



Spring 5, Hibernate 5, Security 5

Step-By-Step





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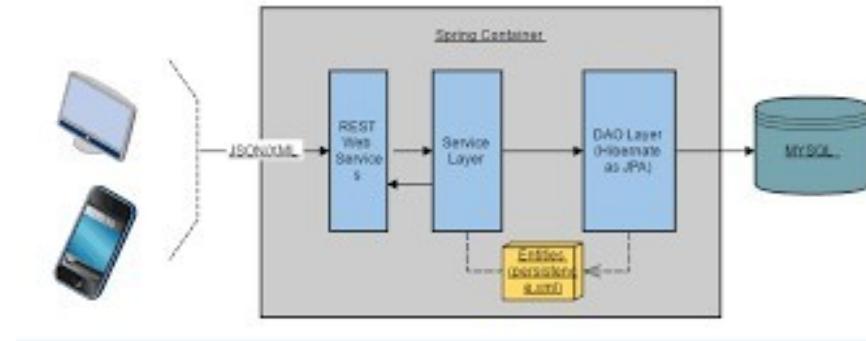
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- ▼ bookappsspringhib
- ▶ Deployment Descriptor: bookappsspringhib
- ▶ JAX-WS Web Services
- ▼ Java Resources
 - ▼ src
 - ▼ com.app.model.controller
 - ▶ BookController.java
 - ▼ com.app.model.dao
 - ▶ Book.java
 - ▶ BookDao.java
 - ▶ BookDaoImpl.java
 - ▼ com.app.model.service
 - ▶ BookService.java
 - ▶ BookServiceImpl.java
 - ▶ Libraries
 - ▶ JavaScript Resources
 - ▶ build
 - ▼ WebContent
 - ▶ META-INF
 - ▼ WEB-INF
 - ▶ lib
 - ▶ views
 - fc-configuration.xml



book isbn book title book author book price

1338 c is c@@22 gjhgjh 777.0 [delete](#) [update](#)

[Add new Book](#)

Step 1: DAO, DTO

Dao Layer

```
@Entity  
public class Book {  
    @Id @GeneratedValue(strategy=GenerationType.IDENTITY)  
    private int id;  
    @Column(unique=true, nullable=false)  
    private String isbn;  
    private String title;  
    private Double price;  
    private String author;  
    private String publisher;  
    @Temporal(TemporalType.DATE)  
    private Date pubDate;
```

```
public interface BookDao {  
    public List<Book> getAll();  
    public Book add(Book book);  
    public Book delete(int bookId);  
    public Book update(Book book);  
    public Book getBookById(int bookId);  
    public Book getBookByIsbn(String isbn);  
}
```

Daolmpl

```
1  package com.journaldev.hibernate;
2
3  import org.hibernate.SessionFactory;
4  import org.springframework.orm.hibernate3.HibernateTemplate;
5  import org.springframework.stereotype.Repository;
6
7  @Repository
8  public class BookDaoImpl implements BookDao {
9
10     @Autowired
11     private SessionFactory factory;
12
13     private Session getSession(){
14         return factory.getCurrentSession();
15     }
16
17     @Override
18     public List<Book> getAll() {
19         return getSession().createQuery("from Book").list();
20     }
21
22     @Override
23     public Book add(Book book) {
24         getSession().save(book);
25         return book;
26     }
27
28     @Override
29     public Book delete(int bookId) {
30         Book book=getBookById(bookId);
31         if(book!=null)
32             getSession().delete(book);
33         return book;
34     }
35 }
```

Daolmpl

```
@Override  
public Book update(Book book) {  
    getSession().merge(book);  
    return book;  
}  
  
@Override  
public Book getBookById(int bookId) {  
    return (Book) getSession().get(Book.class, bookId);  
}  
  
@Override  
public Book getBookByIsbn(String isbn) {  
    return null;  
}
```

Step 2: Service layer

Service Layer

```
public interface BookService {  
    public List<Book> getAll();  
    public Book add(Book book);  
    public Book delete(int bookId);  
    public Book update(Book book);  
    public Book getBookById(int bookId);  
    public Book getBookByIsbn(String isbn);  
}
```

```
1  import java.util.List;  
11 @Service(value="bs")  
12 @Transactional  
13 public class BookServiceImpl implements BookService{  
14  
15     @Autowired  
16     private BookDao dao;  
17     @Override  
18     public List<Book> getAll() {  
19         return dao.getAll();  
20     }  
21  
22     @Override  
23     public Book add(Book book) {  
24         return dao.add(book);  
25     }  
26  
27     @Override
```

Step 3: Applying AOP

Introduction to AOP

➤ What is AOP?

- AOP is a style of programming, mainly good in separating cross cutting concerns

➤ How AOP works?

- Achieved usages Proxy design Pattern to separate CCC's form actual code

- Cross Cutting Concern ?

➤ Extra code mixed with the actual code is called CCC's Extra code

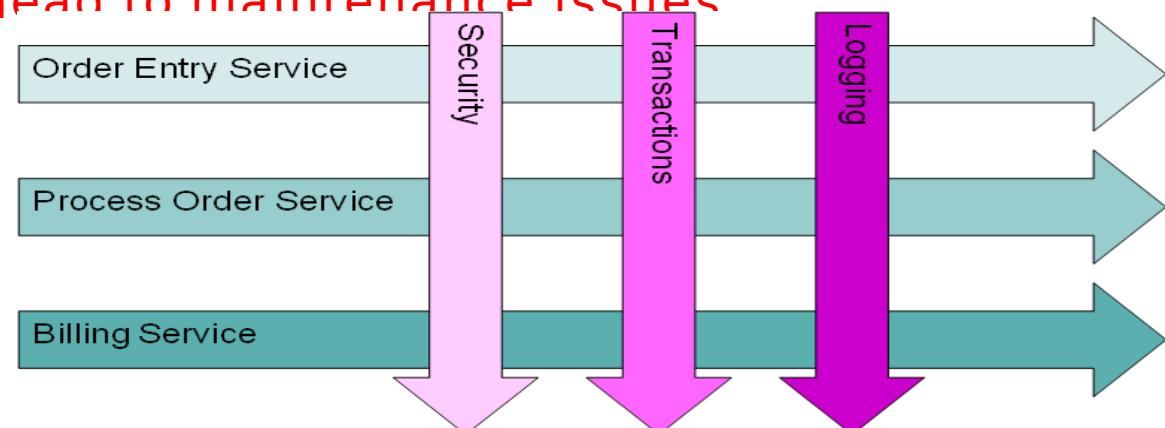
➤ mixed with code lead to maintenance issues

➤ **Logging**

➤ **validations**

➤ **Auditing**

➤ **Security**



Normal Java Class

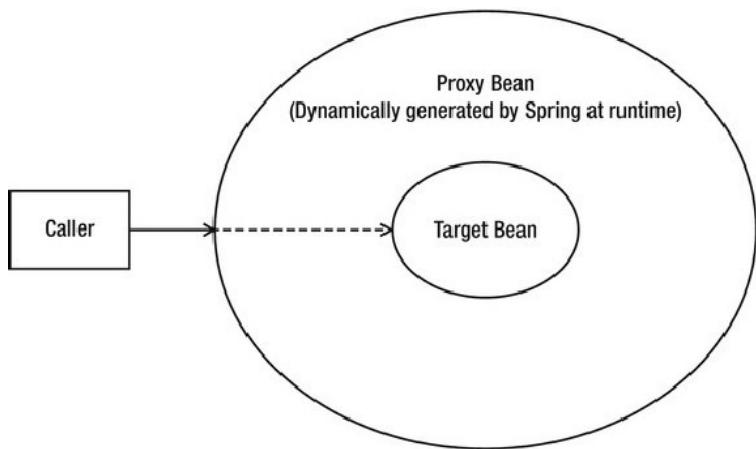
```
class Account {  
    public void withdraw() {  
        // Withdraw Logic  
        // Authentication  
        // Logging  
        // Transaction  
    }  
  
    public void deposit() {  
        // Deposit Logic  
        // Authentication  
        // Logging  
        // Transaction  
    }  
}
```

Spring AOP

```
class Account {  
    public void withdraw() {  
        // Withdraw Logic  
    }  
  
    public void deposit() {  
        // deposit Logic  
    }  
}
```



Proxy Bean
(Dynamically generated by Spring at runtime)



AOP - Definitions

- **Advice** defines what needs to be applied and when.
- **Jointpoint** is where the advice is applied.
- **Pointcut** is the combination of different joinpoints where the advice needs to be applied.
- **Aspect** is applying the Advice at the pointcuts.



