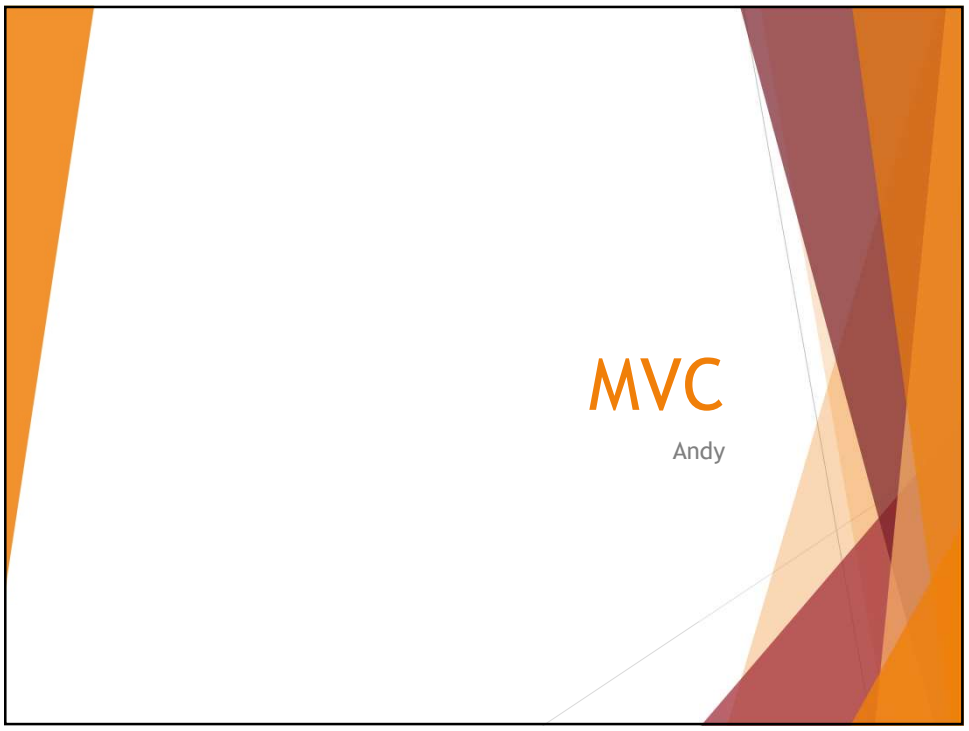


1

Contents

- Spring MVC framework
  - Controller
  - Model
  - View
- Content Negotiation and CORS config
- Spring MVC Fundamentals
- *Jersey Rest Service

2

URL Composition

- URL composition
  - Example:
    - http://localhost:8080/userapp/user/{id}/load?minAge=20&lastName=Stark;
    - http://localhost:8080/userapp/user/2/load?minAge=20&lastName=Stark;
  - Interpretation:
    - **Domain:** http://localhost:8080/ **(http protocol, server, port)**
    - App route/name: /userapp (could be omitted as /)
    - Request route: /user/id/load
    - **Path variable**: id (part of the url / routes)
    - **Query parameter**: minAge, lastName (key=value pair after ?)

- What will happen after hitting this url:
  - 1. Based on domain, it will find the server
  - 2. Based on app route, server will allocate the application (userapp)
  - *3. the application will use "**controller**" to match the request route ("/user/id/load")
  - 4. path variable and query parameter will be passed as parameter to the controller
  - 5. controller returns result and display the view page to user

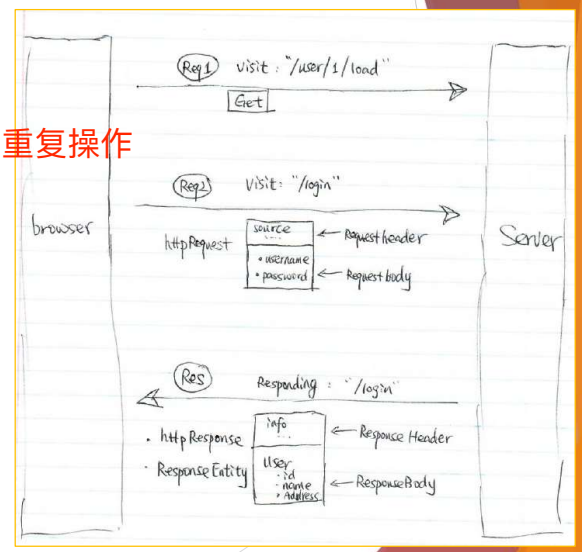
3

URL Request & Response

- Request
  - Method: Get/Put/Post/Delete
  - Route: RequestMapping
  - Data:
    - url: path variable, query parameter
    - Request body
- Response
  - Data: response body
  - View (with data)

