

Implementation of Overlay Ring Structure Configured as a Service in P2P Network

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Abstract— Recent researches of network structure are moving to high-level networks because there are already many research results of low-level network. Especially, current network services has been changed to the multimedia service using multicast routing such as IPTV(Internet Protocol Television) service. Then the same as the existing multicast services to multiple users at once placed to transmit the purpose. But now multicast services, there are many services in one of the network.

At this point, we study to important things that you can see. First, load balancing for network research is needed. Next, how to search for a variety of services are needed.

In this paper, we propose overlay ring structure for load balancing and service search. In particular, the distributed service offers an efficient way to search and directly implement them were using P2P(Peer-to-Peer) and overlay network structure.

Keywords— P2P, overlay network, mobile IPTV, ring network

I. INTRODUCTION

Recent researches of network structure are moving to high-level networks because there are already many research results of low-level network. Especially, current network services has been changed to the multimedia service using multicast routing such as IPTV(Internet Protocol Television) service. Then the same as the existing multicast services to multiple users at once placed to transmit the purpose. But now multicast services, there are many services in one of the network.

At this point, we study to important things that you can see. First, load balancing for network research is needed. Next, how to search for a variety of services are needed.

In this paper, we propose overlay ring structure for load balancing and service search[1][2]. In particular, the distributed service offers an efficient way to search and directly implement them were using P2P(Peer-to-Peer) and overlay network structure.

First it is explain about P2P network. Next we study overlay network and ring structure. And we propose a new ring structure. After that, we implement it using C# language and evaluation of this structure. Finally conclude this paper.

II. P2P(PEER-TO-PEER) NETWORK

Napster is a representative P2P system[3]. It communication between the nodes without the centralization of data with the structure so that transmit the effect of load balancing, but it is tricky to manage, and retrieve data[3]. Therefore, how to retrieve the data and manage the unstructured and structured a variety of technology and how it has been separated.

A. Unstructured P2P

Unstructured P2P manner bordering the central server or peer to send a query to search for resources, and peer-to navigate[4][5].

Of the initial resources to a central server that holds the address of the peer approach is used to tell Napster scalability of the week, but the problem was achieved. The central device adjacent without a search query flooding as a peer to peer approach Pure P2P model was used to find the problem of traffic was heavy.

To compensate, the proposed hybrid P2P model, a system with multiple super-peers configured with a hierarchical structure, then the super-peer resources efficiently between queries flooding to traffic to reduce the signal was used.

B. Structured P2P

This method for retrieving data through a distributed hash table peer content and information on how to map a common space using techniques that are addressing the content of the distributed structure. This technique has the maximum number of searches $O(\log N)$ search data so that the number of peers without any impact on search efficiency can be increased arbitrarily. How to use these technologies Pastry, Tapestry, Chord ring based approach and addresses of the n-level space, how to use the Distribute CAN, and the existing Chord ring form of the address space is organized hierarchically and the Viceroy there is[6][7].

III. OVERLAY NETWORK AND RING STRUCTURE

A. Overlay Network

The IP layer networks are widely researched but application layer networks is not enough researched now. Because we was provided simple services such as VoD(Video on Demand) and

restrict several services until now. But future network services are growth rapidly. So it needs new network structure rather than IP layer network. Then the overlay network structure is appropriate way.

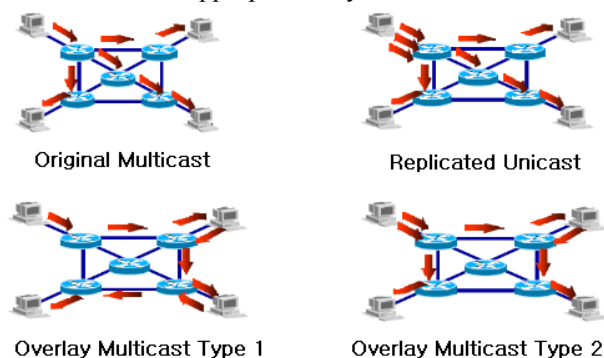


Figure 1. Types of overlay network.

Overlay network is an alternative approach to IP layer network. An overlay approach has the following advantages[8][9]. First, overlay network is easy to deploy. It does not require changes at the network layer. Second, the construction of a logical structure hides routing complications such as link failure instances, which are left to be taken care of at the routing layer. Third, intermediate nodes do not have to maintain per group state for each multicast group. Maintaining per group state has always been a problem in multicasting even in the internet. Finally, overlay network can exploit the capabilities of lower layer protocols in providing reliability, congestion control, flow control or security according to the needs of the application. Through overlay network, the various services are managed efficiently.

B. Ring Structure

The overlay network of service oriented is very efficiently for management of variety services that is connected by P2P. At this point, construction of overlay network is very important for configured as a service.

The ring structure is constructed circular. Each node has information of previous and next node. This structure is widely used P2P that can't manage nodes centrally.

