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Optimization of Mobile Applications and Features through Cloud Computing

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ABSTRACT: MCC refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. Good examples of mobile cloud computing applications are Gmail, Google Maps, and navigation apps. But the majority of applications today provide most of the data storage and processing on the mobile devices themselves and not in the cloud. Mobile cloud computing is becoming popular world wide. According to the latest study from Juniper Research, mobile cloud computing subscribers are expected to grow exponentially in the next five years. Several academic and industrial research groups in Mobile cloud computing have been growing since last few years smart phones set to become the fastest spreading technology. Smart phones support wide application range like augmented reality, face detection, image processing and speech recognition, they are resource dependent devices with limited computation power and energy. The increasing use of mobile computing devices such as smart phone and tablets for business is making demand on IT to provide business executives with access to apps, storage and services on a variety of devices, whenever and wherever these services are needed. Cloud-based options are quick and cost-effective option while relating it with other methods for delivering business applications and services to mobile users. MCC integrates the cloud computing into the mobile environment and overcomes obstacles related to the performance which includes "battery life, storage and bandwidth" environment which comprises of "heterogeneity, scalability, and availability" and security deals in "reliability and privacy". The emphasis is to improve and optimize the performance and fault tolerance characteristics of mobile applications by method which includes replicating the resources or computation on cloud platform at back end dynamic off loader. The cloud computing technology provides unlimited dynamic resources for computation, storage, and service provision by virtual implementation. Researchers extending cloud computing services to mobile devices which will definitely overcome the smart phones limitations. The challenge in doing so is that the old smart phone application models are not compatible with the development of applications that can incorporate cloud computing features and requires specialized mobile cloud application models. This article presents mobile cloud architecture, offloading decision affecting entities, application models classification, the latest mobile cloud application models, their critical analysis and future research directions. This module shows the application's performance when run locally on the mobile and application's performance when it runs on the cloud cluster. So, this paper has reviewed the concept of enhancing mobile applications through cloud computing in addition with its advantages, applications in the network.

Keywords: Mobile cloud computing, security, Technology.

I. INTRODUCTION

In late years, cell phone gadgets have an extensive variety of capacities, for example, GPS (Global Positioning System), Wi-Fi, cameras, colossal capacity and quick processors. In this manner, designer's pattern to construct complex applications, for example, enlarged reality, face location, picture handling and discourse acknowledgment; likewise smart phones clients can play diversions, transfer recordings, deal with their own human services and check financial balance. Every one of these applications requires all the more memory and vitality of battery. Even if all the specified abilities of smart phones, battery life still the essential bottleneck for Smartphone gadgets to run these applications [1, 2].

There are three fundamental methodologies which are utilized to take care of this issue:

1) Upgrade Battery innovation utilizing transistors: Although transistors are littler and expend less power, battery needs more transistors for supporting better execution. In this manner, power utilization really increments.

2) Avoid squandering vitality: In this approach, framework's parts go rest to spare vitality like diminish the presentation while not utilizing.

3) Computation offloading: It offloads concentrated strategies for versatile applications to run remotely on rich asset, for example, cloud [3].

Cloud computing provides applications and services that run on a distributed network using v common Internet protocols and networking standards. It has been recognized as the next generation computing infrastructure and overcome the limitation of mobile computing. It offers some advantages to the users in terms of computing, storage, services and applications at very affordable price on the internet. Cloud computing enables users to elastically utilize resources in an on-demand fashion.
In this paper, a novel framework of mobile applications and architecture with applications of mobile cloud computing is presented [4].

It was introduced in year 2007 after the launch of the cloud computing. It has been attracting the various entrepreneurs that reduce the development cost and profits high. On the other side, it is defined as the combination of internet with mobile web. MCC provides the utilization of mobile services and storage at clouds.

II. LITERATURE REVIEW

1. Previous Point of View of Researchers

1. Ibrahim A Elgendy, Mohamed El-kawkagy, Arabi Keshk paper "Improving the Performance of Mobile Applications Using Cloud Computing" published in the 9th International Conference on informatics and Systems (INFOS2014). 15-17 December
Parallel and Distributed Computing Track proposed a framework to drastically improve the performance of mobile applications and battery consumption. By this framework, mobile applications can execute remotely on the cloud using intensive methods based on decision that taken by a dynamic off loader module.

