

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“Jnana Sangama”, Belgaum - 590 018



## A CASE STUDY REPORT of INTRODUCTION TO CLOUD COMPUTING (18CSE539)

on

### **“Pinterest - A Case Study ”**

*Submitted in the Partial fulfillment of the requirements of Semester 5 of*

## BACHELOR OF TECHNOLOGY

IN

## COMPUTER SCIENCE & ENGINEERING

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2021 – 2022

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### CERTIFICATE

Certified that Course Project Work titled “**Title of the Project**”, carried out by **Madhumitha R (USN: 1NT19CS103), Meghana Reddy (USN:1NT19CS113), Shreya Shettar (USN: 1NT19CS181) and Tejashree Krishna Murthy(USN: 1NT19CS200)** bonafide students of **Nitte Meenakshi Institute of Technology** in partial fulfillment of Semester-5 of Bachelor of Technology Degree in Computer Science & Engineering under Visveswaraya Technological University, Belagavi during the year 2021-2022. It is certified that all corrections/ suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the Departmental Library. The Course Project Report has been approved as it satisfies the Academic requirements in respect of the Course Project Work prescribed for the said Degree.

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## **ABSTRACT**

The main objective of this case study is to understand the implementation of Amazon Web Services using Pinterest. Pinterest is a visual discovery engine for finding ideas like recipes, home and style inspiration, or any such ideas to spark inspiration. AWS forms the backbone of Pinterest. It defines all the features offered by Pinterest. The case study summarizes various research papers. Each explains how each component of Pinterest relies on Cloud and why it is successful. Like social networking cloud to enable the sharing of resources, Amazon S3 (Simple Storage Service) for storing the image-centric data, Amazon Rekognition for analyzing pictures and videos, and Digital Anonymization Systems to maintain the privacy of the user. The constant supply of ideas and inspiration is what attracted many consumers and is why the media has 478 million monthly active users.

## **ACKNOWLEDGEMENT**

The satisfaction and euphoria that accompany the successful completion of the project would be incomplete without the mentioning of the people who made it possible, whose constant guidance and encouragement crowned our efforts with success. We consider it a privilege to express our gratitude and respect towards all those who are guiding us throughout the completion of the project.

We express our deep and sincere gratitude to **Prof. N. R. Shetty**, Director, Visionary of NMIT, Bengaluru for providing the necessary infrastructure and encouraging Research activities for the successful completion of the Work.

We would like to thank **Dr. H.C. Nagaraj**, Principal, Nitte Meenakshi Institute of Technology, Bengaluru, and Dean Academic for providing constant support and encouragement during our tenure at NMIT.

We are deeply indebted to **Dr. Sarojadevi H**, Professor and Head, Department of CSE, who has been magnanimous in giving us complete freedom to do things and in providing the facilities that we required.

We are very grateful to our guide **Ms. Mamatha Bai B G**, Assistant Professor, Dept. of CSE for her valuable inputs in making us understand the concepts and for constantly supporting us during the course of this project work.

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## **INTRODUCTION**

### **SOCIAL CLOUD**

Digital marketing solutions have become increasingly collaborative and now integrate diverse channels like social media platforms and email marketing to craft bigger, better campaigns to improve customer experiences. Social cloud is the way.

Social Cloud integrates social media marketing capabilities into a digital marketing solution and syncs it with the cloud to better align your marketing, sales, and service teams. Prominent social media platforms like Facebook, Instagram, Pinterest and Snapchat are excellent examples of social media cloud. Social clouds enable organizations to share resources across a verified social network and provides security and quality of service, which leads to greater economies of scale. Social cloud provides a unified interface to respond to user comments in real-time and engage them with compelling content. It also provides a platform to influence millions of users on topics ranging from fitness, health awareness, fashion trends, music trends to protection of wildlife and much more.

***Scott Cook quoted that***

***“A brand is no longer what we tell the consumer it is, it is what the consumers tell each other it is”***

The real life example all of us witnessed in the past two years during the pandemic when so many influencers used their social media handles to spread awareness on Covid-19 and helped arrange monetary help, oxygen cylinders, transportation, food and much more. This shows the impact social cloud can make in today's world.

