Minimizing the Congestion and Delay Effects in Peer to Peer Networks

V Raviteja Kanakala
Department of computer Science & engineering
Ideal Institute of Technology, Kakinada

V Ravikishore
Department of computer Science & engineering
Ideal Institute of Technology, Kakinada

Abstract

In this paper, we are minimizing the problems of congestion and delay in peer to peer network. In the existing system it allows the node to share a file in P2P networks and proposes the optimal sizing (number of peers) and grouping (number of directory intermediary) decisions. P2P technologies have many characteristics. First, no central control over the node and no single point of failure and are more scalable. Second, on a large P2P network, any node to find another node with the desired content that is close in which transmission delay may be lowered as well. The existing system has a drawback that only one supernode for each group; there may be problem when the supernode doesn't work properly and if the node doesn't want some particular files to be shared by other nodes in the network so, we are overcoming the problem by providing some backup (making a copy of the supernode) mechanism such that when a supernode fails to respond, the peer nodes can send request to the other node and for a node do not want to share a file with other node that can be overcome by privacy mechanism.

Keywords: Peer to Peer network, Supernode, Content availability, delay

Introduction

P2P networking is the sharing of computer resources and services by direct exchange between systems. These resources and services include the exchange of information, processing cycles, cache storage, and disk storage for files. P2P computing takes advantage of existing computing power, computer storage and networking connectivity, allowing users to leverage their collective power to the 'benefit' of all. P2P Network Characteristics are Clients are also servers and routers. Nodes are autonomous (no administrative authority) and Network is dynamic: nodes enter and leave the network frequently.

In this paper, we analyze the promising supernode-based P2P network structures. The scale of a P2P network plays an important role in determining network performance; we investigate two

All Rights Reserved © 2013 IJARCET

important operational issues of a P2P network: sizing and grouping decisions. Sizing refers to the determination of the optimal size for a P2P community for any given supernodes (i.e., the optimal number of peers connected to the same supernode). Grouping refers to the partition of a fixed number of nodes into multiple P2P communities (i.e., the optimal number of supernodes, given the number of peers). An important factor in grouping decision is the interconnection structure among groups.

P2P Networks

Peer-to-Peer (P2P) technologies link social networks into cooperative ventures that share information (audio, video and graphic files), computer resource (computing cycles, hard disk space, and network bandwidth), and communication and collaboration (instant messaging). Members of a P2P community exchange information or other resources directly with each other, with very little or no use of a centralized or dedicated server. Many P2P services exist today, such as file sharing services (Gnutella and Freenet), grid computing services (Popular Power and Distributed Net), instant messaging service (AOL, Yahoo!, and MSN), and online collaboration service (Groove Networks).

Among various P2P applications, file sharing is probably the most popular. In contrast to the traditional web server-based content delivery paradigm, this emerging "bottom-up" mode of information distribution, leveraging the resources on the peer nodes, is considered to be superior. P2P file sharing networks have attracted many users and much press attention, along with the ire from media firms who feel threatened by the illegal exchange of digital music and movie files.

However, there are drawbacks inherent in the P2P networks, due to the same decentralized structure. First, because each peer node can modify its content freely, it may be costly to find desired contents. Second, since P2P users obtain contents from each other, the availability of these contents completely depends on the peer nodes being logged on. So, content reliability may be an issue.

Literature Survey

There are a number of papers on the technical aspects of P2P networks. These papers focus mainly on developing efficient based search mechanism to improve the effectiveness of supernodes.

On the topic of networks scale, Asvanund et a l. [2] empirically analyze network externality in P2P music sharing networks and suggest that larger networks are not always better. Yang and Garcia-Molina [34], [36] design various content-sharing P2P search architectures and compare the

All Rights Reserved © 2013 IJARCET

maximum number of users that can be served on them. Butler [4] investigates the effect of membership size and communication activity on sustainability of online social structure. The results of this study suggest that networked communication technologies provide benefits to balance the opposing impacts from membership size. These studies provide valuable empirical evidences on scale effect, but they d o not present underlying operational metrics for evaluating network performance and for gaining insights on optimal scale decisions.

