Spring MVC Introduction

Spring Fundamentals

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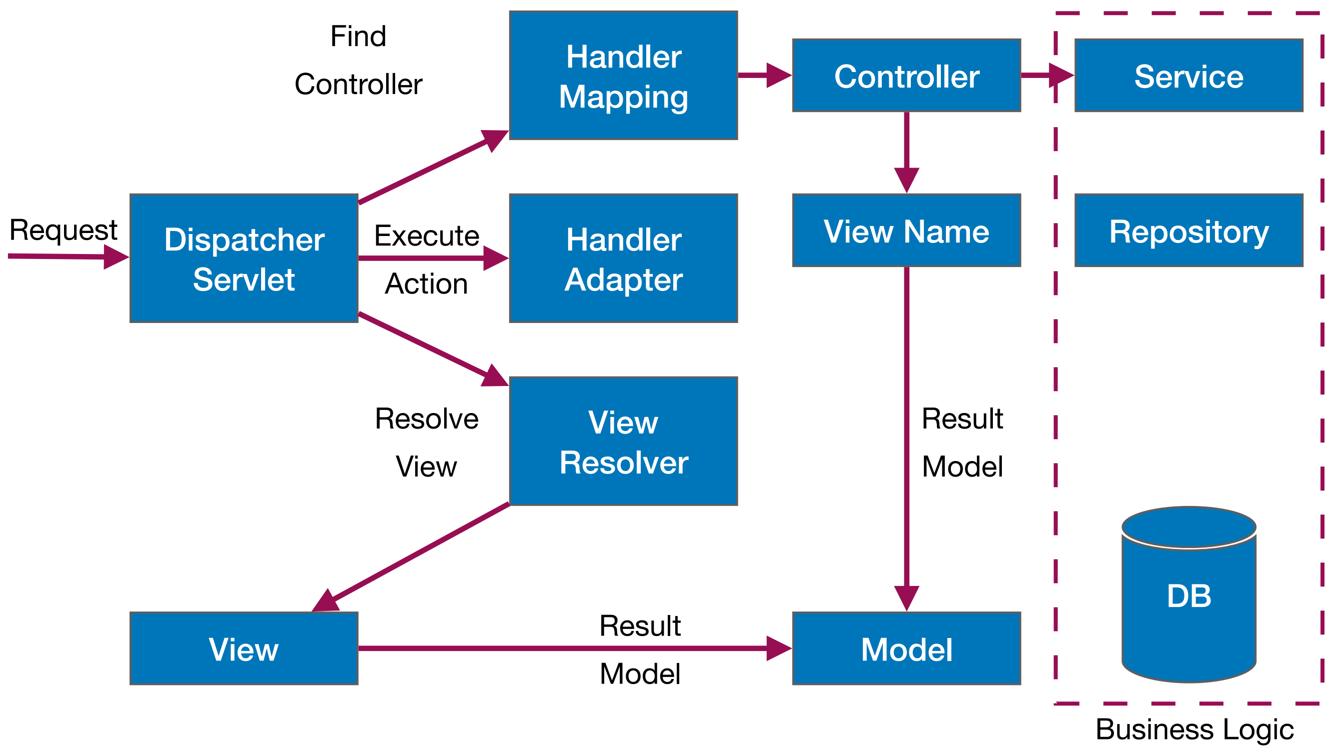
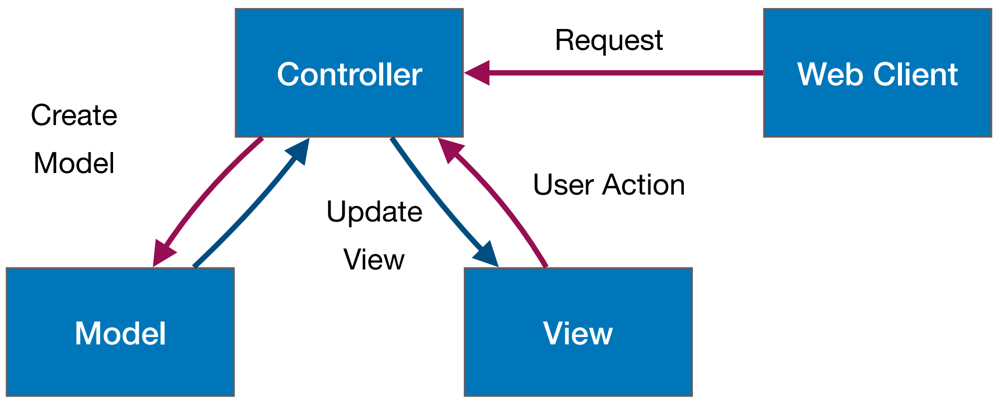
What is Spring MVC?

