



ANDROID

RESMI P D

BCA

Android Phones



HTC G1



Samsung i7500



HTC Hero



Motorola Cliq



Sony X10



HTC Magic



Samsung Moment



Motorola Droid



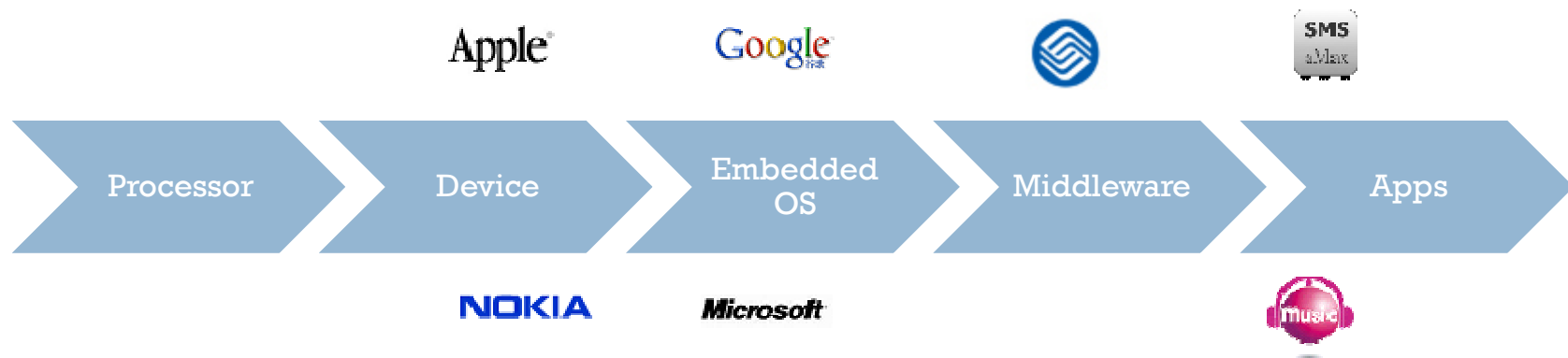
HTC Tattoo



nexus one

Mobile Devices

- It's obvious that mobile device may take the place of PC in future
- OS plays a vital part



Handset Manufacturers



Software



Mobile Operators



open
handset
alliance

Semiconductor



Commercialization



OHA and Android

- OHA(Open Handset Alliance) is a group of 71 technology and mobile companies, including Google, Intel, Dell, HTC and China Mobile...
- OHA's aim :
 - ▣ accelerate innovation in mobile phones
 - ▣ offer consumers a richer, less expensive, and better mobile experience
- OHA developed Android™, the first complete, open, and free mobile platform
- OHA was initially called up by Google, and Google is the 'captain'

What's Android

- Generally, Android is a software stack for mobile devices that includes an operating system, middleware and key applications
- Android is based on JAVA and all its applications are developed in JAVA
- The JAVA VM, known as Dalvik, is highly customized and optimized for mobile devices
- **Android SDK** offers rich tools for android application development and many useful APIs.



Android Features #1



- Application framework enabling reuse and replacement of components
- Optimized Java virtual machine: Dalvik
- Optimized Graphics Processing, supporting 2D and 3D graphics(OpenGL ES 1.0)
- Integrated open source web browser: WebKit
- SQLite for structured data storage

Android Features #2

- ❑ Multimedia capability, supporting varieties of audio, video and still image formats
- ❑ GSM Telephony
- ❑ Bluetooth, EDGE, 3G and Wi-Fi support
- ❑ Camera, GPS, compass, accelerometer and other sensors support
- ❑ Rich development environment, including an emulator, debugging tools, memory probe tools, log tools and powerful eclipse plugins



Hardware depende

Android Architecture

APPLICATIONS

Home

Contacts

Phone

Browser

...

