PROG7313

Open Source Coding

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What is Android?

- Mobile operating system developed by Google that powers smartphones, tablets, smart TVs, and other devices.

- Open-source, based on the Linux kernel, and supports app development using Java and Kotlin.

Java:

```java
public String greet (String name) {

    return "Hello, " + name + "!";
}
```

Kotlin:

```kotlin
fun greet(name: String) = "Hello, $name!"
```

Kotlin achieves the same result in fewer lines, making code more efficient and readable.
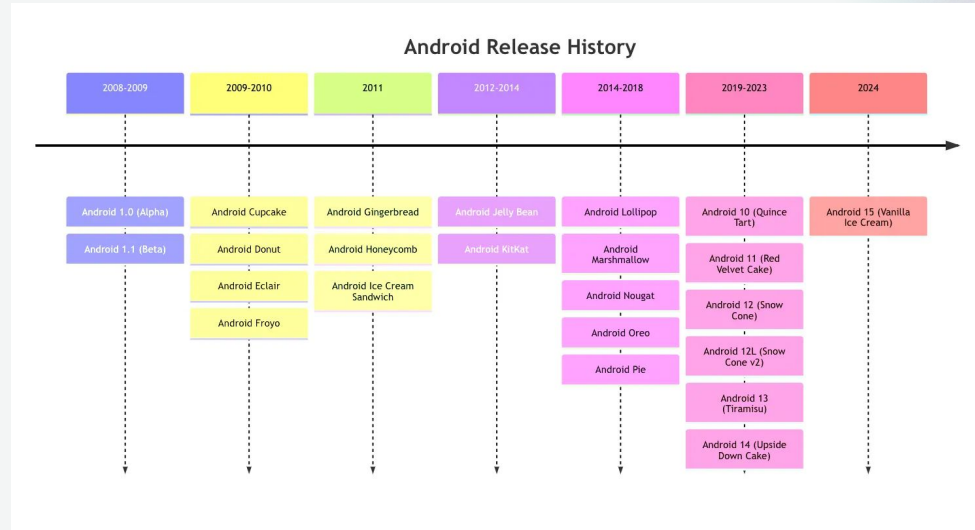
Key Benefits of Kotlin:

- **Concise & Readable** – Requires less boilerplate code than Java, making development faster.

- **Safe & Nullability Handling** – Reduces the chances of NullPointerException, improving app stability.

- **Interoperability with Java** – Allows using existing Java code within Kotlin projects.

- **Better Performance** – Optimized for Android runtime, leading to efficient apps.

- **Coroutines for Asynchronous Tasks** – Handles background processes like API calls smoothly.

https://medium.com/@pcasafont/the-advantages-of-java-over-kotlin-d1a9ff6369d
https://kotlinlang.org/docs/comparison-to-java.html#some-java-issues-addressed-in-kotlin

History -

2003 - 2005 Android Inc. was founded by Andy Rubin and then acquired by Google.

Android Release History

2008-2009	2009-2010	2011	2012-2014	2014-2018	2019-2023	2024
Android 1.0 (Alpha)	Android Cupcake	Android Gingerbread	Android Jelly Bean	Android Lollipop	Android 10 (Quince Tart)	Android 15 (Vanilla Ice Cream)
Android 1.1 (Beta)	Android Donut	Android Honeycomb	Android KitKat	Android Marshmallow	Android 11 (Red Velvet Cake)	
	Android Eclair	Android Ice Cream Sandwich		Android Nougat	Android 12 (Snow Cone)	
	Android Froyo			Android Oreo	Android 12L (Snow Cone v2)	
				Android Pie	Android 13 (Tiramisu)	
					Android 14 (Upside Down Cake)	

https://medium.com/@niranjanky14/a-walk-through-android-history-a-timeline-of-major-releases-36786fc0fe11

Today, **Android powers over 70% of mobile devices worldwide**.

Key Android Development Tools

- **Emulator**
  Testing apps on multiple device types.
  Debugging apps in different Android versions.
  Simulating phone calls, messages, and sensors.

- **SDK Manager**
- The SDK Manager is a tool in Android Studio that allows developers to install, update, and manage different Software Development Kit (SDK) components required for Android development.

- **Gradle**
- Building & compiling the app's code.
- Managing dependencies (e.g., third-party libraries).
- Optimizing performance by handling different build variants (debug/release).

- **Logcat**
  Logcat is a real-time logging tool in Android Studio used for debugging applications. It displays system messages, errors, and custom log outputs.

- Tracking errors and crashes.
- Monitoring app behavior in real-time.
- Debugging API responses and background processes.

Walk through the project structure -

App Module (app/)
- This is the main module where your app's source code, resources, and configurations exist.

Gradle Build System
- build.gradle (Project) – Configures Gradle for the entire project.
- build.gradle (Module: app) – Manages app dependencies.

Gradle Wrapper (gradle/)
- Contains files that ensure the correct Gradle version is used for the project.

Testing (src/test/ and src/androidTest/)
- test/ – Unit tests (runs without an emulator).
- androidTest/ – Instrumented tests (runs on an emulator/device).

- Lecture Objectives:

By the end of this session, students should be able to:

❏ Identify the tools used in Android development.

❏ Understand the history and evolution of the Android Operating System.

❏ Install and configure Android Studio.

❏ Set up and run an Android Emulator.