2. Hoang T. Dinh, Chonho Lee, Dusit Niyato, and Ping Wang paper "A Survey of Mobile Cloud Computing: Architecture, Applications, and Approaches" published in Accepted in Wireless Communications and Mobile Computing - Wiley surveyed about that Mobile cloud computing is one of mobile technology trends in the future since it combines the advantages of both mobile computing and cloud computing, thereby providing optimal services for mobile users. A recent study by ABI Research, a New York-based firm, shows that more than 240 million businesses in 2015 will use cloud services through mobile devices. By this the revenue of mobile cloud computing is $5.2 billion.

3. Atta Ur Rehman Khan, Mazliza Othman, Sajjad Ahmad Madani, Ieee Member, And Samee Ullah Khan, Ieee Senior Memberpaper "A Survey Of Mobile Cloud Computing Application Models" Published In Ieee Communications Surveys & Tutorials, Vol. 16, No. 1, First Quarter 2014 Surveyed that the developed applications usually support one execution

platform, thus, limiting the offloading of the elements (applications, components, clones) to other platforms. The mobile cloud execution platforms need to be standardized to ease computation offloading to the mobile cloud platforms. Also, new energy consumption models are required to facilitate accurate decision making by considering the main entities involved in the offloading process.

4. Sarmad Sadik, Tayyiba Naeempaper "Optimizing Performance and Fault Tolerance Through
Cloud based Adaptive Replication for Mobile

Application" published in 2014 2nd International Conference on Systems and Informatics (ICSAI 2014) research work, the focus is on the development of efficient middleware which improves and optimize the performance and fault tolerance characteristics of mobile applications. This middleware is designed for managing and transporting the necessary contents of mobile application from mobile phone/Tablets to cloud based platform. The proof of concept application simulates the proposed solution. An android application is also developed which uses this middleware. In this research work the proposed middleware is implemented for specific android based phone. The middleware is designed by using JAVA framework.

III. ARCHITECTURE OF MCC

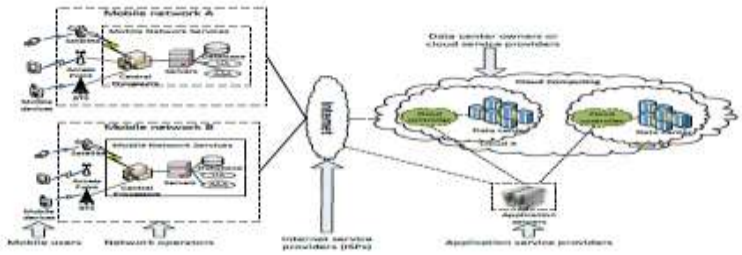

Fig.1: Mobile Cloud Computing Architecture [Wikipedia**]**

Above figure shows the MCC architecture. In MCC, all mobile devices are connected through base stations. Mobile users request is transmitted to central processors then servers provide service accordingly.

Authentication of mobile users is dependent on Home agent stored in db. After that requests gets delivered to cloud via internet. These services are developed with the concepts of utility computing, virtualization, and service-oriented architecture (e.g. web, application, and database servers). There are various cloud services and these are shown below [5, 6, and 7]:

2.1 Iaas Service

Computing services provide computational resources for customers. These services include CPU, random access memory (RAM), and I/O resources. Computing resource pricing options may vary between different providers, but generally pricing options are determined by the amount of computing resources and by overall payment models [8].

On-Demand	Prepaid (reserved)	Spot (auctioned)
$/hours of service	$/year + $/hours of services	$/hours of service

**Pricing options may vary among different providers*

Computing resources are offered as virtual machine instances, whose instance types and assigned prices depend on the combination of CPU, RAM, and I/O capacity. Providers offer a few types of instances, which cover most customer needs and make it easy for customer to choose (i.e., small, medium, large, etc…).
The most popular pricing models are on-demand, prepaid (reserved), and auctioned.

i. On-Demand

These types of instances allow customers to pay hourly service fees without long-term commitments. This pay-as-you-go pricing model is ideal for situations when a company cannot estimate computing resources demand up-front.