## PINTEREST

One of the most important social media marketing platforms is Pinterest. Even though it may not be as popular as Facebook, Twitter, or LinkedIn, Pinterest certainly has its potential to connect with a huge target audience. As one of the most popular social media sites in the world, Pinterest currently has 478 million monthly active users (Pinterest, 2021). The latest Pinterest statistics show that the main reason people use Pinterest is to look for home décor/design inspiration (GlobalWebIndex, 2021). This is followed by seeking ideas for style, clothing, and beauty. They're also used for brand marketing as four in ten Pinterest users say they use the social media platform to research brands and their products.

Analysts frequently compare Pinterest to other social networks like Meta's Facebook and Instagram. However, Pinterest's shoppable pins, which encourage retailers to upload their entire catalogs to its pinboards, could gradually transform its network into an e-commerce platform. That's why big retailers like IKEA upload their entire print catalogs to Pinterest and Shopify partnered with Pinterest to enable smaller merchants to launch shoppable pins with integrated payment options. That's also probably why PayPal was reportedly interested in buying Pinterest for about \$45 billion earlier this year.

Pinterest used AWS to help over 500 Million users discover new ideas. Using AWS, Pinterest has tripled its use of storage and compute over just two years without worrying about reliability or scalability. Pinterest provides one of the world's largest visual-bookmarking tools, with around 1 billion users and 2 billion boards. The company has used a variety of AWS services to scale its processing, storage, and data-analysis workloads to help developers focus on delighting customers.

## **LITERATURE SURVEY**

### **PAPER - 01:**

#### **Cloud the Mainstay: Growth of Social Networks in Mobile Environment**

##### **1.Methodology/Architecture**

Mobile Cloud Computing (MCC) is an emerging cloud service-model following the trend to extend the cloud to the edge of social networks in a mobile environment. The services offered are dynamic and scalable in nature. Whereas mobile could provide much more sustainable resource sharing mechanisms on demand and pay for use; exclusively in dynamic environment. This work will definitely act as a measuring tool for the service providers to understand the future trend of mobile usage; encourage all the stakeholders to upgrade the infrastructure and enhance the services more reliable and highly secure.

##### **2.Usage of Cloud Technology/Platform**

Cloud computing for mobile devices has a major benefit in information dissemination, where the resource-limited mobile devices outsource computation, communication, and high performance social networking intensive operations on cloud. Popular online social networking sites, such as Facebook, LinkedIn, Academia allow users to explore other users with similar interests, share personal and professional information, data, applications, Digital Intellectual Property (DIP) applications of similar interest with friends. It provides a platform to share huge amounts of information among the users, chat to friends, individual as well as group discussion, debates, job searching, business operations, etc.

##### **3.Implementation/Algorithm used**

The interest is to study the impact of cloud on social networks at large and analyze the efficiency of usage performance in mobile environments specifically. Cloud computing for mobile devices has a major benefit in information dissemination, where the resource-limited mobile devices outsource computation, communication, and high performance intensive operations to the nearest cloudlet or cloud. It is important to note



that sharing within a Social Cloud is not representative of point-to-point exchanges between users, rather it represents multi-point sharing within a whole community group.

However, most examples use Cloud platforms to host Social networks or create scalable applications within the Social network. For example, Facebook users can build scalable Cloud based applications hosted by Amazon Web Services.

#### **4.Result obtained**

The dynamic growth of social networking sites due to Cloud implementation and changed drastically the stats of internet usage in desktop environments. The analysis presented in this work shows the wide acceptance of Social Cloud in the mobile environment. (A social computation cloud, A social storage cloud, A social collaborative cloud, A social cloud for public science, An enterprise social cloud. ) The analysis presented in this work shows the wide acceptance of Social Cloud in the mobile environment.

#### **5.Summary of the paper**

This article presents the impact of Cloud on social networks in the mobile environment with detailed analysis. A Social Cloud in mobile environment is typically a unique phenomenon in which it builds upon the social incentives and external real world relationships inherent in social networks; provides resource sharing and trading at large. This work will definitely act as a measuring tool for the service provider to understand the future trend of mobile usage; encourage all the stakeholders to upgrade the infrastructure and enhance the services more reliable and highly secure.

