.com

- A drag and drop web based IDE which aims to simplify building of apps. No java code generated or available.
- Beta & basic tool. Try it to experiment.
- **Good way to jump in for beginning developers; students.**

Future of App Inventor – good and bad

- After *Google Labs* was shut down Google quietly announced the discontinuation of App Inventor by end of 2011. [link](#)
- New home: Massachusetts Institute of Technology (MIT)
- smooth transition? Since apps are stored on servers
- The 5+ engineers on the team that developed App Inventor no longer involved.
- This announcement is a blow to the many kids, students, educators.
- Use for example/demo apps to be built in Eclipse etc
- NEW HOME 2012-jan <http://info.appinventor.mit.edu/>

Source-to-compile cycle

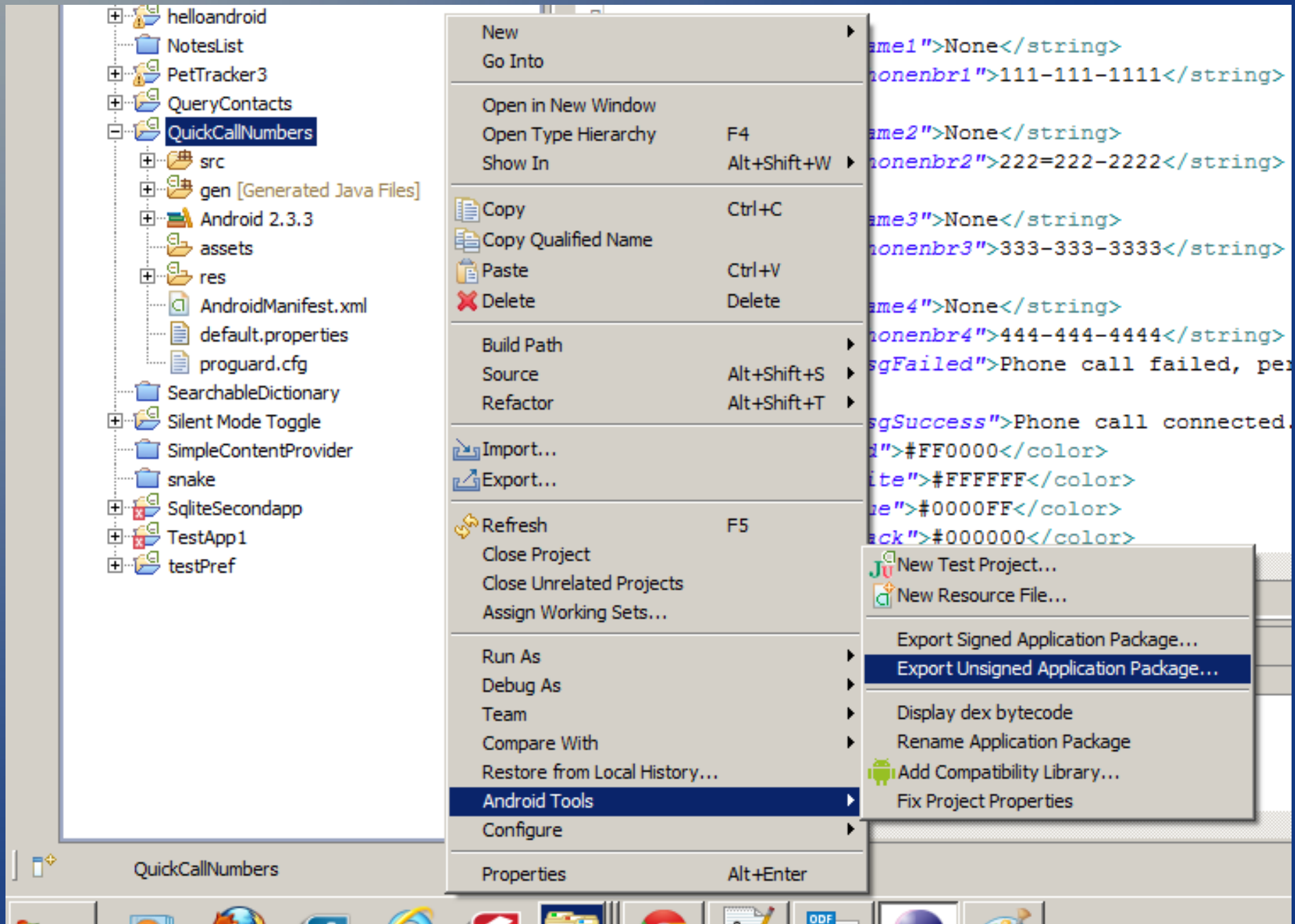
1. You create your program in object oriented *Java* code and **XML** using a tool like Eclipse.
2. Android provides a tool "dx" which converts Java Class files into ".*dex*" (Dalvik Executable) files. This bytecode is produced only for the Dalvik Virtual Machine and **is not standard Java bytecode**. Its the compiled machine code for the DVM.
3. Android applications are then packed into an *.apk* (Android Package) file by the program "aapt" (Android Asset Packaging Tool) which is what you receive when you download an app.
4. Once delivered to the target machine the *.apk* is stored and used to install your app files in:

`data/data/<app_package_name>/`

`data/data/<app_package_name>/databases/<databasename>`

5. You can erase the *.apk* or save for virgin backup.
6. *.apk* is a condensed installation file. **Demo next page - QuickCallNumbers**

Demonstration - create apk and unzip



Your Development app directories

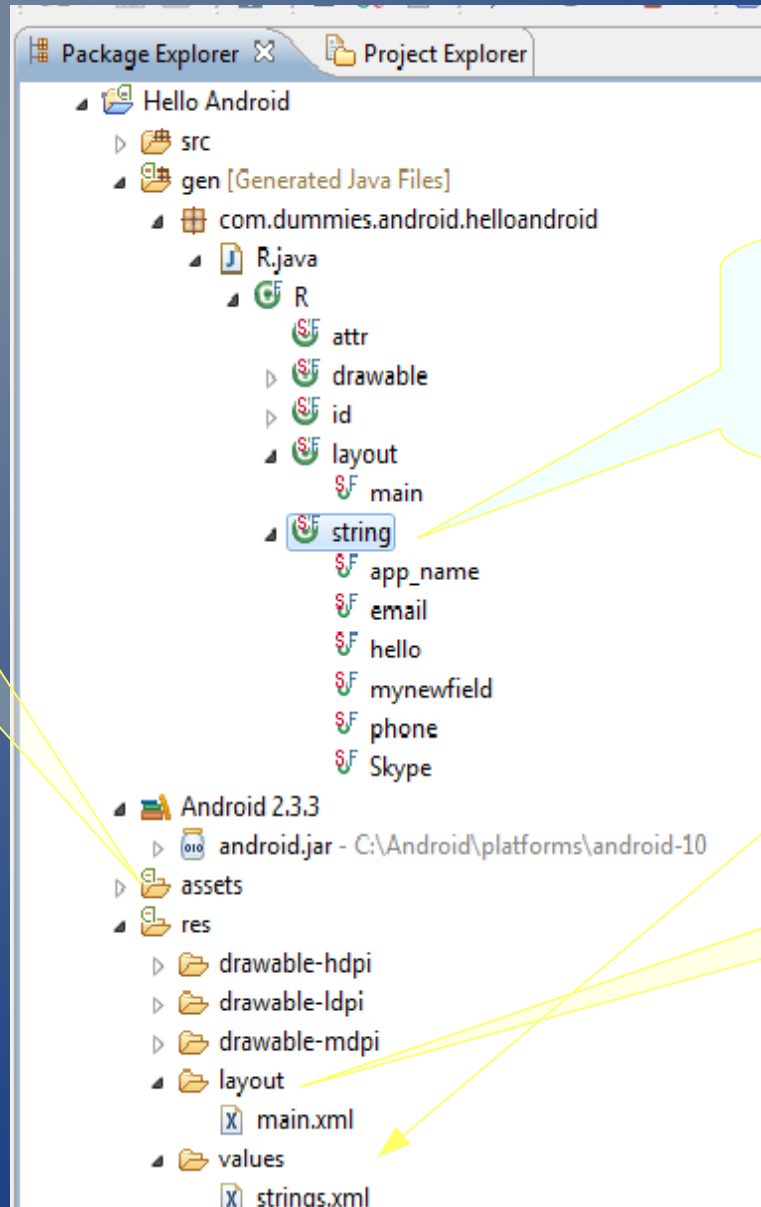
- ../
 - main Project directory
 - **AndroidManifest.XML** identifies components that build and run the application.
 - **Default.properties** file identifies the properties of the project such as Android version
- .settings
 - eclipse environment settings
- assets
 - audio, video, text, sqlite databases. Raw files no *res/IDs*
- bin
 - *.dex and *.apk files created
- gen
 - automatically generated Java files that contains the R class in R.java links/subclasses the externalized resources in the *res/* subdirectories using IDs.
- res
 - externalizes resources such as strings, arrays, dimensions, colors, styles into XML files
- src
 - packages = classes = java code

