Đỗ Hùng Cường

ITITIU13170

Thesis report

Introduction

1/ Situation

Many years ago, in hotel business, the guest who really wanted to book a room had to come directly to the hotel and the reservation process had to be done before booking the desired room completely. In fact, if the huge number of guests came to hotel for booking at the same time, this hotel would be crowded. Then the customers had to wait for another booking, made a queue and wait for own turn. It wastes a lot of time and is very uncomfortable.



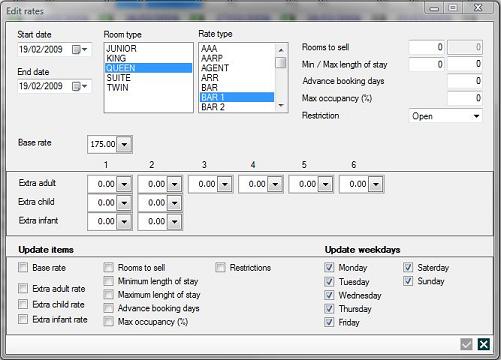
Moreover, in many enormous hotels, management was very difficult and booking based on pen and paper was not convenient for both the customers and the receptionists. Besides, the reservations might cause a lot of risk such as invalid information of customers, wrong information of rooms and booking.

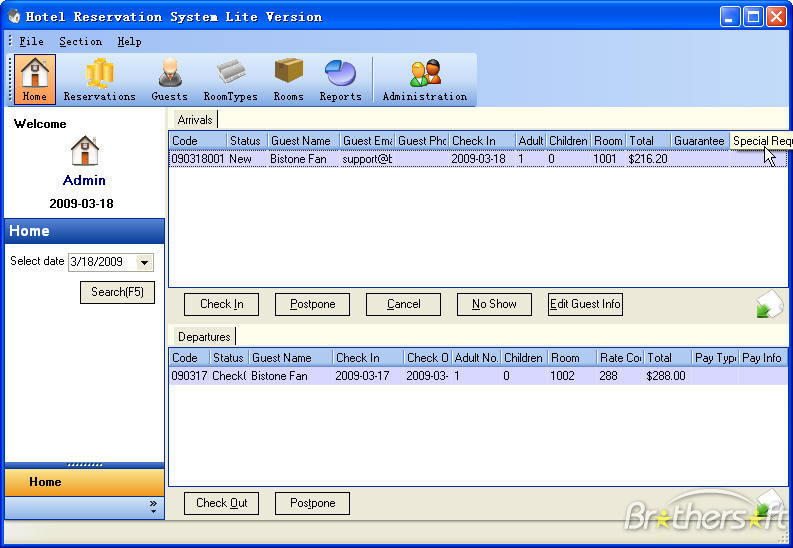
Therefore, many applications had been released with lots of features to support hotel booking. However, at that time, performance of these systems might be very bad. They could overload or run extremely slow when a huge number of users was accessing at the same time. Moreover, the look and feed of these software user interfaces might not be designed beautifully. It leads to situation that many customers or even the administrators who manage the system were not pleased to use those systems.

Ex: <https://www.planet-source-code.com/vb/scripts/ShowCode.asp?lngWId=10&txtCodeId=7186>

<http://www.bistonesoft.com/litereservationstatus.htm>

<https://www.planet-source-code.com/vb/scripts/ShowCode.asp?lngWId=10&txtCodeId=7186>



