# Thymeleaf CRUD - Real Time Project

# Application Requirements

From the Boss

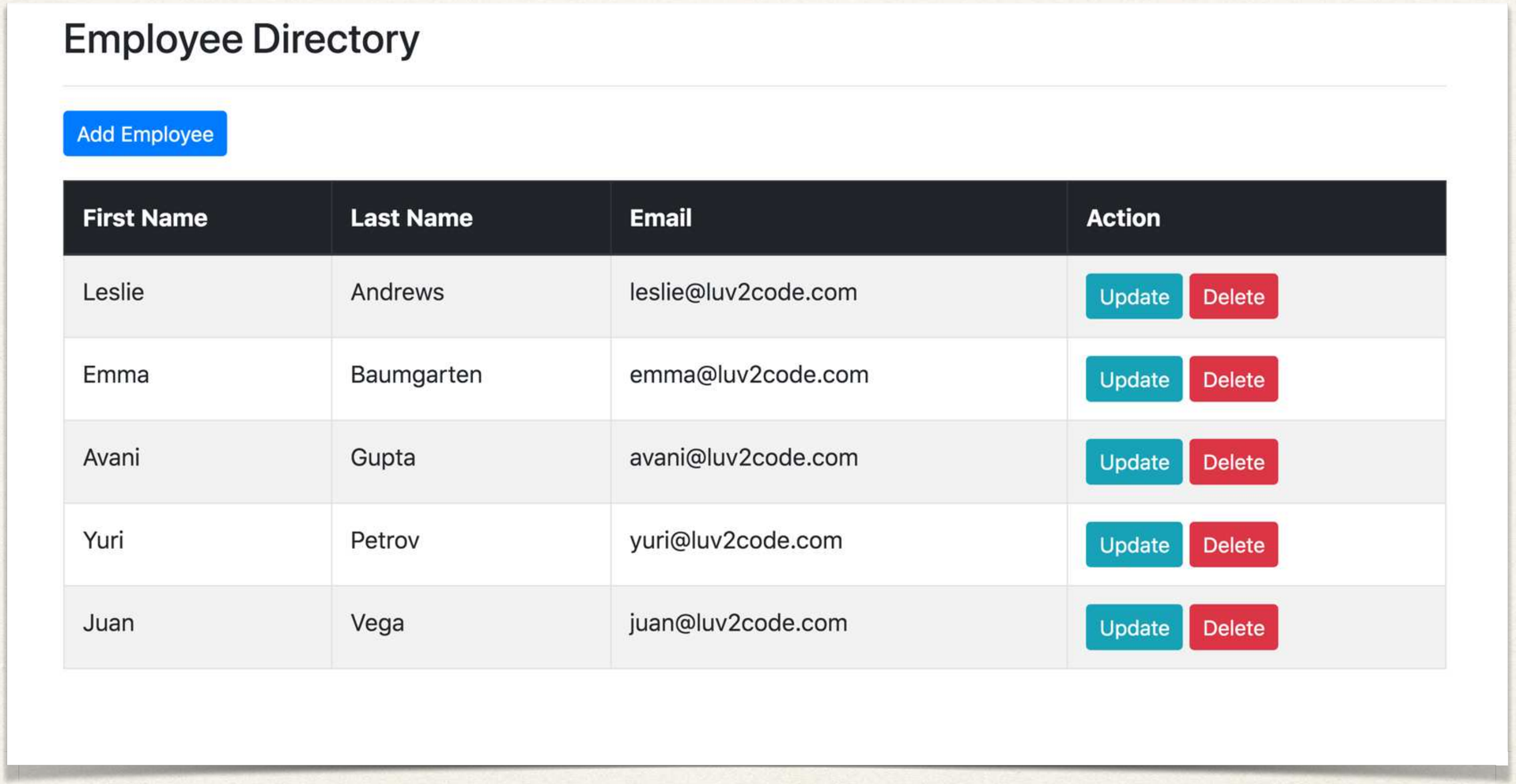
Create a Web UI for the Employee Directory

Users should be able to
- Get a list of employees
- Add a new employee
- Update an employee
- Delete an employee

