

items old cache items need to be deleted as storing capacity of the cache memory not enough.

2.1 Adaptive Replacement Cache:

MapReduce works on multiple jobs parallel and produces the different intermediate result. These intermediate data is very big in size and storing at customized index of the cache memory. As the size of the cache memory is limited, so we need to replace the cache index data by the newly created intermediate data for that we are going to be use extended LRU replacement algorithm i.e. adaptive replacement cache algorithm with better performance to optimal use of cache storage. An adaptive replacement cache algorithm [10] that keeps track of both recently used and frequently used pages with history of the deleted pages for both. In LRU, it stores only entry for last recently used pages. New entry of the page is added to the top of the list after last entry has been deleted. If cache hit then it move to the top by pushing all entries in the list down. ARC is used to improve the LRU strategy by dividing cache list into two sub-lists, t1 for recently used and t2 for frequently used entries. These two lists are extended with a ghost list b1, and b2 which is attached to the bottom of the list respectively. These two extended list are used to keeping track of the recently deleted or evicted cache entries.

This ghost list contains metadata and the actual data itself.

All lists are used in the ARC are,

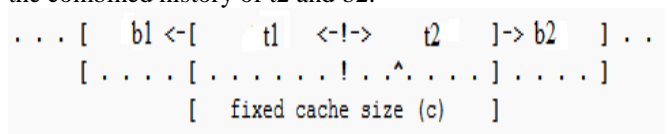
t1=stores the recent entries.

t2= stores the referenced frequent entries at least twice.

b1=entries recently deleted from cache list t1.

b2=entries recently deleted from cache list t2.

New list l1 is combination of t1 and b1 that stores the combined history of recent references. Similarly, l2 is stores the combined history of t2 and b2.



[] brackets show the actual size of the cache, which is fixed.

New entries are added into the list t1 to the left of ‘!’ mark that shows the actual size of the l1 list, and ‘^’ indicates the target size for t1 list that may be equal to, smaller than, or larger than the actual size of the t1.

New entries are added to the list t1 and page hits are added to the list t2. If the hit is occur in the b1 then size of the list t1 will increase by pushing ‘^’ to the right and last entry of the list t2 is pushed into the list b2. If hit is occur in the list b2 then t1 will shrink by placing the ‘^’ to the left and last entry of the list t1 will pushed into the list b1. In this algorithm, cache miss is not affect ‘^’, but ‘!’ boundary is placed closer to ‘^’.

2.2 Same Map Task Cache

In optimal use of cache manager, there are two types of cache items and they have different complexities as they produced at different phase. In Map phase it is easy to use cache memory as they processed in well-formed. Cache memory in Map phase is not use directly used if file splitting

is not context free.

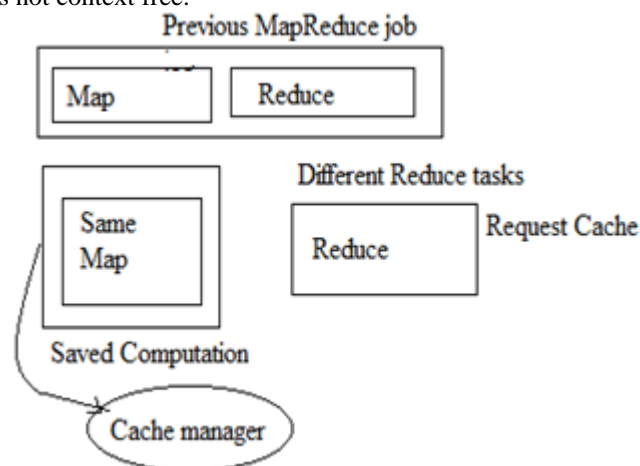


Figure 2: Two jobs have same Map task.

When Reduce phase uses the cache memory it taking two situation in consideration, first is when current MapReduce job of the reducer is totally different from the previous one and second is when reducers can take the advantage of the previous MapReduce job as they append the results from cache items to produce the final result.

