VIRTUAL SMARTPHONE

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Abstract

With the increasing number of Smartphone users and a plethora of mobile applications available, users expect their Smartphones to function like a PC. In this study, we introduce the Virtual Smartphone over IP system, which enables users to create personalized virtual Smartphone images on the cloud. Our proposed platform, ViSP, is cloud-based and employs virtualization technology to provide users with cloud-deployed virtual smartphones. Compared to mobile devices, desktops and laptops are more potent in terms of hardware capabilities. Furthermore, the varying hardware features of each mobile device significantly affect how users interact with their Smartphones.

Keyword: *Virtualization, Android, Remote Display, Cloud Computing, Zlib Encoding***.**

1. INTRODUCTION

Lately, keen glasses have been delivered into the market. Savvy glasses are outfitted with a With the increase in the number of mobile applications and smartphone users, several issues such as battery life, storage space, and CPU power have become more prevalent. To address these issues, this study proposes the Cloud-Based Virtual Smartphone, which is a cloud-based platform that employs virtualization technology to provide users with virtual smartphone images. This not only enhances the functionality of the battery and storage potential but also offers several benefits such as improved computer capabilities and the avoidance of potentially harmful local network apps.

As smartphones continue to replace traditional computers, developers must take into account their hardware limitations, including CPU, memory, storage, and battery. While new applications can help overcome these constraints, they often require significant energy to run. Cloud computing provides a solution by offloading the computational workload to remote

servers, reducing the energy consumption of the smartphone. Additionally, cloud computing offers hardware independence, increasing the scalability of smartphones and eliminating the need for frequent hardware updates.

This paper argues for the importance of researching end-to-end computing processes from smartphones to servers, including investigating offloading scenarios to determine its superiority. Accessing cloud computing via Wi-Fi or cellular data can be used on smartphones, with the latter being the most commonly used form of communication. While many scientists believe that offloading tasks to the cloud can improve computation and storage performance while lowering battery consumption, no study has been done on cloud computing using cellular data.

2. LITERATURE REVIEW

- The focus of our literature review is on cloud computing and cloud-based services, with an aim to design mobile applications that improve users' access to their cloud-based applications and enhance their calculations. Our primary concerns are reducing memory usage and battery consumption.
- We are currently developing Android applications that can be utilized and stored online. Our proposed approach is distinct from MobiDesk and DeskPod, which are both focused on delivering PC software to mobile users. MobiDesk is a mobile virtual desktop hosting architecture designed by R.A. Baratto and S. Potter, while DeskPod by S. Potter and J. Nieh is a MobiDesk upgrade that emphasizes dependability challenges.
- The article titled "MobiDesk: a mobile virtual desktop hosting architecture" by Baratto and Potter (2009) presents a new architecture called MobiDesk for hosting virtual desktops on mobile devices. The authors argue that this architecture can solve some of the issues with existing mobile virtualization technologies, such as poor performance and lack of compatibility with legacy applications. The article provides a detailed description of the MobiDesk architecture and discusses its benefits and limitations. The paper was presented at the 4th ACM workshop on Mobile cloud computing and services and its proceedings were published with page numbers 49-54.
- Potter and Nieh's (2012) paper titled "DeskPod: Dependability challenges in delivering virtual desktops to mobile devices" explores the challenges and issues related to

providing virtual desktops to mobile devices. They identify and analyze the difficulties related to delivering a reliable and high-performance virtual desktop experience to mobile users, including network latency, battery life, connectivity, and security. The authors also proposed DeskPod, a system that addresses these issues and improves the dependability of virtual desktop delivery. They also explore the impact of these challenges on dependability, such as how system failures can impact user productivity. The article appears in IEEE Transactions on Mobile Computing.

- Our proposed approach, the Cloud-Based Virtual Smartphone, is more relevant to the current study as it focuses on leveraging the efficiency of mobile applications to allow mobile users to remotely access virtual machine images. By utilizing cloud-based services and virtualization technology, our approach offers several benefits, including improved computer capabilities, increased scalability of smartphones, and the avoidance of potentially harmful local network apps.

3. PROBLEM DEFINITION

Frustration and negative perception:

The Virtual Smartphone system is a hybrid system that combines a mobile app with a cloud-based backend. As technology and automation continue to advance, systems with large amounts of data often experience performance issues due to the high volume of referenced APIs and databases. This can lead to user frustration and a negative perception of the system, whether it is a mobile app or web-based software.

To address these performance problems and reduce the load on the client machine, a two-phase execution system should be implemented. The Virtual Smartphone system is designed to perform functions on the client end while processing the database and reference APIs on the backend server. The hybrid architecture of the Virtual Smartphone system allows for efficient use of resources by leveraging the power of both the mobile device and the cloud server. This approach can enhance the user experience and increase the scalability and availability of the system.

4. OBJECTIVE

- The primary goal of the proposed technology, the Virtual Smartphone, is to provide users with cloud-deployed virtual smartphones that can be accessed remotely using any device. The virtual smartphone will be cloud-based and employ virtualization technology to provide users with a personalized and seamless mobile experience. This technology addresses the hardware limitations of mobile devices, such as battery life, storage space, and CPU power, by offloading the computational workload to remote servers.
- Furthermore, the objective of the Virtual Smartphone is to enable more interactive and tangible communication between users and their digital devices through gesture-based interaction. Gesture-based interaction refers to the ability to control and interact with the virtual smartphone using hand gestures, providing users with a more natural and intuitive way of controlling their virtual device. This technology offers data transfer between users and digital devices without any platform dependency, making it more convenient and user-friendly.
- Data transfer in the Virtual Smartphone occurs via two methods:
    - GSM technology enables voice communication between users without the need for a physical cellular phone.
    - Data transfer between users is facilitated through the internet or intranet.

