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Data Aware Caching Using Map Reduce Framework

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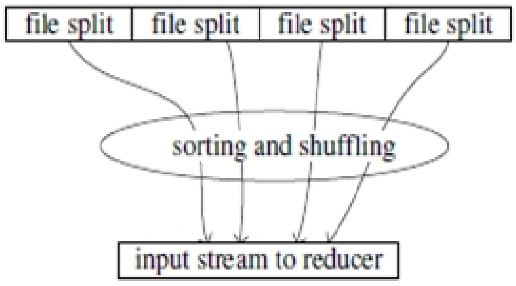
Abstract:
The big data is the concept of large spectrum of data also can be referred as discrete data. It refers to the huge scale distributed data processing applications that operate usually on large amounts of data. The two core concepts of the hadoop are Hadoop Distributed File System(HDFS) which is the storage mechanism and Map Reduce which is the programming language. Results are produced faster than other traditional database operations. Study of the Map Reduce framework is that the framework generates a large amount of intermediate data. Such existing information is thrown away after the tasks finishes. Data-aware cache framework is meant for large data applications. Big data open-source implementation deals with extensively large sets of data where the data may be structured or unstructured for big-data applications. In Dache, tasks submit their intermediate results to the cache manager and queries the cache manager before executing the actual computing work. A task, before initiating its execution, queries the cache manager for potential matched processing results, which could accelerate its execution or even completely saves the execution. We implement Dache by extending the relevant components of the Hadoop project.

Keywords:
Hadoop Distribute File System, Dache, Mapreduce Framework.

1.INTRODUCTION:
The main reason of big data existence is when the traditional relational databases management systems were not capable of processing the unstructured data . Normally big data is measured in Zeta bytes and Terabytes.The Big data is a large corpse of data on which applications works on eccentrically enormous amount of data. There are several challenges in Big data which includes sharing, storage, visualization, analysis, privacy and security. Big data analytics has become all the rage.

The Hadoop Map Reduce is an open source software framework developed by Apache which assists in distributed processing of larger data sets across clusters of commodity servers. The three main components of Apache Hadoop 2 are Hadoop Distributed File System, Yet Another Resource Negotiator and Map Reduce framework. The Map Reduce is a model for processing huge amount of data sets, Hadoop Map Reduce is a software framework for processing applications which possess vast amounts of data. A Map Reduce job usually splits the input data-set into independent chunks which are processed by the map tasks in a completely parallel manner. The framework looks after scheduling tasks, re-executes the unsuccessful tasks and also monitors them.



Google Map Reduce is a programming model and also a software framework for Big -scale distributed Computing on large amounts of data. Figure (i) illustrates the high level work flow of a Task. Application developers specify the computation in terms of reduce function and a map and the underlying Map Reduce Task scheduling system automatically parallelizes the computation across the cluster of machines. While Map Reduce obtain popularity for its simple programming interface and excellent Performance when implement a large spectrum of applications.In “Big and Distributed data application” large amount of input data is presented and it is split to the Task Tracker. Every data file is called as “Records”. In Map Reduce phase all input data is distributed to all Task Tracker. After Mapping, shuffling and sorting is done by using intermediate file created by the Task Tracker.

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Again it submitted to the Task Tracker for the Reducing phase. Finally by using Map Reduce the Reduced output is generated in the disk. Still, there is a restriction of the system, i.e., the inefficiency in incremental processing. Incremental processing refers to the applications that incrementally grow the input data and continuously apply computations on the input in order to produce output. There are potential duplicate computations and operations being performed in this process. However, Map Reduce does not have the any technique to identify such duplicate computations and accelerate job execution. Motivated by this observation, In this paper we propose, a data-aware cache system for big data applications using the Map Reduce framework, which aims at extending the Map Reduce framework and provisioning a cache layer for efficiently identifying and accessing cache items in a Map Reduce job.

2.RELATED WORK / LITERATURE REVIEW:

Daniel Peng et al. proposed, a system for incrementally processing updates to a large data set, and deployed it to create the Google web search index. By replacing a batch based indexing system with an indexing system based on incremental processing using Percolator, Auther process the same number of documents per day

Weikuan Yu et al. proposed, Hadoop-A, an acceleration framework that optimizes Hadoop with plugin components for fast data movement, overcoming the existing limitations. A novel network-levitated merge algorithm is introduced to merge data withoutrepetition and disk access. In addition, a full pipeline is designed to overlap the shuffle, merge and reduce phases. Our experimental results show that Hadoop-A significantly speeds up data movement in MapReduce and doubles the throughput of Hadoop.