Step 4: Spring Hibernate Configuration

Configuration

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:aop="http://www.springframework.org/schema/aop"
       xmlns:context="http://www.springframework.org/schema/context" xmlns:tx="http://www.springframework.org/schema/tx"
       xsi:schemaLocation="http://www.springframework.org/schema/beans http://www.springframework.org/schema/beans/spring-
                           beans.xsd
                           http://www.springframework.org/schema/context http://www.springframework.org/schema/context/spring-context-
                           .xsd
                           http://www.springframework.org/schema/aop http://www.springframework.org/schema/aop/spring-aop-4.0.xsd
                           http://www.springframework.org/schema/tx http://www.springframework.org/schema/tx/spring-tx-4.0.xsd">

    <context:annotation-config />
    <context:component-scan base-package="com.iris.bookapp"></context:component-scan>
    <bean id="dataSource"
          class="org.springframework.jdbc.datasource.DriverManagerDataSource">
        <property name="url" value="jdbc:mysql://localhost:3306/iris2" />
        <property name="driverClassName" value="com.mysql.jdbc.Driver" />
        <property name="username" value="root" />
        <property name="password" value="root" />
    </bean>
    <bean id="sessionFactory"
          class="org.springframework.orm.hibernate4.LocalSessionFactoryBean">
        <property name="dataSource" ref="dataSource" />
        <property name="packagesToScan">
            <list>
                <value>com.iris.bookapp.model.persistance</value>
            </list>
        </property>
        <property name="hibernateProperties">
            <props>
                <prop key="hibernate.hbm2ddl.auto">update</prop>
                <prop key="hibernate.dialect">org.hibernate.dialect.MySQLDialect</prop>
            </props>
        </property>
    </bean>

```

Data source configuration

Hibernate session factory configuration

Driver:
1 driver=com.mysql.cj.jdbc.Driver
2 url=jdbc:mysql://localhost:3306/iris2?useSSL=false
3 username=root
4 password=root

Configuration

```
1b      <property name="username" value="root" />
17      <property name="password" value="root" />
18  </bean>
19<bean id="sessionFactory"
20  class="org.springframework.orm.hibernate4.LocalSessionFactoryBean">
21  <property name="dataSource" ref="dataSource" />
22  <property name="packagesToScan">
23    <list>
24      <value>com.iris.bookapp.model.persistanc</value>
25    </list>
26  </property>
27  <property name="hibernateProperties">
28    <props>
29      <prop key="hibernate.hbm2ddl.auto">update</prop>
30      <prop key="hibernate.dialect">org.hibernate.dialect.MySQLDialect</prop>
31      <prop key="hibernate.show_sql">true</prop>
32      <prop key="hibernate.format_sql">true</prop>
33    </props>
34  </property>
35</bean>
36<bean class="org.springframework.dao.annotation.PersistenceExceptionTranslationPostProcessor" />
37<bean id="transactionManager"
38  class="org.springframework.orm.hibernate4.HibernateTransactionManager">
39  <property name="sessionFactory" ref="sessionFactory"></property>
40</bean>
41
42<tx:annotation-driven transaction-manager="transactionManager" />
43
44</beans>
```

Hibernate factory configuration

Exception translation

Configuration of hibernate tx manager

asking spring for declarative tx

Testing

```
1 public class Tester {  
2  
3     public static void main(String[] args) {  
4  
5         ApplicationContext ctx=new ClassPathXmlApplicationContext("beans.xml") ;  
6         BookService bs=ctx.getBean("bs", BookService.class);  
7  
8         /*List<Book> allBooks=bs.getAll();  
9         for(Book temp: allBooks){  
0             System.out.println(temp);  
1         }*/  
2         Book book=new Book("454", "a" , "b", 99.0, new Date());  
3         try{  
4             bs.add(book);  
5         }catch(DataAccessException ex){  
6             System.out.println("handled...");  
7         }  
8     }  
9  
0 }
```

Step 5: Spring Hibernate Java Configuration

```
@Configuration
@ComponentScan(basePackages={"com.bookapp"})
@EnableAspectJAutoProxy
@PropertySource(value="db.properties")
@EnableTransactionManagement
public class ModelConfig {

    @Autowired
    private Environment environment;

    @Bean(name="dataSource")
    public DataSource getDataSource(){
        DriverManagerDataSource ds=new DriverManagerDataSource();
        ds.setDriverClassName(environment.getProperty("driver"));
        ds.setUrl(environment.getProperty("url"));
        ds.setUsername(environment.getProperty("username"));
        ds.setPassword(environment.getProperty("password"));
        return ds;
    }

    @Bean
    public LocalSessionFactoryBean getSessionFactory(){
        LocalSessionFactoryBean sf=new LocalSessionFactoryBean();
        sf.setDataSource(getDataSource());
        sf.setPackagesToScan("com.bookapp.model.persistanc");
        sf.setHibernateProperties(getHibernateProperties());
        return sf;
    }
}
```

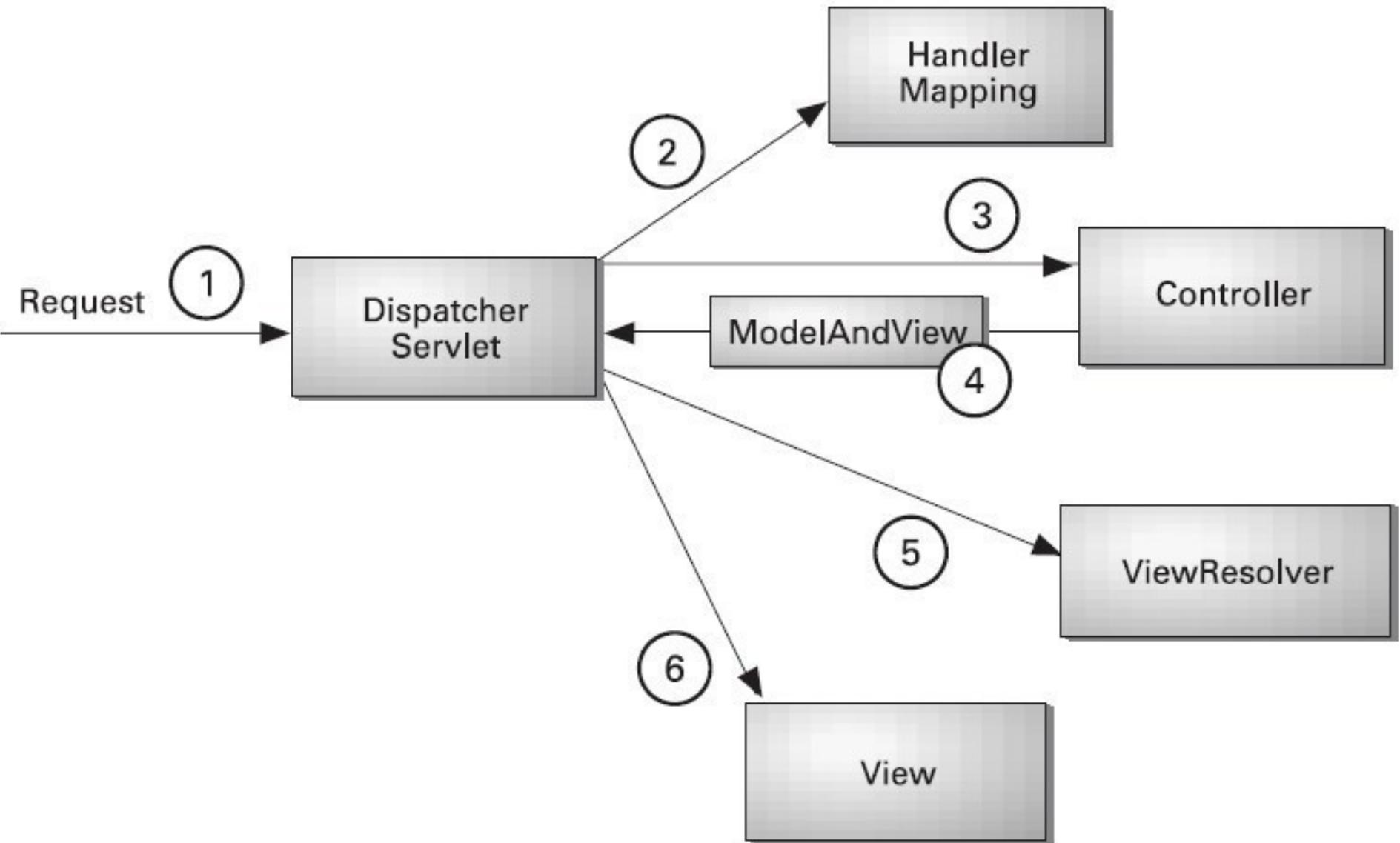
```
    public Properties getHibernateProperties() {
        Properties properties=new Properties();
        properties.setProperty("hibernate.hbm2ddl.auto", "validate");
        properties.setProperty("hibernate.dialect", "org.hibernate.dialect.MySQLDialect");
        properties.setProperty("hibernate.show_sql", "true");
        properties.setProperty("hibernate.formatted_sql", "true");
        return properties;
    }

    @Bean
    public PersistenceExceptionTranslationPostProcessor
    getPersistenceExceptionTranslationPostProcessor(){
        PersistenceExceptionTranslationPostProcessor ps=
            new PersistenceExceptionTranslationPostProcessor();
        return ps;
    }

    @Bean(name="transactionManager")
    //@Autowired
    public HibernateTransactionManager getHibernateTransactionManager(SessionFactory factory){
        HibernateTransactionManager tm=new HibernateTransactionManager();
        tm.setSessionFactory(factory);
        return tm;
    }
}
```

Step 6: Spring MVC

basics



Hello world controller

```
create hello world controller
```

```
@Controller
@RequestMapping("/")
public class HelloWorldController {

    @RequestMapping(method = RequestMethod.GET)
    public String sayHello(ModelMap model) {
        model.addAttribute("greeting", "Hello World from Spring 4 MVC");
        return "welcome";
    }

