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Comparative Analysis of Android 10 and Android 14 in the Eventeer Application

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***Abstract*— In this era of rapid technological advancement, event management systems have undergone significant transformation towards mobile-based models. One prominent application in this domain is Eventeer, offering features such as in-app chat, event scheduling, learning media, and event feeds for user interaction. This study aims to compare the performance of Android operating system versions 10 and 14 when running the Eventeer application. Performance measurements include memory usage, CPU utilization, and total storage used. Testing was conducted on two virtual devices using Android Studio's Pixel 4 emulator, each running Android 10 and Android 14. Testing was conducted using Android Profiler in Android Studio as the primary performance measurement tool, ensuring accurate and comprehensive data collection. Results indicate that Android 14 exhibits higher memory usage compared to Android 10, while CPU usage tends to be more efficient on Android 14. The application size and storage usage did not show significant differences between the two Android versions. The performance comparison was conducted based on direct measurement results without additional statistical analysis. These findings provide valuable insights for developers and users on how the performance of the Eventeer application may be influenced by the Android OS version used. The study recommends further research encompassing broader test aspects such as battery consumption and network usage. Thus, future research can provide deeper insights into the factors affecting the performance of Android operating systems on mobile applications like Eventeer.**

Keywords*—*event management system; operation system; android; eventeer

I. Introduction

In the fast-growing era of technology, Science and Technology (S&T) have also advanced significantly [1]. The current development of information technology is accompanied by numerous innovations in the IT sector, one of which is the transition of event management systems from conventional methods to mobile-based systems [2]. With an event management system, users can plan and manage events more effectively and efficiently, whether online or offline. This system helps overcome common issues in manual event management, such as registration, payments, attendance tracking, and reporting [3]. One example of an event management application is Eventeer. Eventeer provides in-app chat features that keep users engaged, an agenda feature for event creation and scheduling, a learning media section with videos and articles, and feeds for posting event-related content. The key benefit of Eventeer is that users can interact with others involved in the same event through its built-in chat feature. Eventeer is available for download on both the App Store and Play Store, making it accessible on iOS and Android platforms.

With the continuous evolution of the Android operating system, changes in system architecture and resource management directly impact application performance. Android introduces new optimizations in each version, affecting aspects such as memory handling, CPU efficiency, and storage allocation. Android 14, for instance, includes improvements in memory allocation and background task management, which could influence how applications like Eventeer utilize system resources. Additionally, changes in power efficiency and caching mechanisms might alter how the application performs in different environments.

Previous studies, such as Tian Lou's research at Eindhoven University of Technology, have measured performance through memory usage as a key indicator of application efficiency. Meanwhile, according to ISO/IEC 25010:2011, performance efficiency is commonly evaluated based on three variables: memory usage, CPU utilization, and execution time [4]. These indicators provide a comprehensive view of how an application interacts with different system environments. This research aims to compare the performance of Android versions 10 and 14 when running the Eventeer application. Recommended testing tools include Android Profiler, Systrace, and third-party applications like CPU-Z. This study utilizes Android Profiler, as it covers all necessary measurement aspects, including memory usage, CPU performance, and total storage consumption for the Eventeer application.

The findings of this research provide practical benefits for application developers by offering insights into the impact of different Android OS versions on application performance. By understanding how memory usage, CPU efficiency, and storage allocation vary between Android 10 and 14, developers can optimize their applications to improve efficiency and user experience. By leveraging these insights, developers can refine their applications to be more responsive, reduce lag, and ensure compatibility with the latest operating systems.

II. Literature Review

The literature review phase involves gathering, reading, and understanding research references from journals, books, and websites related to technology adoption and career center applications.

A. Android

Android is a mobile operating system that has grown alongside other platforms such as Windows Mobile, iOS, and Symbian. However, modern operating systems primarily focus on native applications without considering third-party applications, which are substantial in number [7]. As of May 2017, Android had more than 2 billion active users worldwide. It has a vast community of developers, primarily using Java and Kotlin, which enhances device capabilities [8].

