Fault Tolerant Through Prism Model

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Abstract

Due to last two decades emergence of internet has increased rapidly and becomes the basic need in today life. Due to this emergence the factor of reliability, performance and security are common issues that we must consider. We are presenting here the reliability and performance of the internet by clustering the networking devices. The conception behind this is to make a bigger system by using a multiple smaller units. The main matter in this concept is to make a connection reliable and to increase the system functioning without using any extra connection. For this multiple networking components operates together for the same reason and this create a distributed system in networking atmosphere. The goal of this distributed system is to permit both load balancing and be unsuccessful between the nodes. In load balancing the overall throughput is increased by distributing network load among the member of the cluster. If any nodes crashed or failed then it is the responsibility of active node to find it and bear the network load from the crashed node without disturbing the data flow. A Model which motivates the creation of PRISM, a suit of distributed protocols and services designed to help networking devise which become more fault tolerant and preferment is described in chapter three which has emerged as a problem in sequel of survey conducted with employees of the computer hardware and software industry. Structural equational modeling is used to determine the required values and to finally prove the model.

Keyword: *Cluster, Fault tolerant, PRISM model*

1.0 Introduction

PRISM stands for Personal Research for Independent and Systematic Model of network. PRISM is a distributed network computing architecture. PRISM reflects this intersection by building distributed computing protocols into the communication stack. PRISM protocols and services work together to enable the clustering of networking elements in that environment.

The overall architecture of the PRISM Distributed Protocols and Services is described in Figure1. The PRISM Distributed Services are plotted into Transport layer, session layer, presentation layer and application layer of the OSI networking stack. PRISM is planned to produce a true distributed system for networking devices, so that more than one networking devices can effort jointly to accomplish collective performance and greater reliability. It is our Prime objective that PRISM protocols and services will make it easy for the application developers to put their application to run on top of a cluster of networking elements. In the PRISM architecture, we

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designed and implemented protocols and services that fit into this model. PRISM will help the applications to sharing the traffic load between the nodes in the cluster. PRISM will also help applications to block out failures for proper network services.

