



# Introduzione ad Android

Lezione 2  
Android Overview

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## Sommario

1. Devices
2. History
3. App development
4. Market



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## Android devices (1/10)



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## Android devices (2/10)

Galaxy Note 3



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## Android devices (3/10)

Galaxy Tablet



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## Android devices (4/10)

Android microwave



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## Android devices (5/10)

Android watch



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## Android devices (6/10)

Android camera



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## Android devices (7/10)

### Android TV



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## Android devices (8/10)

### Android car radio



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## Android devices (9/10)

Android washing machine



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## Android devices (10/10)

Android PC



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## Android history (1/10)

- 1996
  - The WWW already had websites with color and images
  - But the best phones displayed a couple of lines of monochrome text
  - Enter
    - Wireless Application Protocol (WAP) – stripped down HTTP for bandwidth reduction
    - Wireless Markup Language (WML) – stripped down HTML for content

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## Android history (2/10)

- Many issues (WAP = “Wait And Pay”)
  - Few developers to produce content
  - Really hard to type in URLs using the small keyboards
  - Data fees frightfully expensive
  - No billing mechanism – content difficult to monetize
- Other platforms emerged
  - Palm OS, Blackberry OS, J2ME, Symbian (Nokia), BREW, OS X iPhone, Windows Mobile

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## Android history (3/10)

- Origins: Sidekick Phone, by Danger Inc.
  - Conceived by Andy Rubin
  - Impressed Larry Page and Sergey Brin (Google)
  - Cancelled because it didn't achieve commercial success
- In 2004 Rubin decides to create an open OS for phone manufacturers

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## Android history (4/10)

- 2005
  - Google acquires startup Android Inc. to start Android platform
  - Work on Dalvik VM begins
- 2007
  - Open Handset Alliance announced
  - Early look at SDK

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## Android history (5/10)

- 2008
  - Google sponsors 1st Android Developer Challenge
  - T-Mobile G1 announced
  - SDK 1.0 released
  - Android released open source (Apache License)
  - Android Dev Phone 1 released

## Android history (6/10)

- 2009
  - SDK 1.5 (Cupcake)
  - New soft keyboard with “autocomplete” feature
  - SDK 1.6 (Donut)
  - Support Wide VGA
  - SDK 2.0/2.0.1/2.1 (Eclair)
  - Revamped UI, browser

## Android history (7/10)

- 2010
  - Nexus One released to the public
  - SDK 2.2 (Froyo)
  - Flash support, tethering
  - SDK 2.3 (Gingerbread)
  - UI update, system-wide copy-paste

## Android history (8/10)

- 2011
  - SDK 3.x (Honeycomb)
  - Optimized for tablet support
  - SDK 4.0 (Ice Cream Sandwich)
  - Virtual UI buttons
- 2012
  - SDK 4.1.1 (Jelly Bean)
  - Triple buffered graphics pipeline

## Android history (9/10)



**Cupcake**  
Android 1.5



**Donut**  
Android 1.6



**Eclair**  
Android 2.0/2.1



**Froyo**  
Android 2.2



**Honeycomb**  
Android 3.0-3.2



**Ice cream Sandwich**  
Android 4.0+



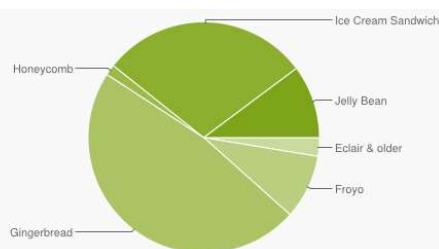
**Jelly Bean**  
Android 4.1.1

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## Android history (10/10)

Version	Codename	API	Distribution
1.6	Donut	4	0.2%
2.1	Eclair	7	2.4%
2.2	Froyo	8	9.0%
2.3 - 2.3.2	Gingerbread	9	0.2%
2.3.3 - 2.3.7		10	47.4%
3.1	Honeycomb	12	0.4%
3.2		13	1.1%
4.0.3 - 4.0.4	Ice Cream Sandwich	15	29.1%
4.1	Jelly Bean	16	9.0%
4.2		17	1.2%



