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ANDROID DEVELOPER INTERVIEW HANDBOOK



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500+

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QUESTIONS

WITH CLEAR EXPLANATIONS



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INTERVIEW
QUESTIONS



DETAILED
ANSWERS &
EXPLANATIONS



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BOOST YOUR
CONFIDENCE &
CRACK INTERVIEWS

WRITTEN BY

ANAND GAUR

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- Android CLI & agentic Android Studio
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- Handoff, desktop windowing & form factors
- Firebase AI Logic, function calling & Live API
- Predictive back, Baseline Profiles & security updates

1. Android Core Concepts

Q:1) What are the core building blocks of an Android application?

Android apps are built using several essential components provided by the Android framework. These components work together to handle **UI**, **background tasks**, **user interactions**, and **data sharing**.

Core Building Blocks of an Android Application:

1. Activities

- Represents a single screen with a user interface.
- Acts as the entry point for user interaction.
- Every screen in an app is usually an Activity.

2. Fragments

- A modular piece of UI that lives inside an Activity.
- Can be reused in multiple activities.
- Useful for responsive layouts (e.g., tablets vs phones).

3. Services

- Runs background operations without user interaction.
- Useful for long-running tasks like downloading files, playing music, etc.

4. Broadcast Receivers

- Listens to system-wide or app-wide broadcast messages.
- Useful for responding to events like battery low, Wi-Fi connected, etc.

5. Content Providers

- Used to share data between apps.
- Acts as a data access interface, like a database that can be queried using URI.

6. View:

- Every UI component like Button, TextView, etc.
- Created in XML or code using Jetpack Compose.

7. Layouts:

- Organize UI views. Examples: LinearLayout, ConstraintLayout, Compose Column/Row.

8. Manifest File:

- Declares all components, permissions, and metadata.
- It's like the blueprint of your app.

Q:2) What is the intent?

Intent is a messaging object used to request an action from another app component (activity, service, or broadcast receiver). It allows communication between components and even across different applications.

There are two types of intents in Android:

1) Explicit Intent

- Used to launch a **specific component** (e.g., another activity **within the same app or in another app**, if the component name is known).
- You define the **class name** or **component name** directly.

Example:

```
val intent = Intent(this, SecondActivity::class.java)
startActivity(intent)
```

2) Implicit Intent

- Used to perform an action **without specifying the exact component**.
- The Android system will match the intent with the appropriate component using **intent filters**.

```
val intent = Intent(Intent.ACTION_VIEW)
intent.data = Uri.parse("https://www.google.com")
startActivity(intent)
```

Q:3) What is the Android Application Lifecycle?

The **Android Application Lifecycle** is the process your **entire app** goes through — from the moment it starts running to the moment it's closed or killed by the system.

This lifecycle is managed by the **Application class**.

Key Steps in the Application Lifecycle:

onCreate()

- Called **once** when the app is first launched
- Best place to **initialize global things** like Firebase, logging, or any SDKs

2. OOPS Concepts

Q:1) What is a Class and Object in Android?

Class

- A **class** is like a **blueprint** or **template** for creating objects.
- It defines **properties (variables)** and **behaviors (functions/methods)**.
- In Android (Kotlin/Java), you use classes to **structure your app**.

Key Points:

- Defines **what an object will have and do**.
- Doesn't occupy memory by itself until an **object** is created.

Object

- An **object** is a **real instance** of a class.
- It occupies **memory** and can **use the properties and functions** defined in the class.

Key Points:

- Object is the **actual entity** created from the class blueprint.
- You can create **multiple objects** from the same class, each with **different data**.

Q:2) What are Primary and Secondary Constructors in Kotlin?

Primary Constructor

- The **main constructor** of a class.
- Defined **in the class header**.
- Can directly initialize **properties**.

Usage in Android:

- Pass **data directly when creating an object**.

Key Points:

- There can be **only one primary constructor**.
- Can include **init block** for additional initialization:

Secondary Constructor

- **Optional additional constructors** for different ways to create an object.
- Defined **inside the class body** with a **constructor** keyword.

- Must **delegate to the primary constructor** (if primary exists) using : `this(...)`.

Usage in Android:

- Useful when you want **flexible object creation** in different scenarios.