Android, as a next-generation mobile platform, provides developers with the opportunity to build applications tailored to their needs. The operating system is based on the Copyleft GNU General Public License Version 2 (GPLv2). Although various development tools are available, most developers prefer Eclipse as their Integrated Development Environment (IDE) [9].

B. Android Studio

Android Studio is the official Integrated Development Environment (IDE) for Android application development, based on IntelliJ IDEA [10]. In addition to IntelliJ's powerful code editor and developer tools, Android Studio offers numerous features that enhance productivity in Android app development. One of its key features is Android Profiler [11].

Android Profiler is a tool within Android Studio that enables real-time monitoring of an application's CPU, memory, and network usage. Through in-depth analysis, developers can identify bottlenecks, resolve performance issues, and enhance application quality. This tool helps reduce latency and optimize resource utilization to provide a better user experience [12].

III. Conceptual Research

This study follows a structured methodology involving direct testing of the Eventeer application using Android Profiler in Android Studio. The research process is visualized in the following figure:

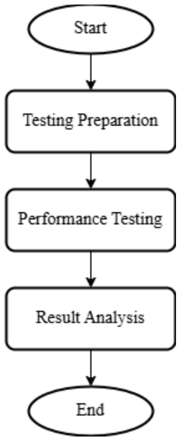

Fig. 1. Research Procedure

According to Fig 1, this research begins with preparing the tools and materials, including Android Studio software and the Eventeer application. The next step is to conduct testing on the Eventeer application using Android Profiler. At this stage, the author records the test results in the form of execution time, memory usage, CPU usage, and total storage used by the application. In the final stage, the author analyzes the recorded aspects in a comparison between operating systems.

A. Testing Device Specifications

The specifications of the emulator used for testing are as listed in the table below.

TABLE I. First Device Specifications

No	Device Type	Specification
1	Smartphone	Pixel 4
2	Processor	Qualcomm SDM855 Snapdragon 855 (8-core)
3	RAM	2GB
4	Storage	8GB
5	OS	Android Q Android 10 (API Level 30)

Table I shows that the emulator used in Android Studio is Pixel 4 with Android 10 as the operating system.

TABLE II. Second Device Specifications

No	Device Type	Specification
1	Smartphone	Pixel 4
2	Processor	Qualcomm SDM855 Snapdragon 855 (8-core)
3	RAM	2GB
4	Storage	8GB
5	Operating System	UpsideDownCake Android 14 (API Level 34)

Table II shows that the emulator used in Android Studio is Pixel 4 with Android 14 as the operating system.

B. *Software Specifications*

The software specifications used for testing are as listed in the table below.

TABLE III. SECOND DEVICE SPECIFICATIONS

No.	Software	Versi
1	Android Studio	Hedgehog 2022.3.1 Patch 1
2	Eventeer	1.6.86

Table III shows that the software used as the testing tool is Android Studio version 2022, while the application being tested is Eventeer version 1.

C. *Data Analysis Method*

The collected data was analyzed using a comparative approach, where performance metrics such as memory usage, CPU utilization, and storage consumption were measured and compared between Android 10 and Android 14. Descriptive statistical analysis, including mean and percentage differences, was applied to quantify performance variations across the two operating systems. The results were visualized using bar charts to provide a clearer comparison of performance efficiency.

IV. RESULT AND DISCUSSION

The results and discussion presented in this article include the testing scenarios conducted, the performance outcomes of these scenarios on both operating systems, and a comparative visualization of the test results for the Eventeer application across different operating systems.