可重复操作

不可重复操作



4

标注这是一个rest的controller，可以接受前端发送的请求

rest是一种前后端交流的协议

Controller

(Spring rest service)

```
@Controller
public class MainController{

    @RequestMapping(value="/user/{id}", method=RequestMethod.GET)
    public ModelAndView getUserById(@PathVariable int id){
        ModelAndView modelAndView = new ModelAndView("user");
        User u = service.getUser(id);
        model.addObject("user", u);
        return modelAndView;
    }

    @RequestMapping(value="/allUsers",
                    method=RequestMethod.GET
                    produces = "application/json")
    public @ResponseBody List<User> getAllUsers(){
        List<User> userList = service.getAllUsers();
        return userList;
    }
}
```

```
@RestController
public class MainController{

    @RequestMapping(value="/user/{id}", method=RequestMethod.GET)
    public User getUserById(@PathVariable int id){
        User u = service.getUser(id);
        return u;
    }

    @GetMapping("/allUsers")
    public List<User> getAllUsers(){
        List<User> userList = service.getAllUsers();
        return userList;
    }

    @GetMapping(path="/allUsers", produces="application/json")
    public List<User> getAllUsers(){
        List<User> userList = service.getAllUsers();
        return userList;
    }
}
```

5

Request Mapping Methods

(rest service http methods)

- @RequestMapping(method = RequestMethod.GET)

- @GetMapping --- Retrieve/Read Data (R)
- @PutMapping --- Update data (U)
- @PostMapping --- Add new data (C)
- @DeleteMapping --- delete existing data (D)

Note: those methods are just contract based- they don't enforce the action. Meaning you can create new using Post method, but it is against the design principle.

6

Request Mapping: GET

- URL composition
  - path, domain, **path variable**, **query parameter**
  - Example:
    - http://localhost:8080/user/{id}/load?minAge=20&lastName=Stark;
    - http://localhost:8080/user/2/load?minAge=20&lastName=Stark;

- Corresponding GET mapping:

能根据url写出出代码

```
@RestController
public class MainController{

    @RequestMapping(value="/user/{id}/load", method=RequestMethod.GET)
    //@GetMapping("/user/{id}/load")
    public User getUserById(@PathVariable int id,
                            @RequestParam(name="minAge") int age,
                            @RequestParam(name="lastName") String surname){
        User u = service.getUser(id, age, surname);
        return u;
    }

}
```

7

Request Mapping: PUT, Post, Delete

```
@Controller
public class MainController{

    /* url: http://localhost:8080/update/1  */
    @PutMapping("/update/{id}")
    public void updateUser(@PathVariable int id, @RequestBody User updateUser){
        User u = service.getUser(id);
        service.updateUser(u, updateUser);
    }

    /* url: http://localhost:8080/newuser  */
    @PostMapping("/newuser/")
    public void ceateNewUser(@RequestBody user newUser){
        service.createNewUser(newUser);
    }

    /* url: http://localhost:8080/deleteUser/1  */
    @DeleteMapping("/deleteUser/{id}")
    public void deleteUserById(@PathVariable int id){
        service.deleteUser(int id);
    }

}
```