Key Points:

- You can have **multiple secondary constructors**.
- Helps when **default values or alternative initialization** is needed.

Q:3) Explain Inheritance in Android with an Example

- **Inheritance** is an **OOP concept** where one class (child/subclass) **inherits properties and behaviors** of another class (parent/superclass).
- Helps **reuse code, reduce duplication, and create hierarchical relationships**.

How It Works in Android

- Android apps are built using **classes**, so inheritance is common:
 - **Activities and Fragments** extend `AppCompatActivity` or `Fragment`.
 - **Custom Views** extend `View` or `TextView`.
 - **Adapters** can extend `RecyclerView.Adapter`.

Q4: What is Polymorphism in Android?

- **Polymorphism** is an **OOP concept** that allows an object to take **many forms**.
- In simple words, the **same function or object can behave differently** depending on context.
- Helps **write flexible and reusable code**.

Types of Polymorphism in Kotlin/Android

a) Compile-time (Static) Polymorphism

- Achieved via **function overloading** or **operator overloading**.
- Function behavior is determined **at compile time**.

b) Runtime (Dynamic) Polymorphism

- Achieved via **inheritance + method overriding**.
- Function behavior is determined **at runtime**.

How It's Used in Android

- **Activities and Fragments:** `Activity` functions overridden in subclasses.

3. Kotlin Concepts

Q:1) What are the main features of Kotlin?

- **Concise:** Less boilerplate than Java
- **Null Safety:** Built-in null checks
- **Extension Functions:** Add functions to existing classes
- **Coroutines:** Lightweight concurrency
- **Smart Casts:** No need for explicit casting after type check
- **Data Classes:** Auto-generate equals(), hashCode(), toString(), etc.
- **Default & Named Arguments**
- **Higher-order functions & Lambdas**

Q:2) What is the difference between `val`, `var`, and `const` in Kotlin?

In Kotlin, `val` and `var` are used to declare variables, but they behave differently:

1. `var` (Variable)

- A **mutable** variable.
- You **can change** its value after it's assigned.
- Stored in **memory at runtime**.

2. `val` (Value)

- An **immutable** variable (like `final` in Java).
- You **can assign only once**.
- Value is also stored **at runtime**, but can't be reassigned.

3. `const val` (Constant)

- A **compile-time constant**.
- Can only be used **with top-level properties or inside objects or companion objects**.
- **Must be of a primitive type or String**, and value must be known **at compile time**.

```
val name = "Anand" // Cannot be changed later
var age = 30        // Can be updated
age = 31
```

Q:3) What are null safety features in Kotlin?

Kotlin eliminates `NullPointerException` (NPE) by making all types **non-nullable** by default.

Types:

- **Non-nullable:** `var name: String = "Anand"` → cannot hold null
- **Nullable:** `var name: String? = null` → can hold null

Safe Operations:

- **Safe call** `?.`: Skips execution if the object is null.
- **Elvis** `?::`: Provide default value if null.
- **Not-null Assertion** `!!`: Throws Null Pointer Exception if value is null.
- **Safe Cast** `as?`: Returns null instead of throwing `ClassCastException`.

Q:4) What is a data class in Kotlin?

A **data class** is a special class made specifically for storing data. It automatically gives you useful methods like:

- `toString()` – so you can print the object easily
- `equals()` and `hashCode()` – to compare objects or use in `HashMap/Set`
- `copy()` – to create a new object with some properties changed
- `componentN()` – to access values using destructuring (like `val (a, b) = obj`)

Syntax:

```
data class User(val name: String, val age: Int)
```

Q:5) What is the difference between == and === in Kotlin?

== (Structural Equality)

- Checks if **two objects have the same content**.
- Internally calls the `.equals()` method.

=== (Referential Equality)

- Checks if **two references point to the same object in memory**.
- Like checking object identity (`===` is the same as Java's `==`).

4. Android Architecture

Q:1) What is Android Architecture?

- It defines a way to structure code into layers.
- Helps separate UI, data, and business logic.
- Makes the code easy to maintain, test, and scale.

Q:2) What is MVVM Architecture?

- MVVM stands for **Model-View-ViewModel**.
- **Model**: Manages data (e.g., from API or database).
- **View**: UI layer (Activity, Fragment, or Compose).
- **ViewModel**: Holds UI data and business logic, survives screen rotation.
- Helps reduce code in Activity/Fragment.

