ISSN 2347 - 3983

International Journal of Emerging Trends in Engineering Research (IJETER), Vol. 3 No.6, Pages : 18 – 22 (2015)
Special Issue of NCTET 2K15 - Held on June 13, 2015 in SV College of Engineering, Tirupati
http://warse.org/IJETER/static/pdf/Issue/NCTET2015sp04.pdf

NOVEL APPROACHES WITH CHORD IN EFFICIENT P2P GRID NETWORKS

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ABSTRACT
Grid computing system which provides accessing of system resources using internet allows us to share files but also most of the software and hardware resources. A good resource detection mechanism is the primary requirements for grid processing systems, as it provides resource handling and assigning of applications. With different innovation methods, Peer-to-Peer (P2P) technology witness quick progress and the key part for this success are well-organized lookup applications of P2P. Chord is a P2P structural replica extensively used as a direction-finding etiquette to find resources in grid surroundings. Data location can be easily implemented on top of Chord by associating a key with each data item, and storing the key/data pair at the node to which the key maps. Chord adapts efficiently as nodes join and leave the system, and can answer queries even if the system is continuously changing. In order to reduce number of hop counts and message complexity, Recently Visited Node and Fuzzy techniques are used . By using the address of Recently Visited Node and Fuzzy techniques can easily locate the grid resources by reducing message complexity and time complexity.
Index Terms: Grid Resource Discovery, Recently Visited Node, Peer-to-Peer, Fuzzy Classification.

1. INTRODUCTION

THE PEER-TO-PEER (P2P) networking concept has attracted a lot of interest in recent years from the practical perspective since the use of these networks abolish the want for using vital servers, permitting all computers to converse and allocate some resources such as records, sensors, and peripherals, In an equal basis [2].P2P networks can be classified into three categories, namely, centralized and decentralized networks. In centralized P2P networks, objects are stored in different nodes across the network, whereas object indexes are located in a centralized server. Nodes at arrival time can contact this server with the objects that they would like to share or can query for the objects that they are looking for in the network. The server will then try to accommodate these requests. It is assumed that the P2P client knows the address of the centralized server. One Possible drawback of such a network occurs when the server shuts down, which will stop the operation of the whole network. Decentralized-unstructured P2P networks are similar to the centralized P2P networks; however, objects are stored in different nodes all over the network, and the search queries are usually randomly passed to other nodes in a hop-by-hop basis; thus, the search process could turn out to be very inefficient because the object may be found or the query may time out.
In decentralized-structured P2P networks, objects and search queries are handled in a distributed manner. The most common way to achieve this search query is through a distributed hash table (DHT) [3]. The DHT is a mechanism for a direction-finding infrastructure on P2P systems that can maintain scalable and dispersed storage and recovery of the information on the clients. In DHT-basedP2P systems, there exists a large identifier space (e.g., 128 bits).Objects and nodes are assigned a random number from this space. When a node searches for an object in the network using its key, the network address of the node whose identifier is mapped to that key must be returned. Typically, each data item (or resource) is hashed (using SHA-1) to a 160-bit key value. Each network node is then related with a part of the key space and contains the information that have their keys in its key space. When a client wants to look up a resource, a key lookup message is sent to any participating client. This message is forwarded from one client to another. The client responsible for the key receives it as specified by the key space partitioning. The research procedure on DHTs consists of locating the information piece for a specified key. DHT-based P2P protocols such as Chord [4] have a specific reasonable topology and resource search for purpose [5]. in fact, each client in the system has a consistent address and keeps element of all keys. When a client wishes to search the resource in the network, the key is searched and can be obtained within $O(\log 2\ N)$ steps, where N is the number of actual nodes in the network. The Chord topology is considered as the most representative structured topologies [4]. It has been used in many works [9], [10] to improve the performance of structured P2P networks.
Grid applications are usually scientific with large number of users and dynamic resources. Because of the dynamic nature of Grid systems, it allows participants to join or leave the system at any time. To discover large number of dynamic resources an efficient, scalable and accurate discovery mechanisms are needed. Grid computing and P2P computing models share more features in common and P2P techniques and protocols can be used to implement scalable services and applications. The main reason for usingP2P techniques in Grid is that it supports scalability which is the key requirement of Grid systems. The two key services [1] of Grid managed by P2P techniques are membership management and resource discovery. The objective of a membership management services is adding a new node to the network and assigning this node a set of neighbor nodes. The resource discovery service is invoked by a

