Open Source Android Development Tools

Manfred Moser

simpligility.com

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Table of Contents

Open Source Android Development Tools - SDK, ADT and beyond

1. Android Itself

2. Development Tools

3. Development Libraries

4. Conclusions
About Manfred

- Android application developer
- Core committer Maven Android Plugin
- Project lead ksoap2-android
- Committer RoboGuice
- Committer Hudson
- Book author, presenter and consultant
- Leader of Vancouver Island JUG, BC, Canada
- Twitter @simpligility, G+ Manfred Moser
What components make up Android codebase?

Android Proper
  as found on your device

Android Open Source Project AOSP
  subset of above

Android Software Development Kit SDK
  for Java based development applications

Android Native Development Kit NDK
  for C/C++ based development

Android Open Accessory Development Kit ADK
  for USB based hardware hacking

Android Development Toolkit ADT
  Eclipse plugin for Android development
Android Proper - As Found on Your Device

- Linux
- Apache Harmony
- Lots of other open source components
- Custom Android related components like Dalvik VM
- Binary device driver and other blobs
- Patched components, custom drivers and different applications from manufacturer and provider
Android Open Source Project AOSP

- Linux, Apache Harmony, OpenGL ES and lots more
- numerous specific components e.g. Dalvik
- various forks from upstream project
- base for custom roms and such
- various different open source licenses
- source released in drops, sometimes late or not yet
Android Tools

- development tools like ADT, DDMS and related tools that form SDK
- cooperating with Eclipse projects, external contributors ...
- fully open source, all commits right to public git repo
- available at http://tools.android.com/
Eclipse and ADT and friends

- default supported development environment
- full tool suite including debugging, profiling and so on
- graphical layout editor
- very powerful also with help of further Eclipse plugins (e.g. Mylyn, egit...)
- well architected so that most components work outside Eclipse too
Other IDE’s

Motorola MOTODEV Studio [http://developer.motorola.com/docstools/motodevstudio/]
partly open source, committing upstream to ADT and Eclipse

Sequoyah [http://eclipse.org/sequoyah/]

Jetbrains IntelliJ IDEA CE [http://www.jetbrains.org]/
fully open source, includes Android support

Oracle Netbeans [http://kenai.com/projects/nbandroid/]
fully open source, community maintained plugin for Android

Emacs [http://gitorious.org/emacs-android-minor-mode]
fully open source, limited
Maven Android Plugin and Friends

Maven Android Plugin  http://code.google.com/p/maven-android-plugin/
  build apk, deploy to devices, run tests and lots more

Maven Android SDK Deployer  https://github.com/mosabua/maven-android-sdk-deployer
  deploy artifacts from SDK to Maven repository

Android4Maven  http://sourceforge.net/projects/android4maven/
  bundle android.jar from AOSP to submit to Maven central

M2E Android  https://github.com/rgladwell/m2e-android
  Maven build to play nice with ADT

AndroidSDKFido  https://github.com/joakime/android-sdkfido
  build source and javadoc artifacts

Android RIndirect  https://github.com/akquinet/android-rindirect
  help with component reuse
Others

Gradle Android Plugin  https://code.google.com/p/gradle-android-plugin/
   for the Groovy based build system Gradle

SBT Android Plugin  https://github.com/jberkel/android-plugin
   for the Scala based build system SBT, Scala based Android applications

Rake/Ruboto/Maven  for JRuby Android applications
Maven Android Plugin - Example

- deploy to multiple devices and run tests
- reuse of other Maven plugins
- use of libraries and Android components easy
- full release cycle sign, zipalign, automatic versioning, ...
- Proguard support
- Native components and libraries
- Scala support
- more
Other Development Tools

Droid at Screen  
http://blog.ribomation.com/2010/01/droidsreen/  
device screen recorder/projector

DroidDraw  
http://www.droiddraw.org/  
UI build and design tool

dex2jar  
http://code.google.com/p.dex2jar/  
converter from dex to jar format

smali/baksmali  
http://code.google.com/p/smalii/  
dex assembler/disassembler

Android2PO  
https://github.com/miracle2k/android2po  
Converter for Android strings to gettext
Java Libraries suitable for Android

**Jackson**  http://jackson.codehaus.org/
  JSON library

**google-gson**  http://code.google.com/p/google-gson/
  JSON library

**SimpleXML**  http://simple.sourceforge.net/home.php
  XML serialization framework

**ksoap2-android**  http://code.google.com/p/ksoap2-android/
  SOAP library

**WSDL2Android**  https://github.com/kigero/WSDL2Android
  code generator for ksoap2-android

**ormlite**  http://ormlite.com/
  light-weight object relational mapping tool

**Twitter4J**  http://twitter4j.org/
  twitter integration library
Frameworks for General Purpose Usage

Roboguice  http://roboguice.org
  Google Guice IoC based framework

AndroidAnnotations  http://code.google.com/p/androidannotations/
  annotation based code generation framework

DroidFu  http://github.com/kaeppler/droid-fu
  general purpose collection of helper classes

CommonsWare Android Components CWAC  https://github.com/commonsguy
  collection of helper classes and widget

DroidKit  https://github.com/droidkit/droidkit
  collection of Android API extensions

