Internet of Things and Cloud Computing
2019; 7(3): 73-79
http://www.sciencepublishinggroup.com/j/iotcc
doi: 10.11648/j.iotcc.20190703.13
ISSN: 2376-7715 (Print); ISSN: 2376-7731 (Online)

SciencePG
Science Publishing Group

Review Article

Challenges and Opportunities of Cloud Computing in Social Network; Survey

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To cite this article:
Gizealew Alazie Dagnaw, Sisay Ebabye Tsige. Challenges and Opportunities of Cloud Computing in Social Network; Survey. *Internet of Things and Cloud Computing*. Vol. 7, No. 3, 2019, pp. 73-79. doi: 10.11648/j.iotcc.20190703.13

Received: August 13, 2019; **Accepted**: October 4, 2019; **Published**: October 16, 2019

Abstract: Nowadays, there has been fast growth in cloud computing and social networking technologies. Cloud computing translates the computing resources to a third party, eliminating the need to purchase, configure and maintain those resources. 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. Cloud Computing and Social Network Sites (SNS) are among the most controversially discussed developments in recent years. The opportunities of using powerful computing resources on demand via the web are considered as a possible driver for the growth of the world economy. Social networks provide a virtual place where people can interact and share. With the increasing user base and the competition social networks needed a scalable, cost-effective backend architecture and efficient business. Online social media network has become part of human life by transforming the way users create new social relations or relate with family and friends. A social network, as the name suggests is a network of individuals created for social communication. It is a massive platform where people interact with others anywhere in the world online based on some relationship. The relationship can be friendship, family membership or others with some shared interests. Despite these considerable benefits, there are serious concerns and challenges about this new technology. The most important issue is related to security and privacy subjects in cloud-based environments. Accordingly, challenges and concerns related to cloud based environments have been identified and most appropriate current solutions for each challenge have been described. In overall, it is anticipated that cloud computing will be the most important and challenging issue in IT industry. As regarding the importance of this technology, we hope this paper will contribute to a better understanding of the vision of cloud computing and the challenges ahead for further researches. Likewise, social networks have seen enormous growth, with millions of Internet users actively participating across various social networking websites.

Keywords: Cloud Computing, Social Cloud, Social Networks, Online Social Network, Challenges, Opportunities

1. Introduction

In today's world social networks has become an integral part of people's lives. People share their personal lives with friends and spoil in other activities like discussions, gaming and various others. In recent years social networks have gained popularity and have grown at fast pace. This growth has posed many challenges of scalability, better service, management, and maintenance issues for the social networks. Cloud computing is the ability of a user to gain access to the computing resources over a network [1]. The shared resources include servers, storage, network, and services among others. Cloud computing provides many advantages the major one being the cost reduction. Most organizations make use of cloud computing services provided by a third party at the time when these particular resources are needed and the scale down and scale up as required without channeling many resources into the infrastructural investment. Social network platforms have rapidly changed the way that people communicate and interact. They have enabled the participation in digital communities as well as the representation, documentation and

exploration of social relationships [2]. It will become easier for users to share their own services, resources and data via social networks. At the same time, social media sites have large number of users all across the globe, and this makes them ideal candidates for cloud adaptation. Social networks help boost internet usability by storing heavy multimedia content in cloud storage systems. Videos and photographs are the most popular content on social media, which essentially use up the maximum space allocated to them. They have the capacity to slow down applications and servers with all of their resource demands. Cloud computing vendors such as Sales force and Amazon nowadays provide varied services including Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP). As they deliver these things through cloud servers, clients can use the flexibility and scalability of the system without purchasing standalone software or hardware. Apart from data storage, the social networks are now also using clouds for various other tasks. For example, this can be ideal for big data analytics. One of the benefits of using cloud systems is that users can access vast amount of structured and even non-structured data easily. Just take a look at the much-improved analytics provided by sites like Face book, especially for its business users [1, 3].

