

Introduction to Android

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October 27, 2008



htc

T-Mobile

Google







What is Android?

“Android is a software stack for mobile devices that includes an operating system, middleware and key applications”



Android

- Google
- G I and the Android Market
- Android platform
- Developer tools
- Android programming

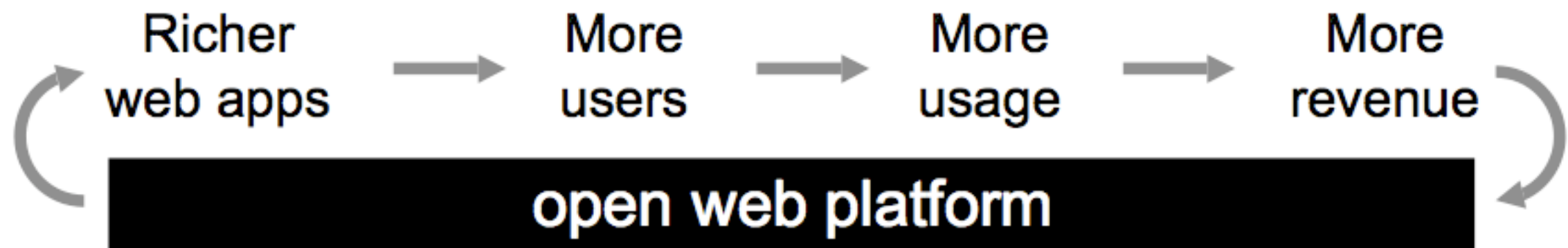


Google's master plan

- make the cloud more *accessible*
- keep connectivity *pervasive*
- make the client more *powerful*



Google's master plan



source: Google I/O keynote, May 2008



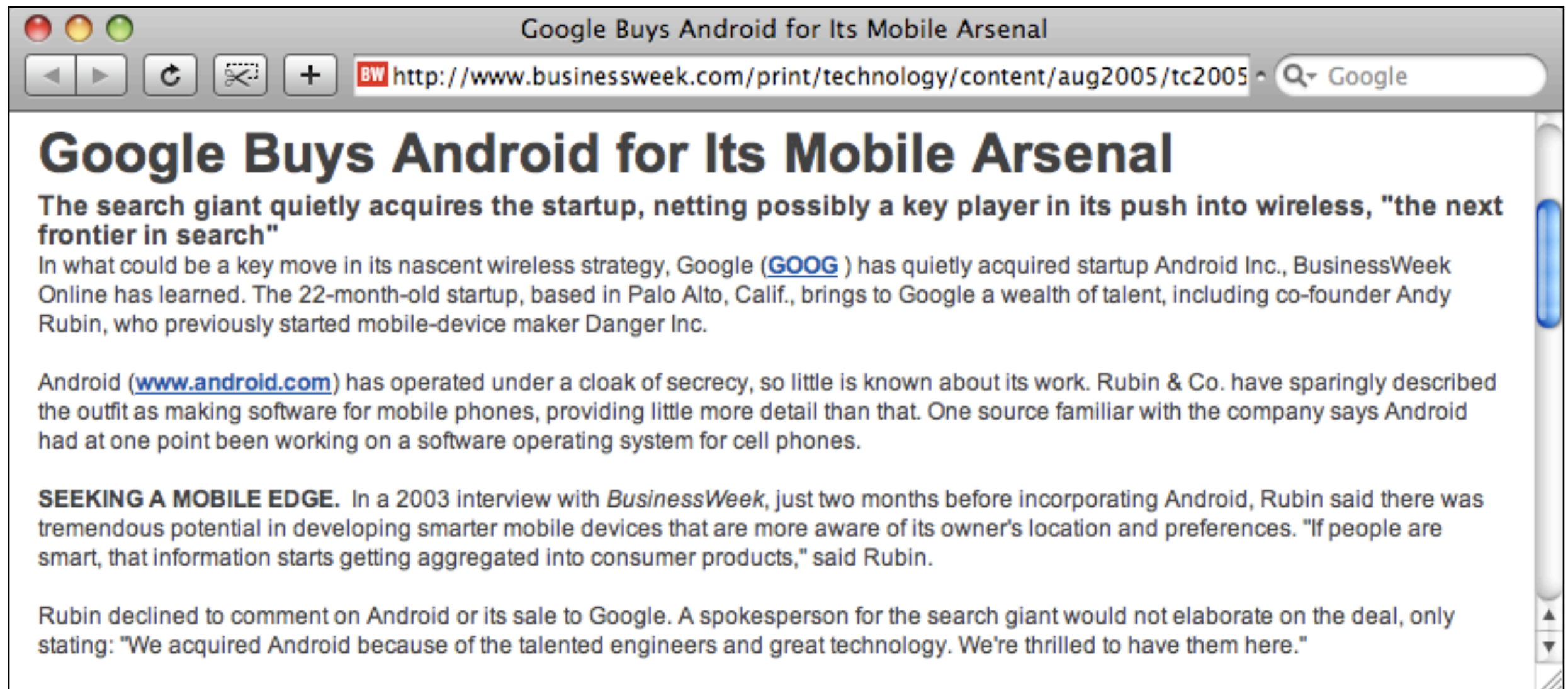
Google

“We want the next killer application to be written for cell phones”

(Andy Rubin, Google)