Q:3) What is ViewModel?

- Part of Android Architecture Components.
- Stores UI-related data across configuration changes.
- Provides data to the View using LiveData or StateFlow.
- Doesn't contain references to View (Activity/Fragment).

Q:4) What is LiveData?

- Lifecycle-aware observable data holder.
- UI observes LiveData to get automatic updates.
- Prevents memory leaks as it only updates when the UI is active.

Q:5) What is the difference between LiveData and StateFlow?

- **LiveData** is lifecycle-aware, works well with XML-based UIs.
- **StateFlow** is not lifecycle-aware, works better with Kotlin Coroutines and Jetpack Compose.
- StateFlow is a part of Kotlin Flow and used for modern reactive UIs.

Q:6) What is a Repository in MVVM?

The Repository is responsible for fetching data. It abstracts the data sources (API, Room database, Firebase, etc.) from the ViewModel. This separation makes it easy to manage and test data logic.

Q:7) What are UseCases in Clean Architecture?

- A UseCase contains a **single specific business logic** (e.g., GetUserDetails).
- Keeps the ViewModel clean by handling complex logic inside it.
- Lies in the **domain layer** in Clean Architecture.
- Reusable and testable units of code.

Q:8) What is Clean Architecture?

- Divides app into **three layers**:
 - **Presentation**: ViewModel, UI
 - **Domain**: Business logic (UseCases)
 - **Data**: API, Room, Repositories
- Makes code **modular, testable, and maintainable**.
- Helps in scaling large applications.

Q:9) What is Room in Android Architecture?

- Room is a library that provides an easy way to use SQLite.
- Uses annotations to create and query databases.
- Helps persist data locally (offline storage).
- Works with ViewModel and LiveData for reactive updates.

Q:10) What are the benefits of using ViewModel, LiveData, and Room?

- **ViewModel** keeps data during screen rotation.
- **LiveData** automatically updates the UI with data changes.
- **Room** provides easy, safe database operations.
- All three are lifecycle-aware and prevent memory leaks.
- Improve app stability, maintainability, and performance.

5. Jetpack Compose

Q:1) What is Jetpack Compose?

Jetpack Compose is Android's modern UI toolkit that lets you build UI using Kotlin code instead of XML.

- It's **declarative**, meaning you describe what the UI should look like, and the system updates it automatically when the data changes.
- It replaces traditional XML + View-based UI system.
- Offers **less boilerplate**, better state handling, and **Kotlin-first approach**.

Q:2) What is a Composable function?

A Composable is a special Kotlin function marked with `@Composable` that describes part of the UI.

Example:

```
@Composable
fun Greeting(name: String) {
    Text(text = "Hello, $name")
}
```

You can call one composable inside another to build complex UIs.

Q:3) What is recomposition in Jetpack Compose?

Recomposition is when Compose **redraws** parts of the UI because data/state has changed.

- Only the part of the UI where data changed is recomposed.
- Compose optimizes this to avoid redrawing everything.

Example: If you update a `count` value shown in a `Text`, only that `Text` composable will recompose.

Q:4) What is State in Compose?

State holds data that changes over time and triggers recomposition.

You can use `remember` and `mutableStateOf`:

```
val count = remember { mutableStateOf(0) }
```

When `count.value` changes, any UI that depends on it will update automatically.

Q:5) What is remember and rememberSaveable?

- `remember` stores state during recomposition but **resets on configuration changes** (like rotation).
- `rememberSaveable` stores state across recomposition **and configuration changes** using `Bundle`.

Use `rememberSaveable` for things like text input or selection state that should survive screen rotation.

Q:6) What is Modifier in Jetpack Compose?

Modifier is used to **modify or decorate** a composable — like setting padding, background, size, click behavior, etc.

Example:

```
Text(
    text = "Hello",
    modifier = Modifier
        .padding(16.dp)
        .background(Color.Yellow)
)
```

Modifiers are chained and read from **left to right**.

Q:7) What is a Scaffold in Jetpack Compose?

