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Energy Efficient Image Data Offload Mobile Cloud Computing

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ABSTRACT: The cloud heralds a new era of computing where application services are provided through the Internet. Cloud computing can enhance the computing capability of mobile systems. Cloud computing is a new paradigm in which computing resources such as processing, memory, and storage are not physically present at the user's location. Instead, a service provider owns and manages these resources, and users access them via the Internet. Amazon Web Services lets users store personal data via its Simple Storage Service and perform computations on stored data. This type of computing provide low initial capital investment, shorter start-up time for new services, lower maintenance and operation costs, higher utilization through virtualization, and easier disaster recovery. Cloud computing can provide energy savings as a service to mobile users, though it also poses some unique challenges. This paper mainly focus on image data offload from mobile to remote server, which then processes image and converts it to appropriate, compatible low resolution image on request by other mobile clients. This conversion reduces mobile device energy consumption rather downloading same high resolution images.

KEYWORDS: Mobile cloud computing; Resource constrained devices; Energy efficient; Decision making algorithm; Image encryption; Image decryption; Resolution.

I. INTRODUCTION

Today, mobile systems, such as smart phones, have become the primary computing platform for many users. Various studies have identified longer battery lifetime as the most desired feature of such systems. Many applications are too computation intensive to perform on a mobile system. If a mobile user wants to use such applications, the computation must be performed in the cloud. Other applications such as image retrieval, voice recognition, gaming, and navigation can run on a mobile system. However, they consume significant amounts of energy. Can offloading these applications to the cloud save energy and extend battery lifetimes for mobile users. Cloud computing can enhance the computing capability of mobile systems, but is it the ultimate solution for extending such systems' battery lifetimes. The Android-SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Java is offered to software developers as the main selection for programming, enriched with software libraries developed by Google. Android is a platform that includes open source operating system, middleware and key applications for use on mobile devices based on the kernel Linux 2.6; in accordance with the principles of platform software design, based on available drives hardware device. One level up, the libraries of the platform are found and the required virtual machine for converting and runtime applications. Thus applications will run in virtual environment, which saves mobile battery life and processing time so the user can utilize the mobile device efficiently.

Most of mobile applications use wireless networks and their bandwidths are orders-of-magnitude lower than wired networks. Meanwhile, increasingly complex programs are running on these systems-for example, video processing on mobile phones and object recognition on mobile robots. Thus there is an increasing gap between the demand for



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complex programs and the availability of limited resources. So the concept computation offloading technique is proposed with the objective to migrate the large computations and complex processing from resource-limited devices (i.e., mobile devices) to resourceful machines (i.e., servers in clouds). This avoids taking a long application execution time on mobile devices which results in large amount of power consumption thereby ensuring system more energy proficient with optimal performance.

II. RELATED WORK

Hoang T. Dinh, Chonho Lee, Dusit Niyato, Ping Wang[1], "A survey of mobile cloud computing", accepted in Wireless communications & mobile computing, Dec-2013 mobile cloud computing integrates the cloud computing into the mobile environment and overcomes obstacles related to the performance and security. Zhibin Zhou and Dijang Huang [2] proposed that security framework for cloud data storage services to secure the image data management in clouds. This paper uses Attribute -Based Encryption to protect user's encrypted data. C Shrivanthi and H S Guruprasad [3] proposed that energy conservation in migration issues, mobile issues, mobile devices, application development platforms and various mobile cloud computing applications. Teofilus Larosa et al [4] proposed and analysed to bring the new concept in constructing mobile cloud computing system. Information exchanging process is presented. Mazedur Rahman , Jerry Gao and Wei-Tek Tsai[6] presented that energy saving strategies and solutions in three perspectives mobile devices, network infrastructures and communications and cloud infrastructure and computing software. Andreas Klein et al[7] proposed that framework for the use of mobile related information for the Heterogenous Access Management provided by the Mobile Cloud Computing has the service for the mobile terminals. A novel min-cost offloading partitioning (MCOP) algorithm that aims at finding the optimal partitioning plan (determine which portions of the application to run on mobile devices and which portions on cloud servers) under different cost models and mobile environments with low time complexity which can significantly reduce execution time and energy consumption by optimally distributing tasks between mobile devices and cloud servers, and in the meantime, it can well adapt to environmental changes[5]. Another example is Image Exchange which utilizes the large storage space in clouds for mobile users [5]. This mobile photo sharing service enables mobile users to upload images to the clouds immediately after capturing. Users may access all images from any devices. With the cloud, the users can save considerable amount of energy and storage space on their mobile devices because all images are sent and processed on the clouds.