APPLICATION FRAMEWORK

Activity Manager

Window Manager

Content Providers

View System

Notification Manager

Package Manager

Telephony Manager

Resource Manager

Location Manager

GTalk Service

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

Bluetooth Driver

Flash Memory Driver

Binder (IPC) Driver

USB Driver

Keypad Driver

WiFi Driver

Audio Drivers

Power Management

Linux Kernel

- Note that Android based on a Linux kernel not a Linux OS
- Supplies Security, Memory management, Process management, Network stack and Driver model
- Acts as an abstraction layer between the hardware and the rest of the software stack



Libraries

- Run in system background
- Using C/C++ Language
- 4 types of Libraries
 - ▣ Bionic Libc, system C libraries
 - ▣ Function Libraries, supporting multimedia, web browser, SQLite...
 - ▣ Native Servers
 - ▣ Hardware Abstraction Libraries



Core Libraries

- **System C library**, the standard C system library, tuned for embedded Linux-based devices
- **Media Libraries**, support playback and recording of many popular audio and video formats, as well as image files, including MPEG4, H.264, MP3, AAC, AMR, JPG, and PNG
- **Surface Manager**, manages access to the display subsystem and seamlessly composites 2D and 3D graphic layers from multiple applications
- **WebKit**, a modern web browser engine which powers both the Android browser and an embeddable web view
- **SGL**, the underlying 2D graphics engine
- **3D libraries**, an implementation based on OpenGL ES 1.0 APIs
- **FreeType** , bitmap and vector font rendering
- **SQLite** , a powerful and lightweight relational database engine

Android Runtime

- **The core of Android platform**
- Dalvik Virtual Machine
 - ▣ Register-based
 - ▣ Executes files in the Dalvik Executable (.dex) format
- Java core Libraries
 - ▣ Provides most of the functionality of the Java programming language.



Android Runtime (cont.)



- The functions of Java core libraries rely on the Dalvik VM and the underlying Linux kernel
- Multiple Dalvik VMs may run at the same time
- Every Android application runs in its own process, with its own instance of the Dalvik virtual machine
 - ▣ The "dx" tool in Android SDK can transform compiled JAVA class into the .dex format

Dalvik Virtual Machine

- **Android custom implementation virtual machine**
 - ▣ Provides application portability and runtime consistency
 - ▣ Runs optimized file format (.dex) and Dalvik bytecode
 - ▣ Java .class / .jar files converted to .dex at build time
- **Designed for embedded environment**
 - ▣ Supports multiple virtual machine processes per device
 - ▣ Highly CPU-optimized bytecode interpreter
 - ▣ Efficiently Using runtime memory
- **Core Libraries**
 - ▣ Core APIs for Java language provide a powerful, yet simple and familiar development platform

DVM vs. JVM



- DVM
 - Google
 - Dalvik executable
 - Only supports a subset of standard Java Library
- JVM
 - Sun
 - Java bytecode
- Some worries that Java world may be divided into different communities, each has its own Java standard

Application Framework

- Simplify the reuse of components
 - ▣ Applications can publish their capabilities and any other application may then make use of those capabilities
- Applications is a set of services and systems, include
 - ▣ Views system, content providers, resources manager and so on



Application Framework (cont.)

- **Activity Manager**, manages the lifecycle of applications and provides a common navigation backstack
- **Notification Manager**, enables all applications to display custom alerts in the status bar
- **Resource Manager**, providing access to non-code resources such as localized strings, graphics, and layout files
- **Content Providers**, access data from other applications (such as Contacts), or to share their own data
- **Views**, used to build an application, including lists, grids, text boxes, buttons, and even an embeddable web browser

Applications

- A set of core applications shipped with Android platform
 - ▣ an email client, SMS program, calendar, maps, browser, contacts, and others
- All written in Java
- Our applications are in the same level as these applications



Development Environment



- IDE – Eclipse
- Eclipse plug-in - ADT
- Software Development Kit (SDK)
- Android Emulator
- Debugger