Data collected during a 14-day period ending on January 3, 2013

<http://developer.android.com/resources/dashboard/platform-versions.html>

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## Android app development (1/8)

- Mobile platform is the platform of the future
  - Double-digit growth in world-wide smartphone ownership
- Job market is hot
  - Market for mobile software surges from \$4.1 billion in 2009 to \$17.5 billion by 2012
  - 2010 Dice.com survey: 72% of recruiters looking for iPhone app developers, 60% for Android
  - Dice.com: mobile app developers made \$85,000 in 2010 and salaries expected to rise

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## Android app development (2/8)

	2Q12 Units	Market Share	2Q11 Units	Market Share
Android	98,529.3	64.1	46,775.9	43.4
iOS	28,935.0	18.1	19,628.8	18.2
Symbian	9,071.5	5.9	23,853.2	22.1
RIM	7,991.2	5.2	12,652.3	11.7
Bada	4,208.8	2.7	2,055.8	1.9
Microsoft	4,087.0	2.7	1,723.8	1.6
Others	863.3	0.6	1,050.6	1.0

Source: Gartner (August 2012)

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## Android app development (3/8)

- A lot of students have them
  - 2010 survey by University of CO: 22% of college students have Android phone (26% Blackberry, 40% iPhone)
  - Gartner survey: Android used on 22.7% of smartphones sold world-wide in 2010 (37.6% Symbian, 15.7% iOS)
- Pre-existing programming languages
  - E.g., Java, Python
  - Low learning curve

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## Android app development (4/8)

- Transferring app to phone is trivial
  - Can distribute by putting it on the web
  - Android Market (now Google Play) for wider distribution



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## Android app development (5/8)

- A software stack for mobile devices that includes
  - An operating system
  - Middleware
  - Key applications
- Uses Linux to provide core system services
  - Security
  - Memory management
  - Process management
  - Power management
  - Hardware drivers

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## Android app development (6/8)

- Mobile devices have advantages
  - Always with the user
  - Typically have Internet access
  - Typically GPS enabled
  - Typically have accelerometer & compass
  - Most have cameras & microphones
  - Many apps are free or low-cost

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## Android app development (7/8)

- And disadvantages
  - Limited screen size
  - Limited battery life
  - Limited processor speed
  - Limited and sometimes slow network access
  - Limited or awkward input: soft keyboard, phone keypad, touch screen, or stylus
  - Limited web browser functionality
  - Range of platforms & configurations across devices

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## Android app development (8/8)

- Applications should be
  - Fast
    - Resource constraints: <200MB RAM, slow processor
  - Responsive
    - Apps must respond to user actions within 5 seconds
  - Secure
    - Apps declare permissions in manifest
  - Seamless
    - Usability is key, persist data, suspend services
    - Android kills processes in background as needed

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## Android applications (1/6)

- Mobile application
  - Any application that runs on a mobile device
- Types
  - Web apps: run in a web browser
    - HTML, JavaScript, Flash, server-side components, etc.
  - Native: compiled binaries for the device
    - Often make use of web services

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## Android applications (2/6)

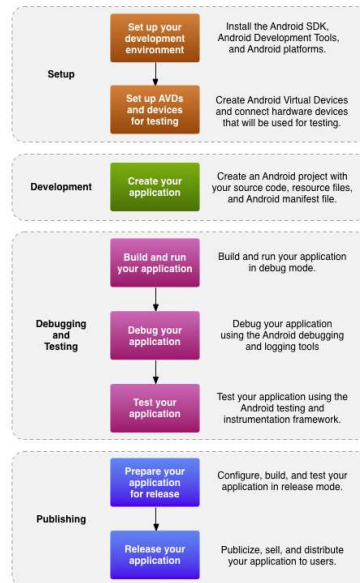
- Android applications
  - Built using Java and new SDK libraries
  - No support for some Java libraries like Swing & AWT
- Java code compiled into Dalvik byte code (.dex)
  - Optimized for mobile devices (better memory management, battery utilization, etc.)
- Dalvik VM runs .dex files

