Social Based Volunteer Computing For Sharing Cloud Resources

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***Abstract* –Social networking platforms have drastically changed the way that people communicate. They have enabled the establishment of, and participation in, digital communities as well as the representation and documentation of social Relationships. We believe that with increasing number of users in social networking sites it's important to make it an efficient one and hence by enabling the ability of sharing resources over social networks we make them sophisticated. To substantiate this, we present a Social Compute Cloud where the provisioning of Cloud infrastructure occurs through "friend" relationships. In a Social Compute Cloud, resource owner's offer virtualized containers on their personal computer(s) or smart device(s) to their social network. However, as users may have complex preference structures concerning with whom they do or do not wish to share their resources, we investigate, via simulation, how resources can be effectively allocated within a social community offering resources on a best effort basis. The key findings of this work illustrate how social networks can be leveraged in the construction of cloud computing infrastructures and how resources can be allocated in the presence of user sharing preferences.**

***Keywords* - Social networks, Cloud Computing, Preference- Based Resource Allocation**

I. INTRODUCTION

A cloud is a platform in which the resources are stored, shared and accessed. Cloud computing relies on *sharing computing resources* rather than having local servers or personal devices to handle applications. The goal of cloud computing is to apply traditional supercomputing, or high-performance computing power, to deliver personalized information and to provide data storage. To do this, cloud computing uses networks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. This shared IT infrastructure contains large pools of systems that are linked together. Often, virtualization techniques are used to maximize the power of cloud computing. A social network is a social structure in which users are interconnected through a variety of relationships. Through these relationships users share messages and media amongst themselves. There exist a large number of online social networking websites such as Facebook, LinkedIn, Twitter Google+, Vine are used by most of the users.These social networking sites have well over 100 million active members. With such a great number of users using these services, social networks present an interesting area of study in a variety of ways.

A social compute cloud is an integrated platform in which storage space is allocated within the user account thereby enabling the user to share resources like images, audio, video,applications and documents. A Social Cloud is a form of Community Cloud, as the resources are owned, provided and consumed by members of a social Networks. Through this cloud infrastructure consumers are able to execute programs on virtualized resources that expose access to contributed resources, i.e. CPU time, memory and disk/storage.

By allowing the users to share resources and applications over a social compute cloud the social platforms will become more efficient and at the same time revenue can be generated from the shared resources.

In this paper, we propose a system by integrating cloud infrastructures and social Networks. The paper is organized as follows: Section 2 briefly review about social networks and cloud infrastructures. Section 3 describes the current system and uses of both social networks and cloud computing, Section 4 describes the architecture that is being deployed, Section 5 reviews about issues and challenges, and Section 6 concludes the paper.

II. RELATED WORK

The term volunteer computing was coined in 1996 by Luis Saramenta, who defines it as a form of distributed computing that allows "high-performance parallel computing networks to be formed easily, quickly, and inexpensively by enabling ordinary Internet users to share their computers' idle processing power without needing expert help" One of the first successes of volunteer computing occurred when a combined effort of 700 volunteer computers discovered the 35th Mersenne prime number. The most popular volunteer computing system, SETI@home, is an attempt to search the skies for intelligent life. SETI@home is now part of the larger BOINC project, which is a framework that joins together multiple research projects and allows volunteers to select among those projects. BOINC currently supports over 30 scientific research projects and has approximately 300,000 active volunteers. In short, volunteer computing is a viable option for harnessing computational power for the sciences and arts[1].

In recent years there has been rapid growth in cloud computing and social networking technologies. Cloud computing shifts the computing resources to a third party, eliminating the need to purchase, configure and maintain those resources.

Likewise, social networks have seen massive growth, with millions of Internet users actively participating across various social networking websites. Even corporations have begun using social networks as a means to market and reach their customers [5].

With the increasingly ubiquitous nature of Social networks and Cloud computing, users are starting to explore new ways to interact with, and exploit these developing paradigms. Social networks are used to reflect real world relationships that allow users to share information and form connections between one another, essentially creating dynamic Virtual Organizations.Combining trust relationships with suitable incentive mechanisms (through financial payments or bartering) could provide much more sustainable resource sharing mechanisms[7].

Social Cloud is a new paradigm in which computing nodes are governed by social ties driven from a bootstrapping trust-possessing social graph. The graphs known in the literature for high trust properties do not serve distributed trusted computing algorithms, such as Sybil defences ---for their weak algorithmic properties, such graphs are good candidates for this paradigm for their self-load-balancing features[3].