Scaffold is a layout component that provides basic structure like:

- TopBar
- BottomBar
- FloatingActionButton
- Drawer
- SnackbarHost

Example:

```
Scaffold(
    topBar = { TopAppBar(title = { Text("Home") }) },
    floatingActionButton = { FloatingActionButton(onClick = {}) { Text("+") } }
) {
```

6. Unit Testing

Q:1) What is Unit Testing in Android?

Unit testing is the practice of testing **individual components or functions** in isolation to ensure they behave correctly.

- In Android, we typically use **JUnit** for unit testing.
- Unit tests run on the **JVM** and are **fast** because they don't require a device/emulator.

Q:2) What is the difference between Unit Tests and Instrumentation Tests in Android?

Unit Test	Instrumentation Test
Runs on JVM	Runs on a real device/emulator
Fast	Slower due to UI/device interaction
Tests logic in isolation	Tests integration, UI, and end-to-end
Uses JUnit/Mockito	Uses Espresso, UI Automator, etc.

Q:3) Which tools/libraries are used for Unit Testing in Android?

- **JUnit** – Base library for writing tests.
- **Mockito / MockK** – For mocking dependencies.
- **Truth / AssertJ / Hamcrest** – Assertion libraries.
- **Robolectric** – Allows you to run Android SDK code in JVM unit tests.
- **Turbine** – For testing Kotlin Flow.
- **Kotlin Test DSL** – For idiomatic Kotlin test writing.

Q:4) How do you test ViewModel in Android?

- ViewModels are easy to test because they don't depend on Android Framework.
- You can write plain JUnit tests and verify outputs by observing **LiveData** or **StateFlow**.

```
@Test
fun testViewModelReturnsUser() = runTest {
```

```

val user = User("Anand")
whenever(repo.getUser()).thenReturn(user)
viewModel.loadUser()
assertEquals(user, viewModel.user.value)
}

```

Q:5) How to test LiveData in Unit Tests?

Use `getOrAwaitValue()` extension or observe synchronously using `observeForever()`.

Q:6) How do you test Kotlin Coroutines in Android?

Use `runTest {}` from `kotlinx-coroutines-test` to control coroutine execution.

Q:7) How do you test Flows in Android ViewModel?

Use `Turbine` or collect manually.

Q:8) How do you mock dependencies in Unit Tests?

Use `Mockito` or `MockK` to mock dependencies.

Q:9) What is Robolectric and when should you use it?

- Robolectric lets you run Android SDK code on JVM without a device/emulator.
- Great for testing Android classes like `Activity`, `Context`, `SharedPreferences`, etc.

Q:10) How do you test a Repository that depends on API and Room?

Use fake/dummy implementations or mock them:

```

class FakeApi : Api {
    override suspend fun getData(): List<String> = listOf("A", "B")
}
class FakeDb : Dao {
    override suspend fun insert(data: List<String>) { /* do nothing */ }
}

```

Use these fakes in the Repository test instead of real API or Room.

Q:11) How do you test Hilt-injected ViewModel or Repository?

Use:

7. Android Security

Q:1) How can you securely store sensitive data in an Android app?

You should never store sensitive data (like passwords or tokens) in plain text. Instead:

- Use **EncryptedSharedPreferences** for small data like tokens.
- Use **Android Keystore** to store cryptographic keys securely.
- Avoid storing sensitive info in internal or external storage.

Q:2) What is Android Keystore and why is it used?

Android Keystore is a secure container that helps store cryptographic keys. These keys can be used for encryption, decryption, or signing without exposing them directly to the app.

It ensures that:

- Keys cannot be extracted.
- Operations happen in secure hardware (if available).
- Your app remains safe even if rooted.

Q:3) What are common security risks in Android apps?

Some common risks:

- Storing data in plain text.
- Using HTTP instead of HTTPS.
- Hardcoding API keys in code.
- Not validating inputs (leading to injection attacks).
- Using outdated libraries with vulnerabilities.

Q:4) How can you protect your API keys in Android?

- Don't hardcode keys in code or strings.xml.
- Use **BuildConfig** with Gradle to store API keys.
- Store keys on the server and use **token-based auth**.
- Use **NDK (native C++)** for critical keys (not fully secure but harder to reverse).

Q:5) How can you prevent reverse engineering of your APK?

- Use **ProGuard** or **R8** to obfuscate the code.
- Remove unused code and classes.
- Avoid storing logic or secrets in the app.
- Sign APKs with release keystore.