Another way cloud computing becomes helpful is by reducing the cost of data backup and recovery in case of a disaster. If the data is only stored in one central location, it becomes much riskier. If something happens there, it is almost impossible to recover the data. But through cloud they remain accessible through shared resources across the globe. This is especially useful for social networks as the store personal data of its users, and so cannot afford to lose even one part of it. Overall, it can be said that cloud computing has several usages, and some of them are still being discovered. For instance, in the near future, personal secure clouds are likely to gain ground. New age social networks and messaging apps such as Snap chat thrive on privacy and they will eventually utilize such resources to offer a more secure and faster service to its users. Cloud Computing and Social Network Sites are among some of the most controversially discussed developments in recent years. The opportunities of using powerful computing resources on demand via the web are considered as a possible driver for the growth of the world economy. As I said before, cloud is a reality and will remain the most distinguished technological breakthrough, transforming the way business is done [4, 5].

The establishment of social networks and the cloud computing technology has led to the enrollment of a large number of online users into the networks. These users to a larger extent are capitalizing on the benefits and available opportunities that lacked before to a larger extent. Cloud computing has therefore enhanced the freedom of interaction on social media that has made most users to freely share personal information via social media as well as storage of information into the cloud computing systems. Accumulation of diverse information raises problems related to data security that has prompted the need for maintaining personal data private and improvement of the trust towards the service provider. This study investigates the privacy concerns that arises from the use of cloud technology in social networks and provides a recommendation on the measures that needs to be enforced to secure personal information stored over the cloud [6, 7].

2. Conceptual Review

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. We propose leveraging the pre-established trust formed through friend relationships within a Social network to form a dynamic Social Cloud, enabling friends to share resources within the context of a Social network. We believe that combining trust relationships with suitable incentive mechanisms (through financial payments or bartering) could provide much more sustainable resource sharing mechanisms. This paper outlines our vision of, and experiences with, creating a Social Storage Cloud, looking especially at possible market mechanisms that could be used to create a dynamic Cloud infrastructure in a Social network environment. Social network provides us with basic means of communication [8]. People nowadays give equal importance to real and online world relationships. In today's world social community credentials are used for authenticating on various other websites (e.g. Face book). Social network is a platform widely used by many users [9].

3. How Social Media Uses Cloud

The present generation has embraced the use of social networks in many roles both personal and commercial. In order to manage such a high traffic, cloud technology has been adapted. Social networks have helped to a larger extent in enhancing the internet usability. Large multimedia content is stored in the cloud storage systems. A lot of space is usually occupied by photographs and videos which are part of the most popular content found on social networks. Cloud computing providers like Amazon and Sales force have diversified in the services offered that are inclusive of enterprise resource planning and customer relationship management. Customers can, therefore, utilize these services without necessarily purchasing them since they are located in the cloud services. Besides data storage, social sites utilize clouds in other tasks such as big data analytics. Face book, for instance, has a more improved analytics that are used mainly the business users. Social networks use clouds to reduce the costs related to data backup and also data recovery when a disaster occurs. Data stored at a particular location is riskier than one found in the cloud. This is due to the hardships encountered during recovery [10]. Through cloud computing, social network users can now access shared resources from anywhere on the globe. This is beneficial to most social networks as they maintain personal information of its clients

and therefore should not lose any part of the information, however, trivial it is. Every user of the social network, therefore, utilizes cloud computing technology [11, 8].

The four primary types of cloud models are given below. Each has its advantages and disadvantages with significant implications for any organization researching or actively considering a cloud deployment [12].

Public Cloud: A public cloud is a cloud computing model in which services, such as applications and storage, are available for general use over the Internet. Public cloud services may be offered on a pay-per-usage mode or other purchasing models. An example of a public cloud is IBM's Blue Cloud.

Private Cloud: A private cloud is a virtualized datacenter that operates within a firewall. Private clouds are highly virtualized, joined together by mass quantities of IT infrastructure into resource pools, and privately owned and managed.

Hybrid Cloud: A hybrid cloud is a mix of public and private clouds.

Community Cloud: A community cloud is an infrastructure shared by several organizations which supports a specific community.

