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Secure And Trusted IBS In Cloud

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Abstract - *Today's organizations raise increasing needs for information sharing via on-demand information access in order to facilitate extensive collaborations. To support information sharing among loosely federated data sources an Information Brokering System (IBS) a top a peer-to-peer overlay has been proposed. To help client queries to locate the data servers, it consists of diverse data servers and brokering components. Server side access control deployment and honest assumptions on brokers adopted by many existing IBSs. They will keep more concentration on privacy of data and metadata stored and exchanged within the IBS. The problem of privacy protection in information brokering process studied in this system. First a formal presentation of the threat models with a focus on two attacks given to the system: attribute-correlation attack and inference attack. To share the secure query routing function among a set of brokering servers, a broker-coordinator overlay, as well as two schemes, automation segmentation scheme and query segment encryption scheme proposed. This paper shows that the proposed system can integrate security enforcement and query routing while preserving system-wide privacy with reasonable overhead. Here, in the proposed system these are achieved with comprehensive analysis on privacy, end-to-end performance, and scalability only. To reduce networking risk and improve system efficiency, finally, T-broker using a lightweight feedback mechanism. The experimental results compared with the existing approaches. Here, very good results observed in many typical cases which yielded by T-broker. With various numbers of dynamic services the proposed system is robust in dealing from multiple cloud sites.*

Keywords: *Automation segmentation; coordinates broker; privacy preserving; and Attribute-correlation attack; Information Brokering System;*

I. INTRODUCTION

Ranging from business to government agencies an explosion of information shared among organizations in many realms in recent years. To reconcile data heterogeneity and provide interoperability across geographically distributed data sources, many efforts have been devoted in order to facilitate efficient large-scale information sharing and all.

To construct a data centric overlay including the data sources and a set of brokers helping to locate data sources for queries is a more practical and adaptable solution in the context of sensitive data and autonomous data owners. A semantic-aware index mechanisms build up by such infrastructure to route the queries based on their content. Such a system allows users to submit their queries without knowing data or server location. In my previous study, through a set of brokers such a distributed system providing data access to various users is referred to as Information Brokering System (IBS).

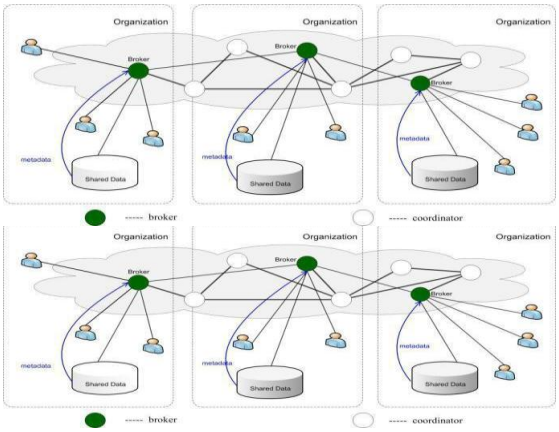

Fig. 1. An overview of the IBS infrastructure

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The Scalability, server autonomy and privacy concerns arises, which are provided with the IBS approach and where as brokers are no longer assumed fully trustable – they may be compromised by outsiders or abused by insiders. To the privacy-preserving information sharing problem there is a general solution in this system. First, a novel IBS, named Privacy Preserving Information Brokering (PPIB) infrastructure proposed in order to address the need for privacy protection. It consists of two types of brokering components with in an overlay infrastructure: brokers and coordinators. For user authentication and query forwarding brokers acting as mix anonymizers, which are mainly responsible one. To enforce access control and query routing based on the embedded nondeterministic finite automata-the query brokering automata, the coordinators concatenated in a tree structure. Two novel schemes designed in order to prevent curious or corrupted coordinators from inferring private information: (a) to segment the query brokering automata, and (b) to encrypt corresponding query segments. To enforce in-network access control and to route queries to the right data sources, to provide full capacity these two schemes ensure that to collect enough information to infer privacy a corrupted or curious coordinator is not capable, such as "which data is being queried", "what are the access control policies" or "where certain data is located", etc. With insignificant overhead and very good scalability PPIB provides comprehensive privacy protection for on-demand information brokering.

A. Related Work

To the problem of large scale data sharing, research areas such as information integration, peer-to-peer file sharing systems such as publish-subscribe systems provide partial solutions. In order to provide an integrated view over large numbers of heterogeneous data sources by exploiting the semantic relationship between schemas of different sources of information the various integration approaches focusing on it. A global schema exists within the consortium, which is assumed by the PPIB therefore, information integration is out of our scope.