- Monitor unauthorized APKs using Play Store Console.

Q:6) What is the use of ProGuard/R8 in Android?

ProGuard (now replaced by R8) is a tool that:

- **Minifies** code (removes unused code).
- **Obfuscates** names (changes class/method names to random characters).
- Makes it harder for attackers to reverse engineer the app.

Q:7) How can you secure communication between app and server?

- Always use **HTTPS (SSL/TLS)** to encrypt data in transit.
- Use **certificate pinning** to verify the server.
- Avoid logging sensitive data (e.g., tokens or passwords).
- Use secure authentication methods like **OAuth2** or JWT.

Q:8) What is certificate pinning?

Certificate pinning is a technique where you **hardcode your server's public certificate or key in the app**. It ensures:

- The app only trusts your server.
- Prevents man-in-the-middle (MITM) attacks, even if a fake certificate is installed.

Q:9) What is the difference between Internal and External Storage in Android?

- **Internal Storage:** Private to the app. Other apps can't access it. More secure.
- **External Storage:** Shared across apps. Can be accessed easily. Less secure.

Always prefer **Internal Storage** for storing sensitive files or data.

Q:10) How to protect user credentials in an Android app?

- Never store raw passwords.
- Use **OAuth** or server-side login mechanisms.
- If needed, use **EncryptedSharedPreferences** to store tokens.
- Always use secure, hashed formats (like bcrypt) for passwords (on server side).

Q:11) How can you detect if a device is rooted?

- Check for presence of **su** binary.
- Look for packages like **com.noshufou.android.su**.

8. Scenario Based Questions

Q:1) How do you handle configuration changes (like screen rotation) in Android without losing data?

ViewModel stores UI-related data across configuration changes.

When screen rotates:

- Activity/Fragment is destroyed and recreated.
- ViewModel is not destroyed.
- ViewModel retains the data and passes it again to the UI.

Example:

In a profile screen, if the user scrolls halfway and rotates the screen, without ViewModel the screen will reload from start.

But with ViewModel, the profile data and scroll position can be restored smoothly.

Q:2) You have two API calls that must run in parallel and update UI when both complete. How do you implement this?

Use Kotlin Coroutines with `async` and `await`.

```
viewModelScope.launch {
    val userDeferred = async { api.getUser() }
    val postsDeferred = async { api.getPosts() }
    val user = userDeferred.await()
    val posts = postsDeferred.await()
    _uiState.value = Success(user, posts)
}
```

This way, both calls run in parallel and UI updates after both are done.

Q:3) You need to fetch data from both the local Room database and network. How do you design this?

Use **Repository** with a fallback logic:

1. First try Room DB (cached data).
2. If data is old/missing, fetch from API.
3. Save new data in the Room.

This ensures:

- Fast response (local DB)

- Always fresh data (network)

Q:4) A user opens an app with no internet. How do you show offline data?

Use Room as the local cache.

- Repository checks connectivity.
- If offline, fetch from Room.
- If online, fetch from API and update Room.

Show “You’re offline” toast/snackbar while loading cached data.

Q:5) In MVVM, who should handle click events and why?

The **ViewModel** should handle logic, not the Activity/Fragment.

- UI calls `viewModel.onLoginClicked()`
- ViewModel checks input, performs API call
- Emits success/error state via LiveData or StateFlow

Keeps code testable and follows separation of concerns.

Q:6) In Jetpack Compose, how do you preserve scroll position when the user navigates back?

Use `rememberLazyListState()` in Composable:

```
val listState = rememberLazyListState()
LazyColumn(state = listState) { ... }
```

When navigating back to the list screen, it retains scroll position.

Q:7) You observe LiveData in Fragment but UI doesn’t update. What could be the issue?

Possible reasons:

- You’re observing LiveData **after** setting it (missed update).
- The observer is not **active** (lifecycle is not STARTED or RESUMED).
- You used `observe()` instead of `observe(viewLifecycleOwner)`.

Always observe LiveData after setting up the UI and use `viewLifecycleOwner`.

9. DevOps in Android

Q:1) What is CI/CD in Android?

CI/CD in Android development refers to Continuous Integration and Continuous Delivery/Deployment, a set of practices that automate the building, testing, and delivery of Android applications.