Libs for Android  http://code.google.com/p/libs-for-android/
  collection of libraries

AndroidLibs  http://www.androidlibs.com/
  social and contact related libraries

AndroidAsync  https://bitbucket.org/hal/android-async/
  alternate implementation for asynchronous tasks
Libraries for Specific Use Cases

**ZXing** [http://code.google.com/p/zxing/](http://code.google.com/p/zxing/)
barcode scanning library and application

image processing library

real time computer vision library

**Facebook Android SDK** [https://github.com/facebook/facebook-android-sdk](https://github.com/facebook/facebook-android-sdk)
your guess ;-) 

**MapsForge** [http://code.google.com/p/mapsforge/](http://code.google.com/p/mapsforge/)
OpenStreetMap toolbox

OpenStreetMap toolbox
Example RoboGuice

@Inject myObj;
@InjectResource(R.string.name)
@InjectView(R.id.editName)
@Singleton stateHolder;
and so on instead of
MyObject myObj = new MyObject();
getResources().getString(R.string.name)
findViewById(R.id.editName)
and lots more
UI Libraries and Widgets

GreenDroid  https://github.com/cyrilmottier/GreenDroid
    application framework and UI widget collection

svg-android  http://code.google.com/p/svg-android/
    SVG rendering library

View Flow for Android  https://github.com/pakerfeldt/android-viewflow
    horizontally scrolling views

Android Wheel  http://code.google.com/p/android-wheel/
    wheel input control widget

ActionBarSherlock  http://actionbarsherlock.com/
    ActionBar support for tablets and phones

Android Actionbar  https://github.com/johannilsson/android-actionbar
    ActionBar support for tablets and phones
More UI Libraries and Widgets

Pull to Refresh for Android https://github.com/johannilsson/android-pulltorefresh
  list refresh widget

  color picker

Android AutoFitTextView https://github.com/grantland/android-autofittextview
  dynamic font resizing in text view

  ellipse for multiline text view

Android MapViewBalloons https://github.com/jgilfelt/android-mapviewballoons
  UI widget for maps
Game Development Libraries

libgdx  http://libgdx.badlogicgames.com/

cross-platform 2D and 3D game development framework for Java/C/C++.

AndEngine  http://www.andengine.org/

Java based 2D OpenGL Game Engine for Android

forget3D  http://code.google.com/p/forget3d/

OpenGL ES framework for Android, Win32, WinCE

min3d  http://code.google.com/p/min3d/

lightweight 3d library/framework for Android using Java with OpenGL ES

Angle  http://code.google.com/p/angle/

game library for 2D games using OpenGL ES
Android Testing Tools

Robotium  http://robotium.org

*Selenium* for Android

Roboelectric  http://robolectric.org

Android tests run on JVM

Calculon  https://github.com/kaeppler/calculon

Android testing DSL


tool to load test report from device/emulator

Memory Sucker  https://github.com/nollbit/memory-sucker

test tool to simulate low memory scenarios

Android Mock  http://code.google.com/p/android-mock/

object mocking library
Others of interest


*collection of reusable components and applications*


*servlet container running on the device*


*programmatically take screenshots, no root required*


*alarm application and toolkit*


*crash report library*


*error report library*
Java is the main language for development and API but also possible are

- C/C++ (via NDK first class)
- JRuby
- Scala
- Clojure
- JavaScript (e.g. via PhoneGap)
- Processing [http://wiki.processing.org/w/Android](http://wiki.processing.org/w/Android)
- C#
Example - Scala libraries

- **Baitha** [https://github.com/sattvik/baitha](https://github.com/sattvik/baitha)
- **Positronic Net** [https://github.com/rst/positronic_net](https://github.com/rst/positronic_net)
- **Borachio mocking library** [http://borachio.com/](http://borachio.com/)
Is Android Java?

- Yes - default application programming language
- Yes - API is Java based
- No - not using a standard compliant Java Virtual Machine Runtime
- No - only using parts of the standard class libraries and
Is Android Open Source?

- Yes, in time - AOSP open sourced in drops
- Yes - ADT fully open source
- Yes and no - cooperation with upstream projects patchy but exists
- No - binary blobs for drivers and other parts
Android part of the Java Community?

- Yes - parts of Android itself
- Yes - tooling around Android
- Yes - lots of libraries and tooling from rest of Java universe
- Yes - lots of people from Java community, also part of Android community
- Yes - lots of JVM related aspects as well e.g. Scala, JRuby, Processing, Groovy...
Android part of Open Source Community?

- Yes - part of Apache Community
- Yes - part of Eclipse Community
- Yes - part of Ruby, Scala, Groovy/Gradle...
- Yes - lots of open source libraries specifically to Android
- Yes - lots of projects on Github, Google Code, ...
- Yes - move towards Maker community with ADK
Overall conclusion

- Despite lots of flaws and kinks that make things interesting
- Android is part of the Java and Open Source communities
- Android touches a lot of other communities and brings them together
- Android is a great chance to collaborate and learn
Conclusions

What can you do?

- Buy an unlocked/unlockable device
- Use a custom ROM
- Ask for open source drops of AOSP
- Encourage patches to upstream projects and
- Ask for open sourcing of any closed parts, tools...
- Contribute and cooperate yourself!