This work represents a novel new approach to analyze the impact of Cloud on social media in general and usage analysis of social networking sites in mobile environment in particular. The rising importance of social media has pushed the technology designers to integrate the technologies, even into mobile environment; bringing access to discrete technologies' resources onto a single interface. The dynamic growth of social networking sites due to Cloud implementation and changed drastically the stats of internet usage in desktop environments. The analysis presented in this work shows the wide acceptance of Social Cloud in the mobile environment.

## **Image-centric Social Discovery Using Neural Network under Anonymity Constraint**

### **1. Methodology/Architecture**

In our proposed model, we consider the primary attack on the third party cloud server which is assumed, to be honest, but curious about learning the contents of user's shared images and user's interests. We focus on preserving the privacy of those shared images and user profiles outsourced in the cloud and provide secure social discovery. The service provider and all the user's in the system are assumed to be trustworthy. We do not consider other possible attacks, such as malicious user attacks at this time.

### **2. Usage of Cloud/ Platform**

Generally, in recommendation systems, a user profile is built for every user capturing the user preferences. When a user requests for recommendation to the service providers, a nearest neighbour search operation is performed based on his/her user profile and results are recommended by the service providers. Apart from the sensitivity of images shared by the users, user profiles are also sensitive. To minimize the disclosure risk, the data should be anonymized or encrypted.

### **3. Implementation/ Algorithm used**

Information flow in the proposed framework occurs in two stages: first, while storing user's uploaded encrypted images and anonymized image profiles in the third party cloud server and second, during the processing of similarity search operation on the anonymized image profiles for social discovery requests. preservation. After receiving images from the users, the service provider first extracts the visual features from the images using the convolutional neural network and encrypts those images. The service provider then generates a binary valued image profile from these extracted features for every user who has uploaded those images. Next, the service provider generates the user profiles using the optimum feature selection scheme operated over binary attributes of user profiles and anonymizes it. After the generation and anonymization of user profiles, The service provider stores the encrypted images and the anonymized image profiles in the cloud server.

Ensuring a right balance between user's privacy and the utility of high dimensional user profiles data is the primary focus of this paper. To the best of our knowledge, our work is the first to deal with nearest neighbour search over high dimensional anonymized data.

1. Convolutional Neural Network
2. Use the extracted features to simulate the interaction between the service user and the cloud server.
3. Jaccard Similarity

#### **4. Results Obtained**

The user image profiles which are mostly similar with the query image profile are eventually recommended. The data utility is preserved after anonymization and it protects the outsourced images. Preserves the utility of data post anonymization and enables efficient search over the anonymized data.

#### **5. Summary of the paper:**

People frequently use these social media sites to express various aspects of their life with peers they are connected to through these sites. The service providers of these sites sometimes use the image features for social discovery such as friend recommendation, group or community recommendation, etc. As images are rich in content and more expressive, it also reveals much sensitive information about a user and impedes their privacy. Due to storage constraints, many popular social media sites prefer to outsource their data to the cloud server. However, if the cloud server gets compromised, then an adversary can use these sensitive images for malicious purposes. In this paper, We propose a privacy-preserving image-centric social discovery framework using the neural network and efficient anonymization scheme based on optimum feature selection. The paper presented a framework for privacy preserving image-centric social discovery where the user's image-centric interests in social networking sites are the main focus. The proposed design provides a solution to two challenges – storing images in the semi-honest cloud infrastructure and providing social discovery by the nearest neighbour search on anonymized data at the cloud server end. The designed framework not only protects the outsourced images but also enables efficient search over the anonymized data preserving the utility of data.

## **PAPER - 03 :**

### **Building virtual anonymized databases for the Cloud**

#### **1.Methodology/Architecture**

An algorithm which inserts data subjects into an  $R^*$ -tree for anonymization using a  $k$ -concealment model. A protocol that allows multiple data providers to publish datasets with personalized needs to cloud servers is used in this paper. The building of virtual anonymized databases is based on the integration of all the local generalized data.