4. Challenges of Cloud Computing

Based on the results of the identification and assessment of barriers as well as the analysis of the different impacts a set of six challenges was selected. It will be analyzed in detail in the following sections. Among them are information protection, privacy and data protection, governance issues (data location, third party access, etc.) and contractual issues. Above that challenges for the market competitiveness, partly also identified in the impact analysis, as well as technological challenges are further subjects of the following analysis [13, 14].

Technological challenges

Though there are only a few technological challenges named in the analysis of barriers and impacts, there are reasons two have a more detailed look at some challenges for two reasons. The first one is that among the identified impacts, drivers and barriers some relate to technological capabilities. One example is flexibility which demands efficient and highly scalable infrastructures. The second reason is that some challenges are reinforced by technological issues. The most prominent example is the vendor lock-in resp. the challenge of data portability, which can be reinforced by a lack of standards. Consequently these challenges will be shortly analyzed in the following. Finally it should be noted that information security is also a technological challenge, but due to its importance it is treated separately. Moreover information security is not only a technical issue, it also relates to organizational aspects, governance [15, 16].

The issue of standards and interoperability exist since the early days of the computer business. Nevertheless many studies in the recent years underline that this complex of topics is still of high relevance. It will gain also a growing importance for Cloud Computing; because together they can result in a vendor lock in. The reason is that one way to achieve the full potential of Cloud is either to change providers according to needs and priorities like price and service offers or to combine different solutions to get the best combination of different applications. To do so it would require that standards and interoperability is given by all providers, but this is often not the case. Moreover some providers try to control their own proprietary software world by restrictive IPR use or non-disclosure of specifications. This might have negative consequences for users, who experience a vendor lock-in, as well as for other providers, who are not able to offer interoperability of their own solutions. Similar to the situation regarding standards the situation for interoperability, i.e. the ability to communicate and interact with other systems is also problematic. This topic is in particular an important issue for Cloud providers, because to offer their specific solutions it is required that it can be used in cooperation with different other solutions. An example for this problem would be an industry-specific extension for an enterprise application. Given the fact that this market is dominated by a few players, which only offer limited insight, the company would need to develop several specific programming interfaces (if even possible), which would either increase their costs by doing so or limit their potentially focusing maybe on one platform owner. Overall this is limitation of competition and hinders the creation of new products and services based on such solutions. Given the fact that the challenge of standardization and interoperability for Europe exists for a long time, there are numerous efforts to increase standardization and interoperability. It includes efforts for strengthening the European position like the promotion of the role of ETSI (European Telecommunications Standards Institute) as well as the support of European companies to participate in industrial standardization committees such as IEEE, which are the dominant way of standard setting in the IT industry [17].

Data management and scalability are still challenges in Cloud Computing because data - as well as the code - are both not structured optimally. Due to this resources are wasted and resource utilization could be far more optimized in the future. At the same time, the size of data is constantly growing. Big Data is a challenging factor for storage and computing resources. 1.2 zettabytes of data were produced in 2010and will increase to 8 zettabytes19 in 2015 referring to a market research study of IDC. Traditional relational databases can't cope with this amount of data. Since recent years the NoSQL movement offers techniques to store large amounts of data but lacks in ensuring the consistency of data. Therefore, further research is necessary in this field. Especially within update intensive applications the offered support is very restricted because ensuring consistency and integrity is difficult (e.g., due to duplications or concurrent access). The amount of data is growing faster than storage and bandwidth do. In this field also the increased usage of mobile devices is challenging for the existing systems. With respect to the challenge of providing scalable data management, emphasize the trade-off between consistency and high scalability and availability. The authors highlight design principles for systems providing

scalable and consistent data management for cloud computing applications. According to recent studies scalable data management should be based on the following design principles know from key value stores Segregate system and application state; Limit interactions to a single physical machine; and Limit distributed synchronization. However, while data management systems based on these principles are good only for single key atomic access, applications increasingly require scalable and consistent access to more than a single key. Traditional database servers running on commodity machine instances in the cloud often become a scalability bottleneck. Key value stores like Big Table or Simple DB cannot be used as the majority of Web applications are designed to be driven by traditional database software. Migrating them to the cloud results in running the database server on commodity hardware instead on premium enterprise database servers [18].

