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RESEARCH ARTICLE

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WORKLOAD MANAGEMENT IN GEO-DISTRIBUTED DATA CENTERS

V.SATHYA PREIYA[1], D.NATHIYA[2], V.RAMYA[3], J.RENUKA MANASWINI[4]
[1]Assistant Professor(Grade – I), [2,3,4]UG Scholar
Department of Computer Science and Engineering,
PANIMALAR ENGINEERING COLLEGE

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ABSTRACT

Data Centre centralizes large amount of data and consumes enormous amount of energy and expenditure. Due to tremendous growth in population, the workload on data centres have been increased because of computation, storage and communication. This leads to operational expenditure due to task assignment, data placement and data movement to geo-distributed data centre providers. Hence we focus on minimizing the cost or managing the workload by big data processing techniques, which couples data and computation for easy storage and retrieval of data worldwide. Therefore, this big data concept results in a) Minimizing the workload and expenditure to geo-distributed data centre providers b) Aims to reduce the security risks that affect the user. MINLP(Mixed Integer Non-Linear Programming) describes 1)how to place these data chunks in the servers, 2) how to distribute tasks onto servers without violating the resource constraints, 3) how to resize data centres to achieve the operation cost minimization goal which provides the requested Web Service like News Feed and Stock Quote.

Index Terms—Data movement, MINLP, Data centre, Task Assignment, Data Placement, DCR, Volley.

I.INTRODUCTION

In modern days, data explosion has become a rising demand for big data processing in geo-distributed data centres. For Example., Google's 13 data centres in 4 continents almost 8 countries. To improve decision making, big data has become a major reason to minimize risk and to develop new products and services. Big data has already been considered as big price due to its high demand on computation and communication resources. Gartner predicts that by 2015, Almost worldwide data center hardware spending will come to 71% from the big data processing, which will surpass to $126.2 billion. Therefore, it is important to study the cost minimization problem for big data processing in geo-distributed data centers. Numerous efforts have been made to lower the communication or computation expenditure of data centers. Although the above results seems to be positive, they are still in progress to achieve the cost efficiency big data processing because of data locality may result in waste of resources. For example, Computation resources of a server with less popular data may not respond properly. The low resource utility further causes more servers to be activated and therefore have higher operating expenditure.

II.EXISTING WORK

In Existing Technique, single cloud, multi cloud and cloud of cloud has been provided. It has been proved that the research into the use of multi cloud providers to maintain security has been less attentive when compared to the research that has the use of single cloud providers. In this case, Routing strategy matters on the transmission cost. In general, cloud computing focusses on the computation and storage constraints, while ignoring the constraints of transmission expenditure. This routing strategy among data centers have been failed to exploit the diversity on data center networks. Due to capacity constraints, operational expenditure and storage mechanisms, it may not be possible to place all the tasks on the common server, on which their corresponding data may reside. It may be unavoidable to download a certain data from a remote server. In this case, routing strategy depends on operational expenditure For Example., the transmission cost, e.g., energy will be proportional to the network links used. The more links used, the higher will be the expenditure. Therefore, it is a vital task to lower the network links to satisfy all the transmission requirements. The disadvantages are i)explosive growth of demands on big data processing causes a heavy burden on computation, cost and storage. ii)Communication in data centres, incurs considerable operational expenditure to data centre providers.

III.PROPOSED WORK

DCR(Data Centre Resizing) and task placement are the most commonly used techniques that are used for data centre energy management which attracts lot of attention. To overcome the difficulties in effectively and efficiently managing big data, many techniques have been proposed to improve the storage and computation process. The proposed system focusses on lowering the computation and operational expenditures of various data centres. Data Centre Resizing (DCR) is a technique where it adjusts the number of activated servers through task placement and therefore reduces the computation cost. The proposed system mainly focusses on News Feed web service. For big data processing, the cost can be minimized through Joint Optimization of task assignment and data placement in geo-distributed data centres. Especially, there are three issues in joint optimization , they are i) Servers are equipped with limited storage, computation and operational expenditure, ii) Each data chunk has a storage requirement and will be required by big data tasks, iii) The data placement and task assignment are transparent to the data users with guaranteed QoS(Quality of Service).Our objective is to optimize big data processing, task assignment, routing and DCR by which these techniques reduce computation and communication expenditure. Based on the closed-form expression, we use Mixed Integer Non-Linear Programming (MINLP) to place data chunks in the servers, to distribute tasks onto servers without violating the resource constraints and to resize data centers to achieve cost minimization. The main advantage is that it improves the storage and computation process. The proposed system has the potential to improve operations and make faster and intelligent decisions. It helps the user to retrieve data effectively and efficiently. It also saves computation time.