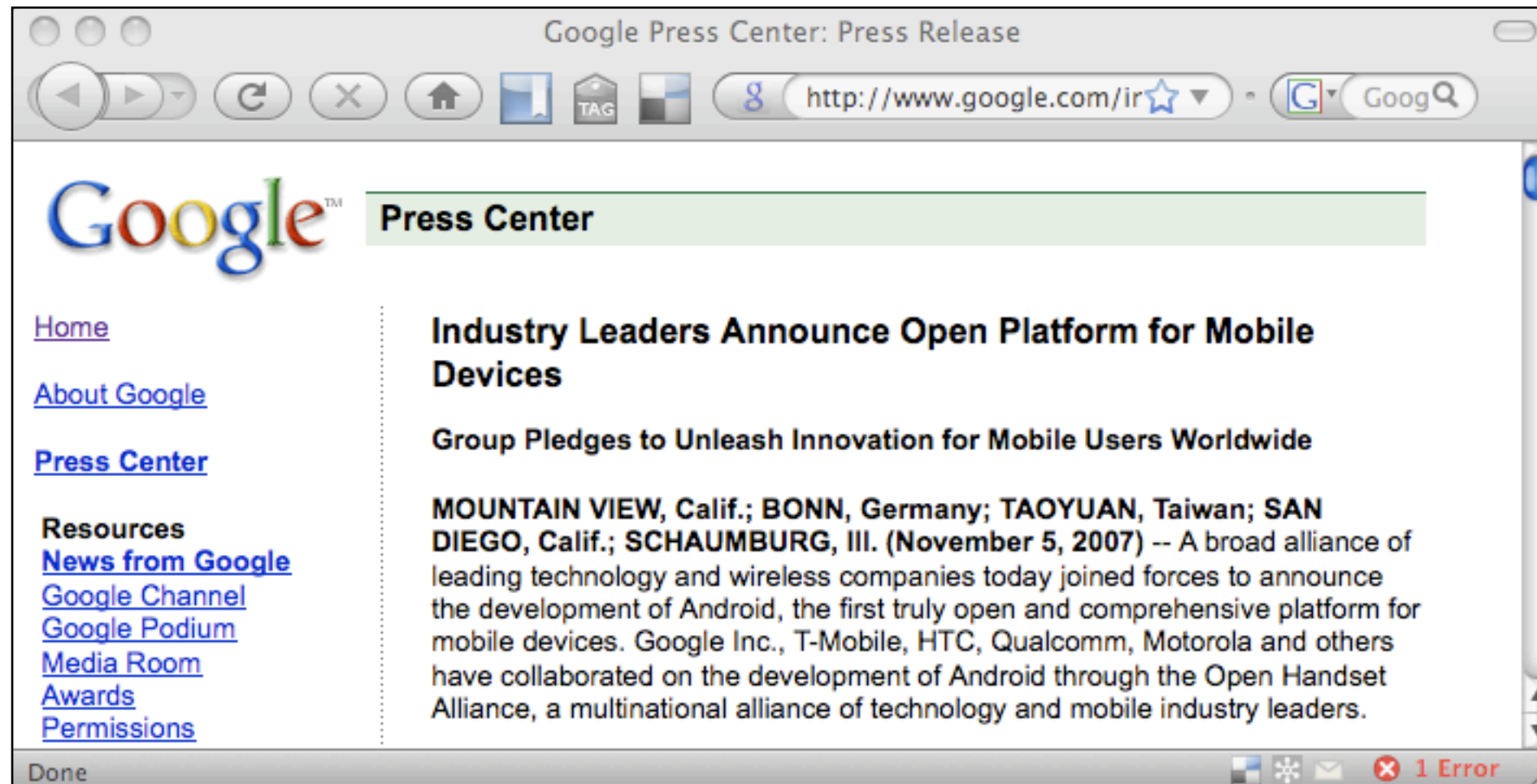
Google buys Android



August 2005



Open Handset Alliance



November 2007



Open Handset Alliance



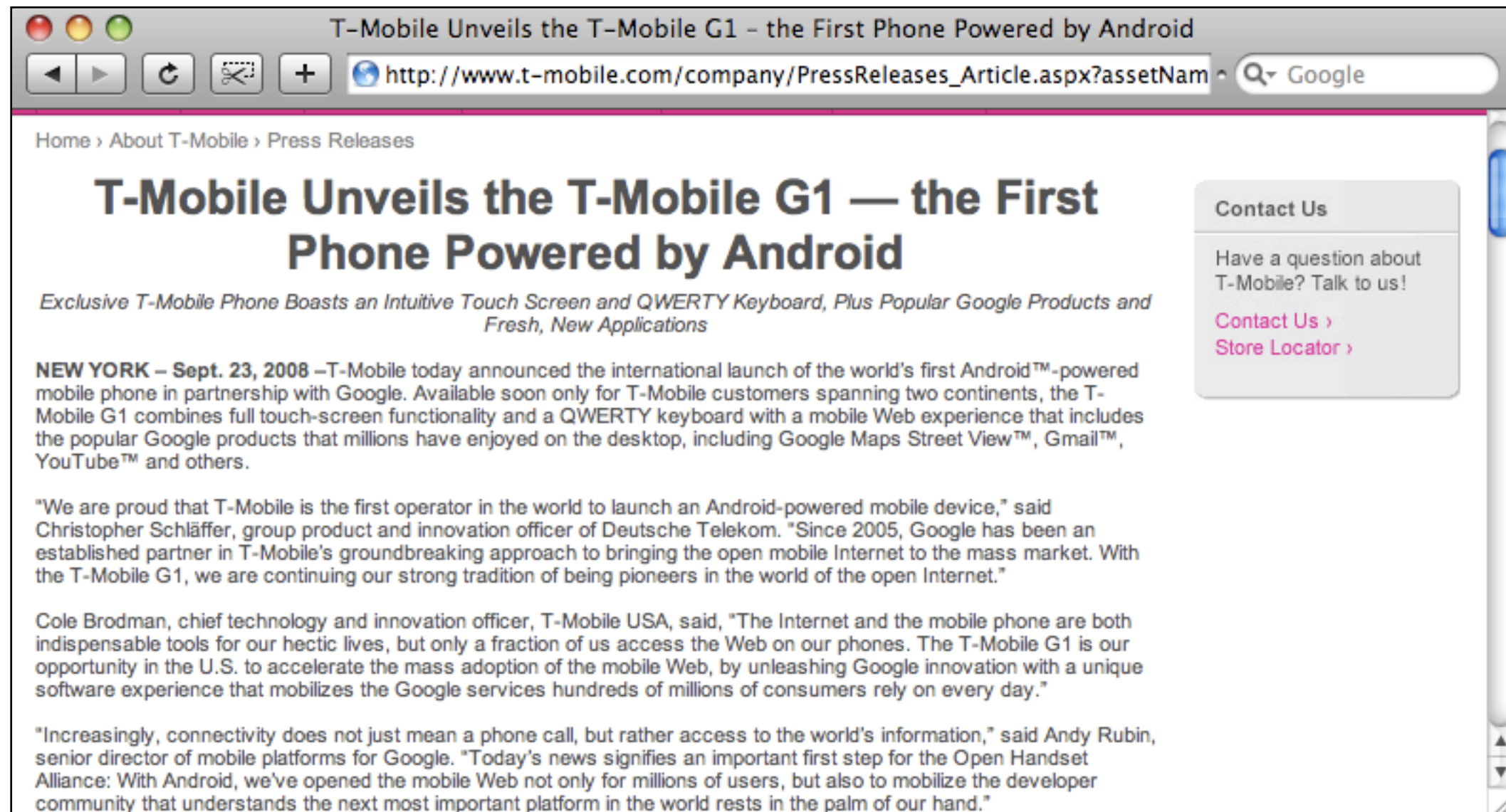
Android SDK



November 2007



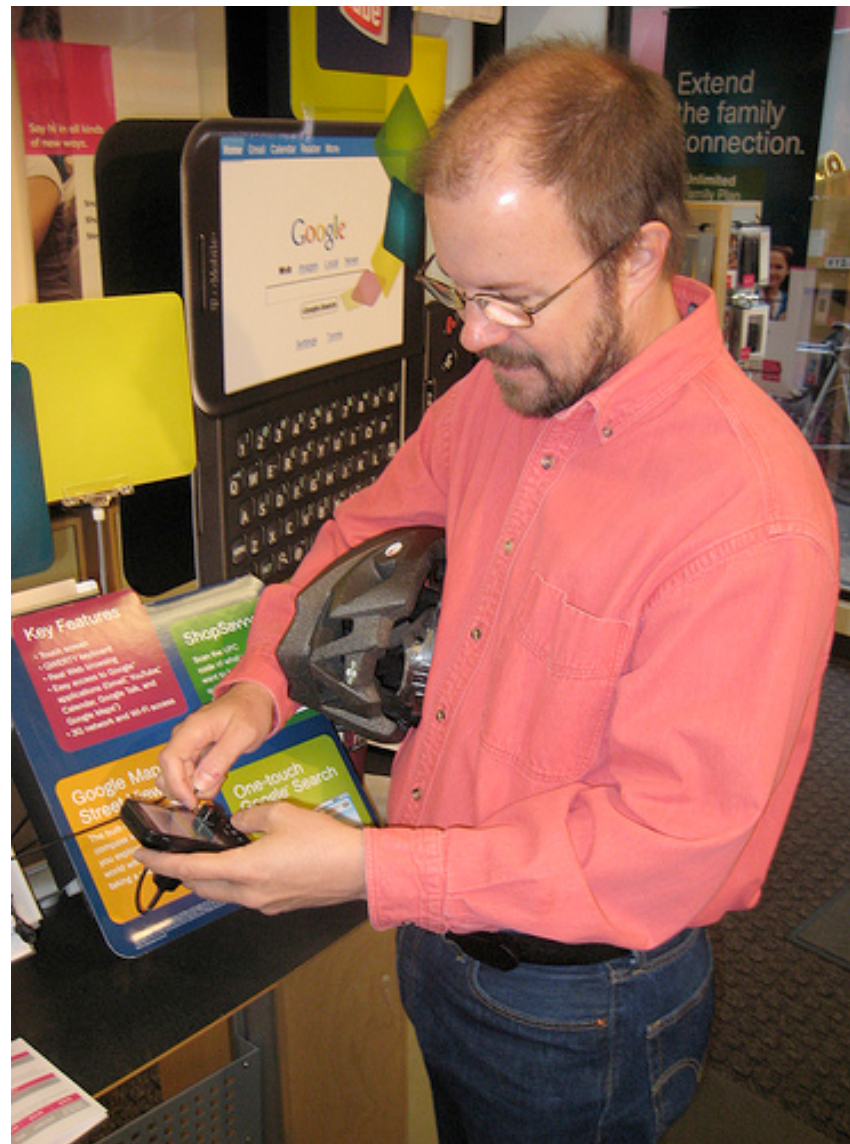
T-Mobile G1



September 2008



Retail launch



October 22, 2008

photo credit: Don Park



G1 technical specs



- Qualcomm MSM7201A, 528 MHz
- ROM 256 MB
- RAM 192 MB
- 4.60 in x 2.16 in x 0.62 in
- 158 grams
- Lithium Ion battery, 1150 mAh



