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Cloud Computing on Smartphone

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Abstract
Cloud computing is the most recent technology for data storage & access. Cloud computing includes specific space on the server, the data can be accessed from or stored on the cloud. Cloud computing results into the high speed data accessed capability. Now a days, Every organization have their own cloud where the data is stored related to their work and whenever required it is accessed. Cloud computing is the platform as a service, key players in this sector is Google, Amazon and Microsoft. Smartphone's and tablets have another growing market so these two technologies combined to form the new concept that is the Smartphone application will access the cloud. The platform evaluated which are suitable for the Smartphone devices is Amazon Web Services. These services allow features like Compute, Database & Storage.
Keywords—cloud computing, Smartphones,Android,Amazon.

I. Introduction

The project is an application of cloud computing for mobile phones. Smartphone capabilities are ever increasing and cloud computing has already succeeded in web based application. The next step is definitely towards the adoption of cloud computing principles on Smartphone/tablet area. The aim of the project is to create an interface for existing cloud computing infrastructures (like Amazon Web Services or Windows Azure) for easy usage in smart phones. This will open a platform for deploying and running applications for the mobile phones directly on the cloud which can be accessed from a smartphone with high speed connectivity. The project tries to implement a novel way of interacting with the cloud using the APIs provided by Amazon Web Services. First step in the project is to start and run virtual instances of operating systems like Linux/windows server and communicating to it through a secured shell. This will be a proof of concept of that we can load and run an operating system in the cloud without using a desktop pc and install applications just like we can run application in a desktop OS.

II. Literature Review

In this paper, we have covered several representative mobile cloud approaches. Much other related work exist, but the purpose of this paper is to give an overview of the wide spectrum of mobile cloud computing possibilities. None of the existing approaches meets completely the requirements of mobile clouds. Native (offline) and Web (online) applications are the two extremes of mobile applications.Therefore, we believe that the full potential of mobile cloud applications lies in between these two extremes, while dynamically shifting the responsibilities between mobile device and cloud.The offloading can happen to some remote data center, nearby computer or cluster of computers, or even to nearby mobile devices Mobile cloud computing will be a source of challenging research problems in information and communication technology for many years to come. Solving this problem will require interdisciplinary research from systems, networks, and HCI.

Several researchers, [10]–[12], have identified the fundamental challenges in mobile computing. Mobile computing environments are characterized by severe resources constraints and frequent changes in operating conditions. Mobile devices inherently have and will continue to have limited resources as processing power, memory capacity, display size, and input forms. These have been the forming factors of existing mobile application approaches.

A. Offline Applications:

Most of the applications available for modern mobile devices fall into this category. They act as fat client that processes the presentation and business logic layer locally on mobile devices with data downloaded from backend systems. There is periodical synchronization between the client and backend system. A fat client is a networked application with most resources available locally, rather than distributed over a network as is the case with a thin client.

B. Online Applications :

An online application assumes that the connection between mobile devices and backend systems is available most of the time. Smart phones are popular due to the power and utility of their applications, but there are problems such as cross-platform issues. Here Web technologies can overcome them; applications based on Web

technology are a powerful alternative to native applications. Mobile have the potential to overcome some of the disadvantages of offline applications because they are:

-multi-platform to device's features such as camera or motion detection.

-difficulties in handling complex scenarios that require keeping communication session a over longer period of time.

C. Issues with Offline and Online Mobile Applications :

Current applications are statically partitioned, i.e. most of the execution happens on the device or on backend systems. However, mobile clients could face wide variations and rapid changes in network conditions and local resource availability when accessing remote data and services. As a result, one partitioning model does not satisfy all application types and devices. In other words, the computation of clients and cloud has to be adaptive in response to the changes in mobile environments [13].

III. Problem Formulation

There are cloud applications which use most of the storage aspects of cloud computing infrastructures. E.g. DropBox, Google Drive and iCloud. These applications use the cloud as a storage device. On the other hand there are some applications which allow using the cloud for running specific application, which are designed by the vendors for doing specific things like word processing (Google docs) or image manipulation (Pixlr.com). But this as well doesn't allow users to run applications of their own choice.

- **Implementation**

The project is implemented in Android platform as it is java based platform as well easy to develop apps. The cloud infrastructure is adopted from Amazon Web Services. Amazon Web Services allow running pre-built/as well as customizable virtual machines of operating systems called Instances on their cloud infrastructure. Amazon provides APIs for programmers to use every step of the process through programs written in Java.

The project has three parts:

1. The mobile App: MeghaOS

The project used some of the API as a proof of concept to run prebuilt Linux Instance on the cloud and get status of the running Instance directly on the mobile phone. The application also tries to implement a secure shell to interact with the running Linux instance through a SSH (Secure Shell) for installing, configuring and running a web server in the cloud as well as a web application which can install other web applications from the phone by uploading them through the installed web application.

