



Android Programming: Installation, Setup, and Getting Started

Originals of Slides and Source Code for Examples:
<http://wwwcoreservlets.com/android-tutorial/>

Customized Java EE Training: <http://coursescoreservlets.com/>

Servlets, JSP, JSF 2.0, Java 6, Ajax, jQuery, GWT, Spring, Hibernate, RESTful Web Services, Android.
Developed and taught by well-known author and developer. At public venues or onsite at *your* location.



For live Android training, please see courses
at <http://coursescoreservlets.com/>.

Taught by the author of *Core Servlets and JSP*, *More Servlets and JSP*, and this Android tutorial. Available at public venues, or customized versions can be held on-site at your organization.



- Courses developed and taught by Marty Hall
 - Android development, JSF 2, servlets/JSP, Ajax, jQuery, Java 6 programming, custom mix of topics
 - Ajax courses can concentrate on 1 library (jQuery, Prototype/Scriptaculous, Ext-JS, Dojo, etc.) or survey several
- Courses developed and taught by coreservlets.com experts (edited by Marty)
 - Spring, Hibernate/JPA, EJB3, GWT, RESTful and SOAP-based Web Services

Contact hall@coreservlets.com for details

Topics in This Section

- **Installing the Software and Documentation**
 - Java 6
 - Eclipse
 - Android SDK base
 - Eclipse ADT Plugin
 - Updated SDK components
 - AVD (Android Virtual Device)
- **Running Apps**
 - Import and test an existing app
 - Run on emulator
 - Create and test a new app
 - Run on emulator
 - Seeing standard output in the DDMS
 - Deploy app to USB-connected Android device

5

© 2011 Marty Hall



Installing the Software and Documentation

Customized Java EE Training: <http://coursescoreservlets.com/>

Servlets, JSP, JSF 2.0, Java 6, Ajax, jQuery, GWT, Spring, Hibernate, RESTful Web Services, Android.
Developed and taught by well-known author and developer. At public venues or onsite at *your* location.

JDK for Java SE 6

• Overview

- Java 6 is newest, best, and especially fastest version
 - Java 5 supported by Android but not recommended
- For PC, Linux, Solaris, follow directions at <http://www.oracle.com/technetwork/java/javase/downloads/>
 - Get JDK, not just JRE
 - Get SE (Standard Edition), not EE or Micro Edition
 - Don't get version with the NetBeans IDE
- For MacOS, Java is preinstalled & updated automatically

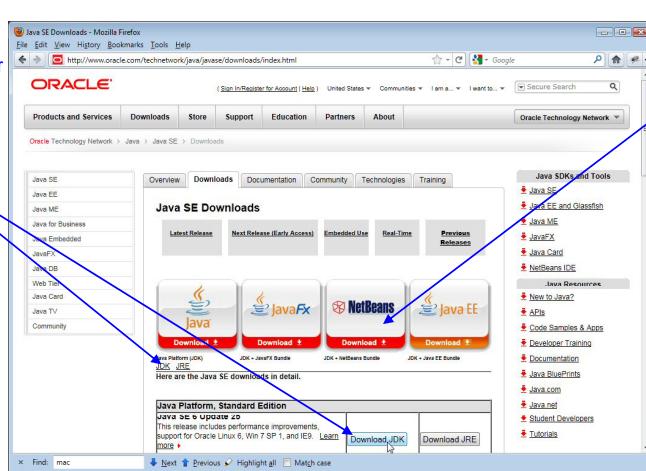
7

Installing Java SE 6

• Install Java 6

- <http://www.oracle.com/technetwork/java/javase/downloads/>

Use this version. The "JDK – Java Development Kit" includes compiler for .java files, whereas the "JRE – Java Runtime Environment" is only for executing prebuilt .class files.



This tutorial uses Eclipse, so do *not* use this link.

As of summer 2011, there is no NetBeans plugin for Android development. So, Eclipse is strongly recommended even if you normally use NetBeans for Java development. However, IntelliJ IDEA has Android support: see http://www.jetbrains.com/idea/features/google_android.html

After downloading, run installer and accept all defaults.

Eclipse

• Overview

- Eclipse is a free open source IDE (Integrated Development Environment). Support for Java, HTML, CSS, JavaScript, C++, PHP, and more.
- Google has free Eclipse plugin to integrate with the Android SDK.

