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# **Android Introduction**

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#### The Universe of Android Programming



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#### **Platform Architecture**





- Linux kernel
  - Use key security features of linux
  - Hardware drivers for well-known kernel
- Android Runtime
  - Similar to Java virtual machine

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## **Android Runtime**



- ART and DEX files optimized for low-memory devices
- Ahead-of-time (AOT) and just-in-time (JIT) compilation
- Optimized garbage collection

## **Android Framework**





## **Android Key Terms**

#### «Activity»

- Logical unit of a user activity (like window in a computer program)
- Usually full-screen
- «View»
  - Hierarchical UI element
  - Combined in layouts and extended to Widgets with more functionality
- «Service»
  - Background activity without UI, e.g., music player or FTP server





## **Android Key Terms**

- «Intent»
  - Asynchronous message to bind components
  - Starts or switches between «Activities»
  - Intent Filters are used to only act on specific Intents
- «BroadcastReceiver»
  - Listens for global events (Intents)
    e.g., «headphones were plugged» sent by the system
  - Can be used to pass system events for further processing
  - Can inform the user about system events





## **Activity Lifecycle**



- Multi-Tasking
  - OS keeps apps alive as long as possible
  - On memory shortage, processes are killed according to their priority

- Essential states of an activity
  - Running (resumed)
  - Paused
  - Stopped
  - Finished/killed



### **Development Tools**

#### SDK Tools

- Development and debug tools, emulator, etc.
- SDK Platforms
  - APIs for target platforms
- Build Tools
- Support libraries
  - Libraries to support backward compatibility



### **Android Versions**

- Very dynamic environment
  - Hard to keep up with changes
  - Compatibility issues
- Since Android 4.0 stable release rhythm (~ yearly)

nent	Code name 💠	Version number +	Initial release date +	API level +
hanges	N/A	1.0	23 September 2008	1
	N/A	1.1	9 February 2009	2
	Cupcake	1.5	27 April 2009	3
	Donut	1.6	15 September 2009	4
	Eclair	2.0 - 2.1	26 October 2009	5–7
le	Froyo	2.2 - 2.2.3	20 May 2010	8
ly)	Gingerbread	2.3 - 2.3.7	6 December 2010	9–10
	Honeycomb	3.0 - 3.2.6	22 February 2011	11–13
	Ice Cream Sandwich	4.0-4.0.4	18 October 2011	14–15
VS HS2013	Jelly Bean	4.1 - 4.3.1	9 July 2012	16–18
	KitKat	4.4 - 4.4.4	31 October 2013	19–20
VS HS2014	Lollipop	5.0 - 5.1.1	12 November 2014	21-22
VS HS2015	Marshmallow	6.0 - 6.0.1	5 October 2015	23
	Nougat	7.0	22 August 2016	24
VS HS2016	→		1	

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## **Now: Android Live Hacking**

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