Spring Security 4 Hello World Annotation+XML Example

This example demonstrates Spring Security 4 usage to secure a Spring MVC web application, securing URL access with authentication. We will use classic Hello World example to learn Spring Security 4 basics. This post uses Spring Annotation based configuration for Servlet 3.0 containers [thus no web.xml] and also shows corresponding XML based Security configuration for side-by-side comparison where applicable.

1. Update pom.xml to include required dependencies

```
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
	<modelVersion>4.0.0</modelVersion>

	<groupId>com.york.springsecurity</groupId>
	<artifactId>SpringSecurityHelloWorldAnnotationExample</artifactId>
	<version>1.0.0</version>
	<packaging>war</packaging>

	<name>SpringSecurityHelloWorldAnnotationExample</name>

	<properties>
		<springframework.version>4.1.6.RELEASE</springframework.version>
		<springsecurity.version>4.0.1.RELEASE</springsecurity.version>
	</properties>

	<dependencies>
		<!-- Spring -->
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-core</artifactId>
			<version>${springframework.version}</version>
		</dependency>
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-web</artifactId>
			<version>${springframework.version}</version>
		</dependency>
		<dependency>
			<groupId>org.springframework</groupId>
			<artifactId>spring-webmvc</artifactId>
			<version>${springframework.version}</version>
		</dependency>

		<!-- Spring Security -->
		<dependency>
			<groupId>org.springframework.security</groupId>
			<artifactId>spring-security-web</artifactId>
			<version>${springsecurity.version}</version>
		</dependency>
		<dependency>
			<groupId>org.springframework.security</groupId>
			<artifactId>spring-security-config</artifactId>
			<version>${springsecurity.version}</version>
		</dependency>

		<dependency>
			<groupId>javax.servlet</groupId>
			<artifactId>javax.servlet-api</artifactId>
			<version>3.1.0</version>
			</dependency>
			<dependency>
				<groupId>javax.servlet.jsp</groupId>
				<artifactId>javax.servlet.jsp-api</artifactId>
				<version>2.3.1</version>
			</dependency>
			<dependency>
				<groupId>javax.servlet</groupId>
				<artifactId>jstl</artifactId>
				<version>1.2</version>
			</dependency>
		</dependencies>

		<build>
			<pluginManagement>
				<plugins>
					<plugin>
						<groupId>org.apache.maven.plugins</groupId>
						<artifactId>maven-war-plugin</artifactId>
						<version>2.4</version>
						<configuration>
							<warSourceDirectory>src/main/webapp</warSourceDirectory>

		<warName>SpringSecurityHelloWorldAnnotationExample</warName>
							<failOnMissingWebXml>false</failOnMissingWebXml>
						</configuration>
					</plugin>
				</plugins>
			</pluginManagement>
			<finalName>SpringSecurityHelloWorldAnnotationExample</finalName>
		</build>
	</project>
```

First thing to notice here is the `maven-war-plugin` declaration. As we are using full annotation configuration, **we don't even use web.xml**, so we will need to configure this plugin in order to avoid maven failure to build war package. We are using latest versions(at time of writing) of Spring and Spring Security.
Along with that, we have also included JSP/Servlet/Jstl dependencies which we will be needing as we are going to use servlet api's and jstl view in our code. In general, containers might already contains these libraries, so we can set the scope as 'provided' for them in pom.xml.

2. Add Spring Security Configuration Class

The first and foremost step to add spring security in our application is to create **Spring Security Java Configuration**. This configuration creates a Servlet Filter known as the `springSecurityFilterChain` which is responsible for all the security (protecting the application URLs, validating submitted username and passwords, redirecting to the log in form, etc) within our application.

```
package com.york.springsecurity.configuration;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.context.annotation.Configuration;
import
org.springframework.security.config.annotation.authentication.builders.AuthenticationMana
gerBuilder;
import org.springframework.security.config.annotation.web.builders.HttpSecurity;
import org.springframework.security.config.annotation.web.configuration.EnableWebSecurity;
import
org.springframework.security.config.annotation.web.configuration.WebSecurityConfigurerAda
pter;
```

```
@Configuration
@EnableWebSecurity
public class SecurityConfiguration extends WebSecurityConfigurerAdapter {

    @Autowired
    public void configureGlobalSecurity(AuthenticationManagerBuilder auth) throws Exception
{
        auth.inMemoryAuthentication().withUser("bill").password("abc123").roles("USER");
        auth.inMemoryAuthentication().withUser("admin").password("root123").roles("ADMIN"
);
        auth.inMemoryAuthentication().withUser("dba").password("root123").roles("ADMIN","
DBA");//dba have two roles.
    }

    @Override
    protected void configure(HttpSecurity http) throws Exception {

      http.authorizeRequests()
        .antMatchers("/", "/home").permitAll()
        .antMatchers("/admin/**").access("hasRole('ADMIN')")
        .antMatchers("/db/**").access("hasRole('ADMIN') and hasRole('DBA')")
        .and().formLogin()
        .and().exceptionHandling().accessDeniedPage("/Access_Denied");

    }
}
```

Method configureGlobalSecurity in above class configures `AuthenticationManagerBuilder` with user credentials and allowed roles. This AuthenticationManagerBuilder creates `AuthenticationManager` which is responsible for processing any authentication request. Notice that in above example, we have used in-memory authentication while you are free to choose from JDBC, LDAP and other authentications.

The overridden Method `Configure` configures `HttpSecurity` which allows configuring web based security for specific http requests. By default it will be applied to all requests, but can be restricted using requestMatcher(RequestMatcher)/antMathchers or other similar methods.

In above configuration, we say that URL's '/' & '/home' are not secured, anyone can access them. URL '/admin/**' can only be accessed by someone who have ADMIN role. URL '/db/**' can only be accessed by someone who have both ADMIN and DBA roles.