    @RequestMapping(value="/helloagain", method = RequestMethod.GET)
    public String sayHelloAgain(ModelMap model) {
        model.addAttribute("greeting", "Hello World Again, from Spring 4 MVC");
        return "welcome";
    }
}
```

Web layer configuration

```
<mvc:annotation-driven />
<context:component-scan base-package="com" />

<!-- CONFIG INTERNAL RESO BEAN RESOLVER -->
<bean
    class="org.springframework.web.servlet.view.InternalResourceViewResolver">
    <property name="prefix">
        <value>/WEB-INF/views/</value>
    </property>
    <property name="suffix">
        <value>.jsp</value>
    </property>
</bean>
```

Front Controller Configuration

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns="http://java.sun.com/xml/ns/javaee"
    xsi:schemaLocation="http://java.sun.com/xml/ns/javaee http://java.sun.com/xml/ns/javaee/web-app_3_0.x
    version="3.0">
    <display-name>app</display-name>

    <servlet>
        <servlet-name>fc</servlet-name>
        <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
        <init-param>
            <param-name>contextConfigLocation</param-name>
            <param-value>/WEB-INF/fc-configuration.xml</param-value>
        </init-param>
    </servlet>
    <servlet-mapping>
        <servlet-name>fc</servlet-name>
        <url-pattern>/</url-pattern>
    </servlet-mapping>
</web-app>
```

```
@PathVariable vs @RequestParam  
-----  
http://localhost:8080/app-01-spring/hello/delete/22  
-----  
@Controller  
@RequestMapping(value="/hello/*")  
public class Hello2Controller {  
  
    @RequestMapping(value="/delete/{sid}", method=RequestMethod.GET)  
    public String sayHello(@PathVariable ("sid")int s){  
        Foo foo=new Foo();  
        System.out.println(s);  
        return "hello";  
    }  
}  
-----  
foo?un=raj&pw=raj  
-----  
@Controller  
@RequestMapping("/foo")  
public class AnotherController {  
    @RequestMapping(method=RequestMethod.GET)  
    public void foo(@RequestParam("un")String un, @RequestParam("pw")String pw){  
        System.out.println("un"+un);  
        System.out.println("pw"+pw);  
    }  
}
```

ContextLoaderListner

=> Use ContextLoaderListener (aka ServletContextListner) that can load some extra configuration files for you!

```
<context-param>
    <param-name>contextConfigLocation</param-name>
    <param-value>/WEB-INF/otherContext.xml</param-value>
</context-param>

<listener>
    <listener-class>
        org.springframework.web.context.ContextLoaderListener
    </listener-class>
</listener>
```

=> NOW WE CAN DEFINE OUR MODEL AND SERVICE LAYER RELATED BEANS IN otherContext.xml

Step 7: Spring MVC java configuration

```
    @Configuration // replacement of xml file, telling spring it is configuration file
    @ComponentScan(basePackages={"com"})
    @EnableWebMvc
    public class AppConfig extends WebMvcConfigurerAdapter{

        @Bean
        public InternalResourceViewResolver getInternalResourceViewResolver() {
            InternalResourceViewResolver resolver = new InternalResourceViewResolver();
            resolver.setPrefix("/WEB-INF/pages/");
            resolver.setSuffix(".jsp");
            return resolver;
        }

        @Override
        public void addResourceHandlers(ResourceHandlerRegistry registry) {
            // Don't forget the ending "/" for location or you will hit 404.
            registry.addResourceHandler("/resources/**").addResourceLocations("/resources/");
        }
    }
```

```
public class WebInitializer extends
    AbstractAnnotationConfigDispatcherServletInitializer {

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

        return new Class[]{AppConfig.class};
    }

    @Override
    protected String[] getServletMappings() {

        return new String[]{"/"};
    }
}

}

//Configuration for error handling
@Override
protected FrameworkServlet createDispatcherServlet(
    WebApplicationContext servletAppContext) {
    DispatcherServlet ds=new DispatcherServlet(servletAppContext);
    ds.setThrowExceptionIfNoHandlerFound(true);
    return ds;
}
```

Step 8: Spring MVC CRUD

```
1  @Controller
2  public class BookController {
3
4      @Autowired
5      private BookService bookService;
6
7
8      @RequestMapping(value="showallbooks", method=RequestMethod.GET)
9      public String showAllBooks(ModelMap map){
10          map.addAttribute("books", bookService.getAllBooks());
11          return "showallbooks";
12      }
13
14
15      @RequestMapping(value="addbook", method=RequestMethod.GET)
16      public String showBookForm(ModelMap map){
17          map.addAttribute("book", new Book());
18          return "addbook";
19      }
20
21
22      @RequestMapping(value="updatebook", method=RequestMethod.GET)
23      public String updateBook(ModelMap map, HttpServletRequest request){
24          int id=Integer.parseInt(request.getParameter("id"));
25          Book book=bookService.getBookById(id);
26          map.addAttribute("book", book);
27          return "addbook";
28      }
29
30  }
```

```
@RequestMapping(value="deletebook", method=RequestMethod.GET)
public String deleteBook(HttpServletRequest request){
    int id=Integer.parseInt(request.getParameter("id"));

    bookService.removeBook(id);
    return "redirect:/showallbooks";
}
//@valid must ==>BindingResult
@RequestMapping(value="addbook", method=RequestMethod.POST)
public String saveBook( @ModelAttribute(value="book") @Valid Book book, ModelMap map,
        BindingResult bindingResult ){
    if(bindingResult.hasErrors()){
        return "addbook";
    }else{
        if(book.getId()==0)
            bookService.addBook(book);
        else
            bookService.updateBook(book);
        return "redirect:/showallbooks";
    }
}
```

Display All Books

```
<body>
    <div class="container">
        <h1>Hello World!</h1>
        <div class="row">
            <div class="col-sm-8">
                <table class="table table-striped">
                    <thead>
                        <tr>
                            <th>id</th>
                            <th>isbn</th>
                            <th>title</th>
                            <th>author</th>
                            <th>price</th>
                            <th>pubDate</th>
                            <th>publisher</th>
                        </tr>
                    </thead>
                    <tbody>
                        <c:forEach var="book" items="${books}">
                            <tr>
                                <td><c:out value="${book.id }" /></td>
                                <td><c:out value="${book.isbn }" /></td>
                                <td><c:out value="${book.title }" /></td>
                                <td><c:out value="${book.author }" /></td>
                                <td><c:out value="${book.price }" /></td>
                                <td><fmt:formatDate pattern="dd/MM/yyyy" value="${book.pubDate }" /></td>
                                <td><c:out value="${book.publisher }" /></td>
                                <td><a href="update?id=<c:out value="${book.id }" />">update</a>
                                <td>
                                    <td><a href="delete?id=<c:out value="${book.id }" />">delete</a>
                                <td>
                            </tr>
                        </c:forEach>
                    </tbody>
                </table>
                <a href="addbook">add book</a>
            </div>
        </div>
    </div>
```

Add/ Edit a Book

```
1<head>
2  <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
3  <title>Add/Update Book</title>
4  <style>
5    .error {
6      color: #EF1313;
7      font-style: italic;
8    }
9  </style>
10 </head>
11 <body>
12 <form:form action="addbook" method="post" modelAttribute="book">
13   <form:hidden path="id"/>
14   Enter book isbn:<form:input path="isbn"/><form:errors path="isbn"/><br/>
15   Enter book title:<form:input path="title"/><form:errors path="title" /><br/>
16   Enter book author:<form:input path="author"/><form:errors path="author"/><br/>
17   Enter book publisher:<form:select path="publisher" items="${publishers }" /><form:errors path="publish
18   Enter pub date:<form:input path="pubDate"/><form:errors path="pubDate" /><br/>
19   Enter book price:<form:input path="price"/><br/>
20   <input type = "submit"/>
21 </form:form>
22 </body>
23 </html>
```

```
@Controller
public class HelloController {

    @RequestMapping("/welcome/{countryName}/{userName}")
    public ModelAndView helloWorld(@PathVariable Map<String, String> pathVars) {

        String name = pathVars.get("userName");
        String country = pathVars.get("countryName");

        ModelAndView model = new ModelAndView("HelloPage");
        model.addObject("msg", "hello " + name + " You are from " + country);

        return model;
    }

    @RequestMapping("/welcome/countryName/{userName}")
    public ModelAndView helloWorld(@PathVariable("userName") String name) {

        ModelAndView model = new ModelAndView("HelloPage");
        model.addObject("msg", "hello " + name);

        return model;
    }

    @RequestMapping(value = "/submitAdmissionForm.html", method = RequestMethod.POST)
    public ModelAndView submitAdmissionForm(@RequestParam("studentName") String name, @RequestParam("studentHobby") String hobby) {

        ModelAndView model = new ModelAndView("AdmissionSuccess");
        model.addObject("msg", "Details submitted by you:: Name: " + name + ", Hobby: " + hobby);

        return model;
    }
}
```

Step 9: Spring MVC validations

JSR 303 Validation API

- **@NotNull** – validates that the annotated property value is not *null*
- **@AssertTrue** – validates that the annotated property value is *true*
- **@Size** – validates that the annotated property value has a size between the attributes *min* and *max*, can be applied to *String*, *Collection*, *Map*, and array properties
- **@Min** – validates that the annotated property has a value no smaller than the *value* attribute
- **@Max** – validates that the annotated property has a value no larger than the *value* attribute
- **@Email** – validates that the annotated property is a valid email address

