

Course Description: This course is intended for experienced developers who wish to learn how to develop applications for the Android operating system from Google. Students will build various example app, service, and widget projects and also work up larger case-study applications involving various UI-design techniques. This fast-paced course gets the experienced Java programmer up and running with the Android API and development tools and in a position to develop useful applications that incorporate the most exciting features of emerging mobile devices. It is designed as an accelerated alternative to Introduction to Android and Intermediate. This explores the Android mobile operating system from the perspective of user, application, and server security and shows experienced Android developers how to apply best practices to secure their applications.

Who Should Attend? This course is intended for experienced developers who wish to learn how to develop applications for the Android operating system from Google. This course is for Java programmers who want to get up and running with the Android API and development tools and who want to develop useful applications that incorporate the most exciting features of emerging mobile devices. This course is for experienced Android developers who wish to learn how to secure their applications

Prerequisites: Students should have some prior programming experience, preferably with an object-oriented programming language.

Benefits of Attendance: **Upon completion of this course, students will be able to:**

- Describe the Android OS architecture.
- Install and use appropriate tools for Android development, including IDE, device emulator, and profiling tools.

- Understand the Android application architecture, including the roles of the task stack, activities, and services.
- Build user interfaces with fragments, views, form widgets, text input, lists, tables, and more.
- Use advanced UI widgets for scrolling, tabbing, and layout control.
- Store app-specific information in SQLite databases.
- Manage audio, photo, and video content, and integrate built-in media applications in your own Android applications.
- Integrate map views into your application, and provide custom overlays of map markers and other information.
- Understand the security characteristics of mobile computing, and the Android OS in particular.
- Manage application data in a secure fashion.
- Apply appropriate safeguards over entry points to applications, including intent filters, bound services, and broadcast receivers.
- Use cryptography as appropriate, especially in remote communications.
- Manage user credentials, including passwords and issued tokens.

Course Outline:

The Android Operating System

1. Mobile Form Factors
2. Versions of Android
3. Applications and APK Files
4. Process Architecture
5. The Role of Java
6. Hello, Dalvik
7. What's In, What's Out
8. Services
9. User Interface
10. Memory and Storage
11. Operating-System Services
12. Inter-Process Communication

Android Development

1. The Android SDK
2. The SDK and AVD Managers
3. Configuring the Emulator
4. Eclipse
5. Resources
6. APK Files
7. Build Process
8. The R Class
9. Assets
10. The Dalvik Debug Monitor Server
11. The Android Debugger (adb)
12. Command Shells
13. The Android Log and LogCat
14. Ant

Applications

1. Activities and Fragments
2. Activity Lifecycle
3. The onCreate Method
4. Layouts and Views
5. The findViewById Method

6. Tasks and the "Back Stack"
7. Intents and Results
8. startActivity and Related Methods
9. Custom Application Classes
10. Shared Application State

User Interface Design

1. XML Layouts
2. Layout Parameters
3. The Box Model
4. Gravity
5. The LayoutInflater Service
6. The
7. The
8. Views and Adapters
9. Form Widgets

Fragments and Multi-Form Design

1. The Fragments API
2. Fragment Lifecycle
3. Relationship Between Activity and Fragment
4. Possible Cardinalities
5. Communication between Activity and Fragment
6. Fragment Arguments
7. Callback Interfaces
8. Designing for Multiple Form Factors
9. Fragments on the Back Stack