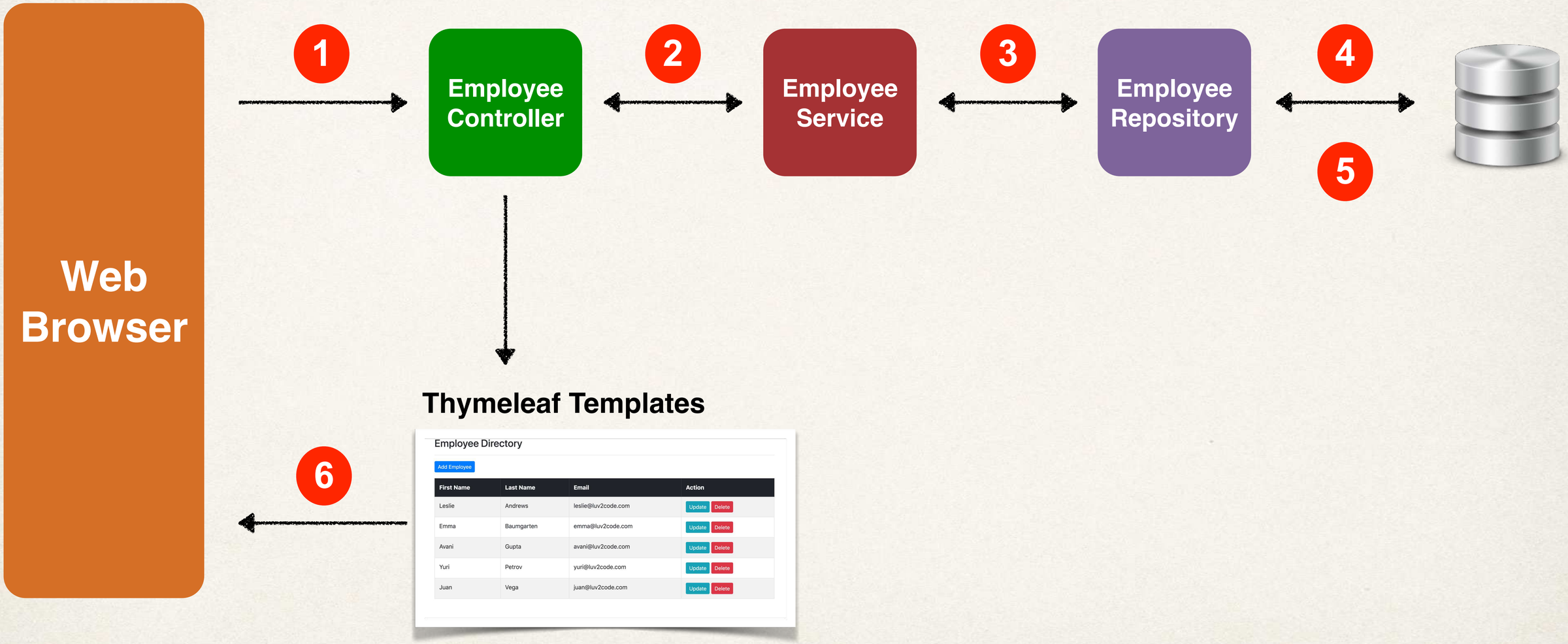
Thymeleaf + Spring Boot

# Real-Time Project

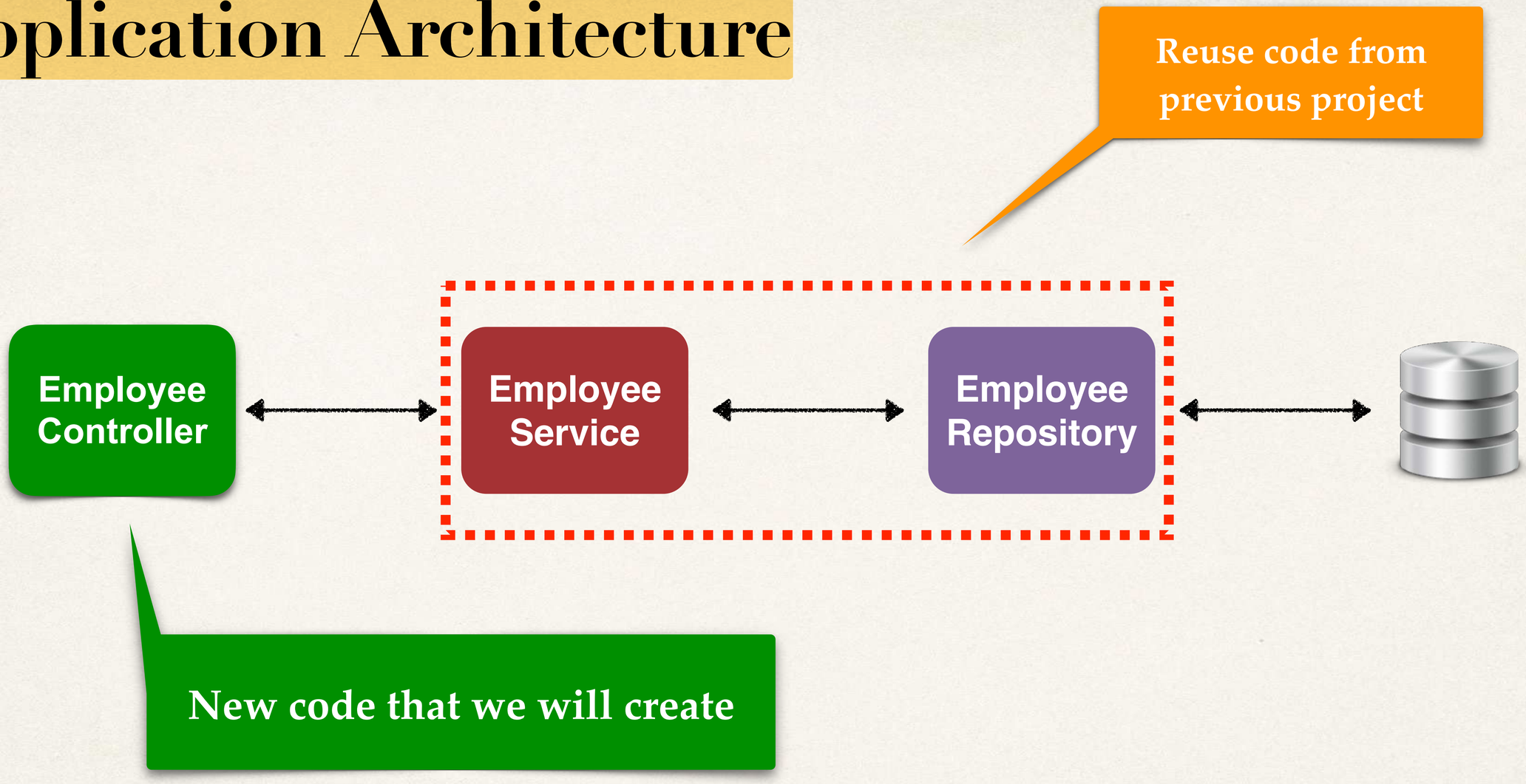
Thymeleaf + Spring Boot



# Big Picture



# Application Architecture



# Project Set Up

- We will extend our existing Employee project and add DB integration

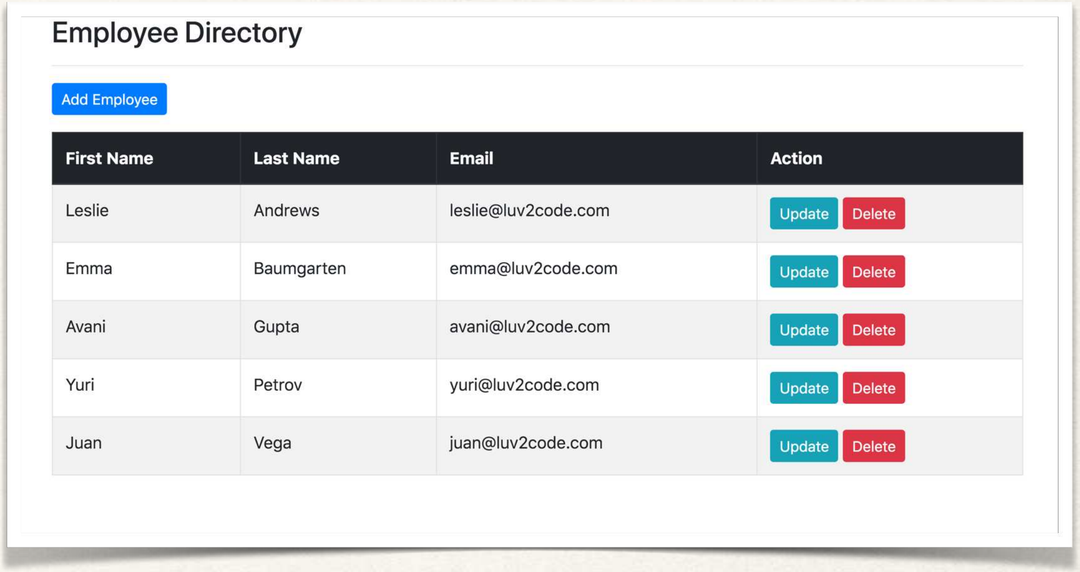
- Add **`EmployeeService`**, **`EmployeeRepository`** and **`Employee`** entity
  - Available in one of our previous projects
  - We created all of this code already from scratch … so we'll just copy/paste it

- Allows us to focus on creating **`EmployeeController`** and Thymeleaf templates

