e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 12, December 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

6381 907 438 6381 907 438 ijmrset@gmail.com www.ijmrset.com

© 2024 IJMRSET | Volume 7, Issue 12, December 2024| DOI: 10.15680/IJMRSET.2024.0712028

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Hybrid Ranking Method for Cloud Services Based on user Requirements

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ABSTRACT: An increase in the number of cloud services makes service selection a challenging issue for cloud users. It is important to determine the best service that can fulfill user requirements. To this end, this paper proposes a hybrid multiple-attribute decision-making (MADM) model. The proposed method considers service measurement index cloud (SMICloud) structure for qualitative attributes of cloud services as well as user requirements based on fuzzy values to consider vague user requirements. Analytical hierarchy process (AHP) and fuzzy logic are used to rank cloud services. Furthermore, a fuzzy Delphi filtering method is proposed to decrease the execution time of ranking cloud services. In experiments, different aspects such as accuracy, execution time, scalability, and sensitivity analysis are investigated. The results confirm that the proposed method outperforms available methods in terms of execution time and scalability. Furthermore, the experiments show that the proposed method has achieved an accuracy of 96%.

I. INRODUCTION

Many companies and organizations have provided various cloud services to clients. These services are classified, according to cloud computing architecture, into three layers namely Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). Clients of the cloud can use services anywhere without any need for specific skills and spending too much money. This has increased tendencies toward cloud computing. Selection of the most suitable service from a great number of provided services according to quality of service (QoS) attributes and users' requirements has attracted the researchers' attention. Cloud Service Measurement Index (SMI) has several attributes used to evaluate cloud services to compare their performance. Each attribute consists of several sub-attributes as shown in Figure (1). Furthermore, users' requirements for cloud services are mainly related to QoS. They are divided into functional and non-functional groups. Several qualitative attributes should be considered to select a service among many others; hence, it is a multiple-attribute decision-making (MADM) problem. Various models have been proposed to solve this issue. However, they suffer from long execution times or low accuracy. We have experimentally demonstrated that they have difficulties in large-scale cloud services. Selecting specific quality attributes to assess cloud services is a challenge. Because each quality attribute affects the ranking results. Inaccurate user requirements must also be considered for ranking systems. In addition, the ranking system should have the least time complexity and high robustness.

II. LITERATURE SURVEY

M. H. Nejat et. al Many cloud providers present various services with different attributes. It is a complex, lengthy process to select a cloud service that meets user requirements from an assortment of services. At the same time, user requirements are sometimes defined with imprecision (sets or intervals), whereas it is also important to consider the quality of user feedback (QoU) and quality of service (QoS) attributes for ranking. Besides, each MADM method has a different procedure, which causes functional contradictions. These contradictions have led to confusion in choosing the best MADM method. It is necessary to provide a method that harmonizes the results. Therefore, choosing a method for ranking cloud services that addresses these issues is currently a challenge. This paper proposes an optimal cloud service ranking (OCSR) method that ranks cloud services efficiently based on imprecise user requirements in both QoS and QoU aspects. OCSR consists of four stages including receiving the requirements, pre-processing, ranking, and integrating the ranking results. At the receiving requirements stage, the query format is created. In the pre-processing stage, a requirement interval is created for considering imprecise user requirements in order to filter inappropriate

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services. Based on QoS and QoU attributes, cloud services are then ranked through multiple multi-attribute decision-making (multi-MADM) methods such as the prominent MADM techniques. Finally, the ranking outputs of various methods are integrated to obtain the optimal results. The experimental results confirm that the OCSR outperforms the previous methods in terms of optimality of ranking, sensitivity analyses, and scalability

A. Hussain et. al Cloud service selection decision has become tremendously challenging because of the exponential proliferation of cloud services. A judicious decision necessitates a thorough evaluation of services from sundry perspectives. While most existing studies evaluate services from the Quality of Service (QoS) perspective, they overlook the degree of delight or annoyance of a service user i.e. Quality of Experience (QoE). Likewise, the literature lacks an integrated methodology to (1) incorporate both QoS and QoE in decision making (2) develop a consensus between the contradictory outputs of Multicriteria Decision Making (MCDM) methods. To address these issues, we propose a novel integrated approach called Methodology for Optimal Service Selection (MOSS). MOSS consists of five stages including the prequel, assessment, ranking, integration, and consolidation/selection. MOSS enables decision-makers to select optimal cloud service with consensus considering both QoS and QoE. In the prequel stage, we introduce Pareto optimality to shrink search space and identify dominant services. In the assessment stage, we use the best worst method to calculate weights of QoS/QoE criteria. We employ a multi-MCDM approach consisting of eminent existing MCDM techniques to obtain QoS, and QoE based ranks in the ranking stage. We obtain and compare the integrated ranks of each method in the integration stage. We obtain the consolidated ranks of cloud services using the Copelands' method. To verify the efficacy/practicability, we implement MOSS in the context of an e-commerce company facing a cloud service selection decision. Further, we perform a comprehensive analysis considering a comparative analysis and complexity analysis. The results show MOSS is practical and useful.