2. The web application : CloudApp installer:

This is a simple web application that can be loaded from the MeghaOS and which will allow simple HTML based apps to the web server running in the launched AWS Instance.

3. The Sample cloud app:

A sample HTML5 based game to be installed on the cloud using the MeghaOS and CloudApp installer.

IV. Proposed Methodology

The proposed system does a new way of using smartphones. One limitation of smartphone is that most of the application running on desktops can not be run on mobile devices. Different apps need to be installed for different needs and these apps are limited in functionality compared to its desktop equivalent. This is due to the limitation of hardware capabilities of mobile devices at the moment. The proposed application will help bridge gaps between desktop applications and mobile devices by running desktop applications in the cloud and delivering the user interface directly to the mobile device.

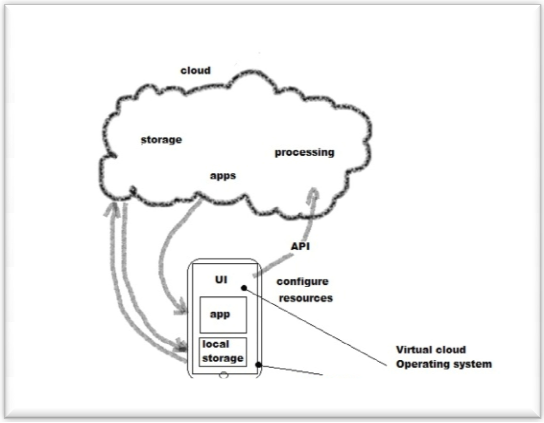

Fig. Mobile cloud Approach with parallel storage

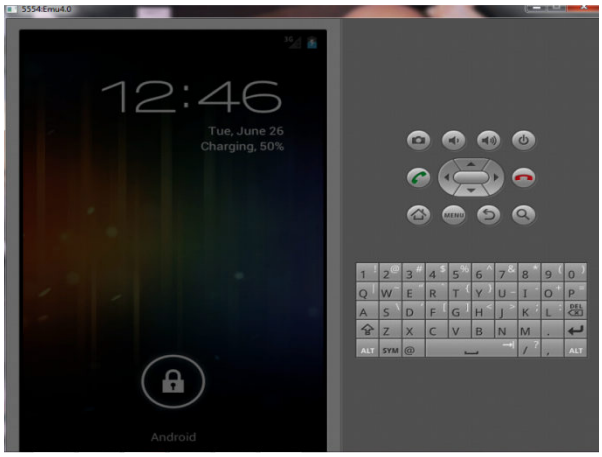

Fig. Screenshot 1

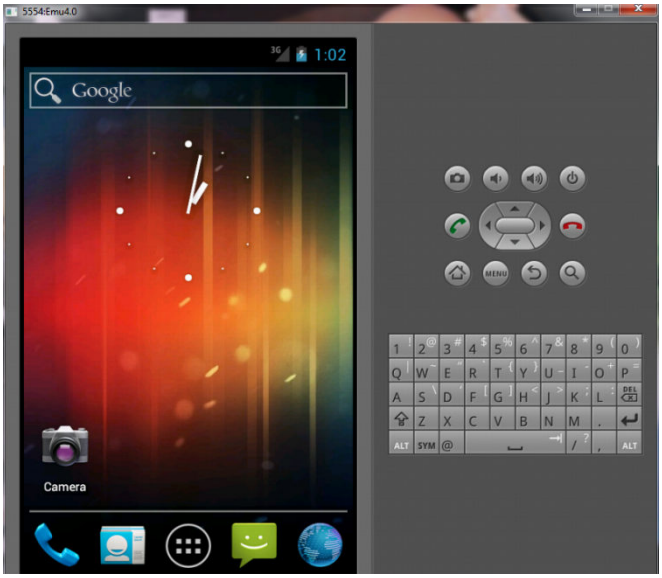

Fig. Screenshot 2

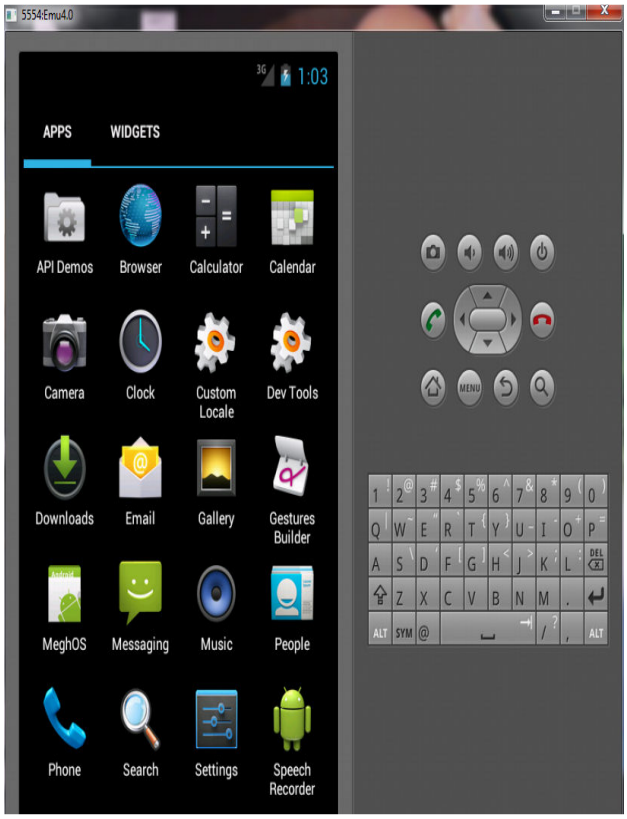

Fig.Screenshot 3

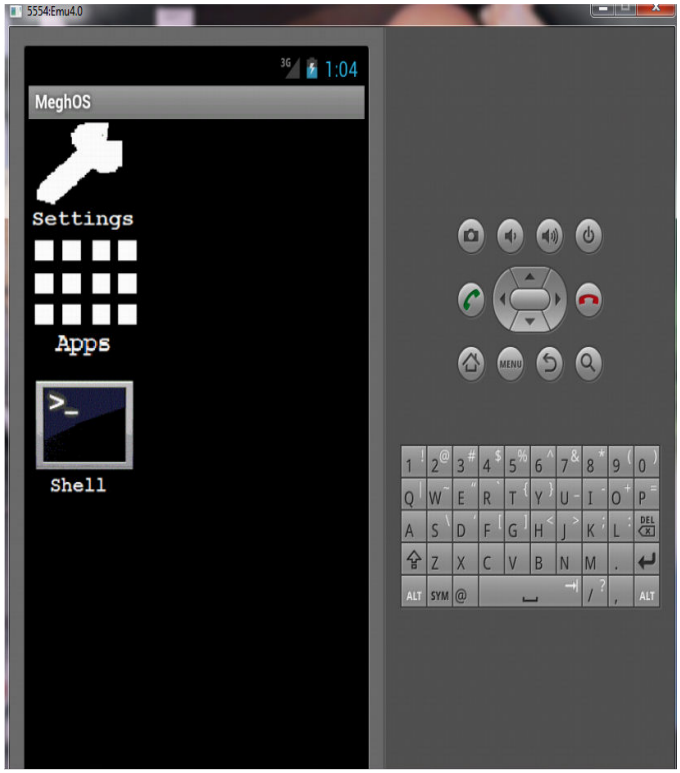

Fig. Screenshot 4

V. **Future of Mobile Computing**

1. Devices will integrate each others technology
   Examples:
   -PDA Cell Phone
   -Cell Phones working with WLAN's
   -Cell Phones with MP3 players
2. Wired devices thing of the past
   -Land lines
3. Android app development

VI. Conclusion

In this paper, we have covered several representative mobile cloud approaches. Much other related work exist, but the purpose of this paper is to give an overview of the wide spectrum of mobile cloud computing possibilities. None of the existing approaches meets completely the requirements of mobile