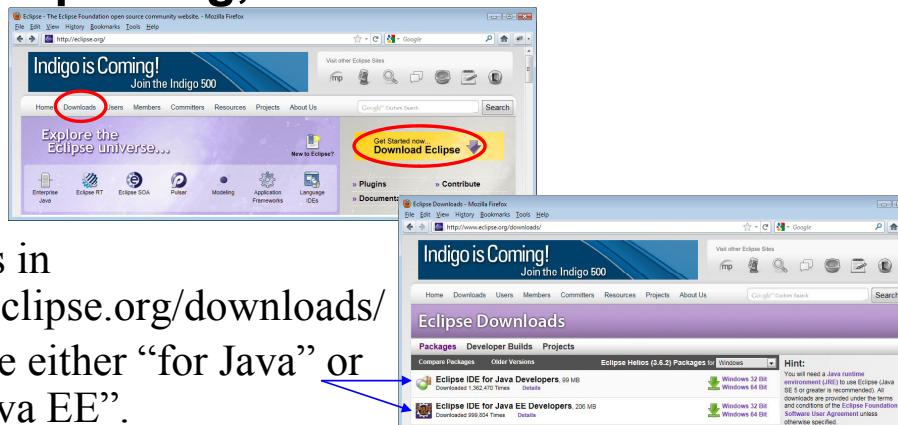
• Features

- General
 - Checks your syntax as you type
 - Automatically compiles every time you save file
 - Refactoring, debugging, templates for common tasks, etc.
- Android-specific
 - Deploy apps to Android emulator
 - Configure virtual environments
 - Drag-and-drop GUI builder

9

Installing Eclipse

• Go to eclipse.org, click on “Downloads”

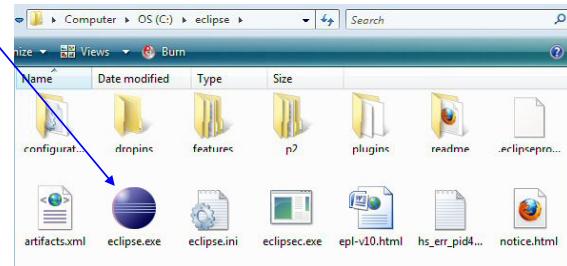


- Results in <http://eclipse.org/downloads/>
- Can use either “for Java” or “for Java EE”.
 - I use EE version since I also use Eclipse for Web apps.
- Latest version (3.6 – Helios) recommended.
 - Previous version (3.5 – Ganymede) still supported
 - Older versions (3.4 and earlier) not supported

10

Running Eclipse

- **Unzip the downloaded file (no installer!)**
 - Call the folder you unzip into “installDir”
- **Double click `eclipse.exe`**
 - From `installDir/bin`
- **Click on “Workbench” icon**
 - Next time you bring up Eclipse, it will come up in workbench automatically
- **Shortcut**
 - Many developers put Eclipse link on their desktop
 - R-click `eclipse.exe`, Copy, then go to desktop, R-click, and Paste Shortcut (not just Paste!)



The Android SDK

- **Overview**
 - Android-specific libraries
 - Dalvik (Android virtual machine) compiler
 - Android emulator (to run without physical device)
 - DDMS debugging environment
- **Documentation**
 - Installation
 - <http://developer.android.com/sdk/installing.html>
 - Developer’s Guide
 - <http://developer.android.com/guide/developing/index.html>
 - JavaDoc (API Reference)
 - <http://developer.android.com/reference/classes.html>
 - Tutorials and articles
 - <http://developer.android.com/resources/index.html>

Bookmark these URLs!

Installing the Android SDK

- **Download and run installer**
 - From <http://developer.android.com/sdk/>
 - I install in C:\Android-sdk-windows
 - Sets up basic SDK, but omits many components
- **Detailed instructions**
 - <http://developer.android.com/sdk/installing.html>
- **Postponed step**
 - After installing Eclipse plugin, we will run the SDK updater to get the important missing components
 - Easier to do it from Eclipse than from command-line tool described in link above. See upcoming slide after Eclipse ADT installation.