Directory structure

- Project

SQLite databases go in *assets/*

**Demo
in
live Eclipse
Directory
tree**



XML resource files are automatically subclassed in the R package and stored in *gen/*

Layout/ references the R subclass pointers

The Professional Developer environment

Eclipse

This rich development environment includes

- ADT = Android Development Tools plug-in
- An Android device emulator in the DDMS
- XML editor
- tools for debugging : run-time, breakpoints etc
- memory tracking and performance profiling
- DDMS = Dalvik Debug Monitor Server
- screen capture tool : emulator or attached phone
- the offline version of the Android developer documentation in your browser.

Developer environment installing all the pieces

- Java – best version is 5 or 6
- Eclipse
- Android add-ons
- USB drivers for windows etc
- Rooting your phone – not necessary for now.
- To install apps from a cable go to *Menu* ➔ *Settings*
 - Select *Unknown sources* checkbox
 - *Development* ➔ select *USB Debugging*
- <http://www.ibm.com/developerworks/opensource/tutorials/os-eclipse-androidwidget/index.html?ca=dgr-eclipse-1>

ALL FREE

Adb.exe - Android Debug Bridge

- adb is a versatile command line tool that lets you communicate with an emulator instance or connected Android-powered device.
- In your platform-tools/ subdirectory
- Put this directory in your PATH variable
- Windows: go to C: prompt Try these commands:
 - Run *adb shell*
 - *#sqlite3 /data/data/com.example.hello/databases/demo.db*
 - Run *adb devices*
 - Run *adb -d* or *adb -e* if you have one of each
 - Run *adb -s <device-name> shell*
 - *adb -s emulator-5556 install helloWorld.apk*
 - *adb pull <remote> <local>* or *push <local> <remote>*
- <http://developer.android.com/guide/developing/tools/adb.html>

Developer environment

Android Full Application Tutorial

&

Android Game Development Tutorials

@

www.javacodegeeks.com

Publishing your apps

- Your own e-commerce website
- Market
- Google
- Amazon Market
- Private client release – Who owns it?

How/where store information data?

- Interact through Content Provider class and its methods
- Cache/memory
- Structured local text **File** in an app directory, e.g. Help screen
- **XML** structured file e.g. Preferences file; read/write capabilities.
- **Databases**
 - SQLite ships with Android with supporting classes.
 - MongoDB, e.g. one vendor mongolab.com created cloud based db using mongoDB
 - JavaDB
- On a private **website** server or with a cloud vendor. Why?
- Synchronization e.g. Gmail, company employees or catalog.