III. EXISTING SYSTEM

There exist a number of social applications that are making use of cloud computing technologies. As previously discussed, these applications typically involve using the existing user management capabilities of the social network to use cloud resources much like the content that is already being shared by social networking users. Box.net is one such cloud storage provider. They have created a variety of apps aimed at sharing their stored data across numerous social networks. These include Twitter, Linked.in and Facebook. The application interfaces with social networks and posts links that allow users access to the stored data (Cassavoy, 2011). The flexibility of cloud services to scale up and down to meet the resource need fits well with the dynamic nature of the social network.

FACEBOOK

Facebook is a social networking website that provides users a personal profile page where they can post messages, photos and other media. These materials can be shared with other users who they have 'friended.' Other features include: groups and friend lists. As of September 2012, Facebook has surpassed one billion active users who use their service. Facebook allows storing and sharing files within groups.Facebook hosts the largest in volume Hadoop cluster that consists of 4,400 nodes and over 100 PB of data (Menon, 2012).

TWITTER

Twitter is a social networking service that provides users a personal page where they can post messages that are no longer than 140 characters called "tweets". Users are able to communicate with each other through adding an username prefixed with the "@" symbol. As of December 2012, Twitter announced they had over 200 million active monthly users. Twitter uses Hadoop clusters to do off-line batch processing of user relationship data to power their People You May Know feature (Ryaboy, 2012).

LINKEDIN

LinkedIn is a social network geared towards professional networking. Users are provided with a profile page where they can maintain a list of connections with other users on the service. Other features include: resume posting and job postings. As of January 2013, LinkedIn had more than 200 million users on their network. LinkedIn's architecture is made of several components. For features such as People You May Know, Hadoop, Hive and Pig are used to batch process off-line data.

YOUTUBE

YouTube is a video sharing website where users can upload, view, share and comment on videos. Users are provided with a profile page that lists their videos and messages. Users are able to subscribe to other users to receive updates on their videos and comments. As many as 1 billion unique users visit YouTube in a month. YouTube makes use of a delivery cloud that is responsible for serving video content. YouTube uses two methods of load distribution across this cloud. Based upon the user's location, users are directed to video cache servers in close proximity. During peak hours, they may be directed to a farther cache if located in a heavy usage area. The second method is just a redirection to another user if the current server being used is busy. This delivery cloud has three components: video id space, video servers, and a physical server cache. The video id is a fixed length unique identifier for each video. The video server organization consists of several DNS namespaces representing a set of logical video servers. The physical server cache is a hierarchy of physical servers grouped into primary, secondary and tertiary locations (Adhikari, 2011).

IV. PROPOSED WORK

In this paper we are proposing a system (Social Compute Cloud) by integrating the advantages of cloud computing and social networks. A Social Compute Cloud is a platform for sharing infrastructure resources within a social network. Using our approach, users can download and install a middleware, leverage their personal social network via a Facebook application, and provide resources to, or consume resources from, their friends through a Social Clearing House. There are two advantages for this system one is Users should not have to pay for the services offered by a Social Cloud platform and the secondis Resources should be allocated in users based on preference

ARCHITECTURE

The architecture composed of the following modules.The working of these modules arealso described below.

SOCIAL NETWORK

We are creating a social network like facebookthat acts as an interface for individuals to create profiles, gets authenticated and share valuable resources over a social network. The new user will register to the social network by providing their valuable information. An existing user will directly login to the social network by providing their id and password. It allows the users to share images, videos to others over the social network. It allow the users to update their status. The Admin Monitors All the Activities Happening inside that of a Social Network. The Users Can Interact with One Another and Share and Reach out Their Friends.The Users Set Preference with whom they want their Resources to be shared with.

SOCIAL CLOUD PLATFORM

Integration between Social Network and Cloud Platform, another component of Social Relationship Management enables direct links to customer insights, trends, and feedback based on ongoing social marketing campaigns, content, and messaging—all from a single interface. It's a complete approach to social that's built for the way social brand teams work efforts in one place.

The technical implementation for the construction and facilitation of the Social Cloud as well as necessary middleware to enable resource sharing between "friends" at the edges of the Internet. Social Cloud platform Acts as The Storage Unit for The Resources Being Shared over the Social Network.

A socio-technical adapter: the means to observe and interpret social ties for the elicitation or derivation of sharing preferences.A Social Cloud platform contains the Social clearing house using which the user can provide resources to, or consume resources from their friends.