GI technical specs



- 3G (HSDPA)
- touch screen, HVGA 320x480
- QWERTY keyboard
- 3.2 megapixel camera
- microSD expansion slot
- GPS, compass, accelerometer



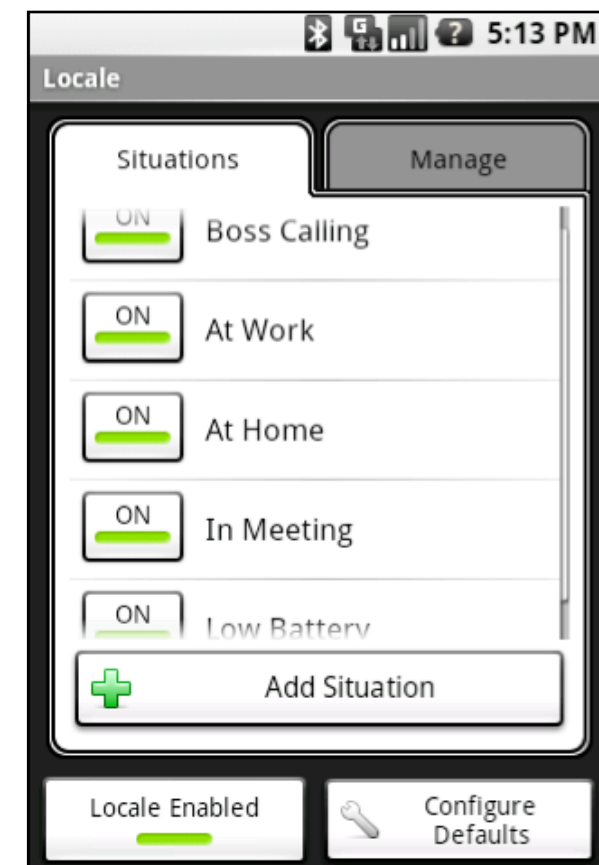
Third party applications



lifeaware.net



Maverick



Android Locale



Android applications

- multiple applications, running simultaneously
- user may switch between running applications
- background services
- copy and paste

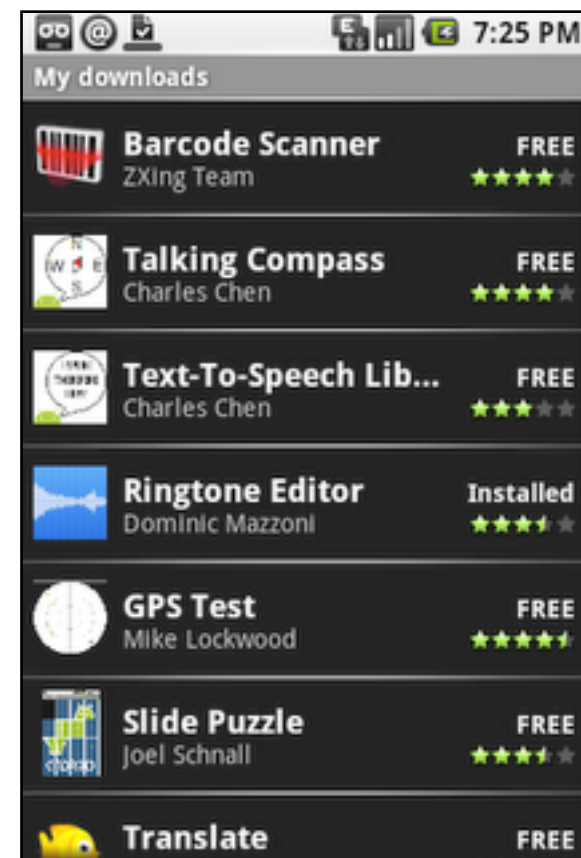
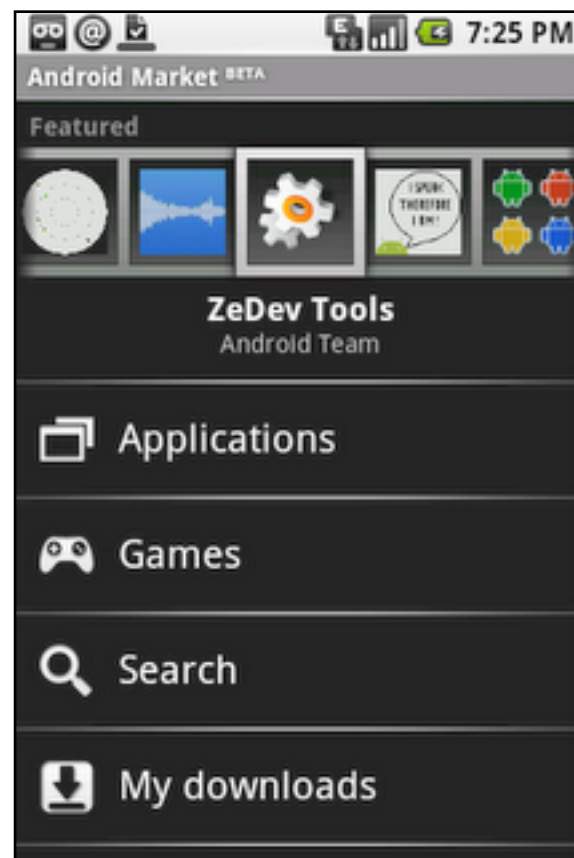


Distributing Android apps

- Android Market
- self-publish on your own web site
- use a 3rd party application store



Android Market



Android Market

- \$25 registration fee for developers
- developer receives 70% of each sale
- remaining amount goes to carriers
- Google does not take a percentage
- <http://www.android.com/market/>



Market got you down?