M. S. Goraya and D. Singh In cloud computing, the selection of an efficient multi-criteria decision-making (MCDM) method (with minimum time complexity and maximum robustness) is a challenging and interesting problem. The time complexity and robustness of a MCDM method depend upon the methodology of evaluating the best alternative (i.e., cloud service). Although numerous MCDM methods are proposed for the quality-of-service based service selection in the cloud, still the issue of selecting the most efficient method remains unresolved. This paper presents a comparative analysis of the prominently used MCDM methods in terms of time complexity and robustness. The MCDM methods are used in the geographical region selection problem for Amazon Web Service cloud, and a comparative analysis of the obtained ranking results is performed. Further, application-specific analysis and sensitivity analysis are performed to ascertain the robustness of ranking methods. Experimental analysis is performed on the large-scale synthetic dataset to get the ranking overhead, i.e., time complexity of different MCDM methods.

M. H. Nejat et. al In a cloud computing environment, there are many providers offering various services of different quality attributes. Selecting a cloud service that meets user requirements from such a large number of cloud services is a complex and time-consuming process. At the same time, user requirements are sometimes described as uncertain (sets or intervals), something which should be taken into account while selecting cloud services. This paper proposes an efficient method for ranking cloud services while accounting for uncertain user requirements. For this purpose, a requirement interval is defined to fulfill uncertain user requirements. Since there are a large number of cloud services, the services falling outside the requirement interval are filtered out. Finally, the analytic hierarchy process is employed for ranking. The results evaluate the proposed method in terms of optimality of ranking, scalability, and sensitivity analyses. According to the test results, the proposed method outperforms the previous methods

III. METHODOLOGY

The study of this paper is to know about the ranking that is provided by the consumers for certain cloud services system that can correctly understand about the feedback that is provided for te cloud services at a cost. We aim to improve the cloud services , precision by optimising feature extraction using Pre-decision Fuzzy Delphi Ranking (PFDR)techniques,and improve the services.

DISADVANTAGES OF EXISTING SYSTEM:

- Complexity in selecting and ranking cloud services.
- Less QoS and security.
- More time complexity and less robustness.

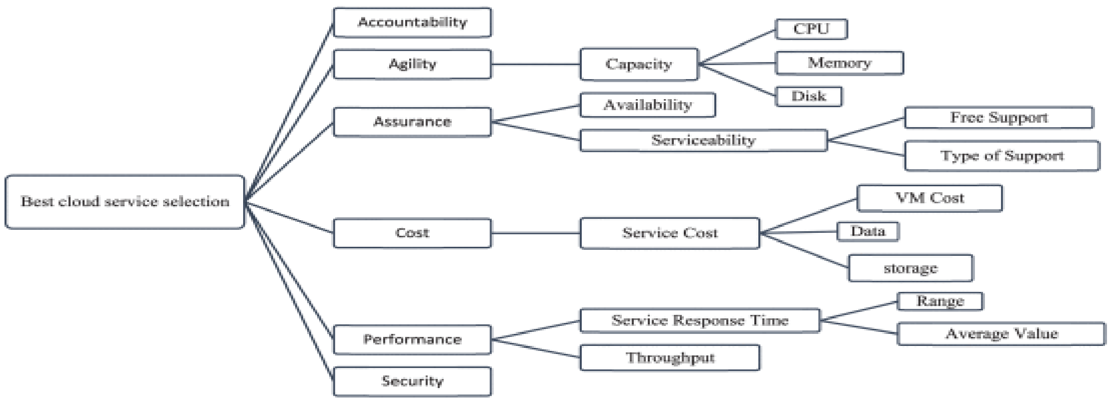
PROPOSED SYSTEM

- A hybrid ranking method called Pre-decision Fuzzy Delphi Ranking (PFDR) has been proposed based on user requirements. PFDR uses appropriate attributes by the Delphi method. Also, it uses Fuzzy values to consider vague experts' opinions and imprecise user requirements.PFDR emphasizes pre-processing to improve the ranking results by selecting appropriate quality attributes.PFDR employs the Fuzzy AHP method to rank cloud services. The ranking results were obtained from imprecise user requirements and quality values.A comparison has been applied based on scalability, execution time, accuracy, and sensitivity metrics between PFDR and other existing methods.

