Introduction to Android
Android Smartphone Programming

University of Freiburg

Matthias Keil
Institute for Computer Science
Faculty of Engineering
University of Freiburg

October 19, 2015

UNI
FREIBURG

Outline
University of Freiburg

- Mobile platform (More than an OS, has middle ware, key applications...)
- Owned by Google/ developed by Open Handset Alliance
- Linux kernel
- Latest version: 6.0 "Marshmallow" (October 2015)

- Media and Graphics Support.
- Telecommunication and Location Access Support.
- Very rich development environment:
    - Software Development Kit (an Application Framework).
    - Plug-in for the Eclipse 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)

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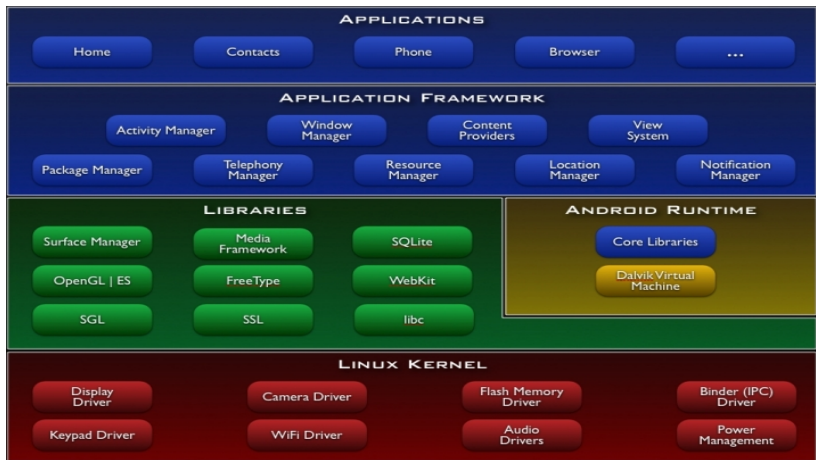- Rich and Innovative aspects maintained.

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

University of Freiburg

[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.
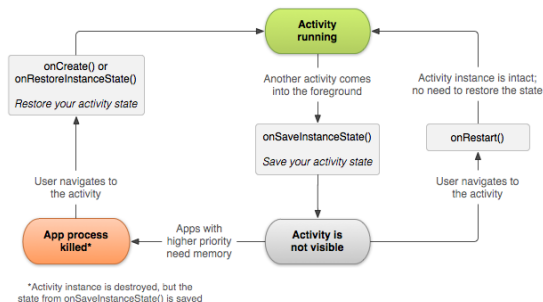
Activity Manager: Manages Application Life Cycle.

Applications: A Quick Glimpse
The Activity Life Cycle
University of Freiburg

[1]

Applications: A Quick Glimpse
Interacting with the Outside
University of Freiburg

[3]

- 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 mentions components, other methods are used for further declarations.

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

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

R.Java :   Auto-generated file that keeps up with the *AndroinManifest.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.

Bibliography

📄 ANDROID DEVELOPERS.
Activity Life Cycle.
http://developer.android.com/guide/topics/fundamentals/activities.html.

📄 ANDROID DEVELOPERS.
Android Architecure.
http://developer.android.com/guide/basics/what-is-android.html.

📄 ANDROID DEVELOPERS.
Interacting Using Intents.
http://developer.android.com/guide/topics/fundamentals/activities.html.