Introduction to Android
Android Smartphone Programming

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Outline
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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)

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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)

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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.

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Development on Android
Android SDK
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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

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Android Architecture
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Development on Android
Application Components
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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.

Development on Android
Underlying Processes
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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.

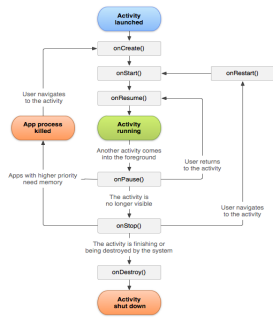**Activity Manager:** Manages Application Life Cycle.

Applications: A Quick Glimpse
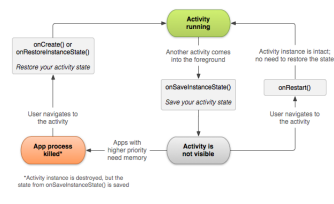### The Activity Life Cycle
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[1]

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.

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Applications: A Quick Glimpse
Declaring Content
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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.

Applications: A Quick Glimpse
Declaring Content
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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 *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.

Summary
Summary
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- 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.

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