Method `formLogin` provides support for form based authentication and will generate a default form asking for user credentials. You are allowed to configure your own login form.We will see examples for the same in subsequent posts.

We have also used `exceptionHandling().accessDeniedPage()` which in this case will catch all 403 [http access denied] exceptions and display our user defined page instead of showing default HTTP 403 page [which is not so helpful anyway].

Above security configuration in XML configuration format would be:

```
<beans:beans xmlns="http://www.springframework.org/schema/security"
    xmlns:beans="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-4.1.xsd
```

```
    http://www.springframework.org/schema/security
http://www.springframework.org/schema/security/spring-security-4.0.xsd">

    <http auto-config="true" >
        <intercept-url pattern="/" access="permitAll" />
        <intercept-url pattern="/home" access="permitAll" />
        <intercept-url pattern="/admin**" access="hasRole('ADMIN')" />
        <intercept-url pattern="/dba**" access="hasRole('ADMIN') and hasRole('DBA')" />
        <form-login authentication-failure-url="/Access_Denied" />
    </http>

    <authentication-manager >
        <authentication-provider>
            <user-service>
                <user name="bill"  password="abc123"  authorities="ROLE_USER" />
                <user name="admin" password="root123" authorities="ROLE_ADMIN" />
                <user name="dba"  password="root123" authorities="ROLE_ADMIN,ROLE_DBA" />
            </user-service>
        </authentication-provider>
    </authentication-manager>


</beans:beans>
```

3. Register the springSecurityFilter with war

Below specified initializer class registers the `springSecurityFilter` [created in Step 3] with application war.

```
com.york.springsecurity.configuration.SecurityWebApplicationInitializer
package com.york.springsecurity.configuration;

import org.springframework.security.web.context.AbstractSecurityWebApplicationInitializer;

public class SecurityWebApplicationInitializer extends
AbstractSecurityWebApplicationInitializer {

}
```

Above setup in XML configuration format would be:

```
<filter>
    <filter-name>springSecurityFilterChain</filter-name>
    <filter-class>org.springframework.web.filter.DelegatingFilterProxy</filter-class>
</filter>

<filter-mapping>
    <filter-name>springSecurityFilterChain</filter-name>
    <url-pattern>/*</url-pattern>
</filter-mapping>
```

4. Add Controller

```
com.york.springsecurity.controller.HelloWorldController
package com.york.springsecurity.controller;
```

```
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

import org.springframework.security.core.Authentication;
import org.springframework.security.core.context.SecurityContextHolder;
import org.springframework.security.core.userdetails.UserDetails;
import
org.springframework.security.web.authentication.logout.SecurityContextLogoutHandler;
import org.springframework.stereotype.Controller;
import org.springframework.ui.ModelMap;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestMethod;

@Controller
public class HelloWorldController {



    @RequestMapping(value = { "/", "/home" }, method = RequestMethod.GET)
    public String homePage(ModelMap model) {
        model.addAttribute("greeting", "Hi, Welcome to mysite. ");
        return "welcome";
    }

    @RequestMapping(value = "/admin", method = RequestMethod.GET)
    public String adminPage(ModelMap model) {
        model.addAttribute("user", getPrincipal());
        return "admin";
    }

    @RequestMapping(value = "/db", method = RequestMethod.GET)
    public String dbaPage(ModelMap model) {
        model.addAttribute("user", getPrincipal());
        return "dba";
    }

    @RequestMapping(value="/logout", method = RequestMethod.GET)
       public String logoutPage (HttpServletRequest request, HttpServletResponse response)
{
          Authentication auth = SecurityContextHolder.getContext().getAuthentication();
          if (auth != null){
             new SecurityContextLogoutHandler().logout(request, response, auth);
          }
          return "welcome";
       }

    @RequestMapping(value = "/Access_Denied", method = RequestMethod.GET)
    public String accessDeniedPage(ModelMap model) {
        model.addAttribute("user", getPrincipal());
        return "accessDenied";
    }

    private String getPrincipal(){
        String userName = null;
        Object principal =
SecurityContextHolder.getContext().getAuthentication().getPrincipal();

        if (principal instanceof UserDetails) {
            userName = ((UserDetails)principal).getUsername();
        } else {
            userName = principal.toString();
        }
        return userName;
    }
}
```

Methods in controller class are trivial. Method getPrincipal is a generic function which returns the logged in user name from Spring `SecurityContext`. Method logoutPage handles the logging out with a simple call to **SecurityContextLogoutHandler().logout(request, response, auth);**. It's handy and saves you from putting cryptic logout logic in your JSP's which is not really manageable. You might have noticed that '/login' is missing, it is because it will be generated and handled by default by Spring Security.

5. Add SpringMVC Configuration Class

```
com.york.springsecurity.configuration.HelloWorldConfiguration
package com.york.springsecurity.configuration;

import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.ComponentScan;
import org.springframework.context.annotation.Configuration;
import org.springframework.web.servlet.ViewResolver;
import org.springframework.web.servlet.config.annotation.EnableWebMvc;
import org.springframework.web.servlet.view.InternalResourceViewResolver;
import org.springframework.web.servlet.view.JstlView;

@Configuration
@EnableWebMvc
@ComponentScan(basePackages = "com.york.springsecurity")
public class HelloWorldConfiguration {

    @Bean
    public ViewResolver viewResolver() {
        InternalResourceViewResolver viewResolver = new InternalResourceViewResolver();
        viewResolver.setViewClass(JstlView.class);
        viewResolver.setPrefix("/WEB-INF/views/");
        viewResolver.setSuffix(".jsp");

        return viewResolver;
    }

}
```