ADVANTAGES OF PROPOSED SYSTEM:

- More effective ranking results.
- More security and QoS.
- Specific quality attributes to assess cloud services.
- The ranking system should have the least time complexity and high robustness..

SYSTEM ARCHITECTURE:



MODULES:

User Interface Design: In this module we design the windows for the project. In this module mainly we are focusing the login design page with the Partial knowledge information. Application Users need to view the application they need to login through the User Interface GUI is the media to connect User and Media Database and login screen where user can input his/her user name, password and password will check in database, if that will be a valid username and password then he/she can access the database.

Cloud Service Consumer: In this project the CSC (Cloud Service Consumer) is who get the service from the CSP (Cloud Service Providers). To get the services from the CSP he must need to register in this site and must accepted by admin then only he/she can able to view the available cloud services and select them by the different trust parameters of the CSP. After purchasing the cloud the CSC is able to upload the data into cloud and download that data.

Cloud Service Provider: In this project the CSP is added by admin with different functionalities. Each and every CSP have trust percentage in the form of different parameters like user recommendations, rating on internet, Number of user activities and by area. Based up the above parameters the CSC's are able to find the related CSP by using this application. And the CSP is store take care about the user's data. The CSP's are not able to create an account directly, there are only able to login by using the credentials which are given by the admin.

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Admin: Here the admin will handle whole the site. The admin will add the CSP's into site, and also he can able to delete the CSP's from the site. And the admin will trace the CSP's activities and performances by analyze the graphs by deferent parameters like user recommendations, rating on internet, Number of user activities which are get from the users' activities that respected CSP. And also, admin accept the CSC's request to allow into site. He had his unique username and password apart from those he can't be able to perform any operation why because he can't get into his home page where these operations are maintained.

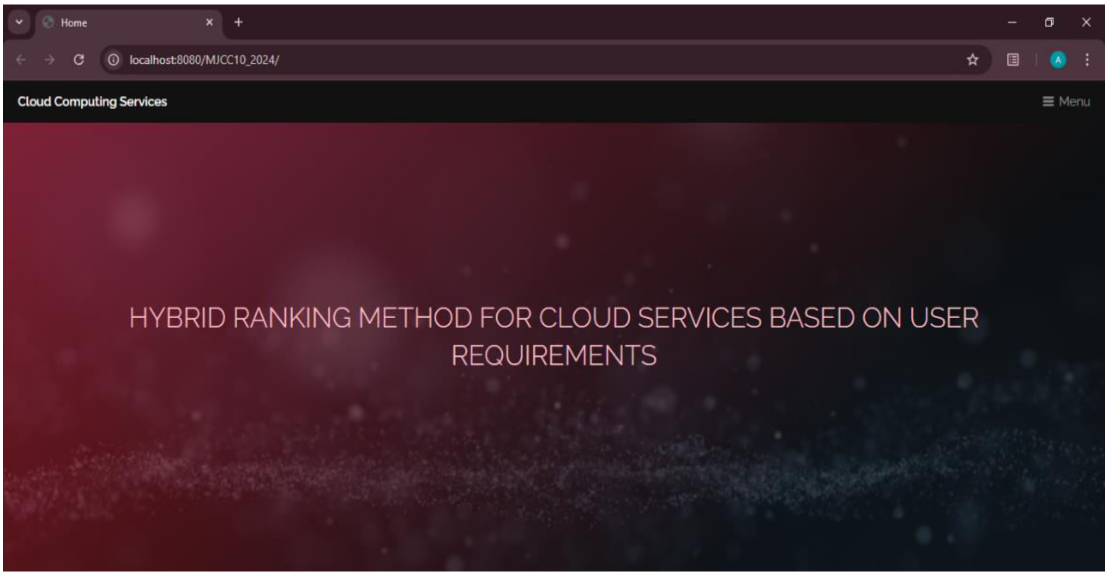
IV. IMPLEMENTATION

The **Hybrid Ranking Method for Cloud Services Based on User Requirements** is an advanced technique designed to evaluate and rank various cloud services by taking into account both quantitative and qualitative factors based on specific user requirements. This method combines multiple ranking strategies (often involving multi-criteria decision-making techniques) to offer a more comprehensive and reliable ranking of cloud providers that best match the user's needs.By leveraging a **hybrid ranking method**, users can make well-informed decisions that not only meet their technical needs but also align with strategic goals, ensuring the best cloud service provider selection based on personalized requirements.

