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

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Learning Objectives in this Part of the Lesson

1. Understand what is an application framework & know why it’s useful

- Dropbox
- Application-specific functionality
- Runnable
- Hook method
- Looper
- Handler
- Executor
- FutureTask
- Domain-specific functionality for concurrent Android programs
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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1. Understand what is an application framework & know why it’s useful
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

- Frameworks use an event-driven programming model to plug app code into them
- They enhance systematic reuse by providing canonical structure & functionality to apps

See 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

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

- 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

*Example events*:
- Arrival of network messages
- Clicks on GUI components

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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  - Framework *calls back* the object when an event of interest occurs
Overview of Application Frameworks

- 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.
Overview of Application Frameworks

• When app callback is done control returns to the framework, where it waits for the next event to occur
• Lather, rinse, repeat until app is done …
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.eytimes.com/2013/12/birds-eye-view-android-system-services
Overview of 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.

  - 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

- The **Application framework** layer contains system services that provide apps with the capabilities & info they need to do their work.

  - **Expose hardware & Linux OS kernel capabilities to apps**
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Overview of 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
  
• Expose hardware & Linux OS kernel capabilities to apps

• Run continuously during system operation

• Control flow is driven by various events & callbacks
These system services are largely written in Java, with some C/C++ native code.
Overview of 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

  **We focus on the Activity Manager Service throughout this course**

This services interacts with activities, services, & broadcast receivers
• Atop Android’s software stack are apps used every day

See [android.googlesource.com/platform/packages/apps](android.googlesource.com/platform/packages/apps)
Atop Android’s software stack are apps used every day

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- It’s also possible to write apps in C/C++
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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
End of the Overview of Android (Part 3): Application Framework & Apps