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A User Priorities Based Strategy for Three Phase Intelligent Recommendation and Negotiating Agents for Cloud Services

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ABSTRACT: As the field of information technology expands, there is a huge need for cloud service providers (CSP). CSP's vast solutions and services support Cloud, IoT, Fog, and Edge computing. In today's competitive cloud market, customer satisfaction is critical more than ever. CSP and consumer satisfaction with service level agreement (SLA) fulfilment have always been given more attention. As a result of signing SLA and CSP agreements to supply resources in high demand, customers are now experiencing issues with resource delivery. Cloud and heterogeneous environments necessitate an intelligent recommender and negotiation agent model (IRNAM) to handle responsibilities in the current system. The Recommender system recommends CSP as per users' priorities, which eases the filtration process. The negotiation process provided by IRNAM ensures that users' choices are prioritized with maximum jobs to CSP. IRNAM keeps track of the most critical metrics and can reach decisions quickly and for the best possible deal. It uses an analytical concession algorithm that analyzes consumer and CSP choices to find a reliable, secure server with the simplest solution. The negotiation process uses user's and CSP choice metrics, performance factors, evaluation measures, and success factors in the best execution time to decide. IRNAM provides a flexible and valuable way for selecting CSP and negotiating for services on the user's terms while considering CSP satisfaction.

I. INTRODUCTION

Cloud computing is an internet-based service to support users in computing, storing data, designing software, and using the software as a service. Cloud computing is evolving with significant features like full virtualization, elastic resources, reliable and secure services, and a low-cost on-demand computing paradigm on a subscription-based model. Cloud service provider (CSP) offers maintenance free services, flexible model, and pay-per-use schemes, which has gained popularity in academia and industry. Thousands of CSPs come into the business with commends a suitable CSP per the demand. Another challenge is that there may be a contradiction over service level agreement (SLA) between them after the recommendation of CSP to the consumer. Since cloud consumers and CSPs are contradictory regarding requirements and demands, negotiation can provide a solution to establish a stable SLA between both parties. Negotiation is a process between the consumer and CSP to define a mutually acceptable agreement that leads to a final SLA. Negotiation may help obtain essential services with maximum benefits for consumers and CSP, which further settle on an SLA contract to satisfy the quality of service (QoS) as per requirements. This study proposes a solution for meeting the demands of users who require prioritized service attributes in cloud computing. The proposed solution utilizes an agent framework with a novel analytical technique for managing service level agreements (SLAs). The aim is to develop a three-phase intelligent agent technique that can effectively address the challenges associated with SLA management in the cloud, including the recommendation of CSP. We proposed an Intelligent Recommender and Negotiation Agent Model (IRNAM) to select matching CSP in cloud environments and provide negotiation for selected services to overcome these challenges. IRNAM is a compact recommendation and negotiation model that could help entities make decisions by considering the market demands and supply. It also considers the user and provider QoS satisfaction before finalizing the SLA, making the IRNAM more efficient, satisfactory, and reliable. The proposed study uses an optimized negotiation solution to recommend CSPs based on the user's preferences and choices.

II. LITERATURE REVIEW

Pratt. R. Qi, J. Zhou, Z. Wang, and X. Song. 2022. An elastic recommender process for cloud service recommendation scalability,'' Concurrency Compute., Cloud computing services are ubiquitous in society and cloud recommender systems play a crucial role in intelligently selecting services for cloud users. Currently, recommendations are static with low scalability. Only one recommendation list is generated at a time and the recommender strategy in the recommendation cycle is not adjustable. This project presents a new elastic recommender process (ERP) for cloud users. A Markov model is used to characterize the dynamic relationship between different user states. The ERP generates an elastic recommendation that can be used to dynamically adjust the recommender strategy to meet the user's needs based on their browsing records in the current service cycle without the recommender system's involvement. Experimental results show that the ERP improves the effectiveness of the recommender thus increasing the accuracy and diversity of its recommendations. Cloud computing provides resources in the form of services (or composite services) whose technical details are transparent to users. There are three service models: infrastructure as a service, platform as a service, and software as a service.

