

# Basic Web Project

## MVC, Spring and Thymeleaf



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**#fund-java**

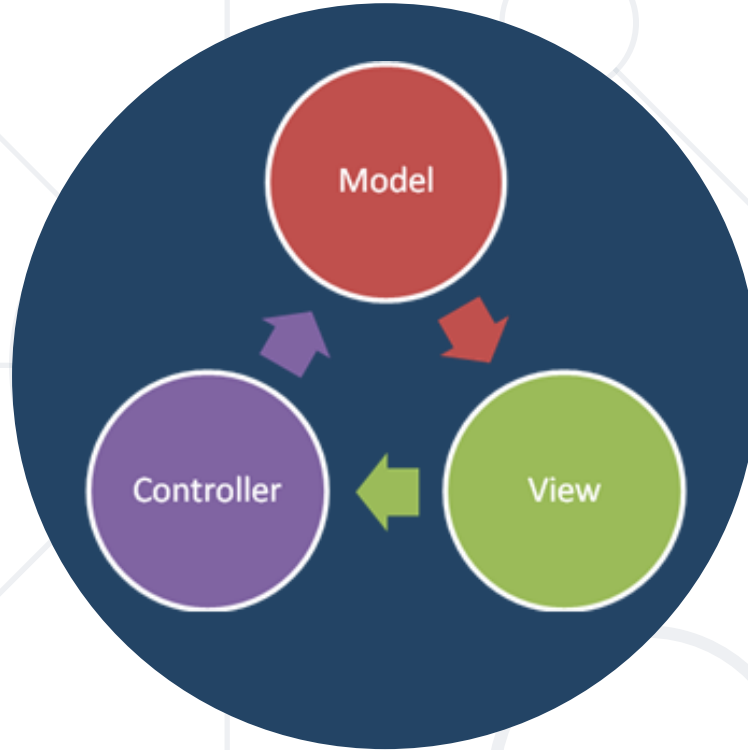
## 1. **Model-View Controller** (MVC)

## 2. **Spring** MVC

- Annotations
- Controllers
- Processing Requests

## 3. **Thymeleaf** View Engine





**MVC**

Model-View Controller

# What is Model-View Controller

- **MVC** == Model-View-Controller
- **Views** (presentation / UI)
  - Render UI (produce HTML)
- **Controllers** (logic)
  - Prepare UI (presentation logic)
  - Update database (business logic)
- **Models** (data)
  - Data access classes or ORM



# Model (Data)

- Set of **classes** that describes the **data** we are working with
- Rules for **how** the data can be **changed** and **manipulated**
- May contain **data validation rules**
- Often **encapsulates** data stored in a database



# View

- Defines how the application's **user interface** (UI) will be displayed
- May support master views (**layouts**)
- May support sub-views (**partial views** or controls)
- May use **templates** to **dynamically generate** HTML