To share files and data sets (e.g. in collaborative science applications) peer-to-peer systems are designed. Then in order to locate replicas based on keyword queries distributed hash table technology is adopted here. Based on of our expressiveness needs, the coarse granularity (e.g. files and documents) still makes them short. For further request, P2P systems may not provide complete set of answers while we need to locate all relevant data.

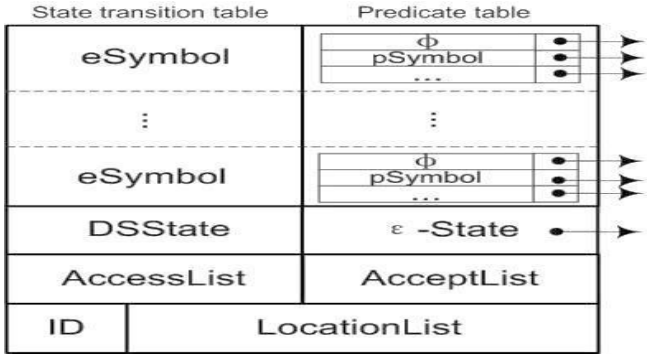

Fig. 2. Data structure of an NFA state

B. Vulnerabilities and the Threat Model

Data owners, data providers and data requestors are three types of stakeholders in a typical information brokering scenario. Each stakeholder has its own privacy.

(1) The identifiable data and the information carried by this data (e.g. medical records) are provided in the privacy of a data owner (e.g. a patient in RHIO). Strict privacy agreements are usually signed by data owners with data providers in order to protect their privacy from unauthorized disclosure/use.

(2) Two types of metadata are created by data providers to store the collected data, namely routing metadata and access control metadata, for data brokering. For a data provider these both types of metadata are considered as they are providing privacy.

(3) In the querying process both identifiable and private information disclosed by data requestors. For example, about AIDS treatment the disease of the requestor (possible) revealed based on the query.

Two types of adversaries, they are outside attackers and curious or corrupted brokering components assumed and the semi-honest (i.e., honest-but-curious) assumption for the brokers adopted by me. Outside attackers passively eaves drop communication channels. Where as the protocols properly working to fulfill their functions. While trying their best to infer

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others' private information from the information disclosed in the querying process, are followed by the curious or corrupted brokering components.

C. Attribute-correlation attack

A query typically contains several predicates, and an attacker intercepts a query (in plaintext). Each predicate describes a condition, sensitive and private data (e.g. name, SSN or credit card number etc.) sometimes involved in it. To infer sensitive information about the data owner the attacker can "correlate" the corresponding attributes if the query having multiple predicates or composite predicate expressions.

For example, At California Hospital a tourist Diana is sent to the emergency room. Through a medicare IBS doctor Bob queries for her medical records. Leukemia is the symptom of Diana, the query has two predicates: [name="Diana"], and [symptom="leukemia"]. "Diana has a blood cancer" any malicious broker could guess easily by correlating two predicates in the query.

II. METHODS AND MATERIAL IN PREVIOUS IMPLEMENTATION

A. Privacy-Preserving Query Brokering Scheme

The content-based indexing function integrates with the NFA-based access control mechanism by QBroker. Where NFA is heavily relies on the QBroker. So that it can enforces and shifts all the data (i.e., index rules, user queries and the ACR) to it. The privacy of both the requestor and the data owner is under risk, if the QBroker is no longer assumed fully trusted (e.g., under the honest-but-curious assumption). With two core schemes a privacy-preserving information brokering (PPIB) infrastructure will tackle this problem. QBroker is divided by the automata segmentation scheme into multiple logically independent components so that each component's can process a piece of an user query. But still via collaboration it can fulfill the original brokering functions. To encrypt query pieces with different keys the query segment encryption scheme is used and for decryption one automaton component is used to the responsible piece(s). With the direct monitoring information only the existing brokering architecture for cloud computing is considering. For multiple cloud environments the efficiency of a trust system is so important. To serve for a large number of users and providers the trust brokering system must be fast and light-weight. So that a large number of users and providers can access services.

B. Automaton Segmentation

Multiple organizations join a consortium and agree to share the data within the consortium, in the distributed information brokering. A global schema exists by aligning and merging the local schemas where different organizations may have different schemas. For all the organizations thus, the index rules and access control rules can be crafted by a global automaton shared schema, the global QBroker. To logically divide the global automaton into multiple independent yet connected segments is the main key idea of the automaton segmentation scheme. It can also do to distribute the segments physically onto different brokering servers.

