# Knowledge Management and Resource Discovery using Peer to Peer Network

By

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## ABSTRACT

The success of Knowledge management frame work in an organization depends on the timely and precise updation of the data, tools and techniques used for Information exploration. The Traditional approach of Client Server model requires the data to be pooled at a central place and all clients access this central database for access to the information, which usually requires lot of manual efforts for data collection and maintenance of the database. With recent advancement and popularity of the Peer to Peer Network architecture, we have explored the possibility of the use of such type of architecture for Knowledge Management and Resource discovery. This will ensure timely updation of database and de-centralized mode of data archival.

**KEYWORDS :** Knowledge Management, Peer to Peer Network, Client Server Network, Resource Discovery

## 0. INTRODUCTION

Knowledge management is very essential to the success of the organization as it not only helps in discovering the resources, but also in current scenario helps in evolving new business rules and models[1]. The success of the information explored from the database depends on the quality of the data and how fast the information is updated in the database to make it most recent. The traditional approach to Knowledge management is using a Client/Server model, where the database is stored at a central location and all clients access the Central Server requesting information. We propose a model for Knowledge management and resource discovery using Point to Point communication architecture[2]. This model will provide access to the resources at the point for their origin, which will always make it most recent. The proposed model will also reduce the dependency of availability of knowledge on the single central database, in case of server failure and non-availability of connectivity to that server.

## 1. INTRODUCTION TO PEER TO PEER NETWORK

Peer to Peer is a type of decentralized computing where computers communicate directly with each other avoiding the dependency on a central dedicated server. In this model, all computers are connected and all computes can act as a clients, when they require service from another node or as servers when they need to provide service to others. In other words we can say that this is a decentralized architecture where neither client nor server status exists in a network, every peer has equal status. Such type of computing environment pools together processing power, memory and other resources from many computers [5].

**Peer to Peer has three different models**

- Collaborative Computing
- Instant Messaging
- Affinity Communities

## 2. TRADITIONAL APPROACH

Traditional approach of sharing the knowledge base is client server approach [Fig1]. In this model the whole data is stored at a central location called server and all other systems, called clients, can access the information stored on that server. Such model is surely more secured and easy to manage as it requires administration of a single server but is less fault tolerant and requires lot of manual efforts for building and maintenance of the database used for Knowledge management.

For example, we have designed an expert database [3] using client server model (http://nissat.inflibnet.ac.in). The expert's information is available on the central server and clients can access this information by applying various search criteria to the database.

The problem with this model is that if an expert wants to modify his information, he has to access the central server and then only he can update his information. This in real world is very difficult as it is impossible for an expert to keep track of the servers on which he has registered himself and periodically update his profile.

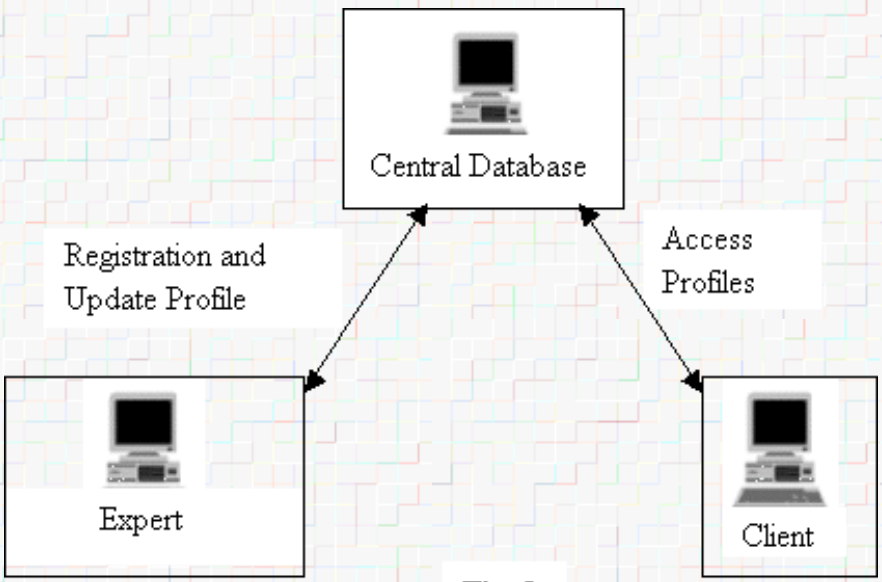


**Fig. 1**

## 3. PROPOSED MODEL

We propose the new approach of designing knowledge management and resource sharing system, using peer to peer protocol in a distributed computing environment. In our proposed solution, we are using peer to peer network architecture for accessing information from the source/originator and a central database, which will contain the metadata for providing a quick access to the database.

The Peer to Peer model of knowledge management is different from our traditional client server model. In P2P model, all connected clients and server of the traditional model can work as a server and client, which we call as peer. Each peer can request for data and can produce the data on a request from other peers. By using this model, knowledge can be distributed among different peers, connected in a network. Their resources, like knowledge, CPU and storage can be shared. So load on one server will be distributed among all the peers. In our model we propose two configurations. In first configuration [Fig 2], the organization willing to share its resources will download the organization shell from the central servers. This shell will help the organization to announce its resources in a P2P framework.