6. Add Initializer class

```
com.york.springsecurity.configuration.HelloWorldConfiguration
package com.york.springsecurity.configuration;
```

```
import
org.springframework.web.servlet.support.AbstractAnnotationConfigDispatcherServletInitiali
zer;

public class SpringMvcInitializer extends
AbstractAnnotationConfigDispatcherServletInitializer {

    @Override
    protected Class<?>[] getRootConfigClasses() {
        return new Class[] { HelloWorldConfiguration.class };
    }

    @Override
    protected Class<?>[] getServletConfigClasses() {
        return null;
    }

    @Override
    protected String[] getServletMappings() {
        return new String[] { "/" };
    }

}
```

Notice that above initializer class extends `AbstractAnnotationConfigDispatcherServletInitializer` which is the base class for all `WebApplicationInitializer` implementations. Implementations of WebApplicationInitializer configures ServletContext programatically, for Servlet 3.0 environments. It means we won't be using web.xml and we will deploy the app on Servlet 3.0 container.

7. Add Views

```
welcome.jsp
<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-
8859-1"%>
<html>
<head>
    <meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
    <title>HelloWorld page</title>
</head>
<body>
    Greeting : ${greeting}
    This is a welcome page.
</body>
</html>

admin.jsp
<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-
8859-1"%>
<%@ taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core"%>
<html>
<head>
    <meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
    <title>HelloWorld Admin page</title>
</head>
```

```
<body>
    Dear <strong>${user}</strong>, Welcome to Admin Page.
    <a href="<c:url value="/logout" />">Logout</a>
</body>
</html>
```

```
dba.jsp
<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-
8859-1"%>
<%@ taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core"%>
<html>
<head>
    <meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
    <title>DBA page</title>
</head>
<body>
    Dear <strong>${user}</strong>, Welcome to DBA Page.
    <a href="<c:url value="/logout" />">Logout</a>
</body>
</html>
```

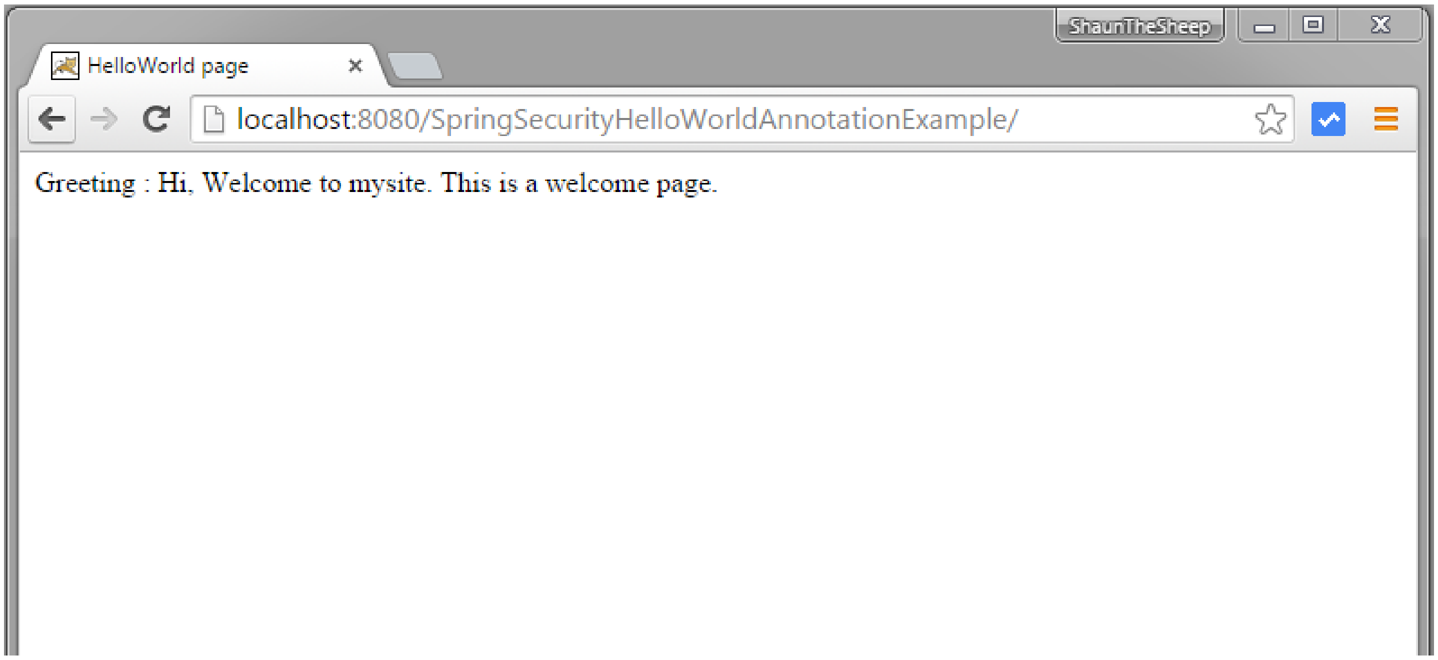
```
accessDenied.jsp
<%@ page language="java" contentType="text/html; charset=ISO-8859-1" pageEncoding="ISO-
8859-1"%>
<%@ taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core"%>
<html>
<head>
    <meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
    <title>AccessDenied page</title>
</head>
<body>
    Dear <strong>${user}</strong>, You are not authorized to access this page
    <a href="<c:url value="/logout" />">Logout</a>
</body>
</html>
```

8. Build and Deploy the application

As mentioned in Step 7, we are not using web.xml in our application as the ServletContext is loaded programmatically.

