Survey on Reliable Multicast in Data Center Networks

Sonia Tresa Paul

PG Scholar, Department of CSE, Karunya University
Coimbatore, Tamil Nadu, India

Jeban Chandir Moses

Assistant Professor, Department of CSE, KarunyaUniversity
Coimbatore, Tamil Nadu, India

Abstract:-*Multicast advantages data center group to communicate in each saving network traffic and to improve application throughput. Reliable packet delivery is needed in information center multicast for data-intensive computations. Reliable multicast solutions for the internet are not appropriate for the data center setting,especially with regards to keeping multicast from degrading upon packet loss, which is norm rather than exception in information centers.*

Index Terms:- Data center networks, reliable multicast, backup overlay.

1.INTRODUCTION

A reliable multicast protocol is a computer networking protocol that provides a reliable sequence of packets to multiple recipients simultaneously, making it suitable for applications like multi-receiver file transfer or streaming media and to cooperatively pass their data through the network to a main location. The performance of a reliable multicast delivery algorithm depends on the underlying topology and operational environment set of session members, session sources, and congested link, it should be feasible to analyze the behavior of the repair and request algorithms with fixed timer parameters. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. Multicast is a network addressing method for the delivery of information to a group of destinations simultaneously using the most efficient strategy to deliver the messages over each link of the network only once, creating copies only when the links to the multiple destinations split . Data centers are driven by large-scale computing services like net looking out, on-line social networking, online workplace and IT infrastructure outsourcing, and scientific computations. It is expected that within the future a considerable portion of net communication can happen inside information center networks. The rest of this paper discusses about techniques or methods related to Relaiable multicast. The last section of this survey paper is the conclusion of the comparative study of the papers.

2.RELATED WORKS

2.1 MAP REDUCE: SIMPLIFIED DATA PROCESSING ON LARGE CLUSTER

One of the programming model is map reduce. It is associated and implemented for the processing of large data set. Users will commonly use map function and reduce function for merging the intermediate values associated with some intermediate key. Map reduce will be run on a large cluster commodity machines and map reduce is highly scalable because, it process terabytes of data on thousand of machines. In functional style the programs written and it will be automatically parallelized and executed on a large cluster of commodity machines.

Partitioning the input data, scheduling the program execution on a set of machines, managing machine failures and inter machine communication is done by run time system. The programmer who does not have much experiences use it with parallel and distributed system to easily utilize the resource of a large distributed system. It will keep master data structure and each map reduce task and map task, it stores the state of worker machine. It consist of a map reduce library, it will process a very large amount of data. Using thousands of machines, the library will manage the failures gracefully. There may occur two failure i) work failure, each worker will get a ping periodically. If the master is not getting any response, master will mark that the worker is failed. If the response is available, then workers will be in progress or in completed state. Google will use map reduce programming model for many different purpose. The main advantage of this model is easy to use. The programmer without experience can use parallel and distributed system. Parallelization of fault tolerance, locality optimization and the load balancing can be hidden by map reduce model. Map reduce computation will express large amount of problems easily. Map reduce function is used for data mining, machine learning, sorting, google production, web search service. The impact of slow machines ca reduce the redundant execution and to handle data loss and machine failures. Reducing the amount of data sent across the network will optimize the numbers of systems targeted. The intermediate date to the local disks saves the network bandwidth and the locality optimization allows to read data from a local disks. The local information of the input files into the account and attempts to schedule a map task on a machine that contains a replica of the input data conrrresponding token by the map reduce master.

Advantage includes the model is easy to use,even programmers without experience with parallel and distributed and it will hide the details of parallelization,fault tolerance,locality optimization

Disadvantages are some system will restrict programming models and use the restriction to parallelize the computation automatically.