13

Eclipse ADT Plugin

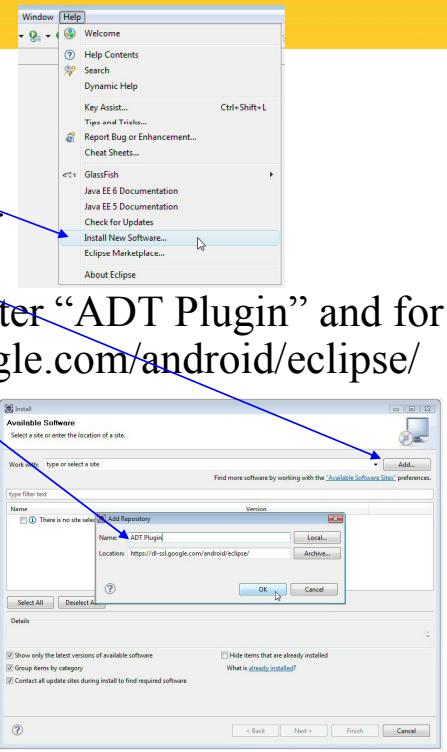
- **Overview**
 - ADT (Android Development Tools) provides many useful features accessible directly in Eclipse
 - Integration between Eclipse & Android command-line tools
 - Drag-and-drop GUI builder
 - Many development and debugging aids
- **Detailed instructions**
 - <http://developer.android.com/sdk/eclipse-adt.html>

14

Installing Eclipse ADT

- **Steps**

- Start Eclipse
- Help → Install New Software ...
- Click “Add” in upper-right
- In Add Repository, for Name enter “ADT Plugin” and for Location enter <https://dl-ssl.google.com/android/eclipse/>
- Click OK, select checkbox next to Developer Tools, Next, see packages to be installed, accept license, Finish
- Update the ADT plugin.
 - Help → Check for Updates

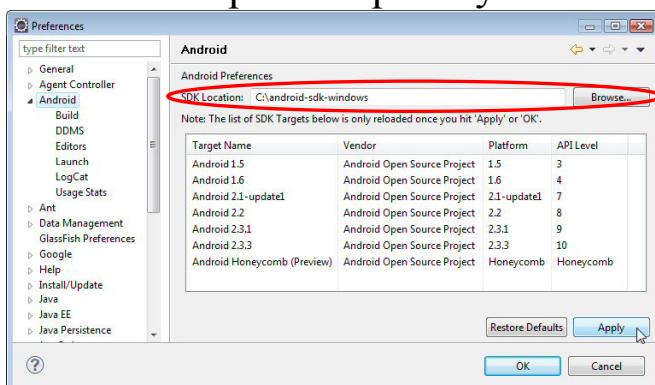


15

Configuring Eclipse ADT

- **Set SDK Location**

- Window → Preferences → Android
- Click Browse and point at place you installed the SDK



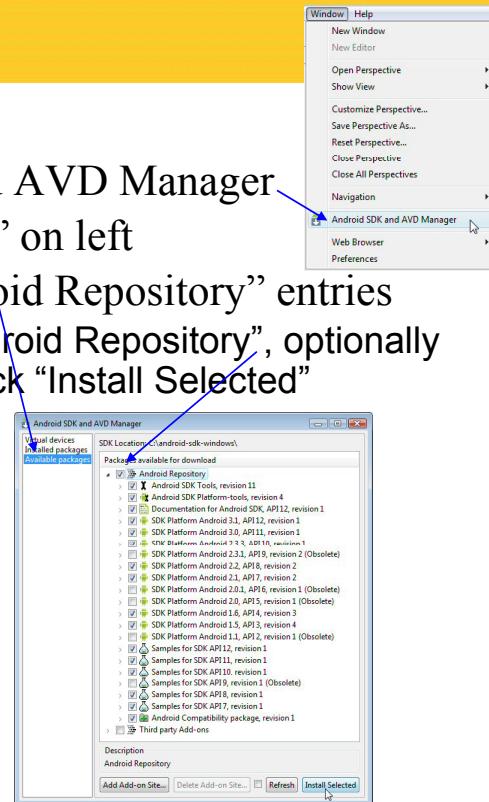
- **Optional: disable sending stats to Google**
- Window → Preferences → Android → Usage Stats

16

Updating SDK Components

- **Run SDK manager**
 - Window → Android SDK and AVD Manager
 - Click on “Available packages” on left
 - Select all non-obsolete “Android Repository” entries
 - Select checkbox next to “Android Repository”, optionally unselect obsolete entries, click “Install Selected”
 - Runs for a long time
- **Detailed instructions**
 - <http://developer.android.com/sdk/adding-components.html>

17



Android Virtual Devices (AVDs)

- **Overview**
 - An AVD (Android Virtual Device) is an Android Emulator configuration that lets you model an actual device by defining hardware and software options
- **Idea**
 - Define several AVDs at different Android API levels to test against. At least:
 - Recent version (e.g., 3.x or 2.3.3)
 - Most common version (2.2 as of 2011)
 - To see statistics for versions of currently used Android devices, see <http://developer.android.com/resources/dashboard/platform-versions.html>
- **Detailed instructions**
 - <http://developer.android.com/guide/developing/devices/managing-avds.html>

18

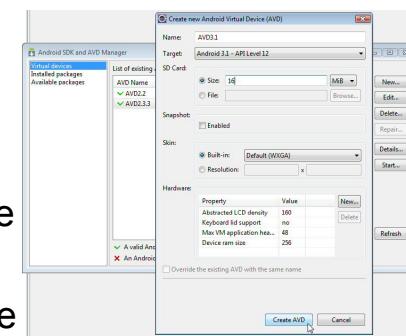
Defining an AVD

- **Defining**

- Window → Android SDK and AVD Manager
- Click on “Virtual devices” on left. Click Add, choose options. You can (should!) create several AVDs.

