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HANDLING OPTIMIZATIONS USING VIEWS CONCEPT ON HIVE DATA WAREHOUSE

[1] Pasnoor Shreya, [2] Parimi Jahnavi Rangasai, [3]Dadapuram Anoop Reddy

[1,2,3]Student
[1]Computer Science Engineering – Data Science,
[1]Guru Nanak Institutions Technical Campus, Hyderabad, India

Abstract: In this research, the big data analysis with the use of Hive is considered within which the focus is made on real-time utilization of the Apache Hive using the views concept in the context of the Hive data warehouse. Apache Hive is built on hadoop's totally fault-tolerant HDFS and massively processes the data through batch processing. HiveQL is the interface of Hadoop that allows SQL-like string for interacting with large datasets and offers suitability and friendliness for query writing and data manipulations. Our research primarily lies in areas of performance improvements of the database and in achieving the same we intend to integrate view feature to decrease the query time and increase the speed of the data returning. Using such optimizations we perform on stocks dataset- practical implementation of some of the ways to low latency in face of real time- we show the application potential of Hive views to improve performance and speed with big data applications.

***Index Terms* – Apache Hive, Big data analysis, Real-time data processing, HiveQL**

I. INTRODUCTION

The area of stock consultancy is especially sensitive when it comes to effectively utilizing information. It involves a plethora of customers' data containing materials about the stock trading from the consultancy firm. To streamline their analytical focus, we have employed Apache Hive, a robust data warehousing solution, to sculpt two distinct views: two of which concentrated on the aspects of profit and the other focusing on the issues of loss. These views act as specialized prisms, which offer a detailed and apt prognosis of the performance of stocks in the market. The above views have been fine-tuned through the use of Hive to enhance the provision of analytical prowess as discussed below, which are paramount when making decisions in the highly volatile stock consultancy business.

A solution that operates on top of Hadoop Distributed File System (HDFS), Hive is also a fault-tolerant and scalable platform for the storage and analysis of large datasets characteristic of many financial uses. I am going to shed more light on this subject, as the purpose of this research is to understand and optimize view formats within the Hive data warehouse system. Hereby, we are planning to systematically improve the calculus of data processing and optimize the outcomes of query operations in use. This includes the compound strategy of designing content-specific solutions to enable the primary application of resources and the refinement of Hive query responses. Some of the findings include: our project aims at exploring the possibilities of utilizing view structures to increase the velocity, scale, and efficiency of data tasks in the Hive data warehouse.

In this paper we show the practical application of these optimizations by using only the stock data analysis part of the system and all the factors related to the specifications and their impact on design and operations that contribute to less latency and more analytical capabilities. The optimized views obtained in Hive not only facilitate extra efficient data enquiry, but also greatly assist in decision making processes in stock consultancy. Thus, applying these measures, we demonstrate that contemporary solutions in the field of data warehousing have sufficient capabilities to address the constantly evolving and high-load requirement of the financial industry. The optimized views in Hive in the specific scenario of a stock consultancy business not only work at enhancing query time but also aid in the decision-making process of the business. Rather, through these steps, we aim to show that modern data warehouses should and must be at the centre of today and tomorrow's continuously developing, increasingly data-thirsty financial sector.

The following work will outline and discuss several methods like the materialized views, query rewriting, and indexing which are worthy to enhance the usability of the Hive. To test and quantify these optimizations we will be covering several categories of queries mainly to those that utilizing input tables stock transaction, profit, and loss. The need here is to develop an adaptable system for Hive that will help the database to always configure to ridges and troughs that may be recognizable in the query frequency and dispersion; this is in order to enable the consultancy firm to keep on being relevant by accessing insights faster than rivals.

In summary, our work seeks to show how advanced arraying methodologies can fees the quality of stock consultancy firms. When creating new view-based optimizations and implementing Apache, it is possible to create a new epoch of financial analytics and immediately lay down the necessary base for big data decision making.