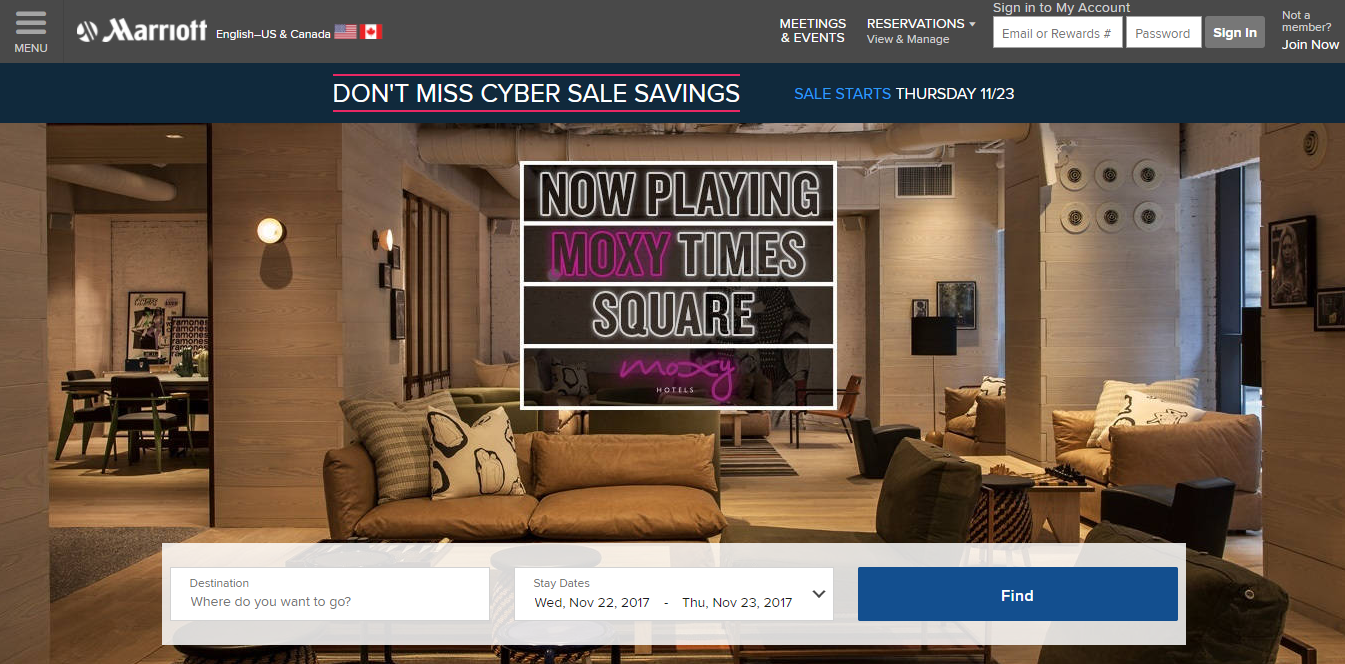


2/ Modern Hotel Booking System

To solve these problems above, many deluxe hotels or five-stars hotels in the world such as Marriott International, Hilton Worldwide or InterContinental Hotels Group already have their own hotel booking systems.

In developing technology industry, their systems were improved so much with friendly user interface, high performance and especially the ability to track the behavior of customers. With this tracking customers feature, the administrators, the managers or hotel owners could know what customer had done on their websites. They would know which pages customers clicked on, how long customers stayed at each page, which rooms, which services that customers had searched, booked, ordered or send the feedbacks.

Based on the data collection, the systems will automatically suggest what customers may like, recommend which rooms customers should book. Moreover, the hotel owners can improve their hotel business based on the information collected by their systems.



3. Technology

Nowadays, there are many technologies for building a hotel booking system based on web application. Today, one of the most popular architecture is Single Page Application.

3.1/ Single Page Application

Single Page Application is a web application that on only one single web page or only one index page contains dynamic actions which we do not need to refresh the page. Single Page Application interactions can be handle without reaching server.

Single Page Application can improve performance in many cases such as loading time, using AJAX, easy to navigate pages etc. That makes the end users feel more comfortable when using Single Page Application.

Recently, many frameworks, platforms or techniques were released to support building a Single Page Application. Angular is one of the most popular Single Page Application framework.

3.2/ Angular:

3.2.1/ AngularJS:

3.2.2/ Angular 2:

Recently, many frameworks, platforms or techniques were released to support building a Single Page Application. Angular is one of the most popular Single Page Application framework. It allows us to build a single page application easily because of the following reason:

* Angular makes the HTML more expressive by support some features such as if-else condition, switch-case, loop and local variable.
* Angular has powerful data binding. Thank to data binding, we can easily display variables from the data model such as component, track changes, and process updates from the user.
* Angular promotes modularity by design. Every Angular application is a set of building blocks and that is easier to create and reuse content.

- Angular has built-in support for communication with a back-end service. In Angular application, it is easy for the front-end to integrate with a backend server to get and post data or execute server-side business logic.

In Angular 2, we can use Typescript which is a super set of Javascript. Typescript is a form of JavaScript, in Typescript we can know types and classes. Typescript can be compiled to JavaScript. TypeScript is an open source that contains many aspects of object orientation such as interfaces and inheritance. The TypeScript’s syntax is cleaner than javascript and similar to C# or java. Because of using TypeScript, so we can use all its libraries and the functionality of TypeScript itself in Angular 2.

3.3/ RESTful webservice:

Angular 2 is simply a front-end framework for building applications. It is not the right determinant for what backend you should use for your application.

There are many ways to connect angular 2 to your backend server. RESTful Web Service which is essentially REST Architecture based Web Services is one of the architectural style that helps angular 2 and your backend server communicate with each other.

In REST Architecture, everything is a resource. RESTful web services are light weight services so the developers usually use RESTful web services to make APIs for web-based applications.

In some case, RESTful Web Service help us write a software application in various programming languages and we can run them on various platforms. For example, we can write a backend server in Java using RESTful web service and connect to fontend in Angular 2 using Typescript.

REST is a web standard based architecture which was first presented by Roy Fielding in 2000. The word ‘REST’ means REpresentational State Transfer. REST uses HTTP Protocol for data communication. It spins around resources where each component is a resource and a resource accessed by a typical interface utilizing HTTP standard methods.

