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Virtual network Routing in Cloud Computing Environment

P. Priya Ponnusamy, Asst. Prof. [1], S. Abinaya, M.E.[2]
[1, 2] Department of Computer Science and Engineering
Sri Shakthi Institute of Engineering and Technology
Coimbatore, Tamilnadu, India

Abstract- Cloud computing offers on demand services, accessing and availability of resources by means of multiple devices by speedy detecting as required. In cloud computing data centers are consider as a virtual servers and organization or single users pay as the capacity they use (eg:Amazon web services).data centers offers an cloud services by use of virtualization techniques. Compute, network, storage are the principle offering of information facilities. . In networks the data lookup may degrade the network transparency so the importance of the routing is considered as an essential part in the cloud computing since they are based on the on-demand networks. Thus the comprehensive way of different types of routing algorithms in cloud computing environment is surveyed. Here we have compared routing in structured and unstructured overlay network.

Keywords: cloud computing, Routing, Network virtualization

I. INTRODUCTION

Network virtualization in cloud computing environment brings out reliable advantages. It can be implemented at various protocol layers, virtual private network, and Virtual Local Area Network (VLAN) and overlay network [14]. Overlay network is a network that is organizes on any other non-logical network. Nodes in the overlay network can be view as being interconnected by logical links, which corresponds to a path, possibly through many physical links, in the elementary network. This paper analyzed different routing algorithm such as Distributed Hash Table routing[3], Key Based Routing, content based routing that will be analyses in the virtualized network for efficient routing to improve the lookup of data and latency. Here location of data can be considered as metric to search a nearby data available. DHT from theory to practice and solve many practical problems such as load balance, multiple replicas, consistency, latency and soon [3].

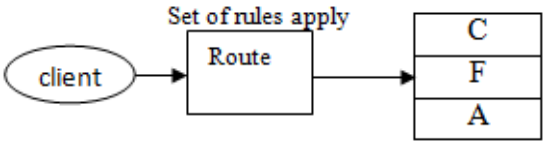
II. ROUTING IN CLOUD COMPUTING

Cloud computing is widely used in distributed and mobile computing environment [2]. The significance of the routing is considered as an important part in the cloud computing since they are based on the on–demand networks. Hence allocating the nearest data is a vital role in cloud computing. Data centres are the essential parts of cloud computing. In a single data centre generally thousand of virtual servers [14] run at any instance of time, hosting many tasks and at the same time the cloud system keeps receiving the batches of task requests. Traditional approach that are used in routing cannot be well in managing nodes and it is affected by network latency and inability to reach the specified location However in cloud, it is tolerable to find near best solution for routing problem in cloud environment[1].

III. EXISTING ROUTING

A. Content Based Routing:

It routes the message based on the content of the message better than specifying destination. It opens the message up and applies set of constraints to its content of message to find those who is interested in its content. The main advantage is that high degree of flexibility and adaptable to change based on location. It is implemented in two types of entities such as router and services [3][13]. Harvester technique content of messages can be store as a formatted message, used intermediate between the client and router. It is applicable in mail transfer agent stores, news server, legacy system and databases. The problem in this technique is that complete content of message consists of header and body, in body section long part cannot be examined in the process of routing [14].



B. Geographical Routing:

It is also called as a position based routing [1] and depends on geographic position information and widely used in wireless network. It routes the message based on the location of the destination instead of network address. Consider a

node 'A' determine its own location as well as location of the destination' B ' and easily route to destination without any topology and prior routing. It consists of two type of strategies single path (greedy forwarding and face forwarding) and multipath (flooding based).The issues in this routing is that there is no guarantee of delivery and waste of bandwidth and energy [5].