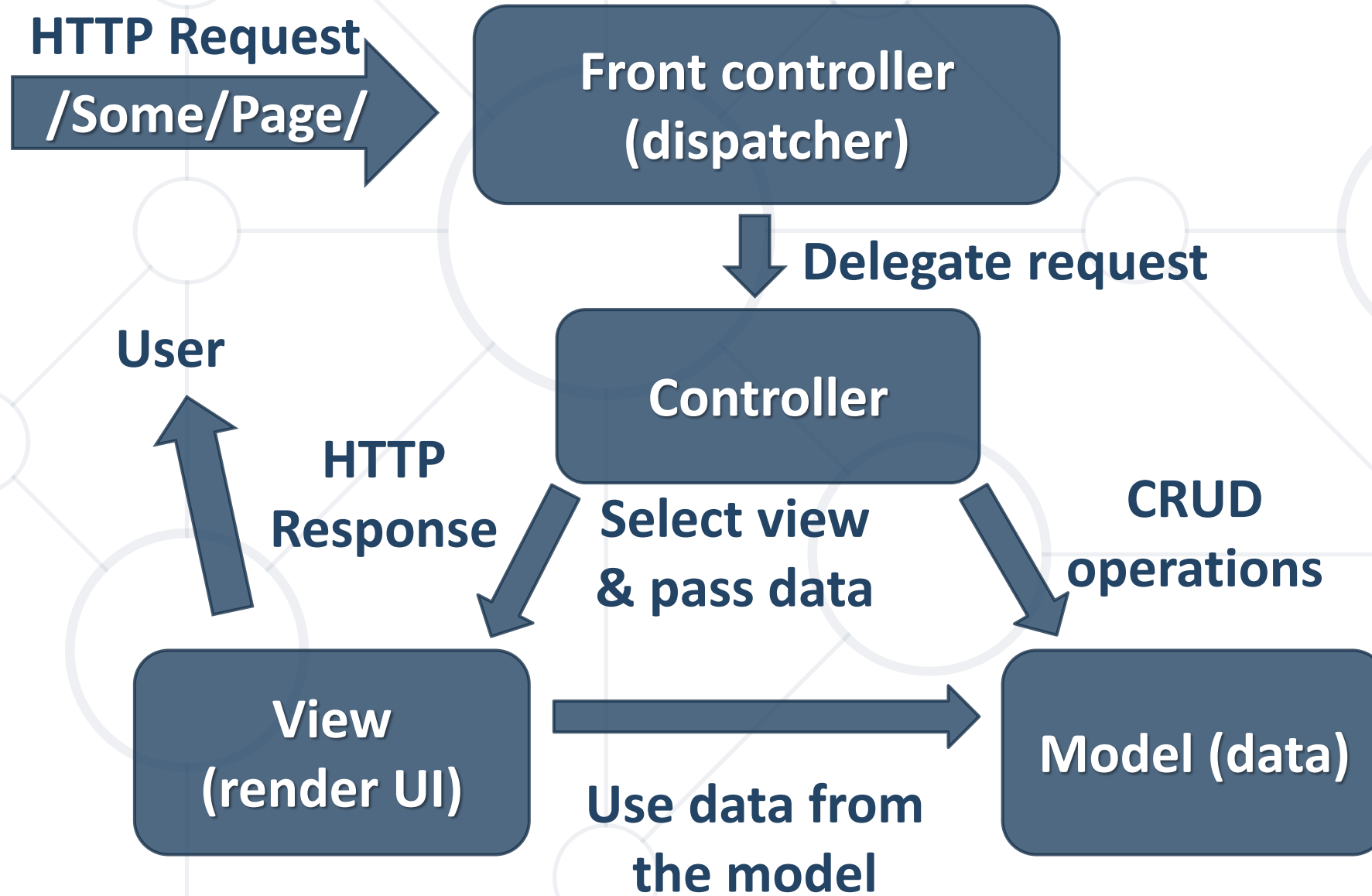
# Controller

- The **core** MVC component - holds the **logic**
- Process the requests
- A set of classes that handles
  - **Communication** from the user
  - Overall application **flow**
    - Application-specific **logic** (business logic)
- Every controller has one or more "**actions**"





# The MVC Pattern





**Spring MVC**

# Spring MVC

- Spring MVC == open source Web MVC framework for Java
  - Developed by Pivotal Software
  - <https://spring.io>
- Built top of Java Servlet API



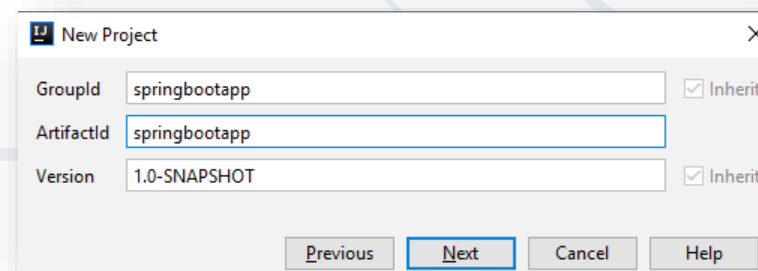
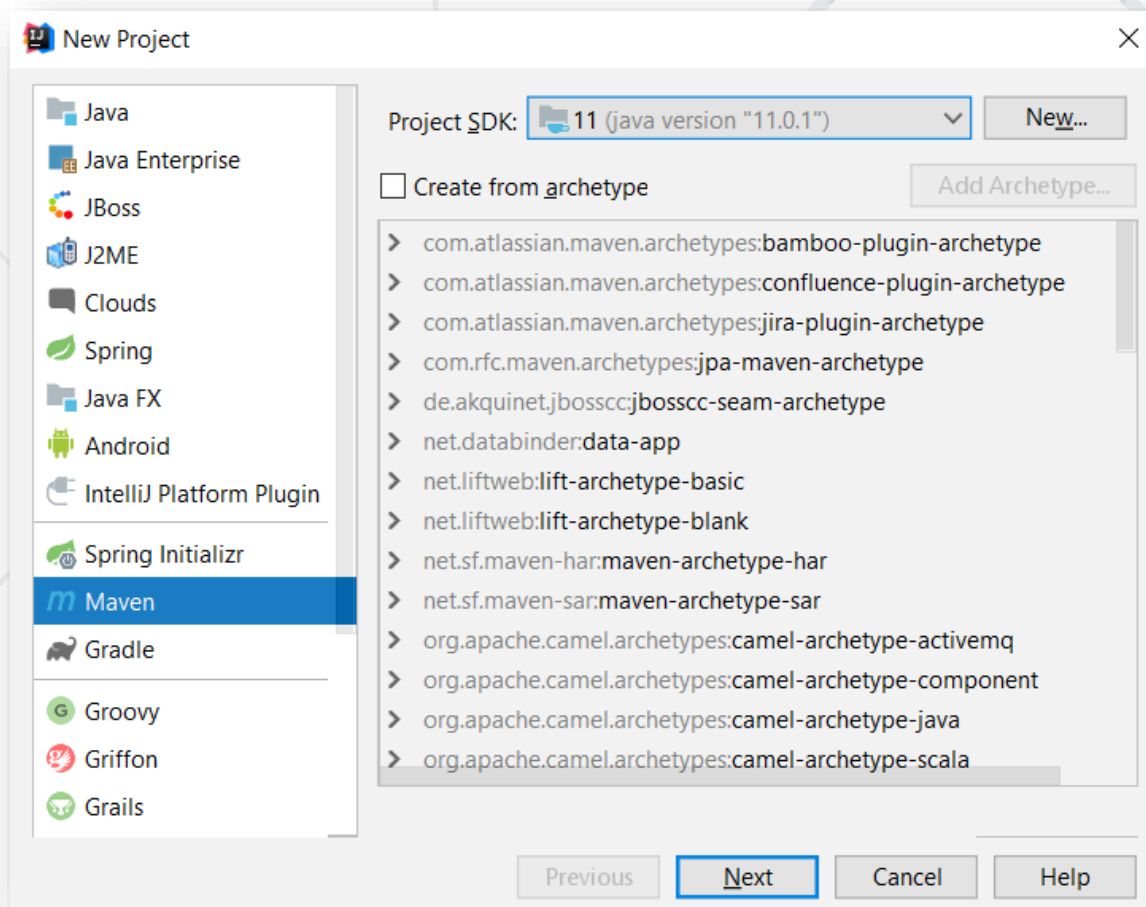
spring