# Development Process - Big Picture

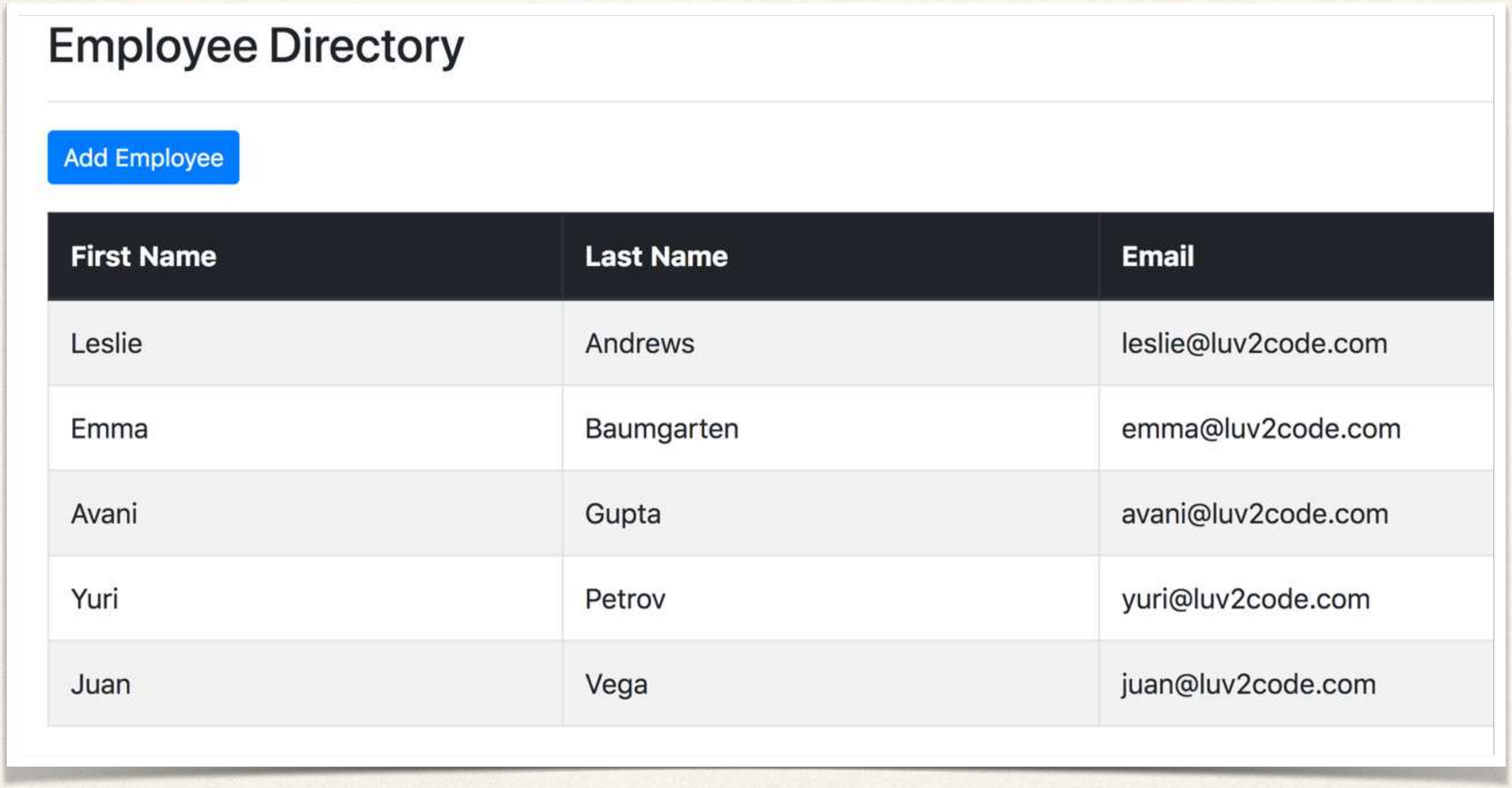
Step-By-Step

1. Get list of employees
2. Add a new employee
3. Update an existing employee
4. Delete an existing employee



# Thymeleaf - Add Employee

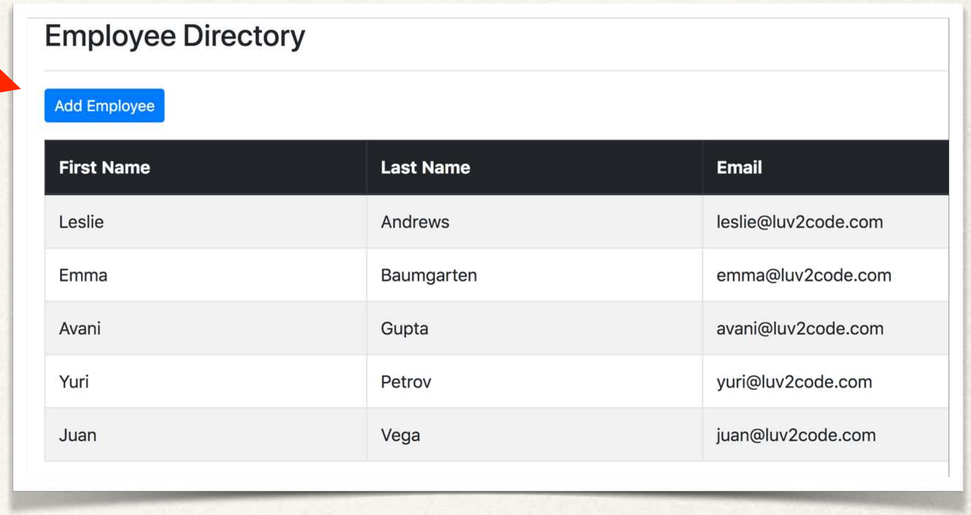
# Add Employee - DEMO



# Add Employee

Step-By-Step

1. New **Add Employee** button for list-employees.html

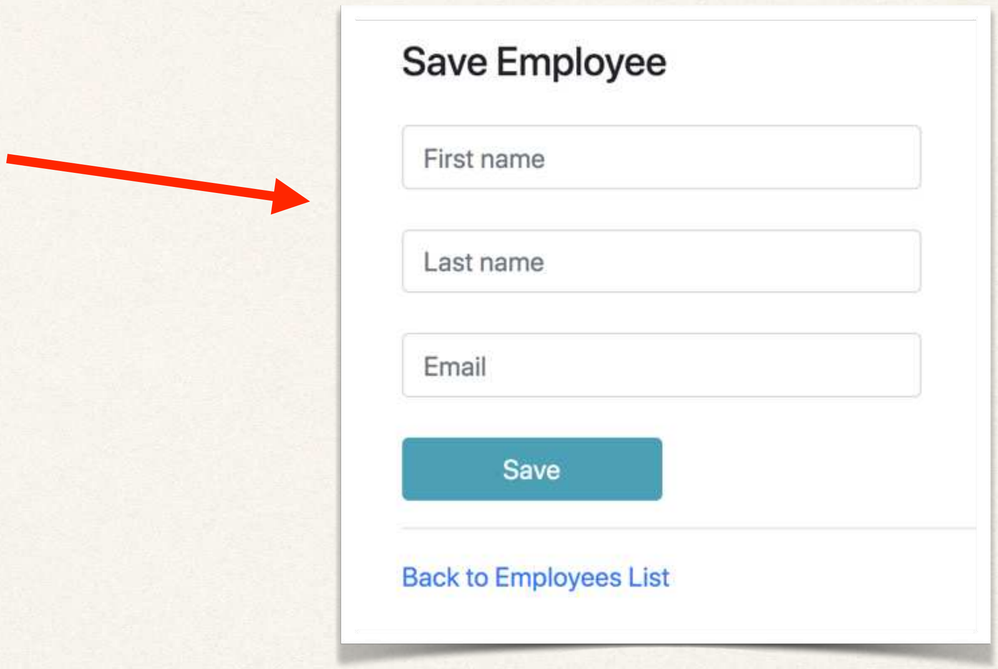


# Add Employee

Step-By-Step

1. New **Add Employee** button for list-employees.html

2. Create HTML form for new employee



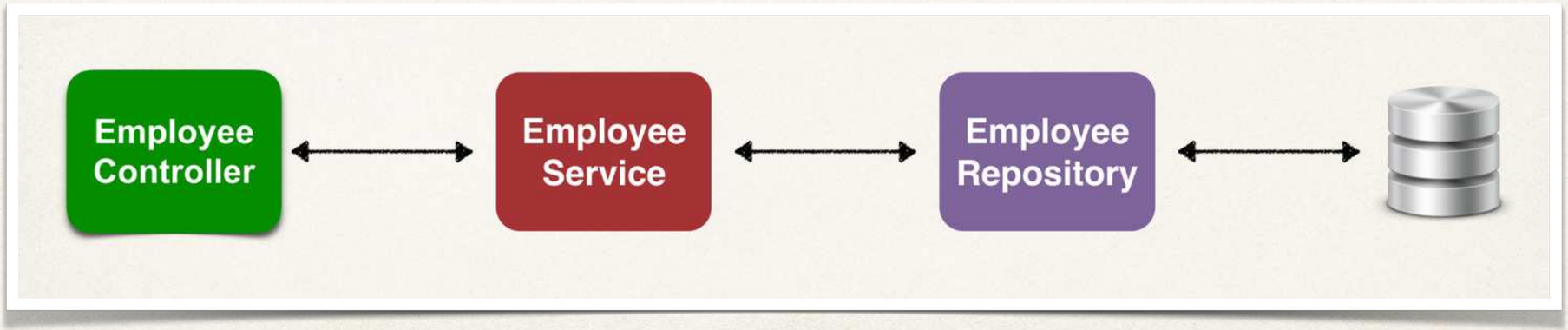
# Add Employee

Step-By-Step

1. New **Add Employee** button for list-employees.html

2. Create HTML form for new employee

3. Process form data to save employee



# Step 1: New "Add Employee" button

- **Add Employee** button will href link to
  - request mapping ***/employees/showFormForAdd***

```
<a th:href="@{/employees/showFormForAdd}">
  Add Employee
</a>
```

Add Employee

**@ symbol**
**Reference context path of your application**
**(app root)**

# Step 1: New "Add Employee" button

- **Add Employee** button will href link to
  - request mapping ***/employees/showFormForAdd***

```
<a th:href="@{/employees/showFormForAdd}"
 class="btn btn-primary btn-sm mb-3">
 Add Employee
</a>
```


Apply Bootstrap styles

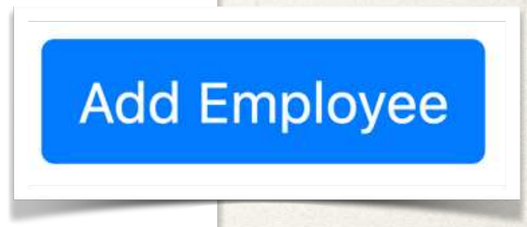
Docs on Bootstrap styles: www.getbootstrap.com

Button
Button Primary
Button Small
Margin Bottom, 3 pixels

# Step 1: New "Add Employee" button

- **Add Employee** button will href link to
  - request mapping ***/employees/showFormForAdd***

```
<a th:href="@{/employees/showFormForAdd}"
 class="btn btn-primary btn-sm mb-3">
 Add Employee
</a>
```