C. Key Based Routing (KBR):

KBR is a lookup service based on key and used in distributed hash table and also in overlay network. Based on some metric KBR [6] provides a information nearest host for that data according to the some parameter. Key Based Routing networks such as follows

- Freenet
- GNUnet
- Kademila

D. DHT Based Routing:

Distributed Hash Table is a decentralized approach and it provide lookup service similar to hash table and also manages node failure, departure and arrival .It depends on overlay network and store the nodes as filename, data with 160 bit key space string [3][4][6].

DHT hashing technique consists of consistent, rendezvous and locality preserving hashing.

- *Consistent Hashing*: Determine the distance between the keys and its unrelated to geographical distance. It manages unique ID for each node and it store all keys closest to ID.
- *Rendezvous Hashing:* Depends on weight which is near to its node and hash the value based on same list of weights.
- *Locality Preserving Hashing:* It enables the similar key to similar objects and exhibits range queries based on routing, similar keys are stored in neighbour node.

The structured overlay network [12] well applicable to implements in Distributed Hash Table, because sending and receiving messages to all nodes collect the statistics and in overlay multicasting network. Pastry overlay and dynamic querying search algorithm based on DHT Routing.DHT Implementation and protocols:

- Tapestry
- Pastry
- BATON Overlay
- Chord
- Napster /Gnutella
- CAN
- Mainline DHT
- Koorde
- TomP2P
- Cjdns
- FAROO
- Cloud SNAP
- Codeen

E. Backpressure routing:

Backpressure routing works on the principle of max-weight scheduling and possibly visits the multiple nodes and reducing the delay in the network and it obey the multi-hop queuing network model for lookup services [7].

Structure of Network Virtualization

The following structure of the virtual network has been implemented for each data center , in our host system need to create different network to route data from various daatcenter.

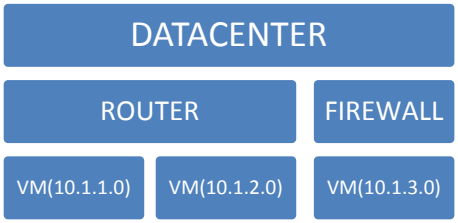


Figure 1: Virtual Network

From the figure 1, the data center from various regions can be connected by router that is virtually link to the multiple virtual machines.

Pooling of resources in network virtualization is depends on the location independent and physical link can require for the virtual connection over the network.

Table 1: Comparative Table of DHT Based Routing Protocols

PROTOCOLS	TAPESTRY	PASTRY	BATON overlay	CHORD
Structure	Peer –to- peer overlay network	Self-Organizing overlay network	Balanced tree overlay network	Distributed lookup protocol.
Working principle	Location aware routing to nearby resources and locally optimal routing table	Ping or trace route to determine best route and by using IP address	Distributed tree with range search(range query)and based on AVL tree	Consistent hashing, use finger table to avoid caching problem in routing
Application	Bayeux, Multicasting ,DHT, routing	Past, Scribe	Peer to peer system	Organizing the nodes and contents in P2P networks.
Advantages	Minimize Latency and Self Repairing Scalable, Location-Independent and Efficient Routing of Messages	Fault tolerance and scalability	Search cost minimized and should be in balanced manner.	Load Balancing, Decentralization, Scalability, Availability and flexible naming.
Node joining	a)Determine an active node b)construct an own routing table c)notifies other node in routing table	Numerically closer in the namespace set.	a) New node request to leaf node b) Leaf node checks the routing table whether space for adding a node is full or empty.	A node may dynamically join a Chord system.
Node leaving	a)voluntary node (i.e.)notification to other nodes when leave b)non-voluntary (without notification	No need of protocol, only refresh to updated data.	Node should inform the adjacent node ,child node and parent node while leave	A node may dynamically leave a Chord system.
Routing	$\text{Log}_B N$ N:network size B :ID base	Nearest node information. No of levels : (log N/b)	Restructuring the position	(n to log n) efficient routing
Disadvantages	Scalability ,node joining does not handle properly and node leaving	Latency due to if joining a node the routing table maintain path along the node information	No of levels is higher compare to chord.	Each node has only one choice for routing, if one node fails, the connectivity of the graph will be destroyed.

