APT FILE SYSTEM

Monisha Chauhan*

Dr. Mamta Bansal*

Dr. R.P. Agarawal*

ABSTRACT

Apt File System is a social distributed file system that allows users to save their files. Apt File System reduces the servers' costs by harnessing idle resources. If user wants to share part of his drive with the Apt File System network he receives additional storage from Apt File System. It helps in improving download speed, file availability and reduces the servers' cost. When a user adds a file to Apt File System it is encrypted and split into fragments. Each fragment is identified by apt global unique identifier (AGUID) for block storage. Apt File System clients interpret these fragments as a file system. Apt File System uses eraser coding and map reduce framework for robustness, decreases latency and guarantees that file is never lost.If any fragment will lost ,then file will not be open.This proposed new file system will be work very perfectly in cloud computing, grid computing as well as cluster computing.

Keywords-Map Reduce, Erase Coding ,Metadata, Distributed File System, Cloud Computing, Grid Computing, Cluster Computing.

* Shobhit University, Meerut

INTRODUCTION

A file system is a clearly-defined method that the computer's operating system uses to store, catalog, and retrieve files. Files are central to everything we use a computer for: all applications, images, movies, and documents are files, and they all need to be stored somewhere. For most computers, this place is the hard disk drive, but files can exist on all sorts of media: flash drives, CD and DVD discs, or even tape backup systems.

File systems need to keep track of not only the bits that make up the file itself and where they are logically placed on the hard drive, but also store information about the file. The most important thing it has to store is the file's name. Without the name it will be nearly impossible for the humans to find the file again. Also, the file system has to know how to organize files in a hierarchy, again for the benefit of those annoying humans. This hierarchy is usually called a directory. The last thing the file system has to worry about is metadata.

METADATA

Metadata literally means "data about data" and that's exactly what it is. While metadata may sound relatively recent and modern, all file systems right from the very beginning had to store at least some metadata along with the file and file name. One important bit of metadata is the file's modification date—not always necessary for the computer, but again important for those humans to know so that they can be sure they are working on the latest version of a file. A bit of metadata that is unimportant to people—but crucial to the computer—is the exact physical location (or locations) of the file on the storage device.

DISTRIBUTED FILE SYSTEM[14]

A Distributed system is a collection of loosely coupled computers interconnected by a communication network.These computers can share physically dispersed files by using a distributed file system(DFS).

Before understand to DFS ,we have to understand the main terms service, server and client. A service is software entity running on one or more machines providing a particular type of

function to clients.A server is the service software running on a single machine. A client is a process that can invoke a sevice using a set of operations that form its clients interface.

A DFS file system whose clients, servers and storage devices are dispersed among the machines of a distributed system. Accordingly, service activity has to be carried out across the network. Instead of a single centralized data repository, the system frequently has multiple and independent storage devices.

CLOUD COMPUTING[11]

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

Cloud computing describes a new supplement, consumption, and delivery model for IT services based on Internet protocols, and it typically involves provisioning of dynamically scalable and often virtualized resources It is a byproduct and consequence of the ease-of-access to remote computing sites provided by the Internet. This may take the form of web-based tools or applications that users can access and use through a web browser as if they were programs installed locally on their own computers.

GRID COMPUTING[12]

Grid computing is a term referring to the combination of computer resources from multiple administrative domains to reach a common goal. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. What distinguishes grid computing from conventional high performance computing systems such as cluster computing is that grids tend to be more loosely coupled, heterogeneous, and geographically dispersed. Although a grid can be dedicated to a specialized application, it is more common that a single grid will be used for a variety of different purposes. Grids are often constructed with the aid of general-purpose grid software libraries known as middleware.

