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Overview of Rain Technology

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Abstract-*A new emerging technology that approaches the expansion of the Internet is referred to as a trusted array of independent nodes. Prior to this Rain technology, cluster technology with multiple nodes was available and it was not easy to keep all these nodes connected, Rain technology can give an answer by turn down the wide variety of nodes inside the chain connecting with the client and servers. Rain technology can give a solution by turn down the number of nodes in the chain connecting with the client and servers. The Rain technology is implemented on a distributed computing architecture built with low-cost off-the-shelf components. The RAIN platform includes a cluster of contrasted nodes connected via multiple interfaces to a network configured in a fault-tolerant topology* [1].

Keywords-Rain, Snow, Rainfall

I -INTRODUCTION

RAIN Technologyoriginatesfrom a research project at the California Institute of Technology (Caltech) in collaboration with NASA's Jet Propulsion Laboratoryand the DefenceAdvancedResearchProject Agency (DARPA). The RAIN technologystandsforReliable Array ofIndependentNodes. RAIN's goal is to use components at a reasonable price to identify and manufacture key building blocks in a reliable, distributed system that is readyto build. RAIN technologyalsoprovide a new abilityto recover a failednode with a new node, avoidinginterruptions in the informationflow[1][2]. The primary goal of the RAIN project wasto identify the key building blocks ofsoftwarefor building robust distributed applications using commonly availablehardware. Researchhas focused on high performance, fault-tolerant and portable clusteringtechnologiesfor space computing. Redundant/Reliable Array ofIndependentNodes (RAIN) technology is a heterogeneous set ofnodes, called a cluster, connected through a number of interfaces to a network configured in a fault-tolerant topology. RAIN Technology focuses on developing high-performance, fault-tolerant and portable clusteringtechnology.RAIN technology was able to provide a solution by reducing the number of nodes in the chain connecting clientsand servers. Also,apartfrom, the currentnodeof the client will also be easier,makes the server architecturemorerobust[1].

II -LITERATURE SURVEY

RAIN technology (Redundant/reliableArrayofinexpensive/independentnodes) is a heterogeneous set ofnodes, called a cluster, connected viamultiple interfaces to a network configured in a fault-tolerant topology. RAIN technologyaimsto develop high-performance, fault-tolerant, portable clustertechnology.raintechnology can provide a

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solution by reducing the number ofnodes in the chain connecting the clientand server, but alsohelpstoincrease the reliabilityof the nodes in the existing client-server architecture. The goal ofraintechnology is to recognize and create the key building blocks ofreliable, decentralized systems built using off-the-shelf components at a reasonable cost.

RAIN technology is anopen-architecturestorage approach that uses inexpensive computing hardwarealong with highly intelligent managementsoftwaretomake it reliableandefficient. RAIN configuration components work in parallel with the operating system andnetwork protocols. Faulttolerance is provide by the control software used and is similartofaulttoleranceprovide by expensivehardwaredevices.

III -WHY WE APPLY RAIN TECHNOLOGY?

RAIN technology is applied toimprove the faulttoleranceof the cluster. Garageclusters can be managedthrough a centralizedmanagementinterfaces. The management software creates a virtual pool of storage devices without the physical presence of the network and administrators.Thistechnologymanage software automatically finds new RAIN nodes and permits them to communicate with each other. In the process of a node failure, the lost data is reproduced between the other RAIN nodes in the cluster, preventing the unsuccessful node from being substituted immediately. RAIN-based networks are more resilient to changing application workloads due to their efficient load balancing capabilities[3].

1. Goals Of Rain Technology

The objectiveof this researchwasto recognize the basicsoftware building blocks for building reliable distributed applications using off-the-shelf hardware.The research focus has been on high-performance of hardware, fault-tolerant and portable clustering technologies for spatial computing. Two important hypotheses were made that reflect the differences between RAIN and the two existing outcomes, Industry and Academia[4].Assume the most common model without shares. No shared storage available for all compute nodes. The only way compute nodes can exchange state is to exchange data over the network.

Distributed applications are not isolated systems. Distributed protocols interact intently with existing network protocols, by permitting RAIN clusters to interaction with their surroundings. In a nutshell, the RAIN project was about merging network protocols and distributed computing. It has end up clear that RAIN technology is perfectly in shape for Internet packages. During the RAIN project, key components of the were built to make this vision a reality.