3. Dache: A Data Aware Caching

An observation regarding Hadoop and NoSQL database applications is that they generate and store a large amount of intermediate data [1], and this abundant information is thrown away after the processing finishes. Inspired by this observation, Yaxiong Zhao et al proposed a data-aware cache framework for big-data applications, which they called Dache. In Dache, tasks submit their intermediate results to the cache manager. Monetary values of computational resources are well captured in existing cloud computing services, for example, in AmazonAWS [7] and Google Compute Engine[8]. Active SLA [9] is an admission control framework that takes into account the monetary gain of admitting jobs to run on a cloud-based database service provider.

4. MapReduce: Simplified Data Processing on Large Clusters

They designed a MapReduce program that can be automatically paralyzed and executed on large cluster of the machines [2].As this model is easy to use even for programmers don’t have experience with parallel and distributed systems and divided jobs are well balanced using load balancing technique. In MapReduce model of the Jeffrey Dean and Sanjay Ghemawat cache memory is not taking in consideration hence computation overhead increases.

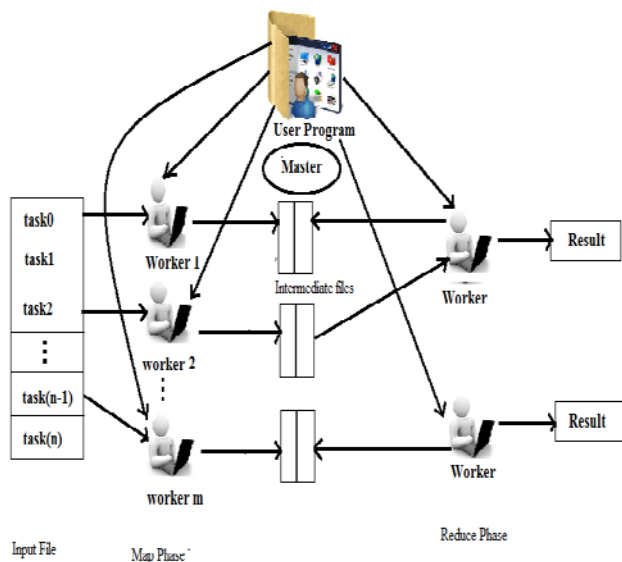


Figure 3: Last Processing on large cluster

5. A Hierarchical Approach to Maximizing MapReduce Efficiency

As in multi-core platforms in Hadoop has limitations in exploiting data locality and parallization of the tasks [3].As we know, Hadoop is open-source for implement the MapReduce, uses the Java Virtual Machines to run the actual MapReduce task. Hadoop implements the writable interface to take the advantage of Serialization and deserialization, resulting overhead in creation and destroy an object. In some applications that need to processing the same slice of the data n-times or iteratively to obtain final output.

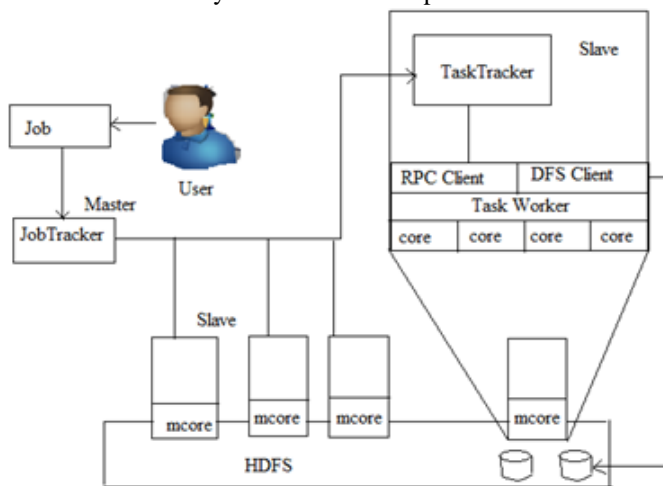


Figure 4: Hierarchical Approach

In many MapReduce systems it does not consider data locality across multiple processing iterations, therefore same data can loaded many times from HDFS to workers that process the data. In this system they extended Hadoop using this concept. Maximizing parallelism and data locality is the main aim of this system. In hierarchical approach, input file is distributed by JobTracker (Master) and assigned to worker (slave). In this system next these single workers are act as separate MapReduce system and split the allocated job by master further into number of sub-jobs that increase the runtime of the MapReduce by acting separate MapReduce job and is divide into a Map and Reduce task on a single

worker. Figure-3 describes the hierarchical approach by Azwraith that integrates an efficient MapReduce runtime for Hadoop.

