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Cost Optimization Algorithm for Data Center Management in Cloud

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Abstract: ***One of the main challenge in cloud is Cost Optimization. In cloud computing, the cloud providers usually calls CSP offer provisioning plans for the cloud consumers in the following two ways one is reservation plan(also referred as long term plan) and the other is on-demand plan(also referred as short term plan). In general, cost of computing asset provisioned by reservation plan is cheaper when compared to cost obtained by the on-demand plan, With the reservation plan, the consumer can reduce the total asset provisioning cost since cloud consumer has to pay to provider in advance. However, the best advance reservation of assets is difficult to be accomplish due to uncertainty of cloud consumer's future demand and providers' resource prices.***

To address this problem, an OCRP algorithm is proposed by formulating a SPI model. The OCRP algorithm can provision computing assets for being used in multiple provisioning stages as well as a long-term plan. The demand and price uncertainty is considered in OCRP. In this project, different approaches to obtain the solution of the OCRP algorithm are considered including DEF, SAA and Benders decomposition. Numerical the studies are extensively performed in which the outcomes clearly show that with the OCRP algorithm, cloud consumer can successfully minimize total cost of asset provisioning in cloud computing environments.

Keyword; OCRP, SPI, DEF, SAA, CSP

I. INTRODUCTION

Cloud computing is the type of computing that is completely based on the internet. One can easily store and retrieve any kind of digital information in cloud instead of storing in our own computer's hardware devices. We can access to the cloud from anywhere using any kind of device that is connected to the internet. Cloud provides hosting and delivering services over the internet. Internet connection is the basic connection required to access the cloud.

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A resource provisioning strategy is required to provide cloud consumers a set of computing resources for processing the jobs or workload and storing the data in cloud in cloud computing.

Resource provisioning means providing resources to the consumer. Generally cloud service providers offer two plans to the customers

1.Reservation plan

2.Ondemand plan

In reservation plan, the consumer must reserve certain amount of resources in advance for certain amount of time in order to utilize them. Reservation plan is also termed as long term plan since the consumer reserves the resources for long period of time.
In on-demand plan, the consumer can demand the provider for resources whenever required, in this plan the user or consumer need not pay for his resources in advance he can demand for the whenever required and the consumer must capable enough to deliver them.

II. LITERATURE SURVEY:

PAPER-1

By using the oracle virtual machine virtual box the cloud environment is configured. Hungarian Method is used in the Virtual Machine Deployment, in resource provision model implementation and utilization of cloud resources is monitored effectively. The Two Stage SPI is applied to solve the complexity of ideal problems. DEF will solve the distribution probability of all the situations to reduce cost. The Benders Decomposition is also a divide and conquer technique which divides the problem into sub problems and SAA is used to reduce the problem situation in the problem of resource optimization [1].

PAPER-2

In cloud computing the resources are provided to the cloud consumers by the cloud providers. The assets are provided based on the two provisional plan. One is On-Demand plan and the other plan is reservation plan. The On-demand asset provisioning is very costlier than the reservation plan as the resources which are requested on the demand of the user in a sudden. To intimate this problem, an OCRP Algorithm is adopted. The uncertainty of asset's demand and uncertainty of price is reviewed. Different inputs are given and test for the acceptance.

This strategy can be utilized as a asset provisioning tool which is used to improve the resource optimization [2].

III. RELATED WORK:

SivadonChaisirihas proposed the OCRP algorithm for the virtual machine management to optimize the resource provisioning cost in cloud computing environment. The resources provided by the CSP's (cloud service provider) (provision of computing resources) can be either or CPU power, storage or network and the existing plans are reservation plan and on demand plan. The formulation in the existing algorithm considers multiple provisioning stages and demand difficulties. The solution methods are based on Benders decomposition and (SAA) algorithms which are used to solve the optimization formulation to optimize the provisioning cost of the resources.

The entire work flow of the proposed system is represented in [Fig 1]. It contains resource provisioning model, SPI, DEF, Benders Decomposition and SAA.

3.1.1 Bender's Decomposition Algorithm:

In [1], "The Benders decomposition could be a strategy in numerical programming that permits the solution of exceptionally large linear programming issues that will have a special block structure. The technique behind Benders decomposition can be summarized as divide-and-conquer."