Regarding the grouping of P2P networks, Asvanund et al. [3] propose a scheme for club membership management based on content similarity and physical location. Ledlie et al. [17] develop a hierarchically grouped system that can self-organize to overcome unreliability. Khambatti et al. [12] use attribute-based clustering models to simulate how self-configuring communities are formed. Their results demonstrate that community structures in a random network can be efficiently discovered based on attribute and link information of peers.

Recently, a few researchers have started to explore the social and economical aspects of P2P free riding phenomenon and incentive mechanism design. For example, Golle et al. [9] construct a formal game theoretic model to develop and analyze several payment mechanisms to encourage file-exchange activities. Krishnan et a l. [13], [14] propose a plausible model to analyze the existence of free-riding behaviors in P2P file-sharing networks.

However, the framework, assuming a constant sharing cost in the absence of any query forward interconnection, does not explicitly discuss the impacts of system parameters on network structures. While most of researches on P2P networks in technological domains assume that users follow prescribed protocols without deviation, Shneidman and Parkes [29] advocate a P2P model in which users are rational and self-interested. They develop a new operating mechanism that allows users to behave rationally while still achieving good overall system outcomes. Using economic incentive model, Jackson and Wolinsky [11] examine whether efficient (value maximizing) social networks will form when self-interested individuals can choose to form or sever links.

Additionally, many reputation and trust systems are proposed to provide incentive s for cooperation without involving a pricing scheme [7]. For example, Ranganathan et a l. [24] propose a multiperson prisoner’s dilemma model to investigate user behaviors and develop pricing- and reputation-based mechanisms to improve system performance. Wang and Vassileva [37] propose a Bayesian network based model to build reputation that is based on recommendation in P2P network. Kung and Wu [15] present a reputation-based P2P admission system, using eigenvector approach, to allow only those nodes that have made reasonable service contributions to receive services from others.

All Rights Reserved © 2013 IJARCET

However, to the best of our knowledge, little attention has been given to the operational aspects of P2P networks so far. Christin and Chuang [6] propose metrics for estimating latency, sharing, routing, and maintaining cost in order to investigate the social optimum structure of P2P networks. In this paper, we focus on scale issues, and develop analytical model to examine how network size and system parameters affect performances of P2P networks and optimal sizing and grouping decisions.

Proposed System

We consider a content-sharing P2P network in which the participants are categorized as regular peer nodes and supernodes. A supernode and a number of regular peer nodes form a community. Only the supernode maintains up-to-date information on all resources available in the community. Every content request (query) is generated at one of the peer nodes, and first processed at the local supernode on a first-come, first-served basis. For every query it processes, the supernode recommends a provision node that has the desired file and the lowest expected download delay. For example, many kinds of P2P file-sharing software (such as BitTorrent or KaZaA) provides the information of download speed and estimated time for each qualified provision node. Once this information is passed on to the requesting and provision nodes, download occurs directly between these two nodes. There could be many supernodes but each peer node is connected to only one supernode whenever it logs on. If a query cannot be satisfied from the local community, it will be forwarded to other supernodes.