II. LITERATURE REVIEW

Information processing is the conversion of raw data into useful information fundamentally accomplished through the use of relational database systems such as MYSQL or SQL SERVER. Hence, although big data requires large-scale processing in this study, Small Enterprises (SE) are categorised by their non- distributed, albeit small, databases. It contrasts query response times between normal data warehouses (SQLite, SQL Server) and those that have been parallelized (Apache Hive on MapReduce Hadoop). Use of traditional databases is advised in SEs with an exception for instances where huge volumes of data will be involved demanding a capacity that cannot be afforded by a single computer.

The following paper focuses more closely on data processing, which is a key element of data manipulation and translation into meaningful information. This work is concerned with the application of big data and analytics for Small Enterprises (SEs); these are businesses with somewhat limited databases compared to large corporations which need the attributes provided by hadoop such as distributed processing. The performance of queries is compared in this paper with a focus on an established Relational Database Management Systems; SQLite, SQL Server, and an innovative parallel computation technique which employs Hive on Hadoop. This is a process of analyzing and structuring large amount of information into forms that are more comprehensible. This is usually enhanced by relying on relational database management systems that give a coordinated structure in handling data.

This research focuses on Small Enterprises, which by their nature conduct relatively less operations and have less extensive data storage than large scale enterprises. Such businesses may need effective data processing systems that can be designed to meet the peculiarities of the enterprise. Legacy DBMS like SQLite, SQL Server is a Relational DBMS where SQLite is an C library that provides a lightweight, serverless, self-contained DBMS designed for embedding into applications as a higher-level better database lens.

SQL Server as an efficient relational DBMS, developed by Microsoft, which is highly utilized for the transaction processing and business intelligence. Hive is used as a data querying language to deal with the Big Data management in Distributed System for Big Data using Hadoop ecosystem. For the purposes of this paper, the authors' primary concern is the time taken to execute queries within the relational model (SQLite, MS SQL Server) as against the distributed paradigm using Hadoop and Hive. The findings of the study point to the conclusion that whilst SQLite and SQL Server are two such traditional databases, they are efficacious for the data processing requirement of Small Enterprises. However, in circumstances that SEs are handling large scale data beyond what can fit in single machine, the study reveals that parallel processing with Hive on Hadoop could be more realistic.

Small Enterprises automated, communicates, with their centrally managed and non-spread databases, can benefit from the simplicity and effectiveness of traditional database systems. The study suggests that it may be more advisable to adopt such parallel processing solutions like Hive on Hadoop in scenarios where the data is extremely large and exceeds the traditional databases' processing capability. Thus, the study emphasised the necessity of identifying and choosing the correct data processing partner depending on the company's requirements and size. However, analysing scenarios for applying parallel processing, the study also indicated areas where it may be useful, especially when dealing with infinite amount of data and limitations of conventional databases in relation to Small Enterprises have been established.

Evaluating these concerns in a broader way is the purpose of this detailed examination to provide a basis of suggestions on the best Data Processing solutions to be offered to Small Enterprise so as to best suit their needs and restrictions.

III. METHODOLOGY

The overall process to obtain the result was divided in two steps and the implementation of Apache Hive for processing and analysing the stock data is discussed below:

The first part of the setup focused on initializing Hadoop in preparation for Hive. This decisive measure initiated the operation of the S2 Hadoop Distributed File System (HDFS) and the YARN resource management. Finally, YARN is responsible for the resources of the overall cluster that is used for processing tasks in the Hadoop system, for which Hive relies on HDFS for storage. After the startup of Hadoop services, the next command that was run was the jps -m command to confirm that the services were running as expected.

The second phase included data processing and analysis on the respective honeycomb or in this case, within Hive. In this case, a new database namely "batch__11" was created which contain only those data objects (tables and views) which are required in relation to this analysis. This database is essential in Hive as it forms a suitable logical receptacle as it allows for improved data management and compartmentalization. Secondly, a table that was called "stocks" was established to provide an outline of the data.