- **Options**

- Target (i.e., target API version)
 - 3.x to test tablet features
 - 2.3.3 to test new phone features
 - 2.2 to test on most common phone
- SD Card size
 - Can be omitted. Or, choose middle of the road value, e.g., 4 GB
- Skin
 - Use default for the target you chose



19

© 2011 Marty Hall



Running Apps on Emulator

Customized Java EE Training: <http://coursescoreservlets.com/>

Servlets, JSP, JSF 2.0, Java 6, Ajax, jQuery, GWT, Spring, Hibernate, RESTful Web Services, Android.
Developed and taught by well-known author and developer. At public venues or onsite at your location.

Big Ideas

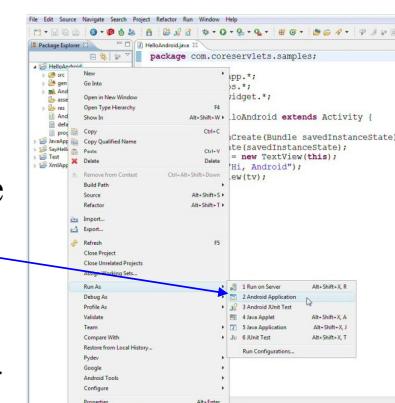
- **Running apps**
 - Soon, you want to learn how to write your own apps. First, however, we will practice running existing apps.
- **Ways to run**
 - Covered here
 - On the Android Emulator. Deploy directly from Eclipse.
 - During development, do your normal testing here
 - On an Android device. Deploy from your PC via USB.
 - Covered in later tutorial sections
 - On an Android device. Deploy from a Web site.
 - On an Android device. Deploy via email.
 - On an Android device. Deploy from the Android Market
- **Writing apps**
 - Covered in later tutorial sections. That is the fun part!

21

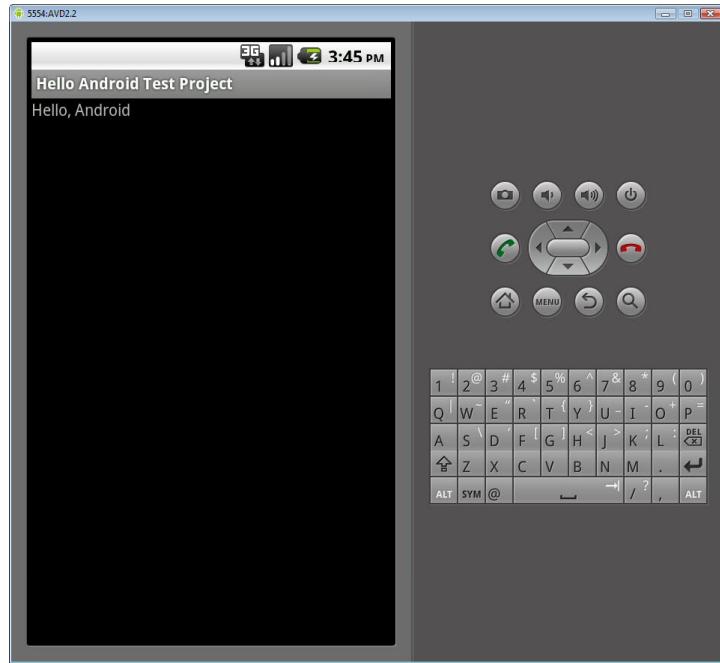
Running the HelloAndroid App in Emulator

- **HelloAndroid**
 - Super-simple app to test deployment and execution steps.
 - For students in live classes, this project is already in your Eclipse workspace.
 - For online readers, download project from the Getting Started section of Android tutorial and import into Eclipse.
 - <http://www.coreservlets.com/android-tutorial/>
- **Steps to run it**
 - Import it if necessary
 - File → General → Existing Projects...
 - R-click on project on L side of Eclipse
 - Run As → Android Application
 - Long wait while emulator initializes
 - Do not close emulator when done
 - Next time, app will come up much faster

22



HelloAndroid: Result



23

Code will be discussed in next tutorial section.