A. *Testing Scenarios*

The testing scenarios were based on the Minimum Viable Product (MVP) features of the Eventeer application. The authors executed several scenarios within the application to obtain realistic performance data. After defining the scenarios, tests were conducted on two different operating systems. The scenarios tested are as follows:

- Sending a new chat message
- Reacting to a chat message
- Deleting a chat message
- Opening the participant list menu
- Opening the feeds menu
- Opening the profile menu
- Editing the profile

B. *Test Results*

After executing all scenarios, the test results were recorded in the following tables:

TABLE IV. MEMORY USAGE TEST ON ANDROID 10

No.	Scenario	Memory Usage
1	Sending a new chat	612 MB
2	Reacting to a chat	580 MB
3	Deleting a chat	590 MB
4	Opening participant list	609 MB
5	Opening feeds menu	600 MB
6	Opening profile menu	594 MB
7	Editing profile	620 MB

Table IV shows the memory usage recorded on an emulator running Android 10 for each defined test scenario.

TABLE V. CPU USAGE TEST ON ANDROID 10

No.	Scenario	CPU Usage
1	Sending a new chat	203%
2	Reacting to a chat	179%
3	Deleting a chat	188%
4	Opening participant list	197%
5	Opening feeds menu	194%
6	Opening profile menu	183%
7	Editing profile	185%

Table V displays the CPU usage recorded on an emulator running Android 10 for each test scenario.

TABLE VI. AVERAGE PERFORMANCE RESULTS ON ANDROID 10

Average Performance of the Eventeer					
Execution Time	Memory	CPU Usage	App Size	Data Left	Cache
275 sec	600 MB	190%	140 MB	24.87 MB	48.55 MB

The testing results for the Eventeer application on Android 10 are summarized in Table VI. The application completed its execution in 275 seconds, which is roughly 4.5 minutes. During this time, it utilized 600 MB of RAM and achieved a CPU usage of 190%. The application itself occupies 140 MB of storage. Upon running, Eventeer generates residual data of 24.87 MB and a cache of 48.55 MB.

TABLE VII. MEMORY USAGE TEST ON ANDROID 14

No.	Scenario	Memory Usage
1	Sending a new chat	800 MB
2	Reacting to a chat	765 MB

No.	Scenario	Memory Usage
3	Deleting a chat	779 MB
4	Opening participant list	790 MB
5	Opening feeds menu	790 MB
6	Opening profile menu	760 MB
7	Editing profile	785 MB

Table VII presents memory usage recorded for each test scenario on an emulator running Android 14.

TABLE VIII. MEMORY USAGE TEST ON ANDROID 14

No.	Scenario	CPU Usage
1	Sending a new chat	189%
2	Reacting to a chat	177%
3	Deleting a chat	180%
4	Opening participant list	185%
5	Opening feeds menu	181%
6	Opening profile menu	179%
7	Editing profile	186%

Table VIII records CPU usage per test scenario on Android 14.

TABLE IX. AVERAGE PERFORMANCE RESULTS ON ANDROID 14

Average Performance of the Eventeer					
Execution Time	**Memory**	**CPU Usage**	**App Size**	**Data Left**	**Cache**
275 sec	781 MB	183%	141 MB	25.02 MB	36.97 MB

Table IX summarizes the performance of Eventeer on Android 14 based on the same test scenarios. The execution time remained 275 seconds. However, memory usage increased to 781 MB, while CPU utilization was slightly lower at 183%. The application size was 141 MB, with 25.02 MB of data left and 36.97 MB of cache generated.

C. *Visualization of Test Results*

The comparative results are illustrated using bar charts to facilitate easy comparison between operating system.

1. *Memory Usage*
   The results of the testing on the Eventeer application regarding memory usage can be seen in the following graph.

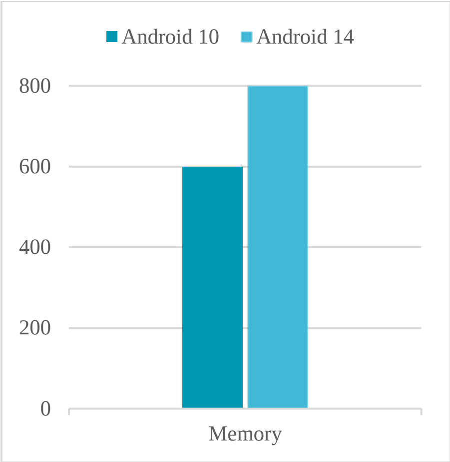

Fig. 2. Memory Usage

As shown in Figure 2, the Eventeer application on Android 14 consumes significantly more memory compared to Android 10. This increase in memory consumption can be attributed to the changes in memory management policies in Android 14. Android 14 introduces enhanced security and background process optimizations, which may cause applications to allocate additional memory for background tasks and security-related functions. Additionally, improvements in rendering and UI responsiveness in Android 14 contribute to increased memory allocation as the system prioritizes smoother animations and faster UI interactions.

