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Task Distribution on Cloud Using Smart phones for Image Processing

Supriya S. Rajhans*, Shamal K. Raut, Bhagyashree P. Shitole, Shivkanya M. Barhate, Prof. R. S. Jagtap

Department of Computer Engineering, Zeal College of Engineering and Research Institute, Pune, India

ABSTRACT

Android devices have become a popular and "anywhere, everywhere" computational resource for a wide range of requirements. Due to its 'mobile' nature, it allows people to carry high computational power in their hands where the computational power is comparable against that of a desktop or laptop. This computational power i.e CPU, Storage Memory and RAM of them is almost same like a desktop computer or Laptop in the recent years. However, Android devices were not being used for executing any computation intensive tasks till 2015 extensively. A recent study shows that users keep their Android devices idle for 8 hours on an average in the night time at their home. During this period, the device would be idle for most of the times except that it needs some CPU cycles and memory for download and/or other user requested applications running in the background. This processing power can be utilize for task scheduling. Android devices follows greedy algorithm for scheduling the tasks and faces a unique set of technical challenges due to the heterogeneity in CPU clock speed, variability in network bandwidth, and lower availability than servers. This paper uses a new scheduling algorithm (Linear Programming Algorithm) and we addressed many of these challenges to develop a distributed computing infrastructure using smart phones for task of Image Processing.

Keywords : Distributed System, Mobile Computing, Bootstrapping, Linear Programming, Load Balancing and Image Processing.

I. INTRODUCTION

Every enterprise in the world has the basic need of fast server to work efficiently as well as rapidly. But day by day computational workloads on server in the form of multiple task requests are also increasing. Because of these multiple tasks on cloud server, it works slower and sometimes gets failed. In this present situation distributing or scheduling of tasks on the distributed computing system is the only solution to reduce workload on server. To form the best distributed computing system we are using smart phones as volunteer or android clients.

Smart phones are energy-efficient and cost-effective alternative to running certain tasks of traditional servers. When these smart phones are plugged into power source for charging battery then this idle phones provides the increasing computing capabilities and sizable computing infrastructure.

Distributing tasks for computations must utilize all the resources equally, no resource should be under or over utilize, and this problem leads to focus on the load balancing technique to support the cloud for processing tasks. In this paper we are proposing the load balancing frame work as cloud supporter for processing tasks on smart phones when they are plugged into the power sources.

Lots of mobiles have idle state at night and while not in use. Therefore there is wastage of processing and efficient features of smart phones. The Processing power of smart phones can be utilize by distribution of tasks. Also we need improved speed of processing. Thus this system provides us cost effective distribution of tasks over smart phones. There is re-usability of idle state processors. This system will allow the user a platform where they can select a task for computation and distribute it over the volunteer's i.e. smart phones. Since, linear programming is used for task distribution,

and multiple mobile phones are working in parallel, the processing become faster. For distributed computing, we have used Image processing as a task.

II. LITERATURE SURVEY

In recent years, applications running on smart phones, such as Apple iPhone and Google Android Phones, have become very popular. Most of the released applications work fine on those platforms, but some of the applications including video encoding/decoding, image recognition, and 3D graphics rendering, could take a significant amount of time due to their computationally intensive nature. Processors on mobile devices are gradually getting faster year by year; however, without aid from special purpose hardware, they may not be fast enough for those computationally intensive applications [2, 8].

To improve the user experience of such computationally intensive applications, offloading tasks to nearby servers is a common approach in mobile computing. Mustafa Y. Arslan proposed an efficient method of performing the computational intensive execution by using the CPU and Memory resources of the smart phones while they are being charged [1]. A survey of research challenges is performed and showed details about how smart phones are being used by the various end users by S. M. Hasan [3]. The paper [4] explained a technique wherein nodes from a radio network can take part in tough CPU intensive computational tasks – which they named it as "Wireless Distributed Computing".

Consequently, a lot of research has been done including [9], which introduces an offloading scheme consisting of a compiler-based tool that partitions an ordinary program into a client-server distributed program. More recent efforts utilize cloud computing technology for task offloading from mobile devices [4, 5]. Both partition an application and offload part of the application execution from mobile devices to device clones in a cloud by VM migration.

At night smart phones are not used much, at that time their processing power and storage can be used as small volunteers. A task distribution system on cloud using smart phones for image processing is proposed in following section using linear programming to distribute the image for processing.

III. PROPOSED SYSTEM

The proposed system will have three components like Job Submitter, Cloud Server and Volunteers. Fig 1 shows block diagram for system.

