

Tachyon: Bike Rentals Made Easy

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Abstract—The bike rental application is an online-based web application which is created to enhance the bike booking facility with ease. This application focuses on the portability of the bike booking feature. This application helps the users to interact with various bike rental companies. With this application, the customer can rent a bike at the best value. One can easily browse through various bikes available by different companies using different interfaces. This application provides three types of users, customer, admin, and super admin who work on the same portal. In this application customer is the one who uses the portal to book the bike, the admin is the one who uses the portal to provide different bike details of his own company and the super admin is the one who uses the portal to manage every other user and company. Every user has their type of authentication to work with so that it provides enhanced security.

Index Terms— Bootstrap, Springboot, bike, rental services, booking.

I. INTRODUCTION

Bike Renting is a quite common service that is being utilized in current times. People who want to ride a bike but do not want to buy the bike or cannot bike can utilize this bike renting and can his work completed We can observe that for the past few years the number of people that are using the bike rental application is increasing rapidly. Even though there are multiple providers for this bike renting, they have their drawbacks.

A. Motivation

Bike rental application is a feature which is having increased in demand in the past years. In the bike rental field, there is no web application designed which makes it mandatory for a user to download the application which every user may not prefer. In general, users prefer to use the application and experience the app, only then do they try to install it, which can be possible only through a web app. As the existing applications and models do not satisfy the ease of bike rental system. We decided to implement our system which is faster and more convenient with more features.

B. Problem Statement

The existing bike rental services are having only android and iOS applications but nothing as a web application or an application that can be run on a Windows system. The system that will be built will be a web application that can be used on any type of Operating System and any type of browser. This can be used to smoothly run the application anywhere which increases the portability.

C. Project Objectives

The application's main goal is to create a website where users can reserve bikes and administrators may rent out bikes. We need to create a special type of user who can monitor and control all users and admins so that the application can run without any issues. Another important task is to make this platform useful by making any admin rent their bikes such that the users can book them based on their interests.

II. EXISTING WORK AND IT'S LIMITATIONS

Some applications provide bike rental services like VOGO, BOUNCE, and GoBumpr which are currently famous in this domain. These applications are present on both iOS and Android but not for Windows. These applications provide mostly gearless bikes like Aactiva, Zest and eTrance. These existing works are two user applications in which user one is the company and user two is the customer who is renting the bikes.

Limitations:

- The existing models are only app-based either Android or iOS-based but not any web application that can be run on any type of operating system.
- In the existing applications, if a person has any bike that he wants to rent out for others, there is no feature provided to him for that.
- In existing applications, there is no way for a user to choose the same bike that he previously rented and liked.
- In the existing application, there is no flexibility in choosing a particular type of bike after selecting a model, he will be randomly assigned a bike.
- The existing applications, as are written specifically for android and iOS, so if they want to change the code or update a feature, they need to write a feature separately for both android and iOS.
- Every time an update to a feature or security is available for an existing programme, it must be downloaded from the Play Store or App Store.

A Web-based application for a bike renting system is proposed. To create this application, we need to build a portal for users to book bikes and for the admins to rent out bikes. A backend server must be created with the help of spring tools like spring boot, spring web, spring JPA, and spring hibernate. This backend server will be connected to a MySQL database that can be run on either a local machine or server. This spring back end will have various functions that will manage the business logic inside the controllers. Various endpoints need to be created using the spring rest controller and with required HTTP methods so that they can be accessed only using the corresponding methods. The front-end will be created using Angular 11 to create various components and reuse components that can be used in various scenarios like navbar. The front-end that is created will use data from spring boot by using different API calls to perform required operations like login, logout, dashboard etc.

III. IMPLEMENTATION TECHNOLOGIES

A. Angular

With the utilization of HTML and TypeScript, singlepage client applications might be made using the Precise stage and structure. TypeScript is utilized to make Precise. As an assortment of TypeScript libraries that you load into your applications, it carries out both center and discretionary usefulness.