© 2011 Marty Hall



Making Your Own Android App

Customized Java EE Training: <http://coursescoreservlets.com/>

Servlets, JSP, JSF 2.0, Java 6, Ajax, jQuery, GWT, Spring, Hibernate, RESTful Web Services, Android.
Developed and taught by well-known author and developer. At public venues or onsite at *your* location.

Making Your Own Android App: Basics

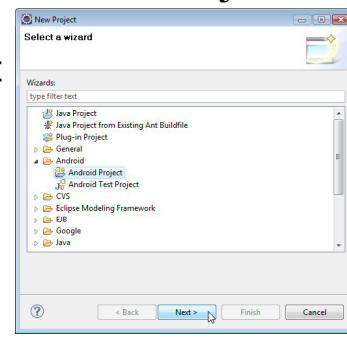
- **Idea**

- When you create a new app, it has simple “Hello World” functionality built in.
 - So, you can create and test an app without knowing syntax (which is not discussed until next tutorial section)

- **Steps**

- File → New → Project → Android → Android Project
 - Once you do this once, next time you can do File → New → Android Project
- Fill in options as shown on next page
- Run new project as shown previously
 - R-click → Run As → Android Application

25



Making Your Own Android App: Setting Project Options

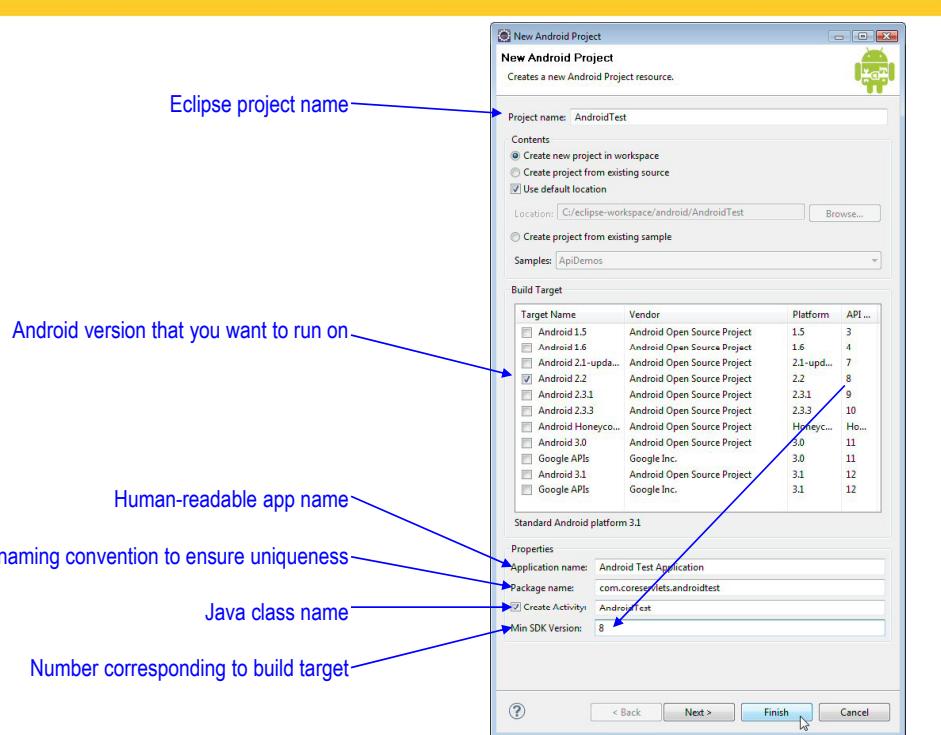
- **New Android Project Settings**

- Project Name
 - Eclipse project name. Follow naming convention you use for Eclipse.
- Build Target
 - The Android version that you want to use. For most phone apps, choose 2.2, since that is the most common version in use worldwide.
- Application name
 - Human-readable app name – title will be shown on Android title bar.
- Package name
 - Apps on a particular Android device must have unique packages, so use com.yourCompany.project
- Create Activity
 - The name of the top-level Java class
- Min SDK Version
 - Number to match the Build Target. Summarized in the Eclipse dialog, but for details, see <http://developer.android.com/guide/appendix/api-levels.html>