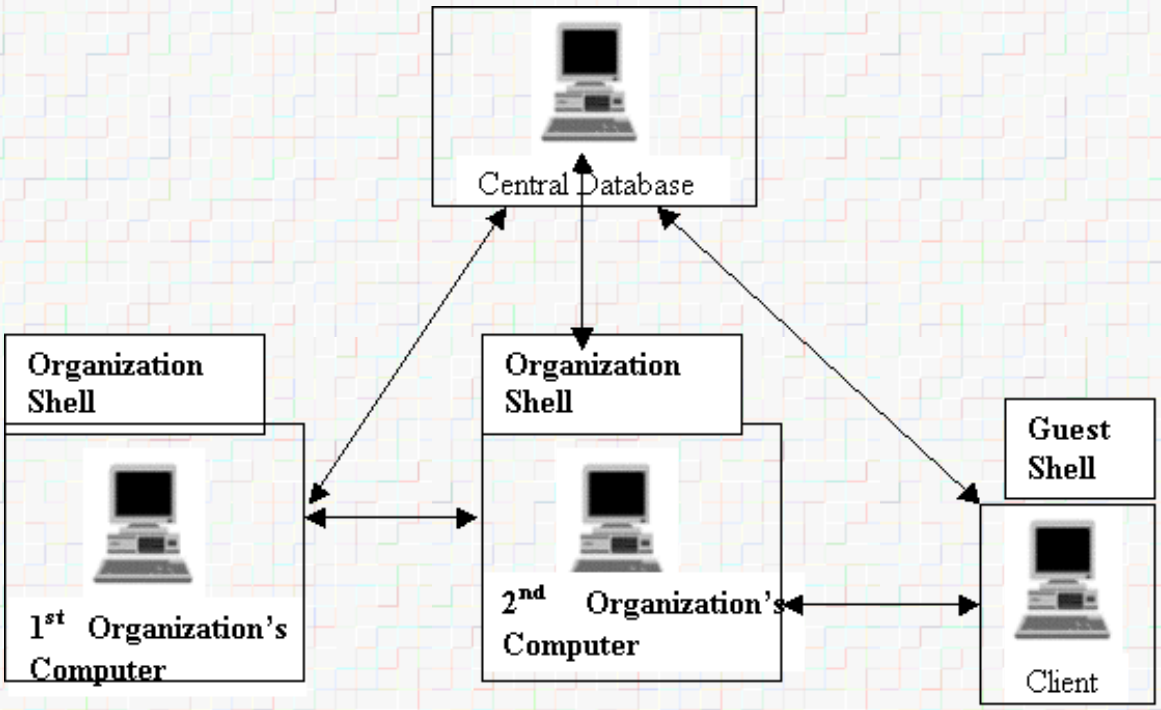


Fig. 2

In the second configuration [Fig 3], the originator of the information ( in our case of Expert's database), the Expert's computer itself is connected in a P2P framework, which will be made available to the Expert during the time of registration and will allow him to participate in a P2P environment.