**TODO:**
**Add controller request mapping for**
**`/employees/showFormForAdd`**

# Showing Form

In your Spring Controller

- Before you show the form, you must add a ***model attribute***

- This is an object that will hold form data for the ***data binding***

# Controller code to show form

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

  @GetMapping("/showFormForAdd")
  public String showFormForAdd(Model theModel) {

    // create model attribute to bind form data
    Employee theEmployee = new Employee();

    theModel.addAttribute("employee", theEmployee);

    return "employees/employee-form";
  }
  ...
}
```

Our Thymleaf template will access this data for binding form data

src/main/resources/templates/employees/employee-form.html

# Thymeleaf and Spring MVC Data Binding

- Thymeleaf has special expressions for binding Spring MVC form data

- Automatically setting / retrieving data from a Java object

# Thymeleaf Expressions

- Thymeleaf expressions can help you build the HTML form :-)

| Expression | Description |
|---|---|
| `th:action` | Location to send form data |
| `th:object` | Reference to model attribute |
| `th:field` | Bind input field to a property on model attribute |
| *more ….* | *See - **www.luv2code.com/thymeleaf-create-form*** |

# Step 2: Create HTML form for new employee

Empty place holder
Thymeleaf will handle real work

Real work
Send form data to
*/employees/save*

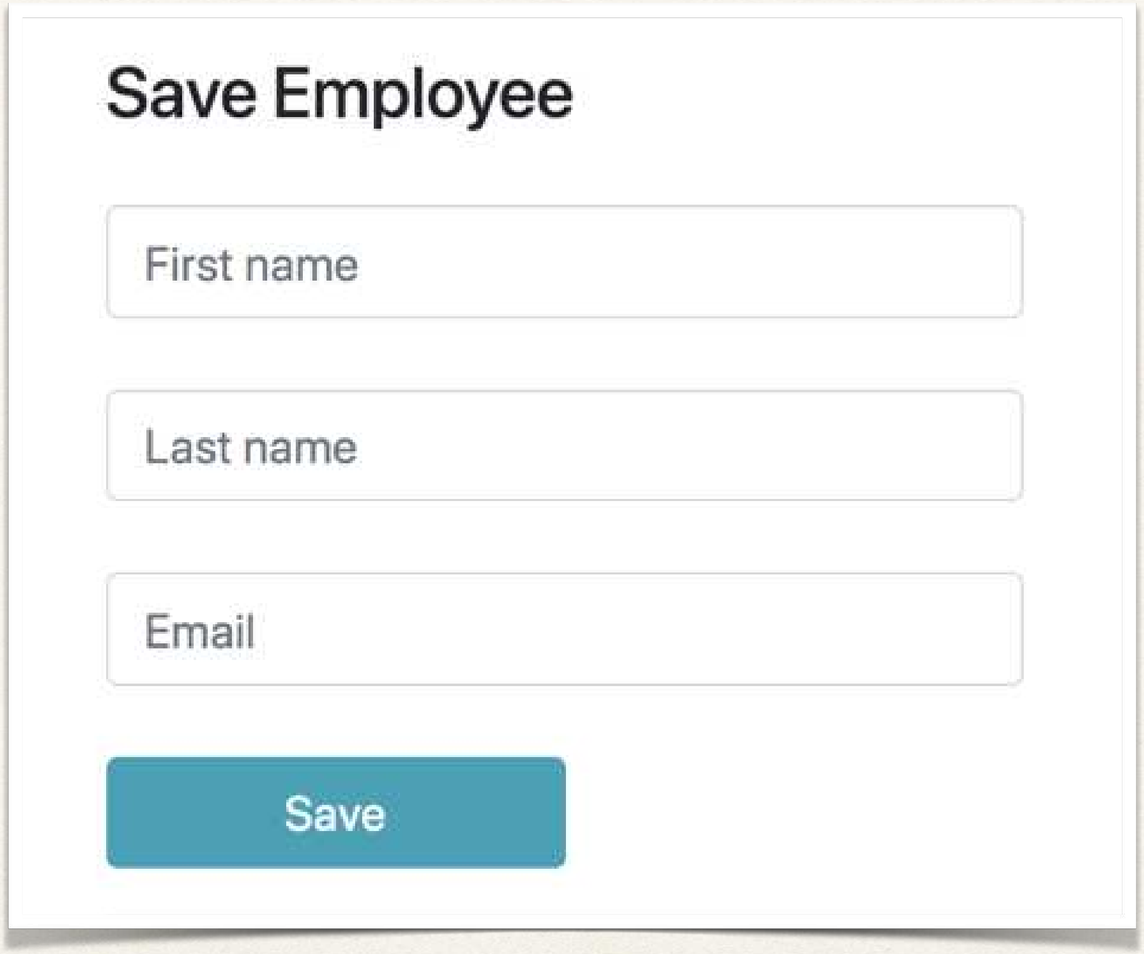
```
<form action="#" th:action="@{/employees/save}"
      th:object="${employee}" method="POST">


</form>
```

Our model attribute

```
theModel.addAttribute("employee", theEmployee);
```

# Step 2: Create HTML form for new employee

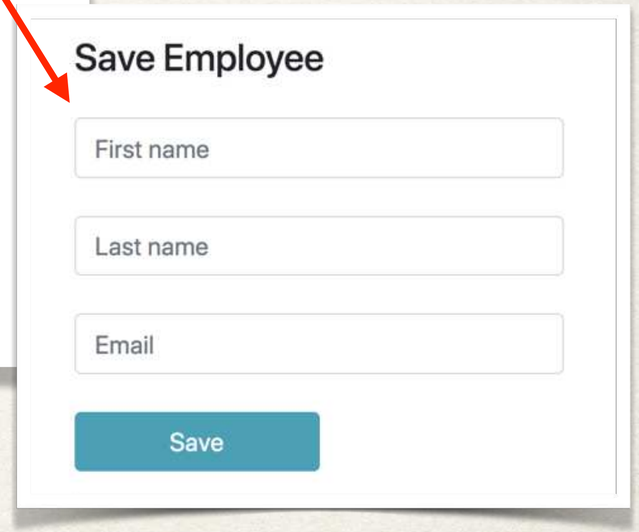
Define form input fields



# Step 2: Create HTML form for new employee

*{...}
Selects property on referenced
th:object

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <input type="text" th:field="*{firstName}" placeholder="First name">

  <input type="text" th:field="*{lastName}" placeholder="Last name">

  <input type="text" th:field="*{email}" placeholder="Email">

  <button type="submit">Save</button>

</form>
```



# Step 2: Create HTML form for new employee

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <input type="text" th:field="*{firstName}" placeholder="First name">

  <input type="text" th:field="*{lastName}" placeholder="Last name">

  <input type="text" th:field="*{email}" placeholder="Email">

  <button type="submit">Save</button>

</form>
```

1

When form is **loaded**, will call:

**employee.getFirstName()**
**...**
**employee.getLastName**

2

When form is **submitted**, will call:

**employee.setFirstName(...)**
**...**
**employee.setLastName(...)**

Call getter methods to populate form fields initially

Example of Data Binding

Call setter methods to populate Java object with form data

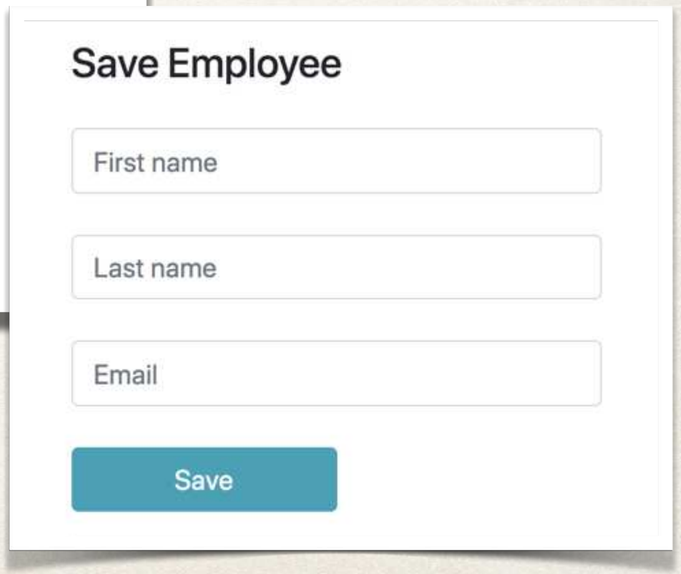
That is an example here of data binding with Thymeleaf and Spring MVC.

# Step 2: Create HTML form for new employee

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <input type="text" th:field="*{firstName}" placeholder="First name"
         class="form-control mb-4 w-25">


</form>
```

Apply Bootstrap styles

Form control
Margin Bottom: 4 pixels
Width: 25%

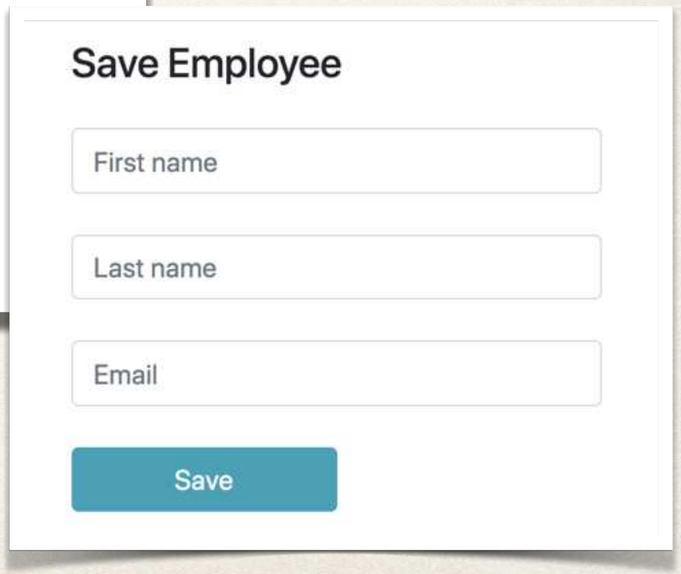


# Step 2: Create HTML form for new employee

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <input type="text" th:field="*{firstName}" placeholder="First name"
         class="form-control mb-4 w-25">