26

Making Your Own Android App: Setting Project Options

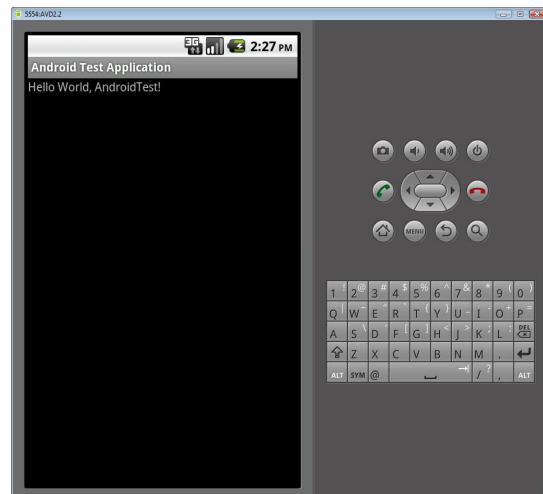
27



Running New App on Emulator

- **Builtin functionality**
 - Newly created projects automatically have simple “Hello World” behavior
- **Execution steps**
 - Same as with any project
 - R-click → Run As → Android Application
 - Reminder: do not close emulator after testing. Emulator takes a long time to start initially, but it is relatively fast to deploy a new or a changed project to the emulator.

28



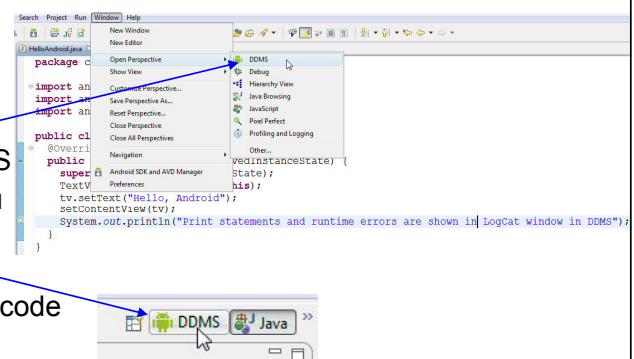


Seeing Standard Output in DDMS

Customized Java EE Training: <http://coursescoreservlets.com/>
 Servlets, JSP, JSF 2.0, Java 6, Ajax, jQuery, GWT, Spring, Hibernate, RESTful Web Services, Android.
 Developed and taught by well-known author and developer. At public venues or onsite at *your* location.

DDMS Basics

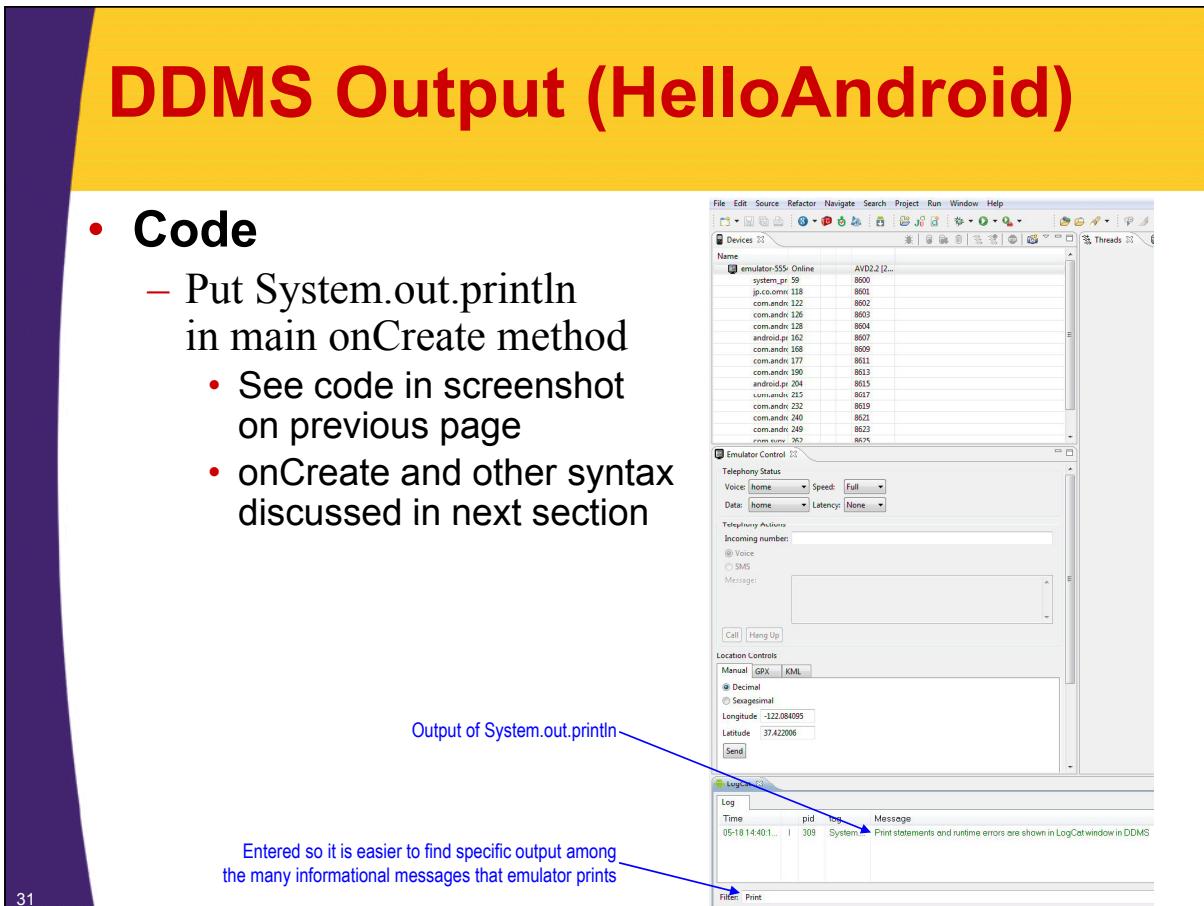
- **Idea**
 - DDMS (Dalvik Debug Monitor Service) is a tool that supports many things
 - Simulate incoming calls in emulator
 - Set GPS locations in emulator
 - **See print statements and runtime errors**
 - Set locations and take screenshots of actual Android device
- **Simple usage now**
 - Start DDMS
 - Window → Open Perspective → DDMS
 - Once you do this once, you can click on “DDMS” at top right of Eclipse
 - Click on “Java” to return to code
 - See print statements
 - Look in LogCat window at bottom
 - Type part of output into Filter field to see specific output



