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TASK SCHEDULING IN CLOUD COMPUTING: A PRIORITY-BASED HEURISTIC APPROACH

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ABSTRACT: With the rapid development of cloud computing, more and more enterprises would like to upload and store their data in the public cloud. When the parts of the business of an enterprise are purchased by another enterprise, the corresponding data will be transferred to the acquiring enterprise. For the usual case, how to outsource the computation cost of data transfer to the cloud? How to ensure the remote purchased data integrity? Thus, it is important to study provable data possession with outsourced data transfer (DT-PDP). For the first time, we propose the novel concept: DT-PDP. By taking use of DT- PDP, the following three security requirements can be satisfied: (1) the other un-purchased data security of acquired enterprise can be ensured; (2) the purchased data integrity and privacy can be ensured; (3) the data transferability's computation can be outsourced to the public cloud servers. For the security concept of DT-PDP, we give its motivation, system model and security model. Then, we design a concrete DT-PDP scheme based on the bilinear pairings. At last, we analyze the security, efficiency and flexibility of the concrete DT- PDP scheme. It shows that our scheme is provably secure and efficient.

I. INTRODUCTION

Cloud computing refers to the provision of on-demand computing resources, including anything from software to storage and processing power [5]. Due to technological improvements, a wide range of sectors is now adopting cloud computing applications to improve and streamline their operations. These applications are accessible from different geographical locations at any given time. It provides diverse services across multiple sectors, including data storage, social networking, education, medical management, and entertainment, among others. Cloud computing services fall into three broad categories: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). A public cloud is made available to the general public on a pay-as-you- go basis, while a private cloud refers to a company's or organization's internal data centers that are not accessible to the general public. A cloud permits workloads to be easily installed and scaled owing to the fast provisioning of a virtual or physical machine [6, 7]. In a cloud computing environment, multiple virtual machines (VMs) can share physical resources (CPU, memory, and bandwidth) on a single physical host, and multiple VMs can share a data center's bandwidth using network virtualization. As there are usually many user requests, a significant challenge is to efficiently schedule user requests with a minimal turnaround time for tasks related to user demands. Task scheduling is used to schedule tasks for optimum resource utilization by allocating specific tasks to certain resources at specific times. Tasks are computational activities that may necessitate diverse processing skills and resource requirements such as CPU, memory, number of nodes, network bandwidth, etc. Each task may have different criteria, such as task priority, a deadline for completion, an estimated execution time, and so on. The task scheduling problem covers two categories of users: cloud providers and consumers. Cloud consumers seek to run their tasks to solve problems of various scales and levels of complexity, whereas resources from cloud service providers will be used to execute custom tasks. Cloud consumers will benefit from prudent resource selection and aggregation, while cloud providers will gain from optimal resource utilization. Since many users and applications share device resources, appropriate task scheduling is essential and crucial [8-10]. Task scheduling in cloud computing includes two basic types of scheduling approaches: preemptive and non-preemptive scheduling methods. The VM is assigned to the tasks for a specified amount of time in preemptive scheduling, whereas in non-preemptive scheduling, the VM is assigned to the task until it finishes. Task scheduling and resource management allow cloud providers to optimize revenue and resource usage to the maximum extent possible. The scheduling and distribution of resources appear to be significant bottlenecks in the effective utilization of cloud computing resources. This bottleneck in efficient scheduling in turn inspires researchers to explore task scheduling in cloud computing. The fundamental principle behind task scheduling is to arrange tasks to attenuate time loss and boost performance. Systems without a proper task scheduling feature may exhibit a longer waiting period and even compel the less important tasks towards starvation. Hence, scheduling strategies must include important parameters like the nature, size, and execution time of tasks as well as the availability of computing resources when calculating task priority and finalizing scheduling decisions [11-15].

II. LITERATURE REVIEW

V. A. Lepakshi and C. S. R. Prashanth dicussed that the parallel task execution in a heterogeneous cloud computing system emerges as NP- complete problem and in the literature, many heuristics behave differently when deployed in various environments. Efficient resource allocation improves reliability and leads to the completion of jobs and minimization of delays. In general, static task scheduling algorithms consider the earliest finish time (EFT) of the task to minimize the make span. In this work, we propose a new heuristic called Efficient Resource Allocation with Score (ERAS) for reliable task scheduling in cloud computing systems, which considers temporal operational availability of Virtual Machines (VM) by considering various types of delays and EFT to assign a normalized score to the processor for scheduling tasks. Here, the allocation of VMs to tasks is based on a score given to each VM, by considering multiple criteria. The results show that ERAS algorithm gives better performance with increased reliability when compared to existing algorithms that consider only EFT for allocation [1]..