2. *CPU Usage*
   The results of the testing on the Eventeer application regarding CPU usage can be seen in the following graph.

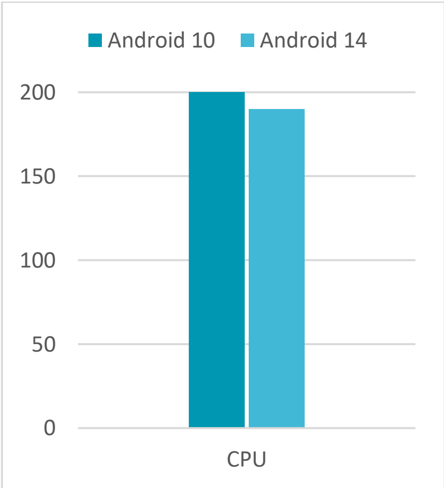

Fig. 3. CPU Usage

Figure 3 depicts a slight difference in CPU usage, with Eventeer on Android 10 utilizing slightly more CPU power than on Android 14. This reduction in CPU usage on Android 14 is likely due to optimizations in task scheduling and CPU efficiency. Android 14 includes an improved workload balancing mechanism that distributes CPU tasks more effectively, reducing the need for high processing power in certain scenarios. Furthermore, updates in the Android Runtime (ART) in Android 14 enhance the execution efficiency of applications, leading to lower CPU usage without compromising performance.

3. *Storage Usage*

The results of the testing on the Eventeer application regarding storage usage can be seen in the following graph.

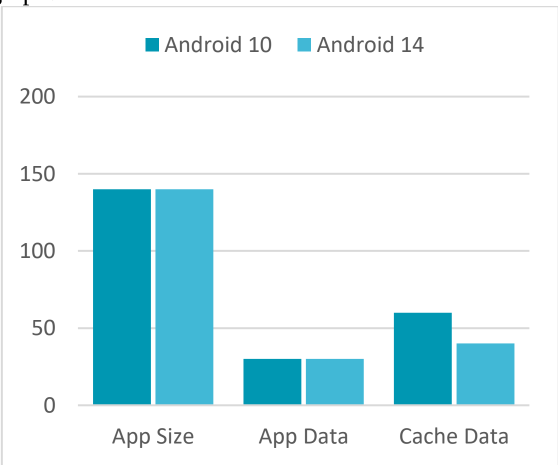

Fig. 4. Storage Usage

According to Figure 4, there is no significant difference in application size and data storage between Android 10 and Android 14. However, a notable difference is observed in cache usage, with Android 10 generating more cache than Android 14. This reduction in cache usage in Android 14 may be attributed to improved data compression algorithms and better cache management policies. Android 14 optimizes how temporary data is stored and retrieved, minimizing unnecessary cache buildup and reducing the overall storage footprint of applications. This improvement helps in maintaining better long-term performance and reducing disk fragmentation issues.

V. Conclusion

Based on the conducted tests for various scenarios and features of the Eventeer application, there are minor differences in resource usage across operating systems. On Android 10, memory usage was 600 MB, which is 23.18% lower than Android 14. This constitutes the most significant difference observed in the test results. Additionally, CPU usage on Android 14 was 7% lower than on Android 10.

Regarding storage usage, there were no major differences in application size or data stored. Android 14 left behind 25.02 MB of data, 0.6% more than Android 10. However, Android 14 occupied 1 MB more storage space overall. The most noticeable contrast was in cache usage, where Eventeer on Android 14 generated 23.85% less cache data compared to Android 10

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