All Rights Reserved © 2013 IJARCET

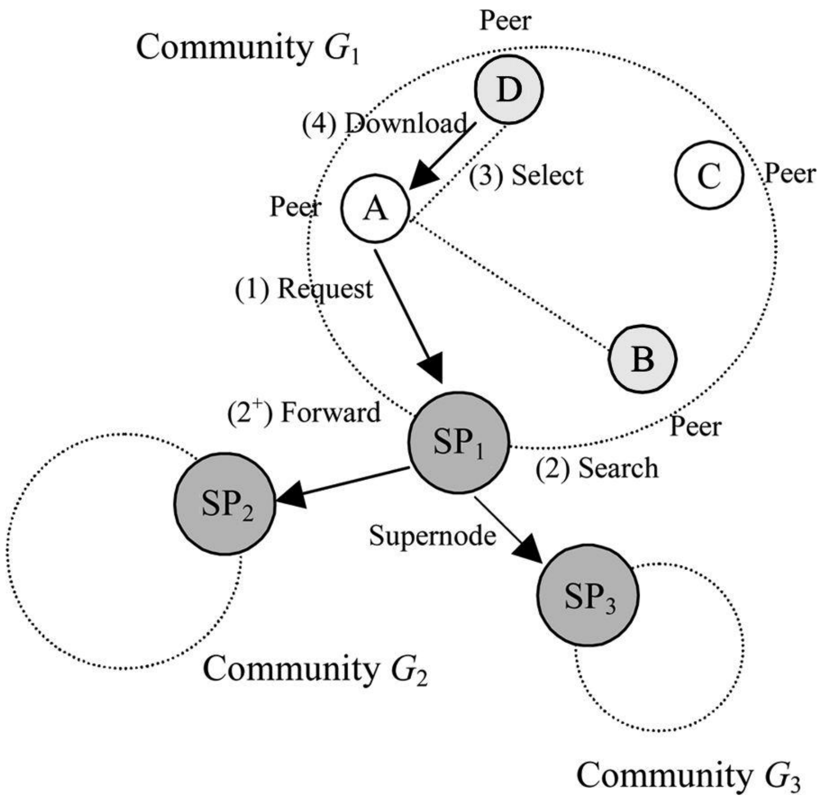

Fig 1: Data Flow Diagram for Peer-to-Peer network

Operating Policy

Fig.1 depicts the operations of a supernode-based P2P net-work. On a snapshot of a network, a peer node in community needing a file that it doesn't own sends a content request to the local community center. The supernode of community searches its directory database and responds with a list of nodes that share the requested content (e.g., nodes), along with the download information (approximate delay). It also recommends the node with the minimum download delay as the provision node (node). After that, the requesting node downloads the content directly from provision node. I f the request is not satisfied (i.e., no node shares the requested content in the local community), the query will be forwarded to other interconnected supernodes, and based on various peering policies (such as parallel or sequential forward). In the paper, we assume that unsatisfied requests will be broadcasted (forwarded in parallel) to all interconnected supernodes.