IV.METHODOLOGY DESCRIPTION

MINLP

MINLP(Mixed Integer Non-Linear Programming) algorithm describes

1)how to place these data chunks in the servers,

2) how to distribute tasks onto servers without violating the resource constraints

3) how to resize data centers to achieve the operation cost minimization goal which provides the requested Web Service like News Feed.

MINLP refers to optimization problems with continuous and discrete variables and non-linear functions.

Software developed for MINLP has generally two approaches.,

- Outer approximation/Generalized Bender's decomposition
- Branch and Bound

Outer approximation algorithm alternate between solving a mixed integer linear programming master problem and non linear programming sub-problems. Branch and Bound methods for mixed integer linear programming can be extended to MINLP with a number of tricks added to improve their performance.

V.MODULE DESCRIPTION

SERVER COST MINIMIZATION

Large-scale data centers have been deployed all over the world providing services to hundreds &

thousands of users. A data center may consist of large number of servers and consumes megawatts of power. Millions of dollars on electricity cost have posed a heavy burden on the operating cost to data center providers. Therefore, reducing the electricity cost has received significant attention from both academia and industry.

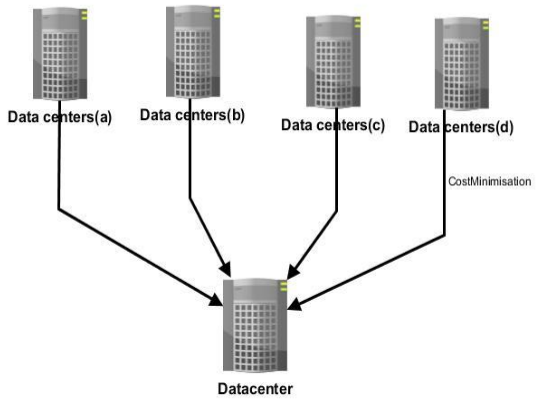


Figure2-Server Cost Minimization

Among the mechanisms that have been proposed so far for data center energy management, the techniques that attracts are Task placement and DCR.

BIG DATA MANAGEMENT

To tackle the challenges of effectively managing big data, many proposals have been proposed to improve the storage and computation process. The key issue in big data management is reliable and effective in data placement. They also analytically show that their codes are optimal on an identified tradeoff between locality and minimum distance.

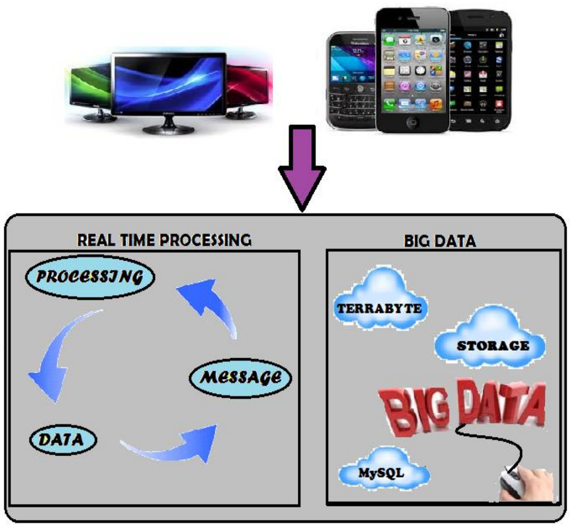


Figure3-Real-time Big Data Processing

Make use of flexibility in the data block placement policy to increase energy efficiency in data centres and propose a scheduling. algorithm, which takes into account energy efficiency in addition to fairness and data locality properties

DATA PLACEMENT

To determine a placement of **Video-on-Demand** (VoD) file copies on the servers and the amount of load capacity assigned to each file copy. This minimizes the communication cost while ensuring the user experience. Propose an automated data placement mechanism Volley for geo-distributed cloud services with the consideration of WAN bandwidth cost, data center capacity limits, data inter dependencies, etc.

