



## International Journal of Intellectual Advancements and Research in Engineering Computations

### A securable data storage framework in cloud computing

<sup>1</sup>C.Vasuki, <sup>2</sup>V.Jamuna<sup>1,2</sup>, <sup>2</sup>V.Kiruthiga, <sup>2</sup>M.Princy Priscilla,, <sup>2</sup>A.Tamil arasan, B.Kirubaharan

<sup>1</sup>Associate professor, Dept of IT, Nandha Engineering College, Erode

<sup>2</sup>UG Scholar, Dept of IT, Nandha Engineering College, Erode

Email: vasukibtech@gmail.com

**Abstract:** This project has been proposed for monitoring working process of internal and external clouds. Here, Public clouds provide Infrastructure as a Service (IaaS) to users who do not own sufficient compute resources. It faces the problem of the scheduling tasks to meet the peak demand while preserving Quality-of-Service (QoS). By using Standard PSO easily traps into local optima and also is not robust for difficult problem instances. In the Proposed work, resource allocation framework in which an IaaS provider can outsource its tasks to External Clouds (ECs) when its own resources are not sufficient to meet the demand. Each task has a strict deadline to meet, so that the resource allocation problem can be considered as a deadline constrained task scheduling (DCTS) one.

An integer programming formulation of the DCTS problem is established, with the objective of maximizing the profit of the private cloud on the premise of guaranteeing QoS. while increases exponentially with the growth of the number of tasks, using the particle swarm optimization (PSO) based scheduling approach is proposed to solve this problem. PSO has the advantages of easily realizing and quickly converging, so that this scheduling approach is able to get an optimal or suboptimal solution in a shorter computational time than the large size problems. It will increase the profit and also increase the problems of nontrivial size.

**Keywords**—Cloud Computing, Infrastructure as a Service (IaaS), Cloud Storage, Storage Security

#### I. INTRODUCTION

Cloud is a group of computers or servers which are interconnected together to provide resources to the clients. It emerges as a brand new computing paradigm that aims to supply reliable, custom- made and QoS (Quality of Service) warranted computing dynamic environments for the end customers. The main problems related to cloud computing are the network bandwidth, response time, minimum delay in data transfer and minimum transfer cost for data. In cloud computing the resource allocation plays an important role in the performance of the entire system and also the level of customer satisfaction provided by the system. However, while providing the utmost customer satisfaction, the service provider ought to make sure of the profits to him also. So the resource allocation should be economical on both views i.e. on the end user and the service provider perspective. So as to get such a system the new technologies insist that the system should be with minimum SLA (Service Level Agreements) violation.

#### II. CLOUD ARCHITECTURE, CHARACTERISTICS, BENEFITS AND

#### SECURITY ISSUES

The service delivery models and the deployment models are the two categories of cloud computing. The NIST definition of cloud computing has been shown in Figure-1. The deployment models are: 1) **Private cloud**: a cloud platform is dedicated for specific organizations. Here the computing infrastructure is dedicated to the customer and it is not shared with other companies. 2) **Public cloud**: a cloud platform available to public user to register and use the available infrastructure. This computing infrastructure is hosted at the vendor's workplace and the end user can not view the infrastructure. 3) **Hybrid cloud**: a private cloud that can extend to use resources in public clouds. Organization can submit less valued application in public cloud and high valued applications in private cloud. 4) **Community cloud**: The cloud infrastructure is shared between companies of the same community. Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) are service delivery model.

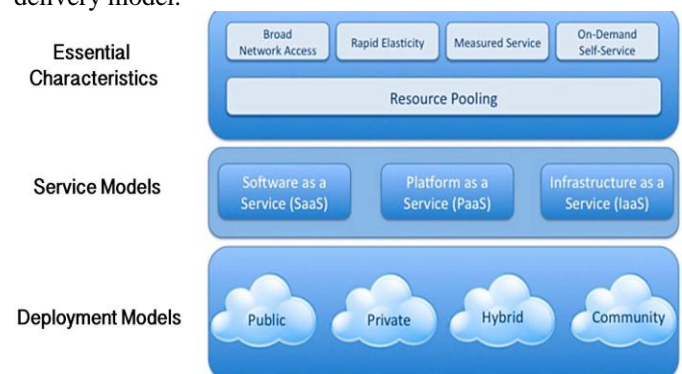


Fig.1: The NIST Definition of Cloud Computing

**Infrastructure as a Service (IaaS)** is the lowest layer which provides the virtualized hardware and storage on the top of which they can build their infrastructure. It is suitable for designing the system infrastructure but provide limited service to build applications. It has the provision to share hardware resources for executing services; typically it is including virtualization technology.