ii. Prepaid

With prepaid services, customers pay a fixed amount up-front for a specific commitment period. Normally, you pay lower costs for longer commitment periods because this helps cloud providers to estimate their infrastructure expenses.

iii. Auctioned

The auctioned pricing model enables customers to bid for the computing capacity offered by a cloud provider, with bid price regulated by supply and demand. If your bid meets or exceeds the current bid price, you can access the resources. If your bid is overridden, you give resources back. The costs for auctioned computing resources are significantly lower compared to prepaid and on-demand services; however these resources cannot be used for critical production environments because they can be taken away if a customer loses a bid [9].

i. IaaS: Network

There are two major network services offered by public cloud providers: load balancing and DNS (domain name systems). Detailed technical descriptions are given below:

i. Load balancing

Load balancing provides a single point of access to multiple servers that run behind it. A load balancer is a network device that distributes network traffic among servers using specific load-balancing algorithms.

Pricing: $/hours of service (only when service is used)/month + $/amount of consumed bandwidth (GB) /month
**Pricing options may vary among different providers*

Many different load-balancing algorithms exist, although the most popular include the following:

a) **Round-robin:** even connection distribution across all servers
b) **Weighted round-robin:** connection distribution proportionate to the weight assigned for each server
c) **Dynamic round-robin:** similar to weighted round-robin, but server weight is dynamically determined based on continuous server monitoring
d) **Least connections:** connection is sent to the server with the lowest number of current connections
e) **Fastest:** distributes new connections to a server based on the fastest server-response time [10].

There are several benefits from load balancing: failover – in case of specific server failure, the load balancer will automatically forward network traffic to other servers; performance – because traffic load is distributed between multiple servers, network response time is typically faster; scalability – customers can quickly add servers under the load balancer to increase computational capacity without affecting other network/system components.

b. PaaS Service

Platform as a Service (PaaS) is another service model of cloud computing. In the PaaS models, cloud providers deliver a computing platform, typically including operating system, virtualization stack. The consumer does not manage or control the underlying cloud infrastructure, including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations. The PaaS model brings significant value to companies because it reduces complexity of infrastructure and application maintenance and allows concentrating on core software development competencies. Application developers can develop and run their software solutions on a cloud platform without the cost and Programming language execution environment, database and web server. PaaS can be viewed as another abstraction layer above the hardware, operating system and complexity of buying and managing the underlying hardware and software layers. Most PaaS development services are oriented towards an agile development process; this is not to say that these PaaS services are not applicable to the waterfall method, but companies won't likely realize the same level benefits as with agile methodology. In the PaaS taxonomy, the list of the leading companies in the PaaS space which is shown in below figure. Five major branches of cloud platform services have been identified, and are selectively reviewed: integration, development and QA, data analytics, database, and "general" (providers that offer multiple PaaS services) [11]**.** Examples of PaaS service models are Google App Engine9, which supports the Java and Python the Google App Engine (GAE) service supports Java and Python and it virtualizes applications across multiple servers and data centers. GAE only supports Google specific data storage and database engines. GAE continuously monitors application performance and auto-scales the environment by adding new nodes to the application cluster. All application-related configurations is done using configuration descriptor files, which are packages within the application and can be written in XML or YAML formats. A GAE application descriptor can configure a variety of features and tasks, such as security, job scheduling, task queuing, URL handling, database indexing, and backend server instances. Like previously stated, programs can be written in Java, or other JVM languages such as Groovy, JRuby, Scala, Clojure, Jython, a special version of Quercus, and in Python with Python web frameworks that run on the Google App Engine such as Django, CherryPy, Pylons, web2py and Google's own web app framework.