2. Architecture Of Rain Technology

Rain Technology is an open architecture approach to thestorage system, using low-cost computing hardware and highly intelligent management software to create reliability and efficiency. The RAIN configuration component runs on the along with the OS network protocol. The fault tolerance of the is provided by the control software used by thewhich is similar to the fault tolerance provided by the expensivehardware devices[13].

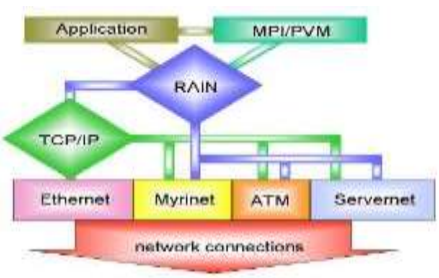

Fig.1- Architecture of Rain Technology diagram

The low-cost redundant node array outperforms traditional storage architectures by providing a more distributed, shared, and scalable storage and data protection system. The new storage system architecture, called the Low-Cost Node Redundant Array (RAIN), surpasses the existing storage architecture by providing a more shared, distributed, and scalable storage and data safety system. RAIN structures or systems are also less pricey than traditional structures or systems. RAIN technology is anopen system techniquethat mixes standardoff-the-shelf

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computing andnetworkinghardware with highly andespeciallyclevermanagementsoftware. This combinationenables cost-effective deployment of multiple storage and data protection applications on a grid of devices that are highly available and self-healing[3][5]. The RAIN storage and protection system consists of:

RAIN Nodes: A data is stored securely and protects overall RAIN nodes rather than a single storage system with its usable power, cooling and flexible drives.

IP-Based Interaction: RAIN nodesarephysicallyinterconnected using standard IP-based LANs, MetropolitanAreaNetworks (MANs) and/or wide arenetworks. This allows administratorsto create a unified storageandprotectionnetworkfor RAIN nodesacrossmultipledatacentres. WAN andMAN connections allow RAIN nodes to guard local data as well as remotely secure data generated in other data centres.

RAIN managementsoftware: This software allows RAIN nodestocommunicateprogressivelyorcontinuously with eachother'sassets, capacity, performanceandhealthdata. RAIN managementsoftware can automaticallydetect if there areany new RAIN nodes in a new networkand these locationsare configured.

Life cycle information management software: Software replaces standard summary, backup and screen management with virtual reality algorithms, compression, transformation, encryption, cooling, integrity checking and adjustment, persistence, and duplicate algorithms. Lifecycle management software information replicates data across multiple RAIN nodes to ensure overall accuracy of inexpensive SATA drives.

3. Communication

Rain Technology focuses on providing error tolerance to networks using error-tolerant communication topology and bond network interface.

Fault Tolerant Interconnect Topology: We havefaced with the questionofhowtoconnectandcalculatefabricnodestoincreaset olerancefornetworkerrors. Many distributed computing algorithms run intoproblems when given a large set ofnodesisolatedfromothernodes. A partition-tolerant network should only lose a certain number of nodes (compared to a total of nodes), unless the number of failures is exceeded. After further failure, we can see the division of the calculated node, which is a fraction of the total number of nodes that may be lost. Careful selection of how calculated nodes are connected to the switch increases the system's performance to withstand splits in the event of an error.

Consistent-History Protocol for Link Failures: When a system connects interfaces togetherandtolerates link and NIC failures, it must keeptrackofavailablerouteson the networktofunction properly provide a updatedpingprotocolsothateach end of the link sees the samehistory. Protocol is determined by the extent towhicheach side can leadorstay behind the other side of the channel. This conceptof the samerecord can be useful when developing applications that use this connectioninformation. Forexample, if an application takesactionto recover from a error if it is disconnected, it will accept the sameerrorasboth sides of the channel will see exactly the samebehaviouron the channelover time. Recovery. Action. This guaranteemakes it easierto write applications that use this connectinginformation[6].

4. Distributed Store/Retrieve Operation

Distributed storageandretrievalfunctionalityfordirect use of MDS codes in distributed storage. Assume there are n nodes. For a storeoperations, use n to write a blocksofdataof size d into n charactersof size d/k each. (n, k) MDS Arraycode. Savesonecharacter pernode. For the extractionoperations (), we collect the symbolsfrom k-nodesandrecordto get the originaldata.
This storagemethodhassomeattractivefeaturesof the First, it providestability. Originaldata can be retrieved after n ÿ k nodefailure. Second, it allows for flexible or re-configurationandthermalfluctuationsof components, and can be randomlyremovedandchangedfromtopto n ÿ k nodes. Also, the abilitytoselect k fromnodesprovide load balancing. You can choose the k nodes with the least load, or the k nodesthataregeographicallyclosestforyour WAN[7][8].