**Platform as a Service (PaaS)** is the middle layer which provides platform for developing application hosted in the cloud. It also gives a platform to execute your software. It delivers platforms, tools and other business services that enable customer to develop, deploy, and manage their own

application, without installing any of these platforms and support tools on their local machines.

**Software as a Service (SaaS)** is the topmost layer which provides with application that are accessible anytime and from anywhere. It is appealing for application serving a wide range of users and that can be adapted to specific needs with little further customization. It provides service for end user without requiring installing the application on the customer’s computers.

### III. SCHEMATIC SYSTEM ARCHITECTURE FOR PROPOSED MODEL

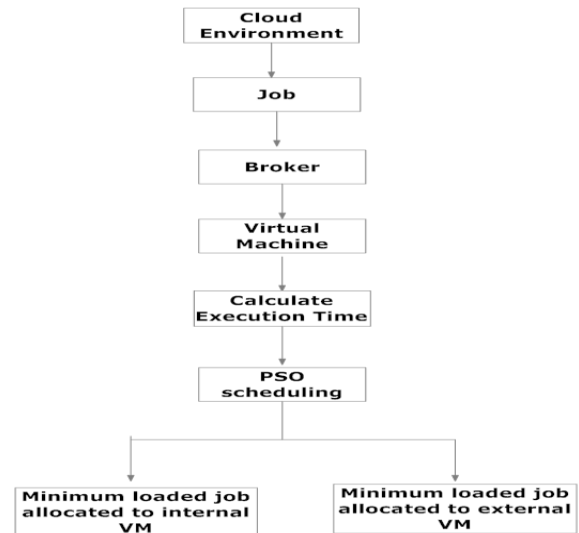
A cloud resources allocation framework to allow it to utilize external clouds. An IaaS cloud has its own private cloud, and is able to outsource its tasks to other cloud providers called external clouds (ECs) when its local resources are not sufficient. Each task has a strict deadline to meet, so that the resource allocation problem can be considered as a deadline constrained task scheduling (DCTS) one. At this time, each task will be allocated into correct server by using the particle swarm optimization (PSO) approach to solve this problem. When PSO scheduling approach is able to get an optimal or suboptimal solution in a shorter computational time than the large size problems. It will give the correct solution for that task scheduling and also increase the profit.

A service provider containing a metasched user is responsible for distributing the tasks among re-source providers according to their load and system configuration. However, allocating resources from multiple providers is challenging because these resource providers cannot disclose much information about their local load to the metascheduler. Workload is private information that companies do not disclose easily since it may affect the business strategy of competitors.

A population consists of one master swarm and several slave swarms. The symbiotic relationship between the master swarm and slave swarms can keep a right balance of exploration and exploitation, which is essential for the success of a given optimization task. The master-slave communication model, is used to assign fitness evaluations and maintain algorithm synchronization. DVS-enabled cluster systems can reduce much energy consumption, which decrease the operational cost and increases the system reliability. In this paper, we proposed power-aware scheduling algorithms for bag-of-tasks applications with deadline constraints on DVS-enabled cluster systems. The proposed scheduling algorithms select appropriate supply voltages of processing elements to minimize energy consumption. The power-aware scheduling algorithms for bag-of-tasks applications with deadline constraints on DVS-enabled cluster systems. The proposed scheduling algorithms select appropriate supply voltages of processing elements to minimize energy consumption.

The algorithms are inspired by biological and sociological motivations and can take care of optimality

enough, discontinuous and multimodal surfaces. Special emphasis is given on the hybridizations of PSO and DE algorithms with other soft computing tools. The article finally discusses the mutual synergy of PSO with DE leading to a more powerful global search algorithm and its practical applications.



### IV. ALGORITHM SPECIFICATION

The network architecture for the cloud data storage is illustrated in Figure 2. Four different network entities have been identified as follows:

#### A. Schematic System Architecture

The detailed design of our proposed model [6] is illustrated in Figure-2.

**User:** Users who want to use cloud infrastructure.

**Cloud Service Provider-1(CSP-1):** This is the Platform as a service provider. The user will perform the computation here. User interact the CSP-2 and CSP-3.

**Cloud Service Provider-2(CSP-2):** Encryption Algorithm, Decryption Algorithm and Key Generation techniques are stored here.