1) Job Submitter

- The Job Submitter will submit the task to server.
- The task can be any time consuming which actually takes time to execute such as file enc/dec, image processing etc.

2) Cloud Server

- After receiving of the task, server will distribute the task to volunteers.
- The load balancing algorithm like linear programming can be used at the server side. Based on current load the task will be submitted to volunteers.

3) Volunteers

- Volunteers will complete the task processing and then send the response to server.
- Server will integrate the result and send the reply back to Submitter application.

In our proposed of cloud supporter framework there will be a submitter who will submit the task to the cloud server for processing. Before submitting the task submitter has to register itself to the cloud server with proper credential details. After logging in submitter can submit the different tasks such image processing or file encryption/decryption etc. We are using the image processing task for easily understanding the concept and efficiency of our work. Cloud server will accept the task and distribute it to the available volunteers for processing. If there is unavailability of volunteers then server will send the toast massage for plugging smart phone on charge and being ready to process the task on registered android volunteer. Smart phones needs to submit their parameters to work as volunteer and all the log details of volunteers are separately saved in the database connected to the cloud server. Cloud server will accept the parameters of task and clients and apply the FCM algorithm to form the cluster of volunteers according to their computing capabilities. Only to show the different computing capabilities of volunteer we are using a laptop and a mobile as volunteer. By calculating the cost of processing load will be balance using the linear programming.

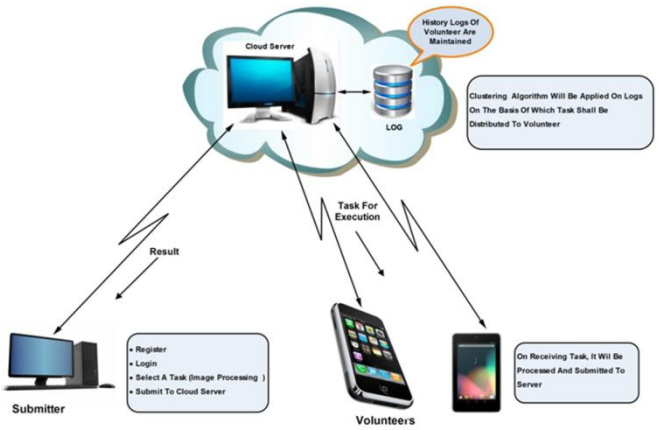

Figure 1: Architecture Diagram

IV. RESULTS

The sample graph based on the precision and recall method indicates accuracy of the project. The proposed system is implemented on Linear Programming Platform which smartly divides the task according to volunteers which gives fast processing speed and obtains optimized results. The final results of the proposed system can be expected as given below –

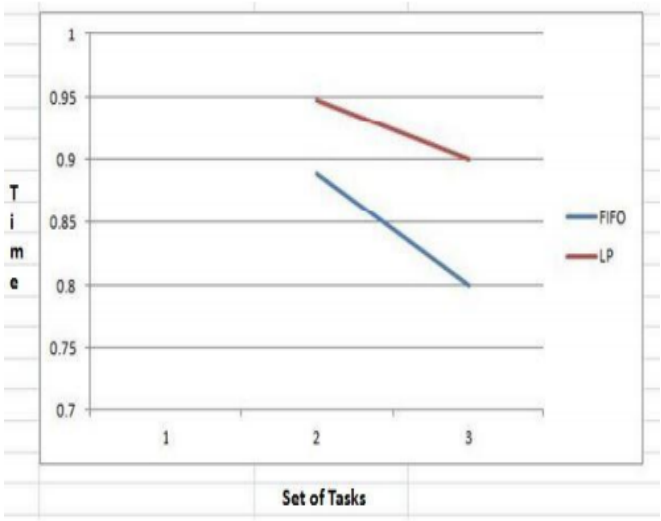

Figure 2: System Accuracy

V. CONCLUSION

According to the survey related to this work, it is found that distributed computing system is the best option to handle the multiple task requests on cloud server. Also to support cloud server for processing these tasks the best and novel idea is using the smart phones as they has good computing capability that can compete with capability of computer. The architecture provides the increasing processing capabilities of smart phone and sizable computing infrastructure. The load balancing framework is necessary to completely utilize all the available resources and equal distribution of the load according to the computing capabilities of the resources to ensure that there should not be any under or over utilized resource. So this load balancing framework works as a cloud supporter to reduce its workload. For distributed computing we have used Image processing as a task, but in future this can be used for any other data and task.

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