C. Shetty and H. Sarojadevi explained that the task scheduling plays a vital role in the function and performance of the cloud computing system. While there exist many approaches for improving task scheduling in the cloud, it is still an open issue. In this proposed framework we try to optimize the utilization of cloud computing resources by using machine learning techniques. Task scheduling algorithms can be designed for static or dynamic scenarios. The proposed framework is for the dynamic scenario. Task scheduling can consider different parameters for scheduling purposes like Make span, QoS, energy consumption, execution time, and load balancing. We propose to apply a machine learning technique for the incoming task requests so as to classify the best suitable algorithm for the task request rather than randomly assigning the scheduling algorithm. Supervised machine learning techniques can be used here. The outcome of the proposed work leads to the selection of the best task scheduling algorithm for the input task(request [2].

Attiya, I., Abd Elaziz, M., & Xiong, S fiscussed in their paper that in recent years, cloud computing technology has attracted extensive attention from both academia and industry. The popularity of cloud computing was originated from its ability to deliver global IT services such as core infrastructure, platforms, and applications to cloud customers over the web. Furthermore, it promises on-demand services with new forms of the pricing package became more complicated due to some factors such as resource dynamicity and on- demand consumer application requirements. To fill this gap, this paper presents a modified Harris hawks optimization (HHO) algorithm based on the simulated annealing (SA) for scheduling jobs in the cloud environment. In the proposed HHOSA approach, SA is employed as a local search algorithm to improve the rate of convergence and quality of solution generated by the standard HHO algorithm. The performance of the HHOSA method is compared with that of state-of-the-art job scheduling algorithms, by having them all implemented on the Cloud Sim toolkit. Both standard and synthetic workloads are employed to analyze the performance of the proposed HHOSA algorithm. The obtained results demonstrate that HHOSA can achieve significant reductions in makes pan of the job scheduling problem as compared to the standard HHO and other existing scheduling algorithms [3].

Jiachen Yang et. al., explained with the increasing popularity of cloud computing products, task scheduling problem has become a hot research topic in this field. The task scheduling problem of cloud computing system is more complex than the traditional distributed system. Based on the analysis of cloud computing in related literature, we established a simplified model for task scheduling system in cloud computing. Different from the previous research of cloud computing task scheduling algorithm, the simplified model in this paper is based on game theory as a mathematical tool. Based on game theory, the task scheduling algorithm considering the reliability of the balanced task is proposed. Based on the balanced scheduling algorithm, the task scheduling model for computing nodes is proposed. In the cooperative game model, game strategy is used for the task in the calculation of rate allocation strategy on the node. Through analysis of experimental results, it is shown that the proposed algorithm has better optimization effect [4].

III. METHODOLOGY

The study of this paper is a data has a transfer in virtual machines and data is stores a one virtual machines through the virtual machines it has a stores a database. Task scheduling and resource management allow cloud providers to optimize a resource usage to the maximum extent possible.

Disadvantages of existing system:

- Less Security
- Prone to keyword guessing attacks.
- High computation cost.

PROPOSED SYSTEM

The proposed work is illustrated in a step-by-step manner with an appropriate number of tasks. The performance of the proposed model is compared in terms of overall waiting time and CPU time. In a cloud computing environment, multiple virtual machines (VMs) can share physical resources (CPU, memory, and bandwidth) on a single physical host, and multiple VMs can share a data center's bandwidth using network virtualization**.**

Advantages Proposed System Advantages

- High Security
- Multiple levels of access and security
- Low computation cost.