Pre-decision Fuzzy Delphi Ranking (PFDR) :
Pre-decision Fuzzy Delphi Ranking (PFDR) is a decision-making methodology that combines the Delphi method with fuzzy logic to assist in decision-making processes, particularly in environments where uncertainties, imprecision, or vagueness are inherent. The PFDR method is particularly useful in scenarios where experts are asked to evaluate and rank alternatives based on criteria that may not be easily quantifiable or where subjective judgments are involved. This hybrid approach leverages the collective expertise of a panel of experts and uses fuzzy logic to handle the ambiguity and uncertainty in their assessments.

V. EXPERIMENTAL RESULTS

HOME PAGE



EXPLAINATION: Upon executing the program and pasting the web address into the browser, the homepage is the initial loaded page. It serves as the primary point of interaction with the website or web application, indicating the initiation of browsing activities.

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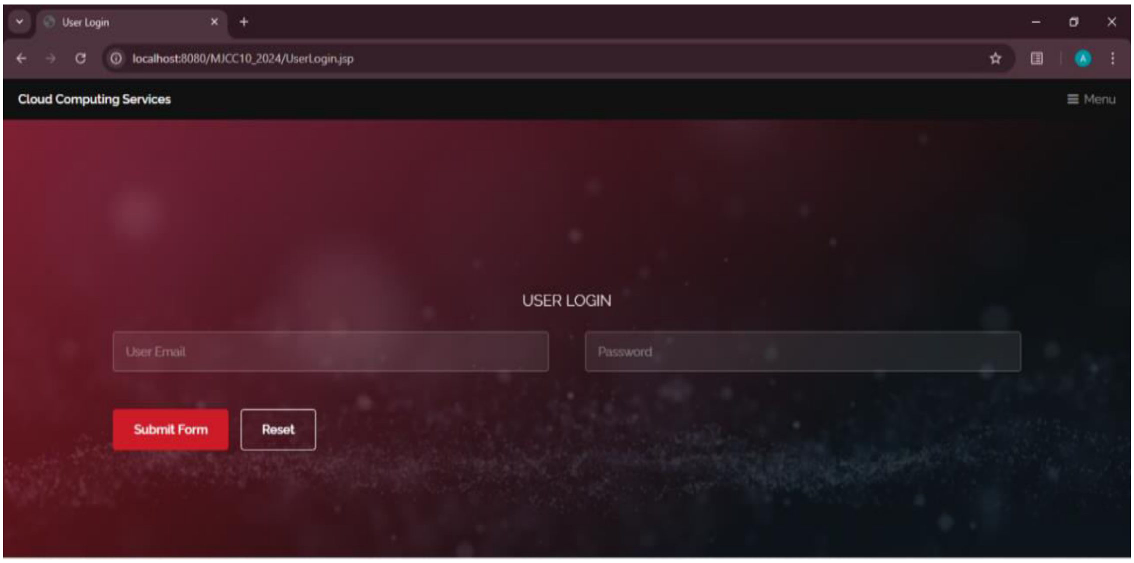
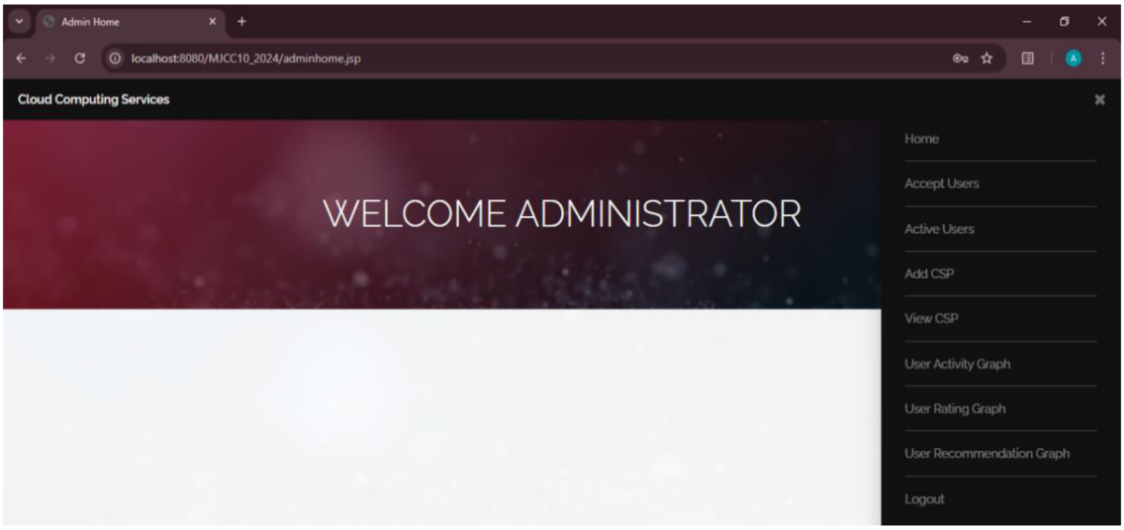
USER LOGIN PAGE