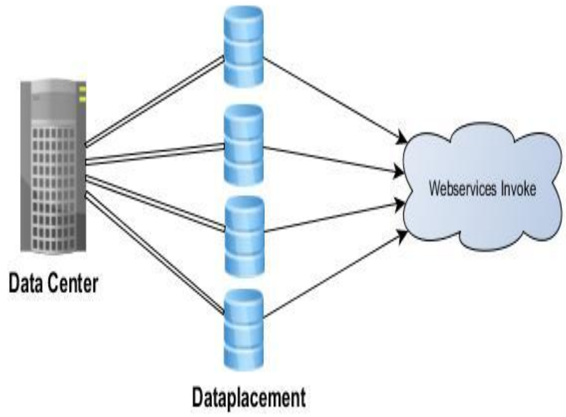


Figure4-Data Placement

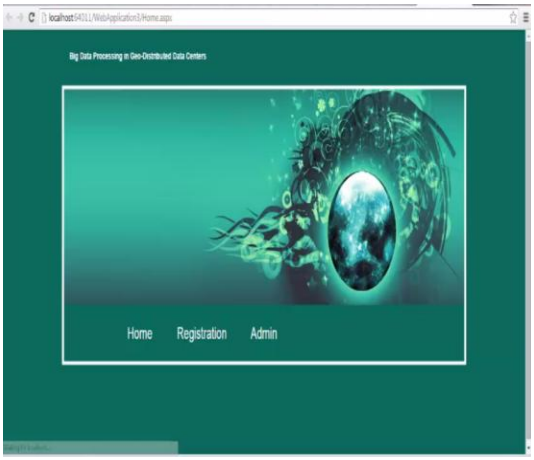
Cloud services make use of Volley by submitting logs of data center requests. Volley analyzes the logs using an iterative optimization algorithm based on data access patterns and client locations, and outputs migration recommendations back to the cloud service.

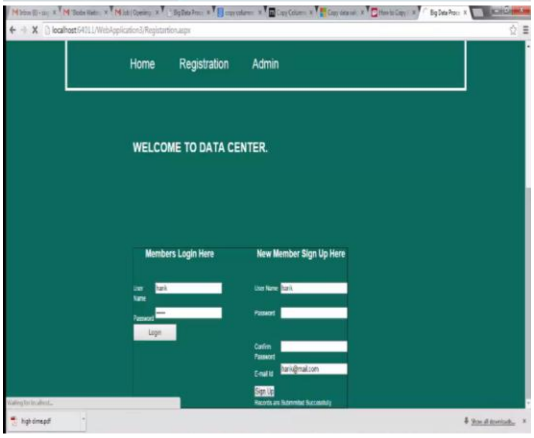
DISTRIBUTED DATA CENTERS

We consider big data tasks targeting on data stored in a distributed file system that is built on geo-distributed data centers. That is, for each chunk, there are exactly P copies stored in the distributed file system for resiliency and fault-tolerance. It has been widely agreed that the tasks arrival at data centers during a time period can be viewed as a Poisson process. Since these tasks will be distributed to servers with a fixed probability, the task arrival in each server can also be regarded as a Poisson process.

Figure5- Distributed Data Centre

VI.SCREENSHOTS





VII.CONCLUSION

In this paper, we get a clear overview in the study of task assignment, data center resizing, data placement and efforts in minimizing the operational expenditures in large-scale geo-distributed data centers for big data appliances. Using a two-dimensional Markov chain, we first analyze the data processing and hence the expected completion time is derived, and so the joint optimization is assumed as an MINLP problem. To overcome the high computational integrity of solving our MINLP, we linearize it into an advanced MILP problem. As a result we show that our joint-optimization solution has great advantage over the approach used in earlier days.

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