

Student data authentication using Spring Boot Application

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Abstract

Spring Boot makes it easy to build standalone, production-grade Spring-based applications that you can "just run". This web application uses user authentication through GitHub to increase security and limit unauthorized access to users. The main reason I chose Spring Boot for this project is that it helps me create a simple to run web application because it requires minimal Spring configuration. This project runs on the OAuth2.0 authentication protocol, which enables client applications on HTTP services like Facebook, GitHub, etc. to access resources from resource owners. This allows resources stored on one site to be shared with another site without using credentials. Use token-based authentication and authorization instead of username and password. This application contains various options used to modify data and access student data.

Keywords: Spring Boot, OAuth 2.0, Spring Tool Suite, GitHub.

Introduction

The Spring Framework provides a comprehensive programming and configuration model for modern Java-based enterprise applications - on any kind of deployment platform. A key element of Spring is infrastructural support at the application level: Spring focuses on the "plumbing" of enterprise applications so that teams can focus on application-level business logic, without unnecessary ties to specific deployment environments. The Spring Framework is an application framework and inversion of control container for the Java platform. The framework's core features can be used by any Java application, but there are extensions for building web applications on top of the Java EE (Enterprise Edition) platform. Although the framework does not impose any specific programming model.

As stated here, you might choose Spring Boot because of the features and benefits it provides

Provides a flexible way to customize Java Beans, XML configuration and database transactions.

- Provides powerful batch processing and manages REST endpoints.
- Spring Boot configures everything automatically. No manual setup required.
- Deliver annotated Spring applications.
- Simplify dependency management.
- Include an embedded servlet container.

Related Work

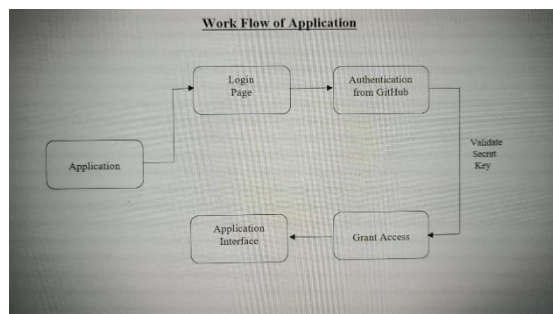
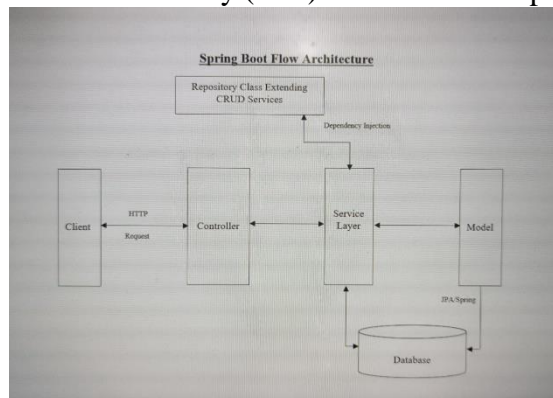
This tutorial shows how to create a sample application that performs various tasks with "social login" using OAuth 2.0 and Spring Boot. . Start with a simple single sign-on from one provider and reach the client with a choice of authentication providers (GitHub or Google). All examples are single page applications using Spring Boot and Spring Security on the backend. They all also use plain jQuery on the frontend. However, the changes required to convert to a different JavaScript environment or use server side rendering are minimal. Here are some examples that build on each other and add new features at each stage.

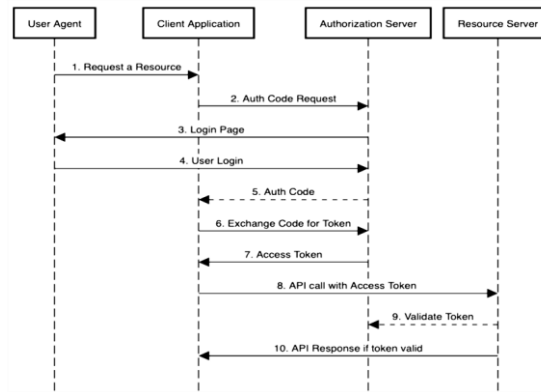
- Simple: A very simple static application with a home page and unconditional login via Spring Boot OAuth 2.0 configuration properties (when you visit the home page, you are automatically redirected to GitHub).
- Click: Add an explicit link that users must click to log in.
- Logout: Also adds logout link for authenticated users.

- Two providers: Add a second login provider so users can choose which provider to use on the home page.
- custom-error: Add error messages for unauthenticated users and custom authentication based on GitHub API. Get access token from GitHub (Authorization Server) using Authorization Code Grant. It then uses the access token to request some personal data (only the ones you've allowed) from GitHub, including your login ID and name. At this point, GitHub acts as a resource server, decrypting the token it sent and verifying that it authorizes the app to access user information. Upon successful completion of this process, the application injects user data into the Spring Security context for authentication. If you take a look at the browser tool (F12 in Chrome or Firefox) and monitor the network traffic for every hop you will see redirects back and forth from GitHub and finally back to the home page with the new Set-Cookie. header. This cookie (JSESSIONID by default) is a token of authentication data for your Spring application (or any servlet-based application). So we have a secure application in the sense that the user must authenticate with the external provider (GitHub) to view the content. I don't want to use it for my internet banking website. However, for the basic purpose of identifying and separating content among different users of the site, this is a good starting point. That is why this kind of certification is very popular these days. : In the next section, we will add some basic functionality to our application. We'll also make it clearer what happens when users receive this initial redirect to GitHub.