SQLite - the embedded database

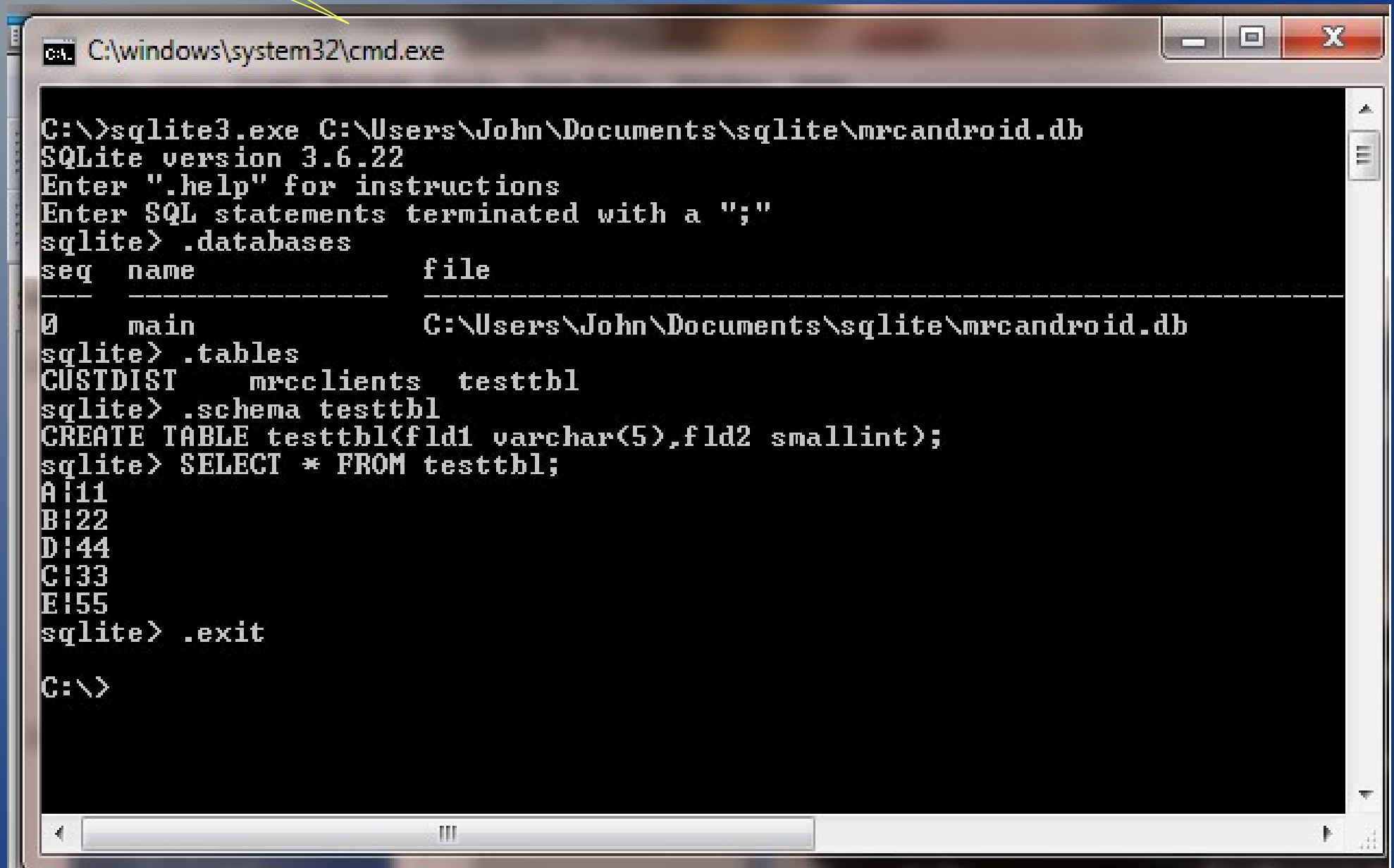
- “Lite” is about setup, administration, overhead, serverless *not* capabilities.
- Consortium: Mozilla, Oracle, Adobe, Nokia, etc. www.sqlite.org
- Cross-platform, zero-configuration, stored in a single cross-platform disk file
- Manage databases with command-line interface [sqlite3 demo1.db](#)
- multiple reads but one write process locks the entire database
- default configuration is case-insensitive comparisons of ASCII characters
- can also be used as an [in-memory database engine](#)
- Supports atomic commits = BEGIN...COMMIT
- version 3.6.19 supports foreign key constraints
- supports FOR EACH ROW triggers, not FOR EACH STATEMENT triggers
- dynamic datatyping as INTEGER, REAL, TEXT, BLOB, or as NULL
- embedded in Android, FireFox, Safari, Chrome, Skype, OS X, iPhone, iTunes, Airbus aircraft, Acrobat, QuickBooks, TurboTax, PHP, McAfee, [etc](#)
- www.sqlite.org/limits.html

The hard way to manage a database

- CLI: command line interface. Included with SQLite installation
 - In windows: Start → type in “*cmd*” in Search box
sqlite3.exe C:/users/john/Desktop/pet_tracker.db
 - **Intro to CLI environment**
 - Type *.help* for list of limited commands
 - sqlite> *SELECT * FROM tablename;*
 - sqlite> *SELECT * FROM SQLITE_MASTER = metadata*
 - Sqlite> *.dump [tablename]* to see all data on screen
 - # sqlite3 *
 - Make sure database exists in directory first.