III. EXISTING SYSTEM

The existing concept of Mobile Cloud Computation still does the most image oriented processing on mobile devices rather in cloud. Cloud also lacks the capability of identifying the mobile configuration and its image supportive format with respect to image resolution so as to reduce the overall consumption of resource constrained energy on download. Problems in the existing system, two main concerns are mobile cloud computing are limited bandwidth and wireless bandwidth. Energy efficiency is a fundamental consideration for mobile devices. Cloud computing has the potential to save mobile client energy but the savings from offloading the computation need to exceed the energy cost of the additional communication. In the existing system the energy consumption will be more during image processing, and accessing can be done faster in cloud compared to the general existing system

IV. PROPOSED METHOD

In this method, image offload computation is done through same machine. The main focus is on determining whether to offload computation by predicting the relationships among these three factors. The prime analysis indicates that the energy saved by computation offloading depends on the wireless bandwidth B , the amount of computation to be performed C , and the amount of data to be transmitted D . This mobile picture sharing service enables mobile users to upload images to the clouds on user request. Users may access all images from any devices. With the cloud, the users can save considerable amount of energy and storage space on their mobile devices because all images are sent and processed on the clouds as per the mobile device compatibility. In the process image data is well secured through

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standard encryption and decryption algorithms to maintain integrity and security of sensitive data on cloud. The system architecture has been visualized in figure 1, where client server, web server and cloud server relationship is depicted.

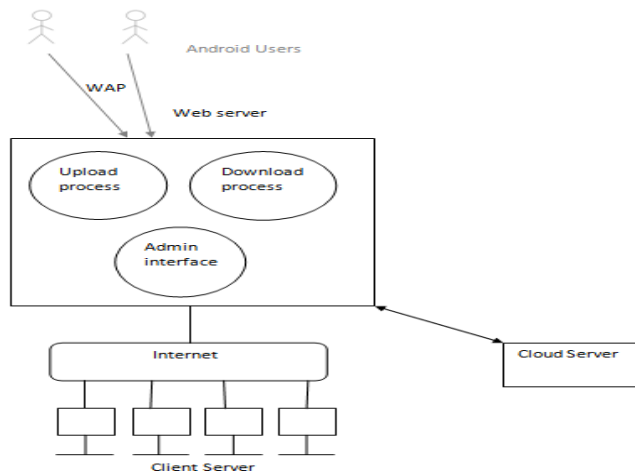


Fig. 1: System architecture

V. PROPOSED SOLUTION

We propose the capability feature to be incorporated in cloud, which can identify the mobile client configuration and its image its image supportive format with respect to image resolution so as to reduce the overall consumption of resource constrained energy on download. In this proposed system, we use two applications namely, J2EE Application (web server) and an Android application (mobile user). Mobile user has to send the file (text, image etc) to J2EE application (web server in cloud), web server will encrypt those file and store into cloud storage. On download, Web server delivers the respective mobile supportive image format to the Mobile client device and displays the same with energy efficiency.

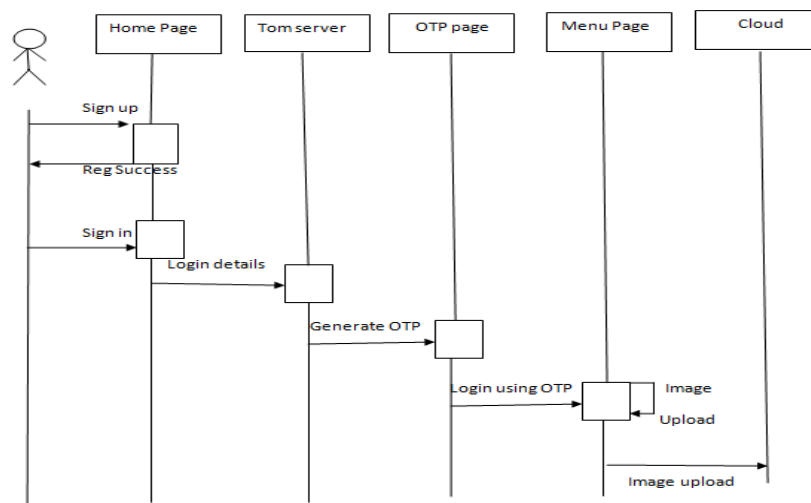


Fig. 2: Sequence Diagram for Image Upload process

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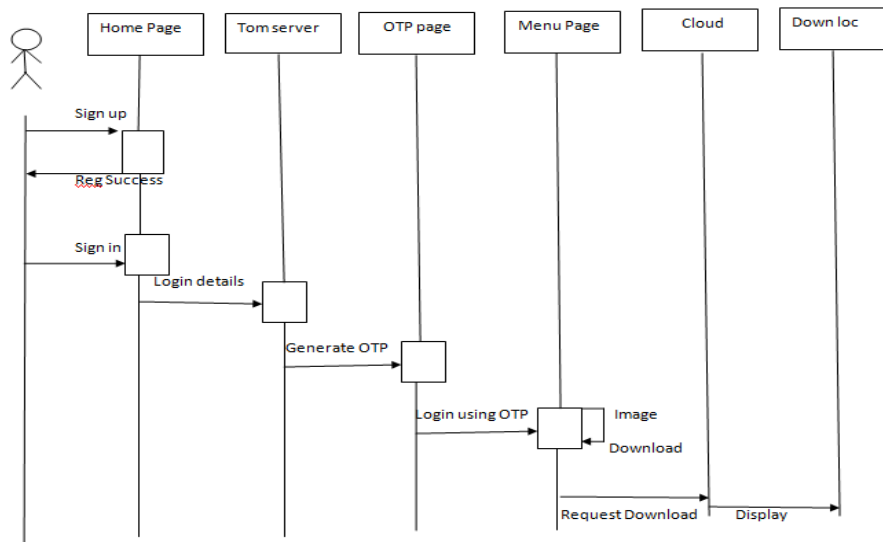


Fig. 3: Sequence Diagram for Image Download process

PROPOSED ALGORITHM: IMAGE OFFLOAD COMPUTATION

Step 1: User signup

If (registration success)

 Login Details

Else

 Registration unsuccessful.