SOCIAL CLEARING HOUSE

A Social Clearing House is an institutionalized microeconomic system that defines how supply is allocated to demand. Using this module, users can download and install a middleware leverage their personal social network via a Facebook application, and provide resources to, or consume resources from, their friends through a Social Clearing House. However, this definition is orientated primarily for monetary-based exchanges, which is not the case here. Therefore, a social clearing house captures the following: the protocols used for distributed resource allocation, the rules of exchange, i.e. who can take part, and with whom may they exchange, and the formalization of one or more allocation mechanisms. For this reason, the social clearing house requires two databases: to capture the social graph of its users, as well as their sharing preferences, and a resource manager to keep track of resource reservations, availability, and allocations.

MIDDLEWARE

A middleware is to provide the basic resource fabrics, resource virtualization and sandboxing mechanisms for provisioning and consuming resources. It should also define the protocols needed for users and resources to join and leave the system**.**

SOCIO-TECHNICAL ADAPTER

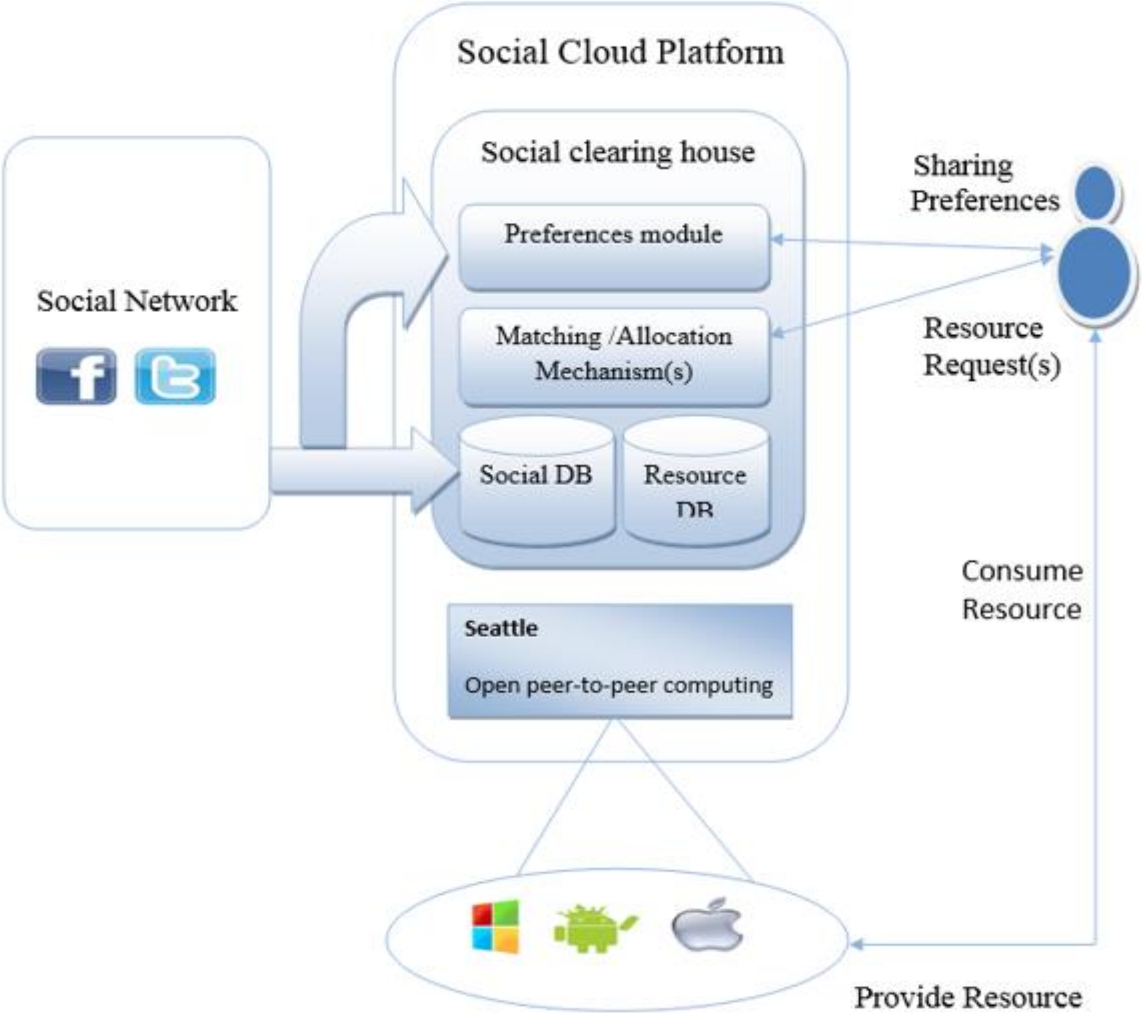
A socio-technical adapter, which in our case is a Facebook application, is needed to provide access to the necessary aspects of users' social networks, and acts a means of authentication, for example, via Facebook connect. Once a user's social network has been acquired via the socio-technical adapter, the social clearing house requires the sharing preferences of the user to facilitate resource allocation. Many aspects of a socio-technical adapter require careful consideration, and many methods can be applied to capture preferences.

