Faculty of Engineering & Technology
Electrical & Computer Engineering Department

OPERATING SYSTEMS (ENCS3390)

Assignment I

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Contents

- Compare and contrast the Android and iOS operating systems from the following viewpoints:

a. customizability
b. performance
c. Business model (how does iOS make money for Apple? How does Android make money for Google?)

Aspect	Android	IOS
Customizability	Highly adaptable thanks to a variety of UI options, widgets, and independent app stores. Users can alter how their devices look and feel. [1]	Limited customizability with a more controlled user experience. Users have fewer options for personalization. [2]
Performance	Depending on the hardware and device manufacturers, performance can change. The performance of high-end Android devices is excellent. [3]	Apple's devices run consistently and smoothly because of their tight hardware-software integration because they are made to function as a single unit. [4]
Business Model	Android itself is offered for free to device manufacturers. Google generates revenue primarily through advertising, search services, and the Google Play Store. [5]	Apple's primary revenue source is the sale of hardware (iPhones, iPads). They also generate revenue from the App Store, Apple Music, iCloud, and other services. [6]

- AOT vs. JIT

a) Why does Android use Ahead-of-Time (AOT) compilation rather than Just-in-Time (JIT) compilation?

Compiled Ahead-of-Time (AOT):

An app is assembled by AOT prior to use, much like a dish is prepared prior to consumption. When you launch the app, it operates more quickly. It's similar to creating a dish that tastes delicious right away, but it takes time to prepare.

Compiling Just-in-Time (JIT):

JIT compiles the application as you use it, much like you would cook a dish as you eat.

It can improve the flavor and adjust to how you're eating.

It's similar to cooking while you go, which is quicker but may not turn out as well the first time. [7]

AOT and JIT are combined in Android. Apps should launch quickly (AOT) and automatically adjust to your device (JIT).In other words, it's like making sure your food tastes good before you eat it and then adjusting it as you go. Simply put, Android uses JIT to optimize apps for your particular device and AOT to start apps quickly.

b) What are the advantages and disadvantages of each method?

Method	Advantages	Disadvantages

AOT Compilation	- Faster App Startup: Apps start quickly as they are already pre-compiled.	- Larger App Size: AOT-compiled apps can be larger because they include pre-compiled code for specific devices.
	- Improved Security: Some security issues can be fixed during compilation.	- Less Adaptability: AOT-compiled apps might not adapt as well to different devices or conditions.
	- Longer Battery Life: By lowering CPU usage, AOT can increase battery life.	- Longer Installation Time: It takes time to pre-compile the app during installation.
	- Code is optimized for a particular piece of hardware, possibly enhancing performance. [8]	
JIT Compilation	- Smaller App Size: JIT-compiled apps are smaller because they don't include pre-compiled code.	- Slower Start: Apps might start slower because they are compiled on the fly.

	- Device Adaptability: JIT can adapt to various devices and conditions, improving flexibility.	- Potential Runtime Overhead: JIT compilation consumes some resources during execution.
	- Memory Efficiency: JIT-compiled code might use less memory for certain workloads.	- Security issues: It's possible that some security flaws won't be fixed until runtime.
	- Quicker Installation: By eliminating the need for pre-compilation, apps can be installed more quickly. [9]	

- Native vs. cross-Platform

a. What is the difference between native mobile code and cross-platform mobile code?

Native mobile code is specifically developed for a single platform (like iOS or Android), making it highly optimized and fast but requiring separate code for each platform. Cross-platform mobile code, on the other hand, is designed to work on multiple platforms with a single codebase, simplifying development but potentially sacrificing some performance and platform-specific features.

b) What are the advantages and disadvantages of each?

Native mobile app development produces apps that are optimized for a single platform, offering top performance and access to all features but requiring unique code for each (like iOS and Android). Cross-platform development creates a single app that functions on several platforms, saving money and time, but it might not run as quickly and may have limited access to some specialized features. [10]

c) How can a programming framework like FLUTTER produce mobile apps that work on both Android and iOS?

With Flutter, developers can build mobile apps that seamlessly run on both Android and iOS with a single codebase while still having the flexibility to access platform-specific features as needed. Flutter offers a robust framework that bridges the gap between Android and iOS. [11]

- Describe Google Chrome as an example of a multi-process, multi-threaded application

Google Chrome is comparable to a super-efficient employee. It separates tasks into different piles and handles them all at once.

1. Visualize having several to-do lists (processes), such as one for reading emails and one for creating documents (tabs).

2. Different workers (threads) are assigned to different piles, each one focused on a particular task, such as reading emails, writing, and taking phone calls (graphics).

3. The other workers are unaffected if one employee makes a mistake or becomes overworked (like a frozen webpage). They continue operating (tabs are still responsive).

So, Chrome uses many workers and piles to make sure you can browse the web quickly, safely, and without one mistake causing everything to crash. [12]

- ## References

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