Jiong Xie et al. proposed that ignoring the data locality issue in heterogeneous environments can noticeably reduce the MapReduce performance. In this paper, author addresses the problem of how to place data across nodes in a way that each node has a balanced data processing load. Given a data intensive application running on a Hadoop MapReduce cluster, our data placement scheme adaptively balances the amount of data stored in each node to achieve improved data-processing performance. Experimental results on two real data-intensive applications show that our data placement strategy can always improve the MapReduce performance by rebalancing data across nodes before performing a data-intensive application in a heterogeneous Hadoop cluster.

3.PROBLEM STATEMENT:

In current Hadoop Map Reduce framework is that the framework generates a large flow of intermediate data. Map Reduce is unable to save that such data so they are deleted after used. But in our system we introducing the cache memory that holds the intermediate results in it, because of that the data processing, means job executing processing is faster than old system, So that system is a time consuming, repetition of data processing are reduced.

4.CACHE DESCRIPTION ON BIG DATA ENVIRONMENT:

Cache refers to the intermediate data that is produced by worker nodes/processes during the execution of a Map Reduce task. A piece of cached data is stored in a Distributed File System (DFS). The content of a cache item is described by the original data and the operations applied. Formally, a cache item is described by a 2-tuple: Origin, Operation. Origin is the name of a file in the DFS. Operation is a linear list of available operations performed on the Origin file. For example, in the word count application, each mapper node/process emits a list of word, count tuples that record the count of each word in the file that the mapper processes. Dache stores this list to a file. This file becomes a cache item. Given an original input data file, word list abc.txt, the cache item is described by word list abc.txt, item count. Here, item refers to white-space-separated character strings. Note that the new line character is also considered as one of the white spaces, so item precisely captures the word in a text file and item count directly corresponds to the word count operation performed on the data file. The exact format of the cache description of different applications varies according to their specific semantic contexts. This could be designed and implemented by application developers who are responsible for implementing their MapReduce tasks. In our prototype, we present several supported operations:

Item Count:
The count of all occurrences of each item in a text file. The items are separated by a userdefined separator.

Sort:
This operation sorts the records of the file. The comparison operator is defined on two items and returns the order of precedence.

Selection:
This operation selects an item that meets a given criterion. It could be an order in the list of items. A special selection operation involves selecting the median of a linear list of items.

Transform:
This operation transforms each item in the input file into a different item. The transformation is described further by the other information in the operation descriptions. This can only be specified by the application developers.

Classification:
This operation classifies the items in the input file into multiple groups. This could be an exact classification, where a deterministic classification criterion is applied sequentially on each item, or an approximate classification, where an iterative classification process is applied and the iteration count should be recorded.

5.PROTOCOL:
Dache has classified cache items into types namely, map cache and reduce cache. These two types interact with each other in different scenarios and there are some complexities when it comes to sharing. In map cache, sharing becomes effortless since the operations enforced are well known but in reduce phase sharing becomes a complex task.

Cache request and reply:
The cache request and reply takes place in both map cache and reduce cache.

Map Cache:
Before commencing the file splitting phase, the job tracker is responsible for sending out cache requests to the cache manager. In return, the cache manager responses with a list of cache descriptions.

Reduce Cache: The requested cache item is compared with the cached items in the cache manager's database. Cache manager identifies the overlaps of the original input files of the requested cache and stored cache and for this purpose linear scan method is used.

6.CONCLUSION:
Hadoop is the tool used to manage and process the big data contents, which is the biggest challenge in the recent years. By using Hadoop distributed file system and map reduce concepts in hadoop we can process any big data contents within short period of time. HDFS acts as the storage mechanism in the hadoop and map reduce is used as the programming language in order to process the contents. Map reduce is operated with the help of two functions, mapper function and the reducer function.

7.FUTURE WORKS:
Hadoop is widely used for strategic decision making in the big data applications. It has many application areas like fraud detection, pattern recognition, content optimizing, marketing analysis, network analysis, large data transformations etc. are some of them. Hadoop framework can be used to make informed decisions in logistic freight inorder to perform the freight audit. By doing freight audit they can prevent organizations from overpaying for the services of freight forwarders, which they haven't used.

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