by Pivotal™

- Simplifies building Spring applications
- Convention-over-configuration
  - Rapid application development with Spring
  - Create production-grade applications that you can "**just run**"
  - **Automatically** configure Spring Framework
- Built-in Web server (Tomcat)
- Integrates Spring MVC, Spring Data and other Spring technologies

# Starting with Spring Boot

- Create a new Maven-based Java project



pom.xml

```
<parent>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-parent</artifactId>
  <version>2.0.4.RELEASE</version>
</parent>
<dependencies>
  ...
</dependencies>
<properties><java.version>11</java.version></properties>
```

pom.xml

```
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-thymeleaf</artifactId>
</dependency>
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-web</artifactId>
</dependency>
```

# Spring Boot Application Class

src/main/java/app/MvcAppExample.java

```
package app;

import org.springframework.boot.*;
import org.springframework.boot.autoconfigure.*;

@SpringBootApplication
public class MvcAppExample {
    public static void main(String[] args) {
        SpringApplication.run(MvcAppExample.class, args);
    }
}
```



- Spring uses strongly-typed annotations
  - Syntax highlighting + error checking
  - Describe the code below them

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

```
@GetMapping("/hello")  
public ModelAndView hello() {  
    ...  
}
```

- MVC **controllers** hold **actions**, mapped to **URL** by **annotations**
- Defined with **@Controller** annotations

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

- Controllers can hold multiple actions on different routes

```
@GetMapping("home")  
public ModelAndView home (ModelAndView modelAndView) { ... }
```

Mapped to **<http://localhost:8080/hello>**

- GetMapping – GET Request

```
@GetMapping("/home")  
public ModelAndView home(ModelAndView modelAndView) {  
    ...  
}
```

- PostMapping – POST Request

```
@PostMapping("/register")  
public ModelAndView register(ModelAndView modelAndView) {  
    ...  
}
```

- Create Web controller + action /hello + view hello.html

```
@Controller
public class GreetingController {
    @GetMapping("/hello")
    public ModelAndView home(ModelAndView modelAndView) {
        modelAndView.setViewName("hello.html");
        return modelAndView;
    }
}
```

**HTML** File in  
resources/templates/  
hello.html



**Thymeleaf**  
Template Engine

# Thymeleaf



- Thymeleaf is a view engine used in **Spring MVC**
  - Natural templates – HTML with additional attributes to add view logic
- Thymeleaf allows us to:
  - Use **variables** / **collections** in our views
  - Execute **operations** on our variables
  - **Iterate** over **collections**

- All Thymeleaf tags and attributes begin with **th:**
- Example of Thymeleaf attribute

```
<p th:text="Example">...</p>
```