3.1.2 Sample-Average Approximation Algorithm:

In [1], "The SAA strategy is an approach for tackling stochastic optimization issues. In this strategy the anticipated objective work of the stochastic issue is approximated by a sample average assess inferred from a arbitrary sample."

a) Stochastic Integer Programming:

In [1], "The SPI with multistage response is displayed as the center definition of the OCRP calculation. To begin with, the first frame of stochastic numbers programming definition is inferred. At that point, the definition is changed into the DEF which can be illuminated by conventional optimization solver program."

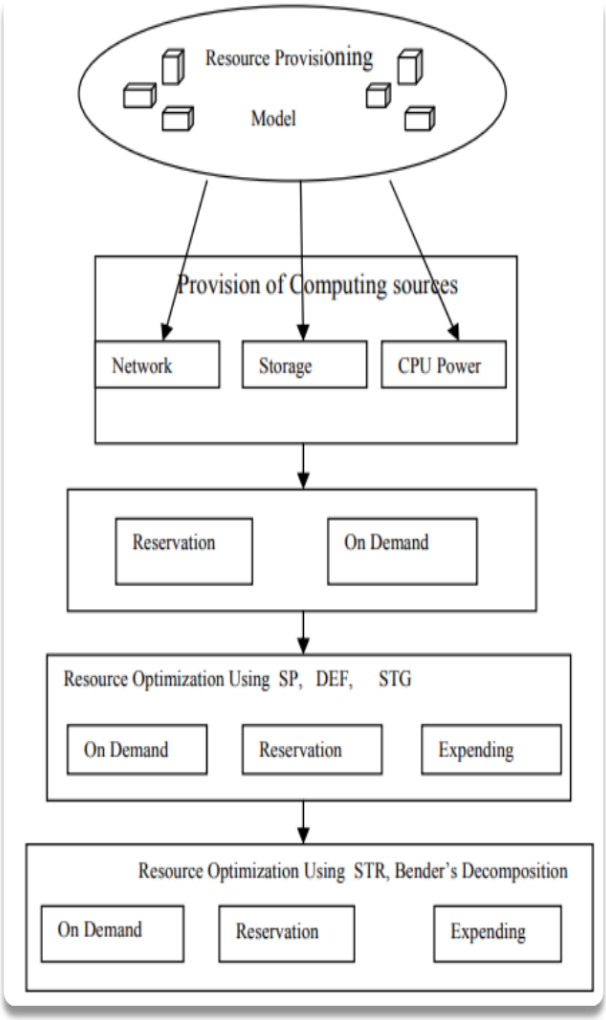

Fig 1

IV. PROPOSED WORK:

OCRP algorithm produces minimized resource provisioning costs than general approach by implementing this algorithm we can control our resource provisioning cost dynamically (using the allocated resources or storage in an efficient way). Generally the resources are allocated to the virtual machine's on the basis of the cost and there will be cost limit for every virtual machine in the server. In the existing system, if the resources exceed the cost limit the system will not notify about the file which exceeds the boundary in the storage and the user may need to delete all the files manually, whereas our system allows users to delete the files of the amount of size that exceeds its boundary. In addition to the existing algorithm, our system contains an alert box using which we can control the resources in a dynamic fashion. Controlling the resources in a dynamic fashion in the sense we can upload/delete the files based on remaining amount of allocated resources.

4.1 MODULE DESCRIPTION:

4.1.1 SERVER FRAME:

Cloud server frame page contains various fields like Upload details (stores the information about the files uploaded by user to the server like data owner, file name, bandwidth and cost of the file), Bandwidth and cost details(contain information like data owner, bandwidth and cost),chunk store(stores information regarding chunk name, file name, data and signature). As the users are connected to server , the data the user uploads is stored in the server.

4.1.2 USER FRAME:

User frame consist of various components like connect with cloud server, upload file, read file and delete file.

connect with cloud server user contains data entry options such as bandwidth and storage cost. The user who wish to establish connection with the server need to enter the bandwidth and storage cost and have to press enter once the enter button is clicked the user will be connected to the server. Once the user is connected to server, he can perform operations like upload file, delete file and read files.