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node when it is needed to discover and use different types of resources. Resource discovery in Grid is a process of locating proper resource candidates which are suitable for executing jobs within a reasonable time. Efficient usage of the right resources is the key component of success of the Grid systems. The characteristics of the Grid systems make the resource discovery a time consuming process which can decrease the performance of the whole system. Various methods have been proposed to solve the resource discovery problem in Grid systems. They are classified into three main categories [2]. Grid resource discovery process uses different classes of systems like centralized and hierarchical systems and agent based systems. Even though these methods have the advantage of Open Grid Service Architecture (OGSA), they suffer from scalability, reliability and false positive problems respectively. On the other hand, agent based systems [3] are attractive in Grid systems because of their autonomy properties. They have capabilities to determine new migration sites according to their migration policies for the distribution of resource discovery queries, so that researchers adopted Peer-to-Peer (P2P) technology in Grid environment to solve these problems. In recent years P2P systems have been the hottest research topic in a large distributed system. Since P2P based network approach may overcome the limitations of hierarchical and centralized methods, P2P techniques are especially used in resource discovery process. The self organization, scalability and dynamicity are the inspiring features of P2P systems. As P2Pnetwork is a kind of distributed network, the nodes of P2P network share their own part of the hardware resources like processing power, storage capacity, network connectivity, RAM, virtual memory etc., P2P systems are mainly divided into Structured P2P networks, Unstructured P2P networks and Super-Peer systems [4].Unstructured P2P resource discovery approaches handle the dynamicity of resources. The routing mechanism of unstructured approaches presents the Grid to scale. In super-peer based methods, flooding [5] mechanism is used which leads to single point of failures. The structured P2P methods [6, 7] ensure the scalability of the system by involving all the nodes in the query processing. This ensures that all nodes in grid will have the equal load. The structured P2P networks based on DHT, which uses structured hash algorithm for hashing resources and node ids in the same space. Among these Chord algorithm is simple and easy to design and implement. Due to its simplicity, scalability and high efficiency Chord lookup protocol has been widely researched and applied in Grid environment especially in resource discovery

2. GRID AND PEER-TO-PEER ENVIRONMENTS

Sharing of resources helps in reduction of work among complex systems, since more number of clients and servers actively participates in network. Through resource sharing, one can effectively reduce load, communication time. Sharing of resources can be easily accessed and it is the common process, that's why most of the systems opt sharing of resources. Grid and P2P networks are commonly applicable and appropriate for sharing of resources. Depending upon the situation, sharing of resources can be done either partially or fully. Mainly grid systems are used in those places where there will be complete utilization of resources such as storage spaces. In order to verify whether the participation of resources occurs correctly, arrangement of grid systems occurs in centralized and hierarchal manner .Grid systems deploys virtual focus and recourse organization methodologies so as to make all resources to be properly utilized. In heterogeneous background, grids are mostly trusted as they having huge amount of security, privacy and consistency but it fails to work out on the nodes that eventually enter and exit. In P2P networks, node maintains high level of independency and dynamicity but the will be no guarantee of service orientation and safety among nodes.P2P and grid combination improve node mobility and increases the performance of node. Hence in realistic manner, it is possible for grid and P2P integration and determines many methods to find out resources.