- **@NotEmpty** – validates that the property is not null or empty; can be applied to *String*, *Collection*, *Map* or *Array* values
- **@NotBlank** – can be applied only to text values and validate that the property is not null or whitespace
- **@Positive** and **@PositiveOrZero** – apply to numeric values and validate that they are strictly positive, or positive including 0
- **@Negative** and **@NegativeOrZero** – apply to numeric values and validate that they are strictly negative, or negative including 0
- **@Past** and **@PastOrPresent** – validate that a date value is in the past or the past including the present; can be applied to date types including those added in Java 8
- **@Future** and **@FutureOrPresent** – validates that a date value is in the future, or in the future including the present

Entity with validation annotations

```
1  @Entity
2  public class Book {
3      @Id @GeneratedValue(strategy=GenerationType.IDENTITY)
4      private int id;
5      @Column(unique=true, nullable=false)
6      @NotBlank(message="isbn can not be blank")
7      private String isbn;
8      @NotBlank(message="title can not be blank")
9      private String title;
10     @Digits(integer=10, fraction=0, message="price can only be integer")
11     private Double price;
12     @NotBlank(message="author can not be blank")
13     private String author;
14     @NotBlank(message="publisher can not be blank")
15     private String publisher;
16     @NotNull
17     @Past(message="date in dd/mm/yyyy formate must be past date")
18     @DateTimeFormat(pattern = "dd/MM/yyyy")
19     @Temporal(TemporalType.DATE)
20     private Date pubDate;
```

some imp points:

for converting string ==> desire data formate

@DateTimeFormat(pattern = "dd/MM/yyyy")

must use <mvc:annotation-driven

auto populate some field:

*Enter Book Type: <form:select path="pubName" items="\${pubNames}" />
*

```
@ModelAttribute(value="pubNames")
    public List<String> getGender(){
        return ....;
}
```

Putting messages from external file

messages.properties

NotEmpty.book.isbn=isbn can not be blank

How spring come to know about it?

```
<bean id="messageSource" class="org.springframework.context.support.ResourceBundleMessageSource">
    <property name="basename" value="messages" />
</bean>
```

Step10: Spring MVC Exception handling

Exception handling

```
@ExceptionHandler(BookNotFoundException.class)
public ModelAndView handleBookNotFoundException(HttpServletRequest request, Exception ex){
    ModelAndView modelAndView = new ModelAndView();
    modelAndView.addObject("exception", ex);
    modelAndView.addObject("url", request.getRequestURL());

    modelAndView.setViewName("error");
    return modelAndView;
}
```

```
11 @ControllerAdvice
12 public class GlobalDefaultHandler {
13
14     @ExceptionHandler(NoHandlerFoundException.class)
15     public ModelAndView handlerNotFoundEx() {
16         ModelAndView mv = new ModelAndView();
17         mv.setViewName("404");
18         mv.addObject("error", "resource/page not found");
19         return mv;
20     }
21
22     @ExceptionHandler(DataAccessException.class)
23     public String handleDataAccessException(HttpServletRequest request,
24             Exception ex) {
25         ModelAndView mv = new ModelAndView();
26         mv.addObject("exception", ex);
27         mv.addObject("url", request.getRequestURL());
28         return "database_error";
29     }
30 }
31 }
```

```
<servlet>
    <servlet-name>springDispatcherServlet</servlet-name>
    <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
    <init-param>
        <param-name>contextConfigLocation</param-name>
        <param-value>classpath:web-config.xml</param-value>
    </init-param>
    <init-param>
        <param-name>throwExceptionIfNoHandlerFound</param-name>
        <param-value>true</param-value>
    </init-param>
    <load-on-startup>1</load-on-startup>
</servlet>

<!-- Map all requests to the DispatcherServlet for handling -->
<servlet-mapping>
    <servlet-name>springDispatcherServlet</servlet-name>
    <url-pattern>/</url-pattern>
</servlet-mapping>
```

Step 11: Spring REST

Spring REST



HTTP Method	Operation Performed
GET	Get a resource (Read a resource)
POST	Create a resource
PUT	Update a resource
DELETE	Delete a resource

Spring Annotations for REST

Annotations	Usage
@Controller	mark the class as a MVC controller
@RequestMapping	Maps the request with path
@PathVariable	Map variable from the path
@RequestBody	unmarshalls the HTTP response body into a Java object injected in the method.
@ResponseBody	marshalls return value as HTTP Response
@Configuration	Spring Config as a class

Example showing Annotations

```
@Controller  
@RequestMapping(value = "/ilo")  
public class iLOController  
{  
    @RequestMapping(value = "/server/{id}", method = RequestMethod.GET)  
    public @ResponseBody Book getServer(@PathVariable String id) {  
        System.out.println("——Getting Server ——" + id);  
    }  
    .....  
    .....  
}
```

```
| @RestController//  @RestController=@Controller + @ResponseBody
| public class BookResources {
|
|     @Autowired
|     private BookService service;
|
|     @RequestMapping(value = "/api/book", method = RequestMethod.GET,
|                      produces = MediaType.APPLICATION_JSON_VALUE)
|     public ResponseEntity<Collection<Book>> getAllBooks() {
|         Collection<Book> greetings = service.getAllBooks();
|         return new ResponseEntity<Collection<Book>>(greetings, HttpStatus.OK);
|     }
|
|     @RequestMapping(value = "/api/book/{id}", method = RequestMethod.GET,
|                      produces = MediaType.APPLICATION_JSON_VALUE)
|     public ResponseEntity<Book> getAnBook(@PathVariable Integer id) {
|         Book book = service.getBookById(id);
|         if (book == null) {
|             return new ResponseEntity<Book>(HttpStatus.NOT_FOUND);
|         }
|
|         return new ResponseEntity<Book>(book, HttpStatus.OK);
|     }
| }
```

```
@RequestMapping(value = "/api/book", method = RequestMethod.POST,
    consumes = MediaType.APPLICATION_JSON_VALUE, produces = MediaType.APPLICATION_JSON_VALUE)
public ResponseEntity<Book> createBook(@RequestBody Book book) {
    Book savedBook = service.addBook(book);
    return new ResponseEntity<Book>(savedBook, HttpStatus.CREATED);
}

@RequestMapping(value = "/api/book/{id}", method = RequestMethod.PUT,
    consumes = MediaType.APPLICATION_JSON_VALUE, produces = MediaType.APPLICATION_JSON_VALUE)
public ResponseEntity<Book> updateBook(@PathVariable Integer id,
    @RequestBody Book book) {

    service.updateBook(book);

    return new ResponseEntity<Book>(HttpStatus.OK);
}

@RequestMapping(value = "/api/book/{id}", method = RequestMethod.DELETE)
public ResponseEntity<Book> deleteBook(@PathVariable("id") Integer id)
    throws Exception {

    service.removeBook(id);

    return new ResponseEntity<Book>(HttpStatus.NO_CONTENT);
}
```

Step 12: Spring Integration test

```
@RunWith(SpringJUnit4ClassRunner.class)
@ContextConfiguration(locations="classpath:spring-context.xml")
@TransactionalConfiguration(defaultRollback=true,transactionManager="transactionManager")
public class EmployeeHibernateDAOImplTest {

    @Autowired
    private EmployeeDAO employeeDAO;

    @Test
    public void testGetEmployeeById() {
        Employee emp = employeeDAO.getEmployeeById(1L);

        assertNotNull(emp);
    }

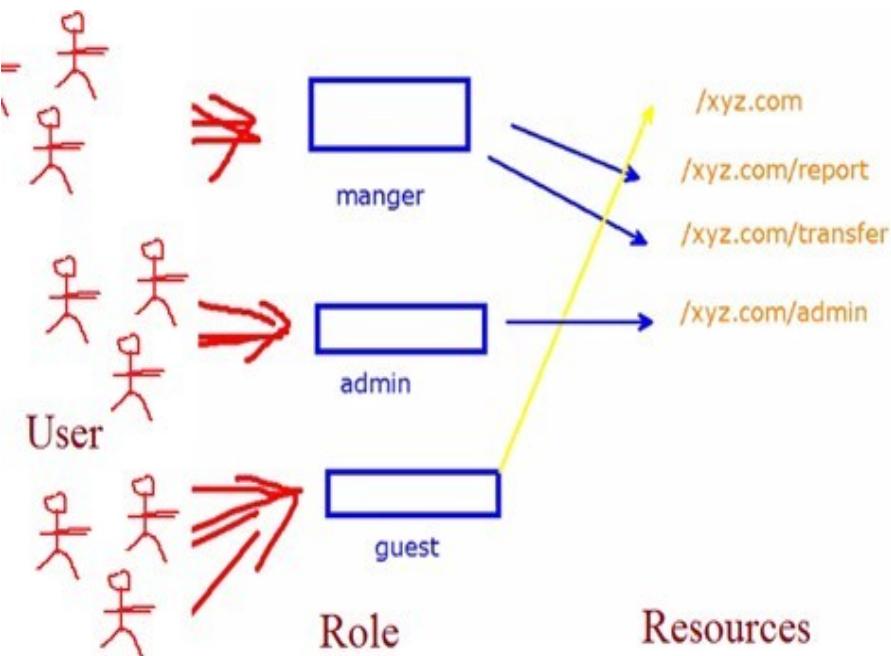
    @Test
    public void testCreateEmployee()
    {
        Employee emp = new Employee();
        emp.setName("Emp123");
        Long key = employeeDAO.createEmployee(emp);

        assertEquals(2L, key.longValue());
    }
}
```