Type
"cmd"
in Search

How it looks in the CLI



```
C:\windows\system32\cmd.exe

C:\>sqlite3.exe C:\Users\John\Documents\sqlite\mrcandroid.db
SQLite version 3.6.22
Enter ".help" for instructions
Enter SQL statements terminated with a ";"
sqlite> .databases
seq  name                file
-----
0     main                   C:\Users\John\Documents\sqlite\mrcandroid.db
sqlite> .tables
CUSTDIST  mrcclients  testtbl
sqlite> .schema testtbl
CREATE TABLE testtbl(fld1 varchar(5),fld2 smallint);
sqlite> SELECT * FROM testtbl;
A|11
B|22
D|44
C|33
E|55
sqlite> .exit

C:\>
```


SQLite GUI tools

- SQLite Manager
- SQLite Database Browser
 - <http://sourceforge.net/projects/sqlitebrowser/>
- Sqliteman
 - <http://sqliteman.com/>
- **Questoid SQLite Manager** manages sqlite databases on an Android device emulator from within in Eclipse. Avoid this \$\$ and weak.
- **Hint:** just get familiar with the *sqlite3.exe* CLI and *adb.exe*

And

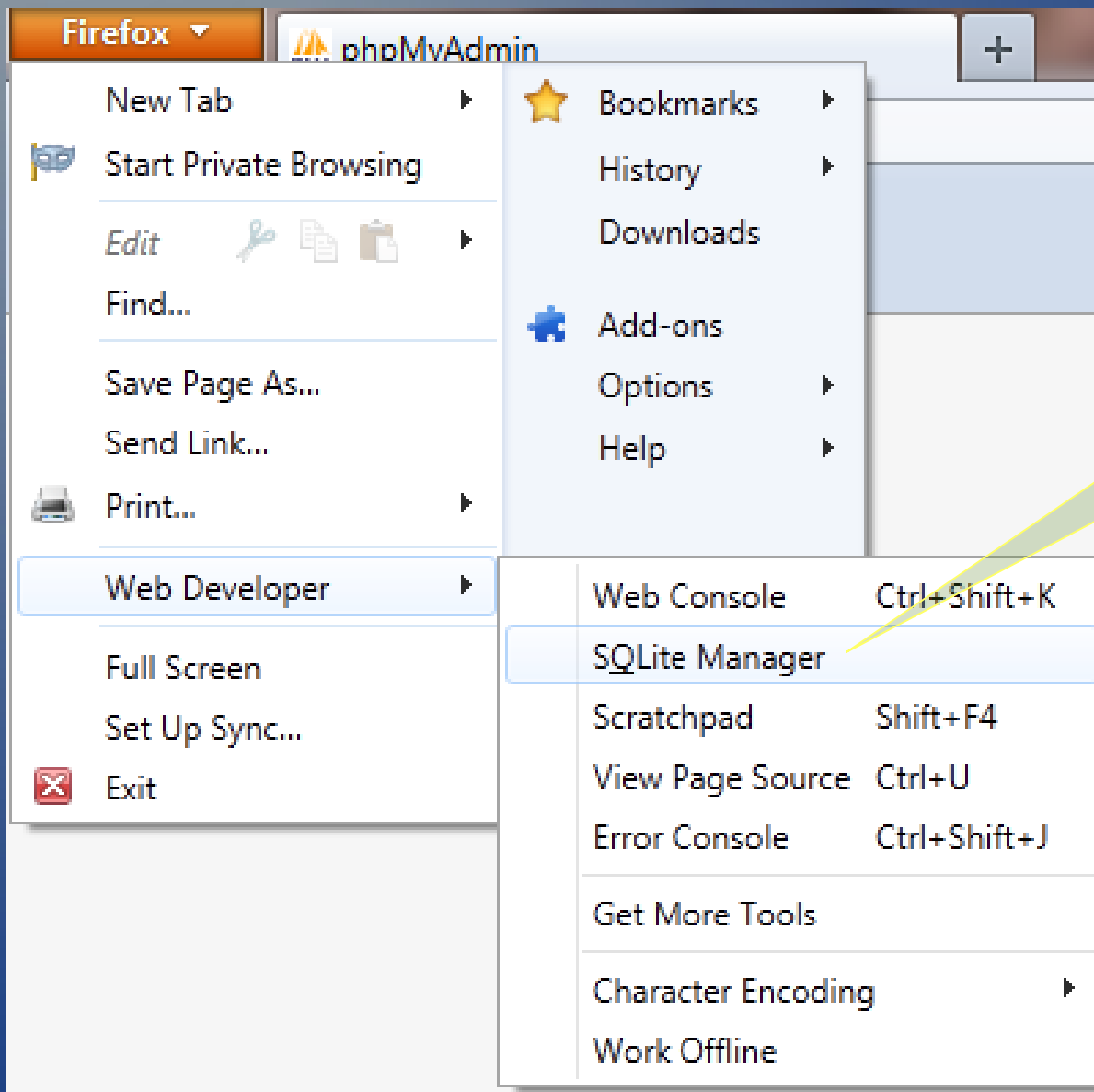


My preferred tool for SQLite

- **SQLite Manager 0.7.6** – a great GUI tool
- You can download and install this free Firefox add-on

[addons.Mozilla.org](https://addons.mozilla.org)

Open SQLite Manager in Firefox



Open the SQLite Manager Add-on from the Web Developer Sub-menu.

How SQLite Manager looks

The screenshot displays the SQLite Manager application window. The title bar reads "SQLite Manager - C:\Users\John\Documents\sqlite\mrcandroid.db". The menu bar includes Database, Table, Index, View, Trigger, Tools, and Help. Below the menu is a toolbar with various icons and a "Directory" field containing "(Select Profile Database)" and a "Go" button. The left sidebar shows a tree view