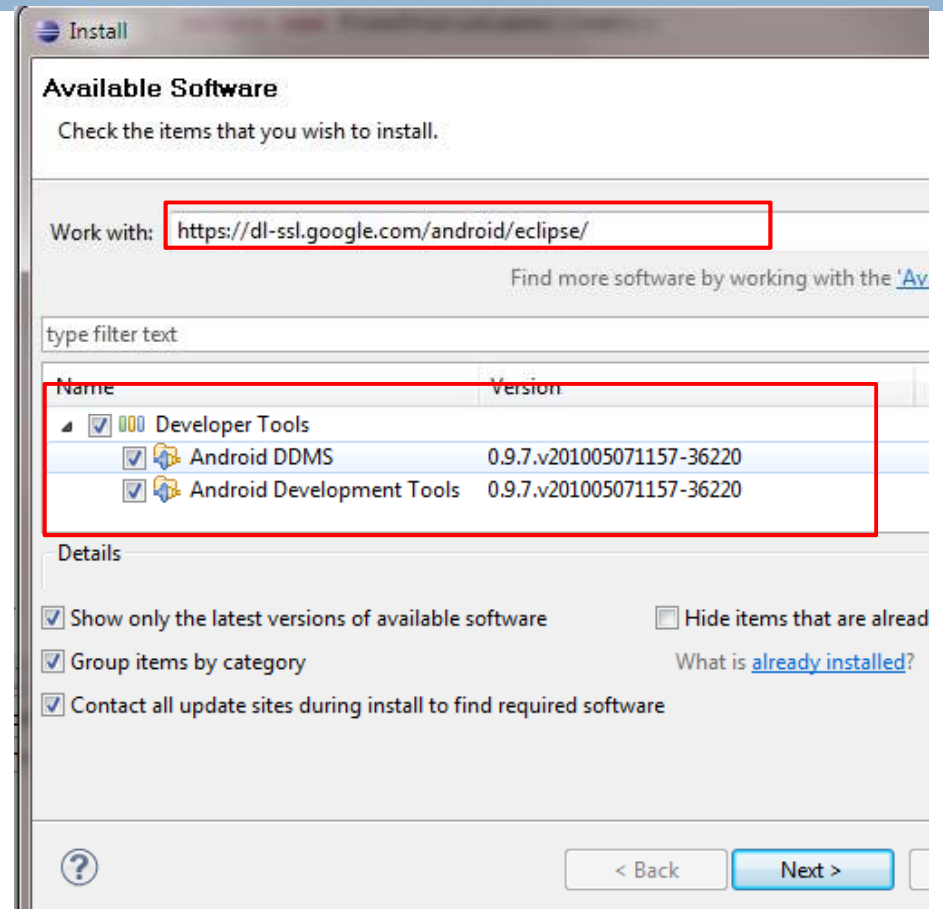
Setup Android SDK

- Download Android SDK and extract the zip file to an arbitrary folder
 - <http://androidappdocs.appspot.com/sdk/index.html>
 - E.g.: extract to C:\

Platform	Package	Size	MD5 Checksum
Windows	android-sdk_r06-windows.zip	23293160 bytes	7c7fcec3c6b5c7c3df6ae654b27effb5
Mac OS X (intel)	android-sdk_r06-mac_86.zip	19108077 bytes	c92abf66a82c7a3f2b8493ebe025dd22
Linux (i386)	android-sdk_r06-linux_86.tgz	16971139 bytes	848371e4bf068dbb582b709f4e56d903