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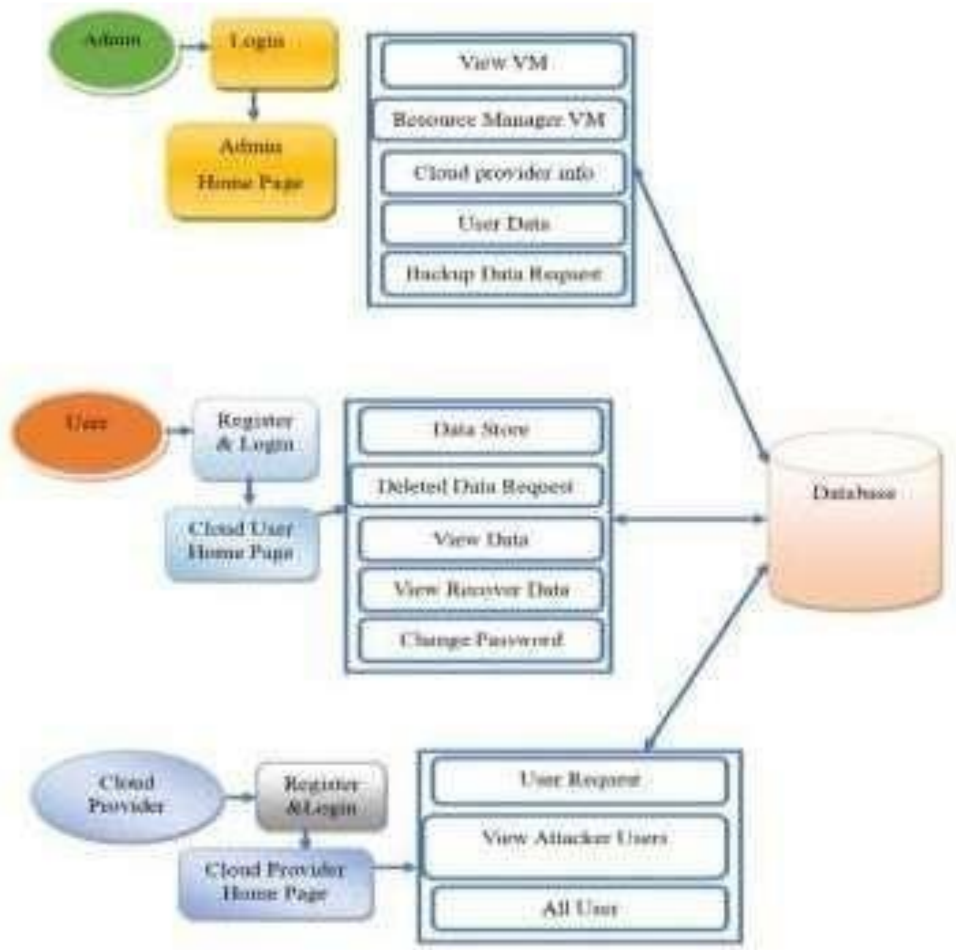
SYSTEM ARCHITECTURE



In our Project we have a three virtual machines in the project. Admin has a login with a user id and password. Admin have a view a virtual machines. Admin can have a resource manager virtual machines. Admin have a cloud provider information. Admin can also have a user data information of the details. Admin have a backup data.

MODULES:

User Interface Design: In this module we design the windows for the project. These windows are used for secure login for all users. If the user already exits directly can login into the server else user must register their details such as username, password and Email id, into the server. Server will create the account for the entire user to maintain upload and download rate. Name will be set as user id. Logging in is usually used to enter a specific page.
Admin: In this module Cloud can login. Admin can view a virtual machine. Admin has a resource manager to the space utilization of the total space. Admin can have a cloud providers information to the cloud storage. Admin can see all the data in the cloud storage in the server. Admin can have a backup request to the server.
User: This is the second module of this project. In this module. user can register after register they need to be a login takes permission from cloud provider. Cloud user can see all my files in the virtual machine data stores. Cloud user can also send a data backup requests.
Cloud Provider: This is the third module of this project. In this module. Cloud provider can register and then login. Cloud provider can have a user request. Cloud provider can have a view attacker users. Cloud provider can have a all users. Cloud providers only allow a permissions for the users. Users cannot login directly takes a permission after approve then it was login.

IV. IMPLEMENTATION

BATS, IDEA And BATS+BAR:

Longest expected processing time preemption (LEPT), bandwidth aware divisible scheduling (BATS)+BAR optimization and divide- and conquer methods. The method uses a queue to store and manage all the incoming tasks to the system. The task allocation is performed by assigning a priority to each task. They use Hybrid Genetic-Particle Swarm Optimization (HGPSO) algorithm for different tasks assignment. The work carried out in applies the mean grey wolf optimization algorithm to minimize the overall make span and energy consumption in cloud computing networks. Gravitational Search and Non-dominated Sorting Genetic Algorithm (GSA and NSGA) have been found in [24] to select the candidate VMs. The cloudlet scheduling problem has been solved by applying the monarch butterfly optimization algorithm