- Continuous Integration (CI) means that developers regularly push code to a shared repository (like GitHub), and every push automatically triggers a build and test. This helps catch errors early.
- Continuous Delivery (CD) means that once code is tested and validated, it can be automatically packaged (APK or AAB) and delivered to testing environments (like Firebase App Distribution).
- Continuous Deployment goes one step further and automatically publishes the app to production like Google Play once it passes all quality checks.

CI/CD improves team collaboration, reduces manual errors, and speeds up release cycles.

Q:2) Why is CI/CD important in Android development?

CI/CD helps in:

- Faster development cycles by automating build and testing.
- Early bug detection due to frequent code integration and automated tests.
- Better team collaboration, as code is constantly merged and verified.
- Reduced manual work — no need to manually run tests, generate APKs, or upload to Play Store.
- Consistent builds because the process is scripted and version-controlled.

Q:3) Which tools are commonly used for CI/CD in Android?

Some commonly used CI/CD tools are:

- **GitHub Actions** – Integrated with GitHub, good for open-source and personal projects.
- **Bitrise** – Android and iOS friendly, no setup needed, GUI-based.
- **Jenkins** – Powerful, but needs self-hosting and manual setup.
- **CircleCI** or **GitLab CI** – Useful for medium to large teams.
- **Firebase App Distribution** – For distributing builds to testers

Q:4) What is Git in Android development?

Git is a **version control system** that allows Android developers to **track changes in code**, **collaborate with others**, and manage code history.

In Android projects:

- Git helps you to **save code checkpoints** (commits).
- You can create **branches** to work on features without affecting main code.
- Git supports **pull requests** and **code reviews**.
- You can roll back to **older working versions** if something breaks.

Q:5) What are common Git commands used in Android projects?

Here are some essential Git commands:

- `git clone` – Download project from repository.
- `git status` – See current changes.
- `git add .` – Add all changes to be committed.
- `git commit -m "message"` – Save changes locally.
- `git push origin branch-name` – Upload code to GitHub.
- `git pull` – Fetch and merge latest code from others.
- `git checkout branch-name` – Switch to another branch.

These commands help you manage code effectively in a team

Q:6) What is Git branching and why is it important?

Branching allows you to **create a separate line of development** from the main project.

For example:

- `main` or `master` – production-ready code.
- `feature/login` – working on login screen.
- `bugfix/crash` – fixing a crash.

Branching is important because:

- You can work on new features **without breaking main code**.
- It allows **multiple developers to work in parallel**.
- You can test and review code before merging it.

10. Gradle Concepts & Issues

Q:1) What is Gradle in Android?

- Gradle is the **build system** used in Android.
- It automates compiling code, packaging APKs, and managing dependencies.
- Think of it as a **recipe** that tells Android Studio how to build your app.
- It's fast, flexible, and supports custom build configurations.

Q:2) What is the difference between Project-level and Module-level `build.gradle`?

Project-level `build.gradle`

- Applies to the entire project.
- Defines global configurations such as:
 - Gradle version
 - Repositories
 - Classpath for plugins

Module-level `build.gradle`

- Specific to each app/module.
- Defines module-specific settings such as:
 - Dependencies (`implementation`, `api`, etc.)
 - Build types (debug/release)
 - Product flavors
 - Android SDK version

Key Point: Project-level is for general setup affecting all modules, while Module-level is for app/module-specific configurations.

Q:3) What are Build Variants and Product Flavors?

- **Build Variants:** Combination of build type (debug/release) + flavor. Example: `freeDebug`, `paidRelease`.
- **Product Flavors:** Create multiple versions of your app (free/paid, demo/full).
- Allows **different apps from the same codebase**.
- Helps in testing, release management, and app customization.

Q:4) What is Dependency Management in Gradle?

- Dependencies are **external libraries** your app needs.
- Use keywords like:

- `implementation` → Only used internally, faster builds.
- `api` → Exposes library to other modules.
- Gradle **automatically downloads** required libraries from repositories.
- Helps avoid manual jar management.

Q:5) What are Common Gradle Sync Failures and their fixes?