An Angular application's architecture is based on a few key ideas. The fundamental building elements of the Angular framework are NgModuleorganized Angular components. An Angular application is defined by a series of NgModules, which group similar code into functional groups.

A root module, which facilitates bootstrapping, is always present in an application, and there are often many more feature modules as well.

Views are collections of screen elements that Angular may select from and alter in accordance with your programme logic and data, and they are defined by components. Services, which offer specialised functionality unrelated to views, are used by components. Service providers may be added as dependencies to components, which will make your code efficient, reusable, and modular. Classes that make use of decorators include modules, components, and services. As well as indicating their type and providing metadata, these decorators instruct Angular how to utilise them.

A component class is linked to a template that describes a view by the metadata for that class. Ordinary HTML is combined with Angular directives and binding syntax in a template, which enables Angular to alter the HTML before rendering it for display.

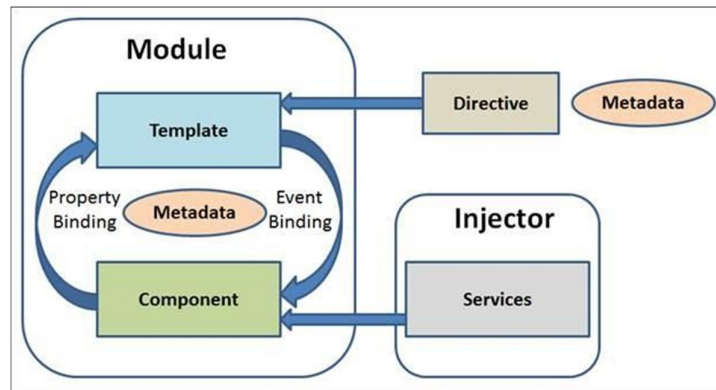


Figure 1: Angular Architecture

A service class's metadata contains the details Angular requires to make it available to components through dependency injection (DI). The parts of an application often define a large number of hierarchically organised views. In order to assist you in creating navigational paths between views, Angular offers the Router service. The router has highly developed browser navigational features. For a group of components that are dedicated to a workflow, an application domain, or a collection of closely linked capabilities, a NgModule declares a compilation context. A NgModule can link its elements to relevant code, such services, to create functional units. At least one component, known as the root component, connects a component hierarchy to the page document object model in every Angular application (DOM). Each component establishes a class that houses the application's data and functionality, and it is connected to an HTML template that establishes the view that will be seen in the target environment.

B. System Architecture

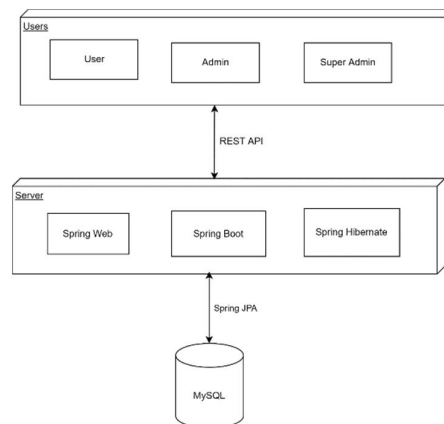


Figure 2: System Architecture

C. Bootstrap

A free and opensource web development framework is Bootstrap. By offering a collection of vocabulary for template designs, it is intended to make the web development process for responsive, mobilefirst websites easier. In other words, Bootstrap enables web designers to create websites more quickly by relieving them of the burden of learning fundamental commands and functions. It is made up of scripts that are based on HTML, CSS, and JS for various web design-related functions and elements.

The main goal of Bootstrap is to build responsive, mobilefirst websites. It guarantees that a website's UI elements function properly across all screen sizes. Precompiled and based on source code versions of Bootstrap are both options.

The latter is preferred by seasoned developers since it enables them to tailor the styles to their projects.