8

Http Return Type

```
@GetMapping({"/user", "/"})
//@ResponseBody
public @ResponseBody User getUser(){
    return userManager.findUser();
}

@GetMapping({"/user", "/"})
public ResponseEntity<User> getUser(){
    User u = userManager.findUser();
    return new ResponseEntity<User>(u, HttpStatus.OK);
}

@GetMapping({"/user", "/"})
public ModelAndView getUser(){
    ModelAndView mv = new ModelAndView("user"); //user.jsp
    User u = userManager.findUser();
    mv.addObject("user", u);
    return mv;
}
```

```
@GetMapping({"/user", "/"})
public ModelAndView getUser(){
    ModelAndView mv = new ModelAndView("user"); //user.jsp
    User u = userManager.findUser();
    mv.addObject("user", u);
    return mv;
}

@GetMapping({"/user", "/"})
public String getUser(Model model){
    User u = userManager.findUser();
    model.addAttribute("user", u);
    return "user";  //user.jsp will use model
}


@GetMapping({"/user", "/"})
public User getUser(){
    User u = userManager.findUser();
    return u;
}
```

What if we just want to return simple json?

9

@Controller vs @RestController

```
@Controller
@RequestMapping("employees")
public class EmployeeController {

    Employee employee = new Employee();

    @RequestMapping(value = "/{name}", method = RequestMethod.GET, produces = "application/json")
    public @ResponseBody Employee getEmployeeInJSON(@PathVariable String name) {

     employee.setName(name);
```

```
@RestController
@RequestMapping("employees")
public class EmployeeController {

    Employee employee = new Employee();

    @RequestMapping(value = "/{name}", method = RequestMethod.GET, produces = "application/json")
    public Employee getEmployeeInJSON(@PathVariable String name) {

     employee.setName(name);
```

@RestController = @Controller + @ResponseBody

10

Model

(Spring rest service)

```
@GetMapping({"/user", "/"})
public ModelAndView getUser(){
    ModelAndView mv = new ModelAndView("user"); //user.jsp
    User u = userManager.findUser();
    mv.addObject("user", u);
    return mv;
}

@GetMapping({"/user", "/"})
public String getUser(Model model){
    User u = userManager.findUser();
    model.addAttribute("user", u);
    return "user";  //user.jsp will use model
}
```

- ModelAndView & Model
- Spring Thymeleaf Framework

11

View

(Spring rest service)

```
@GetMapping({"/user", "/"})
public ModelAndView getUser(){
    ModelAndView mv = new ModelAndView("user"); //user.jsp
    User u = userManager.findUser();
    mv.addObject("user", u);
    return mv;
}
```

```
<%@ taglib prefix="c" uri="http://java.sun.com/jsp/jstl/core"%>
<html>
<body>
    <h1>Spring MVC Hello World Example</h1>
    <h2>ID: ${user.id}</h2>
    <h2>NAME: ${user.name}</h2>
    <h2>ADDRESS: ${user.address}</h2>
</body>
</html>
```

- Spring Thymeleaf Framework
- Angular/React/Vue

12

HttpHeader & Content Negotiation

- **RequestHeader**

  accept --- Accept: application/json

  content-type --- Content-Type: application/xml

  cookie --- Cookie: access_token=eyJhbGciOiJIUzI1NiIsI.eyJpc3MiOiJodHRwczotcGxlL.mFrs3Zo8eaSNcxiNfvRh9dqKP4F1cB;

  Origin --- Origin: http://www.example-social-network.com

- **Content Negotiation**

  Front-End: RequestHeader contains: accept vs content-type

  Back-End: produces->accept && consumes <- content-type

```
@RequestMapping(value="/allUsers",
                method=RequestMethod.GET
                produces = "application/json",
                consumes = "application/xml")
public @ResponseBody List<User> getAllUsers(){
    List<User> userList = service.getAllUsers();
    return userList;
}
```

