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Smart Travel Booking Platform Using Web Technology

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Abstract

Travel and tourism industry in the global world is expanding at a very high rate. This has resulted in an increased desire of people to have efficient and reliable online booking systems that would provide their users with updated travel information and convenient booking experiences. However, traditional trip booking systems tend to rely on monolithic architectures, which are in turn difficult to maintain and may take more time to obtain real time availability and prices of a variety of service providers. Due to these limitations, customers struggle to make comparisons on the travel options and receive accurate details on their reservations. To address these issues, this project intends to develop a Travel Booking Platform that has a microservices architecture. The system is linked to the Amadeus GDS API to receive current flight times, rates and availability. The platform is developed with Java and Spring boot. The databases are managed using MySQL and the services communicate with one another using RESTful API. The application is implemented on the AWS cloud to ensure that it is accessible at all times, can be expanded when required and is reliable. The proposed system allows individuals to find and compare and reserve trip services in seconds and maintain the modularity and performance of the system. All in all, the platform demonstrates that it is possible to make the solutions of travel booking with the help of the modern distributed system design that will be able to expand when needed.

Keywords: Microservices Architecture, Travel Booking Platform, RESTful APIs, Cloud Computing, Global Distribution System (GDS), Real-Time Data Integration.

1. Introduction

Travel and tourism is an industry that is developing very rapidly in the world. This has presented a massive need to have convenient digital platforms that enable individuals to plan and book travel services. With the increased popularity of the internet and mobile phones, online travel is the primary mode through which individuals seek, compare and make reservation of flights, hotels and transport. OTAs have transformed the process of booking travel by providing the visitor with a central location to access a high number of service providers simultaneously. The objective behind these platforms is to make life easier for the users, reduce the amount of work that will have to be performed manually, and provide the users with accurate information regarding the times, prices, and availability. Tech infrastructure supporting them must evolve to be capable of accommodating the increased number of users, more data

and more integration demand when the number of visitors and service providers increases [1, 2, 3].

Although the digital travel platforms are gaining popularity, most of the systems deployed are still constructed on disjointed monolithic designs where the various functions are integrated in one application. It is easier to develop at first with this design, but it can cause problems as the system grows larger and more complex. In monolithic environments, issues such as lack of scalability, difficulties handling high codebase and challenges integrating multiple external service providers frequently occur. Besides, issues with one module or updating the system can impact the entire program making it less reliable and interrupting the services. These issues demonstrate the significance of adopting the modern building techniques where expansive growth can be accommodated, service management should be isolated and be connected with external travel data providers easily [4, 5, 6].

This project primarily aims to address such issues by developing a distributed system architecture-based travel booking application which would allow managing the services flexibly and in a scaleable manner. Besides providing the customer with one location to seek and reserve travel services, the proposed system will ensure that the numerous functional areas of the system can easily communicate with each other. Another issue that is discussed in the study is the significance of making sure that the international travel data businesses collaborate effectively to ensure that the user is provided with the right and up to date information when making the booking. The platform allows maintaining easier maintenance, shorter development cycles, and more operational flexibility through the construction of the system that isolates important activities into various services [7, 8].

The significance of this work is that it allows making trip booking systems reliable, scalable, and capable of adapting to the evolving needs of the contemporary digital users. The proposed platform demonstrates how travel applications can ensure services become more trustworthy, systems operation is quicker, and users become more satisfied thanks to employing a distributed-based design and real-time data integration. It can demonstrate how the ideas of the modern software design can be applied in the real world to large web applications. Ultimately, the paper assists in developing smarter and more effective travel management systems

which satisfy the demands of the ever-expanding tourism market across the globe, and current digital ecosystems [9, 10].