- **th:block** is an attribute container that disappears in the HTML

```
<th:block>  
...  
</th:block>
```

- Variable Expressions are executed on the context variables

```
${ ... }
```

- Examples:

```
${title}
```

```
${article.title}
```

```
${article.author.name}
```



- Link Expressions are used to build URLs

```
@{ ... }
```

- Example:

```
<a th:href="@{/register}">Register</a>
```

- You can also pass query string parameters

```
<a th:href="@{/details(id=${game.id})}">Details</a>
```

- Create dynamic URLs

```
<a th:href="@{/games/{id}/edit(id=${game.id})}">Edit</a>
```

- In Thymeleaf you can create HTML forms:

```
<form th:action="@{/user}" th:method="post">  
  <input type="number" name="id"/>  
  <input type="text" name="name"/>  
  <input type="submit">  
</form>
```

- You can parse the input as an object

```
@PostMapping("/user")  
public ModelAndView register(@ModelAttribute User user) { ... }
```

- You can use if statements in thymeleaf using **th:if**

```
<div th:if="$ {...}">  
  <p>The statement is true"</p>  
</div>
```

- You can create inverted if statements using **th:unless**

```
<div th:unless="$ {...}">  
  <p>The statement is false"</p>  
</div>
```

- For loop

```
<div th:each="element :  
    ${#numbers.sequence(start, end, step)}">  
    <p th:text="${element}"></p>  
</div>
```

- Example:

```
<div th:each="element : ${#numbers.sequence(1, 5, 1)}">  
    <p th:text="${element}"></p>  
</div>  
  
//1 2 3 4 5
```

- For-each loop

```
<div th:each="item : ${collection}">  
  <p th:text="${item.property}"></p>  
</div>
```

- Example

```
<div th:each="book : ${books}">  
  <p th:text="${book.name}"></p>  
  <p th:text="${book.author}"></p>  
  <p th:text="${book.price}"></p>  
</div>
```

- Passing a string to the view

```
<body>  
    <p>Hello, <span th:text="${name}"></span></p>  
</body>
```

```
@GetMapping("/hello")  
public ModelAndView hello(ModelAndView modelAndView) {  
    modelAndView.setViewName("hello");  
    modelAndView.addObject("name", "Peter");  
    return modelAndView;  
}
```

- Passing a collection to the view

```
<div th:each="book : ${books}">
    <p th:text="${book.name}"></p>
</div>
```

```
@GetMapping("/all")
public ModelAndView listBooks(ModelAndView modelAndView) {
    ...
    modelAndView.addObject("books", books);
    return modelAndView;
}
```

- Implementing **MVC Pattern**
- Spring MVC
  - Open Source **Framework** for **Java**
- Spring Boot
  - **Configures** and **simplifies Spring apps**
- Thymeleaf
  - Powerful **view engine**
  - **Expressions, Conditions** and **Iterations**

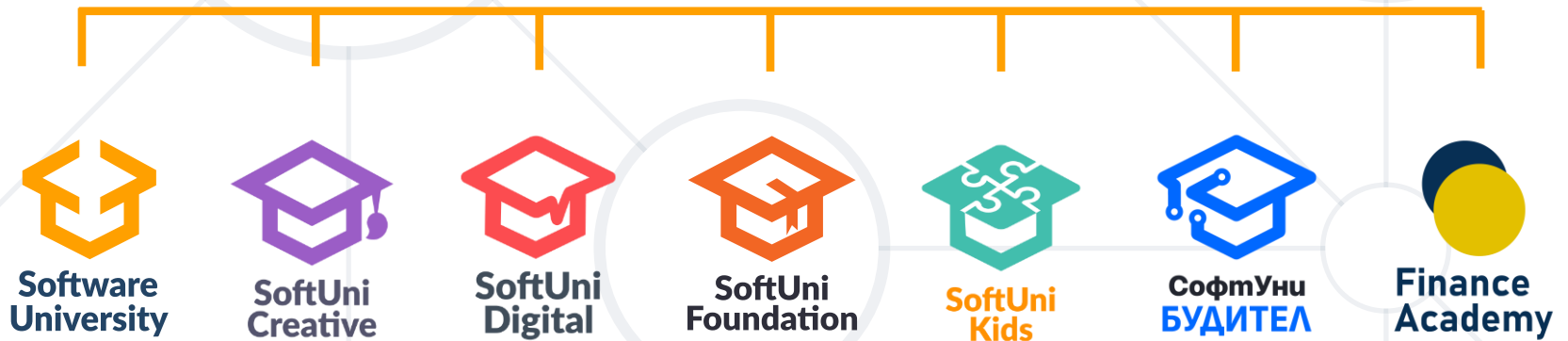




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