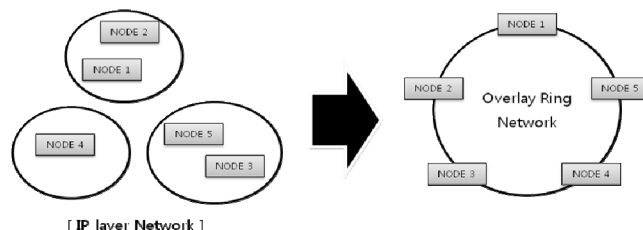


Figure 2. Ring structure.

IV. PROPOSED STRUCTURE

We proposed ring structure which configured as a service. It didn't consider IP level network and make overlay ring structure configured as a service using P2P network.

A. Node Link

Figure 4 shows information of each node. Each node has information of next and previous node. Through that, all nodes are linked in one ring.

In other rings, it is happened same information. Therefore ring structure of all overlay rings is extension of one ring.

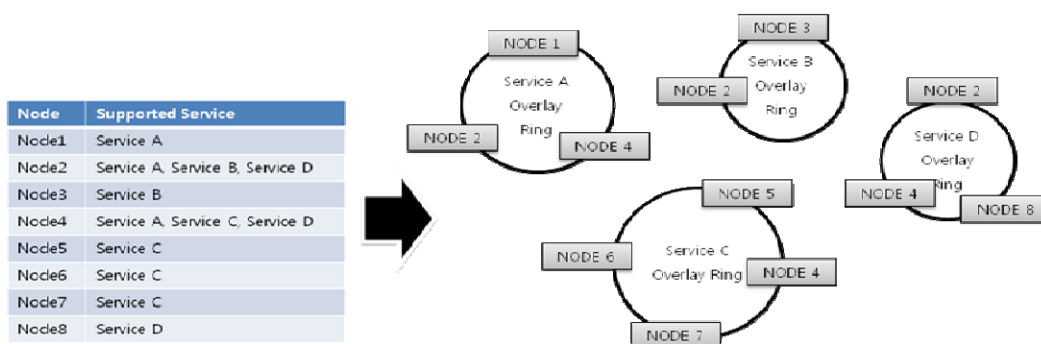


Figure 3. Table and ring sample of proposed structure.

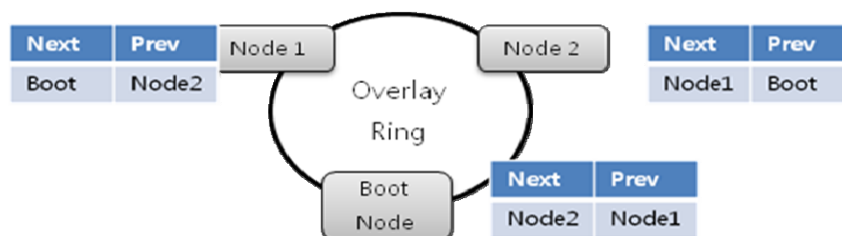


Figure 4. Link information of each node on overlay ring.

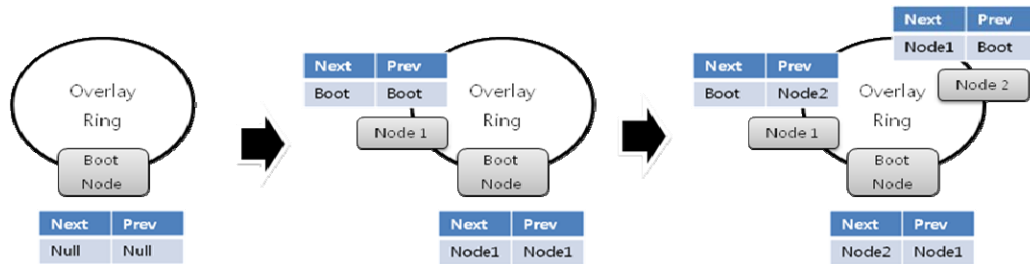


Figure 5. The process of member join.

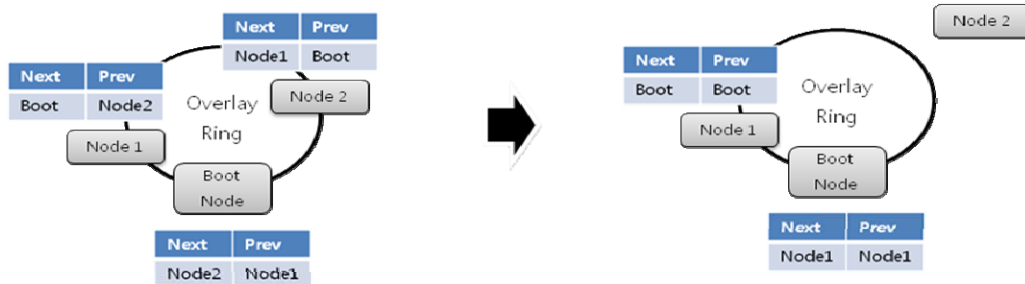


Figure 6. The process of member expire.

B. Member Join

Figure 5 shows process of member join.