6. Secure MapReduce in Cloud Computing

In this system Zhifeng Xiao et al proposed secure MapReduce that can be find out the malicious node in the MapReduce. While working, the accountability test is held by Auditor Group to find out the malicious node in real time. This system is clicked on very sensitive place of the MapReduce which is very important to increase system performance [4]. They proposed new component known as Auditor Group (AG) which can take test to find malicious node in the MapReduce. Customer cloud resources split it into multiple slices which is a bunch of machines allocated to a customer. An AG is allocated to each divided piece of cloud which runs MapReduce. Because of that, independence and privacy of the customers is maintained. The Auditor Group manager is responsible for creation of the new Auditor Group, management, and close. The Auditor Manager takes different parameters into account while creation of the new Auditor Group for newly created piece of the cloud computing. These parameters are user's data size, time and other requirements.

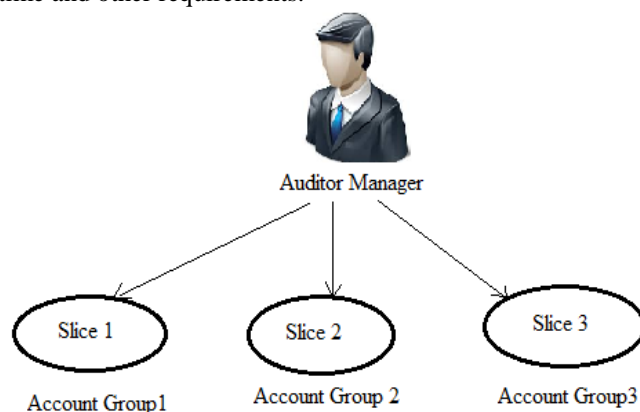


Figure 5: Audit Group in cloud computing

The master is responsible for provide information needed for conduct accountability test. The Group Head is responsible for allocate the accountability test task to the workers also known as Group Members and they provide the status report to master. The performance of the MapReduce will improve automatically as the unauthorized tasks are not executed in cloud. Main drawback of this system is that it can give false output can disfigure everything. This system also introduced some new components and need to add on top of original MapReduce may generates several new problems.

7. Shared Disk Big Data Analytics

In this system, Anirban Mukherjee et al in their study compared a widely used clustered file system: VERITAS Cluster File System (SFCFS) with Hadoop Distributed File System (HDFS) using popular MapReduce benchmarks like Terasort, DFS-IO and Gridmix on top of Apache Hadoop [5]. This system does not need any changes in original MapReduce applications. Big Data analytics can be made up and processing very fast by setting few parameters in the

configuration of Apache Hadoop. Apache Hadoop platform has a very simple architecture as the clustered file system connector module is developed by them. VERITAS clustered file system is used instead of HDFS functionality in the Hadoop stack. MapReduce framework and File system communicate with other by using APIs and that proposed SF-CFS to the Hadoop class. This could be achieved because the Map-Reduce framework always talks in terms of a well-defined File System [10] API for each data access. Both HDFS and their clustered file system connector module implement this File System class shown in figure-5.

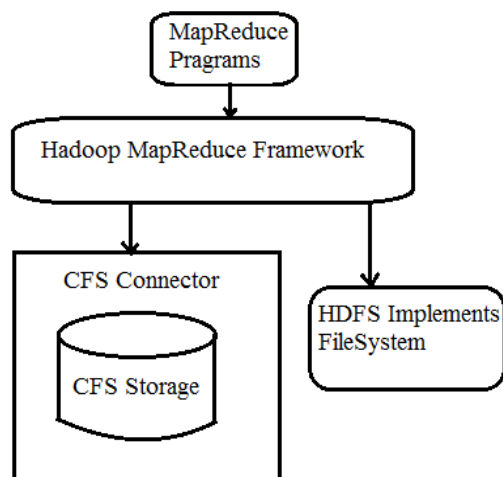


Figure 6: SC-CFS Hadoop Connector

8. Conclusion

In this paper we have analyzed several methods discovered by several researches in solving the problem of performance in MapReduce. In these researches have some problems that can be solved by using cache memory is beginning to become a very exciting application in MapReduce.

References

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Author Profile



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