Basically, there are the classical security issues of confidentiality, integrity and availability. We look atthem one by one [19].

Main challenges

Confidentiality

The discussion of the Snowden-documents indicates that there is no confidentiality of data on computers connected to the Internet. Two reasons for that are mentioned. One is that the NSA has a large facility to eavesdrop Internet traffic, such as having a three days rolling buffer of data on 150 servers. The dangers inherent in the centralization of data processing have received explosive attention on the heels of the leaks by NSA contractor Edward Snowden about secret surveillance programs in the U.S. and the U.K. According to the Guardian, Snowden has documented a secret program of the U.S. National Security Agency (NSA) entitled PRISM through which the NSA has obtained access without warrants to personal information such as search histories, e-mail contents, file transfers and live chats from users of services provided by Google, Face book, Apple and other U.S. internet giants [20, 21].

Integrity

The integrity of systems on the Internet can, of course, be violated by institutions such as the NSA. There are also many other attacks by other individuals or organizations imaginable, such as hacks into the management interface or hijacking of accounts.

Availability

Regarding availability, there are several issues. One is the availability of Cloud servers. For example, Amazon had significant outages, causing harm to the customers of AWS. Attacks by hackers, accidental erasure by providers, physical catastrophes like fire or earthquakes, and providers going out of service all represent ways in which permanent data loss may be suffered by cloud users. A second issue is Denial of Service attacks. Distributed denial-of-service (DDoS) attacks are a primitive, but effective way of causing disturbances to online communications. By overloading communication channels and computing resources, such attacks slow everything to a grinding halt. While the scalability of the cloud initially creates a greater tolerance at system level for such attacks, DDoS methods are continually evolving. A third issue is the availability of the network. While many networks, such as DSL, have a fairly high availability, they are not as permanently available as a local computer. Regarding wireless access, availability is an even larger issue. So Cloud Computing is not yet quite "available everywhere and to anyone", as a European Commission document (COM 2012/529/EC) put it not to mention wireless data roaming fees. On the one hand, issues of wireless connectivity are being addressed, for example by using digital dividend spectrum for LTE with obligations to cover remote areas. On the other hand, there will remain remote areas, tunnels, basement or simply outages which will make ubiquitous access to Cloud Computing services difficult. On a different level, the observation remains true that users lose control of their data when transitioning to the cloud.

5. Open 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. Some websites, such as Face book, encourage the use of real names and thus make a connection between their social network and public identities. Others sites, such as dating services provide some weak anonymity by using only first names or a user-created name instead. Even though Face book does not provide anonymity, it does provide options to restrict access only to those you allow access. Other than access by other users, there are questions on how these social networking services may be using the vast amounts of data that users are providing. Face book's policy states that information may be shared with third parties that does not identify or expose the user's identity. In this case, it may be marketing research companies who use the information to target advertisement to certain users. In terms of privacy, there are questions as to what is being removed from the data being shared that makes the users "unidentifiable". 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 [22].

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. For example, Facebook's policies state that it will use user's information in promotion or connection with its service. When dealing with items such as images, the content remains private if set as private by user preferences. However, Facebook does not have extensive copyright options or preferences much like the image sharing site Flickr. With Flickr, a user can set different

policies through licenses: creative commons, no derivative works, etc. 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 [23].

Data Retention and Failures in the Cloud

Although cloud technologies present much value, there are several concerns about centralizing data and data control in the cloud. Should valuable data be placed in the cloud and lost, there is little that can be done to recover that data. This is not different from the traditional model where data is managed by the organization itself. However when that data is sent into the cloud, organizations relinquish some measure of control and that requires trust that the cloud service provider will manage the data properly. One example of such a failure occurred when social bookmarking service Magnolia had system failures across primary and backup servers, effectively losing all user data in 2009 [24].

6. Opportunities of Cloud Computing

Flexibility

A cloud-based service can instantly meet the demand because of the vast capacity of the service's remote servers. In fact, this flexibility is so crucial that 65% of respondents to an InformationWeek survey said "the ability to quickly meet business demands" was an important reason to move to cloud computing [23].