- self-publish!
- upload APK to your own web server

<http://icecondor.com/download/icecondor-2008-10-26.apk>

- use correct MIME type

`application/vnd.android.package-archive`



Data Synchronization

- How do I sync my calendar data?
- How do I sync my contacts?
- Does Google offer anything like MobileMe?

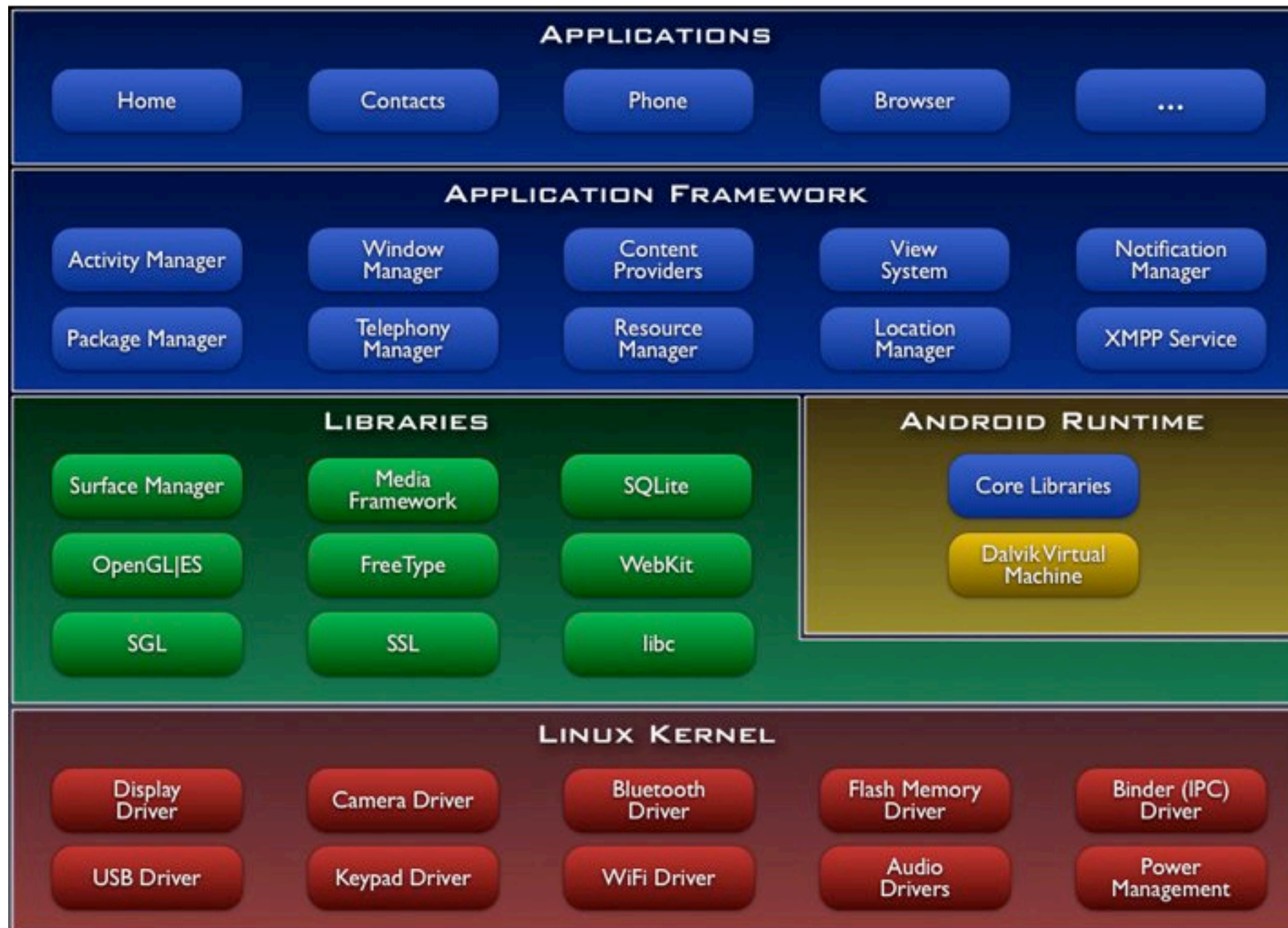


Data Synchronization

“the best way to synchronize these various pieces of information is to let the device do it on its own while you're not looking, so you never have to think about it. Once you've logged into your Google account on an Android-powered phone it automatically synchronizes all your contacts and Gmail information so everything is always available”



System Architecture



Open source project

- <http://source.android.com>
- Apache 2.0 and GPL v2
- Git repository



Android applications

- are written in the Java language
- run on the Dalvik virtual machine



Dalvik VM

- not a Java VM
- design constraints: slow CPU, little RAM
- will run on OS without swap space
- <http://sites.google.com/site/io/dalvik-vm-internals>



Application API's

J2SE	<code>java.util.*</code> <code>java.io.*</code> <code>java.lang.*</code> etc
UI	<code>android.widget.*</code> <code>android.view.*</code> <code>android.graphics.*</code>
Telephony	<code>android.telephony.IPhone</code>
SMS	<code>android.telephony.gsm.SmsManager</code>