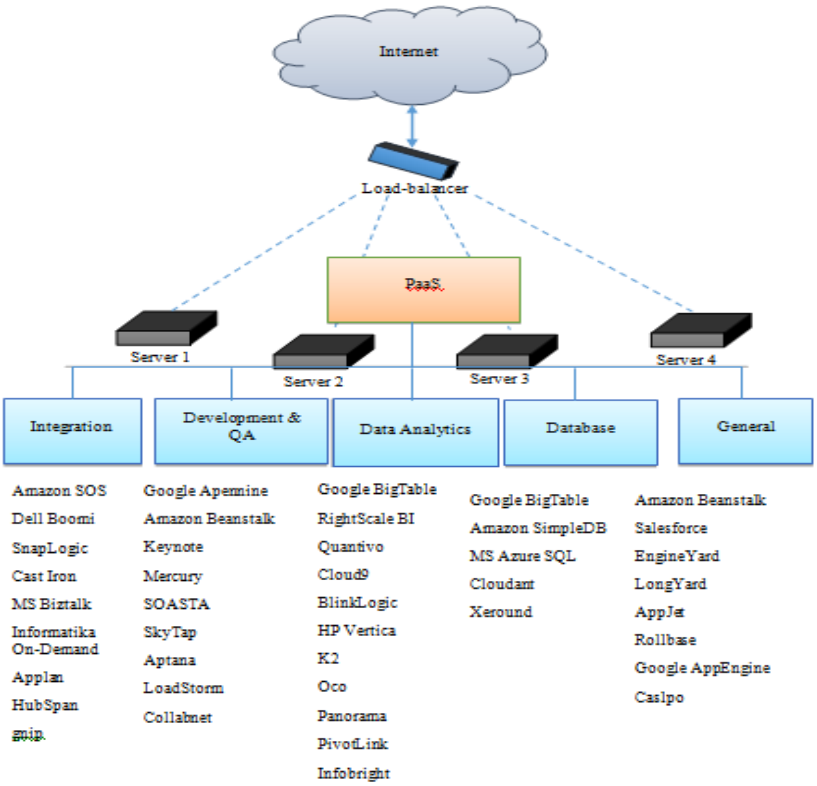

Fig.2: Load Balancing

The complexity of IaaS in comparison to PaaS is a factor also. Users of IaaS services need to know how to work with and configure the underlying operating systems and middleware, and be sure their software is scalable enough. With PaaS this is not a factor and therefore PaaS can be simpler to use in the long run. In

addition to routine infrastructure operations, PaaS also auto-scales infrastructure based on certain application performance conditions. It takes substantial effort and expertise to design such automated scalability internally, while a PaaS platform provides it as part of the service offering [12].

i. PaaS Service Characteristics

Characteristics and components of PaaS include:

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service
- Scalability and auto-provisioning of the underlying infrastructure
- Security and redundancy
- Build and deployment tools for rapid application management and deployment
- Integration with other infrastructure components such as web services, databases, and LDAP
- Logging, reporting, and code instrumentation

2.3 SaaS Service

In the business model using software as a service (SaaS), users are provided access to application software and databases. Cloud providers manage the infrastructure and platforms that run the applications. SaaS is sometimes referred to as "on-demand software" and is usually priced on a pay-per-use basis. SaaS providers generally price applications using a subscription fee. The applications are accessible from various client devices through a thin client interface such as a Web browser (e.g., Web---based e---mail). The consumer does not manage or control the underlying cloud infrastructure, including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user---specific application configuration settings.

In the SaaS model, is a cloud services delivery model that offers an on-demand online software subscription in which cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. Cloud users do not manage the cloud infrastructure and platform where the application runs. This eliminates the need to install and run the application on the cloud user's own computers, which simplifies maintenance and support. Cloud applications are different from other applications in their scalability—which can be achieved by cloning tasks onto multiple virtual machines at run-time to meet changing work demand. Load balancers distribute the work over the set of virtual machines.

This process is transparent to the cloud user, who sees only a single access point. To accommodate a large number of cloud users, cloud applications can be multitenant, that is, any machine serves more than one cloud user organization. The pricing model for SaaS applications is typically a monthly or yearly flat fee per user, so price is scalable and adjustable if users are added or removed at any point.

Therefore, in SaaS taxonomy, we list only selected groups of vendors in a few categories. In this section, we discuss SaaS trends using Salesforce as an example. Salesforce is the largest SaaS Company, with $2.3 billion in revenue for 2012, representing approximately 15% of total SaaS market revenues [13].

IV. ADVANTAGES OF MCC

- Scalability: The deployment of mobile applications can be performed and scaled to meet the unpredictable user demands due to flexible resource provisioning. Service providers can easily add and expand an application and service without or with little constraint on the resource usage.
- Multi-tenancy: Service providers (e.g., network operator and data centre owner) can share the resources and costs to support a variety of applications and large number of users.
- Ease of Integration: Multiple services from different service providers can be integrated easily through the cloud and the Internet to meet the users' demands [14].

