Special Issue Published in International Journal of Trend in Research and Development (IJTRD), ISSN: 2394-9333, www.ijtrd.com

SocialBook: Scalable and Efficient P2P assisted Video Sharing in Online Social Networks

[1]Dhaanappagouda Patil, [1]Suven M
Dept. of Computer Science & Engineering,
University Visvesvaraya College of Engineering, Bangalore, India

***Abstract*—**Now-a-daysvideo sharing has become a very popular application in Online Social Networks (OSNs) like Facebook, Twitter, Google+, etc., but its sustainable development is impeded by the natural limitations of the Client/Server architecture applied in current OSN video systems. The three main limitations are 1) Expensive in terms of server bandwidth 2) Storage and 3) not scalable with the rapidly increasing number of users and video content. Recently many peer-assisted Video-on-Demand (VoD) techniques have been proposed, where peers who all are in online contributed their bandwidth in delivering the video content. But unfortunately, videos can only be shared through friends in OSNs. Therefore, present VoD works on two things 1) clustering nodes with similar interests 2) close location for high performance are optimal, if not entirely inapplicable, in OSNs. We propose a model called SocialBook for peer-assisted video sharing in online social networks system that addresses node failure problems associated with overlay construction using DHT (Distributed Hash Table) aided Chunk Driven Overlay which selects stable nodes, we also explore social relationship, social distance between video viewers and length of videos. We evaluate SocialBook through prototype experimental result and an event-driven simulator show that SocialBook can improve the quality and scalability.

***Keywords*:** *DHT(Distributed Hash Table), Video-on-Demand (VoD), Online Social Networks, Peer-to-Peer networks, Peer-to-Peer assisted VoD.*

I. INTRODUCTION

The most popular Online Social Networks (OSNs) like Facebook, Twitter, Google+, etc., are now among the most popular sites on the Web. OSNs establishes social relationships and these networks provides a powerful means of sharing, organizing, and finding content. Worldwide there are 950 million Facebook users are there and daily 500 million users logon to Facebook and video uploads are 300 million per day. It has over 1.32 billion monthly users unlike other video sharing systems [5] like BitTorrent and YouTube, which are organized around content rather than users. In OSNs users establish thesocial connections with the friends in real world and update their profiles and content share their photos, videos, and notes to their personal pages. Video sharing has become a most popular among users to share their interesting videos with their friends in OSNs. Facebook is the second-largest online video viewing platform according to comScore Releases in August 2010. The total time spent on video viewing on Facebook increased 1,840% year-over-year, from 34.9 million minutes to 677.0 million minutes from October 2008 to October 2009. Video viewers have been also increased by 548% during the same period of time and total number of streams grew by 987%. Video sharing applications in OSNs has been an evolution from simple communication tools to a media portal. OSNs have become a platform for catching up with friends, for personal expression and for sharing variety of content.

Conventional client-server architectures are suffering from storage, bandwidth and costs as they depend upon content delivery networks to deliver content, which is the one of the main reason YouTube was sold to Google. Now Facebook is also facing same problem it depends upon Akamai content delivery network. In recent times effort has been spent on improving client server architectures and many techniques have been proposed with the Peer to Peer (P2P) architectures. P2P architectures provide more scalability with many users as each peer contributing its bandwidth to other peers.

Motivation: In previous papers many techniques have been given on P2P architectures like Tree Based, Mesh Based and Hybrid Structures. They all have tried to address the problems like storage, bandwidth, scalability, and efficiency but they are suffering from one or another problem. In this paper we used DHT aided chunk driven overlay construction and chunk sharing algorithms to address the problems of node failures, stability of overlay construction, and efficiency.

Contribution: Our proposed SocialBook model built upon DHT aided Chunk Driven Overlay. It increases scalability forming a ring structure among stable nodes. This ring structure is flexible it can increase and decrease its size , any number of nodes can join to these stable nodes any time, which also forms DHT based two-layer hierarchical infrastructure as remaining nodes get connected to stable nodes. This two layer hierarchy helps in increasing efficiency of the system.We introduce a mechanism called the game theory which guarantees stream of chunk availability to a chunk requester in DHT based system. Chunks are transmitted in a dynamic tree structure in top-down manner with decreasing node bandwidth.