of the database structure: mrcandroid.db, Master Table (1), Tables (3) (including CUSTDIST, mrcclients, and testtbl), Views (0), Indexes (1), and Triggers (0). The "testtbl" table is selected. The main area shows the table structure with columns "rowid", "fld1", and "fld2". A table of data is displayed below the structure, with rows 1 through 5. The status bar at the bottom shows "SQLite 3.7.5", "Gecko 6.0", "0.7.6", "Exclusive", "Number of files in selected directory: 3", and "ET: 2 ms".

TABLE testtbl

rowid	fld1	fld2
1	A	11
2	B	22
3	D	44
4	C	33
5	E	55

1 to 5 of 5

FireFox uses SQLite (*places.sqlite*)

C:\Users\John\AppData\Roaming\Mozilla\Firefox\Profiles\2nyie3uf.default

The screenshot shows the SQLite Manager application window. The title bar reads "SQLite Manager - C:\Users\John\AppData\Roaming\Mozilla\Firefox\Profiles\2nyie3uf.default\places.sqlite". The interface includes a menu bar (Database, Table, Index, View, Trigger, Tools, Help), a toolbar with icons for refresh, copy, paste, and other actions, and a "Directory" field with a dropdown menu set to "(Select Profile Database)".

The left sidebar shows the database structure for "places.sqlite", including a "Master Table (1)" and "Tables (12)". The "moz_bookmarks" table is selected and highlighted.

The main area displays the "Structure" tab for the "moz_bookmarks" table. It includes buttons for "Search", "Show All", "Add", "Duplicate", "Edit", and "Delete". Below these buttons is a table with the following columns: "id", "type", "fk", "parent", "position", "title", "keyword...", "folder_t...", and "date". The table contains 113 rows of bookmark data. The first few rows are visible:

id	type	fk	parent	position	title	keyword...	folder_t...	date
8	1	1280	7	20	Amnesia man 'may be called Frank'			13
9	1	1230	7	21	Inquiry call after police apology			13
0	1	1231	7	22	Three jailed for mother's killing			13
1	1	1281	7	23	Ban on cigarette machines planned			13
2	1	1232	7	24	£75k of 'hillbilly heroin' seized			13
3	1	1234	7	25	Jail for brief Facebook riot post			13
4	1	1282	7	26	Roman harbour found at Caerleon			13
5	1	1236	7	27	Hound Dog songwriter dies at 78			13
6	1	1237	7	28	Lil Wayne has skating accident			13
7	1	1238	7	29	Trinidad declares crime emergency			13
8	1	1239	7	30	Costa Rica 'facing drugs threat'			13
9	1	1240	7	31	Sudan leader declares ceasefire			13
0	1	1241	7	32	Error hampers Liberia referendum			13
1	1	1242	7	33	Druid loses battle over remains			13
2	1	1243	7	34	Merkel presses Serbia on Kosovo			13
3	1	1244	7	35	Yemeni politician dies in Riyadh			13
4	1	982	7	36	Israel and Hamas in 'Gaza truce'			13
5	1	1245	7	37	India leaders hold Hazare talks			13
6	1	1246	7	38	Protest strikes shut down Karachi			13

At the bottom of the table, there are navigation buttons: "<<", "<", "1 to 100 of 113", ">", and ">>".

The status bar at the bottom of the application shows "SQLite 3.7.5", "Gecko 6.0", "0.7.6", "Shared", "Number of files in selected directory: 3", and "ET: 1 ms".

java package that exposes SQLite to the app
android.database.sqlite

CLASSES

SQLiteClosable	An object created from a SQLiteDatabase that can be closed.
SQLiteCursor	A Cursor implementation that exposes results from a query on a SQLiteDatabase. Is an Indirect Subclass of <code>database.AbstractCursor</code> Exposes methods to manage a SQLite database.
SQLiteOpenHelper	A helper class to manage database creation and version management.
SQLiteProgram	A base class for compiled SQLite programs.
SQLiteQuery	A SQLite program that represents a query that reads the resulting rows into a CursorWindow.
SQLiteQueryBuilder	This is a convenience class that helps build SQL queries to be sent to SQLiteDatabase objects.
SQLiteStatement	A pre-compiled statement against a SQLiteDatabase that can be reused.

Android Market

[The Android Market Website](#)



[Android Market for Developer Help](#)

Installing off-Market apps

- <http://www.brighthub.com/mobile/google-android/articles/37151.aspx>

First you need to do a couple things:

- On your android phone enable “Unknown Sources”

Menu -> Settings -> Applications

- Also enable “USB debugging”

Menu -> Settings -> Applications -> Development

- **** Same steps as USB attachment to PC for developers ****

4 ways to install a third party app on your phone

APK files are basically Android package applications.

1. Download it from the Android Market if its there.
2. Use the **Android SDK** installed on your pc to move the file over to your phone. You need to install the Android USB drivers to connect the SDK software to your cell via USB.
3. Email to your android e-mail account, download it and then click on the APK file. It will install.
4. Download a file manager app from the Market, like ***Astro File Manager***. Then click on the file when found.

Other legitimate markets

- Cisco Systems' Android-based tablet targets the enterprise.
- The government
 - The Army wants every soldier to carry a smartphone to stay networked..... A prototype device running Android called the *Joint Battle Command-Platform*, developed by tech nonprofit MITRE, is undergoing tests, the Army says. [link](#)
- *Google Music vs iTunes*
- Virtualization vendors:
 - Citrix *Xendesktop* and VMware *View*

Future possibilities

- **NFC** -Near Field Communication
 - Mobile payments/commerce ex. *Google Wallet*
 - *Android Beam* for sharing info between devices
- QR codes everywhere
- Multiple environments on the smartphone e.g. VMware dual environment on a personal phone
- Social networking
- Mobile web sites that imitate apps rather than pc www
- Android on Intel chips in 2012.

Mobile Websites

PHP Magazine Mobile

- PC version web page
mobile.phpmagazine.net [view page](#)
- Edition to be viewed on a mobile device
m.phpmagazine.net [view page](#)