Overlay Network

Structured Overlay Network:

A) Chord*:*

Chord is an peer to peer structured overlay network in distributed system and it forms a circle like an ring .The working principle in the chord[6] is Consistent hashing, use finger table to avoid caching problem in routing and based on hash function (SHA-1) .Chord[3] uses the finger table structure to solve the caching problem. To ensure the efficient routing and to maximize the connectivity of the graph, the finger table in each node maintain *n* nodes. Both clockwise and counter clockwise reduces average routing path length from various data center.

B) CAN (Content Addressable Network):

In CAN [1] a node route the message towards the destination while receiving the message with specific destination using a simple greedy algorithm, this process of *Greedy Forwarding* continues until the message arrives to the designated destination. Based on the key value pairs the data is stored and retrieved in CAN. Periodically each node sends update messages to its neighbours for facilitating CAN system [3] [6].

C) Pastry:

When a node routes an incoming message, the node checks first whether destination's ID falls in its namespace set. This helps a message to reach its destination node correctly otherwise the node uses routing table to choose the domain at level *w*here the nodes share the longest prefix with destination node's ID. Then these nodes select a node as a next hop. The selected node is to be closer and alive to the destination than other node in same domain [4] [3][1].The following were the three technologies helps in improving the performance and robustness of CAN System,

- Increasing Dimensions.
- Multiple realities.
- RTT-weighted routing

D) Tapestry:

Tapestry [3][6] is a peer to peer overlay routing infrastructure, helps in offering location-Independent, scalable and efficient routing of messages using only local resources. Each node maintains its routing table which consists of set of neighbouring nodes. When a node routes an incoming message, the node selects the next hop node from the neighbours by matching the level prefix which is similar to the longest *prefix routing* method. As a result the ID's of the node on a route vary gradually12].

Unstructured overlay network:

Unstructured is a decentralization approach and it's not distributed system. Some of the protocols used in this network such as free net, Gnutella, Fast Track, Bit Torrent, Over Net/eDonkey.These methods are inefficient between topology and data location lookup [8].

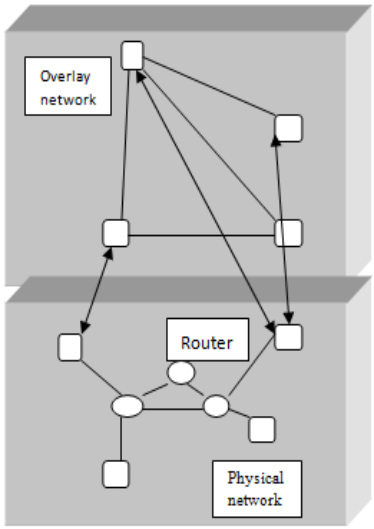


Figure 2 Structure of Overlay Network

From these figure 2 the connection can be mapped a physical IP network to an overlay network connect with virtual links

IV. PERFORMANCE CONSIDERATION

In Cloud Computing performance can be evaluated based on the parameter and its characteristics and there are different performance consideration [8] criteria for cloud infrastructure, such as

- Compute
- Storage
- Network
- Security and access
- Service offerings
- Support and service level agreements
- Managements and DevOps

The main challenges [8] for the large enterprises are given below:

- Availability: Cloud services should
  Be available for both providers and user.
- Storage: the performance can be degrade based on disk capacity and buffered capacity, if the request rejected by the server one of the criteria can degrade.
- Fault tolerance: In case of failure occur in datac enter ,should provide an minimum services
- Recovery: It should increase the performance based on the time that take less to recover otherwise performance will degrade.
- Routing: Location is the main factors for the network performance, the data retrieval from various data center cannot know.
- Security: Attacks on the cloud services may cause an issue on security.

V. RESULT

In propose work considering different routing algorithm for efficient network transparency and easy lookup the data from various data centers. Implement the network virtualization by considering all the resources as virtual and make deploy in cloud stack environment.