2. Methodology

A client makes an HTTP request (GET, PUT, POST, etc.). HTTP request redirected to controller. The controller displays the request. Process the handle and call the server logic. Business logic runs in service layer. Spring Boot does all the logic for database data that maps to Spring Boot model classes via the Java Persistence Library (JPA). Controller's response returned a JSP page.





3. Analysis

Deploying your Spring Boot based applications via MySQL instead of using in-built memory, will provide you with the following benefits:

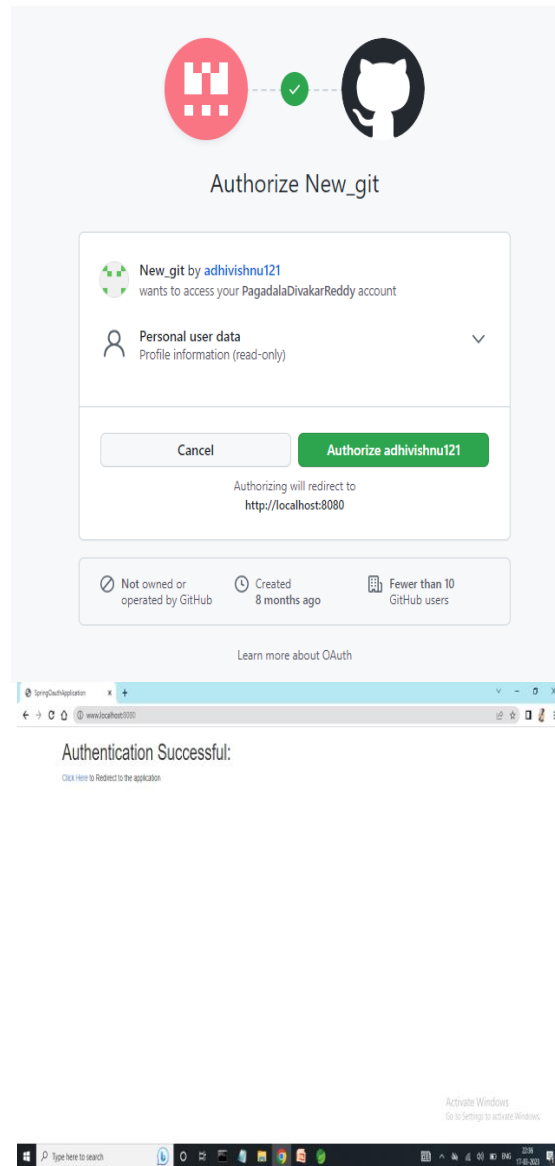
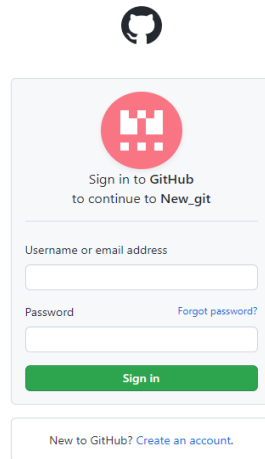
- MySQL offers unparalleled scalability to make it easy to manage deeply integrated Spring Boot applications that operate on terabytes of data. Moreover, on-demand flexibility is the main feature of MySQL. This open-source solution allows full customization of your data and caters to the unique database server requirements of your Spring Boot-based applications for e-commerce businesses.
- Spring Boot can build stand-alone web applications with integrated servers. Now using MySQL Database instead of internal memory storage can minimize the query execution time. Therefore, applications developed for Spring Boot MySQL integration will be better suited for real-time operation and users will have a better experience.
- Applications built on top of Spring Boot and running on MySQL are not only cost-effective to develop, but also a viable solution for enterprise-level workloads. Spring Boot can use MySQL to improve its ability to package entire services (e.g. user authentication) into self-contained, fully deployable forms that also expose APIs. This greatly simplifies the installation and deployment of applications. Spring Boot MySQL integration is also gaining popularity in the microservices world. Spring Boot – CRUD Operations using MySQL Database: CRUD stands for Create, Read/Retrieve, Update and Delete and these are the four basic operations that we perform on persistence storage. CRUD is data-oriented and the standardized use of HTTP methods. HTTP has a few methods which work as CRUD operations and do note they are very vital from a developmental point perspective in programming that also does helps us relate better web development and also aids us while dealing with databases. So, standard CRUD Operations is as follows:

- POST: Creates a new resource
- GET: Reads/Retrieve a resource
- PUT: Updates an existing resource
- DELETE: Deletes a resource as the name suggests
- CREATE Operation: Performs the INSERT statement to create a new record.
- READ Operation: Reads table records based on the input parameter.
- UPDATE operation: Executes an update statement against a table. Based on input parameters.
- DELETE Operation: Delete the specified row from the table. Also based on input parameters.

4. Result

The main aim of this project is to provide the authentication for the student data website by github website. It is done by creating a github Oauth application . After creating the Oauth application copy the secret key of the application and use it in the application.yml file in the spring boot. If you start the application on tomcat server you can see that the application shows the redirectable github button

, which onclick will lead to the github website and after you enter the details it will redirects back to the original application.





5. Conclusion

Using the spring boot application for the student data management makes the administrator who is managing enjoys the facility of providing a flexible way to configure XML configurations, and Database Transactions and using the oauth 2.0 to make the authentication protocol generation of authorization codes, access tokens, and refresh tokens instead of passwords.

6. References

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