2. Related Work

The rapid growth of online travel services has stimulated the intensive study of online travel booking platforms and their technological development. Aamir and Atsan [11] have discussed the emergence of the MSPs in the travel industry and explained how online platforms are transforming the traditional roles of travel agencies and GDS. They have focused on the process of reinter mediation where digital platforms are intermediaries between clients and service suppliers, as well as between travel agents and suppliers. Munasinghe et al. [12] explored the platformization of tourism services and examined how online booking systems made a huge difference to the operations model of accommodation providers. These researches point to the growing importance of digital platforms to travel services; however, they largely focus on industry trends and business perspective, but not on the technical system structure required in large-scale travel platforms.

A lot of research has been done on how integrated travel booking systems have developed over time to provide numerous services to the customers such as transportation and accommodation in the same platform. Gharjale et al. [13] proposed a multi-faceted booking service uniting bus, car and hotel reservations, which demonstrates the effectiveness of multi-service booking platforms to increase customer convenience. On the same note, Doe et al. [14] analyzed the process of in-destination booking services online and outlined the main steps involved in workflow processes of the digital booking platforms. These articles make important contributions to the analysis of organizational and service provision of travel booking services. However, many of them rely on traditional centralized architectures, which might face limitations in scale, flexibility, and availability of systems in a large population of individuals and data.

There have been more and more works done in regard to smart and data-driven reservation systems. Guo et al. [15] have fully explored the intelligent travel booking systems which are based on the complex technologies and which facilitate the travel experiences and evaluate the user behaviour pattern. Neubert [16] has also explored entry strategies of MSP in the travel booking market and the key importance of scalable digital platforms in the success of platforms. Datta [17] conducted an empirical study of the factors influencing the decision of travelers concerning online travel portal, usability, trust, and availability of information factors. Though these studies highlight major technology and user-focused aspects, they do not adequately investigate how the modern system design can support real time integration and scalability service implementation.

The evolution of the travel booking technologies have been considered in a broad technological perspective. Sowmya et al. [18] studied how travel booking systems

developed out of the traditional manual process to the modern digital system and new technologies such as

blockchain. Ani et al. [19] analyzed the issues of usability and purchase intention of online travel booking systems and showed the importance of user-friendly interfaces and system efficiency as the way of improving client engagement. To demonstrate the effectiveness of the service- oriented communication in modern applications, Renaldi et al. [20] supported the use of REST-based APIs to combine trip booking management systems with each other. In as much as these studies significantly contribute to this understanding of system usability, integration engineering and technical advancement, they often fall short of comprehensive implementations that would consolidate real time trip information integration, scalable system design, and modular service development.

Synthesis of literature shows that despite the massive progress that has been realized in understanding online vacation resources, there are still many challenges in coming up with scalable, reliable and modular booking systems, which are capable of handling real time trip information. Many of the existing solutions lack the distribution architecture that offers independent management of its services and efficient communication with the world travel data providers. As a result, the current analysis overcomes these limitations because it introduces a travel booking system that follows a modern service-oriented design and includes features of real-time integration. This plan will aim at enhancing scalability, maintainability, and system performance as well as provide users with an efficient and reliable experience during trip booking.

3. Materials And Methods

The proposed system will help develop a flexible and efficient travel booking service that is capable of searching and purchasing flights, hotels, and rental cars on-site. The system is supplied with the real-time travel information through the connection to the Amadeus GDS, which examines the data of a wide range of airlines and travel service organizations [21]. The requests made by the users are sent to a centralized API gateway and forwarded to other microservices. External APIs and internal databases are then used to retrieve relevant trip information. The site uses a microservices architecture which is implemented through Java and the Spring Boot framework. The services such as user management, flights search, booking management, and destination information provision can be independent of each other. The data stored in MySQL databases is service- specific and it is easy to have services communicating to each other using RESTful APIs. The system is configured on the AWS cloud to ensure its ability to expand, reliability and availability [22]. Swagger is a documentation and test tool used on API. This architecture enables the system to be more modular, faster and capable of accommodating real time trip booking.