All Rights Reserved © 2013 IJARCET

Results and Discussion

Snapshots

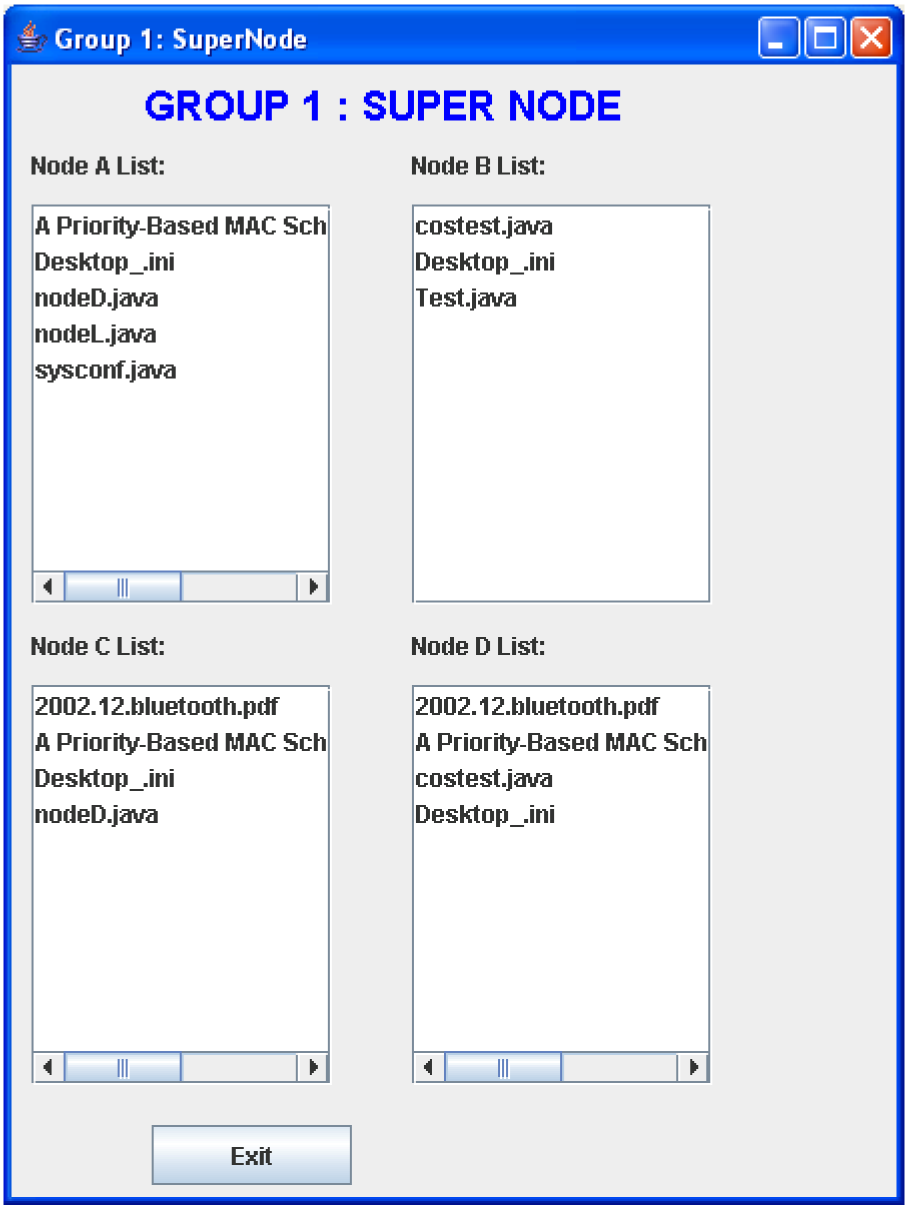

Fig 2: SuperNode of Group1 containing files of all PeerNodes in it

Supernodes contain information about all nodes regarding whatever the files that is available for each node. Each Supernodes having four nodes, which give the direction to the node regarding the files along with the transmission delay.