DDMS Output (HelloAndroid)

- **Code**

- Put `System.out.println` in main `onCreate` method
 - See code in screenshot on previous page
 - `onCreate` and other syntax discussed in next section



Running Apps on Android Device

- **Idea**

- The vast majority of your testing will be on Android emulator. But sometimes you want to test on a physical phone or other Android device to test compatibility and to use camera, GPS, contact list, etc.
 - You first make a signed application package (YourApp.apk), then you have various options for sending it to the phone

- **Options**

- Covered here
 - **Connect phone via USB, use adb to deploy**
- Covered in later tutorial section
 - Submit app to Android marketplace
- Can learn on your own
 - Email apk file to email address of phone
 - Deploy apk file to a Web site, then connect there from phone. Must set MIME type to application/vnd.android.package-archive.

33

Deploying via USB Connection

- **Prereq: install drivers for Android device**

- Plug phone (or other Android device) into computer.
 - Recent OS's will find drivers automatically. If not, download from device manufacturer. See list at <http://developer.android.com/sdk/oem-usb.html>

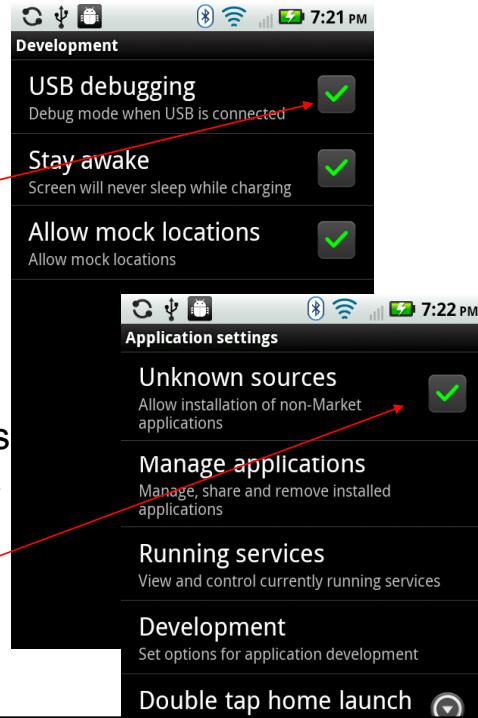
- **Steps**

- Android device
 - Enable USB debugging
 - Allow unknown sources
- Eclipse
 - Export signed application package (YourApp.apk)
- adb
 - Go to `sdk-install-dir\tools` (or put that folder in PATH)
 - Run “adb install C:\...\YourApp.apk”