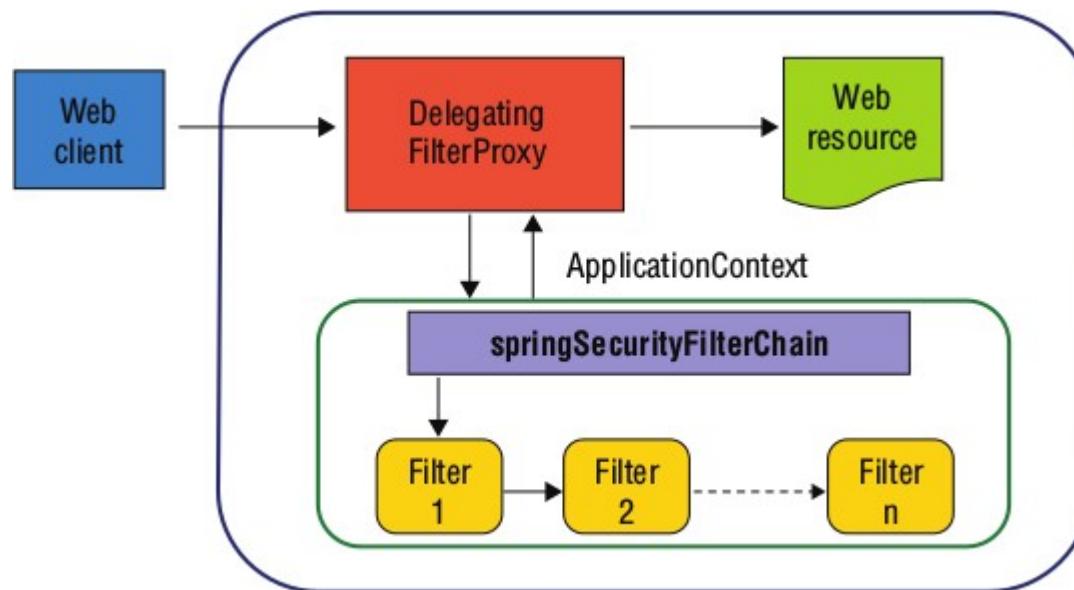
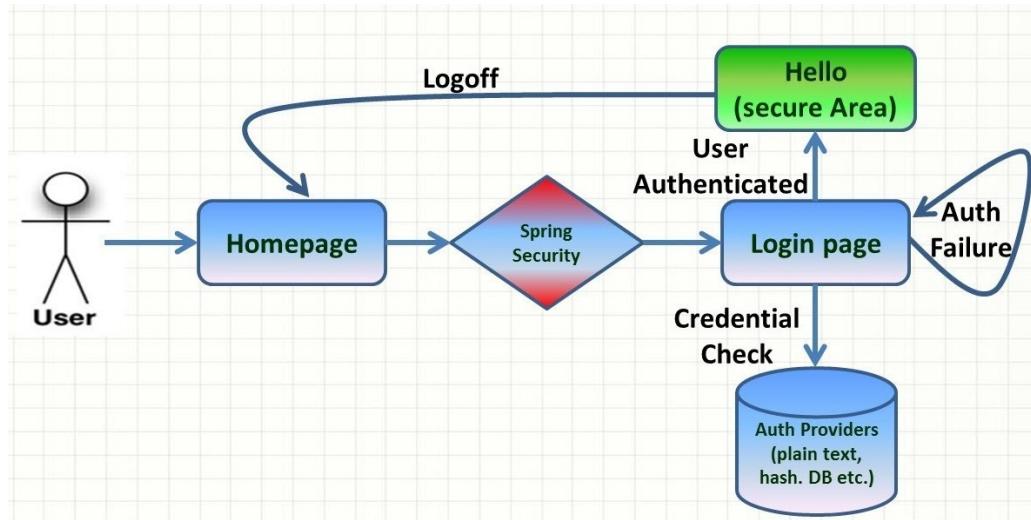
Step 13: SpringSecurity xml

Role based Access Control RAC

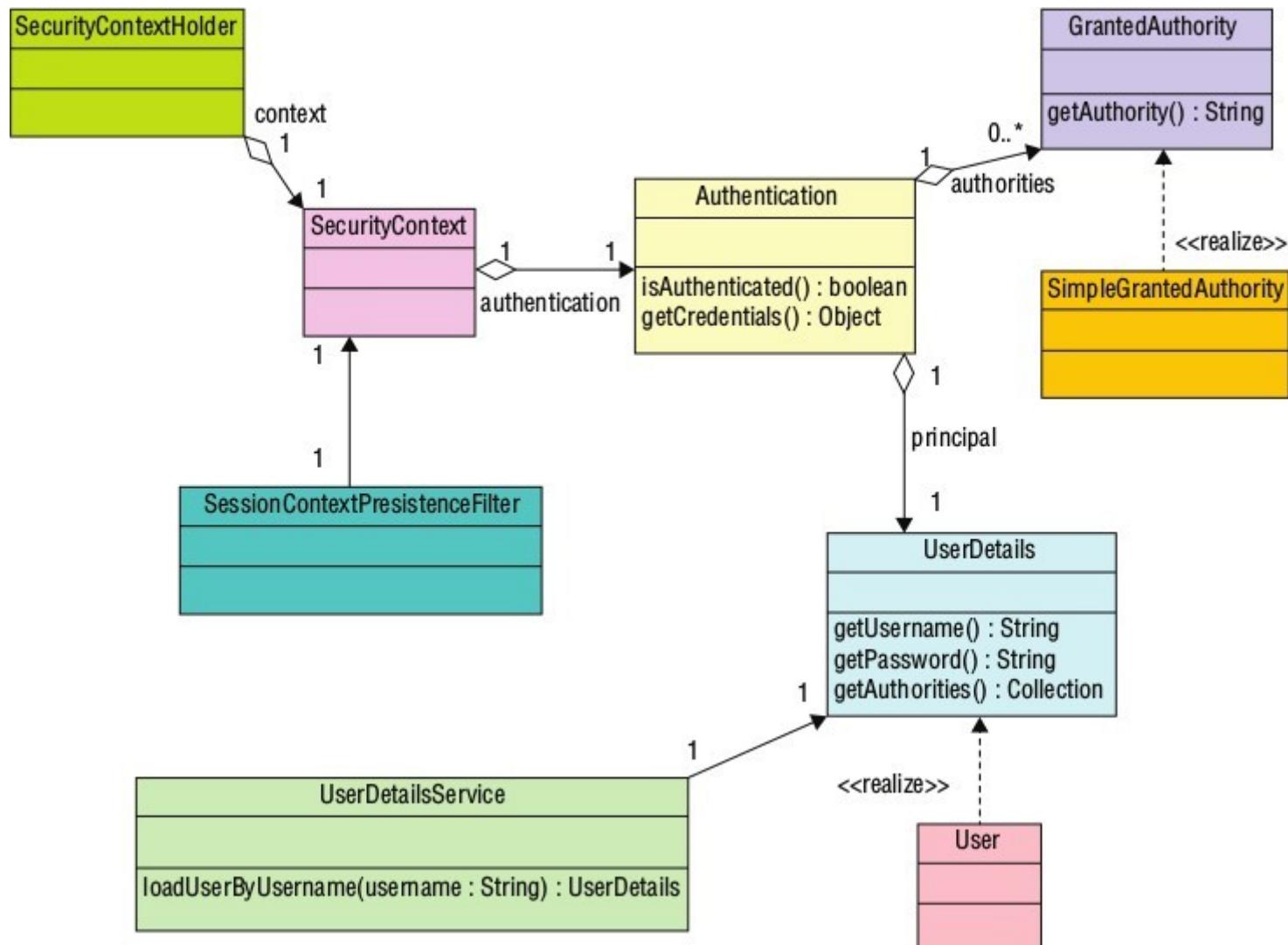
- Role based Access Control (RAC)
 - As it is difficult to manage permission for each user, each user is assigned to a role and permission is set for the role
 - Authentication using Spring
 - Http Basic Authentication (uses in XML- pop up form)
 - Http form based Authentication(uses in XML- custom form)
 - Http form based Authentication(uses in DB)