The advantages of bootstrap are Ease of Use, Browser Compatibility, Bootstrap Image System, and Bootstrap Documentation. There are three distinct types of files in bootstrap, they are Bootstrap.css - Which is a CSS Framework that designs a website by giving class names or by other attributes, and Bootstrap.js – This file is the core part of Bootstrap which consists of JS files that are responsible for website interactivity, Glyphicons – These are the design icons included free with bootstrap.

D. Spring Boot

Spring Boot is an open-source Java-based framework used to create a micro-service. Pivotal Team developed Spring boot and it is used to build stand-alone and production- ready spring applications. Micro Service is an architecture that allows developers to develop and deploy services independently. The lightweight paradigm for supporting business applications is made possible by the fact that each service running has its own process. Easy deployment, straightforward scaling, little configuration, shorter production times, etc., are some of Spring boot's benefits. Java programmers can use Spring Boot to create standalone, production ready spring applications that you can easily execute. Without the requirement for a full setup of Spring configuration, you can get started with the bare minimal configurations.

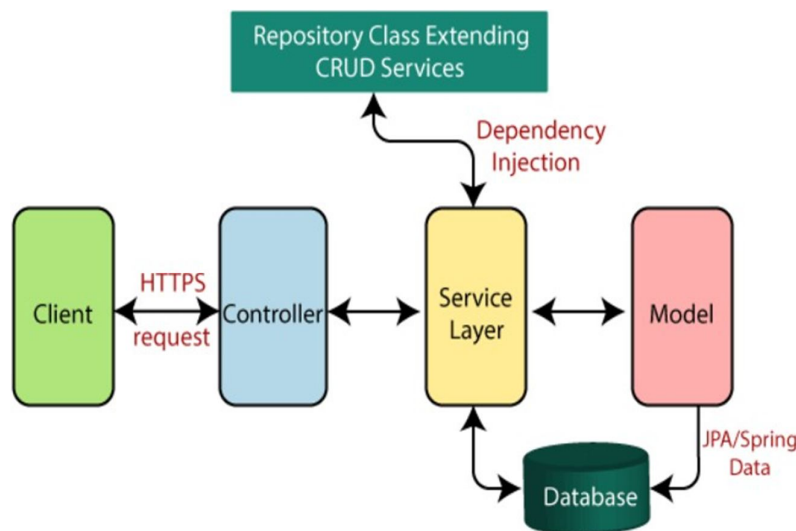


Figure 3: Spring Workflow

By avoiding complicated XML, spring boot makes it easier to create applications that are ready for production. It offers a versatile approach to set up database transactions, XML customizations, and Java Beans. It handles endpoints and offers strong batch processing.

E. MySQL

Usually used in conjunction with PHP and Spring Boot, MySQL is an open-source, quick, reliable, and versatile relational database management system. The only distinction between it and Oracle Database is that MySQL is open-source software.

A database system called MySQL is employed in the creation of web-based applications.

It can be applied to both modest and substantial enterprises. Because it is constantly supported by a team of experts and was designed in C++, which runs more quickly than many other languages, it is incredibly quick and reliable to use.

F. OpenJDK

A free and open-source version of the Java SE Platform Edition is known as OpenJDK.

As a result of the work that Sun Microsystems began in 2006, it was first made available in 2007. Since version SE 7, it has been an official reference implementation of a Java Standard Edition.

It is used since OpenJDK is open-source software, and it releases updates every 6 months, unlike oracle which releases every three years. So, we can get the latest features for free. It performs similar to Oracle JDK as the build process is the same for the JDK.