First, there is boot node on the ring. Next, the node1 join through boot node. The node1 send join message to boot node and update next and previous information of boot node. Finally, the node2 send join message to boot node. After that, boot node send node2 information to node1. So all nodes are updated next and previous information of nodes.

C. Expire

If node2 is expired in the ring, boot node recognize that, and others nodes are received expire message from boot node. After that, each node is updated the information.

D. Maintenance

It must maintain node status for check of broken links on the ring. So each node are sending status message to neighbor nodes. If it can't find neighbor nodes, will be executed expire process

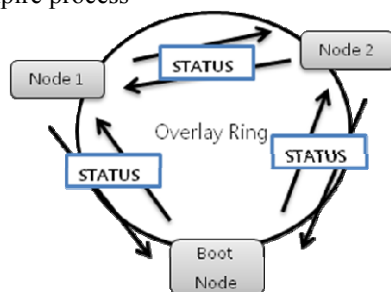


Figure 7. The process of maintenance.

V. IMPLEMENTATION

We implement proposed protocol using visual C# and make it by DLL(Dynamic Link Library) file for support various programming environments. It is example for using this library.

Table 1. Sample source code.

```
RingDLL ring = new RingDLL();
ring.set_Bootnode("192.168.1.100", 10000); // Setting boot node
ring.set_Mynode("192.168.1.116", 10000); // Setting my node
ring.Init(); // Socket Setting for communicate packet
ring.nodeJoin(1); // Join my node (Service key)
```

Table 2. Message types.

Message	Description
0x01	Join message
0x02	Set prev information(there is boot node only)
0x03	Chainging prev of join node to prev information of boot node
0x04	Chainging next information of next node of boot node to information of join node
0x10	Search request message
0x20	Received search result
0x31	Leave message to next node
0x32	Leave meesage to prev node
0x40	Maintenance message

Table 2 shows message types of this protocol. First if node joined, it sends 0x01 message to boot node. After that, boot node is notified information of new node to previous and next node of boot node through 0x02 or 0x03 and 0x04 messages. If contents search happened, the node send 0x10 message to next node. Next it received 0x20 message including result of search. The node is leaved, it send leave message to previous and next nodes. And each node send maintenance message to neighbor nodes on every decision time.

Figure 8 shows nodes information of boot, first joined node and second joined node. The first information of boot node shows boot node. Next it is pointed new node in previous information and first join node is set boot node in next and previous information. The node information of (b) is changed at new node joined. Then, three nodes are completed setting a ring network.

```

C:\WINDOWS\system32\cmd.exe
Socket Open
192.168.1.116:10000 => Prev 192.168.1.116:10000, Next 192.168.1.116:10000
192.168.1.100:10000 => Prev 192.168.1.110:10000, Next 192.168.1.116:10000

```

(a) boot node.

```

C:\Documents and Settings\Wngnlab\바탕 화면\Waa\WTestApp.exe
Socket Open
192.168.1.116:10000 => Prev 192.168.1.100:10000, Next 192.168.1.100:10000
192.168.1.116:10000 => Prev 192.168.1.100:10000, Next 192.168.1.110:10000

```

(b) first join node.

```

D:\nate받은파일\WTestApp.exe
Socket Open
192.168.1.110:10000 => Prev 192.168.1.116:10000, Next 192.168.1.100:10000

```

(c) second join node.

Figure 8. Link information of each node.

VI. EVALUATION

The key of proposed ring structure is distributed ring networks by service. So it find quickly than one ring because that it find all nodes always in one ring structure but proposed ring find contents in selected ring only.

In Figure 9, it is needed five times for searching contents always. But Figure 10 needed under five times. If searching contents in service A need three times. Others services same it. However one ring structure is searching five nodes always.

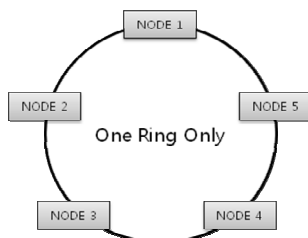


Figure 9. Contents find on one ring structure.

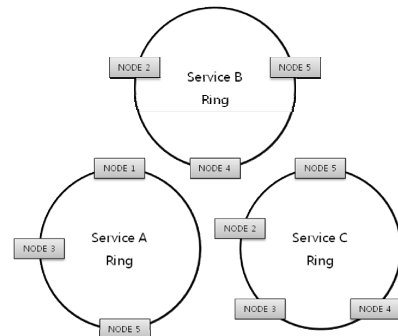


Figure 10. Contents find on proposed ring structure.

Table 3 shows counts of searching nodes of Figure 9 and 10 state. In this result, proposed structure is efficiency structure than one ring structure.

Table 3. Counts of searching nodes.

	One Ring structure	Proposed Structure
All services	5	5
In service A	5	3
In service B	5	3
In service C	5	4

VII. CONCLUSION

In this paper, we proposed distribute ring structure as a service. Current network services are trending toward open platform service. Therefore P2P network is very efficiency. Then, we will research P2P network for enhancement of performance. So proposed ring structure is helpful to this research.

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