Segmentation: An NFA state of the original automaton is the atomic unit in the segmentation. One or several NFA states are allowed to hold by each segment. The greatest distance between any two NFA states contained in one segment is further defined as the granularity level. For each segmentation, given a granularity level k, then the next i 2 [1; k] NFA states will be divided into one segment with a probability 1=k. In a distributed query processing a smaller number of segments and less end-to-end overhead will be there if a larger granularity level indicates that each segment contains more NFA states. Based on the privacy protection, here the granularity level.

1) Via parent-child links, multiple NFA states in the same segment should be connected.
2) Heuristic segmentation rules can be defined to reserve the logical connection between the segments after segmentation.
3) To ensure the segments are logically connected, the "accept state" of the original global automaton should be put in separate segments.
4) Without the parent state, no sibling NFA states should not be put in the same segment.
5) If any segments holding the child states in the original global automaton, with these segments other "dummy" accept states of segments can be point to. Means at last the states of each segment to be changed to "dummy" accept states.

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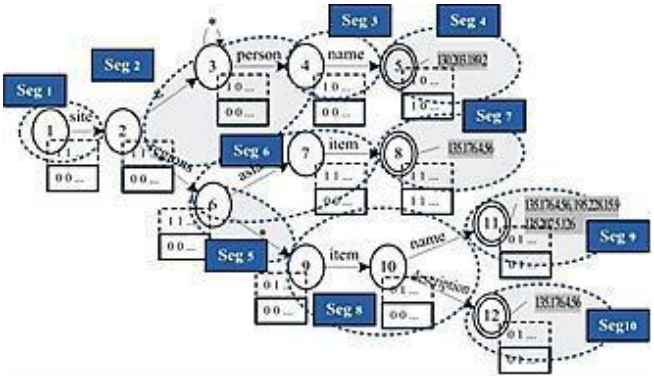

Fig. 3. Divide the global automaton with granularity

III. SYSTEM IMPLEMENTATION

To make trust decisions, most current cloud brokering systems do not provide trust management capabilities, that mentioned above. The cloud computing development greatly hinder because of the above reason. User feedback do not considered by this existing brokering architecture for cloud computing. A service brokering system which is T-broker architecture proposed based on the direct monitoring information. T-broker is designed as the TTP for cloud trust management and resource matching for the indirect feedbacks for the multiple cloud environments. The basic architecture of T-broker and its internal components brief description, before introducing the principles for assessing, representing and computing the trusted data.

A. Sensor-Based Service Monitoring (SSM)

To guarantee the SLA (Service Level Agreement) with the users, in order to monitor the real-time service data of allocated resources this module is used. This module is responsible for getting run-time service data. In the case of interactive process also this module dynamically monitors the service parameters. On the evidence base only the monitored data is stored, which is maintained by broker. The main five kinds of trusted attributes of cloud services are node specific profile, average resource usage information, average task success ratio, average response time and the number of malicious access.

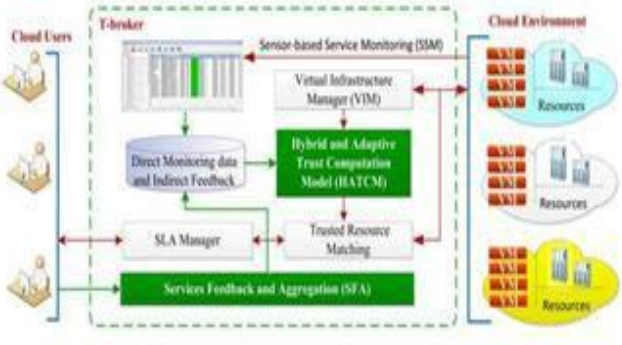

Fig. 4. Proposed Architecture

CPU frequency, memory size, hard disk capacity and network bandwidth are the four trusted evidences of the spec profile node. The current memory utilization rate, current bandwidth utilization rate, current hard disk utilization rate and the current CPU utilization rate are the specific in the average resource usage information. The number of illegal connections and the times of scanning sensitive ports are included by the number of malicious access.

IV. PROPOSED MODEL

From multiple cloud sites with various numbers of dynamic service behaviors, the proposed system is robust to deal with it. For cloud computing environment some hybrid trust models are proposed. Most current studies in hybrid trust models are concentrating on fuse direct trust (first-hand trust) and indirect trust (users' feedback).