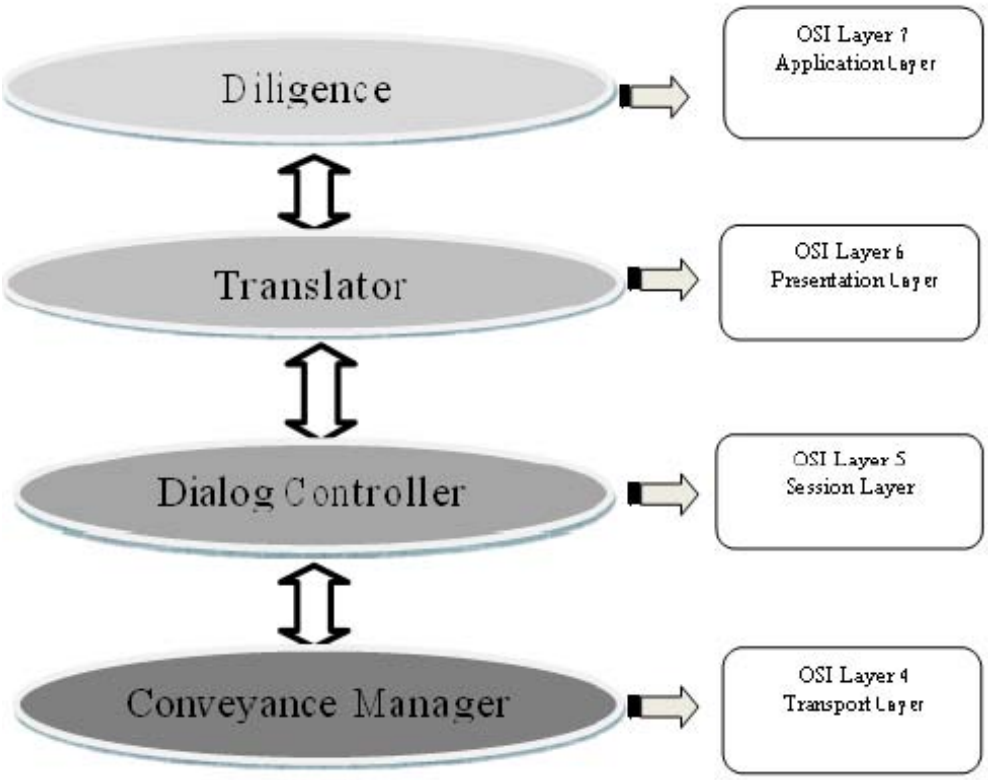

Figure 1: PRISM Model

2.0 PRISM Conveyance Manager

The PRISM Conveyance Manager is a unit placed in the bottom-most layer i.e. Transport layer within the PRISM architecture. It requires th e availability o f an Unpredictable unicast interface to get and through packet. . PRISM Conveyance Manager provides an atomic consistent and reliable unicast transport and negative notification on delivery failure to the session layer. Both TCP and Conveyance Manager provide reliable unicast and flow control. However, PRISM Conveyance Manager provides the following functionalities that are not available in TCP. First one is; PRISM Conveyance Manager is totally based non-handshaking mess age delivery concept. This concept is beyond of connection and full-duplex method. A data packet preserves its state at both ends that means either packet is completely delivered or destroyed squarely. Meanwhile we don't have any record for the connection state information. Second is; When the packet are send either it successfully received to destination or completely fails but in both

cases the Conveyance Manager send the notification to the session layer on successful delivery of packets to the destination as well as when the packet are destroyed. For the dialog controller the failure notification is much beneficial for the analysis purpose and taking action on the basis of that. Third is; the communication pattern of Conveyance Manager is based on multiple physical address, to and fro each nodes. Failure notifications are generally not generated until and unless repetitive attempt of resending the packet. Multiple physical addresses provide the nodes to send the packet again and again if previous attempt are fails. This behavior produces a robust and un-partitioned link between the nodes of the group which makes the group more consistent. Multiple physical addresses can be used in either sequential or parallel.

3.0 PRISM Dialog Controller

Dialog Controller goal is to ensure a reliable, robust and efficient multiple communication transport, and accumulator of groups cluster and node leave. Dialog Controller is a Core component for a distributed system in network. This core functionality i s the exact replica of the session layer functionality. In case of a connection loss this protocol may try to recover the connection. If a connection is not used for a long period, the Dialog Controller Protocol may close it and re-open it. It provides for either full duplex or half-duplex operation and provides synchronization points in the stream of exchanged messages. Dialog Controller reliable multicast transport to share state information among the member nodes, because of its consistent mutual group relationship of cluster. Dialog controller behaves as fail over cluster concept which has a facility to switch the traffic from the failed node to healthy node. All these communication state are encapsulated from the clients or the server.

4.0 Translator

It is mounted on the top of a dialog controller which arranges data items for usage to read and write onto it. Any alteration to a data can be contemporized by a translator. The fundamental problems encountered are not disclosed to a translator. A designing of a Translator consist of a global clock, although the sequence is wrong yet it will provide a coherent sequence of an event in a cluster. The clock is used to overcome the struggle if two leafs try to write the data simultaneously. Translator applies the common exception facility issued by a dialog controller to arrange the locks; a translator will render an interface to permit a user either to use a data as a atomic block or to altered part of a data. A translator will permit the user to use the phenomenon of conversion to atomically access data where a translator will not contemporize the changes up to the conversion.

5.0 PRISM APPLICATION AND PERFORMANCE

5.1 PONDS

The first application built using prism is a prototype called potent Network of dynamic server. The design objective of ponds is to develop a most versatile blemish error tolerant web server that will divide load among all the nodes in a cluster. Ponds uses the PRISM Conveyance manager to handle all the messages passing between the servers in ponds it uses the unrepeated interconnection to make the partitioning of clusters very less.

Figure 2: Five node PRISM cluster in Sherwood lab.

These servers uses mutual exception service that prism provides to decide that which server will response to the request while the servers which differ from a specified one may simply drop the HTTP request. The load information & HTTP request assignment table s would be divided among the cluster by the version of group data manager.