EXPLAINATION: Following the click of the login button, the Login page becomes visible, prompting the entry of details. This sequence illustrates the transition from initiating the login process to providing necessary information for authentication. It underscores the procedural nature of user interaction in accessing secured areas of a website or application.

ADMINISTRATOR HOME PAGE



EXPLAINATION: Upon successful login of administrator, a page showingall the services of the cloud that are provided by the administrator. This process illustrates the post-login navigation flow.Then the administrator can see the or can manage the services and can have a control on the database.

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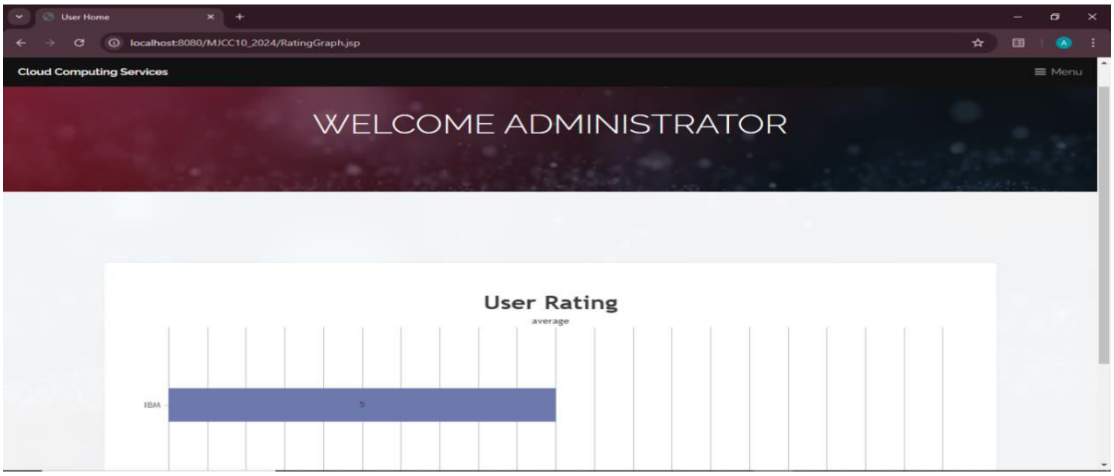
FINAL RESULT DETECTION PAGE



EXPLAINATION: Following page shows the rating for a certain cloud service that is provided by the clients or the customers or consumers. This step highlights the informative feedback loop, offering Admin insights into the Decision process.

VI. CONCLUSION

Swing's high level of flexibility is reflected in its inherent ability to override the native host operating system (OS)'s GUI controls for displaying itself. Swing "paints" its controls using the Java 2D APIs, rather than calling a native user interface toolkit. The Java thread scheduler is very simple. All threads have a priority value which can be changed dynamically by calls to the threads setPriority() method . Implementing the above concepts in our project to do the efficient work among the Server.

VII. FUTURE ENHANCEMENT

In the future, we will extend our research with the aim of service selection in a faster and more accurate system. We plan to encode the user requirements and cloud services into interval code to ignore services that fall outside the range of user requirements. In addition, the meta heuristic ant-colony optimization-based placement method performs better than the modified GA in terms of energy and SLA metrics whereas these techniques perform equally in terms of execution time for VM consolidation. Thus, increasing the number of objectives results in an escalation of execution time and degraded performance for some of the considered metrics. This is attributed to the fact that these methods attempt to figure out solutions that fulfill all the requirements at the same time.

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