3. P2P BASED GRID RESOURCE DISCOVERY

In normal client-server model, client and server will both have different responsibilities in action. But in P2P networks, both client and server acts as a single unit and either can initiate a session and get response. Differentiation between P2P systems can be done according to the methodologies they deploy. Hence P2P systems are classified in to two types namely structured and un structured P2P networks. In structured P2P systems, a particular procedure may be followed for the peers to be connected where as in unstructured P2P systems don't follow a particular procedure among peers .Hence there will be no proper sequence regarding the position of file. Grid and P2P networks have their respective momentous similarities and differences. The main common activity is whenever network changes with dynamism leads to improbable maintenance of nodes occur. The most common difference between two of them is sharing of resources vary with dynamism in grid system but it won't be possible in P2P systems. In turn, P2P networks successfully records and maintains information about nodes entry and exit. An appropriate method for resource direction finding procedure is chord and chord mainly relies on distributed hash table. The address of IP in chord can be obtained by consistent hash function and every node will have a distinct identifier. Depending upon the organization of node identifier, chord takes the form of Consistent circle topology. The main activity of chord is granting an input; it maps input on to the node. Relevance with chord, node takes the charge of storing value linked with key. chord makes use of consistent hash function to allot key to nodes and equilibrium load can be maintained as each and every node receives equal amount of keys. Chord differ other P2P direction finding methods based upon its ease, exactness and presentation. Chord just routes the key in an orderly way directed towards the target node. In P2P systems, every node simply maintains information regarding other nodes in small amount, solves each end every lookup desire. As soon as novel node joins in to the network confirmation regarding node may be done in order to stop distinct position of break down. For the chord procedure, if the

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identifier id is between node n and its heir node n, chord will return n as end result else node n searches for key id in its finger table and return node n whose identifier value is more than that of result obtained during lookup. The cause for returning n is n knows utmost information about id.

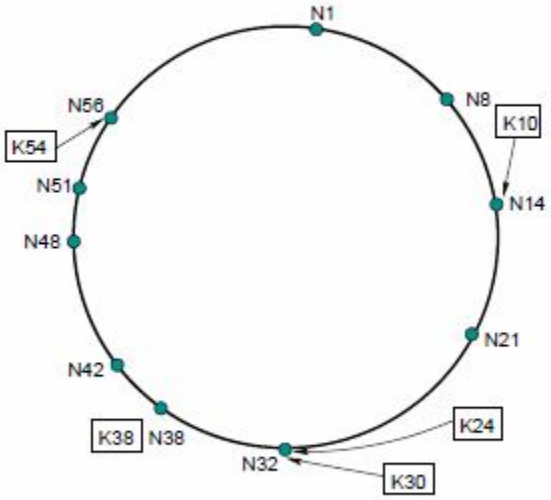

Figure1. An identifier circle (ring) consisting of 10 nodes Storing five keys

4. REQUIREMENTS FOR RESOURSE DISCOVERY

Normally more number of nodes participates in the network for accessing information, for that purpose a large amount of space may be required. Nodes participation in the network is not confined to a particular region and particular time. Nodes are free to enter in any region with any time. Hence there will be necessary of more stable and large scale environment. Network maintenance should be properly done because trust between administrate and participants is more important. In case if the administrate is not trust worthy that means not able to maintain proper information, the node mobility may becomes weak and wrong information may be transferred. Hence the environment where the nodes actively participate can be provided with high security measures and can be aware of node which eventually joins and leave the network. Proper information about node movements that is node joining and leaving can be maintained so that it will become easy to find out whether node is alive or not.The major requirements necessary for finding recourses are Independency is strictly followed, attributed search should be maintained properly, scalability should be maintained, and irregular recourse contribution should ne keenly observed

5. RESOURCE DISCOVERY METHODS

Recent Visited Node Method: Chord protocol is amassed by including a supplementary access in the main chord finger table to store the position of Recent Visited Node. The subsequent find utilize this identifier to place its key if the exact position is found. The chief aspire is to get well organised and quick finding of nodes. Usually, the concert of chord can be based in stipulation of size, number of hops needed and average hops required. Whenever a node desires for a key, it has to explore its initial finger table and if it locates its heir if explore is found or else, node passes messages to erstwhile whose node identifier is less than or equal to equivalent key and requires little more hops to find it. Once the tracing of heir is done, the result is returned to that node which had initiated the search and finding procedure is lucratively made.