Disaster recovery

When companies start relying on cloud-based services, they no longer need complex disaster recovery plans. Cloud computing providers take care of most issues, and they do it faster.

Automatic software updates

In 2010, UK companies spent 18 working days per month managing on-site security alone. But cloud computing suppliers do the server maintenance – including security updates –themselves, freeing up their customers' time and resources for other tasks.

Cap-Ex Free

Cloud computing services are typically pay as you go, so there's no need for capital expenditure at all. And because cloud computing is much faster to deploy, businesses have minimal project start-up costs and predictable ongoing operating expenses.

Increased collaboration

Cloud computing increases collaboration by allowing all employees – wherever they are to sync up and work on documents and shared apps simultaneously, and follow colleagues and records to receive critical updates in real time. A survey by Frost & Sullivan found that companies which invested in collaboration technology had a 400% return on investment.

Work from anywhere

As long as employees have internet access, they can work from anywhere. This flexibility positively affects knowledge workers' work-life balance and productivity. One study found that 42% of working adults would give up some of their salary if they could telecommute, and on average they would take a 6% pay cut.

7. Special Issue on Clouds for Social Computing

Currently, two complimentary Internet based research areas are emerging: social computing and cloud computing. On the one hand, social computing empowers individual users with relatively low technological sophistication to use the web to engage in social interactions, contribute their expertise and share their content, experiences and opinions. On the other hand, cloud computing offers everyone sophisticated computing infrastructures and resources as utilities, so that individual users with relatively low computing knowledge can have at their disposal a high performing computing infrastructure with little investment. Together, these two complementary technological advances form the backbone of our digitized world, when coupled with the rise of sensors, mobile devices and the internet of things. Of course, they also face significant challenges. These articles look at each area and describe how they complement each other. The Social Web has become an important means of communication for everyone: individuals, organizations, and governments all use it to disseminate and share information, offer opinions and engage in discussions [25].

Social Internet of Things is changing what social patterns can be, and will bring unprecedented online and offline social experiences. Social cloud is an improvement over social network in order to cooperatively provide computing facilities through social interactions. Both of these two fields needs more research efforts to have a generic or unified supporting architecture, in order to integrate with various involved technologies. These two paradigms are both related to Social Networks, Cloud Computing, and Internet of Things. Therefore, we have reasons to believe that they have much potential to support each other, and we predict that the two will be merged in one way or another [26].

8. Finding Report

This aim of the study explore the challenges and opportunities of cloud computing in social network. 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. With the incentive of lowered operational costs in software, hardware and human effort, many companies are considering the use of cloud services [11]. 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. This paper will survey the current issues in cloud computing and social networks and

how these technologies are being used together. Social cloud is a resource and service sharing framework utilizing relationships established between members of a social network. Social networks are used to represent actual world relationships that allow users to share information and form connections between one another creating dynamic virtual organizations. So to enable social sharing a social cloud requires access to user's social networks. Two-sided accepted matching is followed here. In order to gain access to the social network two factor based authentication is followed. The consumer's likings for each possible friend are then calculated by regaining preferences stored in the database. This information is then aggregated and sent to the matching service to determine an appropriate match. The main advantage is that social networks can be used in the implementation of cloud computing infrastructures and the resources can be allocated in the presence of user sharing preferences [19].

Online social media network has become part of human life by transforming the way users create new social relations or relate with family and friends. Online social network (OSN) has drastically increased the rate at which people interact with each other by simplifying the means of communication. However, privacy is raising a serious concern. All user generated data within the OSN system need to be protected against unauthorized friends or hackers or even against the provider of OSN. Many research works are going on to encounter the privacy issues in OSN. This paper analyses the limitations of the recent work being done in this field and proposes an efficient abstract solution to them. A level of trust can be developed by online relationships in social network which are based on real world relationships. To form a dynamic Social Cloud and to enable users to share heterogeneous resources within the context of a social network we have proposed leveraging of the social relationships. We believe that combining trust relationships with suitable incentive mechanisms could provide much more sustainable resource sharing mechanisms. We have introduced a business application as a means of regulating sharing, due to the unique nature of the Social Cloud. The business application is innovative as it uses both social and economic protocols. In today's world, social community credentials are being used for authentication purpose on various other websites (e.g. Facebook). Here we outline our vision of creating a Social Storage Cloud, looking especially at possible market mechanisms that could be used to create a dynamic Cloud infrastructure in a Social network environment [6, 24].