13

Cookie vs Session

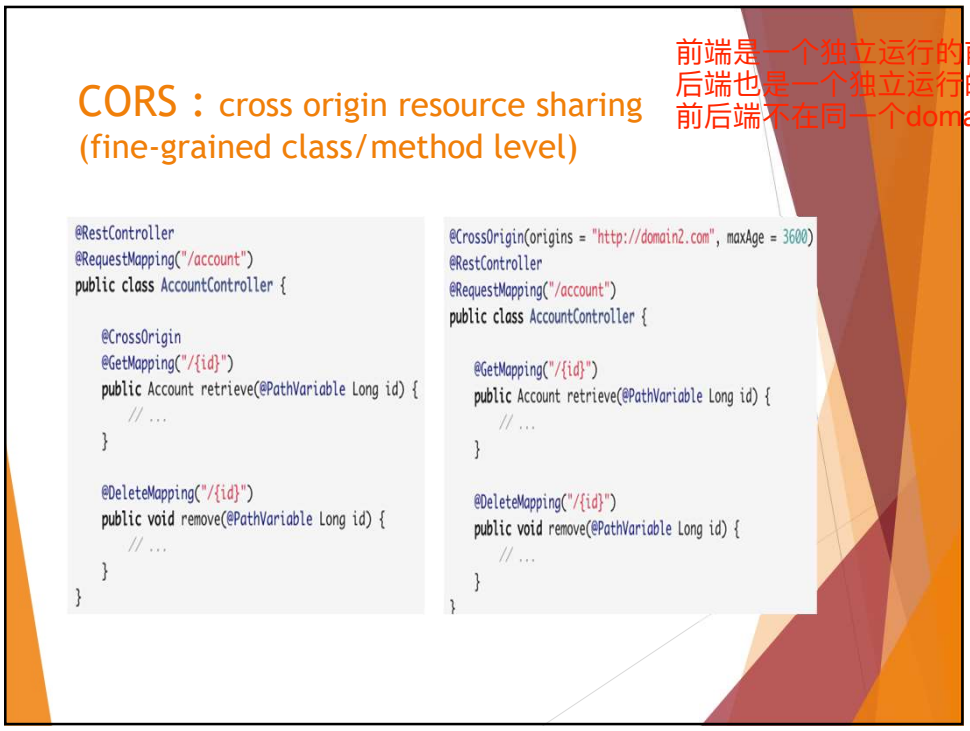
- Cookie: front end storage, small size, can be used with every http request, popular for application with independent front end.
- Session: back end storage, has expiration time (~20mins), corresponding to front end tab. Expires if time is reached without user interactions or the tab is closed. Usually used with jsp.

- Get Mapping for Cookie and Session:

```
@GetMapping("/demo")
public void handle(@CookieValue("JSESSIONID") String cookie) {
   //...
}
@RequestMapping("/")
public String handle(@SessionAttribute User user) {
   // ...
}
```

14

BQ里面的challenge答案！



15

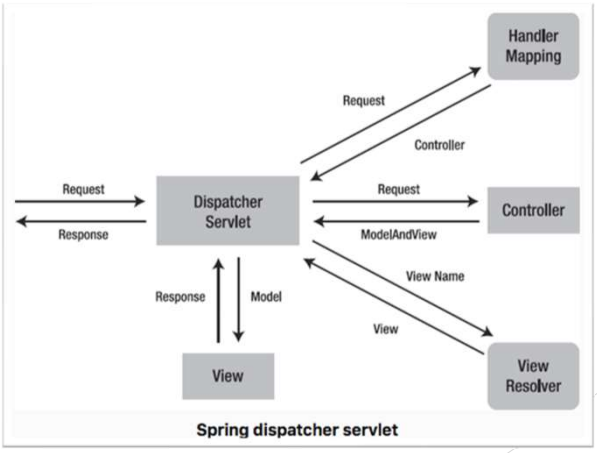
16

Http Error Code

Code	Meaning
400 Bad Request	User sent invalid request - syntax or parameter
401 Unauthorized	User is not authenticated
403 Forbidden	User is not allowed/permitted
404 Not Found	User sent wrong request URL
500 Internal Server Error	Server has internal configure error
502 Bad Gateway	Server cannot access certain resource
503 Service Unavailable	Server under maintenance
504 Gateway Timeout	Server not responding in time