SHA1 hash function is used to exactly locate the key and node identifier as that of main chord. Recent Visited Node stores the key of earlier lookup which is recognised by changed Rvn id which will be former column access in finger table. For each and every novel search, node initiates finding process by glancing Recent Visited Node id which was modernised by earlier lookup. If it doesn't precisely matches, then the node again checks for key, if it is more than Recent Visited Node, then it carry on its search from that position or else follows the normal main chord procedure to locate the heir of the key

Fuzzy Method- In this method we apply Fuzzy classification which classifies elements into a fuzzy set and its membership function is defined by the truth value of a fuzzy proposition al function. The Chord is constructed initially with 2m nodes. The ring is divided into three rings according to the basic Fuzzy-rule. Nodes with more than 66% of resources are grouped in HOTTEST RING. Nodes with resources between 34 to 65% are grouped into HOTTER RING and nodes with less than34% resources are allocated to the HOT RING. The goal of this method is to create a model which includes all the necessary conditions to clearly differentiate each ring. Whenever a new node enters, the algorithm correctly predicts the corresponding ring and the node will join into the desired place. In this place Divide-and-Conquer learning concept is applied to split the nodes into subsets and this process is recursively executed for the subset of nodes.

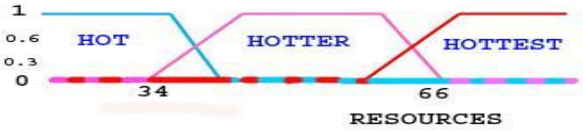

Figure 2: Fuzzy Membership Function for Three Rings

Now the 2m nodes are grouped into three rings according to the classification procedure of decision tree algorithm with the help of basic fuzzy logic properties. The splitting is based on the number of resources each node has. In each ring, Ring-Head is selected based on the strength of the resources. Ring-Head is the entry point to each ring. If a query is started by the node of any ring, the Ring-Head checks its own ring and simultaneously sends the query to the Ring-Head of the remaining two Ring-Head. So the resources are simultaneously searched in all the three rings. The lookup process may successfully end in the ring which originates the query or any one of the two rings may find the resource. If the resource is

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located in the originated ring, the process is similar to the normal lookup process. Otherwise, the node which stores the key will return the result to its Ring-Head and in-turn the Ring-Head submits the result to the corresponding node via the head of the corresponding ring. As far as the lookup process is concerned, this method will find the key through parallel search and reduces the communication time dramatically

6. RESULT

Recent visited method, the name itself indicates recently visited node hence for searching the key already previously visited node path may be used. Through this process, accessing of information can be done quickly and effectively. Communication time may be greatly reduced. In fuzzy method, chord may be divided in to many rings and lookup process may be done in those rings. By using Recent visited node method, a distinct column may be added in which previously visited paths are noted. Memory consumption is more in Recent visited node method but fuzzy method utilizes less amount of memory. Number of hop counts, Communication time may be greatly improved compared to that of base chord method.

7. CONCLUSION

As more and more resources appear in grids, there is an increasing need to discover these resources effectively and efficiently. Our common aim is to efficiently locate the resources in grid environment by using P2P techniques. Since Chord is the appropriate choice for single keyword search, we have experimented chord with two different systems. In the first method, previous history of lookup process is used to find the resources quickly if the previous path is used by most of the lookup processes. In our second method, we use Fuzzy classification to split the Chord into multiple Rings and the search process is done simultaneously in all the rings. From the simulation results, we conclude that the two proposed methods effectively reduce the required number of hops, messages and communication time. But the methods need a little more memory to store the previous history and Resource table respectively than the base Chord. It will not be an issue as memory is measured in terms of RAM-Bytes.

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ISSN 2347 - 3983

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Special Issue of NCTET 2K15 - Held on June 13, 2015 in SV College of Engineering, Tirupati
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