#### **2.Usage of cloud technology/platform**

Pinterest uses AWS to house its enormous amount of user data and images. Image Recognition for recommendations and easier search of pins.

#### **3.Implementation/algorithm used**

Distributed Anonymization protocol.

Given a centralized version of the anonymization algorithm, we can decompose it and utilize distributed protocols for communication that are proven to be secure in order to generate a secure and distributed anonymization among cloud servers.

#### **4.Results**

Each private dataset produces a local anonymized dataset that satisfies all the privacy constraints and their union forms a global virtual database that meets a global anonymization principle ( $k$ -concealment). Thus the data is anonymised virtually.

#### **5.Summary**

This paper presents a distributed anonymization protocol for privacy-preserving data publishing from multiple data providers in a cloud environment. This work addresses two important issues, privacy of data subjects and privacy of data providers.

For the privacy of data subjects (individuals), we have used a  $k$ -concealment model that offers a higher utility with less generalisation than that which is required by  $k$ -anonymity.. For the privacy of data providers, we have adopted a bottom-up algorithm instead of top-down approach, while using  $R^*$ -tree index for better generalization. We

also illustrated that the R\*-tree strategy leads to more effective insertions and splitting than that of the R-tree.

## **PAPER - 04:**

### **The Pin-Bang Theory: Discovering The Pinterest World**

#### **1.Methodology/Architecture**

Investigated this social network from a privacy and security standpoint, and found traces of malware in the form of pin sources.

Instances of Personally Identifiable Information (PII) leakage were also discovered.

Analysis demonstrated how Pinterest is a potential venue for copyright infringement.

#### **2.Usage**

Pinterest is one of the most recent additions to this popular category of image-based online social networks. Pinterest is being heavily used by many big business houses like Etsy, The Gap,

Allrecipes, Jettsetter, etc. to advertise their products. Pinterest uses aws to house its enormous amount of user data and images

#### **3.Implementation**

- Selecting top 5 profiles as initial seeds
- Feed seed into crawler
- Crawl through followers of followers
- User data collection- geographical locations, other social media links
- Pin data collection- pin dataset-
- Perform analysis-extracted 100 most frequently occurring words from the profile description, and found topics like fashion, design, food, music, art, photography, and travel as the most popular user interests
- Analyse security and privacy of pinterest

## **4.Results**

Pinterest uses storage and compute solutions on Amazon Web Services (AWS) to provide the scale, speed, and security its platform requires, while keeping costs low and freeing

engineers to focus on innovation. One such innovation, Pinterest Lens (Lens), uses machine learning (ML) to power visual search, so users can identify objects and discover related themes and products with just a photo.

## **5.Summary**

Pinterest is a social network dominated by topics like fashion, design, food, travel, love etc. across users, boards, and pins. The largest contributors of content (images) on Pinterest were the users themselves, with 2,768,851 (4.7%) users uploading original content; the remaining content (95.3%) was pinned from pre-existing web sources. Focused analysis on the security and privacy issues on Pinterest, and found numerous instances of PII leakage through users' description field. Although this information is shared voluntarily by users, the all public nature of the network makes users potentially more vulnerable to third-parties extracting and using this information for marketing and other purposes.

## **PAPER - 05:**

### **A Statistical Overview of Pinterest**

#### **1.Methodology**

Our approach is wholly quantitative and statistical. Qualitative research can be used to enrich the picture we painted in this paper, providing thick descriptions of motivations and goals for using Pinterest. Further, the statistical techniques we used examine a small segment of the possible behaviors on Pinterest.

#### **2.Usage**

In this paper, Pinterest uses cloud services like AWS to store pins which are in the form of images.

## Pinterest - A Case Study

Fine Grain Access Control (FGAC) is developed by AWS and Pinterest to store Pinterest's data on the cloud on S3. Using AWS, Pinterest has tripled its use of storage and compute over just two years without worrying about reliability or scalability.

### 3.Implementation

- Obtain the data- a web crawler was used to collect popular pins.
- Prepare the data for analysis- the data was categorised based on location, user gender, text used.
- Usage of statistical methods- binomial regression- to model Pinterest activity as a function of predictive variables., negative binomial regression, penalised logistic regression.