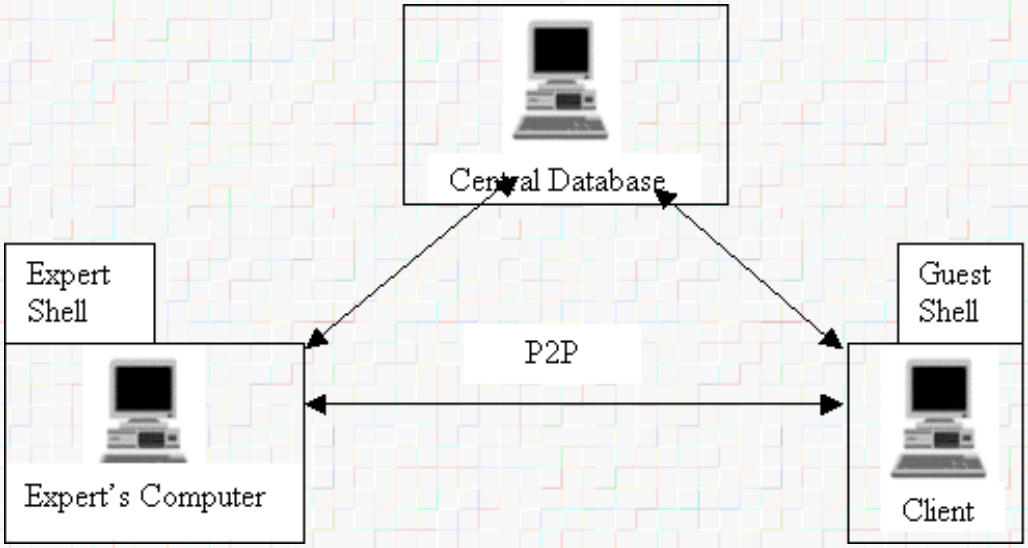


**Fig.3**

## 4. IMPLEMENTATION

In our expert database, peer to peer network model can be implemented. Presently we have only one server containing expert's information. Peer to Peer model will use the central server to hold the metadata about the expert and the detailed data about the expert will be at the Expert's computer or at some central server such as the server of the organization to which the expert belongs. The metadata of expert's data at our central database will contain expert's brief information and a Peer-ID, which will be assigned to each expert during registration. The Expert will be provided with an Expert Shell, which he will run at his computer for participation in a P2P network. This shell will allow the expert to publish his data and share resources. This shell will also allow the expert to chat with other experts or clients using instant messaging facility of the P2P framework. This will makes the expert's and central database administrator's job easy. Expert can quickly and periodically update his information from his place and the load on the server will also become less. Client access to such environment will call for firing a search at the central database and based on the metadata displayed by the server, the Client can access the expert's resources such as his papers and other reports published by him by downloading the guest shell from the central server. Guest shell will allow the client to directly interact with the expert and can access resources and published data on the expert's computer. If client wants to get more information from that expert, then he can directly chat by using the instant messaging functionality of peer to peer model.

The same model can be applied to organizations where access to individual expert's computer is not possible, in such cases all experts belonging to an organization can publish their data on the central computer of their organization and this central computer can participate in P2P framework. Here organization's computer will act as a peer with a Peer ID and we store that Peer ID in our database along with brief information of organization. So if any user wants to access that organization's information, then user will get organization's Peer ID and directly interact with the organization and access the available resources. In this way, the load on our server will become less as compared to traditional client server model.

From experts database, if any client wants to access specific organization's expert information, then by using guest shell, client will directly connect his computer with the requested organization's computer, which will allow him to access resources of that computer and directly interact with a particular organization's expert.

## 5. AVAILABLE COMPUTING PLATFORMS FOR PEER TO PEER MODELS

Different options exist for development of Guest and Experts shell. JXTA [4] is one such environment, which is an open source effort and provides a general purpose architecture and protocol standard on which peer to peer systems can be built. JXTA is peer to peer

computing platform, which defines a set of protocols that can be used to build almost any peer to peer applications.

JXTA provides three major features, which make it popular for use.

**Inter Operability:** To enable peer to peer services to locate each other and communicate smoothly with each other.

**Platform Independence:** To be independent of programming languages, transport protocols and deployment platforms.

**Ubiquity:** To be accessible by any device with a digital heartbeat, not just PC or specific deployment platform.

## 6. COMPARISON OF TRADITIONAL MODEL TO PEER TO PEER MODEL

### Advantages of Peer to Peer computing model

It is very cost effective solution, in which peripherals and files can be shared. The reason for its being a lower cost solution is that there is no dedicated server, which is generally the most expensive network component in a client server model. In our Expert Database with peer to peer model, we need not have to keep a powerful server for storage of voluminous data related to experts.

As each peer contributes certain resources to the network, such as, storage space and CPU cycles, we need less space in our database to store data and computer processing will also be divided among different peers

When more peers join the network, the networks capability increases. So our database becomes strengthened in both quantity and quality.

Remote workers collaborating on the same project can instantaneously chat with each other and complete their tasks more frequently.

Each peer can control access to his or her resources; this is good for security purpose.

Because of peer to peer model's ability to distribute workloads across multiple machines, it is possible to handle large data or perform complex computations.

**Advantages of Traditional model.**

Peer to Peer Networks are slower than the traditional Client/Server networks, since each computer is less powerful and may be in use as a client and server at the same time.

Managing this traditional model is easy, as it calls for administration of Single computer.

Easy to implement Security and backup policies

Access control is better as it involves single computer handling resources.

## 7. CONCLUSION

In today's scenario the important problem of large, distributed organizations is the efficient management and distribution of information, knowledge and expertise. Use of Peer to Peer Network might become a solution to these problems by giving a low cost, extensible, flexible and dynamic peer to peer knowledge network, which will provide more accurate and fast solutions to the problems. The other advantage of the P2P is the ease of resource discovery; the traditional approach requires lot of manual efforts in terms of data collection, categorization and publishing. P2P has in-built capability for resource discovery.

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***Dr. T.A.V. Murthy*** is currently the Director of INFLIBNET and President of SIS. He holds B Sc, M L I Sc, M S L S (USA) and Ph.D. He carries with him a rich experience and expertise of having worked in managerial level at a number of libraries in many prestigious institutions in India including National Library, IGNCA, IARI, Univ of Hyderabad, ASC, CIEFL etc and Catholic Univ and Casewestern Reserve Univ in USA. His highly noticeable contributions include KALANIDHI at IGNCA, Digital Laboratory at CIEFL etc. He has been associated with number of universities in the country and has guided number of Ph.Ds and actively associated with the national and international professional associations, expert committees and has published good number of research papers. He visited several countries and organized several national and international conferences and programmes.

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