- Model-View-Controller (MVC) framework is designed around a DispatcherServlet that dispatches requests to handlers.



MVC – Control Flow



Spring Controllers

Annotations, IoC Container

Spring Controllers

- Defined with the @Controller annotation

```
@Controller
public class HomeController {
  ...
}
```

- Controllers can contain multiple actions on different routes

Request Mapping

- Annotated with @RequestMapping(...)

```
@RequestMapping("/home")
public String home(Model model) {
    model.addAttribute("message", "Welcome!");
    return "home-view";
}
```

- Or

```
@RequestMapping("/home")
public ModelAndView home(ModelAndView mav) {
    mav.addObject("message", "Welcome!");
    mav.setViewName("home-view");
    return mav;
}
```

- Problem when using @RequestMapping is that it accepts all types of request methods (get, post, put, delete, head, patch)

- Execute only on GET requests

```
@RequestMapping(value="/home", method=RequestMethod.GET)
public String home() {
    return "home-view";
}
```

Get Mapping

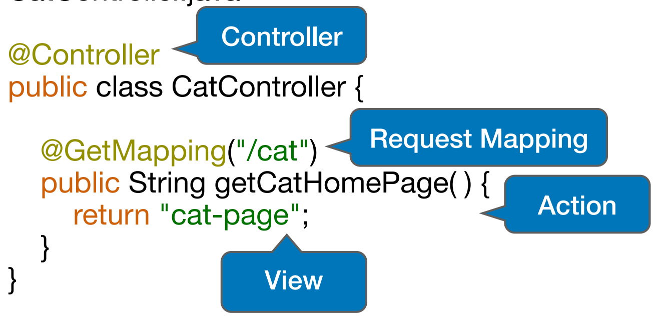
- Easier way to create route for a GET request

```
@GetMapping("/home")
public String home() {
    return "home-view";
}
```

- This is alias for RequestMapping with method GET

Actions – Get Requests

CatController.java



```
@Controller
public class CatController {

    @GetMapping("/cat")
    public String getCatHomePage( ) {
        return "cat-page";
    }
}
```

Controllers

DogController.java

```
@Controller
public class DogController {

    @GetMapping("/dog")
    @ResponseBody
    public Dog getDogHomePage( ) {
        Dog bestDog = dogService.getBestDog( );
        return bestDog;
    }
}
```

Post Mapping

- Similar to the GetMapping there is also an alias for RequestMapping with method POST

```
@PostMapping("/register")
public String register(UserDTO userDto) {
    ...
}
```

- Similar annotations exist for all other types of request methods

Actions – Post Requests

CatController.java

```
@Controller
@RequestMapping("/cat")
public class CatController {

    @PostMapping("/")
    public String addCat(CatDTO catDto) {
        return "new-cat";
    }
}
```

Actions – Post Requests (2)

CatController.java

```
@Controller
@RequestMapping("/cat")
public class CatController {
    @PostMapping("/")
    public String addCatConfirm(@RequestParam String catName, @RequestParam int catAge) {
        System.out.println(String.format("Cat Name: %s, Cat Age: %d", catName, catAge));
        return "redirect:/cat";
    }
}
```

Passing Attributes to View

- Passing a **String** object to the view

```
@GetMapping("/")
public String welcome(Model model) {
    model.addAttribute("name", "Pesho");
    return "index";
}
```

Passing Attributes to View (2)

- Passing a **ModelMap** object to the view

```
@GetMapping("/")
public String welcome(ModelMap modelMap) {
    modelMap.put("name", "Pesho");
    return "index";
}
```

Passing Attributes to View (3)

- Passing a **ModelAndView** object to the view

```
@GetMapping("/")
public ModelAndView welcome(ModelAndView mav) {
    mav.addObject("name", "Pesho");
    mav.setViewName("index");
    return mav;
}
```

- The **Model**, **ModelMap** and **ModelAndView** objects will be automatically passed to the view as context variables

- Attributes can be accessed from Thymeleaf

Models and Views

DogController.java

```
@Controller
public class DogController {

    @GetMapping("/dog")
    public ModelAndView getDOgHomePage(ModelAndView modelAndView) {
        modelAndView.setViewName("dog-page");
        return modelAndView;
    }
}
```

Request Parameters

- Getting a parameter from the query string

```
@GetMapping("/details")
public String details(@RequestParam("id") Long id) {
    ...
}
```

- @RequestParam can also be used to get POST parameters

```
@PostMapping("/register")
public String register(@RequestParam("name") String name) {
    ...
}
```