Organization*:* The paper organization is as follows. The Section 2 provides a brief overview of related research work. Section 3 presents the Proposed System Model. Section 4 demonstrates the empirical result. Finally, conclusions are given in section 5.

II. RELATED WORKS

In Online Social Networks video searching functionality is not provided unlike other video sharing systems (e.g. YouTube) and videos can only be shared by friends and friends of friends. So we take into considerations like social distance, physical distance as most of the videos watched by close friends and tend to be located in same location, and video length. As most of the videos viewed are short length videos. Average time spent on Facebook per user is 20 minutes.

Cheng et al., [2] proposed a model called NetTube a novel to demonstrate peer-to-peer assisted delivering framework which discusses the clustering in social networks for short length video sharing. Their work focuses on series of key design issues to realize the system,a bi-layer overlay, an efficient indexing scheme and a pre-fetching strategy leveraging social networks.

Huang et al., [3] have answered a question called Can internet Video-on-Demand be profitable? In depth. Video-on-Demand applications have becoming an increasingly popular a in internet over the last few years. And it has become very costly due to its high bandwidth requirements and popularity. Their work focuses on design and benefits of peer-assisted Video-on-Demand, where peers can assist the server in delivering VoD content. The assistance can be provided in such a manner that it provides the same user quality and experience as that of client-server distribution mechanisms. Also they focus on the single-video approach, whereby a peer can only redistributes a video that has been currently watching.

Shenet al., [4] given a mechanism called DHT-aided chunk-driven overlay for scalable and efficient P2P live streaming. Due tointernet-based video streaming applications are gaining more popularity, attracting millions of users every day. This growth of users poses problems like high video Quality of Service (QoS), availability,scalability and low-latency challenges to peer-to-peer assisted live video streaming systems. Tree-based systems with low-delay are vulnerable to churn, while mesh-based systems are churn-resilient and have a high delay and overhead. They address these problems by introducing a DHT aided chunk driven overlay.

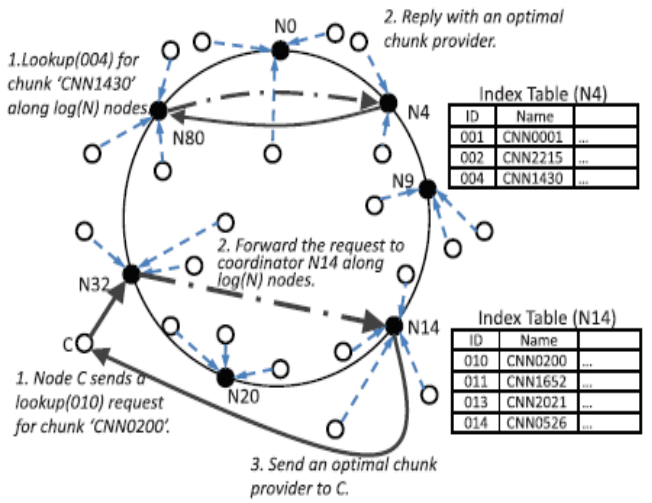

Figure 1: Chunk sharing in DHT aided Chunk Driven Overlay [4]

DHT aided Chunk Driven Overlay selects stable nodes for efficient chunk sharing we call these nodes coordinators. Chunks are transmitted in top-down manner with decreasing bandwidth.

Node Join: Server keeps track of number of nodes in the system and selects a node depending on its active life period makes it as coordinator (stable node) or joins it to the particular coordinator.

Node departure and failure: Node can either leave informing to the neighbor nodes or abruptly it can leave the system. If node failure happens in the system certain time out period will be noticed and coordinator will remove that node from DHT table if coordinator node failed than after communication failure with the coordinator server assigns new coordinator to the system.

In Figure 1, dark circled nodes are stable nodes(Coordinator).Each stable node has a ID and Name. Video chunks withID 001 and name CNN0001 are in the first entry. Stable node N4 is the owner of ID 001, ID 002, and ID 004, it stores the video chunks with these IDs. (Indices of specific chunk of different nodes gather in same coordinator.)

Haiying Shen et al.,[5] gives a model called SocialTube-Their work focuses on increasing scalability and user experience in online social networks for video sharing applications. They have given mainly two algorithms P2P overlay construction and chunk prefetching algorithms to address these problems. But still they didn't answer problems of node failures in overlay construction.

