Overview of Android (Part 3): Application Framework & Apps Layers

Douglas C. Schmidt
d.schmidt@vanderbilt.edu
www.dre.vanderbilt.edu/~schmidt

Professor of Computer Science
Institute for Software Integrated Systems
Vanderbilt University
Nashville, Tennessee, USA
1. Understand what is an application framework & know why it’s useful
Learning Objectives in this Part of the Lesson

1. Understand what is an application framework & know why it’s useful
2. Recognize common system services in the Android Application Framework layer
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2. Recognize common system services in the Android Application Framework layer

3. Recognize common apps that are available on an Android device
Overview of Application Frameworks
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- A framework is an integrated set of components that provide a reusable architecture for a family of related apps.

See www.dre.vanderbilt.edu/~schmidt/frameworks.html
Overview of Application Frameworks

- Frameworks use an event-driven programming model to plug app code into them.

See en.wikipedia.org/wiki/Event-driven_programming
Overview of Application Frameworks

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- They enhance systematic reuse by providing canonical structure & functionality to apps

See [en.wikipedia.org/wiki/Code_reuse#Systematic_software_reuse](en.wikipedia.org/wiki/Code_reuse#Systematic_software_reuse)
Overview of Application Frameworks

- An app registers callbacks for specific types of events that can occur within the framework.

![Diagram showing the interaction between Application Code and Framework Code]

See [en.wikipedia.org/wiki/Callback_(computer_programming)](en.wikipedia.org/wiki/Callback_(computer_programming))
Overview of Application Frameworks

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• A callback is an object passed as an argument to a framework

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  - A callback is an object passed as an argument to a framework
  - The framework monitors event sources for activity of interest

![Diagram showing interaction between application code and framework code]

- e.g., arrival of network messages, clicks on GUI components, etc.

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  - Framework *calls back* the object when an event of interest occurs
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• An app registers callbacks for specific types of events that can occur within the framework
  • A callback is an object passed as an argument to a framework
  • The framework monitors event sources for activity of interest
  • Framework *calls back* the object when an event of interest occurs
  • The app processing occurs in context of framework thread(s)
Overview of Application Frameworks

- When app callback is done control returns to the framework, where it waits for the next event to occur.
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- Lather, rinse, repeat until app is done ...

See [en.wikipedia.org/wiki/Lather,_rinse,_repeat](en.wikipedia.org/wiki/Lather,_rinse,_repeat)
Overview of the Android Application Framework & Apps Layers
The **Application framework** layer contains system services that provide apps with the capabilities & info they need to do their work.

See [opensourceforu.efytimes.com/2013/12/birds-eye-view-android-system-services](opensourceforu.efytimes.com/2013/12/birds-eye-view-android-system-services)
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- Expose hardware & Linux OS kernel capabilities to apps
- Run continuously during system operation
- Control flow is driven by various events & callbacks
Overview of Android: Application Framework & Apps Layers

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These system services are largely written in Java, with some C/C++ native code.

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We focus on the Activity Manager Service throughout this course.

This service uses intents to interact with activities, services, & broadcast receivers.
Atop Android’s software stack are apps used every day.

See android.googlesource.com/platform/packages/apps
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It’s also possible to write apps in C/C++.

See developer.android.com/ndk
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- The bulk of these apps are written in Java.
- It’s also possible to write apps in C/C++.
- As well as Kotlin!

See [developer.android.com/kotlin](http://developer.android.com/kotlin)
End of the Overview of Android (Part 3): Application Framework & Apps