### 4.Results

The number of users by location, number of female users was more prevalent than male users, most of the pinterest images were sourced by google or twitter, being female means more repins, likes and comments drive more repin, being american or british earns repins, being female means fewer followers

### 5.Summary

This paper provides a statistical overview of Pinterest. Three main findings- First, being female on the site leads to more repins, while geography seems to play no role. Second, women have fewer followers. Finally, comparing the language used on Pinterest to language used on Twitter, we come to a concise set of terms defining the two sites. Notably, the four verbs uniquely describing Pinterest are “use,” “look,” “want,” and “need,” reflecting the “things” at the heart of Pinterest.

## **PAPER - 06: AMAZON REKOGNITION**

### **1.Methodology**

Amazon Rekognition is a cloud-based SaaS Computer Vision platform, launched in 2016. The Amazon Rekognition technology founded by the Amazon scientists is a deep learning technology which is used to analyze a huge number of videos and images daily. Pinterest's visual search feature, called Lens is supported by Rekognition, allows users to search for items they've captured in a photo with their phone's camera. Users can also upload existing photos from their camera roll. Now, Pinterest will start surfacing shoppable pins in visual search results.

### **2.Cloud technology/ platform used**

It uses application program interface (API) to perform analysis on any picture or video file which is stored in Amazon S3 (an Amazon cloud storage service). It uses reinforced learning to provide accurate search results. Hence, Amazon Rekognition is said to be a continuous development process, as it always adds and improves its new labels by learning from the new data which it has collected.

### **3.Implementation**

Amazon Rekognition creates a database of videos and stored images where the user has the capability to search and analyze so one can establish the new trends from the content. Rekognition specializes in the following fields :

- i. **Object Scene Detection** -Detects thousands of objects and scenes, plus activities such as "delivering a package" or "playing soccer."
- ii.**Analyzing the sentiment of the customers**- It can capture facial expressions and then analyze them to check whether they are happy, surprised or sad.
- iii.**Identifying the celebrities and famous personalities**- It can also be used for searching for the faces in the images and videos which are stored in the face collection container
- iv.**Scanning the text in images**- Amazon Rekognition can also be used in detecting the text in images (Schutz, 2021). It identifies the text which is various fonts and sizes and in various orientations.



## **4.Results**

Amazon Rekognition prides itself on its facial recognition capabilities. It has changed the ball game for Entrepreneurs as they can just rent the Image processing services instead of deploying a whole microservice team and has hence cut back on labour. It has also helped budding developers and students to implement AI projects.

## **5.Summary**

Amazon Rekognition enables the user to integrate picture and video analysis to an application using deep learning technology which is very simple to use. With this technology, one can identify people, activities, objects, text, and scenes in images and videos, as well as identify any inappropriate content.

## **PAPER - 07:**

### **How Pinterest is used as a marketing tool**

#### **1.Methodology**

Social media networks have attracted a large number of users the year which has increased its potential as a marketing channel.

There is increased interest in leveraging social media platforms from not only online businesses, but also traditional brick-and-mortar businesses seeking to use the power of social media to acquire new customers as well as retain existing customers and create. Businesses are using social media sites to promote and market products, engage customers, and create brand loyalty.

#### **2.Cloud Technology/platform used**

- Clustering algorithms and Big Data are used to find the present trends in order to keep the brands upto date
- Improved web technologies are used in design to distinguish themselves from other brands/companies.
- TAM (Technology Acceptance Model) is used that predicts use and interaction(user-platform fit) of technology systems.

### **3. Implementation**

Research says that pinterest experience depends on usability, user-platform fit and content. Social media design (organisation,layout) and technology (tools, modules and applications) are important because advertising revenue and sales are tied to audience engagement in the social media site. Researchers found that the level of interactivity on a website is a strong factor in supporting the user-platform fit.To remain competitive, web designers incorporate technical capabilities, user preferences and options, as well as design considerations in user platforms to facilitate browsing (using visual images in Pinterest), sharing (using pins), or making a purchase (buyable pins).The hypothesis being: The higher the level of user-platform fit, the stronger will be the positive association between usability and content and users' affinity toward Pinterest.

