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A Secure Cloud Framework for Resource Allocation and Optimization

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ABSTRACT

With the advancement of technology various types of cloud services have direct or indirect effect on our daily used data. It is the most crucial part that encryption of data should be according to the type and relevance of data used. It is also very tedious and critical part simultaneously creates equilibrium between data protection schemes and system performance. This paper reports analysis of existing resource allocation techniques on cloud. There are tabular presentation of given techniques with benefits and parameter used. After analyzing these resource allocation techniques, Key Selective Secure Privacy (KSSP) framework is proposed. This framework chose the algorithm based on complexity. After that, it will utilize genetic algorithm for data and resource optimization. The combination of genetic algorithm, load balancing and scheduling will create a positive influence on system performance and on the resources used on the cloud environment.

Keywords: *Cloud Computing, Genetic Algorithm, KSSP, Load Balancing, Privacy Requirement*

I. INTRODUCTION

The cloud platform is the upcoming platform for software as a service. As the world is working on the mobility of the services, it is also necessary that the platform chosen should be efficient enough and proper resource optimization will be done. Cloud computing is an innovation technology which utilizes mainly internet along with centralized remote-servers to keep data as well as applications. With the advent of this technology, the cost of computation, application hosting, proper storage of content and delivery is abridged considerably. The idea of cloud computing is established on a basic principal of "re-usability of information technology capabilities". The most widely used definition of the cloud computing model is introduced by NIST as "a model for enabling convenient, On-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction". It is a flexible method to distribute assets out of a group, permitting to consume processing power according to an individual needs. If service level agreement is not followed properly, then utility of cloud technique will be limited. Cloud depicts the utilization of an application, group of services, information, and infrastructure comprises of groups of information, network, process, and storage resources. All the organizations whether they are small, big or medium sized cloud computing is

applicable to them as there is no need to invest in costly infrastructure, hardware and software. Multi-tenancy, data isolation, service level agreement, regulatory compliances are the security issues, which should be addressed carefully. The paper organized in the following manner: Section II introduces the related work that includes cloud model and characteristics. Section III there is analysis of existing resource allocation techniques in cloud. In section, IV key selective secure privacy (KSSP) framework is put forwarded, and the Section V will cover the conclusion part.

II. RELATED WORK

2.1 Cloud Service Model

Software as a Service (SaaS): The most basic form of cloud computing. Here the applications running on a cloud infrastructure provide service to consumer, through internet. Online word processing and spreadsheet tools are the examples (Google Docs etc). The major benefits of SaaS are that there is no licensing risk involved and neither are there any version compatibility issues. Platform as a Service (PaaS): it provides computational resources through the platform such as development tools and Operating systems. It provides an environment where application can be run. Examples are Google App engine, Microsoft Azure. Infrastructure as a Service (IaaS): Here the consumers do not need to invest in costly infrastructure rather consumers take on rent hardware include processors, storages, network, and other fundamental computing resources. Consumer does not have direct control on the infrastructure but pay for facility which used by them. Rackspace Cloud and Amazon EC2 are the examples.

2.2 Essential Characteristics

The resources are allocated on demand, when one needs it. Whole process is carried out without human interference. Resource sharing means to assign computing resources to multiple customers dynamically. The resources are scalable up and down as it is highly elastic. The services of cloud are metered. User is charged based on the amount of resources used. In cloud, there is broad network access.

III. ANALYSIS OF EARLIER RESOURCE ALLOCATION SCHEMES

Table1. Tabularization of various techniques

Author Name	Techniques Used	Benefits	Parameters
Youwei ding et.al,[10]	Energy Efficient Scheduling Algorithm. EEVS is used and can support DVFS well	Reduces the total energy consumed by the cloud. High performance power ratio.	Number of virtual machines and performance power ratio
Xaiomin Zhu et.al, [11]	Rolling-Horizon Scheduling called Energy Aware Rolling-Horizon	Virtualization technique increases resource utilization and reduces	Task count and Task arrival rate , Task Deadlines