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For a multi-cloud environment the proposed trust management framework is based on the trust propagation network and on the proposed trust evaluation model. For multiple cloud environments, first a trusted third party-based service brokering architecture is proposed. For service matching and cloud trust management the T-broker acts as a middleware. To compute the overall trust degree of service resources T-broker uses a hybrid and adaptive trust model. As a fusion evaluation result from adaptively combining the direct monitored evidences the trust is defined.

A. Cloud User Module

For accessing the cloud resources, cloud users can send request to the T-broker. All the locally-generated users ratings are collected by the feedback system and to yield the global evaluation scores aggregates these user ratings. Once a user completes a transaction, for other users in future transactions that user will provide his or her rating as a reference.

B. Cloud Resources Module (Admin)

All cloud resources will be provided by the cloud resource module. From multiple providers for managing the cloud infrastructure a web based cloud computing managing tool will be used. To easily manage and deploy various clouds like public, private and hybrid clouds with business-critical applications, right scale enables organizations. A structured cloud capacity market place is provided by the spot cloud where at each moment the buyers advantage is selecting the cheap rates in respect to the best service provider and where the service providers sell the extra capacity they have. Facility, hardware, OS, middleware, network, application, and the user, with these seven layers a cloud is modeled, and these layers can be controlled by either the cloud customer or the cloud provider.

C. T-Broker Module

T-broker uses some sub modules, in this module.

- *Trust-aware brokering architecture*

For trust management and resource scheduling the broker itself acts as the TTP. Both the dynamic service behavior of resource providers and feedbacks from users will be handled by this brokering architecture and it can also work as real-time monitor, through distributed soft-sensors.

- *Maximizing deviation method (MDM)*

To compute the direct trust of service resource, a maximizing deviation method is using here. The limitations of traditional trust models can be overcome this method, in which the trusted attributes are weighted subjectively or manually. Than other existing approaches this method has a faster convergence at the same time.

- *Hybrid and Adaptive Trust Computation Model (HATCM)*

To compute the overall trust degree of service resources a hybrid and adaptive trust model is using, in which trust is defined as a fusion evaluation result from adaptively combining dynamic service behavior with the social feedback of the service resources. When accessing the trust score of cloud providers the HATCM allows cloud users. Where cloud users specify their requirements and opinion globally. According to their business policy and requirements, users can specify their own preferences, to get a customized trust value of the cloud providers.

- *Virtual Infrastructure Manager (VIM)*

Several VM configurations often referred to as instance types, each cloud provider offers any of these instance types. In terms of hardware metrics such as CPU frequency, hard disk capacity, memory size, etc., an instance type is defined. OpenNebula virtual infrastructure manager is a module, in this work, the VIM component is based on this module. From multiple cloud providers OpenNebula module collecting and indexing all these resources information. For monitoring system it acts as a resource management interface and from each particular cloud provider it obtains the information. In a multi-cloud marketplace, cloud providers acts as sellers and through the VIM module cloud providers register their resource information. For the deployment of each VM in the selected cloud, this component is more responsible as specified by the VM template. The VM life-cycle management also taken as responsible by this component. Once it has deployed all VMs, the VIM caters for user interaction with the virtual infrastructure by making the respective IP addresses of the infrastructure components available to the user.

- *Sensor-Based Service Monitoring (SSM)*

In order to guarantee the SLA (Service Level Agreement) with the users and for allocated resources to monitor the real-time service data, this module is used. The service parameters are monitored dynamically with this module in the interactive process and the run-time service data obtained is the main responsible of this module. In the evidence base, the monitored data is stored and which is maintained by the broker. The trust worthiness of a resource mainly focused on five kinds of trusted attributes of cloud services. To calculate QoS-based trustworthiness of a resource, these five kinds of attributes are important. They are average response time, node spec profile, average resource usage information, the number of malicious access and the average task success ratio.

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- *Service level agreement Manager (SLA)*

For the service of quality of resource providers an appropriate guarantee offered by this SLA, in the multiple cloud computing environment. For the expected level of service, SLA serves as the foundation between the users and the providers. Between a user and a provider an SLA is a contract agreed component. A series of service quality characters defined in this agreement. SLA management cloud brokering system can prepare the best trustworthiness resources by adding the trust mechanism into it. All trustworthiness resources for each service request in advance SLA will create and allocate the best resources to users.