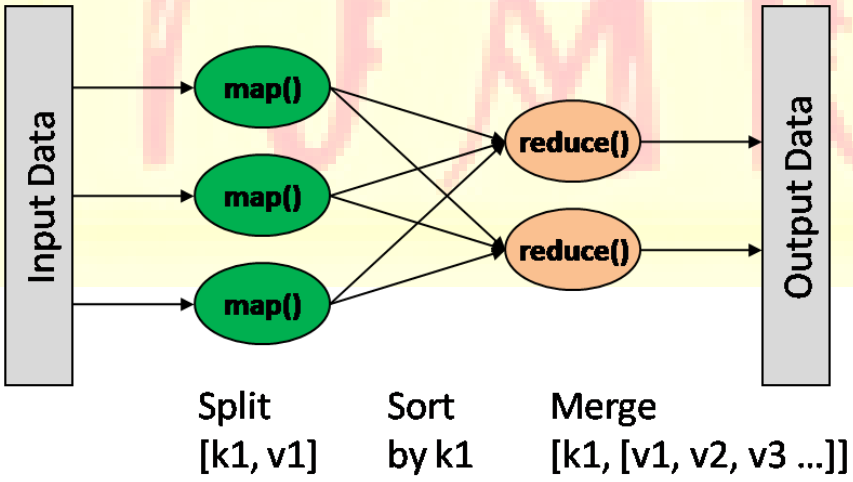
CLUSTER COMPUTING[13]

In computers, clustering is the use of multiple computers, typically PCs or UNIX workstations, multiple storage devices, and redundant interconnections, to form what appears to users as a single highly available system. Cluster computing can be used for load balancing as well as for high availability. Advocates of clustering suggest that the approach can help an enterprise achieve 99.999 availability in some cases. One of the main ideas of cluster computing is that, to the outside world, the cluster appears to be a single system.

MAPREDUCE[19]

Map Reduce is originated by two functions from the functional language:map and reduce.The Map function processes a key/value pair to generate a set of intermediate key/value pairs and the the reduce function merges all intermediate values associated with the same intermediate key.

The MapReduce framework provides a set of client APIs that allow developers to specify their map and reduce functions, to locate the input data, and whether to collect the results if required.



ERASER CODING[17]

An **erasure code** is a forward error correction (FEC) code for the binary erasure channel, which transforms a message of *k* symbols into a longer message (code word) with *n* symbols such that the original message can be recovered from a subset of the *n* symbols. The fraction *r=k/n* is called the code rate, the fraction *k'/k*, where *k'* denotes the number of symbols required for recovery, is called reception efficiency.

PROBLEM STATEMENTS

For our proposed file system ,we have gone through many file systems .From uniform file system to distributed file system, we find different awareness. we started from history of all file systems like Jurassic file systems ,ext2.NTFS etc.We have also read many distributed file systems like AFS,GFS etc. Our proposed file system is based on the distributed system and appropriate for working in cloud computing, grid computing as well as cluster computing.

The gaps between the proposed file and existing file systems are the motivation factors of proposed work.

Concise problem statements:-

1. Problem of encryption
2. Reduce workload on server
3. Use of others hard disk space effectively
4. Reduce cost of server
5. Less fault tolerance
6. File System running on all type of computing

JUSTIFICATION

The proposed file system not only decrease the cost of server but also have less fault tolerance using eraser coding. The proposed file system focus on the proper utilization of hard disk spaces present in the multiple computers. Eraser coding is applied here for encryption of file into m fragments because in eraser coding if any fragment will lost ,the original file is easily

recovered. And due to this eraser coding is less fault tolerance as comparatively replication. After doing literature survey ,eraser coding is not applied before. Map Reduce framework is taken along with the eraser coding is never be done before in this proposed file system i. e Apt File System.The main important feature is in this proposed file system is it runs on each type of computing like Cloud computing, Grid computing as well as Cluster computing.

PROPOSED FILE SYSTEM

Architecture

Apt file system is social distributed file system.It is proposed for reducing the limitation of other file systems.In this proposed file system ,we use eraser coding with map reduce framework. And make it more secure than other file systems along with reducing the cost of server.