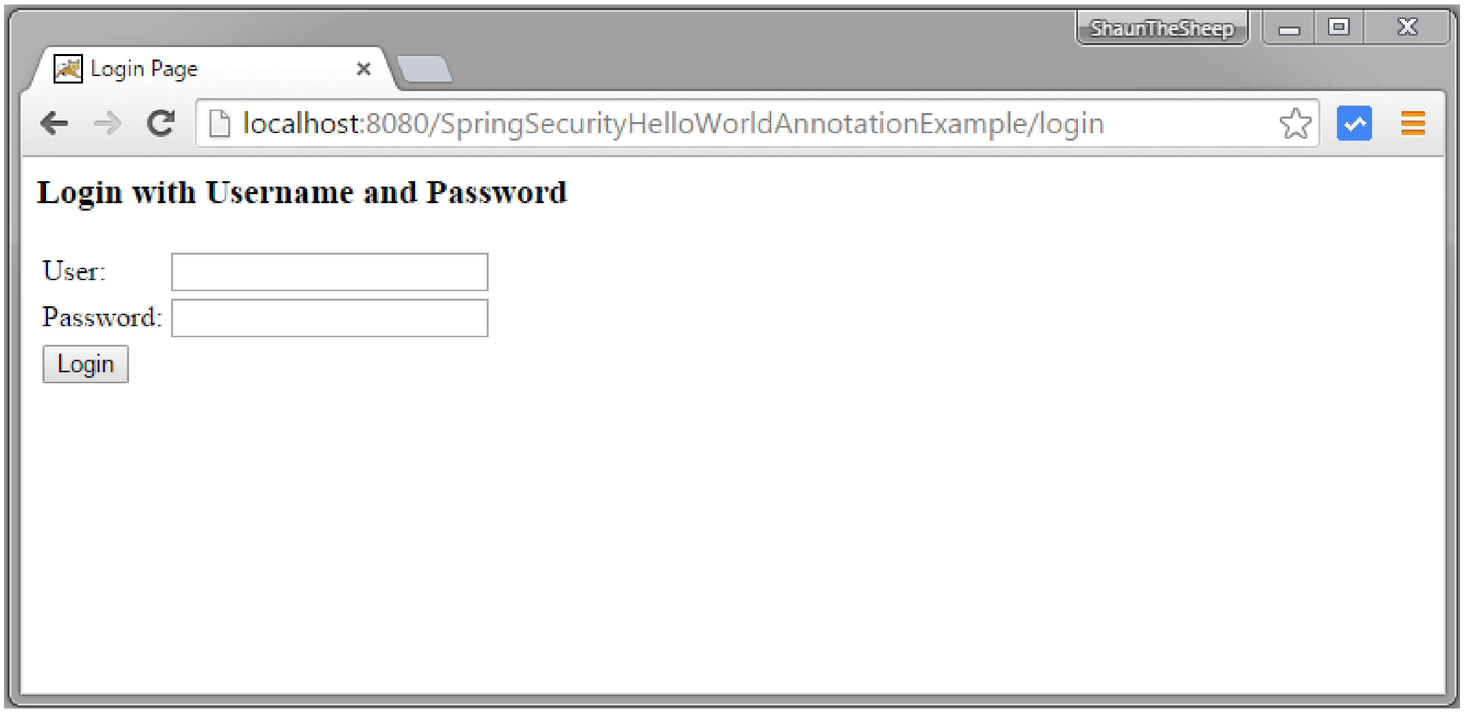
Now build the war (either by eclipse/m2eclipse) or via maven command line(`mvn clean install`). Deploy the war to a Servlet 3.0 container . Since here i am using Tomcat, i will simply put this war file into `tomcat webapps folder` and click on `start.bat` inside tomcat bin directory.

Run the application
Open browser and goto **localhost:8080/SpringSecurityHelloWorldAnnotationExample/**



Greeting : Hi, Welcome to mysite. This is a welcome page.

Now try to access admin page on localhost:8080/SpringSecurityHelloWorldAnnotationExample/admin, you will be prompted for login.


ShaunTheSheep
Login Page
localhost:8080/SpringSecurityHelloWorldAnnotationExample/login