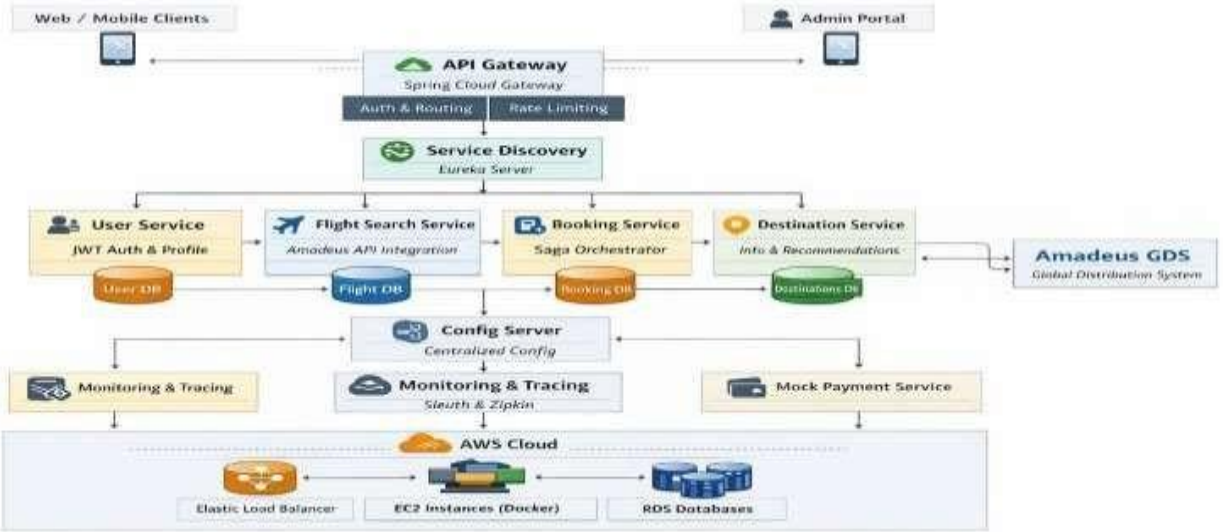


Fig. 1. System Architecture

A) Modules

1. *User Module:* The User Module manages all aspects that are related to users in the trip booking platform. It allows individuals to enroll, easily log in and manage their personal accounts. Through this feature, users are able to search flights, vacation destinations, and car rentals depending on the way they wish to travel. It also allows users to have a history of the bookings and to track the bookings made or been made.

2. *Booking Module:* The Booking Module makes the bookings of trips on your behalf. Once the users select flights or any other travel services, they submit planning requests to it. Confirmations, cancellations and transaction of bookings are all followed in this section. It also ensures that the database contains the appropriate information regarding booking hence the person could easily locate and manage their reservations.

3. *Integration Module:* The Integration Module uses the Amadeus API to integrate the system with external travel service providers. It receives real time information which comes as an input of airlines and travel services such as flight times, prices and availability. This module ensures that information about travelling is accurate and current thus users can compare options and make bookings without doubt [23].

4. *Admin Module:* The Admin Module provides system administrators with an opportunity to operate and monitor the travel booking site. It allows administrators to modify the system settings, monitor booking activities, and manage working data. This module will help maintain the system, monitor the performance of the services and ensure the platform runs in the most efficient manner by ensuring the admins monitor and regulate system operations.

B) Methods/Technologies

- Java: The Java language is the major one used in the trip booking platform and is mostly used in the backend components of the system. It is compatible with a wide range of platforms and it possesses high levels of protection. Java supports object-oriented programming, and therefore it is simpler to make flexible maintainable applications that can be utilized to create scalable systems based on microservices.

- Spring Boot: The system uses Spring Boot to develop and operate the microservices. It also has built in functionality to create RESTful APIs, which helps in easier setting up of the applications and reduces the time spent in the development process. Spring boot allows one to create applications in a short time, integrate them with databases and APIs, and manage individual services without a problem.