RESTful Web Services are Web services based on REST Architecture. They use HTTP methods to implement the concept of REST architecture. URI is usually a service which a RESTful Web Service provides resource such as Text, JSON and XML.

There are many framework written in many programming language support build a RESTful webservice such as Express framework for Nodejs and Spring MVC for java.

3.4/ Nodejs & Express framework

Node.js is a JavaScript runtime built on Chrome's V8 JavaScript engine. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient.

Node.js package ecosystem, npm, is the largest ecosystem of open source libraries in the world. Node.js application is written in Javascript so it is very easy to interact with Angular to build a Single page application easily

Express is a minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications. The advantage of Nodejs combine with Express framework is listed below:

* APIs

With a myriad of HTTP utility methods and middleware at your disposal, creating a robust API is quick and easy.

* Performance

Express provides a thin layer of fundamental web application features, without obscuring Node.js features that you know and love.

3.5/ Java & Spring MVC:

Spring MVC is the most powerful J2EE framework to build Java web application. It is an open source Java platform that provides comprehensive infrastructure support for developing robust Java based Web applications very easily and very rapidly.

Spring MVC provides a model-view-controller architecture and ready components that can be used to develop flexible and loosely coupled web applications. The MVC pattern results in separating the different aspects of the application (input logic, business logic, and UI logic), while providing a loose coupling between these elements.

To build a Web Application we need at least one type of database system to store all the data. For example, to build hotel booking system, we need to store the information users, rooms, admin and so on for the servers to retrieve and display on the client user interface or to update the data which users saved to the database. MongoDB stores data in JSON-like documents so that it is a good type of database system to combine with Nodejs Express framework and Angular to build the best Single page application. It called MEAN stack technology which means MongoDB, Express, Angular and Nodejs.

3.6/ SQL & Hibernate:

SQL is a standard language for storing, manipulating and retrieving data in databases.

Some kind of SQL: MySQL, SQL Server, MS Access, Oracle, Sybase, Informix, Postgres, and other database systems.

Hibernate ORM (Hibernate in short) is an object-relational mapping tool for the Java programming language. It provides a framework for mapping an object-oriented domain model to a relational database. Hibernate handles object-relational impedance mismatch problems by replacing direct, persistent database accesses with high-level object handling functions.

Hibernate is free software that is distributed under the GNU Lesser General Public License 2.1.

Hibernate's primary feature is mapping from Java classes to database tables, and mapping from Java data types to SQL data types. Hibernate also provides data query and retrieval facilities. It generates SQL calls and relieves the developer from the manual handling and object conversion of the result set.

3.7/ MongoDB:

MongoDB is an open-source database. In MongoDB, entity relationship is not mandatory so we can call it NoSQL – No SQL which provides a mechanism for storage and retrieval of data that is modeled in means other than the tabular relations used in relational databases.

MongoDB stores data in JSON-like documents that can vary in structure. Related information is stored together for fast query access through the MongoDB query language.

MongoDB uses dynamic schemas, meaning that you can create records without first defining the structure, such as the fields or the types of their values. You can change the structure of records (which we call documents) simply by adding new fields or deleting existing ones.

This data model give you the ability to represent hierarchical relationships, to store arrays, and other more complex structures easily.

Documents in a collection need not have an identical set of fields and denormalization of data is common. MongoDB was also designed with high availability and scalability in mind, and includes out-of-the-box replication and auto-sharding.

3.8/ MEAN stack:

MEAN is a user-friendly full-stack JavaScript framework ideal for building dynamic websites and applications. It is a free and open-source stack designed to supply developers with a quick and organized method for creating rapid prototypes of MEAN-based web applications. One of the main benefits of the MEAN stack is that a single language, JavaScript (in Angular 2, Typescript will be compiled into JavaScript) runs on every level of the application, making it an efficient and modern approach to web development.

4/ Goals and Scope

To keep up with current trends in hotel business industry, I will build a Hotel Booking and Reservations System which includes some features that similar to those five-stars hotel booking systems. It means experiment successfully MEAN and Spring MVC to implement Hotel Booking & Reservation System with more than 120 features likes a modern hotel booking system.

The main architecture of my system is using MEAN stack technology and J2EE with Spring MVC framework. Applied MEAN stack technology, my system becomes an online single page application with high performance and dynamically loading thank to Angular 2 and RESTFULL web service which is built by Nodejs and express framework.

Furthermore, the administrator’s system is built by Spring MVC, the most powerful java framework so it becomes a cross-platform system and runs well with all operating system. With dynamic webpages and friendly user interfaces, customers will be very comfortable when booking rooms on my website and the administrators can manage the whole system easily.

Besides, my application supports almost features for hotel bookings as well as reservations management with ability to track user’s behavior and it will provide data collection for applying AI machine learning in the feature.