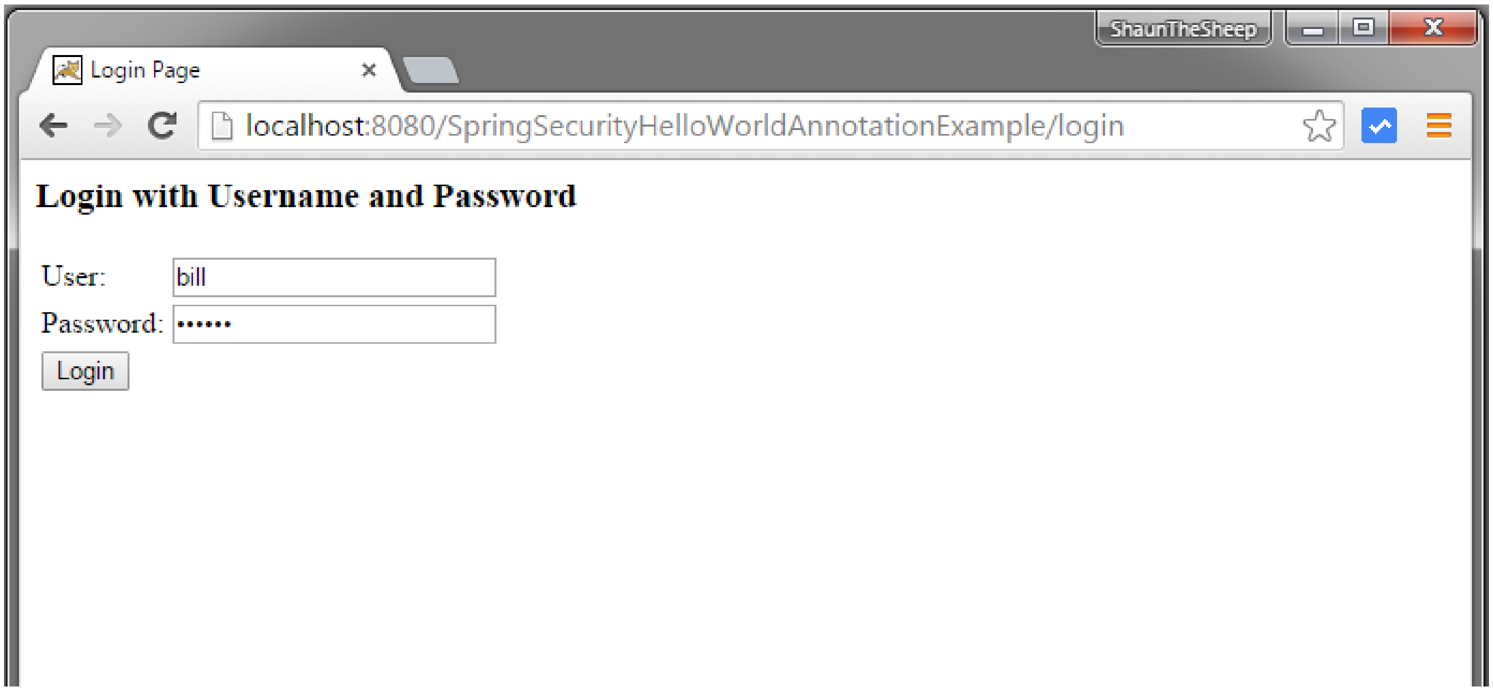
Login with Username and Password

User:

Password:

Login

Provide credentials of a 'USER' role.


ShaunTheSheep
Login Page
localhost:8080/SpringSecurityHelloWorldAnnotationExample/login

