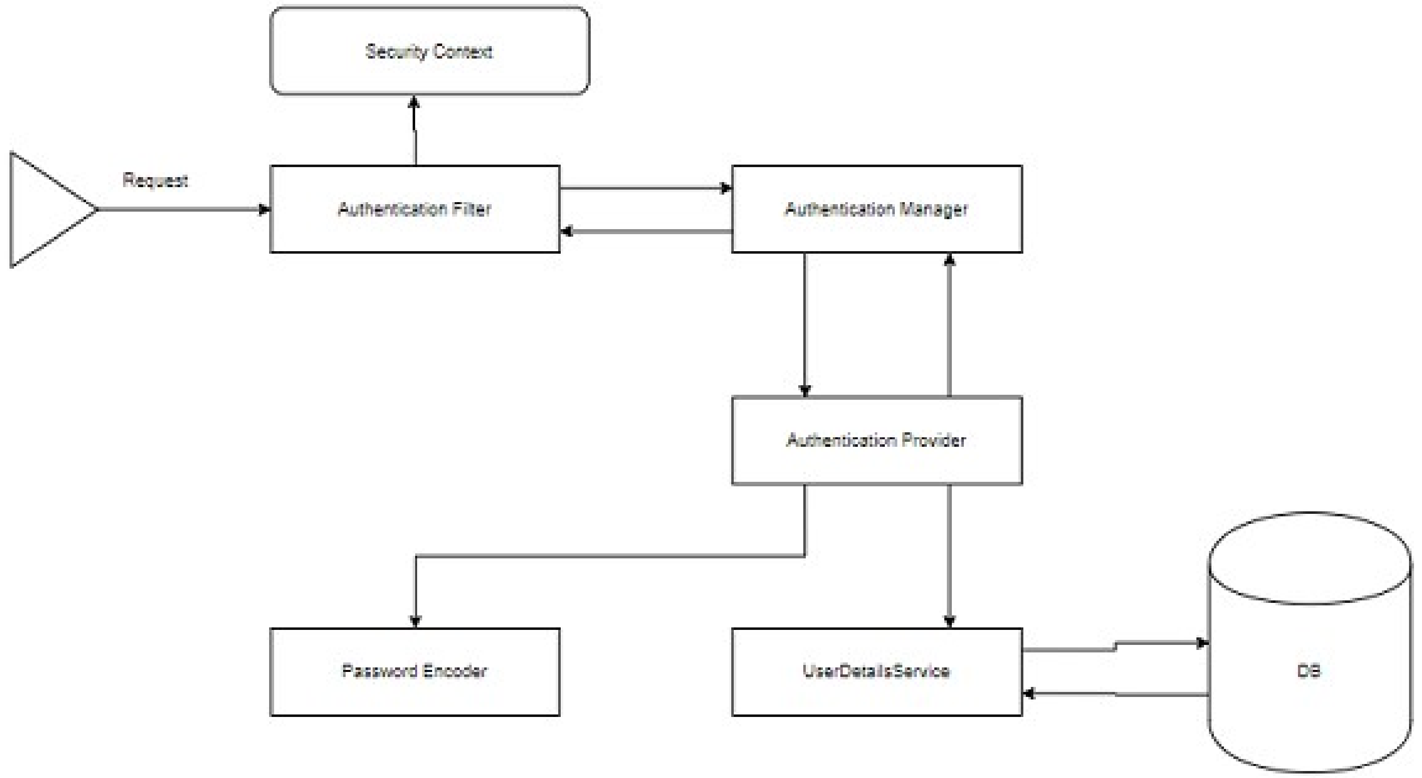
Spring Security

We are also going to set up a registration page through which the users will be able to register themselves with our application.

Architecture

- architecture of Spring Security starts with servlet filters. These filters intercept requests, perform operations on them, and then pass the requests on to next filters in the filter chain or request handlers or block them if they do not meet certain conditions.
- It is during this process that Spring Security can authenticate requests and perform various authentication checks on the requests.
- It can also prevent unauthenticated or malicious requests from accessing our protected resources by not allowing them to pass through.

Project Structure



AuthenticationFilter

- intercepts requests and attempts to authenticate it.
- It converts the request to an Authentication Object and delegates the authentication to the AuthenticationManager.

AuthenticationManager

- the main strategy interface for authentication. It uses the alone method **authenticate()** to authenticate the request.
- The **authenticate()** method performs the authentication and returns an Authentication Object on successful authentication or throw an **AuthenticationException** in case of authentication failure.
- If the method can’t decide, it will return null. The process of authentication in this process is delegated to the **AuthenticationProvider**.

AuthenticationProvider

- The AuthenticationManager is implemented by the ProviderManager which delegates the process to one or more **AuthenticationProvider** instances.
- Any class implementing the AuthenticationProvider interface must implement the two methods – **authenticate()** and **supports()**.
- **supports()** method is used to check if the particular authentication type is supported by our **AuthenticationProvider** implementation class.
- If it is supported it returns true or else false. Next, the authenticate() method. Here is where the authentication occurs. If the authentication type is supported, the process of authentication is started. Here is this class can use the **loadUserByUsername()** method of the **UserDetailsService** implementation. If the user is not found, it can throw a **UsernameNotFoundException**.

UserDetailsService

- The authentication of any request mostly depends on the implementation of the UserDetailsService interface. It is most commonly used in database backed authentication to retrieve user data.
- The data is retrieved with the implementation of the alone **loadUserByUsername()** method where we can provide our logic to fetch the user details for a user.
- The method will throw a **UsernameNotFoundException** if the user is not found.