**Cloud Service Provider 3(CSP-3):** This is the Infrastructure as a service provider. All data are stored.

#### B. Notation and Preliminaries

**F<sub>Encod</sub>:** This is a text file which contains the encrypted data and this file is stored in CSP3.

**F<sub>Temp</sub>:** It will be used during data processing time (i.e. retrieval operation and will be free) and it is a temporary file.

**Gen\_Key():** It is function which generate a secure key.

**Ks:** It is a key which is generated by Gen\_Key function in CSP-2.

**Encryption ():** It is encryption algorithm to encode file.

**Decryption():** It is a decryption algorithm to decode file

### C. Detailed Design of Encryption Scheme

We have described the detailed design of our secure key generation algorithm.

#### Algorithm 1:

This sub-algorithm determines the most appropriate VMs to which the tasks of the overloaded VMs can be allocated, and finds the optimal task scheduling schema by applying the PSO algorithm. This sub-algorithm applies the data and information determined in Steps 1 and 2 of the TBSLB-PSO algorithm as its inputs. In the task scheduling model, there are tasks  $\{t_1, t_2, \dots, t_n\}$  that should be assigned to  $m$  VMs  $\{vm_1, vm_2, \dots, vm_m\}$  to be executed (Table 1). All particle positions  $X_i = (x_1, x_2, \dots, x_n)$  determined by PSO by applying Eqs. 7 and 8, are vectors with continuous values, but their corresponding discrete values are needed to determine the number of VMs chosen for executing tasks. Therefore, we apply the Small Position Value (SPV) rule [32] to convert the particles' continuous position values vector to discrete vectors  $d(X_i) = (d_1, d_2, \dots, d_n)$ . The sub-TBSLB-PSO algorithm is described as follows: [Begin TBSLB-PSO algorithm-step 3]

Step 3.1 Determine the overloaded VMs by applying Eqs. 1 and 2

Step 3.2 Determine the candidate host VM set by choosing the set of VMs as  $V_{Mset} = \{vm_1, \dots, vm_m\}$  which satisfy following constraints:

- VM is not overloaded
  - VM is not located on the idle PM
  - VM has similar attributes to one of the overloaded VMs
  - VM has enough memory and the required number of idle CPUs to execute extra tasks
- Step 3.3 Determine the set of tasks which need to be migrated from the overloaded VMs as the migrating task set:  $T_{set} = \{t_1, \dots, t_n\}$
- Step 3.4 Apply the PSO method to solve the proposed optimization problem and assign the migrating tasks ( $T_{set}$ ) to the host VMs to minimize task execution time and transfer time. To achieve this goal, the following steps should be conducted:

Step 3.4.1 Create an initial population array of every particle  $i$  ( $X_i$ ) with random positions and velocities on  $n$  dimensions in the search space.

Step 3.4.2 Convert continuous position values vector of  $X_i$  to discrete vector  $d(X_i)$  using the SPV rule to determine the allocated VM for every arrival task.

Step 3.4.3 Determine the value of  $DE_{ik}$ ,  $VM_{mk}$ ,  $VM_{ck}$  and  $B_{ik}$  based on  $d(X_i)$  to calculate the value of every fitness function.

Step 3.4.4 For each particle, calculate  $Tex_{ek}$ ,  $Tex_{eand}$  and  $T_{trans}$  applying Eqs. 3, 4 and 5.

Step 3.4.5 For each particle, calculate the fitness function  $f(\text{time})$  applying Eq. 6.

Step 3.4.6 For each particle, evaluate the desired optimization fitness function.

Step 3.4.7 Compare each particle's fitness evaluation with its personal best fitness function value ( $x_{pbest_i}$ ). If the current value is better than  $x_{pbest_i}$ , then set  $x_{pbest_i}$  equal to the current value, and the best position  $p_i$  equal to the current location  $x_i$  in  $n$ -dimensional space.

Step 3.4.8 Identify the particle in the neighborhood with the best global success so far as  $x_{gbest_i}$ , and assign its index to the variable  $g$  as the best global position.

Step 3.4.9 Change the velocity and position of the particle according to Eqs. 7 and 8.

Step 3.4.10 If a criterion is met (usually a sufficiently good fitness or a maximum number of iterations) then Step 3.4.10.1 Output best particle position in  $n$ -dimensional space  $d(X_{gbest})$  as the optimal task migration schema Else Step 3.4.10.2 Go to step 3.4.2.