  <input type="text" th:field="*{lastName}" placeholder="Last name"
         class="form-control mb-4 w-25">

  <input type="text" th:field="*{email}" placeholder="Email"
         class="form-control mb-4 w-25">

  <button type="submit" class="btn btn-info col-2">Save</button>

</form>
```

Button
Button Info
Column Span 2

Apply Bootstrap styles

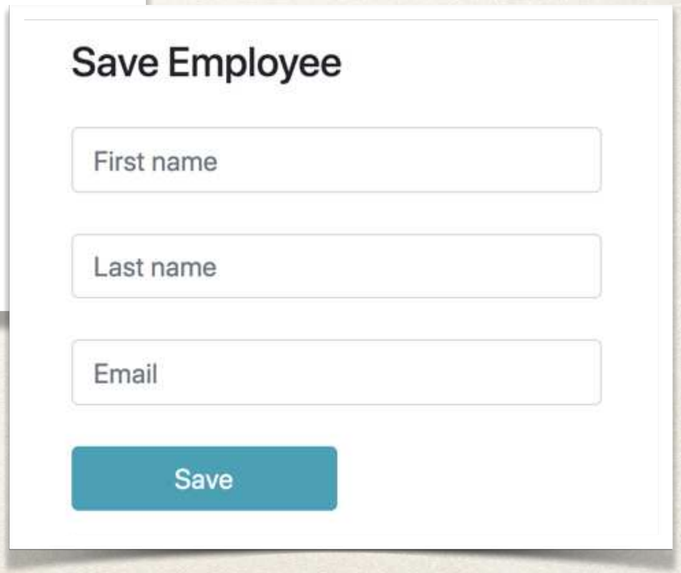


# Step 2: Create HTML form for new employee

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <input type="text" th:field="*{firstName}" placeholder="First name"
         class="form-control mb-4 w-25">

  <input type="text" th:field="*{lastName}" placeholder="Last name"
         class="form-control mb-4 w-25">

  <input type="text" th:field="*{email}" placeholder="Email"
         class="form-control mb-4 w-25">

  <button type="submit" class="btn btn-info col-2">Save</button>

 </form>
```

**TODO:**

**Add controller request mapping for `/employees/save`**



# Step 3: Process form data to save employee

Since only one constructor
@Autowired is optional

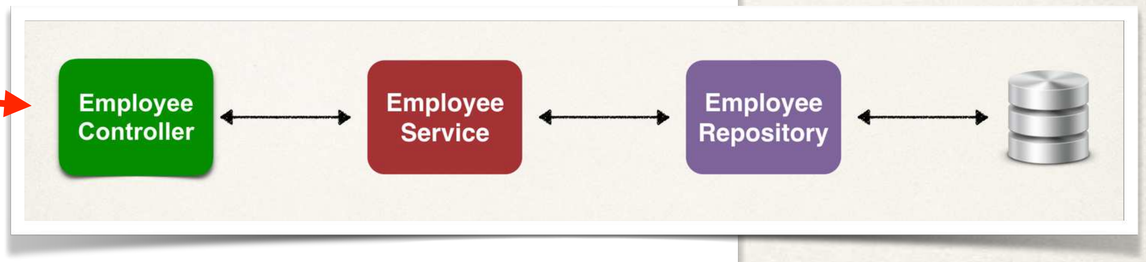
```
@Controller
@RequestMapping("/e
public class Employ

   private EmployeeService employeeService;

   public EmployeeController(EmployeeService theEmployeeService) {
      employeeService = theEmployeeService;
   }

   @PostMapping("/save")
   public String saveEmployee(@ModelAttribute("empl

      // save the employee
      employeeService.save(theEmployee);

      // use a redirect to prevent duplicate submissions
      return "redirect:/employees/list";
   }
   ...
}
```

Constructor injection

# Step 3: Process form data to save employee

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

   private EmployeeService emp

   public EmployeeController(E
      employeeService = theEmp
   }

   @PostMapping("/save")
   public String saveEmployee(@ModelAttribute("employee") Employee theEmployee) {

      // save the employee
      employeeService.save(theEmployee);

      // use a redirect to prevent duplicate submissions
      return "redirect:/employees/list";
   }
   ...
}
```

```
<form action="#" th:action="@{/employees/save}"
                 th:object="${employee}" method="POST">
```



# Step 3: Process form data to save employee

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

   private EmployeeService employeeService;

   public EmployeeController(EmployeeService theEmployeeService) {
      employeeService = theEmployeeService;
   }

   @PostMapping("/save")
   public String saveEmployee(@ModelAttribute("employee") Employee theEmployee) {

      // save the employee
      employeeService.save(theEmployee);

      // use a redirect to prevent duplicate submissions
      return "redirect:/employees/list";
   }
   ...
}
```

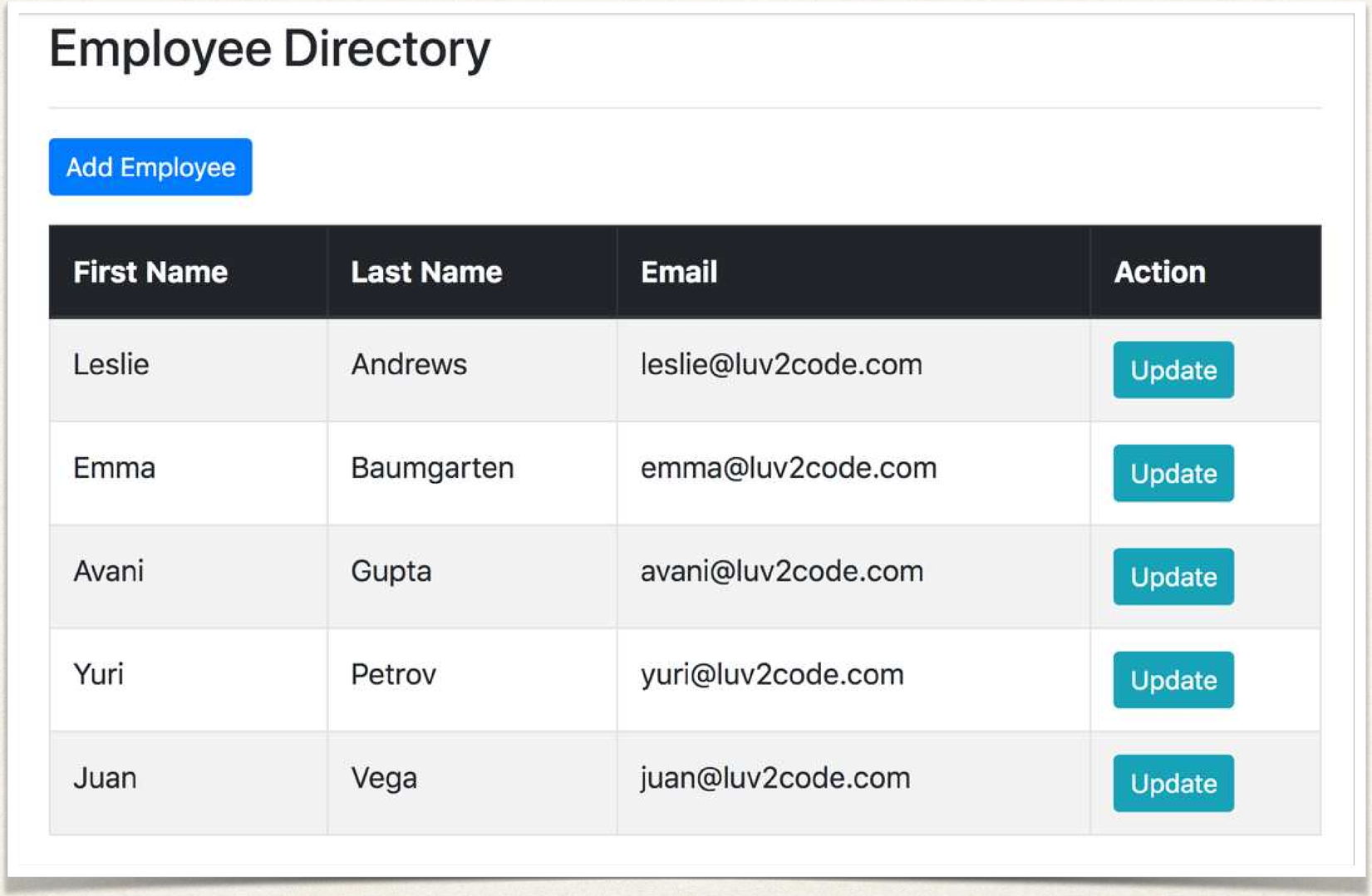
**Redirect to request mapping `/employees/list`**