C. Multiple Clouds Computing

In the cloud computing industry, MULTIPLE cloud theories and technologies are the hot directions. From this new innovation a lot of companies and government got benefited with their concern. Multiple cloud computing environment has many unique features when compared with traditional networks. Features of cloud computing environment are resources belonging to each cloud provider. Such resources are being completely heterogeneous, distributed and totally virtualized. Unmodified traditional trust mechanisms are not used longer time that can be indicated by these features. Between the cloud users and providers there is a lack of trust. That trust has hindered the universal acceptance of clouds as outsourced computing services.

D. Feedback Aggregation

To improve the ways on trust management in cloud environments the "Trust as a Service" (TaaS) framework is used. By considering cloud service consumers' capability and majority consensus of their feedbacks, an adaptive credibility model distinguishes between credible trust feedbacks and malicious feedbacks. Based on users' feedback as well as monitoring information this framework does not allow to access trustworthiness. Feedback on large-scale distributed systems, such as grid computing, P2P computing, wireless sensor networks and so on, it provides an efficient and effective way to build a social evaluation. Based on trust relationship among network entities this social evaluation will be build up. In evaluating cloud resource trustworthiness feedback provider is also an important reference. From various computing environments, in the large-scale cloud collaborative computing environment, hosting hundreds of machines and handling thousands of requests per second, the delay induced by trust system can be one big problem. A feedback aggregating mechanism is the most fundamental requirement for the computational efficiency. Using feedback technology among virtualized data centers and distributed cloud users, a cloud social evaluation system build up that was in Fig. 3, and there is another feedback mechanism that was depicted in the same Fig. 3 which can effectively reduce networking risk and improve system efficiency.

Table 1: Service of Behaviors

Trust attributes	QoS indicators (service behavior)
node spec profiles	CPU frequency memory size hard disk capacity network bandwidth
average resource usage information	current CPU utilization rate current memory utilization rate current hard disk utilization rate current bandwidth utilization rate
average response time	average response time
average task success ratio	average task success ratio
the number of malicious access	the number of illegal connections the times of scanning sensitive ports

VI. RESULT AND DISCUSSION

A. Accuracy Evaluation

To measure the degree of deviation of calculating results; the of εri (λ) is used. If the value is zero, then the higher the calculating accuracy. With different number of training samples, observing MAD under conditions first. For a training sample dt = (dt1, dt2, ….,dtm) at each time-stamp t, here the number of training samples equals to the number of time-stamps. Using two kinds of inputting samples, in order to observe the experimental results under different scale of training samples. The two inputting samples are a small number of training samples and a large number of training samples.

The total number of training samples changing from 10 to 50 in the first group of experiments. It shows that the number of training samples has a direct effect on the accuracy of the trust models. The MADs of three models are more than 0.20, when

the number of training samples is small (t < 30). The MADs of the other two models are more than 0.23, when the number of training samples is set larger (t ≥ 30). The MAD of

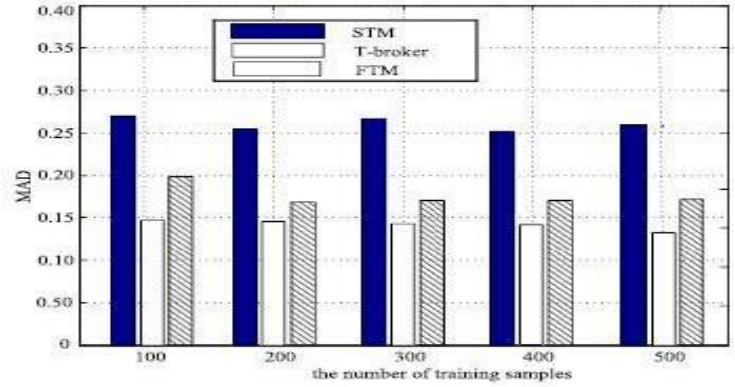

Fig. 5. The values of MAD with a large number of training samples

our trust model is much smaller than that of STM and FTM, which reflects that our model's performance is better than that of other models under conditions with different number of training samples.

In statistics, the MAPE is a measure of accuracy in a fitted time series value, specifically trending. Accuracy as a percentage, it usually expresses. MAPE can reflect the unbiasedness of the calculating model. A smaller value of MAPE reflects the calculating model has better and unbiased accuracy. Two kinds of inputting samples used in order to evaluate the MAPE of the three models. They are a small number of training samples and a large number of training samples.