All Rights Reserved © 2013 IJARCET

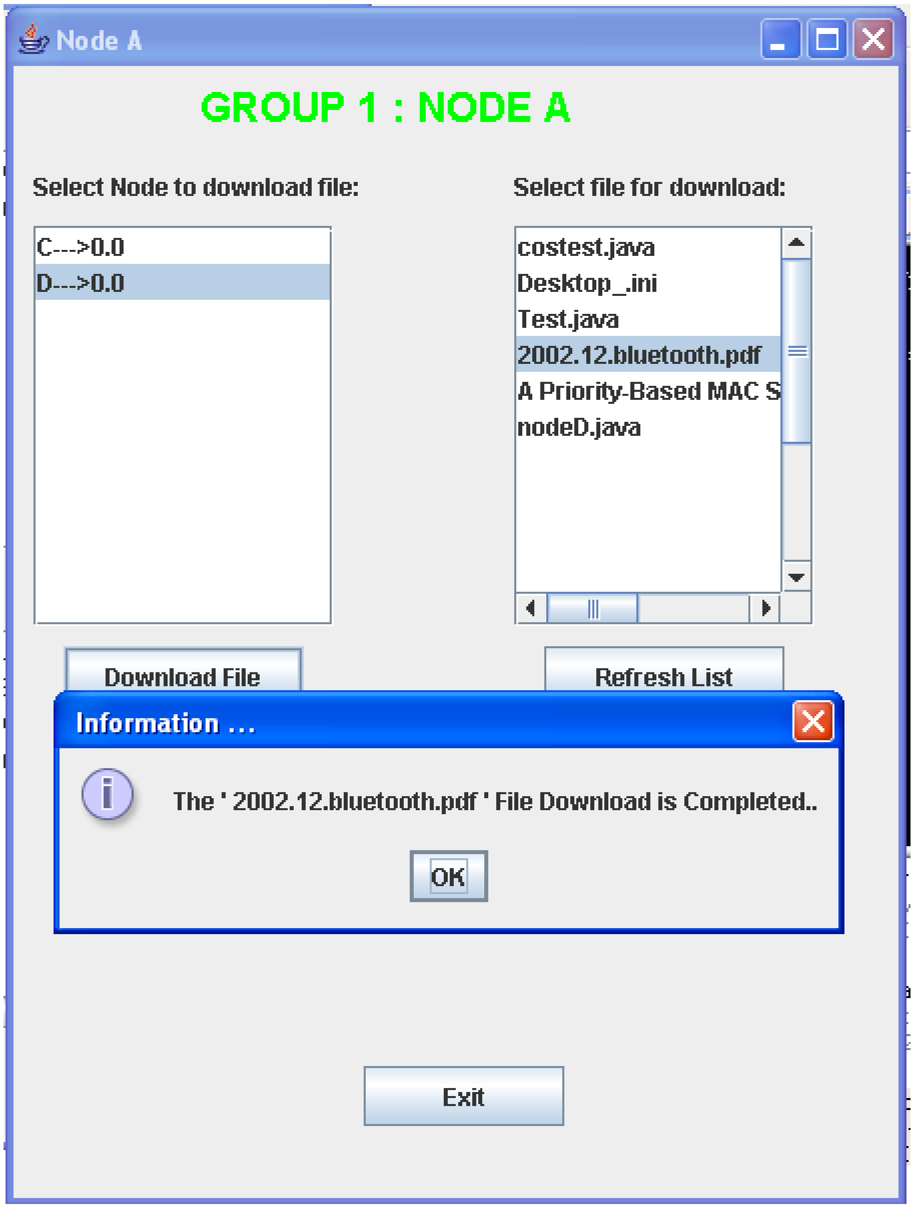

Fig 3: After downloading selected file in PeerNode A

Node A request the Bluetooth.pdf file to the Supernode, it will check whether the file is available or not within the group, if it is available within the group it will send which node having that file along with transmission delay to the requested node. Then it will select the node with minimum delay and download the file from that node and it will make updation in its table.