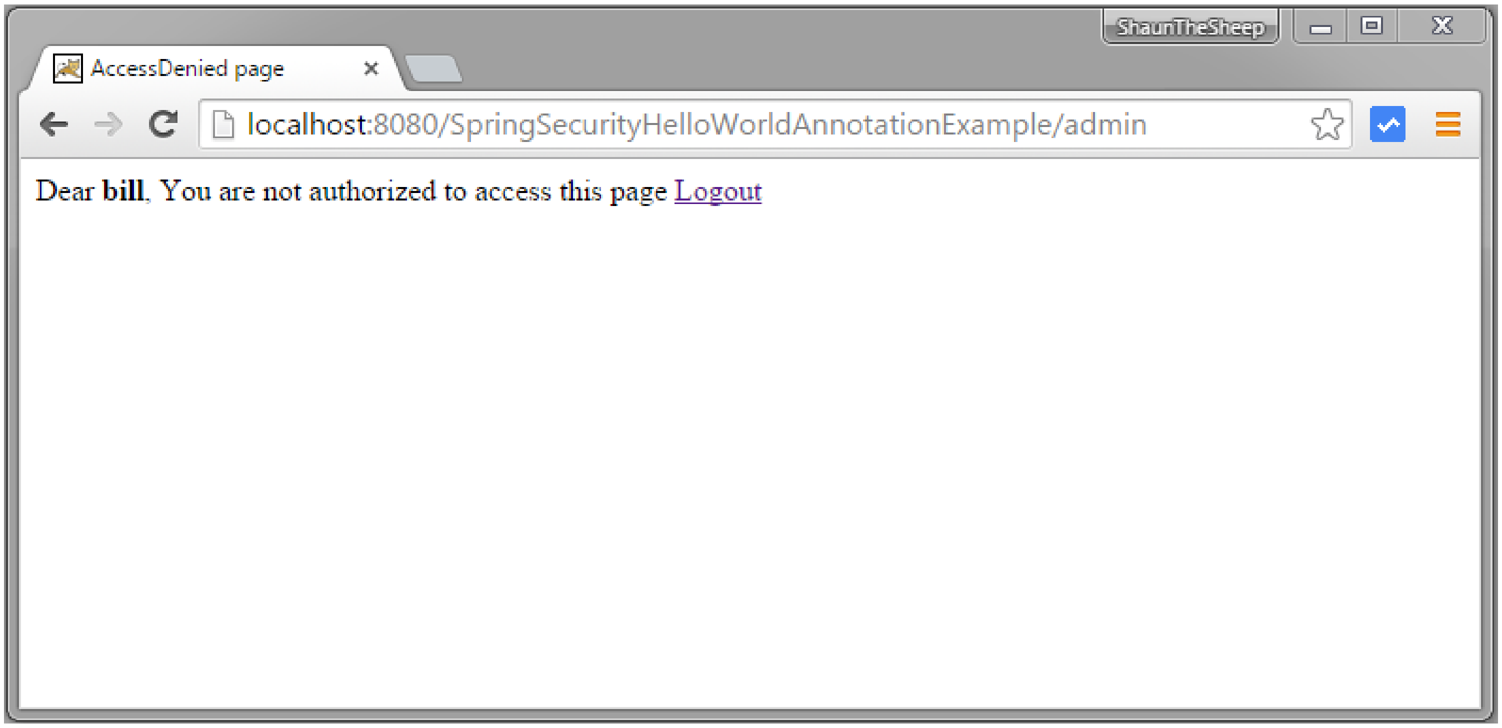
Login with Username and Password

User: bill

Password: ••••••

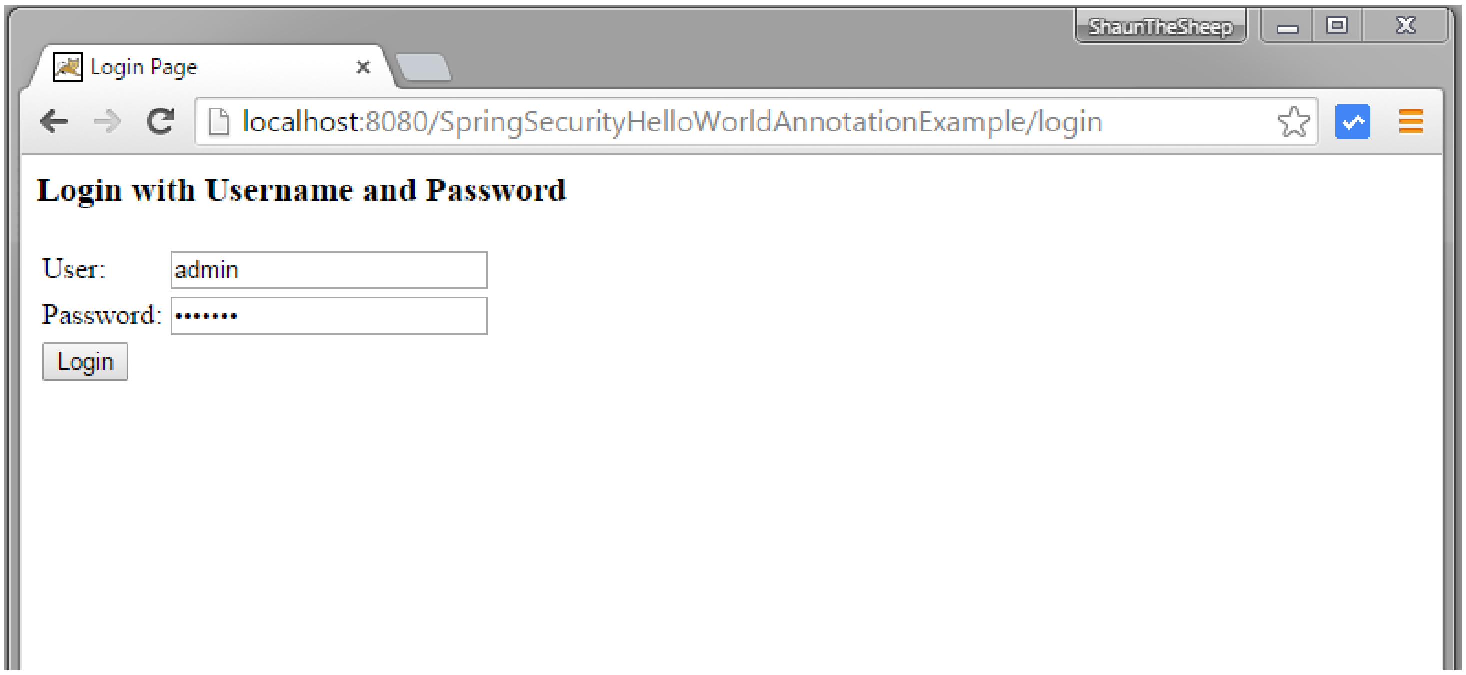
Login

Submit, you will see AccessDenied Page


ShaunTheSheep
AccessDenied page
localhost:8080/SpringSecurityHelloWorldAnnotationExample/admin

Dear **bill**, You are not authorized to access this page Logout

Now logout and try to access admin page again


Login Page

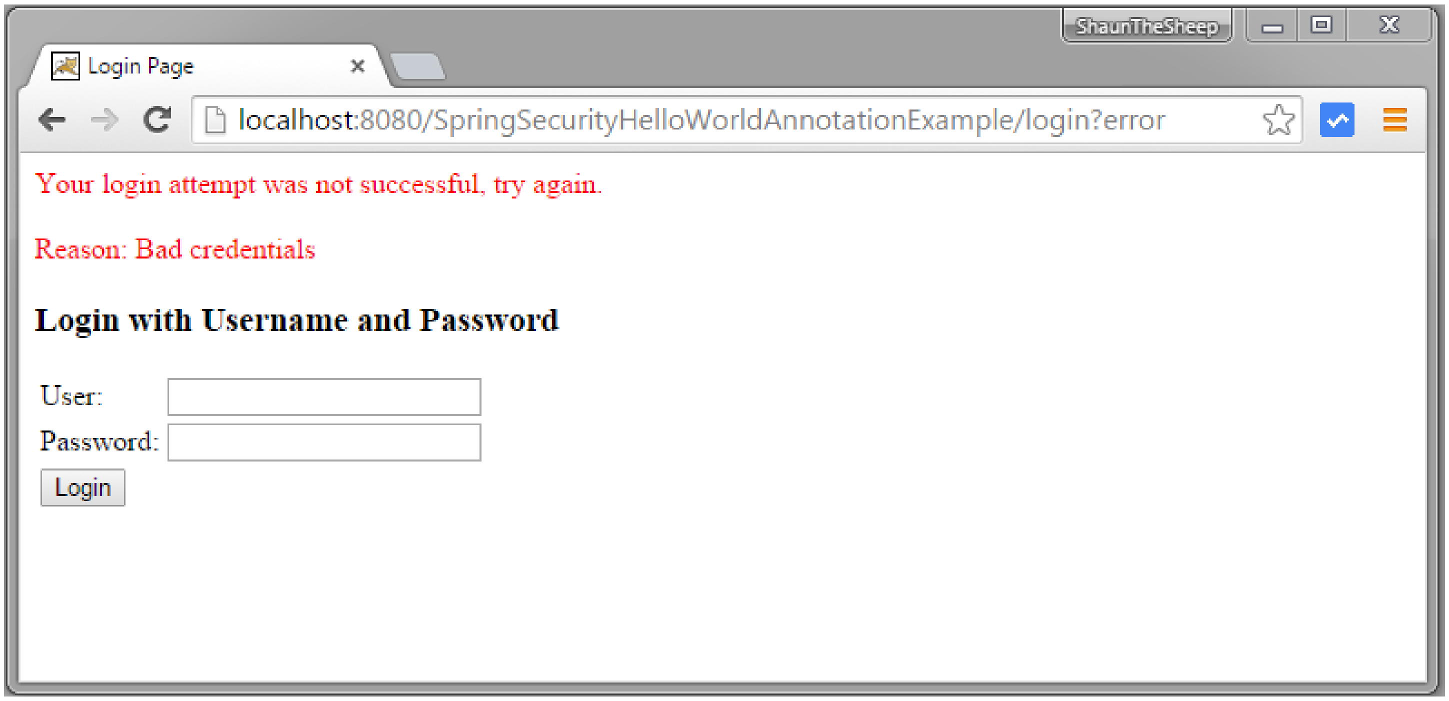
localhost:8080/SpringSecurityHelloWorldAnnotationExample/login