R. R. Kumar, A. Tomar, M. Shameem, and M. N. Alam. 2022. OPTCLOUD: An optimal cloud service selection framework using QoS correlation lens. Cloud computing has grown as a computing paradigm in the last few years. Due to the explosive increase in the number of cloud services, QoS (quality of service) becomes an important factor in service filtering. Moreover, it becomes a nontrivial problem when comparing the functionality of cloud services with different performance metrics. Therefore, optimal cloud service selection is quite challenging and extremely important for users. In the existing approaches of cloud service selection, the user's preferences are offered by the user in a quantitative form. With fuzziness and subjectivity, it is a hurdle task for users to express clear preferences. Moreover, many QoS attributes are not independent but interrelated; therefore, the existing weighted summation method cannot accommodate correlations among QoS attributes and produces inaccurate results. To resolve this problem, we propose a cloud service framework that takes the user's preferences and chooses the optimal cloud service based on the user's QoS constraints. We propose a cloud service selection algorithm, based on principal component analysis (PCA) and the best-worst method (BWM), which eliminates the correlations between QoS and provides the best cloud services with the best QoS values for users. In the end, a numerical example is shown to validate the effectiveness and feasibility of the proposed methodology.

Z. Ma, M. H. Nejat, H. Vahdat-Nejad, B. Barzegar, and S. Fatehi, 2022. An efficient hybrid ranking method for cloud computing services based on user requirememts. 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 fulfil user requirements. To this end, this project 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%. Many companies and organizations have provided various cloud services to clients [1]. 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) [2].

T. N. Mujawar and L. B. Bhajantri, 2022, Behaviour and feedback based trust computation in cloud environment. Cloud Computing has become a promising paradigm to deliver different computing resources and services over the Internet on demand. The cloud users have to rely on the third party service providers for accessing services. With an increase in available cloud services, selecting an appropriate cloud service provider to deliver the service securely will be always challenging for users. The trust measure plays an important role while selecting proper service providers to handle user's requests in the cloud environment. Hence, evaluation of the trustworthiness of the

cloud service provider before selecting it to deliver the service has become an important requirement in the cloud environment. The project presents a method to evaluate the trustworthiness of cloud service provider on the basis of its behavior and feedback given by the users. The various Quality of Service attributes are considered for computing behavioural trust values. The different parameters from the service level agreement are used to maintain the feedback and compute the feedback trust value for the service provider. The trustworthiness of the cloud service provider is judged by computing the cumulative trust, which is calculated using behavioural trust and feedback trust.

III. METHODOLOGY

The study of this paper introduces IRNAM, bridging users and CSPs by recommending providers and negotiating SLAs. It aims to simplify CSP selection and optimize negotiations for maximum benefits. The study proposes a novel approach to SLA management, employing a three-phase intelligent agent technique. Through this methodology, CSPs can better fulfill user demands, enhancing service delivery efficiency.

Disadvantages of existing system:

- CSP Diversification
- Resource Delivery Challenges

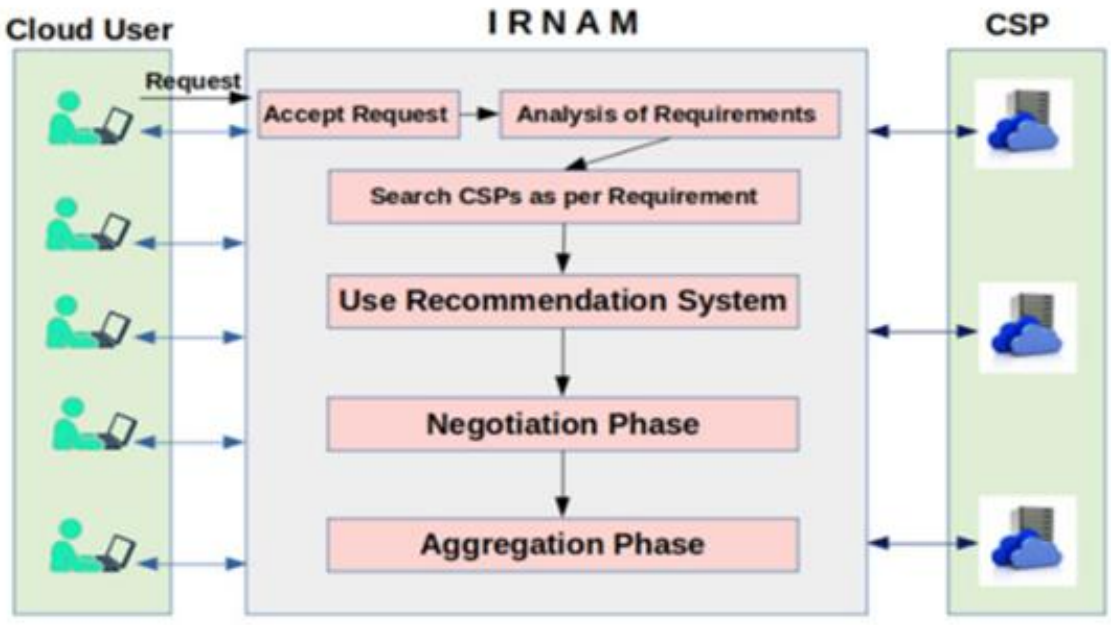
PROPOSED SYSTEM

The proposed work introducdes IRNAM, an Intelligent Recommender and Negotiation Agent Model, tailored for selecting CSPs in cloud environments and facilitating negotiations for services. IRNAM addresses market dynamics, user preferences, and QoS satisfaction to streamline decision-making and SLA finalization. By optimizing

Proposed System Advantages

- Recommender System
- Negotiation System
- Real-time Interaction

SYSTEM ARCHITECTURE



In our Project a broker is essential due to the users' complex requirements with multiple attributes and quality of service (QoS) considerations. IRNAM analyzes these requirements to recommend the optimal CSP, organizing CSPs based on user needs and market performance. Following this, negotiation parameters are established and a negotiation process is conducted with the recommended CSP. Finally, the aggregation phase verifies that both user and provider satisfaction is met, ensuring high QoS.

MODULES:

User: In this module we design the windows for the project. These windows are used for secure login for all users. To connect with server user must give their username and password then only they can able to connect the server. 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.

Search : This is the second module is user can register and Login. After login there is an option to search. In that search bar we can search a product by submitting that button we can see the details of the product. After that there one phase which we are Negotiating the product from the cloud service provider, that means we are request that CSP for the product.

CSP: This is the third module of this project. In this module CSP will manage the user Request that means when the user requests a product with his own price then Cloud Service Provider will decide that the status of user request is Approved or Not.

Cloud: This is the fourth module in this project. This module also have login only and this module will show System Requirements and we will see the users in this module and stored in Database. This is the final module in this project.

Upload: This module is used to upload or add any new system requirements and these requirements were added by admin. First admin has to login with his credentials then only he can add any requirement and it is stored inside database.

Negotiate: This module is used to negotiate cost of particular product by user. When user enter a price of a particular product then automatically it will give response from csp that mans the negotiated price approved or not.