IV. SCREEN SHOTS

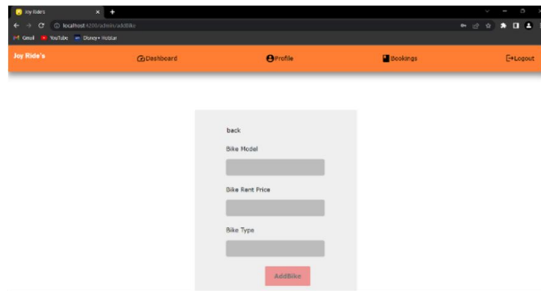


Figure 4. Admin add bike page

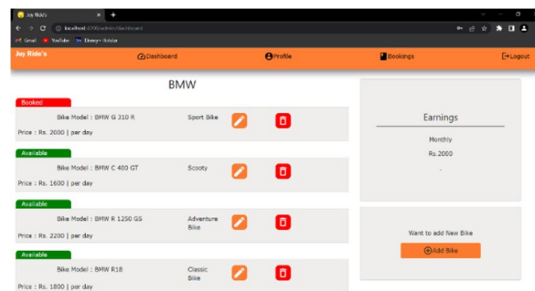


Figure 5. Admin Dashboard page

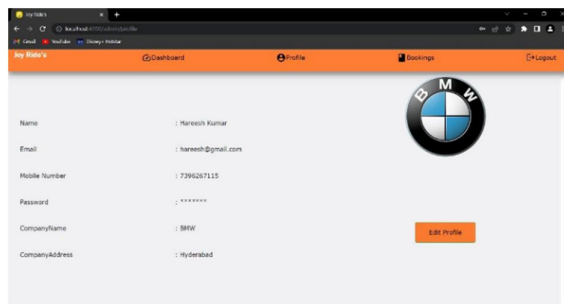


Figure 6. Admin profile page

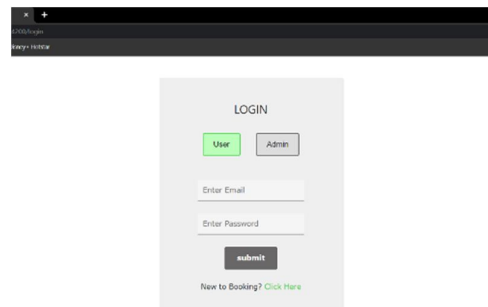


Figure 7. Login Page

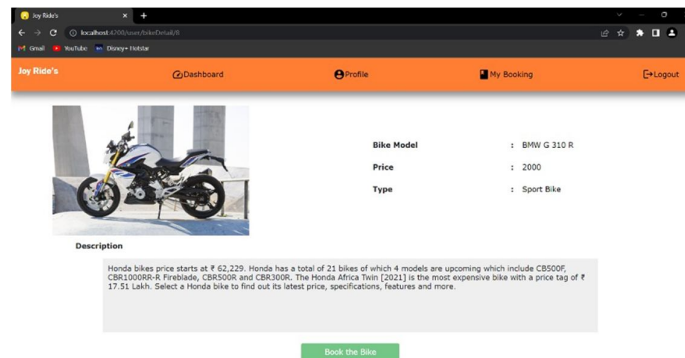


Figure 8: Bike details page

V. CONCLUSION

This project facilitates smoother and faster bike renting services for the customers. This application is built using API which uses very less payload, so it consumes less amount of network, which in turn becomes fast as it needs to transport a small amount of data. This application is built on Single Page Architecture (SPA) which makes sure that the components that are re-used will be rendered only once and used repeatedly. This makes sure that the time to load decreases as well as it uses less CPU than normal.

FUTURE SCOPE

A location feature that allows for bike tracking can be added to this application. This can be used to prevent bike theft, and to do this, we can easily install a GPS sensor on each bike. A rating feature is a plan of adding after every bike is returned to the admin, the user will be given a choice to rate the company and the bike based on his experience and similarly, the admin/ company will be given a choice to rate the customer based on the condition how the customer returns it.

A feature can be added such that before accepting any person as an admin or as a company, he will be verified with the admin's data like his bikes and their authenticity and only then the admin can access the portal. A feature can be added such that image upload can be done directly. To achieve this a base64 format can be used to store the images as a string, or it can be stored as a blob.

When a user clicks the "book the bike" button, a payment gateway must be implemented so that the user is immediately taken to the payment gateway of his choice where he may make the payment to reserve the bike.

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