5. RESEARCH METHODOLOGY

- The study focuses on addressing the challenges of battery consumption and processing resources in smartphones. To achieve this goal, we propose the use of the Secure Virtual Mobile Platform, an open-source cloud-based virtual platform for smartphones. This platform allows users to access a virtual smartphone running commercial apps remotely using their own phone as a terminal. In this way, sensitive data and apps can be safely stored on virtual devices, which are securely operated in a data center.
- The Secure Virtual Mobile Platform addresses the challenges of battery consumption and processing resources in smartphones by offloading computational tasks to remote servers, reducing the energy consumption of the smartphone. By leveraging the cloud-based architecture, our proposed approach allows for increased scalability and reduced hardware dependencies, enabling the platform to run on a variety of devices without the

need for frequent hardware upgrades.

- Our main priorities are to reduce memory usage and battery consumption, which we plan to achieve by developing Android applications that operate on the cloud.

6. ANALYSIS FINDINGS

To evaluate the performance of our system, we conducted tests in different network settings. The server we used was equipped with a 3.1GHz Intel Core i5 -3450 CPU and 8GB of system memory, while the client app ran on an LG Nexus 5. We simulated an Android 5.1 OS on our customized Android emulator with a resolution of 320x480 pixels.

The figures below show the CPU usage of the server during the tests. The average CPU usage on one core was 29.25 percent, which suggests that a quad-core CPU like the one we used can support up to 10 virtual Android devices on a single server.

Our study demonstrates that running a virtual Android device on a server can significantly reduce the CPU load on a physical device. By using a server with a more powerful CPU than a mobile device, all apps can be run seamlessly. However, the cost of bandwidth must be considered since screen reconstruction needs to be transmitted over the Internet. Clients may be using 3G or 4G, which can result in additional charges based on the amount of data consumed.

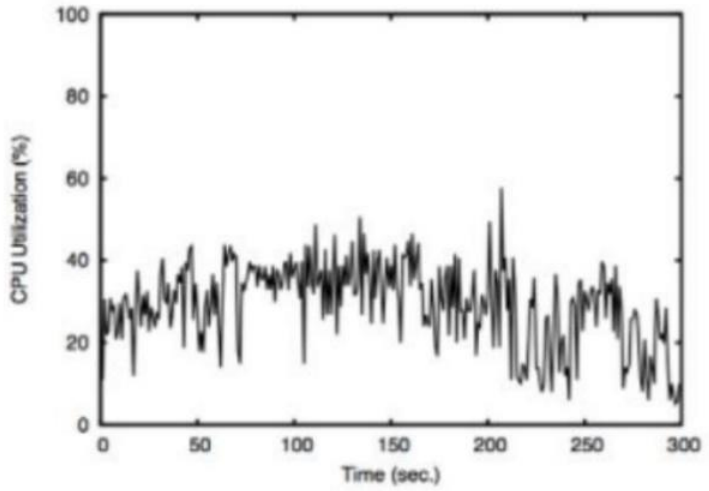

Figure 1: CPU Utilization

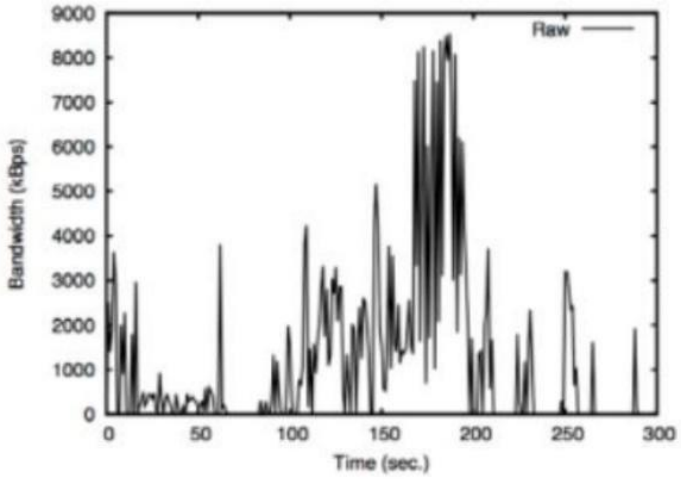

Figure 2: Bandwidth

7. LIMITATION

The study limitations suggest the necessity for additional research into enhancing hand gestures. We aim to include support for multi-touch and sensors to optimize the functionality of physical devices. In addition, migrating the server platform to KVM or Xen is desirable due to the innovative features they offer, such as administration APIs and live migration.

8. CONCLUSION

The conclusion of the study highlights the Virtual Smartphone as an innovative wearable interface that allows users to interact with digital information in the physical world using natural hand gestures and computer vision technology. It introduces ViSP, a cloud-based platform that enables users to create virtual smartphones in the cloud by utilizing virtualization and client software.

The experiments conducted in the study demonstrate that ViSP can provide a satisfactory user experience with minimal bandwidth requirements, especially when using zlib compression. By accessing sensor readings on physical smartphones, cloud-based mobile applications can enhance the performance of mobile apps without compromising the device's battery life.

However, the conclusion suggests that further research is needed to improve the hand gesture recognition and add multi-touch and sensor support to fully utilize the capabilities of physical devices. Migrating the server platform to KVM or Xen can offer groundbreaking features

like administration APIs and live migration.

Despite the limitations, ViSP has great potential for enabling users to remotely execute their programs on virtual smartphones hosted in the cloud. This can provide several benefits, such as reducing the hardware and software costs associated with traditional smartphones and increasing the accessibility of digital information. Overall, the study suggests that the Virtual Smartphone and ViSP can be a significant step towards more efficient and accessible computing.

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