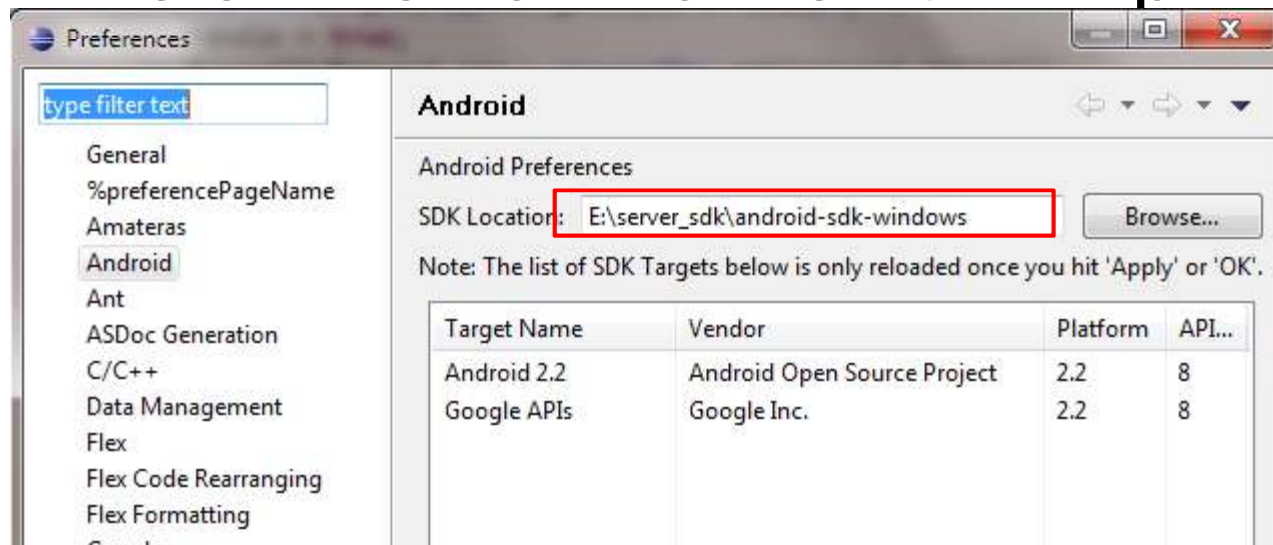
Setup ADT plugin

- Install Eclipse ADT plugin
 - Eclipse must be J2EE edition, 3.5 recommended
 - Update site: <https://dl-ssl.google.com/android/eclipse/>
 - Install all the plugins in the repository
 - Restart needed after installation