MATCHING MECHANISMS

Matching Mechanisms are socio-economic implementations of the social clearing house microeconomic system. They determine appropriate allocations of resources via users' sharing preferences across their social network. Our approach considers non-monetary allocation mechanisms based on user preferences. Depending on the specific market objective, several algorithms exist that compute a solution to the matching problem, e.g. computing a particularly fair solution or one with a high user welfare.

PROVIDE AND CONSUME RESOURCES

Any user can share their own resources to their friends using the social cloud.If any friend made a request for particular resource the owner can provide it by just sharing that resource to the requested user.Any user can share their own resources to their friends using the social cloud.If any friend made a request for particular resource the owner can provide it by just sharing that resource to the requested user.



COMPUTE RESOURCES

Leveraging social structures to facilitate the sharing of compute resources within a social network. To utilize social structures for resource sharing, users must first allow access to their social network, and trust the platform with their social network data. Basing resource allocations upon a binary notion of friendship would be ill conceived for several reasons Here, resources largely entail personal computers, servers or clusters. We envisage that as the computing industry continues to invest in mobile computing devices that such devices could also be offered within a Social Cloud in the future.

PREFERENCE-BASED MATCHING

Two-sided preference-based matching is studied in economic literature, and such algorithms can be applied in many other settings. We have selected three algorithms from the literature, and a fourth of our own implementation

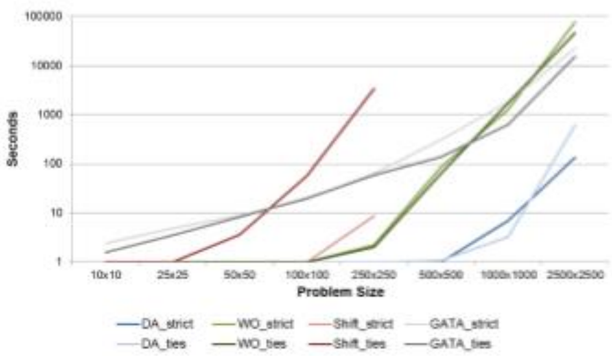
MATCHING ALGORITHMS

For the case of complete preference rankings without indifferences there are polynomial-time algorithms that solve the matching problem for different objective functions. In the literature, citing empirical evidence, stability is considered important for successful matches. Stability simply means that there is no pair of users who would prefer to be matched over their current match The Welfare-Optimal (WO) algorithm yields the stable solution with the best welfare score by using certain structures of the set of stable solutions and applying graph-based algorithms. DA and WO run in polynomial time (O(n2) and O(n4), respectively) and Shift's runtime is proportional to the squared length of the largest indifference group of all users. Therefore we proposed the use of heuristic algorithms such as a genetic algorithm (GA), and have shown that these algorithms can yield superior solutions compared to the other algorithms. The GA starts with randomly created (but stable) solutions and uses the standard mutation and crossover operators to increase the quality of the solutions

MATCHING SERVICE

It can be used to either perform batch allocations for a group of users, or single allocation for an individual user. Whilst it may seem unusual to facilitate both of these settings, the reason is simple: the matching algorithms perform best when batches of users are allocated simultaneously.Individual allocations may result in resources being blocked for other users, for example those with a small number of connections. Whereas batch allocation means that users may have to wait until the next round of allocations to receive resources. Both options are inefficient in different ways: individual allocation achieves at best local optima, and can block resources for other users, but can be performed in near real time, as the computational effort is significantly lower; batch allocations could achieve the global optimum, but may require either migrations or users to wait for resources.

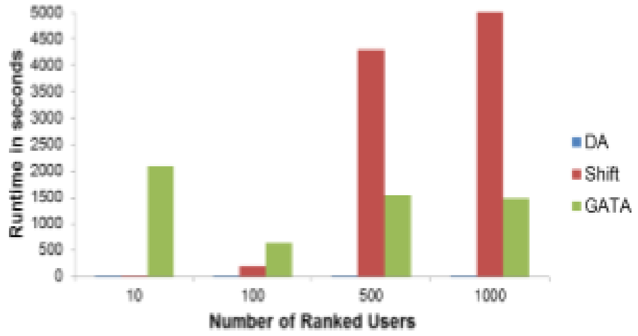
The social network of users is captured via the existence of preferences between users. The matching mechanisms will only consider matching two users if both have a preference for each other. If a preference exists in only one direction, i.e. A has ranked B, but B has not ranked A, we assume that B has not yet considered A, and A's preference for B will be ignored.