Request Parameters with Default Value

- Getting a parameter from the query string

```
@GetMapping("/comment")
public String comment(
    @RequestParam(name="author", defaultValue = "Annonymous") String author) {
    ...
}
```

- Making parameter optional

```
@GetMapping("/search")
public String search(
    @RequestParam(name="sort", required = false) String sort) {
    ...
}
```

PathVariable

- Getting a parameter from the query string

```
@GetMapping("/details/{id}")
public String details(@PathVariable("id") Long id) {
    ...
}
```

From Objects

- Spring will automatically try to fill objects with a form data

```
@PostMapping("/register")
public String register(UserDTO userDto) {
    ...
}
```

- The input field names must be the same as the object field names

Redirecting

- Redirecting after POST request

```
@PostMapping("/register")
public String register(UserDTO userDto) {
    ...
    return "redirect:/login";
}
```

Redirecting with Parameters

- Redirecting with query string parameters

```
@PostMapping("/register")
public String register(UserDTO userDto, RedirectAttributes redirectAttributes) {
    redirectAttributes.addAttribute("errorOd", 3);
    return "redirect:/login";
}
```

Redirecting with Attributes

- Keeping objects after redirect

```
@PostMapping("/register")
public String register(
    @ModelAttribute UserDTO userDto, RedirectAttributes redirectAttributes) {
    ...
    redirectAttributes.addFlashAttribute("userDto", userDto);
    return "redirect:/register";
}
```

Inversion of Control

Constructor vs Field vs Setter Injection

Field Injection

- Easy to write
- Easy to add new dependencies
- It hides potential architectural problems!

```
@Autowired
private ServiceA serviceA
@Autowired
private ServiceB serviceB
@Autowired
private ServiceC serviceC
```

Constructor Injection

- Time Consuming
- Harder to add dependencies
- It shows potential architectural problems!

```
@Autowired
public ControllerA(ServiceA serviceA, ServiceB serviceB, ServiceC serviceC) {
    this.serviceA = serviceA;
    this.serviceB = serviceB;
    this.serviceC = serviceC;
}
```

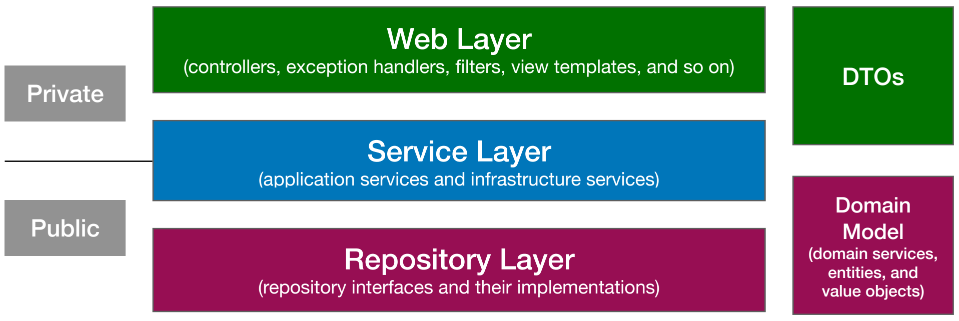
Setter Injection

- Create setters for dependencies
- Can be combined easily with constructor injection
- Flexibility in dependency resolution or object reconfiguration

```
@Service
public class HomeController( ) {
    // ...
    @Autowired
    public void setServiceA(ServiceA serviceA) {
        this.serviceA = serviceA;
    }
}
```

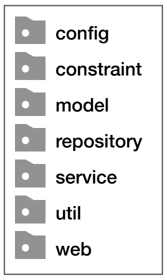
Layers

The Correct Project Structure


Web Layer
(controllers, exception handlers, filters, view templates, and so on)
Service Layer
(application services and infrastructure services)
Repository Layer
(repository interfaces and their implementations)
Private
Public
DTOs
Domain Model
(domain services, entities, and value objects)

Layers

- We are used to splitting our code based on its functionality:
- It gets hard to navigate in bigger applications



Thin Controllers

Creating Simple Components

Thin Controllers

- Controllers should follow well known principles such as DRY and KISS
- Should delegate functionality to the service layer
- The service layer consists of application logic, e.g. services, executors, strategies, mappers, DTOs, entities, etc.

Summary

- Spring MVC - MVC framework that has three main components:
    - Controller - controls the application flow
    - View - presentation layer
    - Model - data component with the main logic
- Constructor injection - the best way for DI
- Splitting your application code by layers
- Every component should be as "thin" as possible