All Rights Reserved © 2013 IJARCET

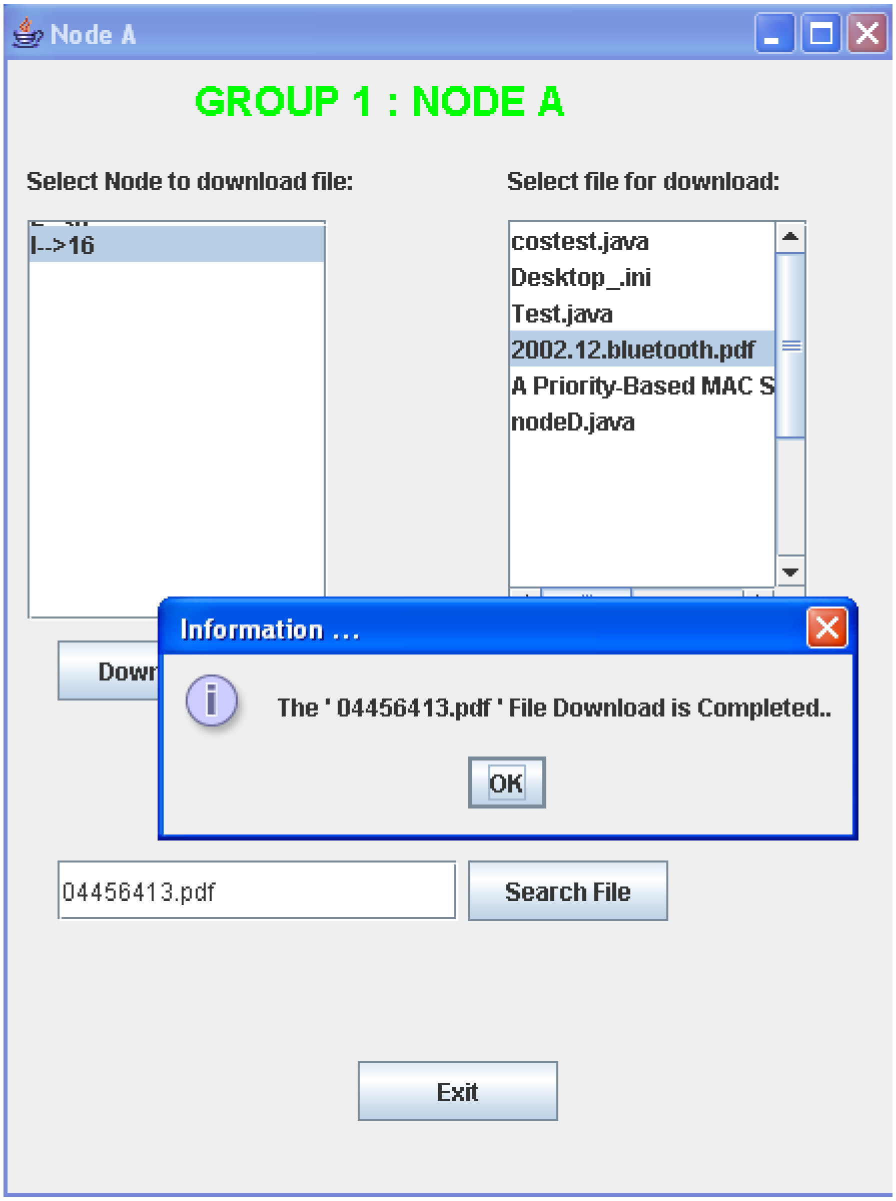

Fig 4: PeerNodes A after downloading file from remote node I

If the requested file is not available within the group Supernode send the requested file to other Supernode in the Peer to Peer (P2P) network. It will check the requested file in its database , if its available it will send the nodes which is having that file and time delay to Supernode ,so that Supernode in turn sends to the requested node and makes its table updation. Based on minimum delay the node will download that file. In this figure nodeA downloading the file from remote community node I which is having a minimum delay.

All Rights Reserved © 2013 IJARCET

ISSN: 2278 – 1323
International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)
Volume 2, Issue 12, December 2013