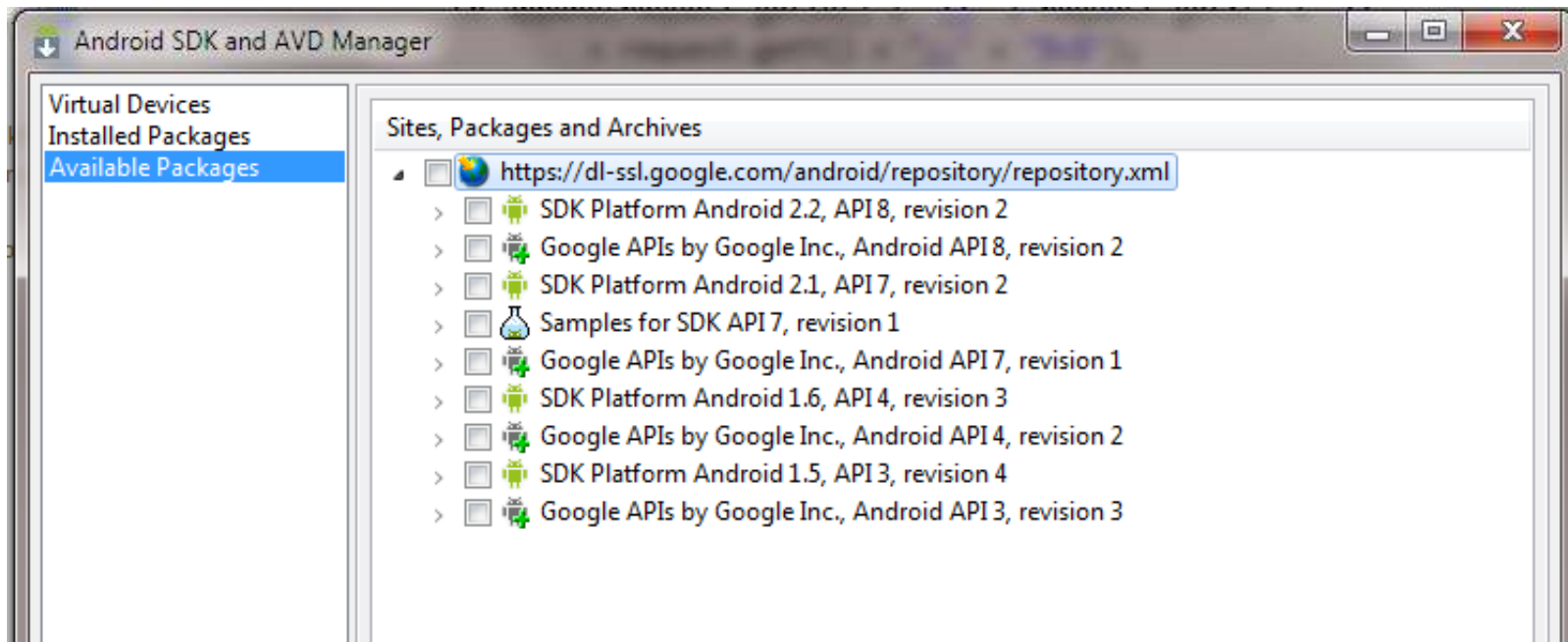
Configure ADT Plugin

- ❑ Open eclipse Window->Preferences, select Android
- ❑ Setup the SDK location as the folder where you extracted the downloaded SDK zip file



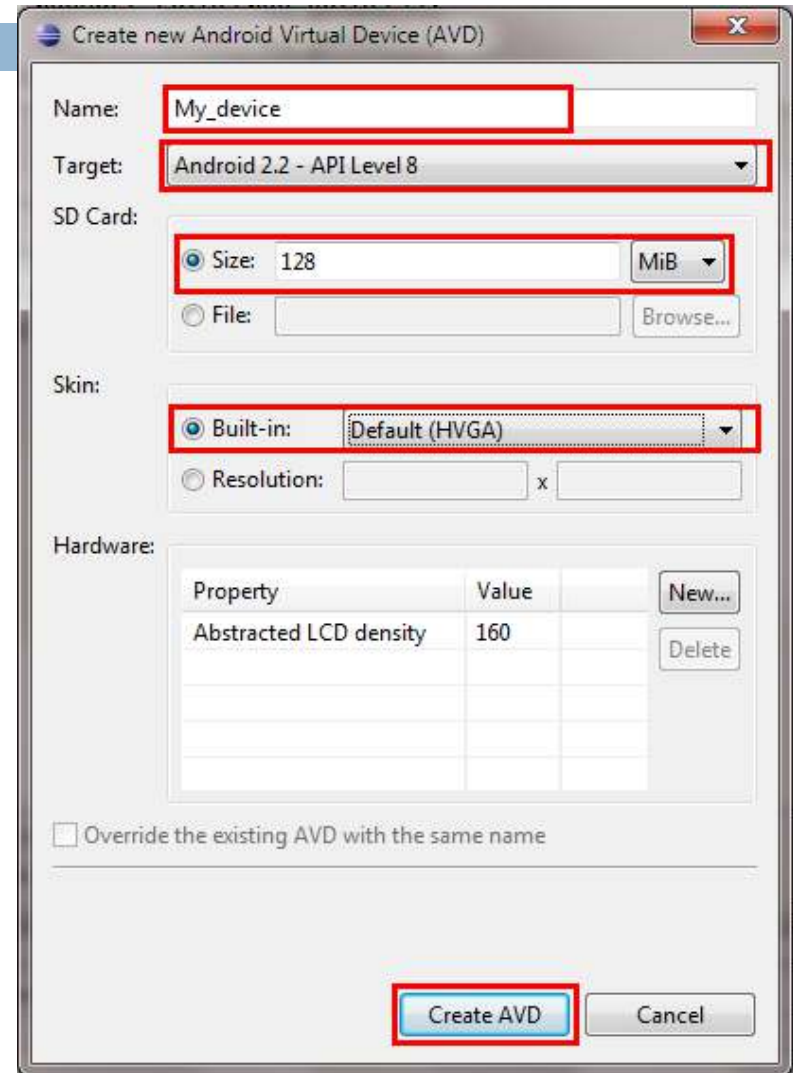
Setup SDK APIs

- ❑ Open Window->Android SDK and AVD Manager
- ❑ Click *Available Packages* and then choose proper APIs to install, the latest may be the best



Setup Emulators

- After SDK APIs installation, click *Virtual Devices*
- Click *new*, there will be a dialog
 - ▣ input a name
 - ▣ choose a running target and a skin
 - ▣ specify the SD card size





THANK YOU