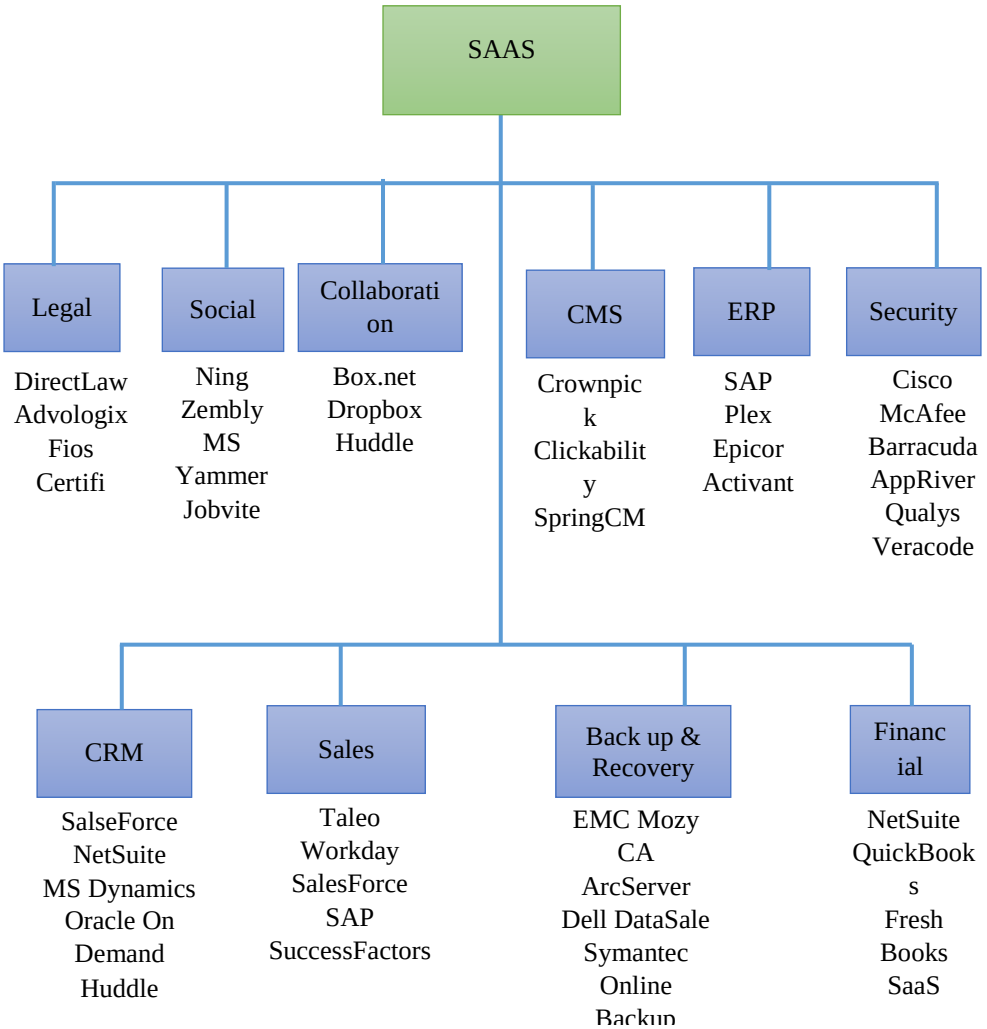

Fig.3: Saas cloud Services in Saas

V. RESEARCH FINDING

In the evaluation certain tasks like Data mining, Job scheduling are performed on both mobile and cloud computing .Then the CPU computation time and
Memory occupied (RAM) are calculated on various severs and mobile devices on various internet speed .We expect that there is a drastic difference in computation time and space when the tasks compute on mobile and cloud servers.

VI. OBJECTIVE

The Main Objective of this Research is to enhance the capabilities of mobile applications and its features through mobile cloud computing. Mobiles are resource-constrained devices with limited computation power and energy. So to increase mobile computing power and reduce its limitation we need a technology to overcome this. The mobile cloud computing can play a big role in this and it can provide mobile users a big platform to enhance its features without spending too much amount for it.