Application API's

Web	android.webkit.WebView
Camera	android.hardware.CameraDevice
Local database	android.database.*
Maps	com.google.android.maps.MapView
Location	android.location.LocationManager
Multimedia	android.media.MediaPlayer
HTTP	org.apache.http.client.*



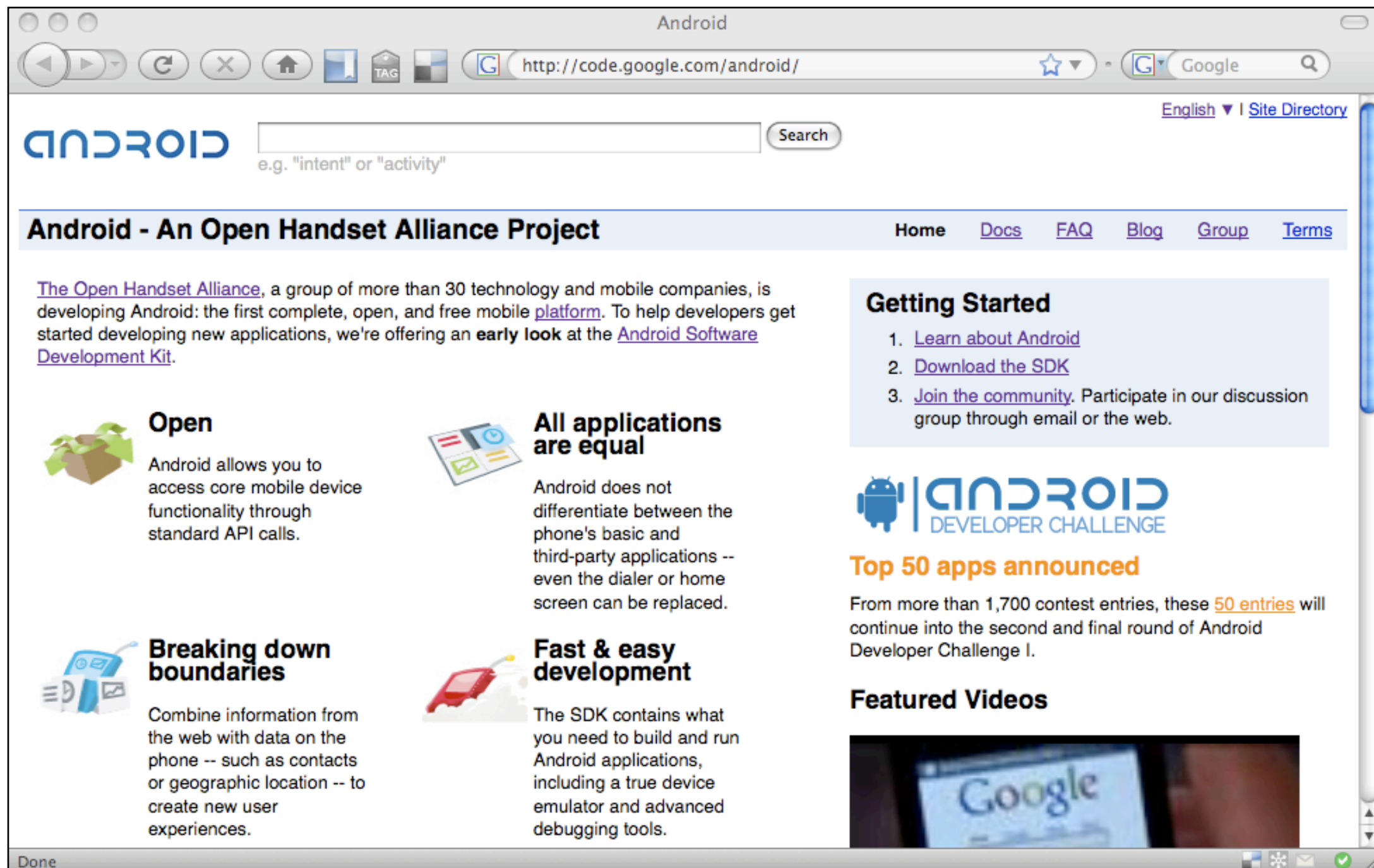
Demo



- Android 1.0
- GPS
- Yahoo Fire Eagle
- OAuth



Getting started



The screenshot shows a web browser window with the address bar displaying `http://code.google.com/android/`. The page features the Android logo and a search bar with the text "e.g. 'intent' or 'activity'". Below the logo, the heading "Android - An Open Handset Alliance Project" is followed by navigation links: Home, Docs, FAQ, Blog, Group, and Terms. The main content area is divided into several sections:

- Open**: Accompanied by an icon of an open box, it states that Android allows access to core mobile device functionality through standard API calls.
- Breaking down boundaries**: Accompanied by an icon of a mobile phone, it describes combining information from the web with data on the phone (like contacts or location) to create new user experiences.
- All applications are equal**: Accompanied by an icon of a phone screen, it explains that Android does not differentiate between basic and third-party applications, even the dialer or home screen can be replaced.
- Fast & easy development**: Accompanied by an icon of a red car, it states that the SDK contains everything needed to build and run Android applications, including a true device emulator and advanced debugging tools.

On the right side, there is a "Getting Started" section with a list of links:

1. [Learn about Android](#)
2. [Download the SDK](#)
3. [Join the community](#). Participate in our discussion group through email or the web.