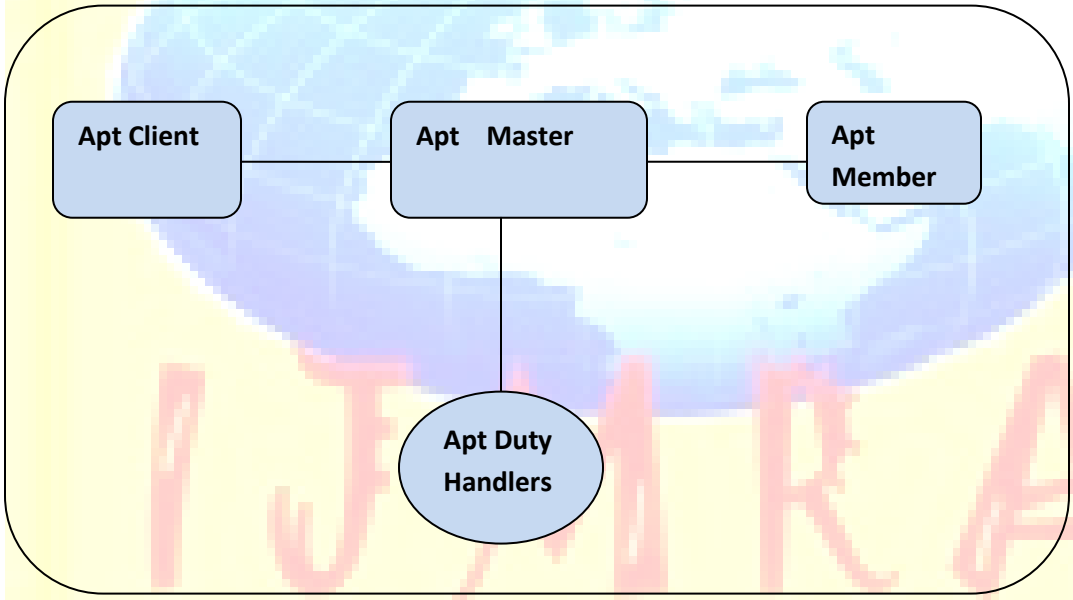


Fig 1- Components of Apt File System

In the above diagram the main components of Apt File System is shown.The components of Apt file system are:-

1.Apt Master

2.Apt Client

3.Apt Member

4.Apt Duty Handlers.

These are the important components on which all working of this Apt file system is depends.In this proposed file system, the synopsis of these components are described below:-

1.Apt Master:-Apt Master is the mind of this proposed file system.In this proposed file system , AGUID (Apt Global Unique Identifier) is given to each file and Apt namespace is created for each file and directories. With the help of this Apt namespace the mapping is done with actual storage of file blocks.File is first encoded here with the Reed Solomon algorithm and converted inti m blocks. And then further processing is done over the file.

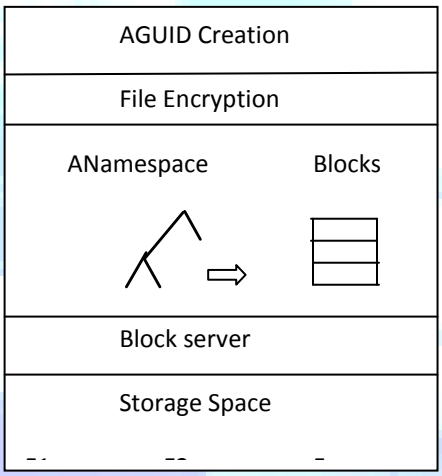


Fig 2-Apt Master

In Apt Master there is a Block server who take these m block and then apply Map Reduce framework with the help of Apt Duty Handlers. Block server have all details of file as well as blocks. Reduced file block are sent to the Apt members according to availability of free space in their hard disks.

2.Apt Client:- It send a request to the Apt Master to save its file which it sent .Apt Master after accept the request allot AGUID to the file and send a copy of the same back to the Apt Client for further verification.Apt Client does not use its own space for storage proposition .Rather than it uses Apt Member free space for the storage purpose and also for security pont of view. Because file is not stored at once place.It is stored among the various Apt Members through Apt Master.

3.Apt Member:- Apt Member is actually the member of the Apt File System.It is called Apt member because it send a request to the block server in Apt Master about the status of available free space in its hard disk periodically.It send a offer of using its free space for other purpose if needed.And after doing all these it become a member of the Apt File System.Message consisting Apt Member ID as well as free available space and also full capacity of hard disk.Block server get it update its information about the Apt Member and send the confirmation of getting request.Apt Member also consisting detail of block of particular file according to their AGUID. Apt Member have VFS layes that is virtual file system.With help of VFS layer ,Apt Member have no compatibility problem with the block of file.