### **4. Results**

This research paper emphasized that the allocation and sharing of resources can be possible in an innovative way, by combining the social networks processes and cloud computing concepts. Using this, users are able to execute their programs on virtualized resources provided by their friends from their own devices like personal computers, smart phones etc.

### **5.Summary**

Pinterest has a highly interactive and niche design that is appealing to the users and offers tremendous potential for marketers because of niche appeal in a strong visual medium using antecedents of usability, design, user-platform fit, and media content of the Pinterest platform and has helped gain value loyalty and trust of brands.

## **PAPER - 08:**

### **Social Cloud Computing: A Vision for Socially Motivated Resource Sharing**

#### **1.Methodology**

Social networks provide a primary means of communication between friends, family, and coworkers.The allocation and sharing of resources can be possible in an innovative way, by combining the social networks processes and cloud computing concepts. A Social

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Network cloud is nothing but allocating and sharing the resources of cloud within the social network members. While sharing the resources from their personal devices they can share their resources within their friend circles that have the stronger relationship.

## 2.Cloud Technology/Platform used

The users are grouped by the use of cluster-ing techniques like K-means clustering. Using this approach the social network users can download the resources via facebook application.

For predicting the relationship between the friends, big data can be used based on the friends data-base. Amazon EC2 provides great success in provisioning the infra-structure services and Microsoft Azure has success in provisioning the platform services.

## 3.Implementation

When a user wants to share resources, the social cloud platform gets activated in the backend. The platform should satisfy some functionality like user management and resource allocation etc. A “social locating house” contains several modules

- Preference module- A numeric value is set to each friend to emphasize how preferred they are. If the value is higher than the preference will be high to that particular friend.
- Clustering:A clustering module clusters the similar users based on their avail-able data for provisioning the resources efficiently. Primarily used when the website targets its audience and puts up advertisements that would cater the interest of that particular cluster.
- Allocation Mechanism:The allocation of resources is going to be handled by this module. allocation of resources is done based on scaling available resources and queueing.
- Access control:The popularity of social networks makes the safety of the user’s private information a necessary but scientifically challenging issue. The relationship-based access control mechanisms have been taken to solve this problem.
- Database-The databases are used to store the social network related data and the user preferences related data to be used in social locating houses.

## 4.Result

The allocation and sharing of resources can be possible in an innovative way, by combining the social networks processes and cloud computing concepts. The allocation of resources has been done by the resource providers itself. The similar users are grouped based on the clus-tering techniques. The access control mechanism to have the restricted access is also incorporated in this work.

## **5.Summary**

In this paper, the social network cloud: a platform which enables the sharing of infrastructure resources and software resources between friends through digitally encoded social relationships. Using this, users are able to execute their programs on virtualized resources provided by their friends from their own devices like personal computers, smart phones etc.

### **PAPER - 09: Social Cloud: Cloud Computing in Social Networks**

#### **1.Methodology**

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 specifically at possible market mechanisms that could be used to create a dynamic Cloud infrastructure in a Social network environment.

#### **2. Usage of Cloud/Platform**

The structure of a Social Network is essentially a dynamic virtual organization with inherent trust relationships between friends. We propose using this trust as a foundation for resource (information, hardware, services) sharing in a Social Cloud. A Social Cloud, therefore, is a scalable computing model in which virtualized resources contributed by users are dynamically provisioned amongst a group of friends.

#### **3. Implementation**

Pinterest exposes an application API through a REST like interface which includes methods to get a range of data including friends, events, groups, application users, profile information, and photos. The Markup Language used includes a subset of HTML with proprietary extensions that enables the creation of applications that integrate completely with the Pinterest look and feel. The final page is then returned to the user. This routing structure presents an important design consideration in a Social Cloud context as access to the Cloud services would be expensive if routed through both the server and the callback application server in order to get data from the actual Cloud service. To reduce

this effect it can be used to request data asynchronously from the specified service in a transparent manner without routing through the application server.

#### **4. Result**

This paper has presented the architecture and implementation of a Social Cloud; an amalgamation of Cloud Computing, Volunteer Computing and Social networking. In our system social media users can discover and trade storage services contributed by their friends, taking advantage of pre-existing trust relationships. In order to discourage free loading we have adopted a credit-based trading approach.