Figure 2 shows a schematic diagram of a parallel distributed system lab having six nodes in a PONDS cluster whish are designated using six dual Pentium pro 200 MHz servers, connected repeatedly by four fast Ethernet switches. In an implementation of PONDS prism protocol were tightly coupled with the web server logic and they have lack of a modular form that can be useful to the various applications. In a fast Ethernet environment, PONDS can process more than 100 mega bits/sec of an incoming load since all packets are arrived at every node.

5.2 FLIM:Flock of I.P. Manager.

This method is used to overcome the problems encountered PONDS. In order to design a way of dividing loads to a group of networking elements by maintaining a pool of a viable virtual Is among group members which are publically advertised IP addresses for this network cluster, all load that goes through cluster is directed towards one of the virtual IPs. Thus the virtual IPs is mutually exclusively

adopted for different nodes in cluster by virtual IP manager module FLIM.

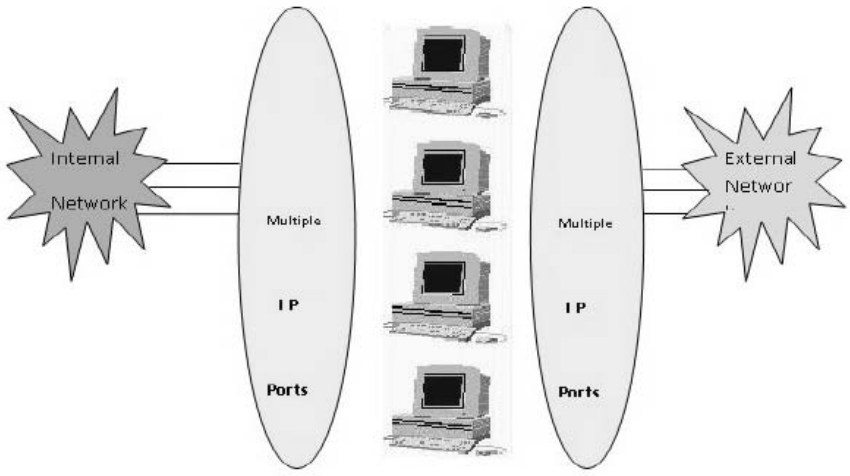

Figure 3: A cluster of CLOUD nodes with two pools of virtual IPs

FLIM may allow user to manually move the virtual IPs from a node to another. In case of virtual IP movement during faulty conditions they can also be moved as load balancing condition as when a load is loaded heavily than the other and it has more than one virtual IPs the load balancing algorithm may decide to move that virtual IP to a less heavily loaded node. When a virtual IP is moved from one node to another a voluntary ARP message is sent to refresh the ARP cache thus the virtual IP corresponds a new MAC on all the computers and routers on the same subnet. Therefore during virtual IP movement the load designated for the virtual IP will be redirected to the new node, using this method the network throughput (response) by having more than one virtual IP for each subnet can be scaled up efficiently.

5.3 Prism Shield

Prism Shield uses the same virtual IP manager that FLIM uses to arrange the pools the pools of virtual IP addresses for the firewall clusters, virtual IPs are specified in the routers and local clients. Prism Shield ensures the firewall accessibility in the presence of failures and accomplishment of optimal performance under heavy load by managing the virtual IPs effectively and efficiently as the entire load goes through firewall is being directed to one of the virtual IPs. Prism Shield also includes a kernel level software packet engine that load balances traffic connection to all firewall nodes n cluster. This facility provides way to contemporize connection state information without racing condition. The load and connection designation information's are shared among the cluster using prism.

6.0 Conclusion

The performance analysis and measurement of the PRISM protocols. At the same time we also explore other topologies and mechanisms for group communication in addition to a simple ring, for example, ring of rings. We'll compare the performance of different topology for different applications and size of clusters. The current PRISM protocol is implemented on top of the upper datagram protocol in an internet protocol version four environment. We can take lead of the features offered in up-and-coming standards in the networking world, for example, VI architecture and internet protocol version six, for performance optimization.

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