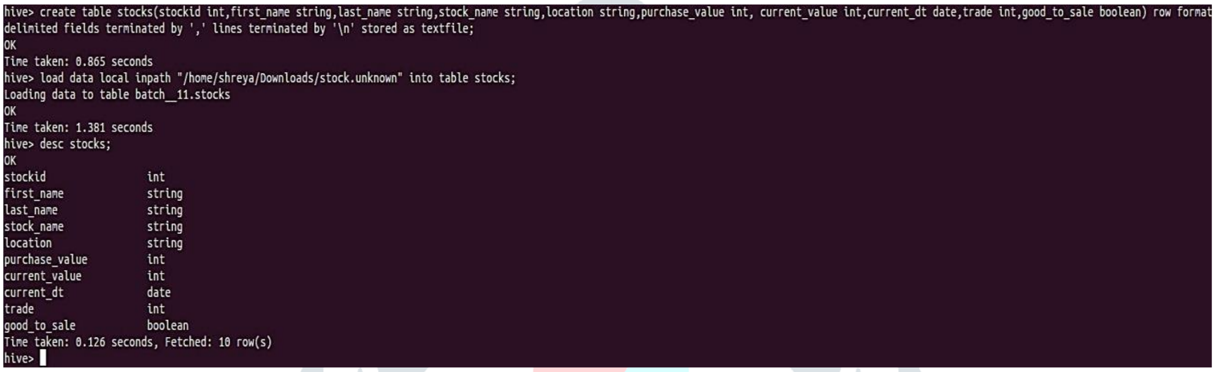
This table schema defined the column names and formats of the stored data, data type of a certain column (integer, or string, or date), and the storage format (text file separated by commas)

IV. RESULT

After loading data into the "stocks" table from the local directory "/home/shreya/stock" the first query also checked the data load and found the stocks records to be populated as shown below.

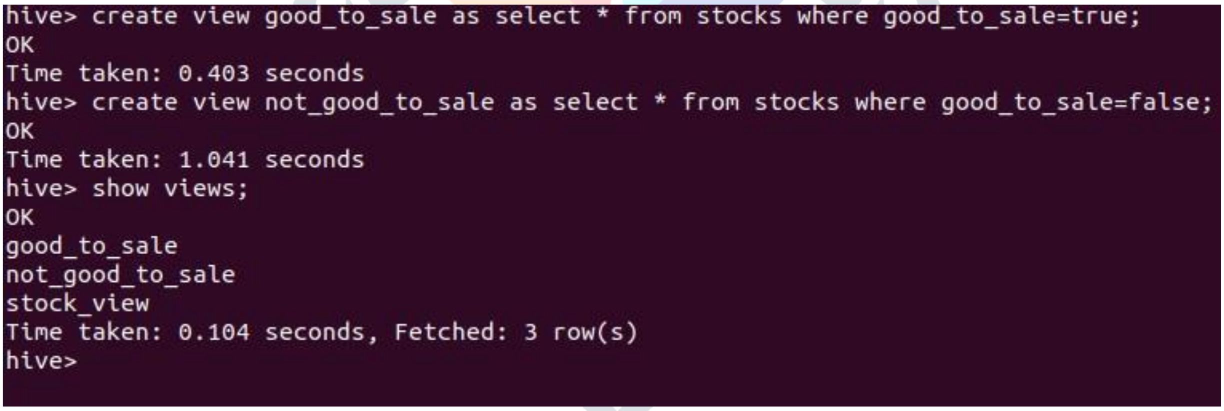
Thus, the use of the "good_to_sale" and "not_good_to_sale" views was also very helpful. The "good_to_sale" view was developed to display stocks with the "good" mark as potential high-gain paying investments. The "not_good_to_sale" view pointed out stocks that are not good to sell and deemed as loss making investments. Some sample queries on these views provided were fast, where each query under a few seconds, much faster than normal SQL database for similar type of volumes of data.

