

**OPERATING SYSTEMS**

**ASSIGNMENT # 04**

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**COMPARATIVE ANALYSIS OF MOBILE SYSTEMS THROUGH OPERATING SYSTEMS CONCEPTS**

# **INTRODUCTION:**

This report provides a comparative analysis of iOS and Android operating systems based on core operating system concepts such as process management, memory management, file system, security, and scheduling. The analysis incorporates insights from two academic papers—one focusing on the brand image and functionality of iOS and Android, and the other examining user preferences and security features—supplemented with additional research.

# **KEY OPERATING SYSTEMS CONCEPTS**

## **PROCESS MANAGEMENT**

* **iOS:**
  + Utilizes a strict process lifecycle management system.
  + Background tasks are limited and tightly controlled to conserve resources.
  + Employs Grand Central Dispatch (GCD) for efficient task execution.
* **Android:**
  + Offers greater flexibility with multitasking, supporting services, and background processes.
  + Uses a shared runtime environment (ART/Dalvik) for running applications.
  + Processes are managed by the Linux kernel’s CFS (Completely Fair Scheduler).

## **MEMORY MANAGEMENT**

* **iOS:**
  + Features aggressive memory management through Automatic Reference Counting (ARC).
  + Suspends background applications to free up resources.
  + Implements virtual memory but limits direct access for security.
* **Android:**
  + Manages memory through ART/Dalvik, optimizing garbage collection for better performance.
  + Prioritizes memory allocation for active applications, terminating low-priority processes when necessary.

## **FILE SYSTEM**

* **iOS:**
  + Utilizes the Apple File System (APFS), designed for speed, reliability and encryption.
  + APFS supports snapshots, space sharing and metadata integrity.
* **Android:**
  + Uses ext4 as its primary file system, which is robust but less optimized for encryption and metadata management compared to APFS.

## **SECURITY**

* **iOS:**
  + Emphasizes a closed ecosystem with sandboxing and app review processes.
  + Features hardware-based encryption and Face/Touch ID for authentication.
* **Android:**
  + Open-source nature allows flexibility but increases vulnerability.
  + Security mechanisms include app permissions and device encryption, though consistency varies due to fragmentation.

## **SCHEDULING**

* **iOS:**
  + Utilizes priority-based preemptive scheduling optimized for responsiveness.
* **Android:**
  + Employs the Linux kernel’s Completely Fair Scheduler (CFS) for multitasking and real-time processing.

# **CREATIVE ANALOGY: “OPERATING SYSTEMS AS CITY PLANNERS”**

* **iOS:**
  + Like a gated community with strict rules, offering uniformity and security.
  + Prioritizes user safety and smooth experience over flexibility.
* **Android:**
  + Resembles an open city with diverse architecture, offering freedom but sometimes resulting in inconsistency.
  + Users enjoy customization but face security risks.

# **INSIGHTS AND PERSONAL OBSERVATIONS:**

* iOS excels in user experience and security but sacrifices customization.
* Android’s open nature makes it versatile yet vulnerable.

# **CONCLUSION**

This analysis highlights the distinct approaches of iOS and Android to operating system design. Each OS serves different user needs: iOS for security-conscious users and Android for customization enthusiasts. Understanding these differences is crucial for making informed choices in app development and system usage.

# **REFERENCES**

* 1. Research on the brand image of iOS and Android smartphone operating systems. Frontiers in Psychology, 2023.
  2. Preference of Mobile Platforms: A Study of iOS vs Android. International Journal of Modern Agriculture, 2021.

**THE END**