clouds. Native (offline) and Web (online) applications are the two extremes of mobile applications. The former type is using capabilities of mobile devices, but the integration with the cloud is poor. The latter type lacks from insufficient usage of mobile device sensors and available device computing resources while suffering from interactivity issues. Therefore, we believe that the full potential of mobile cloud applications lies in between these two extremes, while dynamically shifting the responsibilities between mobile device and cloud.

Result & Discussion

The implementation is partial due to time limitation and lack of prior experience in the platforms.

- **MeghaOS**:

A status checking of the running instance is implemented which proves that the APIs can be used in a mobile app. Some experiments are done using java desktop applications, which can be ported to the mobile on availability of more time.

- **The CloudApp installer:**

Fully implemented and tested for proof of concept. And can be used from a desktop. From mobile phone is not yet tested.

- **The Sample web Application:**

This is a test application using open source HTML5 based game application tested on both desktop and mobile phone.

➢ **Comparison between existing systems**

Application name	Application area	Mobile integration	Cloud storage	Cloud computation	User can install their own applications	Desktop integration
DropBox	Storing and synchronization of files between cloud connected devices	Yes	Yes	No	No	Yes
Google Drive/	Editing, Storing and synchronization of documents and files between cloud connected devices	Yes	Yes	Yes	No	Yes
iCloud	Storing and synchronization of files between cloud connected devices	yes	Yes	No	No	Yes
Proposed Application: MeghaOS	Running apps in the cloud	Yes	Yes	Yes	Yes	Not implemented, but possible

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