Fujimoto et al., [6] given a strategy called P2P Video-on-Demand streaming using caching and reservation scheme based on video popularity. By caching viewed video data peers can reduce video server load sending these cached data to other peers. In many algorithms a first-in, first-out approach is typically used for caching, it is not a very efficient mechanism to use peers' uploading capacity because the peers may cache the data of unpopular and not interested vide data.Their work focus on Video-Popularity-based Caching and Reservation (VPCR) scheme which makes use of the upload capacity of peers. They also address temporal viewership fluctuations for videos which reducesuse of peers upload capacity using the reservation scheme VPCR.

These literature surveys done here shows that each of the model given has one or other problems. By studying all these papers we incorporated DHT- Based Chunk Driven Overlay scheme which address the node failure problems in overlay construction algorithms by selecting stable nodes for chunk sharing.

III. THE PROPOSED SYSTEM MODEL

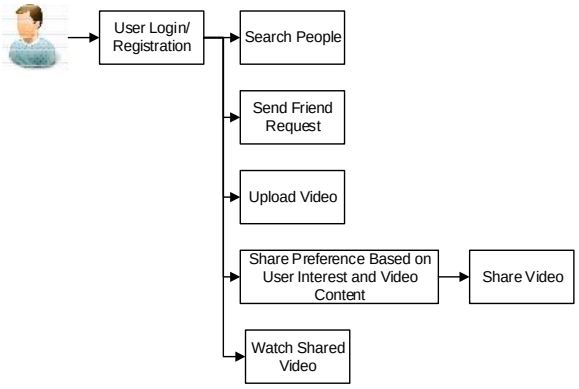

Figure 2: System Architecture

Figure 2describes the system architecture of our proposed model. First a user can login/Register to our social networking site with his/her credentials, after registering he/she can login to the site. The successful login creates profile for a given user in our social networking site where he can find four features namely i) Search People, ii) Send Friend Request, iii) Upload Video iv) Share Video.

Once a user finds people in our social networking site he can send friend requests to others to establish social connections. After successful social relation establishment he/she can upload their interested videos in the social networking site. Once the video upload is successful he/she can share the video either as public or as private by selecting few friends in which he/she can find interests.

IV. EXPERIMENTS AND RESULTS

We have experimented results by creating a social networking website where we have established social connections among other users by sending and accepting friend requests. For every user who logins to our site we generated a profile.

After creating social profile and establishing friendship relations.Users can upload their interested videos in our site. Later they can share videos publicly or privately among friends based on their interests.

Figure 3 shows the finding the people in social networking site with whom we can establish friendship relations by sending friend requests. It is found that friendship relations are established with the most people are tend to be located in the same place.

Figure 4 shows uploading a video in social networking site. User can upload his/her interested video in the site. Most of the videos are uploaded are of short length and they were shared among friends based on their interests.

Figure 5 shows a video can be shared among friends privately. They may also share publicly.

V. CONCLUSIONS& FUTURE WORK

In this paper we implemented a social networking site using DHT based architecture. In our social networking site users successfully uploaded their interested videos, and they can share uploaded videos among friends. We found shared videos are watched by most of all the friends.