Building mobile websites on Android

- PHP for Android



- JQuery for mobile devices



10 tool apps for developers

- AndFTP



- DropBox



- SilverEdit



- WordPress Mobile



- PhotoShop



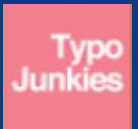
- Thinking Space



- View Web Source



- Typography Junkies



- Mobile GA



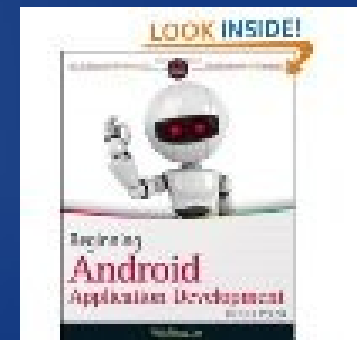
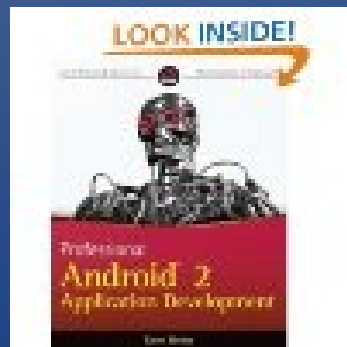
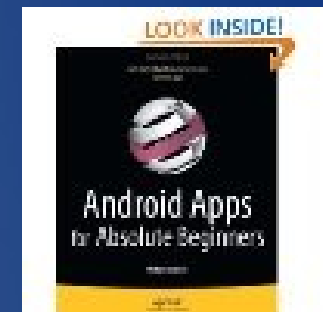
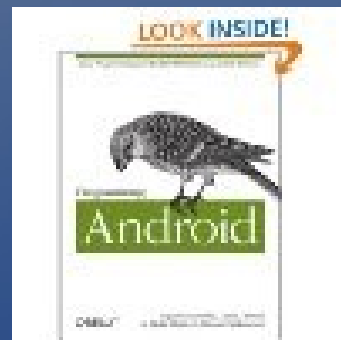
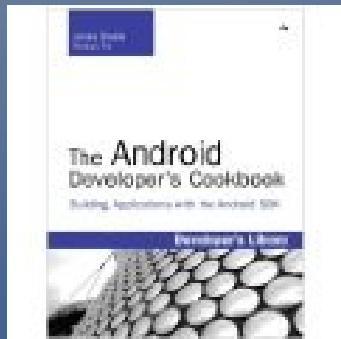
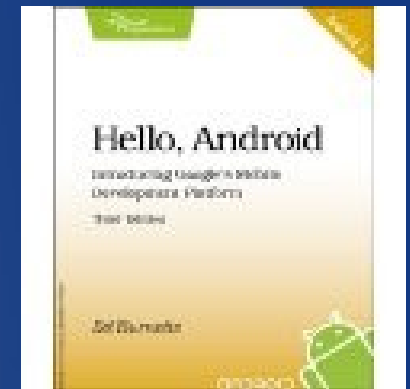
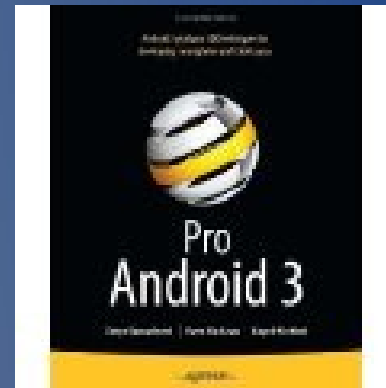
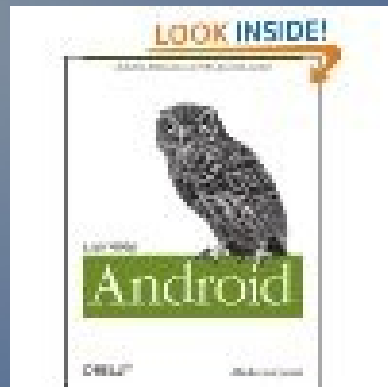
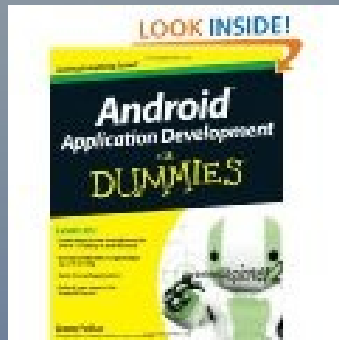
- HTML Test



Website resources

- chicagoandroid.com/
- www.xda-developers.com/
- www.appbrain.com/
- www.google.com/mobile/android/
- developer.android.com/
- Android Full Application Tutorial

Books, books, and books...



Thanks for participating



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