VI. CONCLUSION

In this paper we have studied and analyzed about the problems in existing routing and also about various routing algorithm. The routing for the data center should be chosen based on the requirement of the data center and we have analyzed the relationship between the routing algorithms [1] which are required for route the data .This survey has been useful for the clear idea about how to route the data and its lookup access.

REFERENCES

[1] Antony Rostrum and Peter Druschel, "Pastry: Scalable, distributed object location and routing for large –scale peer to –peer systems, in proc.IFIP/ACM middleware 2001, Jan germany , Nov 2001.

[2] David B. Johnson, David A. Maltz, and Yih-Chun Hu;" The Dynamic Source Routing protocol for mobile ad hoc networks (DSR). Internet draft (work in progress)", IETF, April 2003.

[3] Hao Zhang, Yonggang Wen, Haiyong Xie, and Nenghai Yu: A Survey on Distributed Hash Table (DHT): Theory, Platforms, and Applications "survey paper 'July 2013.

[4] Jihong Song , Shenyang University of Technology, China, Shaopeng Wang, Shenyang University of Technology, China The Pastry Algorithm Based on DHT", , Computer and Information science journal November 2001

[5] Karthik Nagaraj, Hitesh Khandelwal, Charles Killian, Ramana Rao Kompella, Purdue University, "Hierarchy-Aware Distributed Overlays in Data Centers using DC2" IEEE Journal on Selected Areas in Communications, 2012.

[6] Keong Lua; Crow croft, Jon; Pias, Marcelo; Sharma, Ravi; Lim, Steve. "IEEE Survey on overlaynetworkschemes". CiteSeerX: 10.1.1.111.4197: covering unstructured and structured decentralized overlay networks including DHTs (Chord, Pastry, Tapestry and others).

[7] Nagaraj, Karthik; Khandelwal, Hitesh; Killian, Charles; and Kompella, Ramana Rao, "Revisiting Overlay Multicasting for the Cloud" (2010). Computer Science Technical Reports, Paper1727.

[8] Niloofar Khanghahi and Reza Ravanmehr:" Cloud Computing Performance Evaluation: Issues and Challenges" International Journal on Cloud Computing: Services and Architecture (IJCCSA), Vol.3, No.5, October 2013.

[9] Siamak Azodolmolky, Philipp Wieder, Ramin Yahyapour: Cloud Computing Networking: Challenges and Opportunities for Innovations, IEEE Communications Magazine · July 2013.

[10] Stoica, R. Morris, D. Karger, M. F. Kaashoek, and H. Balakrishnan. Chord: A scalable peer-to-peer lookup service for Internet applications. In Proc. ACM SIGCOMM'01, San Diego, CA, Aug. 2001.

[11] Tosmate Cheocherngngarn, Hao Jin, Jean Andrian, Deng Pan, and Jason Liu:" Depth-First Worst-Fit Search based Multipath Routing for Data Center Networks".

[12] Xingkong Ma, Student Member, IEEE, Yijie Wang, Member, IEEE, and Xiaoping Pei: A Scalable and Reliable Matching Service for Content-based Publish/Subscribe Systems, IEEE Transactions on Cloud Computing VOL: PP NO: 99 Year 2014.

[13] Yichao Jin, Yonggang Wen, Member, IEEE, and Weiwen Zhang, Student Member, IEEE Content Routing and Lookup Schemes using Global Bloom Filter for Content-Delivery-as-a-Service.

[14] Franco Callegati,Walter Cerroni, Chiara Contoli:performance of multi-tenant Virtual Networks in Open stack-based Cloud Infrastructures, IEEE transactions on cloud computing in 2013.

[15] Hari Balakrishnan, M. Frans Kaashoek, David Karger, Robert Morris, Ion Stoica_MIT Laboratory for Computer Science" Looking Up Data In P2p Systems.