Priority assignment to tasks (PAT):

Every task remains in the queue after its arrival in the system. The priority of each task must be computed for its subsequent execution while minimizing its waiting time. Thus, if two tasks (Ti and Tj) are waiting for VM with priority values x and y respectively, the task Ti is executed.
When a task enters the system, its priority is computed and added to the queue. The scheduling algorithm must allocate VM to the task with the highest priority. This allocation is implicitly true unless any new task arrives with a higher priority than the currently running tasks. When it comes to accomplishing a certain task, the former adheres to its non-preemptive nature, whereas the latter adheres to its preemptive nature. Moreover, both time and memory are saved by adopting non-preemption of tasks. However, preemption of tasks though being less efficient in terms of CPU time and memory cannot be avoided. Hence, it is necessary to switch between these methods for efficient task completion. Thus, the priority assigned to the task along with the building of the Heap must be executed concurrently with the scheduling algorithm. As initially there is no task in the system, the heap must be built first and then only the tasks can be scheduled, which in turn requires that for the arrival of each α number of tasks, the priority assignment and Heap construction must be accomplished while during the next the arrival of α number of tasks, the task must be allocated. In order to the above discussed steps, a parallel scheduling algorithm is proposed for optimizing the overall waiting of tasks.

V. EXPERIMENTAL RESULTS