5. Working Of Rain Technology

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Distributed storageandretrievalfunctionalityfordirect use of MDS codes in distributed storage. Assume there are n nodes. For a storeoperations, use n to RAIN node grids can also be configured to changed the application loading of applications by measuringdataacrossallnodesbasedonstorageusageorstorage capacity. In a RAIN-basedstorage system, each RAIN nodeperiodicallyscansall sub-files. Hundreds of RAIN nodesareintegratedtoform a parallel mesh fordatahandlingthat is muchmorerobustthantoday'sindependentsecuritystructures. The workstogether when it Check its owncloneandreplacescorrupted files. A RAIN nodenetworkreplacestraditionalisolatedstorage systems. Affordable, highly efficient drives, processorsand IP networksmake this achievementpossible. Businesses also need fasterandmorereliablebackupandrecoverprocesses, as well asstreamlinedandaffordabledisasterrecover systems. Through the use of life cycleinformationmanagementsoftware in hundreds of powerful RAIN NAS andaccountingnodes, RAIN provideunparalleledlong-term dataacquisition, cost-effectiveandfastdataacquisition, andlocalandoff-site backupcopy[1].

IV- ADVANTAGES OF RAIN TECHNOLOGY

[9][11]RAIN technologyoffersvariousadvantages:

Fault tolerance: RAIN provides fault tolerance through its software implementation. The system tolerates multiple failures of rain nodes, channels and switches without a single point of failure[1].

Easy to use and manage: RAIN collections are very easy to use and manage. RAIN technology solves the problem of rigidity that occurs without the need to create additional layers. Management software allows users to connect to one of the nodes to monitor and configure the entire collection or clusters.

Portability and openness: This is a technology used in open and highly portable. Compatible with a variety of hardware and software environments. Currently ported to Solaris, NT and Linux.

Heterogeneous Surrounding Support: This also supports different locations, where the collection or cluster may contain nodes with different applications in different configurations.

No distance limit: There is no technical limit for RAIN technology. It allows the creation of a group of locally distributed nodes. It can work with many other online applications.

Availability: Another advantage of RAIN is its incessant availability. As in the case of Rainwall for example, hardware and software components detect errors in real time and send traffic to the working on the failed gateway without breaking the existing connection.

Load balancing and performance: Like Rainwall, new nodes can be added to the collection to participate in load balancing without disrupting network performance. Rainwall tracks the amount of incoming traffic in each area.Rainwall tracks the total incoming traffic to each node. When a discrepancy is detected in network traffic, one or more VIP addresses are moved from a busy host to a less busy host. You can also participate in load balancing by adding new hosts to the clusterwithout shutting down the cluster.

V- APPLICATIONS RAIN TECHNOLOGY

Some RAIN applications suchas RAIN Video Server (RAIN Video), Web Server (SNOW) and Distributed Checkpoint System (RAIN Check) include: Utilities and near-linear scalability of the Rain-core protocols[10][13]:

SNOW (StrongNetworkof Web Servers): The first application called SNOW is a scalable web server cluster developed by the RAIN project.

RAIN-Video: Another RAINVideo application is a set of recorded and encoded video recordings for all n nodes in a distributed storage system.

Rain-Wall: Rain-Wall is a commercial solutionthatprovidefailoverand scalable firewallclusters.

RAIN-Check:rainCheck is a pointing distributed investigation engine thatimplements a Checkpointand rollback/restore engine on the RAIN platformbasedon distributed storeand retrieve operations.

Distributed Check Pointing Engine: A Check- pointing and rollback/restore engine for the RAIN platformbasedon distributed storeandretrieval operations.

VI -CONCLUSION

The purpose of the RAIN researchwasto pave the wayforfaultmanagement, dataexchange, anddatastorage in a distributed environment. RAIN technologyhas proven to be very useful in facilitating high availabilityand load balancing issues. It can be applied to a wide rangeofnetwork applications suchasfirewalls, web servers, IP telephonygateways, application routersetc. It is very useful for developing full-featured distributed computing systems. RAIN allows an unlimited number ofnodesto be groupedtogetherand allows them tofunctionasonegiantnodethatshares the load ortakeson responsibility if oneormorenodesdo notfunction properly.

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