Login with Username and Password

User:	admin
Password:	•••••••

Login

Provide wrong password


Login Page

localhost:8080/SpringSecurityHelloWorldAnnotationExample/login?error

Your login attempt was not successful, try again.

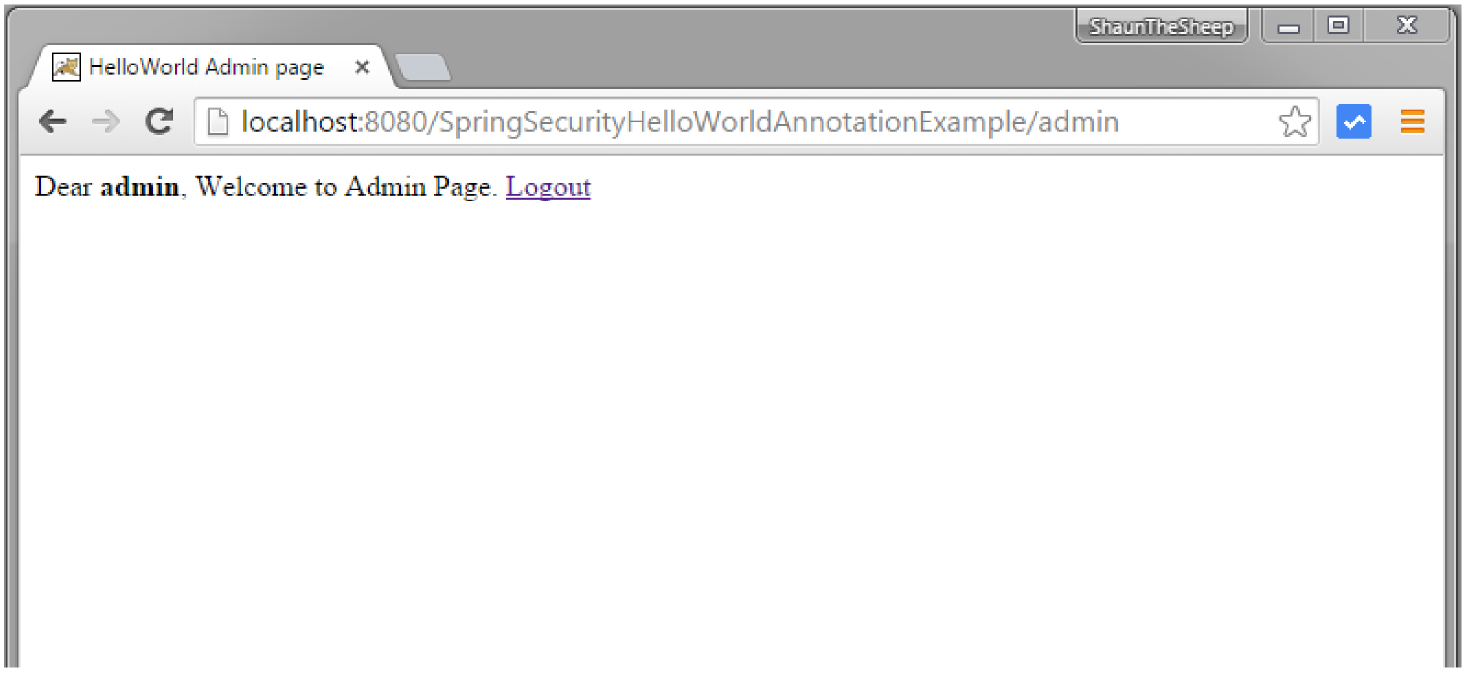
Reason: Bad credentials

Login with Username and Password

User:	
Password:	