	Scheduling Algorithm or Earth is used	energy consumption	
Jinn-Tsong, Tsai et.al,[12]	IDEA Combines Taguchi Method and DEA	High and effective optimization	Cost versus Time
Yue Gao Ming Hsieh et.al,[13]	Static Scheduling and Dynamic Scheduling	High error coverage and fault tolerance while minimizing global energy cost	Slack Application Index and Replication factor
Youwei Ding et.al, [14]	Static and Dynamic allocation. Bin Packing Heuristics	Increases resource utilization. Most energy efficient solution	Time and Active Server Count
Jiaxin Li, et.al,[15]	User Internet Data Centers (IDCs). LP-MKP Algorithm (Layered Progressive Multiple Knapsack Problem)	LP-MKP is significantly superior to the Greedy algorithm and better than the heuristic allocation algorithm	Maximum idle resources (Greedy), maximum available resource in the information tree
Mehiar Dabbagh et.al,[16]	Data Clustering, Workload Prediction and Power Management	Significant energy saving and energy utilization	Sum of squared distances(SSD) and number of clusters
Shaung Chen et.al,[17]	Convex Optimization Technique	Reduction in total cost	Charging/Discharging rate, ESD capacity
Zhen Xiao et.al, [18]	Skewness Algorithm, Hotspot Migration and Green Computing	Proper utilization of servers and saves energy	Hot threshold
Chia Ming Wu et.al,[19]	Green Energy Efficient Scheduling Algorithm with extension of DVFS	Minimum resource requirement of job	Number of jobs versus energy consumption
Riddhi Patel et.al,[20]	Energy Aware Best Fit Decreasing (EABFD) Algorithm	Optimization of QoS	Number of VM migration and percentage of SLA violation

Manasa H.B et.al,[21]	VMs Allocation Policies using modified Best Fit Decreasing (MBFD)	Reliability and sustainability	Number of VMs and energy consumed
ClaudioFian Drino et.al,[22]	Power, Performance and Network traffic metric	Helps to detect hardware faults	CNEE, PUEE and ISCL
Mehiar Dabbagh et.al,[23]	Workload Prediction, VM Placement and Workload Consolidation	Reduction in cloud centre energy and solve under utilization issues	Time versus number of requests
Ashkan Paya et.al,[24]	Energy Aware Scaling Algorithm with Load Balancing	Idle servers switched to sleep state to save energy	High cost versus low cost application scaling
Gang Sheng et.al,[25]	Shadow Price Guided Genetic Algorithm	SGA is faster than GA	-
Andreas et.al,[27]	Energy Efficient Cloud Computing	Identify main source of energy consumption	Energy consumption and Power consumption
Anton et.al,[29]	Energy Aware Resource Allocation Heuristics	High potential for improvement of energy efficiency under dynamic workload scenarios	Performance delivery
Yashwant Singh et.al,[31]	Green Cloud Computing	Energy efficiency and power management	Virtualization of servers
Guazzone et.al,[32]	Energy Efficient Resource Management	Minimum consumption of energy	Energy and QoS
Beloglazov et.al,[33]	Energy Efficient Allocation of Virtual Machines.	Virtualization leads to high performance	Energy minimization
Bo An et.al,[34]	Automated Negotiation with De commitment for Dynamic Resource Allocation	Solve the source allocation problem and reduction in operative cost	Source rate
Mohamed et.al,[35]	Resource Allocation in Network based Cloud Computing	High performance	VM migration

