

Introduction to Android

Android Smartphone Programming

University of Freiburg

Matthias Keil / Tim Aicher

Institute for Computer Science
Faculty of Engineering
University of Freiburg

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What is Android?

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- Mobile platform (More than an OS, has middle ware, key applications...)
- Owned by Google/developed by Open Handset Alliance
- Linux kernel
- Latest version: 8.0 "Oreo" (August 2017)



What is Android?

Specifications

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- Media and Graphics Support.
- Telecommunication and Location Access Support.
- Very rich development environment:
 - Software Development Kit (an Application Framework).
 - Android studio IDE.
 - Debugging tools.
- A new instance of the Dalvik Virtual machine for every application on runtime.
- Since 5.0 Android uses ART/ Ahead-of-time-Compiler Android Runtime (ART)



Development on Android

Android SDK

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- Enables manipulation of all device aspects in application.
- Build applications from scratch or use existing APIs
- Rich and Innovative aspects maintained.





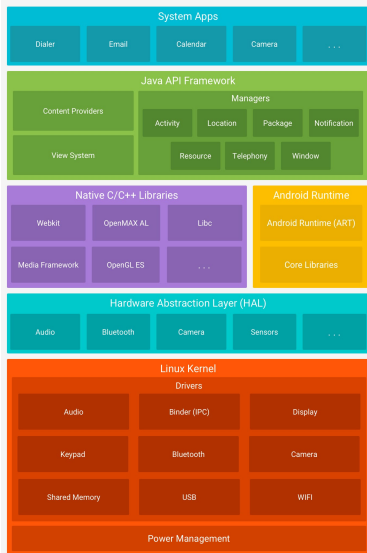
Several libraries are included (written in C/C++) in the system's core components and are exposed to the developer in the application framework:

- System C library
- Media Libraries
- Surface Manager
- LibWebCore
- SGL
- 3D libraries
- FreeType
- SQLite



Android Architecture

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[2]



An Android Application is built by the following components:

Activities: Single screen with user interface. Result in a final output for the user by working together, however each is independent of the other in terms of implementation and usability.

Services: Background component without user interface. Performs long-running operations or work for remote processes.

Content providers: Manages a shared set of application data.

Broadcast receivers: Responds to system-wide broadcast announcements.





During the runtime of applications a set of services and systems are running:

Views: Basically different ways for data representation to user.

Resource Managers: Provides access to graphics, strings, and layout files.

Notification Manager: Allows applications to display alerts in status bar to interact with user.

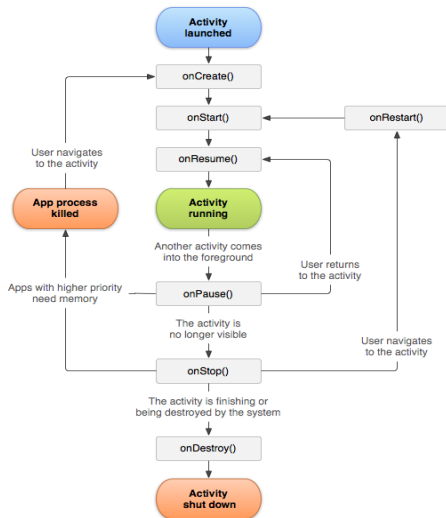
Activity Manager: Manages Application Life Cycle.



Applications: A Quick Glimpse

The Activity Life Cycle

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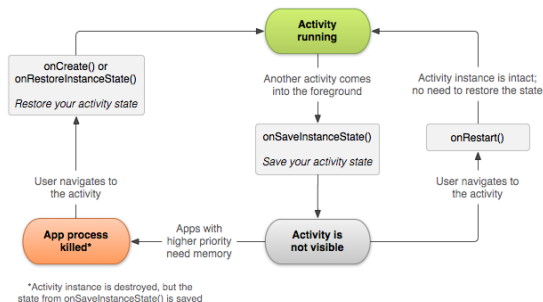
[1]



Applications: A Quick Glimpse

Interacting with the Outside

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[3]



Applications: A Quick Glimpse

Interacting with the Outside

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- Interacting with Android System or other applications.
- Use Intent Object, includes source, destination and type of interaction.
- Broadcast Receiver handles incoming Intents.
- Effective for real-time interaction.





AndroidManifest.xml

- Identify application requirements for user permissions.
- Declare Hardware and Software features required to run.
- Declare minimum API Level to run, and API Levels to be linked to if any.





Content is not only limited to the previously mentioned components, other methods are used for further declarations.

drawable Directory: Contains images and drawings to be accessed by *AndroidManifest.xml*.

strings.xml : Contains application-specific and internationalization strings. Accessed by *AndroidManifest.xml*.

R.Java : Auto-generated file that keeps up with the *AndroidManifest.xml*. This makes an easy interface while writing the Application's source code.





- Android is a Software Stack not only an Operating System.
- Application Framework on Android is very well developed and useful.
- Application Development Fundamentals and Principles provide for an organised and rich environment for developers.
- The Android Architecture makes for a very secure and stable system for all sorts of Applications to run on.





ANDROID DEVELOPERS.

Activity Life Cycle.

<http://developer.android.com/guide/topics/fundamentals/activities.html>.



ANDROID DEVELOPERS.

Android Architecture.

<https://developer.android.com/guide/platform/index.html>.



ANDROID DEVELOPERS.

Interacting Using Intents.

<http://developer.android.com/guide/topics/fundamentals/activities.html>.