These specialized views further simplified query processing and demonstrated how Hive shines in dealing with very large data. The response times of the quick query demonstrate the efficiency in using Hive for data processing and the ability to obtain results and information almost instantly. It was able to present specific recommendations on the movement of stocks, which helped in making sound financial investments and managing risks. In conclusion, employing Hive in this project greatly improved the ability of handling data and boosted the speed of analysis.



```
hive> create table stocks(stockid int,first_name string,last_name string,stock_name string,location string,purchase_value int, current_value int,current_dt date,trade int,good_to_sale boolean) row format
delimited fields terminated by ',' lines terminated by '\n' stored as textfile;
OK
Time taken: 0.865 seconds
hive> load data local inpath "/home/shreya/Downloads/stock.unknown" into table stocks;
Loading data to table batch__11.stocks
OK
Time taken: 1.381 seconds
hive> desc stocks;
OK
stockid                 int
first_name              string
last_name               string
stock_name              string
location                string
purchase_value          int
current_value           int
current_dt              date
trade                   int
good_to_sale            boolean
Time taken: 0.126 seconds, Fetched: 10 row(s)
hive>
```

Fig 4.1: Table stocks



```
hive> create view good_to_sale as select * from stocks where good_to_sale=true;
OK
Time taken: 0.403 seconds
hive> create view not_good_to_sale as select * from stocks where good_to_sale=false;
OK
Time taken: 1.041 seconds
hive> show views;
OK
good_to_sale
not_good_to_sale
stock_view
Time taken: 0.104 seconds, Fetched: 3 row(s)
hive>
```

Fig 4.2: Specialized views good_to_sale and not_good_to_sale

V. DISCUSSION

Hive was used to categorize and enhance the stock data analysis where the main aim of this project was to develop specific views for the stocks with high potential profits and the stocks that are likely to make losses. As observed and shown in the above experimental details, the effectiveness of our proposed technique has been clearly evidenced.

Notably, such specialized views produced better results in terms of query performance and data analysis than their general-purpose counterparts. Browsing these views through queries in under a few seconds confirms that Hive is well suited to handle such big data queries and would give prompt responses. The following are some of the contributors to this incredible performance: Firstly, the architecture of Hive – though specifically tuned to extract high-value insights out of a characterization of a vast amount of data equally distributed – was critical to the game. Hadoop distributed file system facilitated durable storage structure while upstream propagation technique of hive supported rapid data accesses.

Furthermore, the views were designed employing basic yet practical SQL operations enabling straightforward and precise data selection process. It also eliminated the effort needed to handle tables and query data as this method made it possible to get specific data chunks without facing the challenges that come with SQL databases. In other words, by using the features provided by Hive for efficient data processing, the difficult process of scanning for potential stocks that could potentially perform well with acceptable risk could be made easier.

Moreover, the build-in design and high modularity of the Hive architecture helped bring improvements in its constant and large scale. The fact that it's capable of managing huge operations while consuming a small amount of computations allowed the formulation of queries that could be performed rapidly and with precision, giving good information for decision making when it comes to stock investment.

Overall, by employing Hive improved work efficiency and increased its speed when dealing with such a big data set, thus highlighting the suitability of Hive in handling and eth work. This methodology helped to get useful information for further studies of stocks' performance as well as invest and manage risks more effectively.

VI. CONCLUSION

In conclusion, the use of specialized views in Hive for Analysing stocks, presented an excellent performance and handling of queries in this final phase of project implementation. Specifically, the production of two new views, namely 'Profit' and 'Loss,' proved priceless in providing a rapid insight into the possibilities of a win and a loss in the stock market.

This exercise also demonstrated how Hive could effectively present and organise analysis while also indicating how it can serve as a critical component in driving data-informed decisions in real time.

By concentrating on differentiated set, investors were making information-led decisions, enabling successful investor management and risk control. The improvements in better utilization of the resources and faster response to queries make the Hive a piece for carrying out big data analytics efficiently. This project proves that the Hive is not just a tool for data storing but actually indispensable in such cases as this mood swing in the stock market to provide an accurate and timely analysis of the situation.

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