CLOUD PROVIDER REGISTRATION

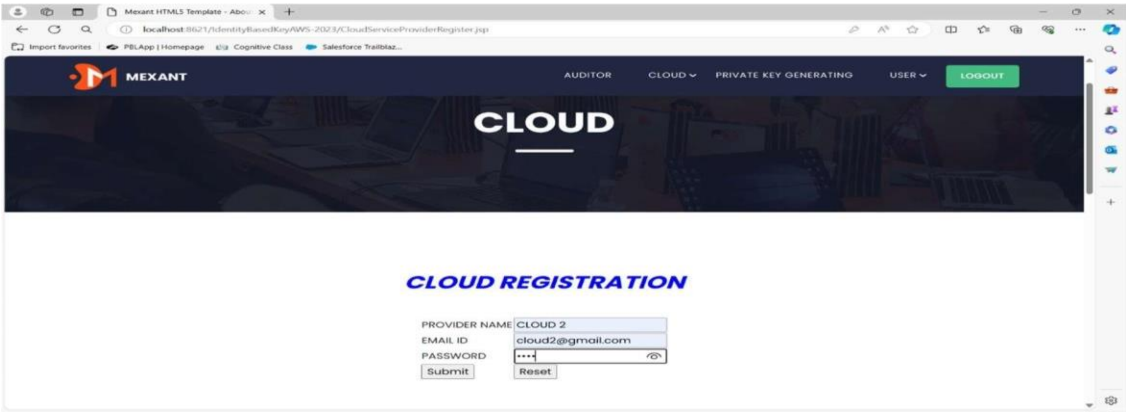


Figure. Cloud Provider Registration Page

- Register with Name, E-Mail ID and Password

USER REGISTRATION

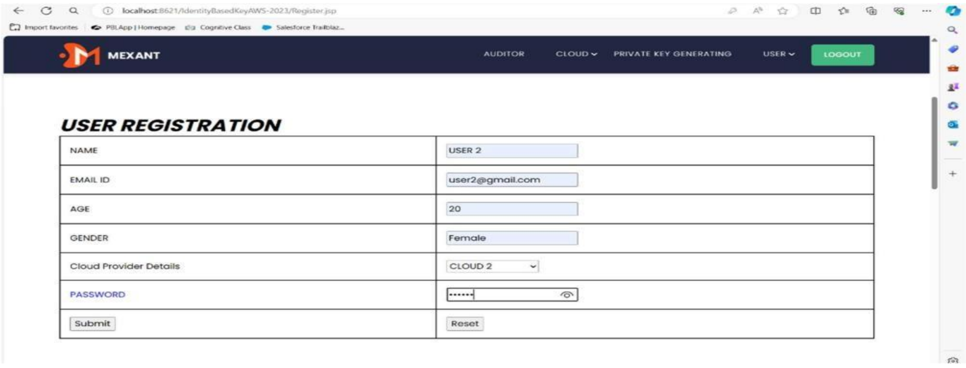


Figure. Cloud User Registration Page

- User's Cannot login directly it takes a permission from a cloud provider

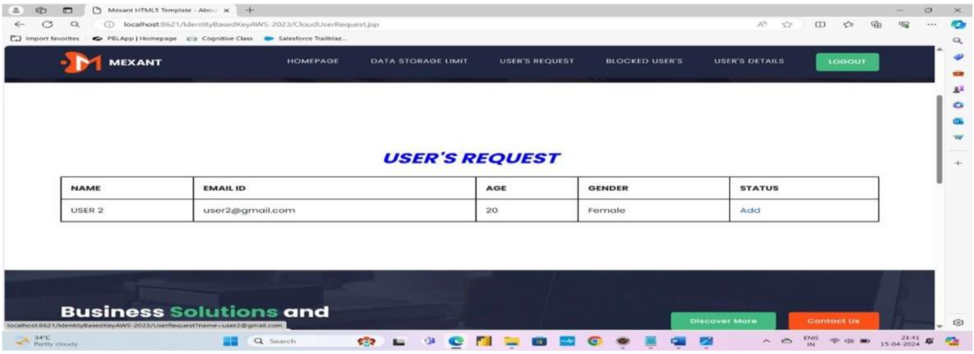


Figure. User's Request Page

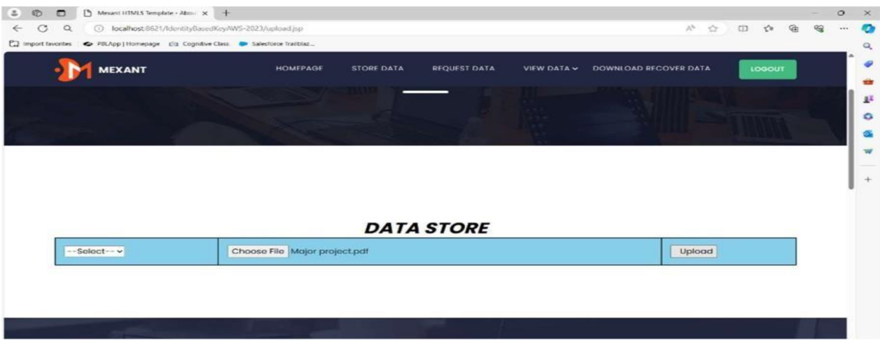


Figure. User Data Upload Page

- Data Store > Choose File > Upload > Done

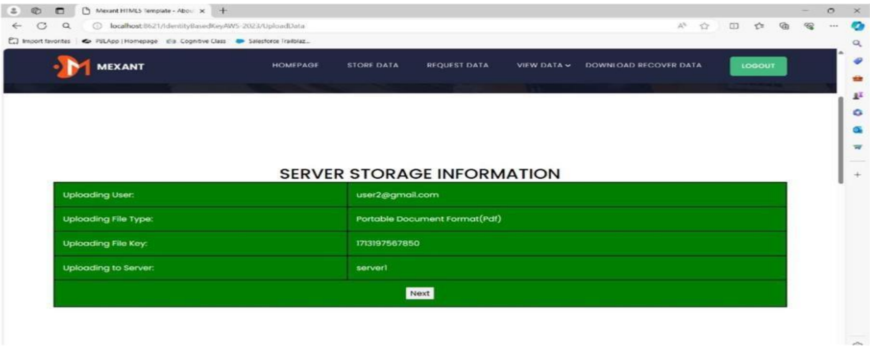


Figure. User Data Server Storage Information

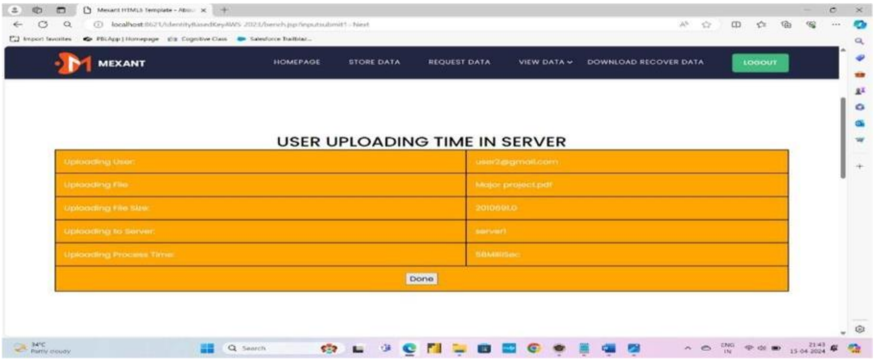
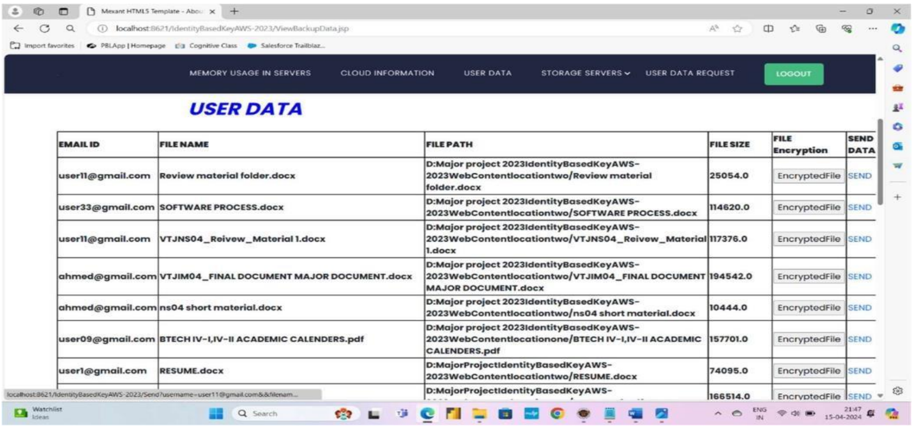


Figure. User Data Uploading Time



EMAIL ID	FILE NAME	FILE PATH	FILE SIZE	FILE Encryption	SEND DATA
user11@gmail.com	Review material folder.docx	D:Major project 2023IdentityBasedKeyAWS-2023WebContentlocationtwo/Review material folder.docx	25054.0	EncryptedFile	SEND
user33@gmail.com	SOFTWARE PROCESS.docx	D:Major project 2023IdentityBasedKeyAWS-2023WebContentlocationtwo/SOFTWARE PROCESS.docx	114620.0	EncryptedFile	SEND
user11@gmail.com	VTJNS04_Reivew_Material 1.docx	D:Major project 2023IdentityBasedKeyAWS-2023WebContentlocationtwo/VTJNS04_Reivew_Material 1.docx	117376.0	EncryptedFile	SEND
ahmed@gmail.com	VTJIM04_FINAL DOCUMENT MAJOR DOCUMENT.docx	D:Major project 2023IdentityBasedKeyAWS-2023WebContentlocationtwo/VTJIM04_FINAL DOCUMENT MAJOR DOCUMENT.docx	194542.0	EncryptedFile	SEND
ahmed@gmail.com	ns04 short material.docx	D:Major project 2023IdentityBasedKeyAWS-2023WebContentlocationtwo/ns04 short material.docx	10444.0	EncryptedFile	SEND