- Gradle sync fails when Android Studio **cannot build the project**.
- **Common reasons:**
 - Wrong Gradle version
 - Missing SDK or build tools
 - Network issues (library download fails)
- **Fixes:**
 - Check Gradle version in `gradle-wrapper.properties`
 - Make sure required SDK/build-tools are installed
 - Try “**Sync Project with Gradle Files**” or **offline mode**

Q:6) How to handle Version Conflicts & Duplicate Classes?

- Happens when **two libraries use the same dependency version**.
- Causes build errors like `Duplicate class`.
- **Fixes:**
 - Use `./gradlew app:dependencies` to check conflicts
 - Use `implementation` instead of `compile`
 - Exclude transitive dependencies with `exclude group:`

Q:7) What is the Gradle Wrapper (gradlew) and why use it?

Gradle Wrapper (`gradlew` / `gradlew.bat`)

- A script that runs Gradle with a specific version defined for the project.
- Ensures everyone on the team uses the same Gradle version, avoiding version mismatch issues.
- No need to install Gradle manually on each machine.
- Supports reproducible builds on any system.

Common Commands:

- `./gradlew build` → Builds the project
- `./gradlew assembleDebug` → Builds debug APK

11. What's New in Android (2026)

This chapter covers the latest Android updates that interviewers are now asking about — the shift to Compose-first development, Jetpack Navigation 3, adaptive UI for new form factors, and on-device AI with Gemini Nano. These are recent (2025–2026) changes, so showing you're current is a strong signal.

Q1) What were the biggest Android updates announced at Google I/O 2026?

The headline theme was Android moving from "an operating system to an intelligence system," plus a firm push toward Compose-first, adaptive development. Key updates worth knowing:

- **Compose-first** – all new UI should be Jetpack Compose; the View system moved to maintenance mode.
- **Jetpack Navigation 3** – a Compose-first navigation library with a user-owned back stack.
- **Adaptive-first (Android 17)** – build for phones, foldables, tablets, desktop (Googlebook), cars, and XR.
- **On-device AI** – Gemini Nano via ML Kit GenAI APIs, plus the Prompt API for custom use cases.
- **Agentic tooling** – a stable Android CLI, agentic Android Studio features, and AppFunctions (Android MCP).

Q2) What does "Compose-first" mean, and what happens to XML and the View system?

Google's official stance is now that **all new Android UI should be built with Jetpack Compose**. Compose is the standard, and the old View toolkit has moved into **maintenance mode**.

- Maintenance mode means the [android.widget](#) View system and libraries built on it — Fragments, RecyclerView, ViewPager — still get critical bug fixes and stay supported.
- What they won't get is new feature development — new UI tooling in Android Studio is built for Compose only.
- There is no deprecation, no removal timeline, and no plan to break existing View-based apps.

Interview tip In an interview, the right framing is: existing XML apps keep working, but new screens and new investment go to Compose. If you have a large XML codebase, migrate gradually — don't panic-rewrite.

Q3) What is Jetpack Navigation 3 (Nav3), and how is it different from the old Navigation Component?

Navigation 3 is a new navigation library built from the ground up for Jetpack Compose. The original Navigation (now "Nav2") was designed for the XML/View world and got Compose adapters bolted on; Nav3 embraces Compose state as the foundation.

Navigation 2	Navigation 3
Built for the View/XML system	Built for Compose from scratch
Library owns the back stack internally	You own the back stack (a state list)
String routes (typo-prone)	Type-safe keys (data classes)
Adaptive layouts are hard	Adaptive (list-detail) is first-class

Nav3 reached **stable 1.0**, so it's production-ready. Nav2 is now in maintenance mode.

Q4) How does the back stack work in Navigation 3?

The back stack is a list of keys that **you own** — a Compose-backed [SnapshotStateList](#). Navigating means adding a key to the list; going back means removing the last one. The [NavDisplay](#) composable simply observes that list and updates the UI when it changes.

- Each screen is identified by a key — a [@Serializable](#) object or data class.
- Routes can implement [NavKey](#) to use [rememberNavBackStack](#) for a persistent back stack.
- Because the back stack is your own state, it's a true single source of truth — no split state between the app and the library.

```
@Serializable data object ProductList : NavKey
@Serializable data class ProductDetail(val id: String) : NavKey

val backStack = rememberNavBackStack(ProductList)
// navigate:
backStack.add(ProductDetail("42"))
// go back:
backStack.removeLastOrNull()
```

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