**"Post/Redirect/Get" pattern**

**For more info see www.luv2code.com/post-redirect-get**

# Thymeleaf - Update Employee

# Update Employee - Demo



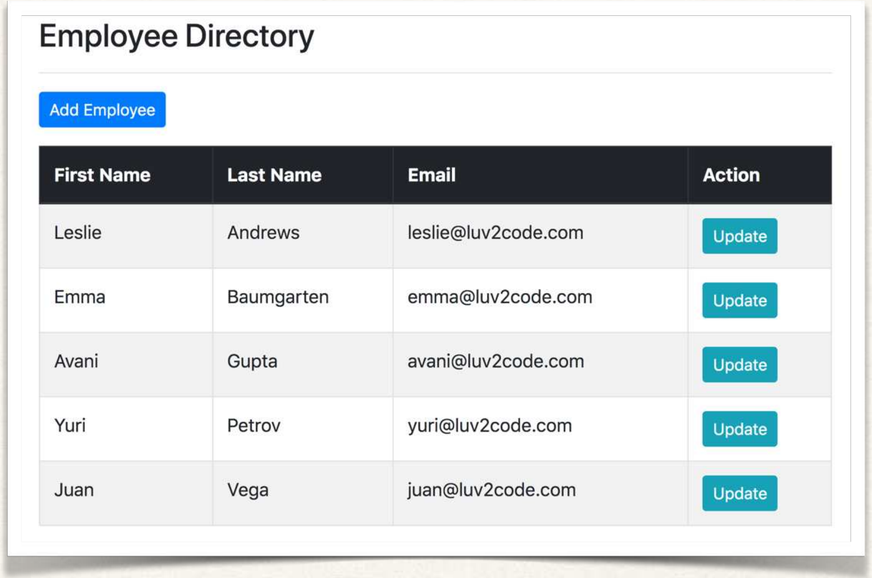
# Update Employee

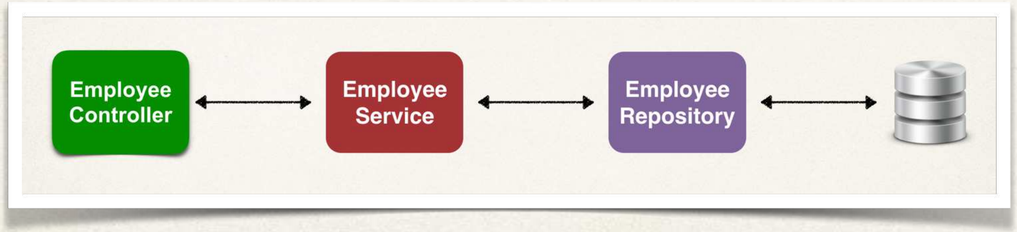
Step-By-Step

1. "Update" button

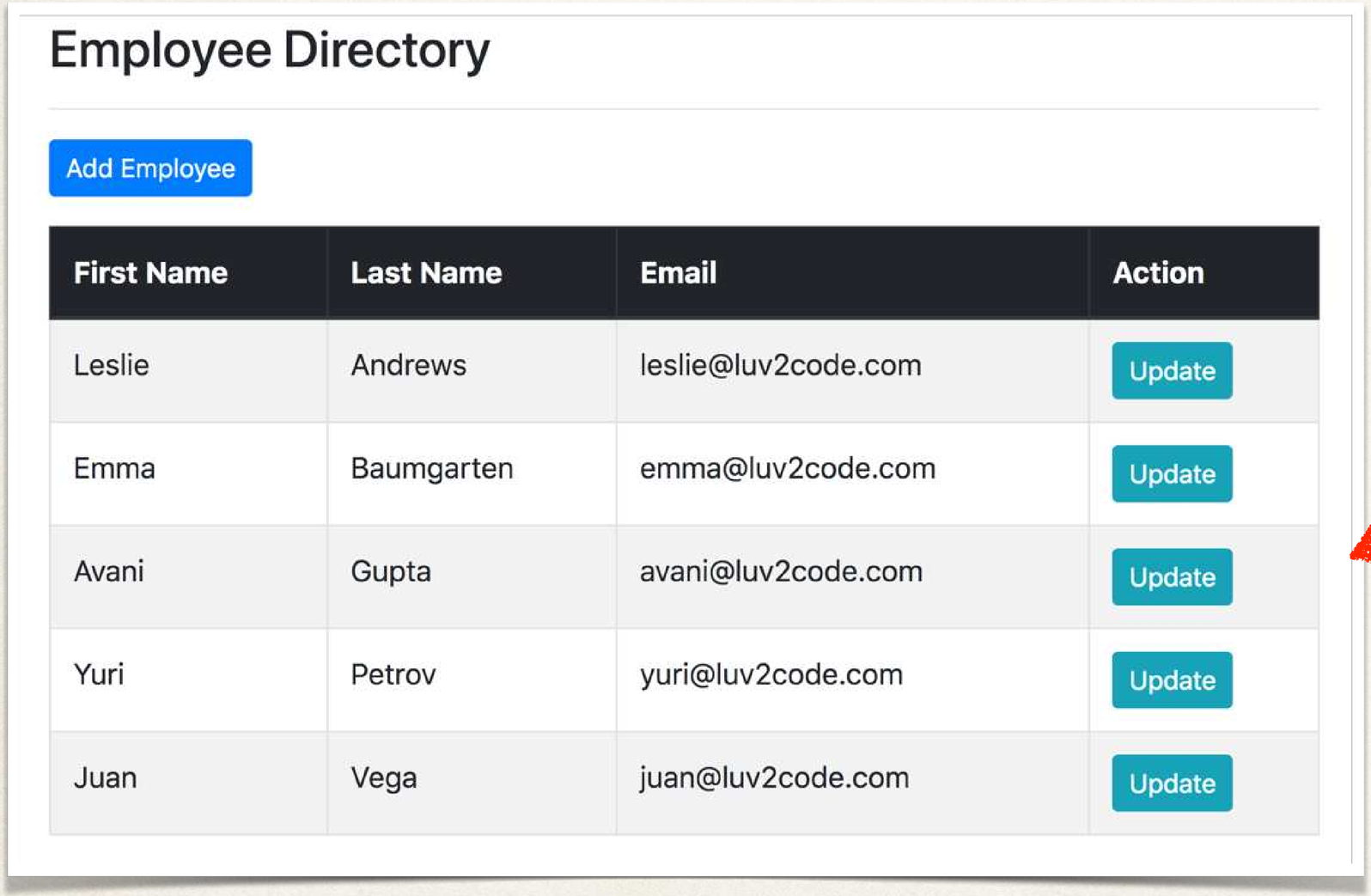
2. Pre-populate the form

3. Process form data



# Step 1: "Update" Button




Each row has an **Update** link

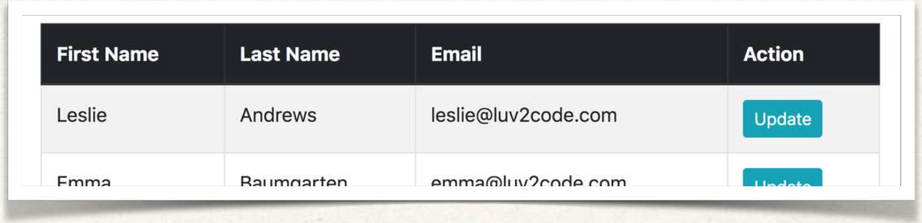
- current employee id embedded in link

When **clicked**

- will load the employee from database
- prepopulate the form

# Step 1: "Update" button

- **Update** button includes employee id




```
<tr th:each="tempEmployee : ${employees}">
  ...
  <td>

    <a th:href="@{/employees/showFormForUpdate(employeeId=${tempEmployee.id})}"
       class="btn btn-info btn-sm">
      Update
    </a>

  </td>

</tr>
```

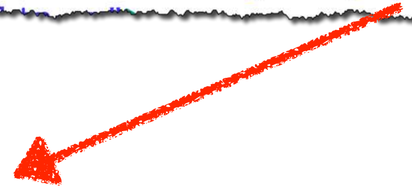
Appends to URL

**?employeeId=xxx**

# Step 2: Pre-populate Form

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

  @GetMapping("/showFormForUpdate")
  public String showFormForUpdate(@RequestParam("employeeId") int theId,
                                  Model theModel) {