In upload files section the user can upload multiple number of files until he reach the boundary. Once he reaches the boundary the system asks the user to delete the existing files so that he can make use of resources in a effective way. Rather than deleting all the files in case if a user exceeds his limit, our system asks the user to delete the file based on the size of file he/she exceeded.

The user can view the files once he successfully uploaded. He can also delete the file by providing the name of the file.

V. RESULTS:

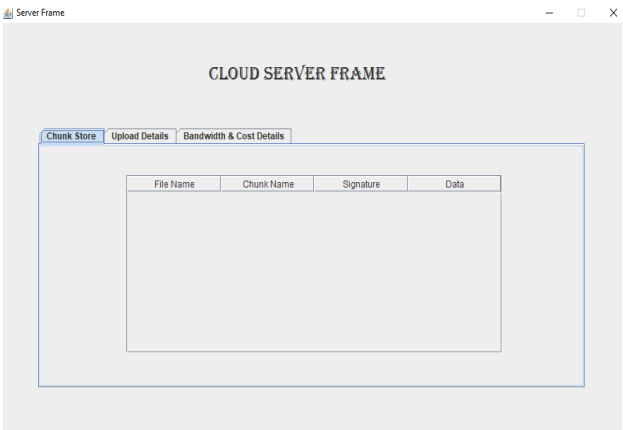

Fig.2 cloud server frame

- In Chunk store the file which is uploaded will be divided and stored. If the size of the file is small then it will not divided, if the size is large then it will be divided and stored as chunks.
- In chunk store the attributes are first name, chunk name, signature and data.
- File name will contains the name of the file.
- Chunk Name will have the name and format of the file.
- A signature is obtained for the file that is to be uploaded in order to achieve integrity and confidentiality.

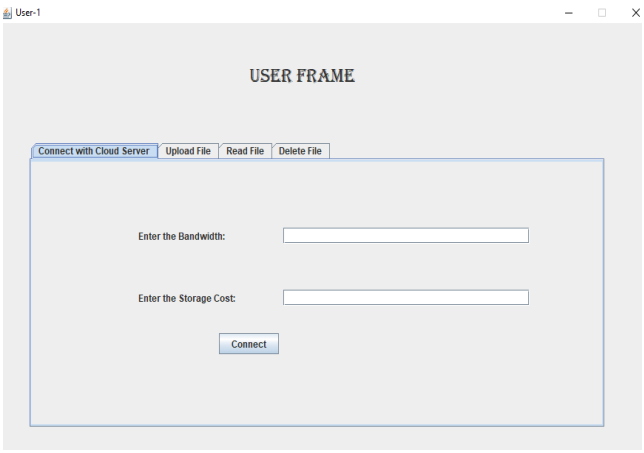

Fig 3 Cloud user frame

After creating the user, user need to connect to the server by providing the details like bandwidth and cost.

- In a certain time, the piece of data which is transferred from one place to another place is called bandwidth.
- Every file will consume some cost. Every user will have some cost limit, the user must upload files according to the cost.

Once the user is connected to the server he can upload the files, view the files and delete the files.

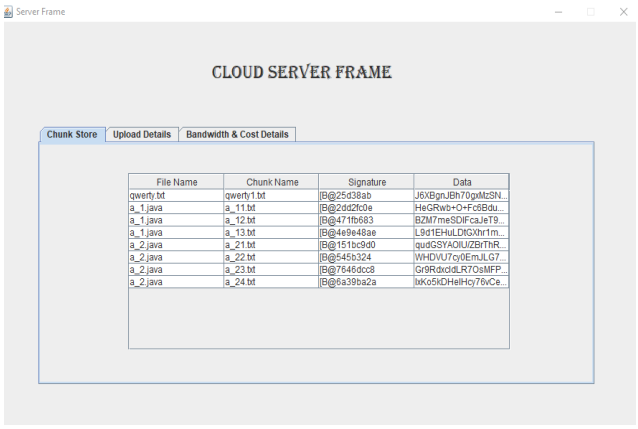

Fig 4

[Fig 4] is the representation for a file which is stored. In the chunk store the file which is uploaded is divided into many chunks.