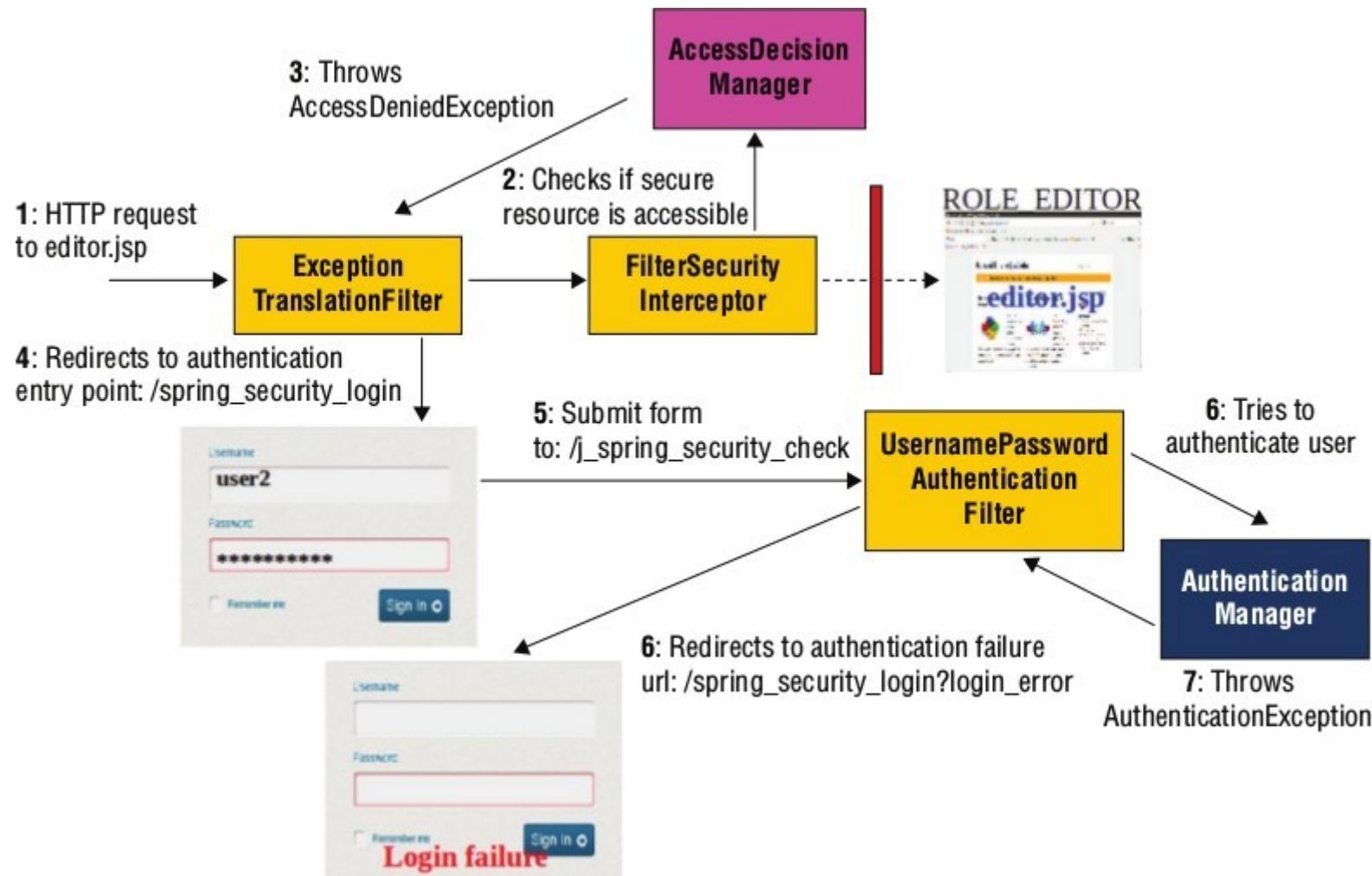
Spring security Why? How?



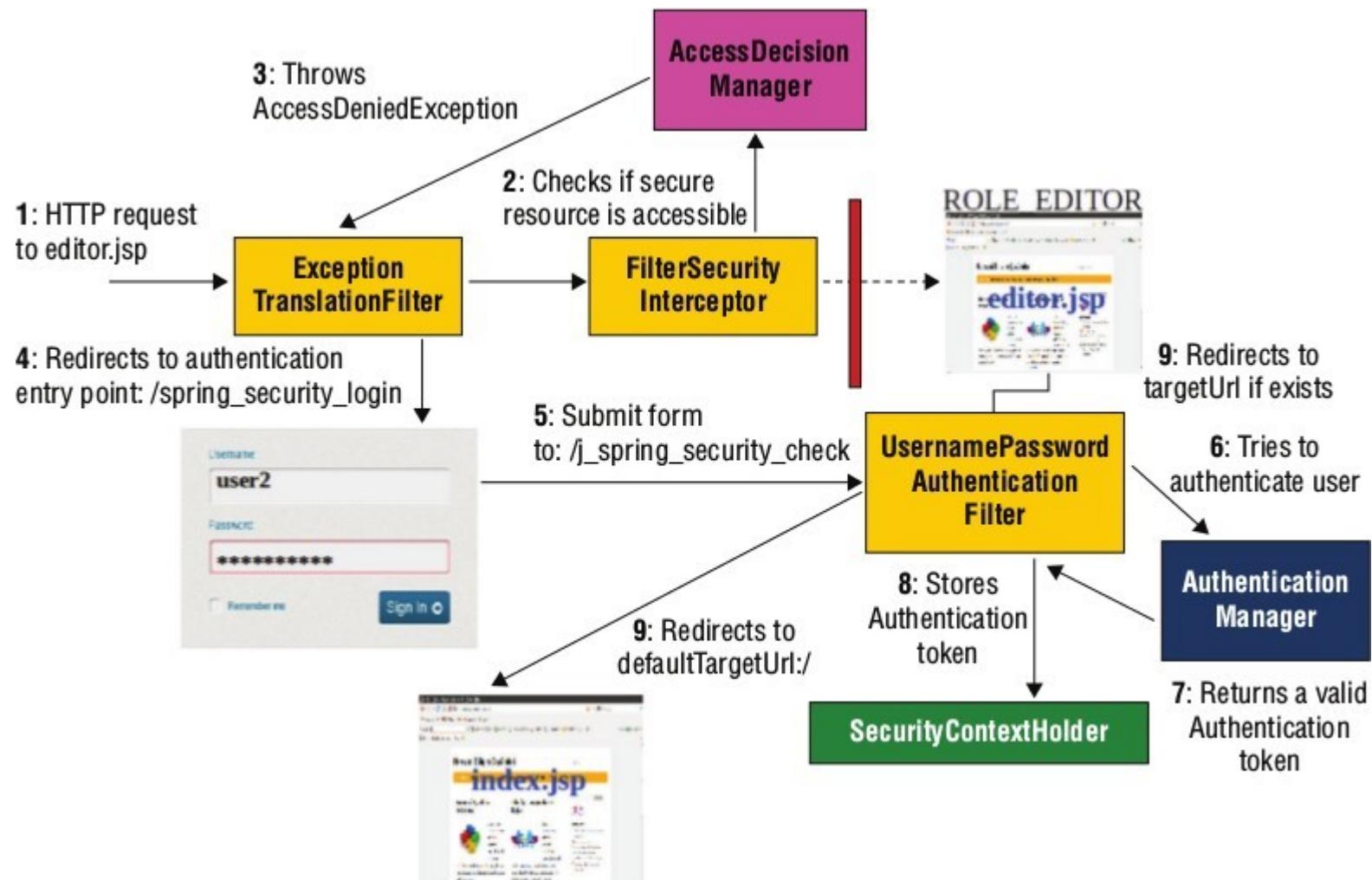
Building Blocks of Spring Security



Unsuccessful Login Flow



Successful Login Flow



Configuration spring security

```
<context-param>
    <param-name>contextConfigLocation</param-name>
    <param-value>classpath:model-config.xml,classpath:spring-security.xml</param-value>
</context-param>
```

configure security configuration xml file
this contain information about authentication/auth

```
<listener>
    <listener-class>org.springframework.web.context.ContextLoaderListener</listener-class>
</listener>
```

```
<!-- Spring Security -->
```

```
<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>
```

Configure security filter

Configuration spring

security:authentication and authorization

```
<http://www.springframework.org/schema/security> http://www.springframework.org/schema/security

<security:http use-expressions="true">
    <security:intercept-url pattern="/**" access="isAuthenticated()" />
    <security:form-login default-target-url="/home"/>
</security:http>
<security:authentication-manager>
    <security:authentication-provider>
        <security:user-service>
            <security:user name="foo" password="{noop}foo" authorities="Admin, User"/>
            <security:user name="bar" password="{noop}bar" authorities="User"/>
        </security:user-service>
    </security:authentication-provider>
</security:authentication-manager>
```

Step 14: Spring Security java config

Spring Security java config Hello world

- Step 1: configure
AbstractSecurityWebApplicationInitializer

```
//this class magically configure security filter
public class SecurityWebInitializer extends
    AbstractSecurityWebApplicationInitializer{
}
```

- Step 2: Configure
authentication

```
1 @Configuration
2 @EnableWebSecurity
3 @ComponentScan(basePackages={"com.bookapp.security.config"})
4 public class SecurityConfig extends WebSecurityConfigurerAdapter{
5     @Override
6     protected void configure(AuthenticationManagerBuilder auth) throws Exception {
7         //add user for in memory auth
8         UserBuilder users=User.withDefaultPasswordEncoder();
9         auth.inMemoryAuthentication()
10            .withUser(users.username("raj").password("raj").roles("admin"))
11            .withUser(users.username("ekta").password("ekta").roles("mgr"))
12            .withUser(users.username("gunika").password("gunika").roles("emp"));
13    }
14 }
```