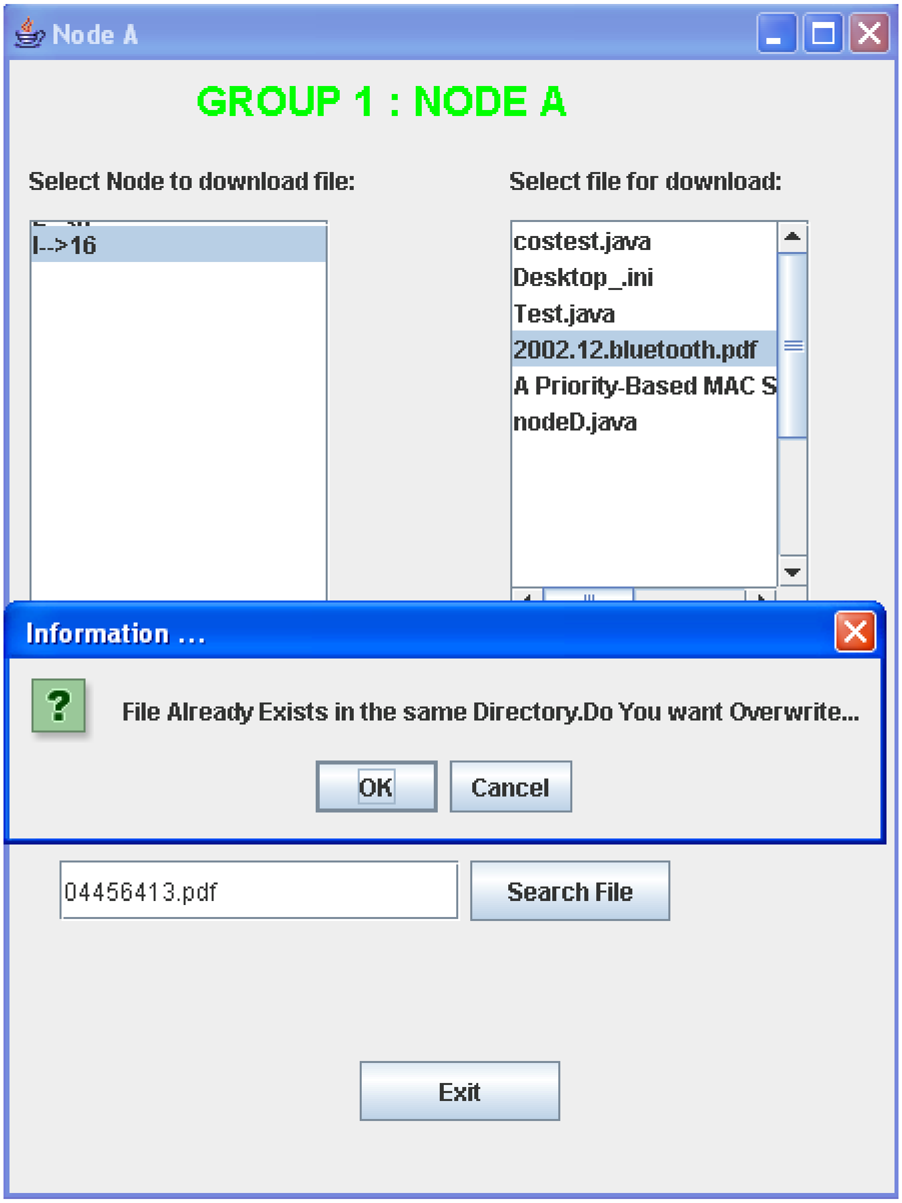

Fig 5: Seeking permission to overwrite the existing file

If the node A downloading a file from remote node I which is having minimum delay, in which the requested file is already available in the node A it will show the file already available in the same directory ,do you want overwrite, if yes it will overwrite the existing file. In this way a PeerNodes can share multimedia files, music files and perform online chatting and video conferencing.

All Rights Reserved © 2013 IJARCET

References

E. Adar and B. A. Huberman, "Free-riding on Gnutella," Firs t Monday , vol. 5, no. 10.

Asvanund, K. Clay, R . Krishnan, and M. D. Smith, "An empirical analysis of network externalities in P2P music-sharing networks," Inf. Syst. Res. , vol. 15, no. 2, pp. 155–174, Jun. 2004.

Asvanund, S. Bagla, M. H. Kapadia, R. Krishnan, M. D. Smith, and R. Telang, "Intelligent club management in peer-to-peer networks," in pr oc. Wor kshop Econom. P eer -to-P eer Systems , Berkeley, CA, Jun. 5–6, 2003 [Online].
Available: http://www2.sims.berkeley.edu/research/conferences/p2pecon/program.html

B. S. Butler, " Membership size, communication activity, and sustainability: A resource-based model of online social structure," Inf. Syst. Res. , vol. 12, no. 4, pp. 346–362, Dec. 2001.

C. Dellarocas and P. Resnick, "Online reputation mechanisms: A roadmap for future research," i n Proc. Workshop on Economics of Peer-to-Peer Systems , Jun. 2003 [Online].
Available: http://www2.sims.berkeley.edu/research/conferences/p2pecon/program.html

All Rights Reserved © 2013 IJARCET