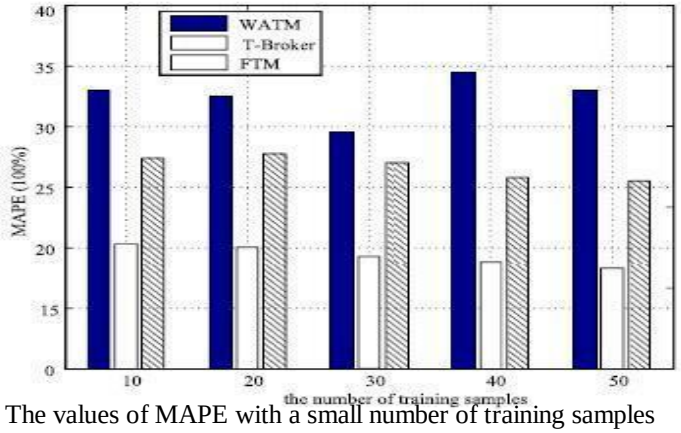

Fig. 6. The values of MAPE with a small number of training samples

V. CONCLUSION

For efficient matching multiple cloud services to satisfy various user requests, in this paper I present T-broker, a trust-aware service brokering system. T-broker yields very good results in many typical cases that can be shown in experimental results. With various number of service resources the proposed mechanism is robust to deal. From two aspects, I will continue my research in the future. First, is with only few monitored evidences reports how to accurately calculate the trust value of resources and second is to the trust measurement engine how to motivate more users to submit their feedback. In a large-scale multiple cloud system the proposed mechanism is implementing and evaluating. Such as remote computing, and distributed data sharing, is another important direction for future research.

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REFERENCES

[1] Hamid Sadeghi (2011), "Empirical Challenges and solutions in constructing a high-performance metasearch engine", emeraldinsight.

[2] C.Swaraj Paul , G. Gunasekaran, "A Descriptive Literature Survey on Search of Data inCloud " in International Journal of Applied Engineering Research IJAER, pp. 13112-13114, Volume 10, Number 17 (2015) Special Issues, ISSN 0973- 4562.

[3] Leonidas Akritidis, Dimitrios Katsaros ∗, Panayiotis Bozanis (2011), "Effective rank aggregation for metasearching", The Journal of Systems and Software 84 (2011) 130–143

[4] Craswell, N. and Hawking, D. (2002), "Overview of the TREC-2002 web track", Proceedings of the 11th Text Retrieval Conference(TREC), National Institute of Standards and Technology, Gaithersburg, MD, pp.86-95.

[5] Dwork, C., Kumar, R., Naor, M., Sivakumar, D., 2001. Rank aggregation methods for the Web. In: Proceedings of the ACM International Conference on World Wide Web (WWW), pp. 613–622.

[6] Farah, M., Vanderpooten, D., 2007. An outranking approach for rank aggregation in information retrieval. In: Proceedings of the ACM International Conference on Research and Development in Information Retrieval (SIGIR).

[7] H. Kim, H. Lee, W. Kim, and Y. Kim, "A trust evaluation model for QoS guarantee in cloud systems," Int. J. Grid Distrib. Comput., vol. 3, no. 1, pp. 1–10, Mar. 2010.

[8] Renda, M.E., Straccia, U., 2003. Web metasearch: rank vs score based rank aggregation methods. In: Proceedings of the ACM International Symposium on Applied Computing (SAC), pp. 841–846.

[9] C.Swaraj Paul , G. Gunasekaran, "An Optimized Attribute Based Similarity Search In Metric Database " in International Journal of Applied Engineering Research IJAER, pp. 15631-15641, Volume 10, Number6 (2015) Special Issues, ISSN 0973-4562.

[10] Vogt, C.C., Cottrell, G.W., 1999. Fusion via a linear combination of scores. Information Retrieval 1(3), 151-173.

[11] Aslam, J.A., Montague, M.H., 2001a. Metasearch consistency. In: Proceedings of the ACM International Conference on Research and Development in Information Retrieval (SIGIR), pp. 386–387.

[12] P. Jain, D. Rane, and S. Patidar, "A novel cloud bursting brokerage and aggregation (CBBA) algorithm for multi cloud environment," in Proc. 2nd Int. Conf. Adv. Comput. Commun. Technol. (ACCT), Jan. 2012, pp. 383–387.

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