Below this is the "ANDROID DEVELOPER CHALLENGE" logo, followed by a section titled "Top 50 apps announced" which mentions that 50 entries will continue into the second round of the challenge. At the bottom right, there is a "Featured Videos" section with a video player showing a Google search interface on a mobile device.

<http://code.google.com/android>



Development tools

- Android SDK
- Eclipse plugin



Android SDK

- Android emulator
- command line tools
- documentation
- example applications

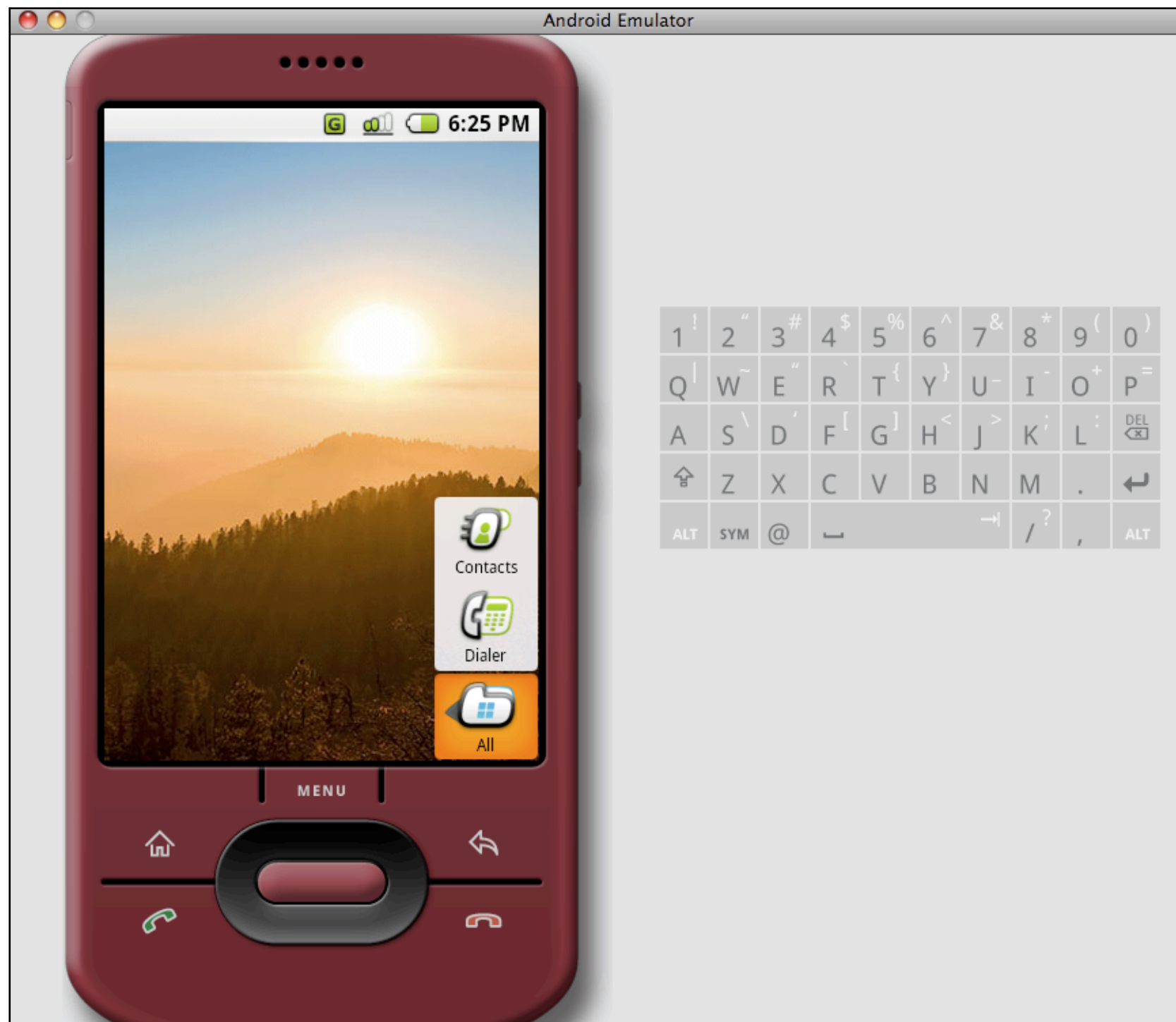


Command line tools

- *aapt* - Android asset packaging tool
- *adb* - Android debug bridge
- *aidl* - Android IDL compiler
- *emulator* - Android emulator