2.2 RELIABLE MULTICAST FRAMEWORK FOR LIGHT WEIGHT SESSIONS AND APPLICATION LEVEL FRAMING

The application level framing protocol model on end to end model of reliability and the IP multicast group delivery model will be guided in the design of scalable reliable multicast. The operational environment and the underlying topology depends on the performance of a reliable multicast delivery algorithm for unicast communication. The multicast delivery algorithm provide good performance over a wide range of underlying topologies one with the adaptive algorithm. In this subdivide the data space in to groups or container that in pages. It will have locally unique name that is a simple sequence number with sufficient precisions to wrap. The data will be multicast to the group when a member generates new data detecting loss, request retransmission and delivery a gap in the sequence space, is done individually by the member in each group considering timestamp that are used to estimate the distance from each member to every other. The repair request and retransmission are multicast to a whole group with the original data. In the session messages, the sequence number state will active for sources each member multicast periodic session messages that will report. Session messages are used by members to determine which are the current participant of the sessions. The state of the page currently viewing will be only reported by each member. Loss recovery is done when a members who detect a loss wait for some amount of time, then multicast their repair request. It will avoid request from other member sharing that losses. Repair request and negative acknowledgement are different in two respects. (i) repair request is not specified for a specific sender. (ii) it will send request data by its unique persistent name. If the host will detect any loss then it arranges for a repair request for a random time in future. In any case the request times expires host will multicast a request for getting missing data.

The main disadvantage in session message is to estimate the distance to each of the other member. In the local recovery, it will limit the unnecessary use of bandwidth in loss recovery events. In the conjunction

control, each session will required to estimate the available bandwidth, how to detect the conjunction or avoid potential conjunction control in relatively new area, the SRM will have minimal reliability. A data structure within which receivers are sorted into native regions or domains and in every domain there is a special receiver known as a chosen receiver which is to blame for causation acknowledgments sporadically to the sender, for process acknowledgment from receivers in its domain, and for retransmitting lost packets to the corresponding receivers. A elementary question for data center network is the way to interconnect a large number of servers with important combination information measure requirements. to the current finish, several analysis efforts are spent on planning scalable and economical data center network structures. Since lost packets square measure recovered by native retransmissions as critical retransmissions from the initial sender, end-to-end latency is considerably reduced, and the overall output is improved additionally the planned structures embody server-centric structures, switch-centric structures and hybrid electrical/optical structures.

2.3 Stateless Multicast Protocol for Adhoc Network

Multicast routing protocol is used in a multicast tree or in a mesh. Each individual node require to maintain state information about all nodes. Receiver based multicast protocol will use many multicast sink's addresses. A multicast-tree-aware backup overlay is expressly designed on cluster members for peer-to-peer packet repair. The backup overlay is organized in such some way that it causes very little individual repair burden, management overhead, as well as overall repair traffic. The address will be embedded in packet header. The receiver will decide the suitable way to forward the multicast traffic. The multicast protocol now using will be generally based on the various a tree structures and each node maintain packet delivery based on the tree states and the routing states. To route the multicast packet, geographic location information can be used and each packet will be split depending on the members in multicast. Each packet header in RB multicast will store destination list. The RB multicast reduces the complexity of routing packet by using receiver based MAC layer. When a receiver based multicast copy the packet for each section or region will have one or more multicast member.

To take the advantage of economies of scale, it is common for a data center network to contain tens or lots of of thousands of servers. several information center applications square measure information and communication intensive., a straightforward net search request might bit 1000+ servers, and information storage and analysis applications might interactively method petabytes of knowledge on thousands of machines. They outline varied traffic patterns such as matched, one-to-all, and all-to-all communications. To completely explore the network capacities inside the physical structures, researchers have planned a series of data center network routing protocols. Send their acknowledgments to the sender, rather than all receivers causation their acknowledgments to the sender, a single acknowledgment is generated per native region, and this prevents acknowledgment implosion. Receivers send their acknowledgments, thereby simplifying error recovery.

2.4 RELIABLE MULTICAST IN DATA CENTER NETWORK

Reliable packet transmission is required in data center for intensive computations in multicast. Data center network will have rich link resources and multiple equal cost paths from different servers. To bypass the multicast tree, unicast packet will repair with high probability. Unicast way in richly connected data center network transmit the repaired packets. Transmission pause can be avoided when a node/link failure occurs in the multicast tree. The congested link will not be exacerbated by repair packet. Packet acknowledgement will sent according to the sequence number assigned to each packet. In repair window, it will be maintained by every receiver for achieving the packet received from both the multicast tree and the backup overlay. Repair window will buffer the packets. The highest sequence number among the packets received will be present in the upper bound of the repair window. In packet repair, the receiver in the multicast is responsible for packet repair to overlay all