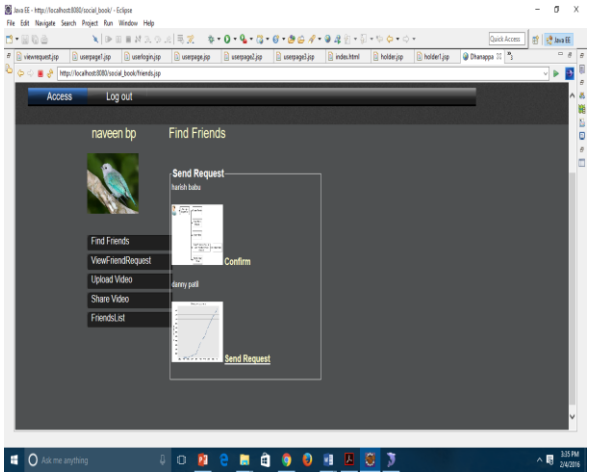

Figure 3: Finding people in social networking site

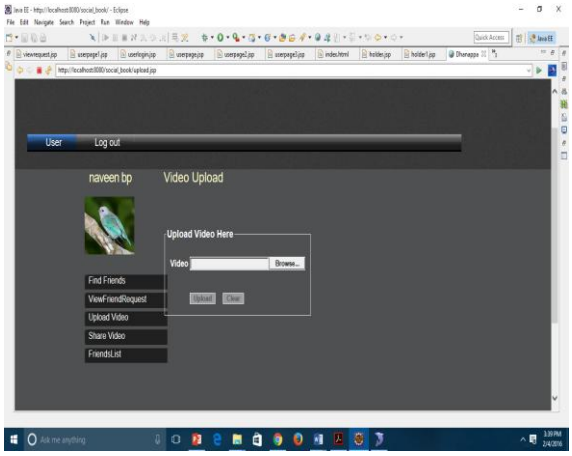

Figure 4: Uploading video in social networking site

DHT- aided architecture can be used to improve Scalability of the system with the increasing and decreasing number of users. It also over comes the node failure problems as it forms ring like structure with the stable nodes and remaining any number of nodes can join to the stable nodes to form two layer hierarchy.

As DHT based architectures form two layer hierarchies which improve the overall system efficiency, which also guarantees high availability of video chunks. It also helps to utilize the bandwidth for high quality video streaming.

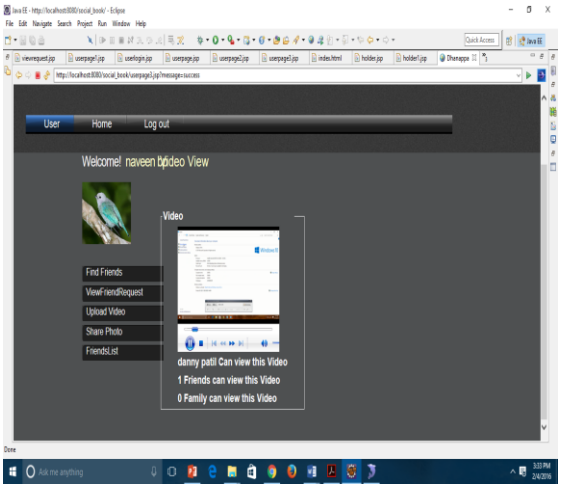

Figure 5: Videos shared among friends

Acknowledgements

Though it may appear that the following exposition is a monotonous boat of an unusual acknowledgement assert beyond the confines of the simple senses of the word gratitude to pass on my deep felt thanks to Dr. Venugopal K R, Principal, UVCE and Dr. P Deepa Shenoy, Dr. Thriveni J,Dr. Pushpa CN and all other staff members of Department Of CSE, UVCE for their ungrudging guidance.

References

[1] Social Media and http://thefuturebuzz.com/

[2] J. Liu andX. Cheng. NetTube: Exploring Social Networks for Peer-to- Peer Video Sharing. In *Proceeding of INFOCOM*, 2009.

[3] C. Huang, J. Li, and K. W. Ross. Can Internet Video on-Demand be Profitable? In *Proceedings of SIGCOMM*, 2007.

[4] H. Shen, L. Zhao, Z. Li, and J. Li. A DHT-aided Chunk-driven Overlay for Scalable and Efficient P2P Live Streaming. IEEE Transactions Vol. 24 No. 11.Pages 2125-2137, 2013.

[5] Z. Li, H. Shen, H.Wang, G. Liu, and J. Li. SocialTube: P2P Assisted Video Sharing in Online Social Networks. Vol. PP No. 99 of IEEE Transactions, 2014.

[6] T. Fujimoto, R. Endo, and H. Shigeno. P2P Video-on Demand Streaming Using Caching and Reservation Scheme based on Video Popularity (VPCR). *International Journal of Grid and Utility Computing*, 3(2/3):188–199, 2012.

[7] W. P. K. Yiu, X. Jin, and S. H. G. Chan. VMesh: Distributed Segment Storage for Peer-to-Peer Interactive Video Streaming. *IEEE Journal on Selected Areas in Communication*, 2007.

[8] H. Shen, L. Zhao, H. Chandler, J. Stokes, and J. Li. P2P Based Multimedia Sharing in User Generated Contents. IEEE Transactions on Parallel and Distributed Systems, Volume. 23, No. 5, May 2012.

[9] Haiying Shen, Yuhua Lin, and Jin Li, Social Network-Aided Efficient Peer-to-Peer Live Streaming System. IEEE Transctions. Vol.23, 2015.