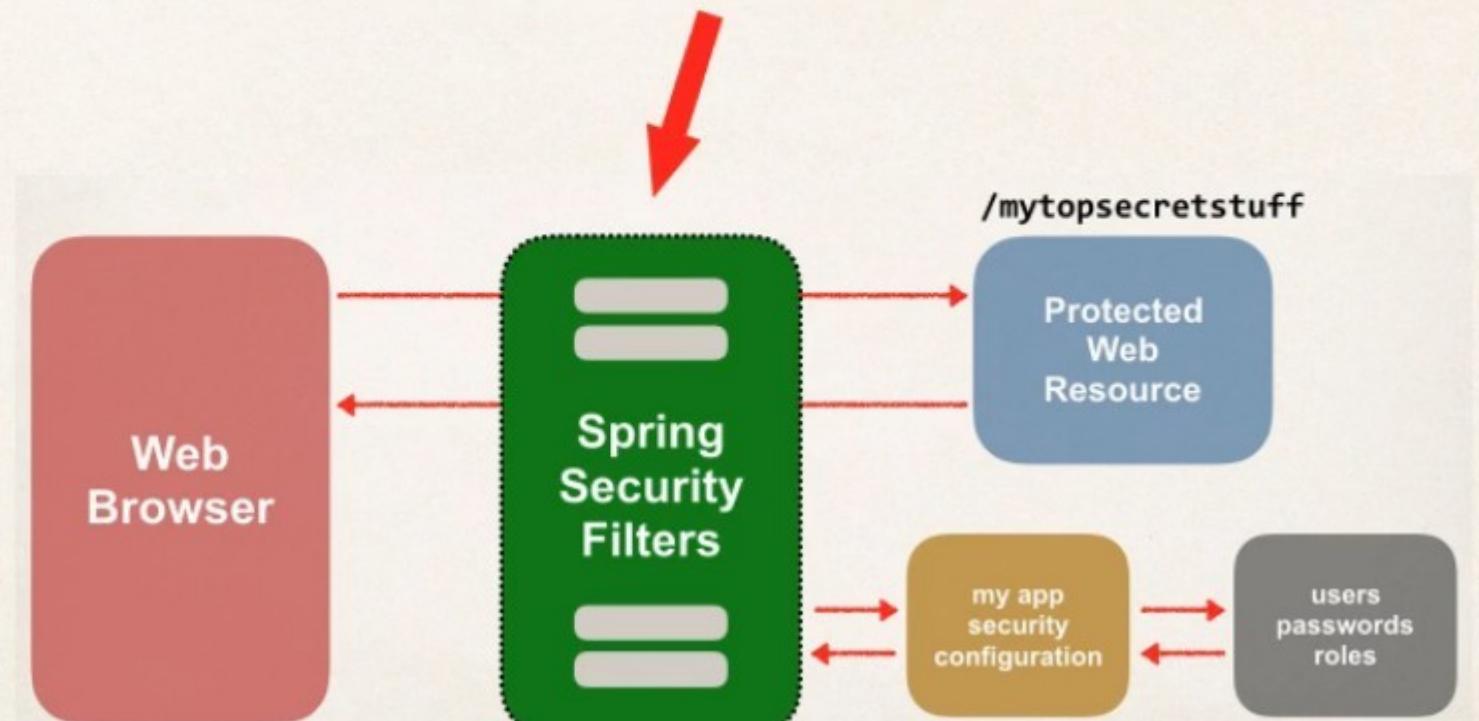
- Step 3: Don't forget to configure security config in spring framework

```
public class WebInitializer extends AbstractAnnotationConfigDispatcherServletInitializer{

    @Override
    protected Class<?>[] getRootConfigClasses() {
        return new Class[]{AppConfig.class, SecurityConfig.class};
    }
}
```

AbstractSecurityWebApplicationInitializer

Special class to register the Spring Security Filters



Spring security custom login page

- Step 1: Modify Spring config to refer custom login page

```
public class SecurityConfig extends WebSecurityConfigurerAdapter{  
    @Override  
    protected void configure(HttpSecurity http) throws Exception {  
        http.authorizeRequests()  
            .anyRequest().authenticated()  
            .and()  
            .formLogin()  
                .loginPage("/showLoginPage")//url pattern of controller that display login page  
                .loginProcessingUrl("/authTheUser")  
                .permitAll();  
    }  
}
```

- Step 2: create an controller to show that login page

```
@Controller  
public class LoginController {  
    @GetMapping("/showLoginPage")  
    public String showLoginPage(){  
        return "login_page";  
    }  
}
```

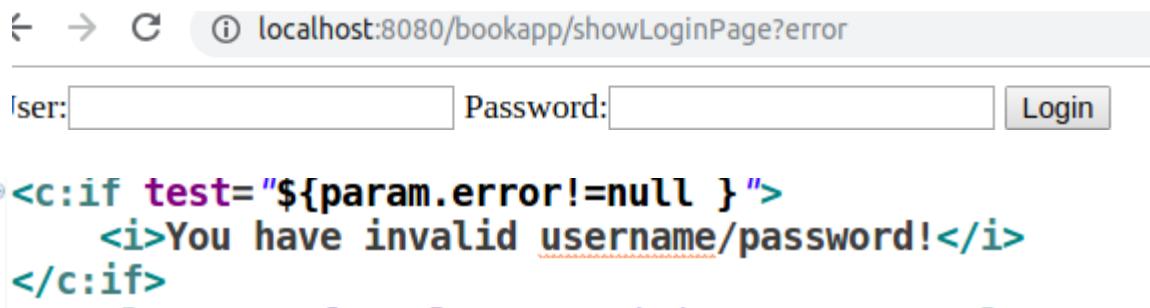
- Step 3 :create custom login page

```
<%-- <form:form action="${pageContext.request.contextPath }" method="Post"> --%>  
<c:url var="url" value="/authTheUser"></c:url>  
<form:form action="${url }" method="Post">  
    <tr><td>User:</td><td><input type='text' name='username'></td></tr>  
    <tr><td>Password:</td><td><input type='password' name='password' /></td></tr>  
    <input name="submit" type="submit" value="Login"/>  
</form:form>
```

Spring security custom login page

- Step 4: custom error messages

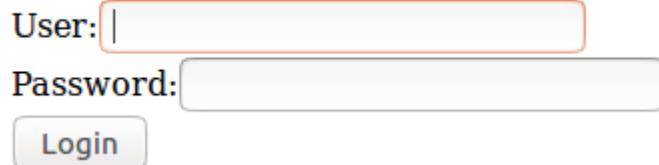
When login failed, spring security put error parameter automatically



A screenshot of a web browser window. The address bar shows "localhost:8080/bookapp/showLoginPage?error". Below the address bar is a login form with two input fields labeled "User:" and "Password:", and a "Login" button. To the left of the User field is a small icon of a person.

```
<c:if test="${param.error!=null }">
    <i>You have invalid username/password!</i>
</c:if>
```

You have invalid username/password!



A screenshot of a web browser window showing the same login page as above. The error message "*You have invalid username/password!*" is displayed below the login form. The User and Password input fields are highlighted with a red border, indicating they are required or invalid. The "Login" button is also visible.

Spring security custom login page

```
    .formLogin()
        .loginPage("/showLoginPage")
        .loginProcessingUrl("/authThe")
        .permitAll()
    .and()
        .logout().permitAll();
```

- Step 4: custom logout

- spring security automatically configure url /logout now we can create an logout controller, logout would be handled by spring security.
- Spring security invalidate user httpsession and remove session
- cookies etc Send back to your login page and append an logout

```
<c:url var="logout" value="/logout"></c:url>
<form:form action="${logout }" method = "post">
    <input type="submit" value="logout">
</form:form>
```

- [all books](getallbooks)

Step 5: logout controller, no need to create any controller!, mention logout message on login page

```
<c:if test="${param.logout!=null }">
    <i>You logged out successfully!</i>
</c:if>
```

Spring security: csrf configuration

- We do not need to use csrf tags if we are using <form:form>

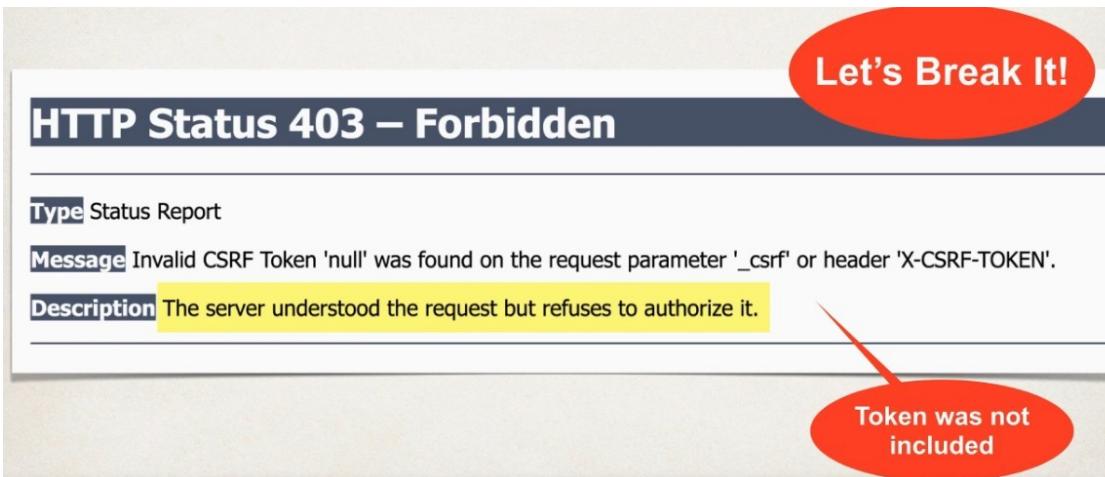
```
<form action="..." method="POST">

    <input type="hidden"
        name="${_csrf.parameterName}"
        value="${_csrf.token}" />

</form>
```