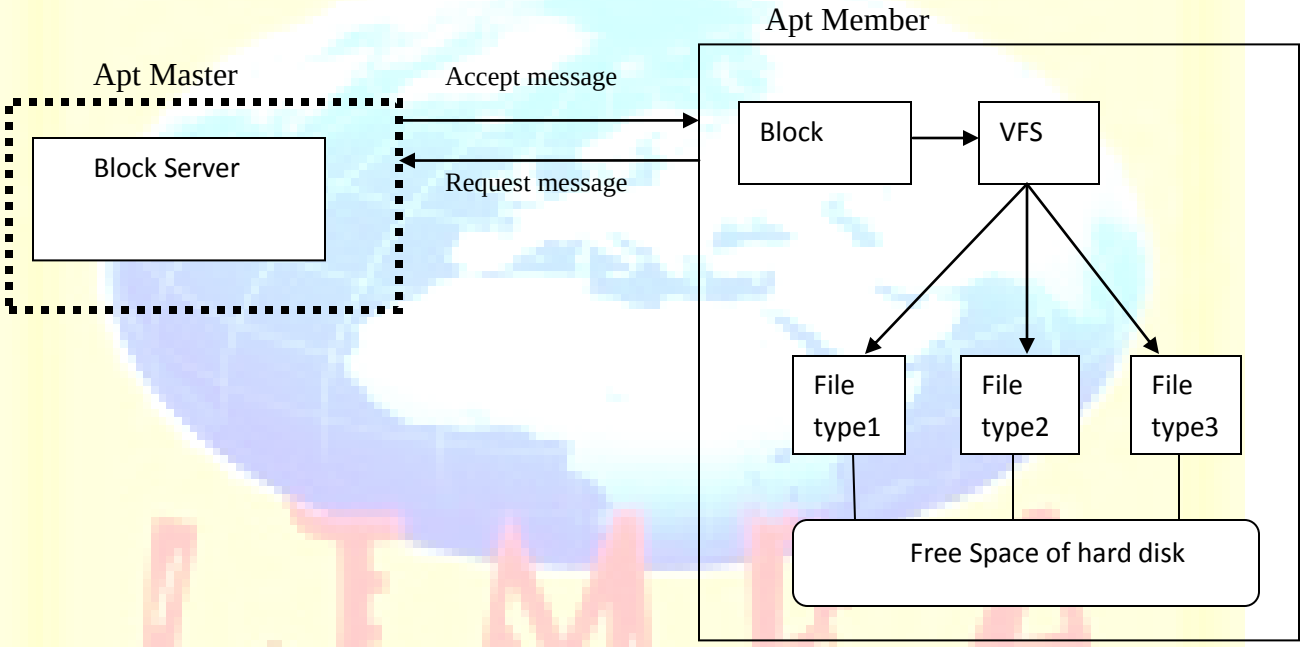


Fig 3-Apt Member

4. Apt Duty Handler(ADH):-Apt Duty Handler Apt Duty handlers plays very important role here. Apt Duty Handler per map function and also reduce function. Some ADH perform map function and some are used to perform reduce function. They are working just like a workers for the Apt File System.

A ADH who is assigned a map task reads the contents of the corresponding input fragment.It parses the key/value pairs out of the input data & passes each pairs to the user defined map function.The map function are buffered in the memory. Periodically,the buffered pairs are

written to the local disk are passed back to the block server, who is responsible for forwarding these locations to the other ADH for applying reduce function.In above figure the [4] is represent the ADH ,who is used for performing reduction function.

When a ADH is notified by the master about these locations, it uses remote procedure calls to read the buffered data from the local disks of the map ADH. When a ADH has read all intermediate data, it sorts it by the intermediate keys so that all occurrences of the same key are grouped together. The sorting is needed because typically many different keys map to the same reduce task. If the amount of intermediate data is too large to fit in memory, an external sort is used. The ADH iterates over the sorted intermediate data and for each unique intermediate key encountered, it passes the key and the corresponding set of intermediate values to the Reduce function. The output of the Reduce function is appended to final output file for this reduce partition. When all map tasks and reduce tasks have been completed, the master wakes up. At this point, Reduced file block ready for save.