PasswordEncoder

- Until **Spring Security 4**, the use of **PasswordEncoder** was optional. The user could store plain text passwords using in-memory authentication.
- **Spring Security 5** has mandated the use of **PasswordEncoder** to store passwords. This encodes the user's password using one its many implementations.
- The most common of its implementations is the **BCryptPasswordEncoder**. Also, we can use an instance of the **NoOpPasswordEncoder** for our development purposes. It will allow passwords to be stored in plain text. But it is not supposed to be used for production or real-world applications.

Spring Security Context

- the details of the currently authenticated user are stored on successful authentication. The authentication object is then available throughout the application for the session. So, if we need the username or any other user details, we need to get the **SecurityContext** first.
- This is done with the **SecurityContextHolder**, a helper class, which provides access to the security context. We can use the **setAuthentication()** and **getAuthentication()** methods for storing and retrieving the user details respectively.

Form Login

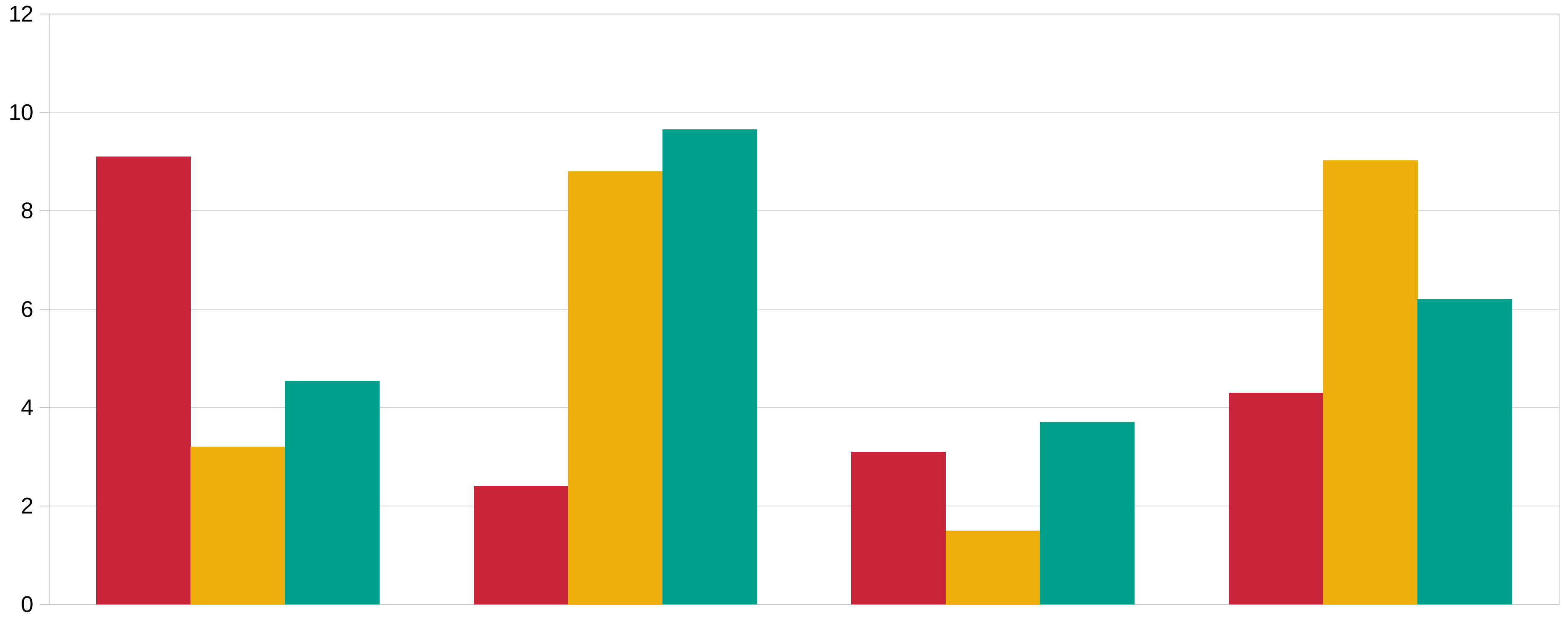
- When we add Spring Security to an existing Spring application it adds a login form and sets up a dummy user. This is Spring Security in auto-configuration mode.
- It also sets up the default filters, authentication-managers, authentication-providers, and so on.
- This setup is an in-memory authentication setup. We can override this auto-configuration to set up our own users and authentication process. We can also set up our custom login method like a custom login form. Spring Security only has to made aware of the details of the login form like – the URI of the login form, the login processing URL, etc.. It will then render our login form for the application and carry out the process of authentication along with the other provided configurations or Spring’s own implementation.

Login with a Database

- Spring Security automatically provides an in-memory authentication implementation by default. We can override this by authenticating users whose details are stored in a database.
- In this case, while authenticating a user, we can verify the credentials provided by the user against those in the database for authentication. We can also let new users register in our application and store their credentials in the same database.
- We can provide methods to change or update their passwords or roles or other data. As a result, this provides us with persistent user data which can be used for longer periods of time

Login Attempts Limit

- To limit login attempts in our application we can use Spring Security’s **isAccountNonLocked** property. Spring Security’s **UserDetails** provides us with that property. We can set up an authentication method wherein, if any user or someone else provides incorrect credentials for more than a certain number of times, we can lock their account.
- Spring Security disables authentication for a locked user even if the user provides correct credentials.
- We can store the number of incorrect login attempts in our database. Then against each incorrect authentication attempt, we can update and check with the database table.
- When the number of such attempts exceeds a given number, we can lock the user out of their account. Consequently, the user will not be able to log in again until their account is unlocked.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