34

Configuring Android Device

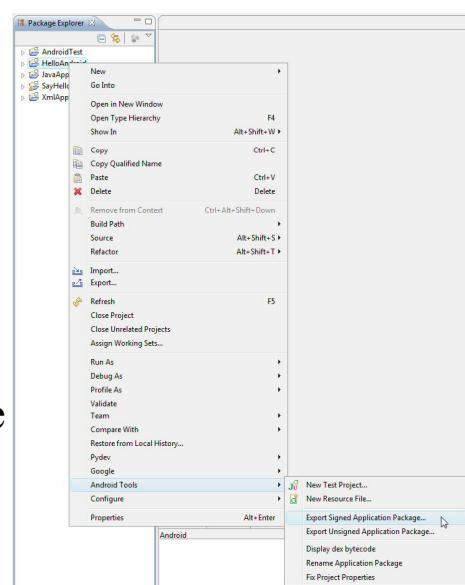
- **Enable USB debugging**
 - Settings → Applications → Development
 - Required: USB debugging
 - Allows PC to send commands via USB
 - Optional: Stay awake
 - Phone/device won't sleep when connected via USB
 - Optional: Allow mock locations
 - Let PC send fake GPS locations
- **Allow unknown sources**
 - Settings → Applications → Unknown sources



35

Exporting Application Package

- **Every time: export**
 - R-click Eclipse project
 - Android Tools → Export Signed Application Package
- **First time: set up keystore**
 - You will be prompted for location for keystore and asked for password. Key will be created and app will be signed with this key, which is in valid format but is not counter-signed by trusted third party.



36

Installing with adb

- **Connect device/phone via USB**
 - With drivers installed and settings from previous slide
- **Open a command window**
 - Windows Start Menu → Run → cmd
- **Go to “platform-tools” folder of SDK**
 - DOS> cd C:\android-sdk-windows\platform-tools
 - A good trick is to navigate to folder in Windows Explorer, then copy address, then type “cd ” and paste address
- **Run “adb install C:\path-to\YourApp.apk”**
 - DOS> adb install C:\Users\Marty\...\HelloAndroid.apk
1439 KB/s (13262 bytes in 0.009s)
pkg: /data/local/tmp/HelloAndroid.apk
Success

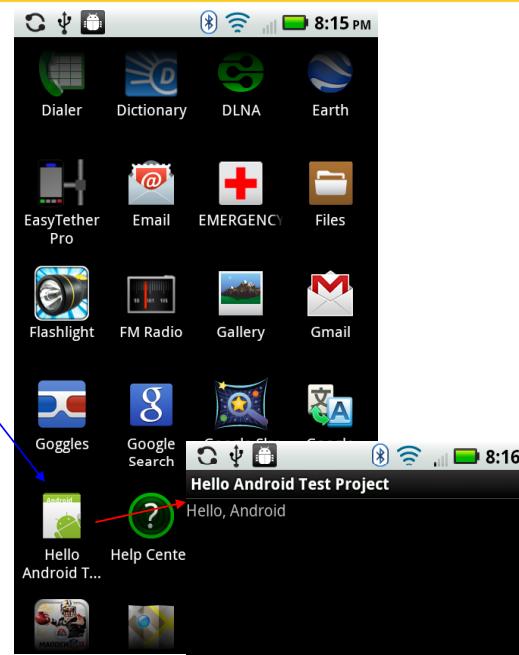
37



Running App on Device

- **Go to installed apps**
- **Tap new app**
 - Remember that the human readable name (Application Name from new Android Project wizard) is shown, not the Java class name
- **If you want to install updated version**
 - Uninstall old version first
 - Settings → Applications → YourApp → Uninstall

38





Wrap-Up

Customized Java EE Training: <http://coursescoreservlets.com/>

Servlets, JSP, JSF 2.0, Java 6, Ajax, jQuery, GWT, Spring, Hibernate, RESTful Web Services, Android.
Developed and taught by well-known author and developer. At public venues or onsite at *your* location.

Summary

- **Install software**
 - Java 6, Eclipse, Android SDK, Eclipse ADT plugin
- **Bookmark documentation**
 - Developer's Guide and more at developer.android.com
- **Update/configure software**
 - Set SDK location in Eclipse
 - Get updated components via SDK & AVD Manager
 - Define at least one AVD to run apps on emulator
- **Run apps**
 - On emulator (usually). R-click project, Run As → Android Application.
 - On physical device (once in a while). Build signed apk and use adb.
- **Make new app**
 - File → New → Project → Android → Android Project
- **See output of print statements**
 - In LogCat window of DDMS



Questions?

Customized Java EE Training: <http://coursescoreservlets.com/>

Servlets, JSP, JSF 2.0, Java 6, Ajax, jQuery, GWT, Spring, Hibernate, RESTful Web Services, Android.
Developed and taught by well-known author and developer. At public venues or onsite at *your* location.