IV. IMPLEMENTATION

IRNAM:

We proposed an Intelligent Recommender and Negotiation Agent Model (IRNAM) to select matching CSP in cloud environments and provide negotiation for selected services to overcome these challenges. IRNAM is a compact recommendation and negotiation model that could help entities make decisions by considering the market demands and supply. It also considers the user and provider QoS satisfaction before finalizing the SLA, making the IRNAM more efficient, satisfactory, and reliable. The proposed study uses an optimized negotiation solution to recommend CSPs based on the user's preferences and choices. This approach offers a personalized and efficient recommendation system that can improve user satisfaction with the recommended CSP. The significant contributions of this article are as mentioned below:

1. To design the three-phase interaction system between the user and provider for obtaining cloud services in real-time.
2. To develop a recommender system that helps users finds CSP from the pool of cloud service providers per the particular cloud service requirements.
3. To develop a negotiation system that could benefit users to obtain on-demand cloud services and select CSP to deliver the maximum load.
4. To develop an aggregated system, which helps finalize the SLA to achieve consensus based on the satisfaction level for both cloud users and CSP.

V. EXPERIMENTAL RESULTS

HOME PAGE

Figure: Home Page

- Home Page of the website

MENU PAGE

Figure: Menu Page

- Menu page that displays 4 available options on the website.

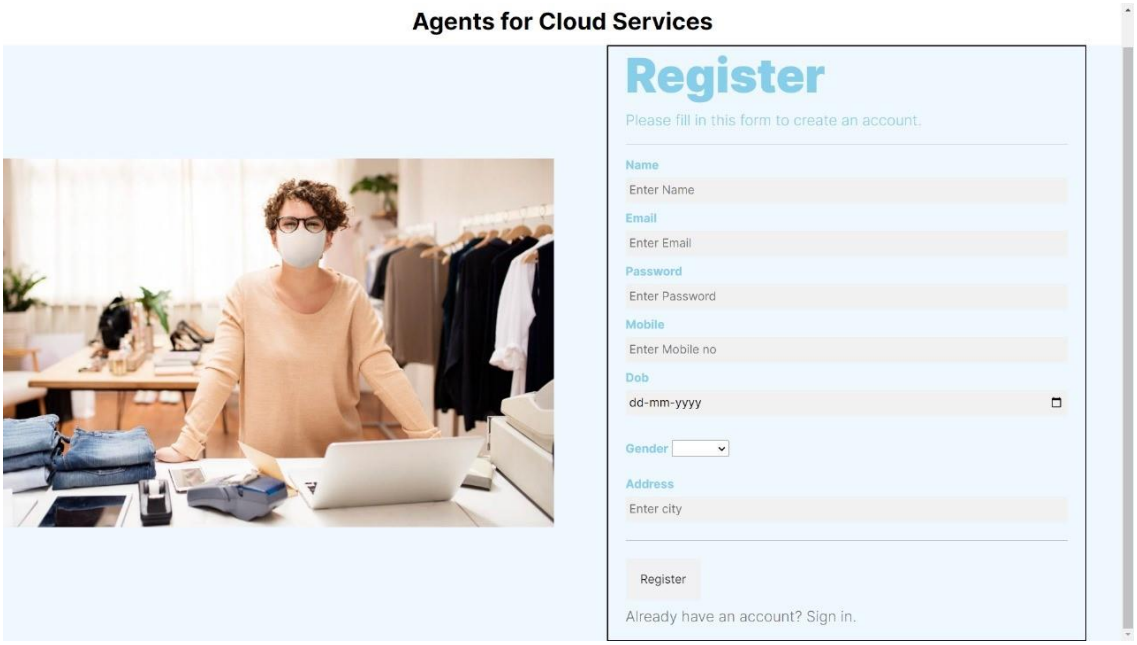


Figure: User Registration Page

- User has to register on the site to be able to login & use the service.