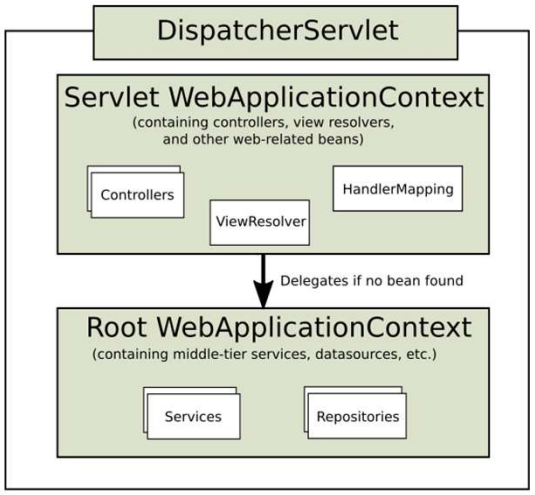
17

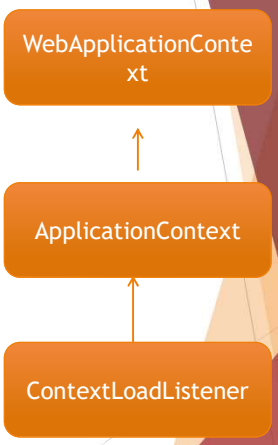
Spring MVC Fundamentals: DispatcherServlet



18

DispatcherServlet





19

Web.xml

```
<web-app>

   <listener>  <!-Not required for new spring version->
      <listener-class>org.springframework.web.context.ContextLoaderListener</listener-class>
   </listener>

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

     <servlet>
      <servlet-name>app</servlet-name>
          <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
      <init-param>
         <param-name>contextConfigLocation</param-name>
         <param-value></param-value>
      </init-param>
      <load-on-startup>1</load-on-startup>
   </servlet>

   <servlet-mapping>
      <servlet-name>app</servlet-name>
          <url-pattern>/app/*</url-pattern>
   </servlet-mapping>

</web-app>
```

20

*Jersey Rest Service

```
@Path("/users")
Class UserRestService{

    @Get
    @Path("/user/{name}/{age}")
    @Consumes({MediaType.APPLICATION_JSON})
    @Produces(MediaType.APPLICATION_XML)
    public Response getUser(@PathParam("name") String name
                            @PathParam("age") int age
                            @DefaultValue("1/1/2010") @QueryParam("from") Date dateFrom
                            @QueryParam("to") Date dateTo
                            ){
        return Response.status(200)
                .entity(new User());
    }
}
```

Get vs Post

```
@POST
@Produces(MediaType.TEXT_HTML)
@Consumes(MediaType.APPLICATION_FORM_URLENCODED)
public void newTodo(@FormParam("id") String id,
        @FormParam("summary") String summary,
        @FormParam("description") String description,
        @Context HttpServletResponse servletResponse) throws IOException {
    Todo todo = new Todo(id, summary);
    if (description != null) {
        todo.setDescription(description);
    }
    TodoDao.instance.getModel().put(id, todo);

    servletResponse.sendRedirect("../create_todo.html");
}
```

21

*Jersey Rest Service

HTTP Method	Operations Performed
GET	Get a resource
POST	Create a resource and other operations, as it has no defined semantics
PUT	Create or update a resource
DELETE	Delete a resource

22

*Jersey Rest Service

```
@PUT
@Consumes(MediaType.APPLICATION_XML)
public Response putTodo(JAXBElement<Todo> todo) {
    Todo c = todo.getValue();
    return putAndGetResponse(c);
}

@DELETE
public void deleteTodo() {
    Todo c = TodoDao.instance.getModel().remove(id);
    if(c==null)
        throw new RuntimeException("Delete: Todo with " + id +  " not found");
}
```

Put vs Delete

23

*Rest: Spring vs Jersey

Spring Annotation	JAX-RS Annotation
`@RequestMapping(path = "/troopers"`	`@Path("/troopers")`
`@RequestMapping(method = RequestMethod.POST)`	`@POST`
`@RequestMapping(method = RequestMethod.GET)`	`@GET`
`@RequestMapping(method = RequestMethod.DELETE)`	`@DELETE`
`@ResponseBody`	N/A
`@RequestBody`	N/A
`@PathVariable("id")`	`@PathParam("id")`
`@RequestParam("xyz")`	`@QueryParam('xyz")`
`@RequestParam(value="xyz"`	@FormParam("xyz")
`@RequestMapping(produces = {"application/json"})`	`@Produces("application/json")`
`@RequestMapping(consumes = {"application/json"})`	`@Consumes("application/json")`

24