Algorithm Runtimes with Different Problem Sizes

ALLOCATION ALGORITHM RUNTIME

The runtime of an allocation algorithm has a large impact on its applicability for a Social Compute Cloud. Given that preference-based matching is often NP-Hard, algorithm runtime is an important design consideration. Therefore, we investigate how relaxing these assumptions impact algorithm runtime.



Runtimes for Different Numbers of Ranked Users, for 1000 Users per Side

V. ISSUES AND CHALLENGES

PRIVACY AND TRUST

Privacy has been a subject of great concern with social networks. The protection of a user's identity varies across the various social network services available across the internet.This website encourage the use of real names and thus make a connection between their social network and public identities. There are means to deduce identities based upon the social network graph topology, and distorted and removing data could affect the quality of data analysis and mining of the information that is being shared. These issues raise questions as to how these social network services handle their data to balance the needs of third party data consumers and the expectations of their users.

OWNERSHIP OF CONTENT

The massive amounts of data that exist on social networking services are mostly user-generated. Different social media sites have different policies. When dealing with items such as images, the content remains private if set as private by user preferences. While users may be the owners of this data, license agreements based upon the use of the services' network may allow these sites to retain data even after users initiate removal or deletion

VI. CONCLUSION

In this paper, we have presented a Social Compute Cloud: a platform that enables the sharing of infrastructure resources between friends via digitally encoded social relationships.Creating a Social Compute Cloud platform will enable the sharing resources between friends via digitally encoded social relationships.Using our implementation, users will be able to execute programs on virtualized resources provided by their friends.Preference-based resource matching is (in a general setting) an NP-hard problem, makes often unrealistic assumptions about user preferences and most state of the art algorithms run in batch modes.Cloud accessing user's social networks, allowing users to elicit sharing preferences, and utilize matching algorithms to enable preference-based socially-aware resource allocation.

REFERENCES

[1] A. McMahon and V. Milenkovic, "Social volunteer computing," Journal on Systemics, Cybernetics and Informatics (JSCI), vol. Volume 9(4), pp. 34 – 38, 2011.

[2] E. Kuada and H. Olesen, "A social network approach to provisioning and management of cloud computing services for enterprises," in CLOUD COMPUTING 2011, The Second International Conference on Cloud Computing, GRIDs, and Virtualization, 2011, pp. 98–104.

[3] K. Chard, S. Caton, O. Rana, and D. S. Katz, "A Social Content Delivery Network for Scientific Cooperation: Vision, Design, and Architecture," in the Third International Workshop on Data Intensive Computing in the Clouds (DataCloud 2012), 2012

[4] B. Chen and A. Roscoe, "Social networks for importing and exporting security," in Large-Scale Complex IT Systems. Development, Operation and Management. Springer, 2012, pp. 132–147.

[5] Sanjay P. Ahuja and Bryan Moore, "A Survey of Cloud Computing and Social Networks", Canadian Centre of Science and Education, Network and Communication Technologies; Vol. 2, No. 2; 2013.

[6] L. Backstrom, P. Boldi, M. Rosa, J. Ugander, and S. Vigna, "Four degrees of separation," Crore, vol. abs/1111.4570, 2011.

[7] A. Mohaisen, H. Tran, A. Chandra, and Y. Kim, "Socialcloud: Using social networks for building distributed computing services," arXiv preprint arXiv:1112.2254, 2011.

[8] D. D. Roure, C. Goble, and R. Stevens, "The design and realisation of the myexperiment virtual research environment for social sharing of workflows," Future Generation Computer Systems, vol. 25, no. 5, pp. 561–567, 2009.

[9] K. Chard, S. Caton, O. Rana, and K. Bubendorfer, "Social Cloud: Cloud Computing in Social Networks," in 2010 IEEE 3rd International Conference on Cloud Computing (CLOUD), 2010, pp. 99–106.

[10] B. Javadi, D. Kondo, J. Vincent, and D. Anderson, "Discovering statistical models of availability in large distributed systems: An empirical study of seti@home," Parallel and Distributed Systems, IEEE Transactions on, vol. PP, no. 99, p. 1, 2011.

[11] E. Kuada and H. Olesen, "A social network approach to provisioning and management of cloud computing services for enterprises," in CLOUD COMPUTING 2011, The Second International Conference on Cloud Computing, GRIDs, and Virtualization, 2011, pp. 98–104.

[12] K. John, K. Bubendorfer, and K. Chard, "A Social Cloud for Public eResearch." in proceedings of the 7th IEEE International Conference on eScience, Stockholm, Sweden, 2011.