    // get the employee from the service
    Employee theEmployee = employeeService.findById(theId);

    // set employee as a model attribute to pre-populate the form
    theModel.addAttribute("employee", theEmployee);

    // send over to our form
    return "employees/employee-form";
  }

}
```

```
<a th:href="@{/employees/showFormForUpdate(employeeId=${tempEmployee.id})}"
```



# Step 2: Pre-populate Form

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <!-- Add hidden form field to handle update -->
  <input type="hidden" th:field="*{id}" />

  <input type="text" th:field="*{firstName}"
      class="form-control mb-4 w-25" placeholder="First name">

  <input type="text" th:field="*{lastName}"
      class="form-control mb-4 w-25" placeholder="Last name">

  <input type="text" th:field="*{email}"
      class="form-control mb-4 w-25" placeholder="Email">

  <button type="submit" class="btn btn-info col-2">Save</button>

</form>
```

1

When form is **loaded**, will call:

**employee.getFirstName()**
**...**
**employee.getLastName**

**This is how form is pre-populated**
**Thanks to calls to getters**

# Step 2: Pre-populate Form

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <!-- Add hidden form field to handle update -->
  <input type="hidden" th:field="*{id}" />

  <input type="text" th:field="*{firstName}"
      class="form-control mb-4 w-25" placeholder="First name">

  <input type="text" th:field="*{lastName}"
      class="form-control mb-4 w-25" placeholder="Last name">

  <input type="text" th:field="*{email}"
      class="form-control mb-4 w-25" placeholder="Email">

  <button type="submit" class="btn btn-info col-2">Save</button>

</form>
```

**Hidden form field required for updates**

**This binds to the model attribute**

**Tells your app which employee to update**

# Step 2: Pre-populate Form

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <!-- Add hidden form field to handle update -->
  <input type="hidden" th:field="*{id}" />

  <input type="text" th:field="*{firstName}"
      class="form-control mb-4 w-25" placeholder="First name">

  <input type="text" th:field="*{lastName}"
      class="form-control mb-4 w-25" placeholder="Last name">

  <input type="text" th:field="*{email}"
      class="form-control mb-4 w-25" placeholder="Email">

  <button type="submit" class="btn btn-info col-2">Save</button>

</form>
```

# Step 2: Pre-populate Form

```
<form action="#" th:action="@{/employees/save}"
          th:object="${employee}" method="POST">

  <!-- Add hidden form field to handle update -->
  <input type="hidden" th:field="*{id}" />

  <input type="text" th:field="*{firstName}"
      class="form-control mb-4 w-25" placeholder="First name">

  <input type="text" th:field="*{lastName}"
      class="form-control mb-4 w-25" placehol

  <input type="text" th:field="*{email}"
      class="form-control mb-4 w-25" placehol

  <button type="submit" class="btn btn-info c

</form>
```

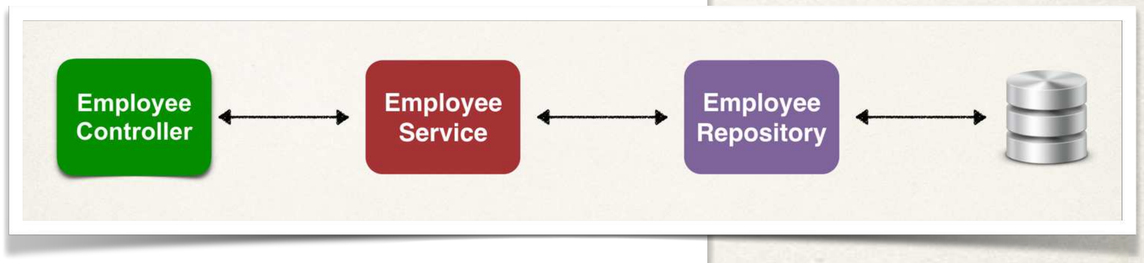
**This binds to the model attribute**

**Tells your app which employee to update**

# Step 3: Process form data to save employee

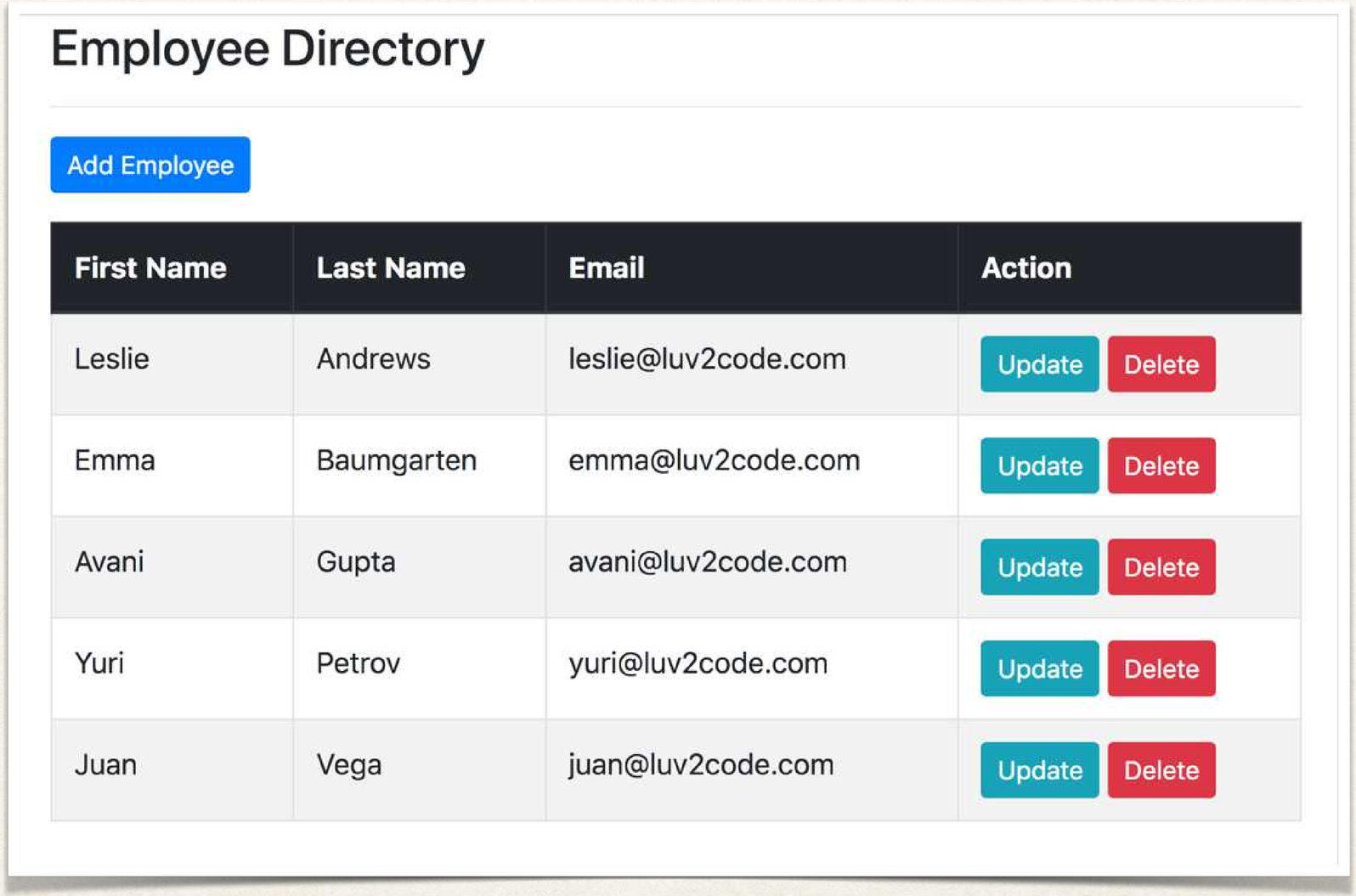
- No need for new code … we can reuse our existing code
- Works the same for add or update :-)

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

   @PostMapping("/save")
   public String saveEmployee(@ModelAttribute("employee") Employee theEmployee) {

      // save the employee
      employeeService.save(theEmployee);