- Spring JDBC: Spring JDBC is incorporated in the travel booking system to do database work. This tool makes it easier to use SQL queries in working with relational databases. The design reduces the amount of redundant code, and accelerates the process of accessing the database that enables the application services and MySQL database to communicate with one another quite readily.

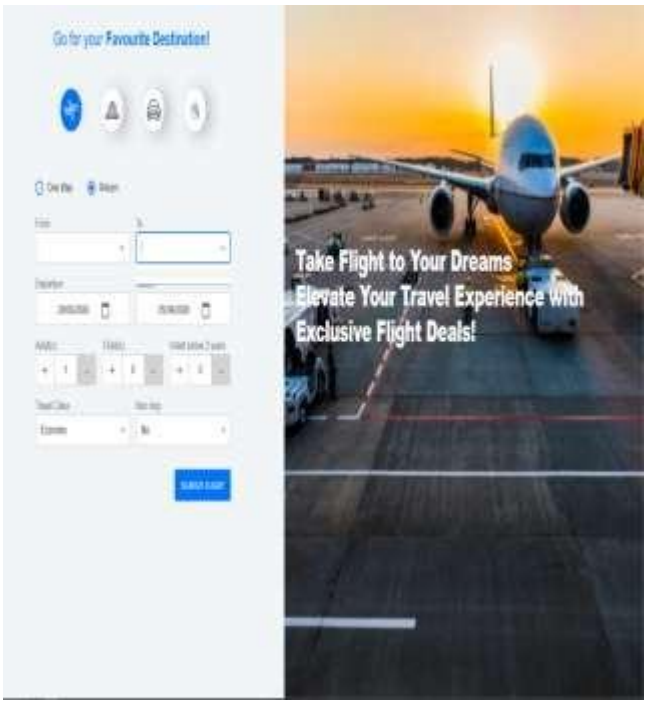
- MySQL: MySQL is a relational database management system which is utilized to store and organize program data. It stores such details as user information, booking records and system settings. The MySQL is safe in storing data, it has the capacity to query data in a structured form and is a quick way of finding data and this is what is required to manage the transactions concerning booking travel.

- Amadeus API: Amadeus API provides real-time access to the trip information across the globe including flights times, prices, and seats available. It connects the travel planning platform with the airlines and other travel services providers. With this integration, the system will be able to get current and precise travel information which will simplify the process of searching and reserving a flight.

- Swagger: Swagger is employed to describe the RESTful APIs and test them in the project. The tool provides developers with an API endpoint, request parameter and response work option. Swagger helps to simplify the process of API testing and enhances communication among workers by ensuring that documentation of the system services is clear.

- Amazon Web Services: The travel booking platform is established and hosted on AWS on the cloud. It provides scalable infrastructure, high availability and consistency of the system. Ec2 and RDS will allow AWS to manage databases and application servers in a simpler manner, leaving the system open to users.

4. Experimental Results



5. Conclusion

Lastly, the primary objective of the given project was to design and develop a travel booking application that can benefit a great number of individuals and can be increased and effective. This platform ought to have the capability of providing people with real-time access to travel services such as flight searches, flight bookings, and travel details. The system was designed based on a microservices-based architecture to ensure that it was modular, scalable and reliable which are issues typical of standard monolithic systems [24]. The site contains the latest travel information on the Amadeus GDS that provides customers with precise information on flight time, price, and availability. Separate RESTful microservices are created with the help of Java and the Spring Boot framework. Data is handled by MySQL and testing and documenting APIs is done by Swagger. The application is deployed on the AWS cloud service to ensure that it will be accessible at all times and that there will be proper management of the resources. The platform performed reliably (approximately 95 percent of the API responses were successful) during the system test. This confirmed that it was well able to deal with real-time travel queries. Moreover, the system is architecturally simple to add new services and have better handling of booking [25]. In general, the system that was developed is a powerful, scalable, and convenient means to book travel, which assists in the efficient operation of online travel system and allows to improve the user experience of the contemporary online travel systems.

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