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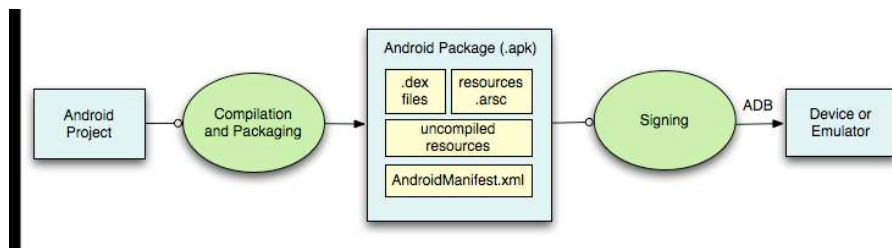
## Android applications (3/6)



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## Android applications (4/6)



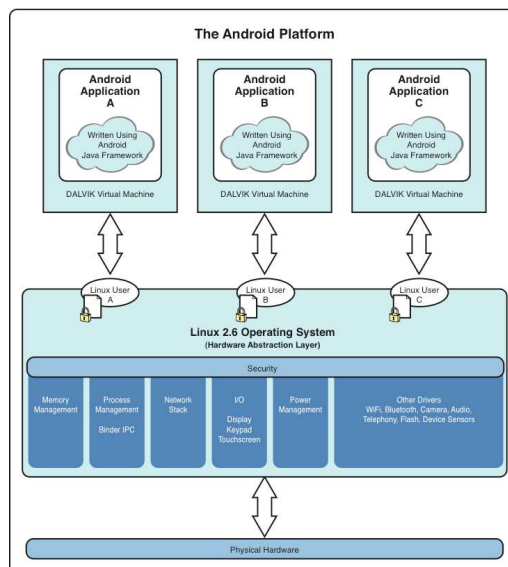
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## Android applications (5/6)

- By default, each app is run in its own Linux process
  - Process started when app's code needs to be executed
  - Threads can be started to handle time-consuming operations
- Each process has its own Dalvik VM
- By default, each app is assigned unique Linux ID
  - Permissions are set so app's files are only visible to that app

## Android applications (6/6)



## Android market (1/4)

- Paid apps in Android Market
- Free, ad-supported apps in Android Market
  - Ad networks (Google AdMob, Quattro Wireless)
  - Sell your own ads
- Services to other developers
  - Ex. Skyhook Wireless (<http://www.skyhookwireless.com/>)
- Contests (Android Developer Challenge)
- Selling products from within your app

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## Android market (2/4)

- Has various categories, allows ratings
- Have both free/paid apps
- Featured apps on web and on phone
- The Android Market (and iTunes/App Store) is great for developers
  - Level playing field, allowing third-party apps
  - Revenue sharing

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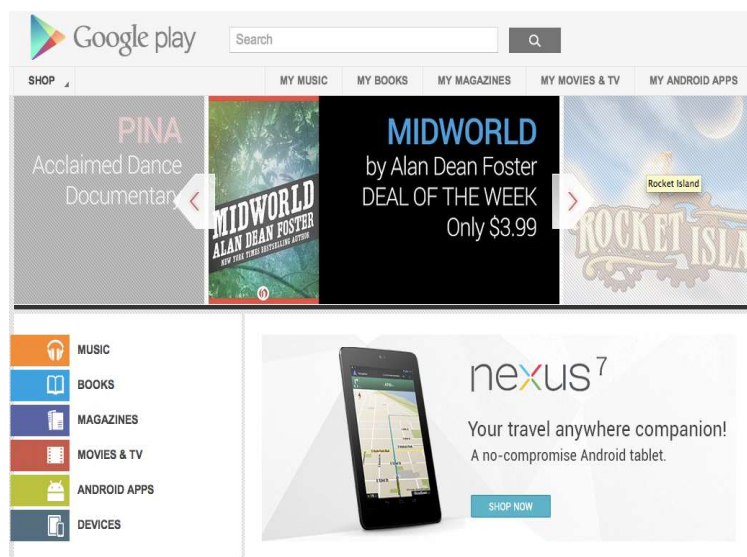
## Android market (3/4)

- Requires Google Developer Account
  - \$25 fee
- Link to a Merchant Account
  - Google Checkout
  - Link to your checking account
  - Google takes 30% of app purchase price

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## Android market (4/4)



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## Credits and references

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