Views, Adapters, and Dialogs

1. Styles and Themes
2. and
3. View Orientation
4. Adapters
5. Dialog Fragments

6. Showing and Managing Dialogs

7. Using AlertDialog

Working with Text

1. The

2. The

3. Input Methods

4. Input Types: Phone, E-mail, Date, Time ...

5. DatePicker and TimePicker

6. Date- and Time-Picking Dialogs

7. Providing Auto-Completion

8. Using the Clipboard

9. Linkification

Working with Lists

1. AdapterView and Subclasses

2. Adapter and Subinterfaces

3. ListView and ListAdapter

4. ListFragment

5. Spinner and SpinnerAdapter

6. Handling Item Selection

7. Custom Adapters

8. ExpandableListView and

ExpandableListAdapter

Working with Tables

1. The and

2. Defining Table Cells

3. Static Table Layouts

4. Dynamic Tables

5. Binding Data

6. Using a Template Row

7. Managing IDs

Graphics and Low-Level Events

1. Drawing on a Canvas

2. The Paint Object

3. Handling Size and Orientation Changes

4. Handling Touch Events

5. Working with Drawables

6. Shape Drawables

7. Bitmap Drawables

8. 9-Patch Bitmaps

9. Custom Drawables

10. The Drawing Cache and Working with
Bitmaps

Menus and the Action Bar

1. Options and Context Menus

2. The Action Bar

3. Menu Resources

4. The MenuInflater Service

5. The Menu and MenuItem Classes

6. Handling Menu Selections

7. The Escape from switch/case!

8. Using a Dispatch Map

9. Building Menus Dynamically

Local Storage

1. The Android File System

2. Internal Storage

3. File Formats

4. Parsing JSON

5. Storage and the Application Lifecycle

6. External Storage

7. Private Storage vs. Public Media

8. Permissions

9. Checking for Availability

10. Preferences

11. Preferences Resources

12. The PreferencesFragment

13. The PreferencesManager

14. Reading Preferences

Database Storage

1. SQLite
2. The SQLiteDatabase Class
3. The SQLiteOpenHelper Class
4. Installing Databases
5. The query Methods
6. Using Cursors
7. Database Updates

Networking and Web Services

1. java.net
2. android.net
3. Apache HttpClient
4. Consuming RESTful Web Services
5. Building URLs
6. Parsing JSON
7. Parsing XML
8. Connected Applications
9. Offline Operation and Server Synchronization

Asynchronous Tasks

1. The UI Thread
2. Background Tasks
3. Loopers and Handlers
4. Using AsyncTask
5. Using ProgressDialog
6. Error Handling

Services

1. The Roles of Services
2. Invoking a Service
3. Do's and Don'ts
4. Communication with the Application
5. Communication with Activities
6. Sending Notifications
7. Pending Intents

8. Downloaders
9. Polling Web Services

Inter-Process Communication

1. Breaking Out
2. Using the Clipboard
3. Linkifying Text
4. Implicit Intents
5. Invoking Built-In Applications and Services
6. Accepting Implicit Intents
7. Passing Data
8. MIME Types

Multimedia

1. Playing Sounds
2. Haptic Feedback (Vibrating)
3. Managing Images
4. Storage and Retrieval
5. Invoking the Camera
6. Invoking the Media Recorder
7. Gallery and other Image Views

Location Services and Maps

1. Location Services
2. Location Notifications
3. The Google Maps API
4. License Terms and Maps API Keys
5. Map View and Map Activity Classes
6. Configuring a Map
7. Controlling a Map
8. Events
9. Projections
10. Map Overlays
11. Item Overlays
12. Custom Overlays

Publishing

1. The App Market

2. Preparing Your App
3. Debug vs. Release Builds
4. Signing an APK File
5. Publishing Your Application
6. Application Metadata
7. Updates and Support

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Mobile OS Security

1. Vulnerabilities of Mobile Systems
2. Security Overview of Android
3. For Comparison: iOS
4. Analysis and Areas of Concern
5. Digital Signature of Applications
6. Rooted Devices
7. Clickjacking
8. Best Practices
9. The OWASP Mobile Top 10

Application Security

1. Permissions
2. Custom Permissions
3. Security Configuration
4. Storage Models
5. Internal Storage
6. USB, Bluetooth, WiFi, and External Media
7. File System Security
8. Encrypted File Systems
9. Injection Vulnerabilities
10. Inter-Process Communication
11. Guarding IPC Entrances
12. Services and Broadcast Receivers
13. Logging

Remote Connectivity

1. Remote Connections from Mobile Devices
2. The INTERNET Permission
3. HTTP and HTTPS Communication
4. Keystores and Cryptography
5. Username/Password Login
6. Managing Credentials
7. HMACs
8. Managing Token Pairs