Techniques Apply

The modern mobile computing environment can be created by using simulation tools cloud sim and java technologies (net beans).This will provide a platform independent environment to carry out the results in best possible manner.

Limitations

1. Limited Energy Source Of Mobile Devices

The high end mobile applications consume lot of power. If the application is deployed on cloud then it consumes less power which increases performance

2. Low Bandwidth

The Bandwidth is still a great concern because the number of mobile users and cloud users dramatically increasing and bandwidth not increases in that ratio
which decrease data transfer rate from mobile to cloud.

3. Limited Storage Space

The mobile devices having limited storage capacity which does not allow them to keep huge amount of data.

VII. CONCLUSION

Mobile cloud computing is one of mobile technology trends in the future since it combines the advantages of both mobile computing and cloud computing, thereby providing optimal services for mobile users. According to a recent study by ABI Research, a New York-based firm, more than 240 million businesses will use cloud services through mobile devices by 2015. That traction will push the revenue of mobile cloud computing to $5.2 billion. With this importance, this article has provided an overview of mobile cloud computing in which its definitions, architecture, and advantages have been presented. So, in future we will try to utilize data mining methods for mobile applications in cloud computing .The main outcome can show the results if bandwidth is not our concern the high end application of mobile can easily be computed on cloud computing and we can observe a change in the performance of mobile applications and its features.

REFERENCES

[1]. M. Satyanarayanan, "Mobile computing: the next decade," in Proceedings of the 1st ACM Workshop on Mobile Cloud Computing & Services: Social Networks and Beyond (MCS), June 2010.
[2]. M. Satyanarayanan, "Fundamental challenges in mobile computing," in Proceedings of the 5th annual ACM symposium on Principles of distributed computing, pp. 1-7, May 1996.
[3]. A. Dathathri and J.L. Atangana, "Countering privacy–invasive software (PIS) by end user license agreement analysis," Master Thesis, Computer Science, Thesis no: MCS–2007:20, Department of Interaction and System Design, School of Engineering, Blekinge Institute of Technology (Ronneby, Sweden).
[4]. K.J. Delaney and V. Vara, , "Google plans services to store users' data," Wall Street Journal (27 November), at http://online.wsj.com/article/SB119612660573504716.html?mod=hps_us_whats_news, accessed 27 February 2009.
[5]. Economist, "Where the cloud meets the ground," Economist (23 October), at http://www.economist.com/, accessed 27 February 2009.
[6]. Economist, "Down on the server farm," Economist at http://www.economist.com/, accessed 27 February 2009.
[7]. Economist, "Computers without borders," Economist (23 October), at http://www.economist.com/, accessed 27 February 2009.
[8]. J.Foley, 2008, "Why Google and Microsoft are building data centers in Iowa," Information Week (4 August), athttp://www.informationweek.com/blog/main/archives/2008/08/google_and_micr_1.html, accessed 27 February 2009.
[9]. S. Fox, "Spyware: The threat of unwanted software programs is changing the way people use the Internet," Washington, D.C.: Pew Internet and the American Life Project, at http://www.pewinternet.org, accessed 27 February 2009.
[10]. G. Gilder,"The information factories," Wired, volume 14, number 10, athttp://www.wired.com/wired/archive/14.10/cloudware_pr.html, accessed 27 February 2009.
[11]. R. Gomulkiewicz and M. Williamson, "A brief defense of mass market software license agreements," Rutgers Computer and Technology Law Journal, volume 22, pp. 335–367, 1996.
[12]. G.M. Graff, "Don't know their Yahoo from their YouTube," Washington Post (2 December), p. B01, 2007.
[13]. J.M. Grimes, P.T. Jaeger, and K.R. Fleischmann, "Obfuscatocracy: Contractual frameworks in the governance of virtual worlds," First Monday, volume 13, number 9 (September), at http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2153/2029, accessed 27 February 2009.
[14]. Fernando, Niroshinie; Seng W. Loke; Wenny Rahayu, "Mobile cloud computing: A survey" (PDF). Future Generation Computer Systems 29: 84–106, 2013.