• <form:form> automagically adds CSRF token

Best Practice



Spring security custom login page

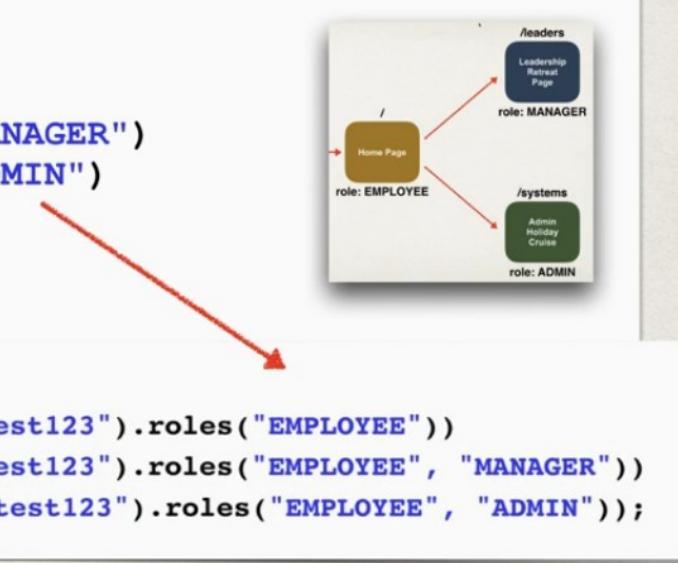
- Step 6: display user role and username on JSP after logged in

logout
User: raj User profile: [ROLE_ADMIN] [all books](#)

```
<%@ taglib prefix="sec" uri="http://www.springframework.org/security/tags" %>  
  
User: <sec:authentication property="principal.username"/>  
User profile: <sec:authentication property="principal.authorities"/>
```

- Step 6 : restrict access as per role

```
@Override  
protected void configure(HttpSecurity http) throws Exception {  
  
    http.authorizeRequests()  
        .antMatchers("/").hasRole("EMPLOYEE")  
        .antMatchers("/leaders/**").hasRole("MANAGER")  
        .antMatchers("/systems/**").hasRole("ADMIN")  
        .and()  
        .formLogin()  
        ...  
    }  
  
    auth.inMemoryAuthentication()  
        .withUser(users.username("john").password("test123").roles("EMPLOYEE"))  
        .withUser(users.username("mary").password("test123").roles("EMPLOYEE", "MANAGER"))  
        .withUser(users.username("susan").password("test123").roles("EMPLOYEE", "ADMIN"));  
}
```



Spring security custom login page

- Step 6 : restrict access as per role

```
@Override  
protected void configure(HttpSecurity http) throws Exception {  
    http.authorizeRequests()  
        .antMatchers("/").hasAnyRole("EMP", "ADMIN", "MGR")  
        .antMatchers("/admin/**").hasRole("ADMIN")  
        .antMatchers("/mgr/**").hasRole("MGR")  
        /*.anyRequest().authenticated()*/  
        .and()  
        .formLogin()  
            .loginPage("/showLoginPage")//url pattern of controller that display login page  
            .loginProcessingUrl("/authTheUser")  
            .permitAll()  
        .and()  
        .logout().permitAll();  
}  
  
3 <a href="admin">admin</a><br/>  
4 <a href="mgr">admin</a><br/>  
5 <a href="getallbooks">all books</a><br/>  
6 </body>
```



HTTP Status 403 – Forbidden

```
@Controller  
public class LoginController {  
    @GetMapping("/")  
    public String showPage(){  
        return "home";  
    }  
  
    @GetMapping(value="/admin")  
    public String showAdmin(){  
        return "home_admin";  
    }  
  
    @GetMapping(value="/mgr")  
    public String showMgr(){  
        return "home_mgr";  
    }
```

Spring security custom login page

- Step 7: create an custom access denied page

```
.and()
    .logout().permitAll()
.and()
    .exceptionHandling().accessDeniedPage("/access_denied");
```

```
@GetMapping(value="/access_denied")
public String showAccessDeniedPage(){
    return "access_denied";
}
```

```
access_denied
<c:url var="home" value="/"></c:url>
<a href="${home }">home</a>
</body>
```

Spring security custom login page

- Step 8: Display content based on role

```
.and()
    .logout().permitAll()
.and()
    .exceptionHandling().accessDeniedPage("/access_denied");
```

```
@GetMapping(value="/access_denied")
public String showAccessDeniedPage(){
    return "access_denied";
}
```

```
access_denied
<c:url var="home" value="/"></c:url>
<a href="${home }">home</a>
</body>
```

Spring security Display content based on roles

```
| ⊕<sec:authorize access="hasAnyRole( 'MGR' , 'ADMIN' )">
| <a href="mgr">MGR</a><br/>
| </sec:authorize>
|
| ⊕<sec:authorize access="hasRole( 'ADMIN' )">
| <a href="admin">admin</a><br/>
| </sec:authorize>
```

Spring Security with hibernate

- Step 1: Create Entity, DAO, DAOImp ...

```
@Entity
@Table
public class User {
    public static final BCryptPasswordEncoder encode =
        new BCryptPasswordEncoder();

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private int id;
    private String username;
    private String password;
    private String email;
    private boolean status;

    private String []roles;
    public User(String username, String password, String email, boolean status,
               String[] roles) {
        super();
        this.username = username;
        setPassword(password);
        this.email = email;
        this.status = status;
        this.roles = roles;
    }

    public void setPassword(String password) {
        this.password = encode.encode(password);
    }
}

@Repository
public class UserDaoImpl implements UserDao {

    @Autowired
    private SessionFactory sessionFactory;

    private Session openSession() {
        return sessionFactory.getCurrentSession();
    }

    public User findByUsername(String username){
        Query query = openSession().createQuery("from User u where u.username = :username");
        query.setParameter("username", username);
        List<User> userList = query.list();
        if (userList.size() > 0)
            return userList.get(0);
        else
            return null;
    }

    public void insert(User user){
        openSession().save(user);
    }
}
```

```
public interface UserDao {
    public User findByUsername(String username);
    public void insert(User user);
}
```

Spring Security with hibernate

- Step 2: Create Service layer ...

```
public interface UserService {  
    public User findByUsername(String username);  
    public void insert(User user);  
}  
  
,  
3 @Service  
4 @Transactional  
5 public class UserServiceImpl implements UserService {  
6  
7     @Autowired  
8     private UserDao userDao;  
9  
10    public User findByUsername(String username){  
11        return userDao.findByUsername(username);  
12    }  
13  
14    @Override  
15    public void insert(User user) {  
16        userDao.insert(user);  
17    }  
18  
19 }  
  
@Service  
@Transactional  
public class DetailService implements UserDetailsService {  
  
    @Autowired  
    private UserService userService;  
  
    @PostConstruct  
    public void post(){  
        User user1=new User("raj", "raj", "raj.mtech@gmail.com", true, new String[]{"ROLE_EMP", "ROLE_MGR", "ROLE_ADMIN"});  
        User user2=new User("eku", "eku", "eku.mtech@gmail.com", true, new String[]{"ROLE_MGR", "ROLE_EMP"});  
        User user3=new User("gun", "gun", "raj.mtech@gmail.com", true, new String[]{"ROLE_EMP"});  
  
        System.out.println("inserting an default user");  
        userService.insert(user1);  
        userService.insert(user2);  
        userService.insert(user3);  
    }  
    @Override  
    public UserDetails loadUserByUsername(String username) throws UsernameNotFoundException {  
        User user=userService.findByUsername(username);  
        if(user==null)  
            throw new UsernameNotFoundException("username is not found");  
        return new org.springframework.security.core.userdetails.User(user.getUsername(),  
                           user.getPassword(),AuthorityUtils.createAuthorityList(user.getRoles()));  
    }  
}
```

Spring Security with hibernate

- Step 3:Injecting UserDetailsService to security config so that it use hibernate configuration

```
2 @Configuration
3 @EnableWebSecurity
4 @ComponentScan(basePackages={"com.bookapp.security.config"})
5 public class SecurityConfig extends WebSecurityConfigurerAdapter{
6     @Autowired
7     private UserDetailsService detailService;
8
9     @Override
10    protected void configure(HttpSecurity http) throws Exception {
11        http.authorizeRequests()
12            .antMatchers("/").hasAnyRole("EMP","ADMIN","MGR")
13            .antMatchers("/admin/**").hasRole("ADMIN")
14            .antMatchers("/mgr/**").hasRole("MGR")
15            /*.anyRequest().authenticated()*/
16            .and()
17            .formLogin()
18                .loginPage("/showLoginPage")//url pattern of controller that display login page
19                .loginProcessingUrl("/authTheUser")
20                .permitAll()
21            .and()
22                .logout().permitAll()
23            .and()
24                .exceptionHandling().accessDeniedPage("/access_denied");
25    }
26    @Override
27    protected void configure(AuthenticationManagerBuilder auth) throws Exception {
28        auth.userDetailsService(detailService).passwordEncoder(com.bookapp.model.entities.User.encode);
29    }
30 }
```



Any questions?