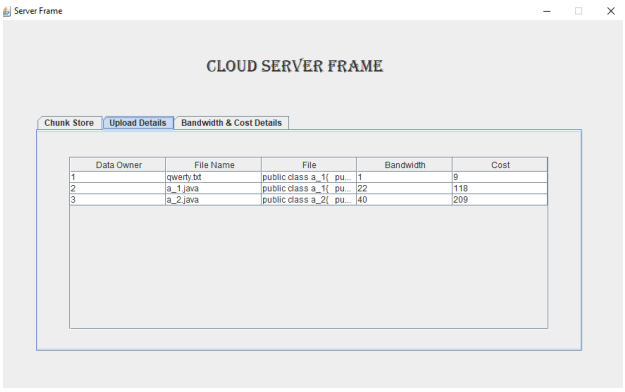

Fig 5

[Fig 5] will have the details of the file which is uploaded like file name, chunk name, signature and data.

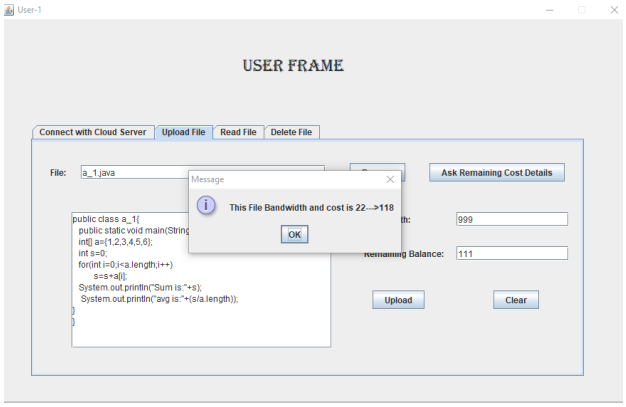

Fig 6

Every time user performs operation like upload he will get notified utilized amount of bandwidth and cost in a message box as shown in [Fig 6]

Once the user touches his boundary, The system asks the user whether to delete the existing files in order to upload new one[Fig 6], so that the resources are utilized in an efficient way.

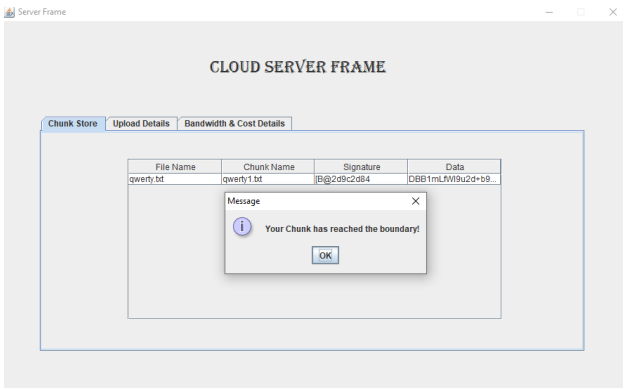

Fig 7

Once the user reaches his boundary, the system asks the user if he want to delete the existing file in order to store new one as shown in the below [Fig 7].

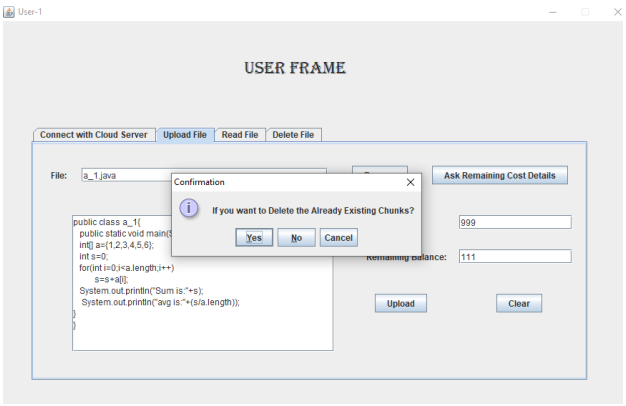

Fig 8

VI. CONCLUSION:

An algorithm to provide resources offered by various cloud providers in an efficient way. The accomplished outcomes provide assets for the cloud consumers with more efficiency. Various inputs have been given and tested for their acceptance. By implementing this algorithm the user can delete the files once he reaches the boundary dynamically rather than constantly monitoring to the available resources the algorithm provides the required information in the alert box thus reducing the manual work. This algorithm can be implemented as a resource provisioning tool in cloud computing environment in which the resource optimization and efficiency of the tool improves.

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