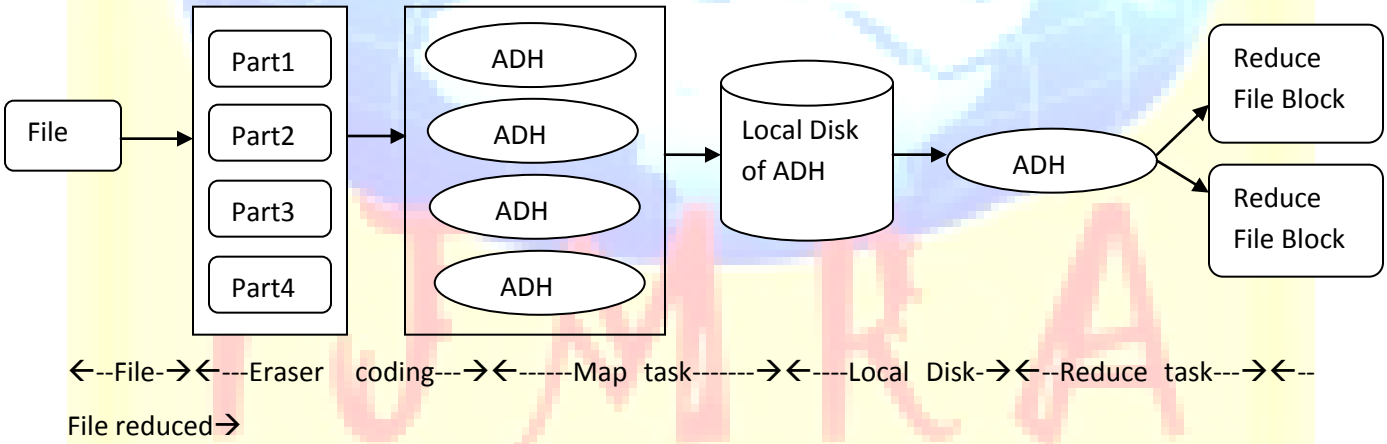


Fig 4- Map Reduce

5. Block Server:-Block server acting important role in Apt Master functioning .It contains meta data of blocks ,free spaces of Apt Members hard disks as well as all details of Apt Duty Handlers. Allotment of map task and reduce task to the appropriate Apt Duty Handler is also done by the block server. Current status of all ADH is kept by the block server. After getting reduce block ,the duty of sending these blocks of particular file to the different Apt Member is also done by the Block server. Block server contains the details of following :-

1. Meta data of Files along with its blocks detail.

2.Meta information of Apt Members.

3.Meta essentials of Apt Duty Handlers.

CONCLUSION

The rise of different type of file system has to produce an urgent need for a file system which has versatile quality. Apt File System demonstrate the qualities essential for supporting more secure file with distributed system along with reducing high cost of storage. Through this system we are also focusing reduce cost of server as well as Map reduce mechanism is used for the file into multiple blocks. These features makes this file system different from others. We are proposing this file system for the further working. The Map Reduce framework has been successfully proposed at Apt File System which reduce file blocks and make it more secure. Map Reduce frame work is done here with the help of Apt Duty Handler because it makes Apt Master loosen up and during that time it will do another work.ADH reduce the workload of the Apt Master effectively .They are doing work just like threads.

In this proposed Apt File System, we are also using the eraser coding which convert file into m fragments. And in case of data loss the recovery of original file easy and less fault tolerance here with the help of eraser coding. We are proposing here eraser coding to reduce fault tolerance ,which are less in case of replication. It is effectively works when we have large set of data with out any problem.

In Apt File System, we are also save the cost of server by using free space offer by the Apt member.File security is more here because file is encrypted as well as stored in many place not at the same place.The chance of file lost is less in this proposed file system.

This is proposed Apt File System . Hopefully , we have convinced the readers that this Apt File System is possible to construct.

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