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IV. KEY SELECTIVE SECURE PRIVACY METHODOLOGY

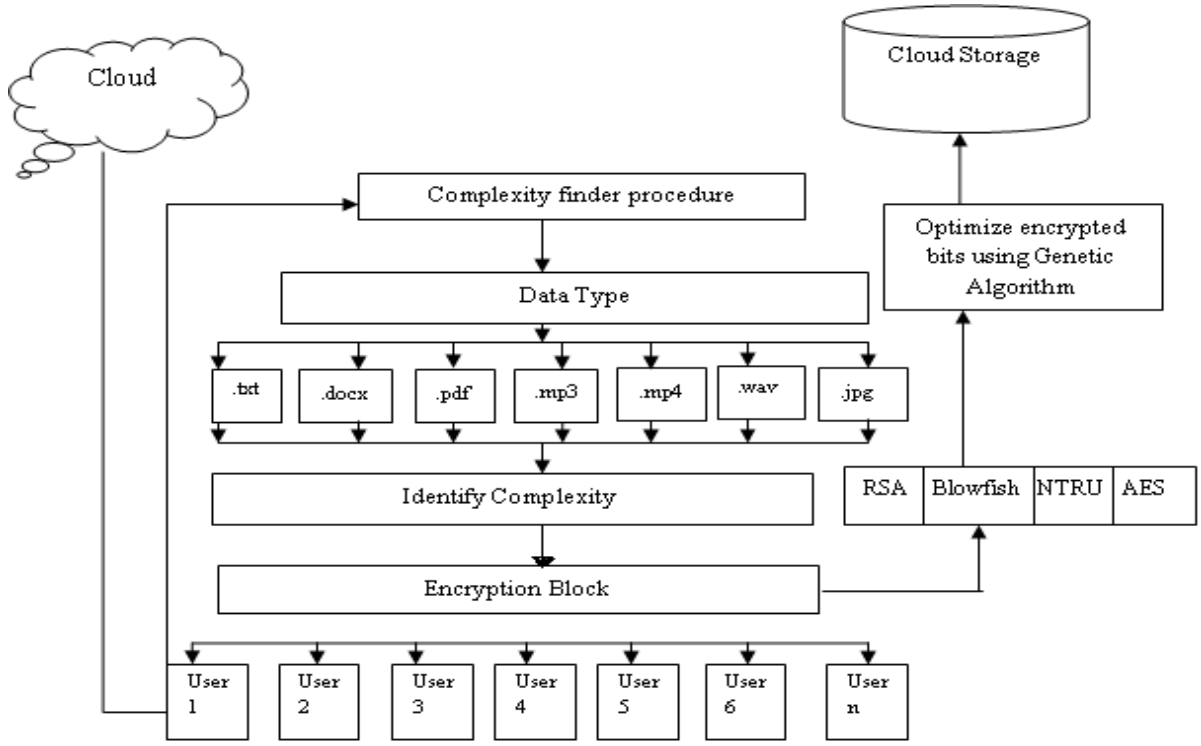

Figure1. Framework of KSSP

The figure1 represents the entire frame work. There are mainly three sections in the proposed architecture. The first one is the complexity finder based on type of the document which has been uploaded. Second section is the selection of the encryption algorithm. The final section is the storage section where the entire data is stored on the cloud in the form of optimized reduced bit pattern. The entire framework is termed as Key Selective Secure Privacy (KSSP) framework. There are certain processes in the proposed framework. The framework looks for the User and Job complexity both. The proposed framework starts from the complexity finder block which is at the top of the entire architecture. The complexity finder is one of the key issues of the proposed KSSP architecture as it saves a lot of time when the data is sent for the encryption. Choosing a wrong encryption algorithm may lead to a huge time gap and loss in data identity. The complexity finder is applied to different type of multimedia files which is an attached block to the data type. All the attached data types have been considered. The algorithm is assigned according to the complexity of the document. There are four algorithms which have been considered for the encryption namely, RSA, BLOWFISH, AES and NTRU. The proposed framework (KSSP) has wisely chosen these four algorithms as per encryption nature of the algorithm and the types of documents which are getting used in KSSP architecture. The encrypted bits are followed by the optimization block which is single handled by the Genetic Algorithm. Genetic

Algorithm is a part of Natural Computing and can handle large number of bits provided to it. There is cloud storage above the entire architecture and the encrypted optimized reduced bits are stored at the top of the cloud storage. After this, job management technique is applied to the entire framework in order to check out that any sub-server does not sit idle or any other server is not over-utilized. In the end, measures like RAM, CPU utilization, Up time, Down time, Waiting time etc. will be evaluated. Figure 2 represent the sequential flow of KSSP.

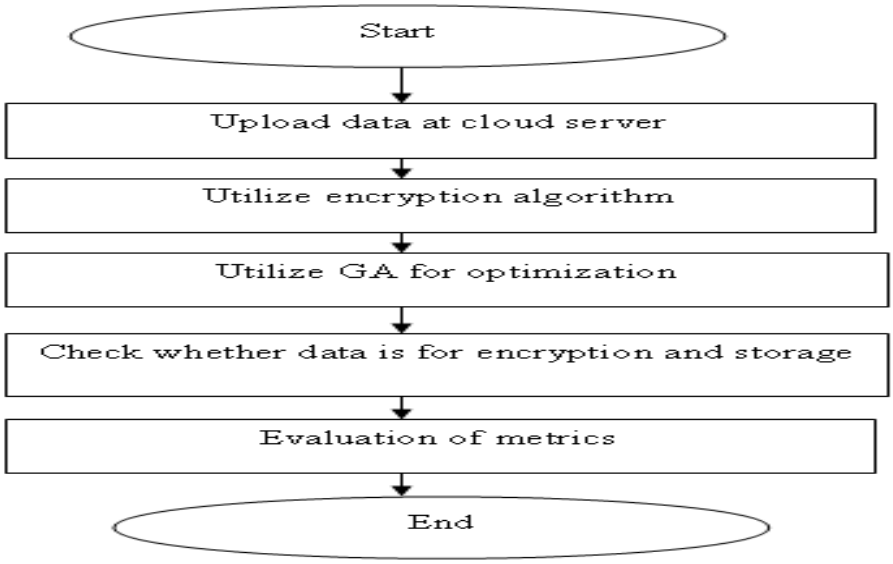

Figure2. Flowchart of KSSP

V. CONCLUSION

In this paper, we have analyses various resource allocation techniques with their parameters on cloud. Their benefits and limitations are tabularized. We think there is a scope of more system performance. So, we proposed Key Selective Secure Privacy Scheme in cloud environment to retain privacy of users' data without effecting system performance. The proposed model algorithm is combination of load balancing and files management. Genetic algorithm will help to remove unwanted data. Simulation result will be more supportive than other discussed techniques. By following correct authentic measures, KSSP is capable of improving resource utilization and performance up to a great extent.

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