the successors in all the overlay rings it joins. Any of the receivers in multicast detects that its overlay successors has lost their packet, it will transmit the repair packet. In repair traffic, the overall repair traffic for receivers experiencing packet loss will be avoided by traffic saving, packet repair method used in multicast. These schemes double the overall repair traffic for receivers that experience traffic loss. In the repair latency, the receiver joining two overlay rings receives a repair packet it sense out the packet to the overlay successor in the overlay rings. The repair packet is transmitted in parallel to the backup overlay. Randomly delayed clustering will have the high link density in data centers to increase the throughput and reduce the impact of packet loss. The multicast manager will insert the receiver to certain position in multicast tree. When a new tree is generated the backup overlay is recalculated. If a new branch is added to new receivers, then need to update the overlay ring. Once one of the receiver takes leave from the multicast session, the multicast manager delete the leaving receiver. When a multicast receiver will access the packet from backup overlay for a period of time, it shows that switch/link failure is occurred in multicast tree. These does not provide packet repair path and repair isolation in multicast tree.

Disadvantages are duplicate repair avoidance, individual repair burden, overall repair traffic and repair latency. Randomly delayed clustering will achieve complete repair isolation, which is critical for throughput isolation. CPU overhead is present when center generates multicast packets from CPU at different rates from 100mbps to 900mbps. One more method that help in packet repair is logging service. It will not affect the data transmission in the multicast tree.

3 Existing Solutions

Routing in Server-centric Structures: In server-centric DCNs,Elementary routing schemes get routes between any two servers with short latency, a additional subtle routing in DCNs needs additional thought and optimisation in latency, reliability, turnout and energy, etc. Such quite optimization is understood because the traffic engineering drawback

Generic Naming — In automatic naming, to identify the address space for data center networks is the main goal it is an automatic process. It will differentiate the well-known structures. The algorithm tries to match the on one category and do the naming procedure.

Load-balancing. The second motivation is to higher utilize the link capability so as to tackle the trade-off between latency and turnout. an information center will run an outsized selection of applications and services, and a wise routing protocol should guarantee the performance of every application by with efficiency utilizing the link capability, e.g., distributing the traffic among the links within the info center as equally as possible.

Energy-efficiency. knowledge about traffic engineering is impelled by the priority that knowledge centers consume an enormous quantity of energy . Besides the efforts on the energy-efficient hardware and computer code of servers, there will be an energy saving at the routing layer. As an example, by showing intelligence routing traffic through solely a couple of active links and switches, a number of different links and switches will be changed to save energy.

4 CONCLUSION

Reliable networks build an explicit multicast-tree-aware backup overlay by leveraging the managed environment and the topological information of data center networks. Using the backup overlay, the packet repair responsibility among receivers is determined. Hence, can both achieve repair isolation and avoid duplicate replication. The high link density in data centers to minimize the impact of packet loss on the throughput degradation of the multicast session. A multicast tree aware backup overlay is explicitly constructed upon group members for packet repair. When packet loss occurs, repair packet is transmitted in a peer-to-peer way on the backup overlay, which has high probability to bypass the congested/failed link in the multicast tree where packet gets lost. A multicast-tree-aware backup overlay is explicitly built on group members for peer-to-peer packet repair. The backup overlay is organized in such a way that it causes little individual repair burden, control overhead, as well as overall repair traffic. Multicast benefits data center

group communication in both saving network traffic and improving application throughput.

5. REFERENCE

[1] R. N. Mysore *et al.*, "PortLand: A Scalable Fault-Tolerant Layer2 Data Center Network Fabric," *SIGCOMM*, 2009.

[2] C. Guo *et al.*, "DCell: A Scalable and Fault Tolerant Network Structure for Data Centers," *SIGCOMM*, 2008.

[3] C. Guo *et al.*, "BCube: A High Performance, Server-centric Network Architecture for Modular Data Centers," *SIGCOMM*, 2009.

[4] A. Greenberg *et al.*, "VL2: A Scalable and Flexible Data Center Network,"SIGCOMM, Aug 2009.

[5]J. Dean and S. Ghemawat, "MapReduce: Simplified Data Processing on
Large Clusters", In *Proceedings of OSDI'04*, Dec 2004

[6] S. Floyd, V. Jacobson, S. McCanne, etc., "Reliable multicast Framework for Light-weight Sessions and Application Level Framing", In *Proceedings of ACM SIGCOMM'05*, Oct

[7]Stateless Multicast Protocol for Ad Hoc Networks
Chen-Hsiang Feng, Student Member, IEEE, Yuqun Zhang,lker Demirkol, Member, IEEE, and Wendi B . Heinzelman, 2013