

# ANDROID

AN OPEN HANDSET ALLIANCE  
PROJECT



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# Open Handset Alliance

- ❑ Est. 2007, led by Google, open source
- ❑ Main product: Android Platform
- ❑ Enthusiastic support from Industry : both equipment makers and network operators
- ❑ HTC to deliver Android capable device soon!



# Open Handset Alliance Members

Mobile operators	Software companies	Commercialization companies	Semiconductor companies	Handset manufacturers
<ul style="list-style-type: none"> <li>China Mobile</li> <li>KDDI Corporation</li> <li>NTT DoCoMo</li> <li>Sprint Nextel</li> <li>T-Mobile</li> <li>Telecom Italia</li> <li>Telefónica</li> </ul>	<ul style="list-style-type: none"> <li>Ascender Corporation</li> <li>eBay</li> <li>Esmertec</li> <li>Google</li> <li>LivingImage</li> <li>NMS Communications</li> <li>Nuance Communications</li> <li>PacketVideo</li> <li>SkyPop</li> <li>SONIVOX</li> </ul>	<ul style="list-style-type: none"> <li>Aplix</li> <li>Noser Engineering</li> <li>The Astonishing Tribe</li> <li>Wind River Systems</li> </ul>	<ul style="list-style-type: none"> <li>Audience</li> <li>Broadcom Corporation</li> <li>Intel Corporation</li> <li>Marvell Technology Group</li> <li>Nvidia Corporation</li> <li>Qualcomm</li> <li>SIRF Technology Holdings</li> <li>Synaptics</li> <li>Texas Instruments</li> </ul>	<ul style="list-style-type: none"> <li>HTC</li> <li>LG</li> <li>Motorola</li> <li>Samsung Electronics</li> </ul>

# INTRODUCTION TO ANDROID

# WHAT IS ANDROID?

- A complete & modern embedded operating system
- A cutting-edge mobile user experience
- A world-class software stack for building applications
- An open platform for developers, users & industry

# Why Android Was Created?

- ❑ Full phone software stack including applications
- ❑ Designed as a platform for software development
- ❑ Android is open
- ❑ Android is free
- ❑ Community support
- ❑ 100% Java Phone

# HISTORY

- July 2005

Google acquired Android Inc.

- 5 Nov 2007

Open HandSet Alliance formed-

Google, HTC, Intel, Motorola, Qualcomm, T-Mobile

- Android is the OHA first product

- 12 Nov 2007

OHA released a preview of the Android OHA



# INTRODUCTION TO THE PLATFORM : ANDROID

# Android Features

## Software Features

- Integrated browser based on the open source **WebKit** engine
- **SQLite** for relational data storage
- Media support for common audio, video, and still image formats  
(**MPEG4**, H.264, **MP3**, AAC, AMR, **JPG**, PNG, **GIF**)
- **Dalvik Virtual Machine** optimized for mobile devices

## Hardware Features supported:

- Cellular networking : GSM, EDGE, 3G (hardware dependent)
- LAN : Bluetooth, and Wi-Fi (hardware dependent)
- Graphics Hardware Acceleration
- Camera, GPS and Compass (hardware dependent)
- **Touch screen** and **accelerometer** for motion sensing

# ANDROID ARCHITECTURE



# Application Framework

## Content Providers

Enable applications access data from other applications ,sharing

## Resource Manager

Providing access to non-code resources

## Notification Manager

Enables all applications to display alerts in the status bar

## Activity Manager

Manages the lifecycle of applications

# Libraries

- Written in C/C++ - System C Library(libc)
- Display/Graphics(SGL)
- Media Libraries
- SQLite –RDB engine-light weight
- LibWebCore–web browser engine–embeddable web view

# Linux Kernel

- Linux Version 2.6
- Security, Memory & Process Management
- Proven driver model
- Efficient computing resource management
- Stable and proven OS for mobile platform

# Android Runtime

- ❑ Includes a set of core libraries that provides most of the functionality-JAVA
- ❑ Every Android application runs in its own process
- ❑ Dalvik VM executes files in the (.dex) format
- ❑ Device can run multiple VMs efficiently

# Anatomy of an Android Application

There are four building blocks for an Android application:

- ❑ **Activity**

- a single screen

- ❑ **Intent Receiver**

- to execute in reaction to an external event(Phone Ring)

- ❑ **Service**

- code that is long-lived and runs without a UI(Media Player)

- ❑ **Content Provider**

- an application's data to be shared with other applications



# Android Building Blocks

These are the most important parts of the Android APIs:

## ❑ AndroidManifest.xml

-the control file-tells the system what to do with the top-level components

## ❑ Activities

-an object that has a life cycle-is a chunk of code that does some work

## ❑ Views

-an object that knows how to draw itself to the screen

## ❑ Intents

-a simple message object that represents an "intention" to do something

## ❑ Notifications

-is a small icon that appears in the status bar(SMS messages)  
-for alerting the user

## ❑ Services

# Development Tools

The Android SDK includes a variety of custom tools that help you develop mobile applications on the Android platform. Three of the most significant tools are:

- **Android Emulator** -A **virtual mobile device** that runs on our computer -use to design, debug, and test our applications in an actual Android run-time environment
- **Android Development Tools Plugin** -for the **Eclipse IDE** - adds powerful extensions to the Eclipse integrated environment
- **Dalvik Debug Monitor Service** (DDMS) -Integrated with **Dalvik** -this tool let us manage processes on an emulator and assists in debugging

# Life Cycle of an Android Application

❑ **An unusual and fundamental feature** - process's lifetime is *not* directly controlled by the application itself

Deciding factors:

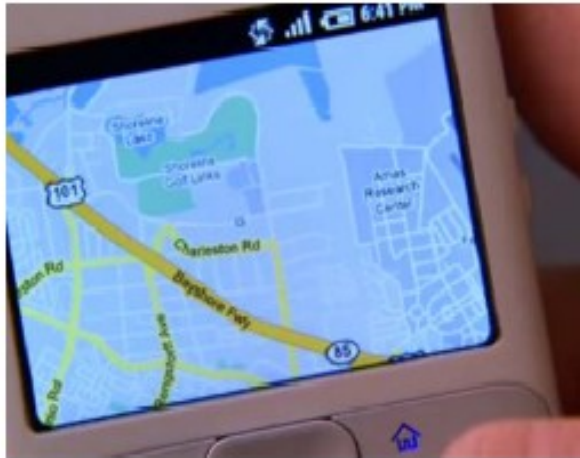
- how important
- overall memory available

❑ To determine which processes should be killed when low on memory: **"importance hierarchy"**

# “Importance Hierarchy” (in Order Of Importance)

- ❑ Foreground Process -required for what the user is currently doing
- ❑ Visible Process -holding an **Activity** - visible to the user on-screen but not in the foreground(on pause)
- ❑ Service Process -holding a **Service** - not directly visible to the user- relevant tasks
- ❑ Background Process -holding an **Activity** - not visible to the user - can kill at any time(**stopped**)
- ❑ Empty Process -doesn't hold any active application components(as a **cache** to improve start-up time)

# Applications



Phone, Email, SMS, Web, Gaming, Maps, Social Network

## Initial screen



## Map



## Browser



# CONCLUSION

- Android is **open** to all: industry, developers and users
- Participating in many of the successful open source projects
- Aims to be as **easy** to build for as the **web**.
- Google Android is stepping into the next level of Mobile Internet



android