Android emulator



Android emulator

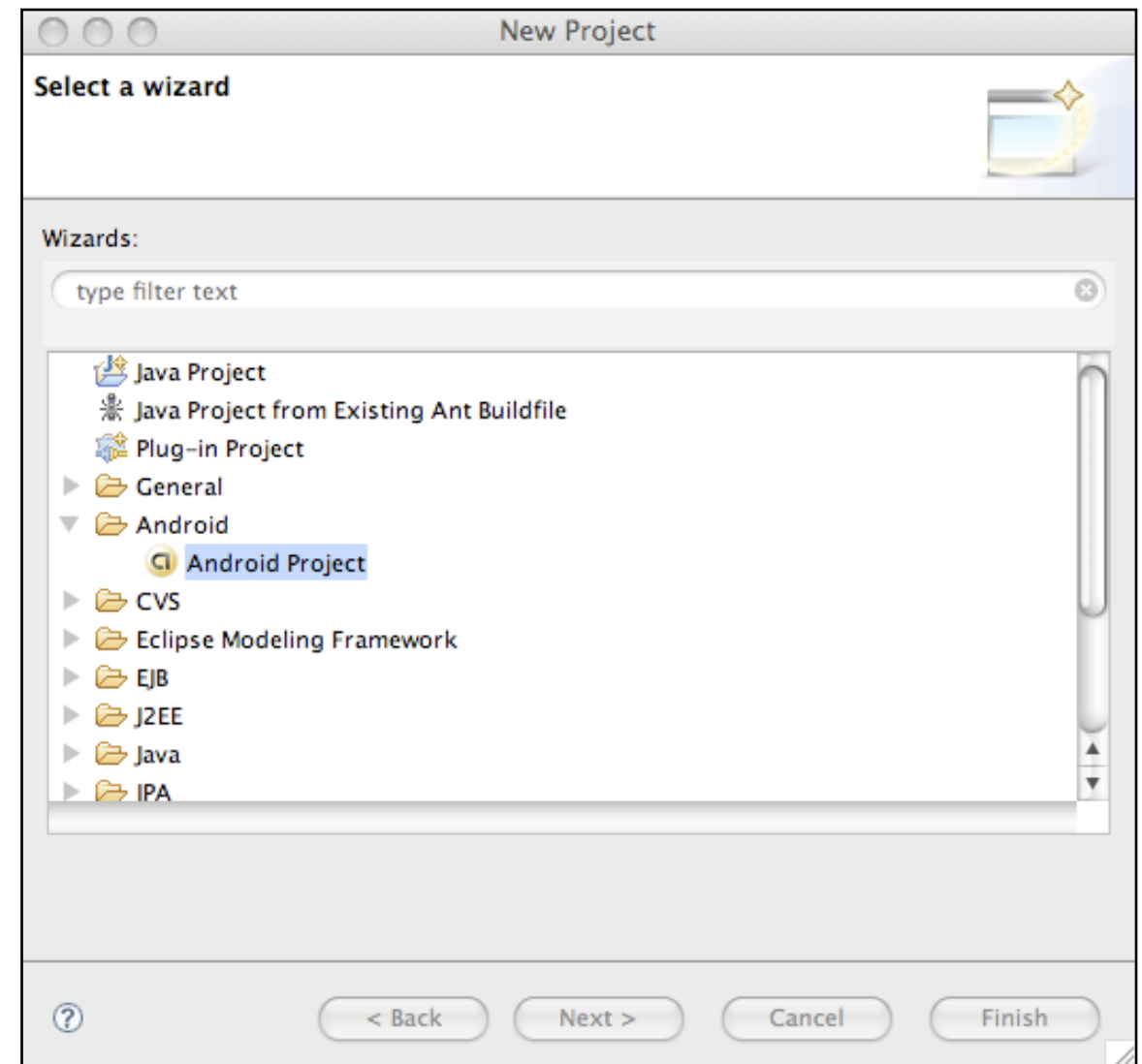


Emulator limitations

- No support for placing or receiving actual phone calls
- No support for camera/video capture (input)
- No support for audio input
- No support for determining connected state
- No support for determining battery charge level
- No support for Bluetooth



Eclipse plugin



<https://dl-ssl.google.com/android/eclipse/>



Android applications

- application package file: *myapp.apk*
- an application is composed of one or more *activities*



Activity

- an activity is usually a single screen in your application
- however, activities can also be faceless
- one activity is designated as the entry point for your application



android.app.Activity

```
import android.app.Activity;

public class MyActivity extends Activity
{
    public void onCreate(Bundle savedInstanceState)
    {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);
    }
}
```



Application building blocks

- AndroidManifest.xml
- Activities
- Views
- Layouts
- Intents & IntentReceivers
- Services
- Notifications
- ContentProviders



Manifest file

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.my_domain.app.helloactivity">
    <application android:label="@string/app_name">
        <activity android:name=".HelloActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN"/>
                <category android:name="android.intent.category.LAUNCHER"/>
            </intent-filter>
        </activity>
    </application>
</manifest>
```

AndroidManifest.xml



Implementing your application UI

- Java code
- XML



Android UI: XML

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    >
    <TextView
        android:layout_width="fill_parent"
        android:layout_height="wrap_content"
        android:text="Hello World"
        />
</LinearLayout>
```



Android UI: Views

- an object that knows how to draw itself on the screen
- examples:
 - *android.widget.ListView*
 - *android.widget.DatePicker*
 - *android.widget.Button*
 - *android.widget.ImageView*



Intents

- “an Intent is a simple message object that represents an ‘intention’ to do something”
- “an intent is an abstract description of an operation to be performed”



android.content.Intent

- VIEW_ACTION
- EDIT_ACTION
- PICK_ACTION
- WEB_SEARCH_ACTION
- SYNC_ACTION
- ...



Application Context

android.app.ApplicationContext

- *startActivity(Intent)*
- *getSystemService*
- *createDatabase*
- *openDatabase*
- *deleteDatabase*
- ...



Additional topics

- Threading
- Security model
- Internationalization
- Power management
- AIDL - Android IDL
- Data synchronization
- WiFi API
- Bluetooth API



What's Next

- more phones (Motorola, ...)
- multi-touch?
- virtual keyboard
- Bluetooth A2DP
- enterprise features (Exchange support?)



Android resources

- <http://code.google.com/android/>
- <http://android-developers.blogspot.com>
- <http://code.google.com/p/apps-for-android/>
- <http://sites.google.com/site/io/>
- <http://www.openhandsetalliance.com/>
- <http://source.android.com>



The End