Step 2: Sign into the Home Page.

Step 3: Generate OTP and login using OTP.

Step 4: if Upload is True then Goto Step 5. Else if Dowload is true then Goto Step 6

Step 5: Image uploaded successfully. Goto Step 10.

Step 6: Request to download image from the cloud.

Step 8: Image downloaded from the cloud.

Step 9: Display Image onto the android mobile.

Step 10: End.

VI. RESULT

To demonstrate the energy efficient image data offload mobile cloud computing, this section consists of Home page, User registration, User login, Image upload, Image download. Initially user should click on the android app and then home page will be displayed and then user should register his details and then registered user can login. During login process OTP will be generated and then user will be logged in after entering OTP. User can upload the image from his gallery and then user can download the image.

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The Fig. 4 shows the home page displayed on the Mobile Offload Android app launch, where user can register and login with the credentials received.



Fig. 4: Home Page

The Figure 5 shows user registration form page where user need to fill in details such as username, password, name, gender, city and mobile number to which one time password is sent as a part of user authentication. The Figure 6 shows user login form through which a registered user can sign into the android app with generated OTP to perform desired operations.

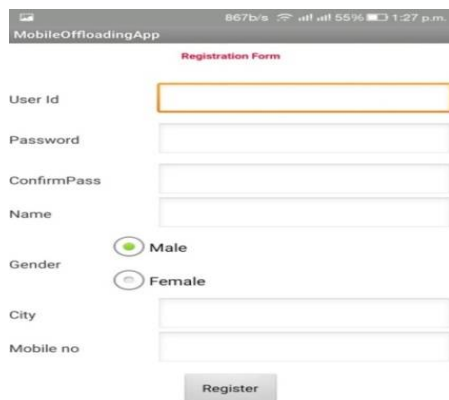


Fig. 5: User Registration form

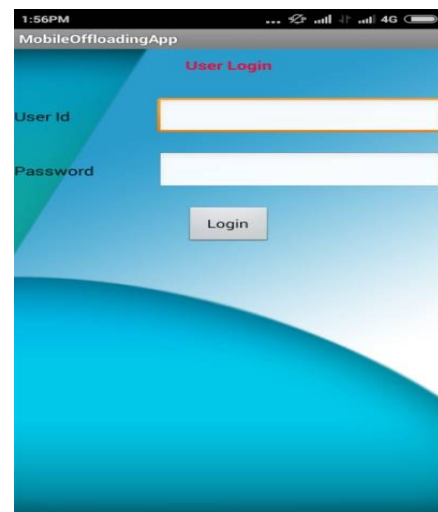


Fig. 6: User login form

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The figure 7 visualizes the image upload process where desired image file can be selected to offload from mobile to cloud (drivehq) which then stores the image data in cloud storage. The figure 8 shows the image download process where a responsible cloud identifies the type of mobile device and deliver the low resolution compatible image to the mobile clients on request.

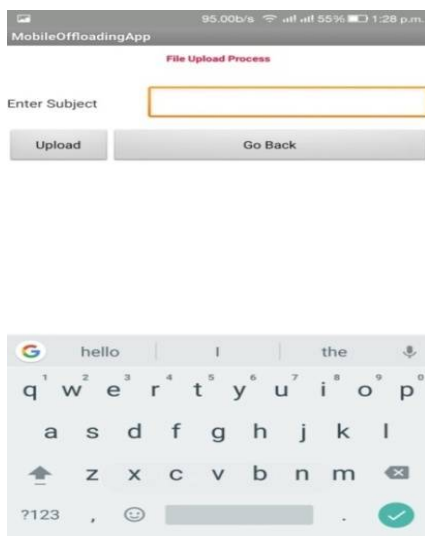


Fig. 7: Image Upload Process page



Fig. 8: Image download process page

VII. CONCLUSION AND FUTURE WORK

Offload cloud computing can potentially save energy for mobile users. However, not all the applications are energy efficient when migrated to cloud. The services should consider the energy overhead for privacy, security, reliability before offloading. We can enhance this project by uploading all types of files so far we have uploaded only image files. By this we can commute more amount of energy in our smart phone. The security features can be made stronger by any decision making algorithm.

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BIOGRAPHY

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Keerthi.G, Manjuladevi P, Masarpu Swathi, Nethravathi are UG scholars studying in Computer Science & engineering, Ballari institute of Technology and Management, Ballari affiliated to VTU, Belagavi. We are keen to discover the new ideas in the field of Mobile cloud computing and take up the research in the relevant field in near future.