user09@gmail.com	BTECH IV-I,IV-II ACADEMIC CALENDERS.pdf	D:Major project 2023IdentityBasedKeyAWS-2023WebContentlocationone/BTECH IV-I,IV-II ACADEMIC CALENDERS.pdf	157701.0	EncryptedFile	SEND
user1@gmail.com	RESUME.docx	D:MajorProjectIdentityBasedKeyAWS-2023WebContentlocationtwo/RESUME.docx	74095.0	EncryptedFile	SEND
		D:MajorProjectIdentityBasedKeyAWS-	166514.0	EncryptedFile	SEND

Figure. List of Deleted Data of Users

VI. CONCLUSION

Our work also exemplifies three distinct scenarios to evaluate the effectiveness of the proposed task scheduling approach while dealing with tasks of different priorities. Furthermore, a demonstration for applying a task scheduling algorithm in a dynamic cloud computing environment is also provided where the decision for virtual machine allocation is based on the number of tasks in the system. The efficiency of the proposed algorithms has been tested using a variety of benchmarks and synthetic data sets. The simulated results are compared with the existing techniques like BATS, IDEA, and BATS+BAR, and the comparison proves that our proposed algorithms perform better in terms of optimizing the overall waiting time.

Future Enhancement

Our work also exemplifies three distinct scenarios to evaluate the effectiveness of the proposed task scheduling approach while dealing with tasks of different priorities. Furthermore, a demonstration for applying a task scheduling algorithm in a dynamic cloud computing environment is also provided where the decision for virtual machine allocation is based on the number of tasks in the system.

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