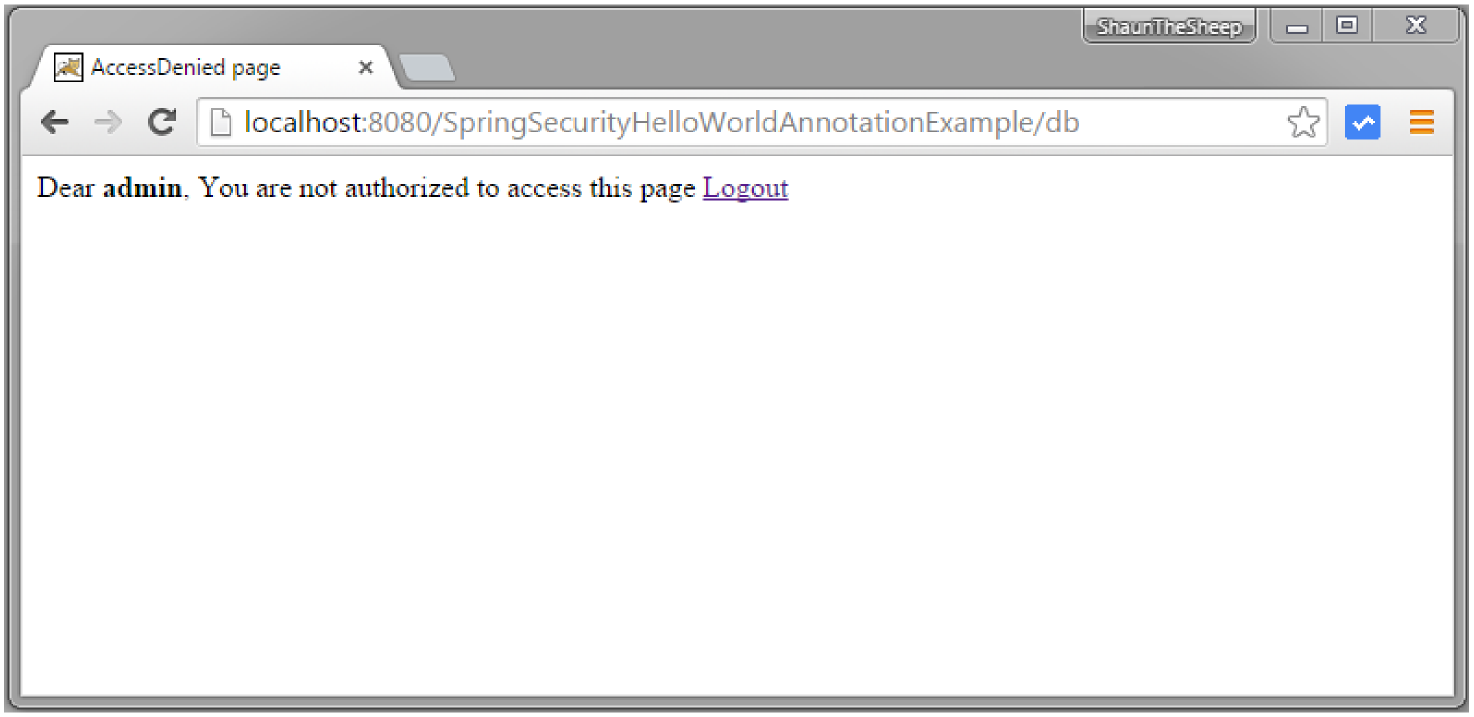
Login

Provide proper admin role credentials and login


ShaunTheSheep
HelloWorld Admin page
localhost:8080/SpringSecurityHelloWorldAnnotationExample/admin

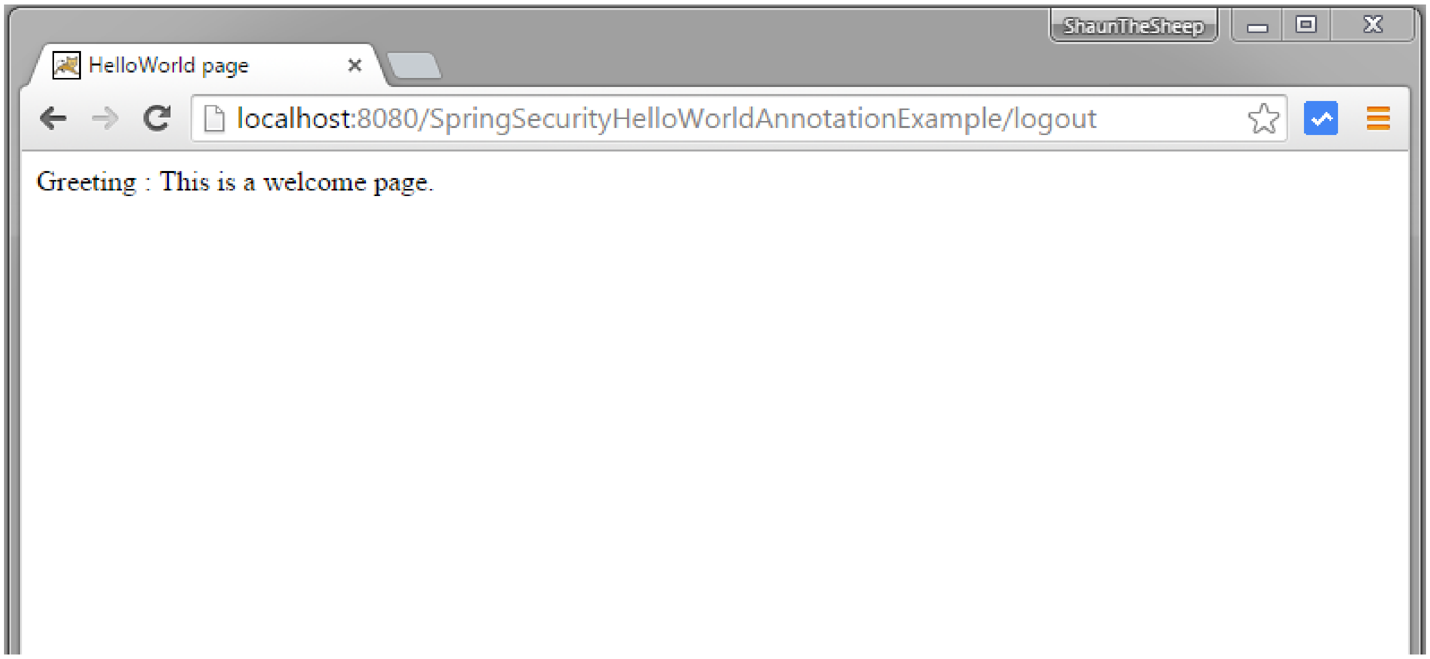
Dear **admin**, Welcome to Admin Page. Logout

Now try to access db page on localhost:8080/SpringSecurityHelloWorldAnnotationExample/db, you will get AccessDenied page.



Dear **admin**, You are not authorized to access this page Logout

Logout, you will be back at home page.



localhost:8080/SpringSecurityHelloWorldAnnotationExample/logout

Greeting : This is a welcome page.