9. Discussion on Report

Today, cloud computing is being defined and talked about across the ICT industry under different contexts and with different definitions attached to it. The core point is that cloud computing means having a server firm that can host the services for users connected to it by the network. Technology has moved in this direction because of the advancement in computing, communication and networking technologies. Fast and reliable connectivity is a must for the existence of cloud computing. In Overall, it is anticipated that cloud computing will be the most important and challenging issue in IT industry report results underline that action is necessary to ensure that the positive potentials can be realized by all and for the society and economy at large. In particular the recent developments such as NSA disclosures or cyber-criminal activities have potential to undermine the trust of consumers and business and make them concerned about security and privacy. Normally, a situation like this is then often coined by the contradiction of interests, but also the IT and internet industry started to realize that trustworthiness is in the long run a critical factor for their business. This situation offers new opportunities for Europe and creates some reasons to take action in Europe now. The first one is the need for a holistic approach. The analysis shows that neither more technological solutions nor more regulations nor new governance structures will solve the problems alone. Only a combination of strong security, modern and appropriate privacy regime, fair legal environment and improved governance structures will assure that potentials for misuse can be minimized. The second reason to take action is that this would allow Europe to use the chance to gain more importance in the global discussion on digital society and economy. Finally, it also offers a chance to boost the European ICT and Internet industry Millions of the people are connected with the help of Internet and many of them are also connected on social networking sites. Social networks are more than just a place for social interactions and personal relationship. Cloud computing enables the social networking companies to consume compute resources as a utility rather than building and maintaining computing infrastructures [4]. This paper introduces internet-based cloud computing and exploring the Characteristics, service models which are used these days as well as the benefits and the challenges of using cloud computing in the social networks. In this paper we have analyzed the recent works being done to solve the privacy issues in OSNs. We have shown the advantages and limitations of each one. Finally we have presented an abstract solution to encounter these limitations. In this work all private data are shielded from OSN and unauthorized users by storing data in trusted/personal cloud storage. Furthermore we brought a simplified means of accessing data through providing a user with token and secret information without the need of encryption to avoid computational complexity. We believed our work when implemented would solve many privacy issues relevant to social media network [12, 27].

10. Conclusion

Cloud computing transforms the way information technology (IT) is consumed and managed, promising improved cost efficiencies, accelerated innovation, faster time-to-market, and the ability to scale applications on demand. Cloud computing is clearly one of the most enticing technology areas of the current times due, at least in part to its cost-efficiency and flexibility. However, despite the surge in

activity and interest, there are significant, persistent concerns about cloud computing that are impeding the momentum and will eventually compromise the vision of cloud computing as a new IT procurement model. With the rapid growth of social networking sites, there has been an increased use of content sharing through social networks. With more and more contents getting shared, the security and rights of shared content are getting compromised. Several existing media sharing sites like YouTube, Flickr, Facebook etc, face several issues with content sharing such as upload limitations, unsupported tracking model and copyright violations. Cloud computing allows the distribution of services such as storage and processing. A social network can be blended with a cloud network. Social networks provide a virtual place where people can interact and share. With the increasing user base and the competition social networks needed a scalable, cost-effective backend architecture and efficient business model. All these objectives can be accomplished by adopting cloud computing architecture at the backend and the SaaS business model. In this paper, we will try to analyze the underlying SaaS business models and backend cloud computing architecture deployed by MySpace and Facebook to support large social networks. 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. We propose leveraging the pre-established trust formed through friend relationships within a Social network to form a dynamic "Social Cloud", enabling friends to share resources within the context of a Social network. We believe that combining trust relationships with suitable incentive mechanisms (through financial payments or bartering) could provide much more sustainable resource sharing mechanisms.

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