#### **5. Summary**

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. Social networking has also extended beyond communication between friends, for instance, there are a multitude of integrated applications and some organizations even utilize a user’s Facebook/Google credentials for authentication rather than requiring their own credentials. The structure of a Social Network is essentially a dynamic virtual organization with inherent trust relationships between friends.

We propose using this trust as a foundation for resource (information, hardware, services) sharing in a Social Cloud. This paper outlines the vision of, and experiences with, creating a Social Storage Cloud, looking specifically at possible market mechanisms that could be used to create a dynamic Cloud infrastructure in a Social network environment.

### **PAPER - 10: Analysis and Optimization of Amazon EC2 Instances**

#### **1. Methodology**

Cloud computing provides resources as a service over the network, enabling their efficient and flexible management. An increasing number of individual users, researchers and companies, established or startups, of any size and scope, trust their computing and storage tasks to public and private clouds, replacing fixed Information Technology (IT) costs of ownership and operation with variable use-dependent costs. Public clouds provide

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resizable compute capacity as a public service (e.g., Amazon Web Services – AWS, Rackspace ), while private clouds are built based on the organizations' own infrastructure, using cloud computing toolkits (e.g., OpenStack , OpenNebula, Eucalyptus) and providing computing services to their employees or customers.

## 2.Usage

Amazon EC2 Service using the Sumo kit

## 3.Implementation

We identify primitive algorithmic operations that should be part of a cloud analysis and optimization tool, such as resource profiling, performance spike detection and prediction, resource resizing, and others, and we investigate ways the collected monitoring information can be processed towards these purposes. The analyzed information is valuable in driving important virtual resource management decisions. We also present an open-source tool developed, called SuMo, which contains the necessary functionalities for collecting monitoring data from Amazon Web Services (AWS), analyzing them and providing resource optimization suggestions. SuMo makes it easy for anyone to analyze AWS instance behavior, incorporating a set of basic modules that provide profiling and spike detection functionality.

## 4.Result

The widespread use of public cloud resources makes analyzing and optimizing clouds increasingly important, but also makes it difficult for a user or administrator to effectively control their proper use. Hence, SuMo implements important functionalities for collecting monitoring data from Amazon Web Services (AWS), analyzing them and suggesting changes that optimize the use of resources and the associated costs.

## 5.Summary

In summary, the instances selected by the CUO mechanism, used in SuMo, result in a large reduction in the cloud resources cost. Also, it achieves a good matching between the requested workload and the offered capacity, leading also to high utilization ratio. We also observed that CUO mechanism usually results in regional changes for the new instances, while the changes in the machine type and the operating system are less. Machine type changes relate both to utilization and cost factors, while regional and operating system changes relate only to cost parameters, tending to select a limited number of low cost regions for hosting the instances or of cheaper Linux instances. Nevertheless, in practice both regional and operating system changes may not be always possible or without cost. Also, the efficient operation of the CUO mechanism was exhibited by the fact that not only downgrades (selecting lower capacity instances) are performed, as one would normally expect so to increase resource utilization and decrease total cost, but more intelligent and less obvious choices, often resulting in upgrades

(selecting higher capacity instances), are also considered. CUO parameterized operation and efficiency under instances with time-varying characteristics is also exhibited.

## **CONCLUSION**

Pinterest has a few prominent services, few of which are- Pins and Boards, Recommendation System, Sharing of pins with other users. A prominent feature of Pinterest is that it protects the user information by maintaining privacy efficiently.

All these Pinterest services or features can be related to AWS features.

Pinterest stores all its user data, information and its diverse set of pin images on AWS' S3 service. Amazon Rekognition algorithm is used in the image recognition service and recommender system service in Pinterest. Pinterest also allows its users to communicate by sharing pins and boards thus implementing Social Cloud Network. Distributed Anonymization System is used to anonymise the user data and protect user privacy.

So in conclusion, Pinterest is one of the applications which saw a huge increase in the user base after the implementation of AWS into their system. AWS being an integral part of Pinterest, has made it easy to use and manage.

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## **ANNEXURE**