Step 3.5 Determine the following criteria according to optimal task scheduling:

- New optimal task execution/transfer times
- Current VM properties (CPU, ...)
- Transfer tasks and their corresponding data to the host VMs [End TBSLB-PSO algorithm-step 3].

### VI. CONCLUSION

In this paper we have presented an overview of data storage security in cloud computing and proposed a framework based on encryption scheme. To ensure the security of user's data in cloud storage, we proposed an effective and efficient encryption strategy for enhancing security on data-at-rest. We have showed that our scheme almost guarantees the security of data when it is stored in the data center of any Cloud Service Provider (CSP). It will help to build a model to secure the data in the field of cloud computation. This architecture is able to improve the customer satisfaction to a great extent and it will attract many investor in this field for industrial as well as future research farms. This model is able to handle the large number of security threats in a fairly big environment. Though in our model error localization can't be addressed and communication delay is remained. Though compared with some other related scheme, it has new features. Moreover the implementation result indicates that the proposed model can be implemented in future. In the future, we will extend our model by providing error localization and reduce the communication delay. We also plan to investigate dynamic storage correctness.

### REFERENCES

1. S. BHARDWAJ , L. JAIN AND S. JAIN "CLOUD COMPUTING: A STUDY OF INFRASTRUCTURE AS A SERVICE (IAAS)", INT. J. ENG. INF. TECHNOL., VOL. 2, NO. 1, PP.60 -63 2010
2. R. BUYYA , C. S. YEO , S. VENUGOPAL AND J. BROBERG "CLOUD COMPUTING AND EMERGING IT PLATFORMS: VISION, HYPE, AND REALITY FOR DELIVERING COMPUTING AS THE 5TH UTILITY", FUTURE GENERATION COMPUT. SYST., VOL.25, NO.6, PP.599-616, 2009
- A. N. TOOSI , R. N. CALHEIROS , P. K. THULASIRAM AND R. BUYYA "RESOURCE PROVISIONING POLICIES TO INCREASE IAAS PROVIDER'S PROFIT IN A FEDERATED CLOUD ENVIRONMENT", PROC. IEEE INT. CONF.