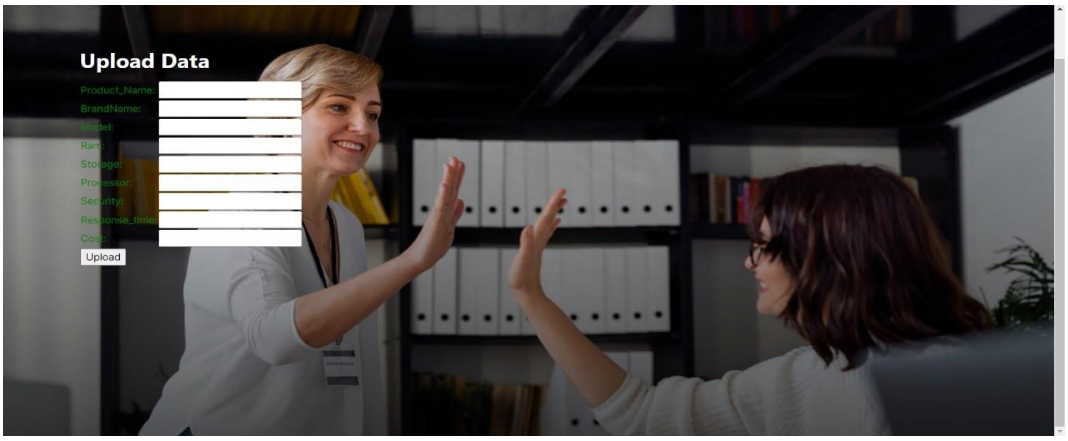


Figure: Data Upload Page

- Upload Data > Enter Details > Upload > Done

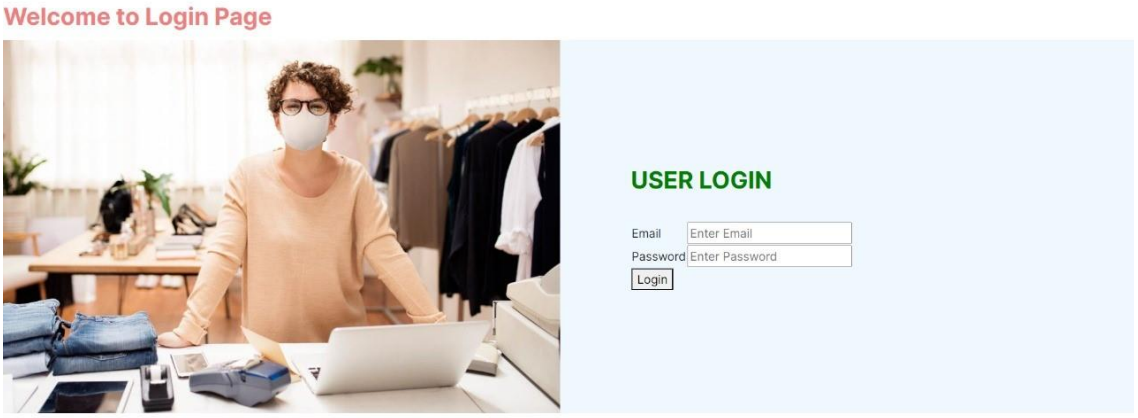


Figure: User Login Page

VI. CONCLUSION

Our work also exemplifies IRNAM, an Intelligent Recommender and Negotiation Agent Model, as a mediator between the user and cloud service provider. IRNAM's primary functions are recommending CSPs based on user requirements and negotiating SLAs. It streamlines the process of finding the best CSP and negotiating terms, ensuring both parties are satisfied. The three-phase intelligent agent technique enhances SLA management, meeting user demands for prioritized service delivery and improving overall efficiency. Future enhancements include incorporating behavior learning algorithms, quantum computing for recommendations, and testing on complex cloud scenarios. Blockchain technology could further secure and monitor these processes.

Future Enhancement

Our work also exemplifies IRNAM's success rate on fewer negotiation rounds is impressive. In the future scope of IRNAM, we can introduce a behavior learning algorithm and a new approach of quantum computing algorithm for the recommendation to monitor the operationalization and final billing processes. We can test IRNAM on composite attributes from multiple CSPs. There is a scope to investigate the model on more complex cloud services scenarios, or it can be tested on intracloud and inter-cloud services. Blockchain can play a vital role in monitoring and securing the process.

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