      // use a redirect to prevent duplicate submissions
      return "redirect:/employees/list";
   }
   …
}
```



# Thymeleaf - Delete Employee

# Delete Employee - DEMO

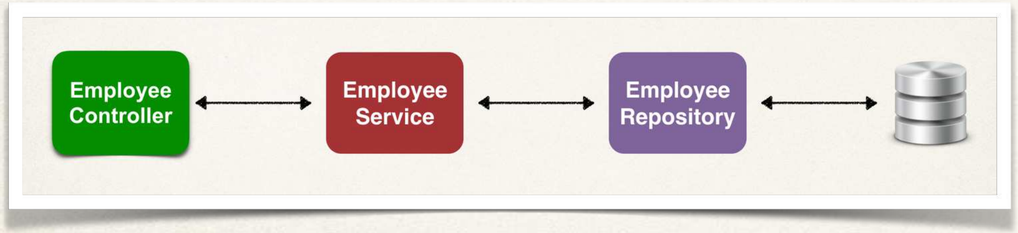


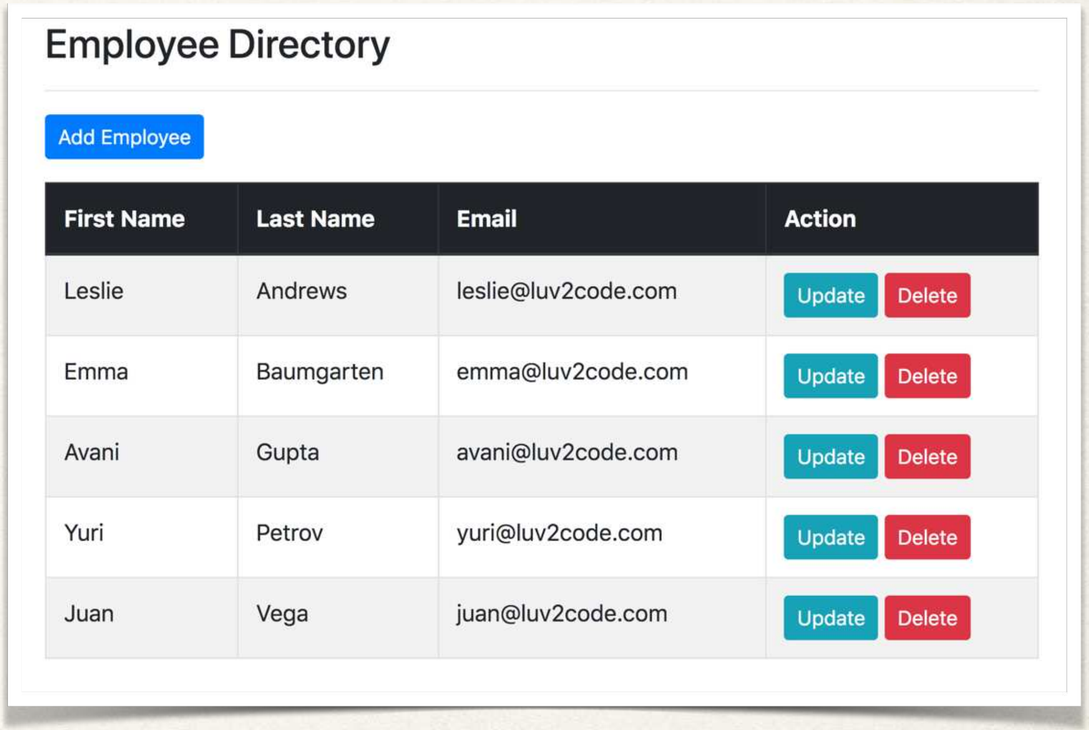
# Delete Employee

Step-By-Step

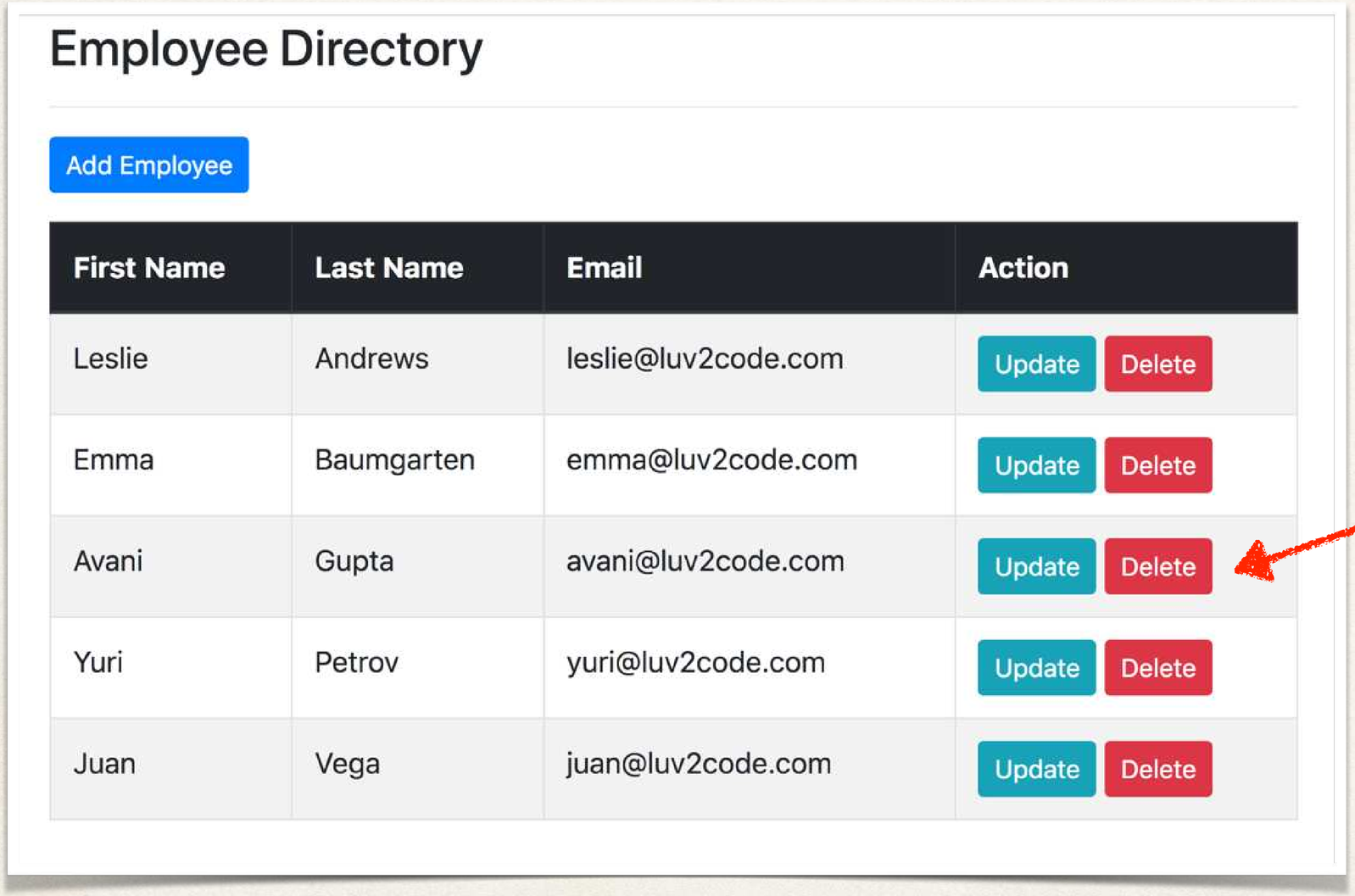
1. Add “Delete” button/link on page

2. Add controller code for “Delete”



# Step 1: "Delete" button




Each row has a **Delete** button/link

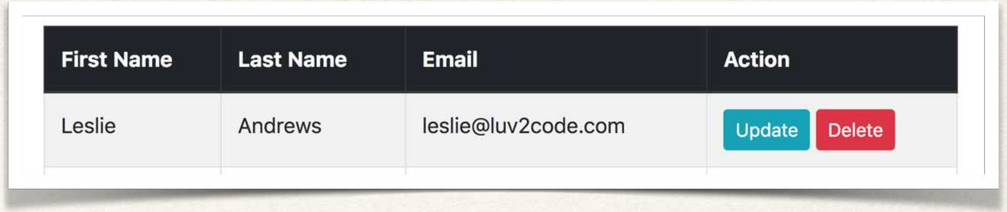
- current employee id embedded in link

When **clicked**

- prompt user
- will delete the employee from database

# Step 1: "Delete" button

- **Delete** button includes employee id




```
<tr th:each="tempEmployee : ${employees}">
  …
  <td>

    <a th:href="@{/employees/delete(employeeId=${tempEmployee.id})}"
       class="btn btn-danger btn-sm"
       onclick="if (!(confirm('Are you sure you want to delete this employee?'))) return false">
      Delete
    </a>

  </td>

</tr>
```

Appends to URL

?employeeId=xxx

JavaScript to prompt user before deleting

# Step 2: Add controller code for delete

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

  @GetMapping("/delete")
  public String delete(@RequestParam("employeeId") int theId) {

    // delete the employee
    employeeService.deleteById(theId);

    // redirect to /employees/list
    return "redirect:/employees/list";
  }
  ...
}
```

```
<a th:href="@{/employees/delete(employeeId=${tempEmployee.id})}"
```