HIGH PERFORM. COMPUT. COMMUN., pp.279-287 2011

D. Breitgand , A. Maraschini and J. Tordsson *Policy-Driven Service Placement Optimization in Federated Cloud,, 2011*

3. S.ORTIZ "THEPROBLEM WITH CLOUD-COMPUTINGSTANDARDIZATION", COMPUTER, VOL. 44, NO. 7, PP.13-16 2011
4. H. LIU AND D. ORBAN "GRIDBATCH: CLOUD COMPUTING FOR LARGE-SCALE DATA-INTENSIVEBATCH APPLICATIONS", PROC. IEEE INT. SYMP. CLUSTERCOMPUT. GRID, PP.295-305 2008
5. J. KENNEDY AND R. C. EBERHART "PARTICLE SWARM OPTIMIZATION", PROC. IEEE CONF. NEURAL NETW., PP.1942-1948 1995
6. Y. SHI AND R. EBERHART "EMPIRICAL STUDY OF PARTICLE SWARM OPTIMIZATION", PROC. IEEE CONGR. EVOL. COMPUT., PP.1945-1950 1999
7. R. XIAO AND J. YU "A NEWLY SELF-ADAPTIVE STRATEGY FOR THE PSO", PROC. INT. CONF. NATURAL COMPUT., PP.396-400 2008
8. B. NIU , Y. ZHU , K. HU , S. LI AND X. HE "A NOVEL PARTICLE SWARM OPTIMIZER USING OPTIMAL FOR FORAGING THEORY", PROC. COMPUT.INTELL. BIOINFORMAT., PP.61-71-2006
  - A. RATNAWEERA , S. K. HALGAMUGE AND H. C. WATSON "SELF-ORGANIZING HIERARCHICALPARTICLE SWARM OPTIMIZER WITH TIME-VARYING ACCELERATION COEFFICIENTS", IEEE TRANS. EVOL. COMPUT., VOL. 8, NO. 3, PP.240-255 2004
9. J. KENNEDY "SMALL WORLDS AND MEGAMINDS:EFFECTS OF NEIGHBORHOOD TOPOLOGY ON PARTICLE SWARM PERFORMANCE", PROC. IEEE CONGR. EVOL. COMPUT., PP.1931-1938 1999
10. J. KENNEDY AND R. MENDES "POPULATION STRUCTURE AND PARTICLESWARM PERFORMANCE", PROC. IEEE CONGR. EVOL.COMPUT., PP.1671-1676 2002
11. P. N. SUGANTHAN "PARTICLE SWARM OPTIMIZER WITHNEIGHBORHOOD OPERATOR", PROC. IEEE CONGR. EVOL.COMPUT., PP.1958-1962 1999
12. X. HU AND R. C. EBERHART "MULTIOBJECTIVE OPTIMIZATION USING DYNAMICNEIGHBORHOOD PARTICLE SWARM OPTIMIZATION", PROC.IEEE CONGR. EVOL. COMPUT., PP.1677-1681 2002
13. M. S. ARUMUGAM AND M. V. C. RAO "ON THE IMPROVED PERFORMANCESOF THE PARTICLE SWARM OPTIMIZATION ALGORITHMS WITH ADAPTIVE PARAMETERS, CROSS-OVEROPERATOR SAND ROOT MEAN SQUARE (RMS) VARIANTS FOR COMPUTING OPTIMAL CONTROL OF A CLASS OF HYBRID SYSTEMS", APPL. SOFT COMPUT., VOL. 8, PP.324-336 2008
14. B. NIU , Y. L. ZHU AND X. X. HE "CONSTRUCTION OF FUZZY MODELS FOR DYNAMIC SYSTEMS USING MULTIPOPULATIONCOOPERATIVE PARTICLE SWARM OPTIMIZER", PROC.INT.CONF. FUZZY SYST. KNOWL. DISCOVERY, PP.987-1000 2005
15. B. NIU , Y. L. ZHU AND X. X. HE "MULTIPOPULATION COOPERATIVE PARTICLE SWARM OPTIMIZATION", PROC. EUR. CONF. ADVANCES ARTIF. LIFE, PP.874-883 2005
- E. V. D. Bergh and A. P. Engelbrecht "A cooperative approach to particleswarm optimization", *IEEE Trans. Evol. Comput., vol. 8, no. 3, pp.225-239 2004*
16. X. F. XIE , W. ZHANG AND Z. YANG "HYBRID PARTICLE SWARM OPTIMIZER WITH MASS EXTINCTION", PROC. INT. CONF. COMMUN., CIRCUITS, SYST., PP.1170-1173 2002
17. M. LBJERG , T. K. RASMUSSEN AND T. KRINK "HYBRID PARTICLE SWARM OPTIMIZER WITH BREEDINGAND SUBPOPULATIONS", PROC. GENETIC EVOL. COMPUT.CONF., PP.469-476 2001
18. Y. WANG , B. LI , T. WEISE , J. WANG , B. YUAN AND Q. TIAN "SELF-ADAPTIVE LEARNING BASEDPARTICLE SWARM OPTIMIZATION", INF. SCI., VOL. 181, NO. 20, PP.4515-4538-2011
19. J.J. LIANG , A. K. QIN AND S. BASKAR "COMPREHENSIVE LEARNING PARTICLESWARM OPTIMIZER FOR GLOBAL OPTIMIZATION OF MULTIMODAL FUNCTION", IEEE TRANS. EVOL. COMPUT., VOL. 10, NO. 3, PP.281-295 2006
20. B. LIU , L. WANG AND Y. JIN "AN EFFECTIVE PSO-BASED MEMETIC ALGORITHM FOR FLOW SHOP SCHEDULING", IEEE TRANS. SYSTEM, MAN, CYBERN., PART B: CYBERN., VOL. 37, NO. 1, PP.985-997 2007
21. J. C. BEAN "GENETIC ALGORITHMS AND RANDOMKEYS FOR SEQUENCING AND OPTIMIZATION", ORSAJ. COMPUTING, VOL.6, NO.2, PP.154-160-1994
  - R. V. BOSSCHE , K. VANMECHELEN AND J. BROECKHOVE "COST-OPTIMAL SCHEDULING INHYBRID IAAS CLOUDS FOR DEADLINE CONSTRAINED WORKLOAD", PROC.IEEE INT. CONF. CLOUD COMPUT., PP.228-235 2010
22. S. HE , L. GUO AND Y. GUO "REAL TIME ELASTIC CLOUD MANAGEMENT FOR LIMITED RESOURCES", PROC. IEEE INT. CONF. CLOUD COMPUT., PP.622-629 2011
23. S. DOCTOR , G. K. VENAYAGAMOORTHY AND V. G. GUDISE "OPTIMAL PSO FOR COLLECTIVEROBOTIC SEARCH APPLICATIONS", PROC. IEEE CONGR.EVOL. COMPUT., PP.1390-1395 2004