Thymeleaf CRUD - Real Time Project

Application Requirements

From the Boss

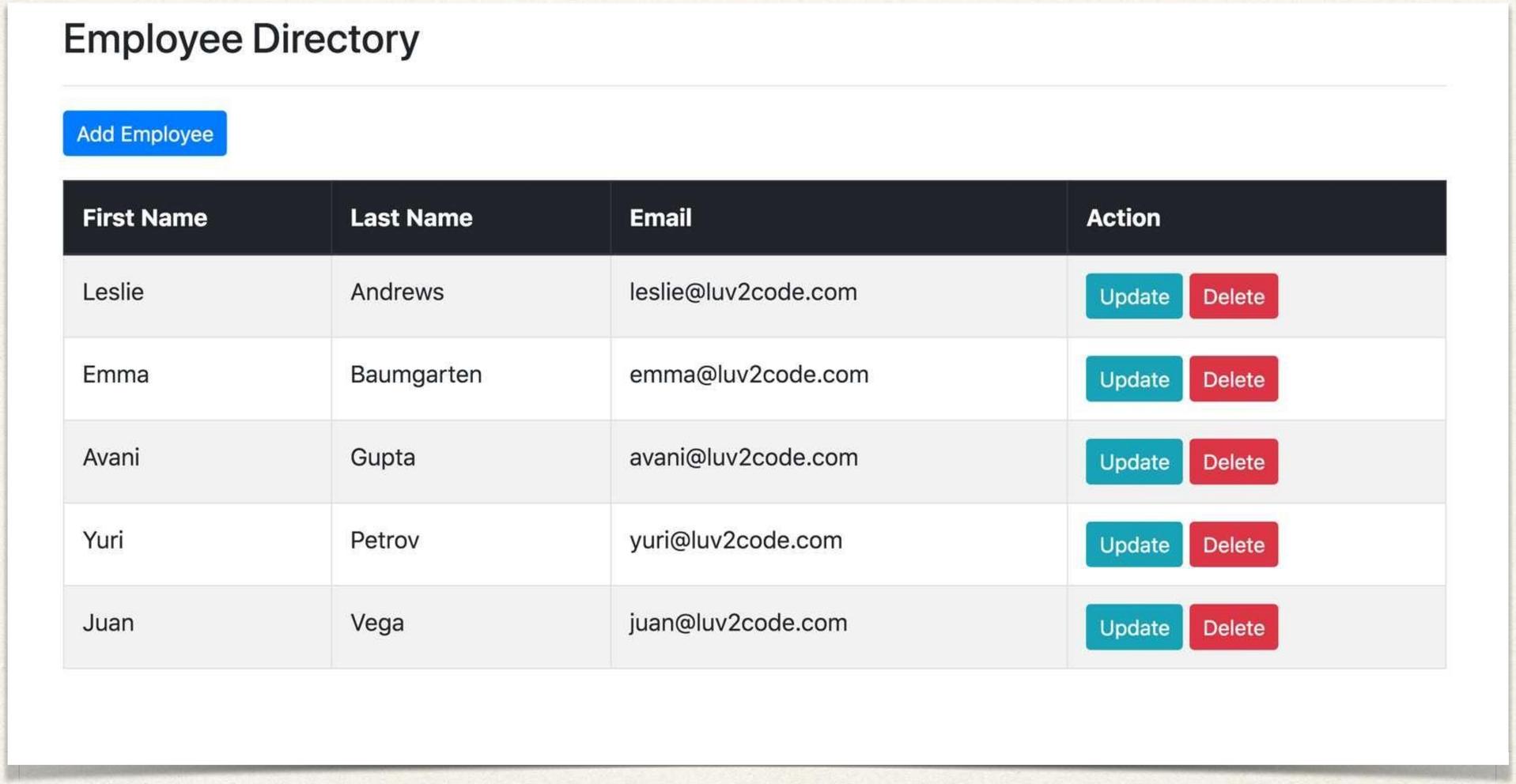
Create a Web UI for the Employee Directory

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

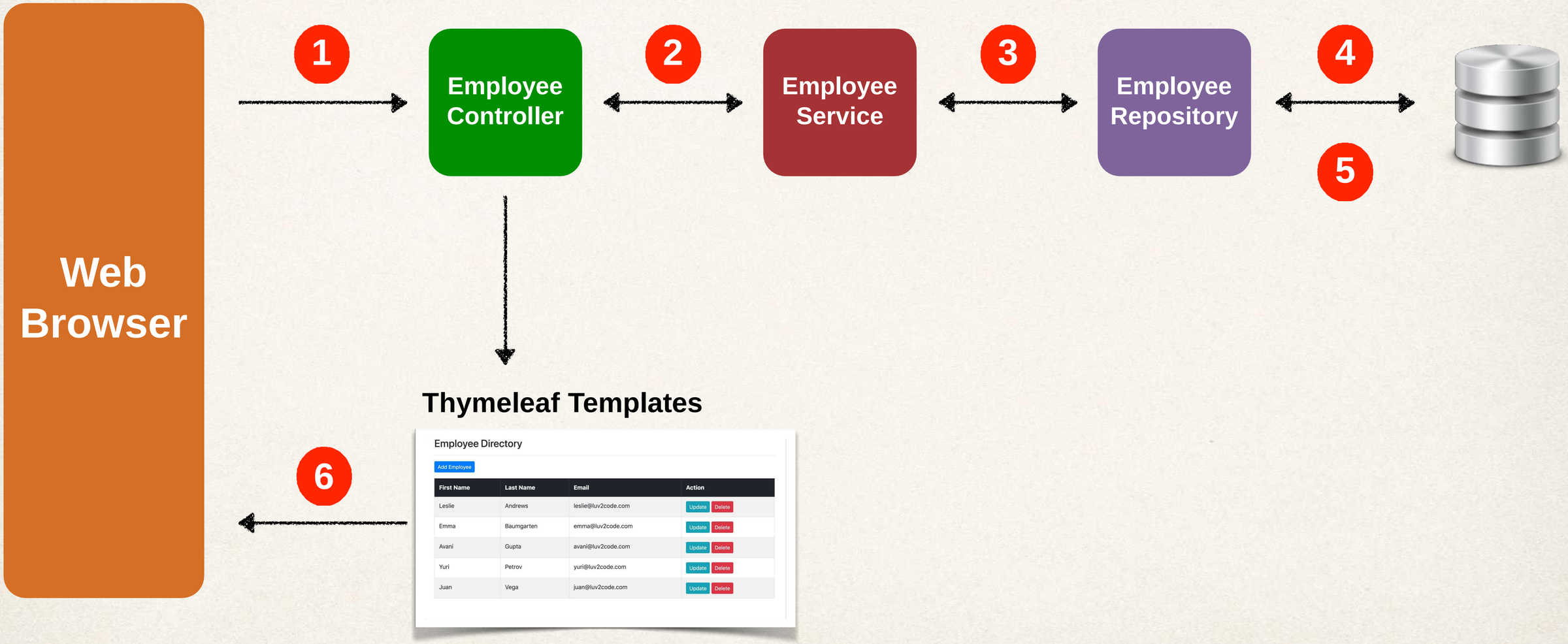
Thymeleaf + Spring Boot

Real-Time Project

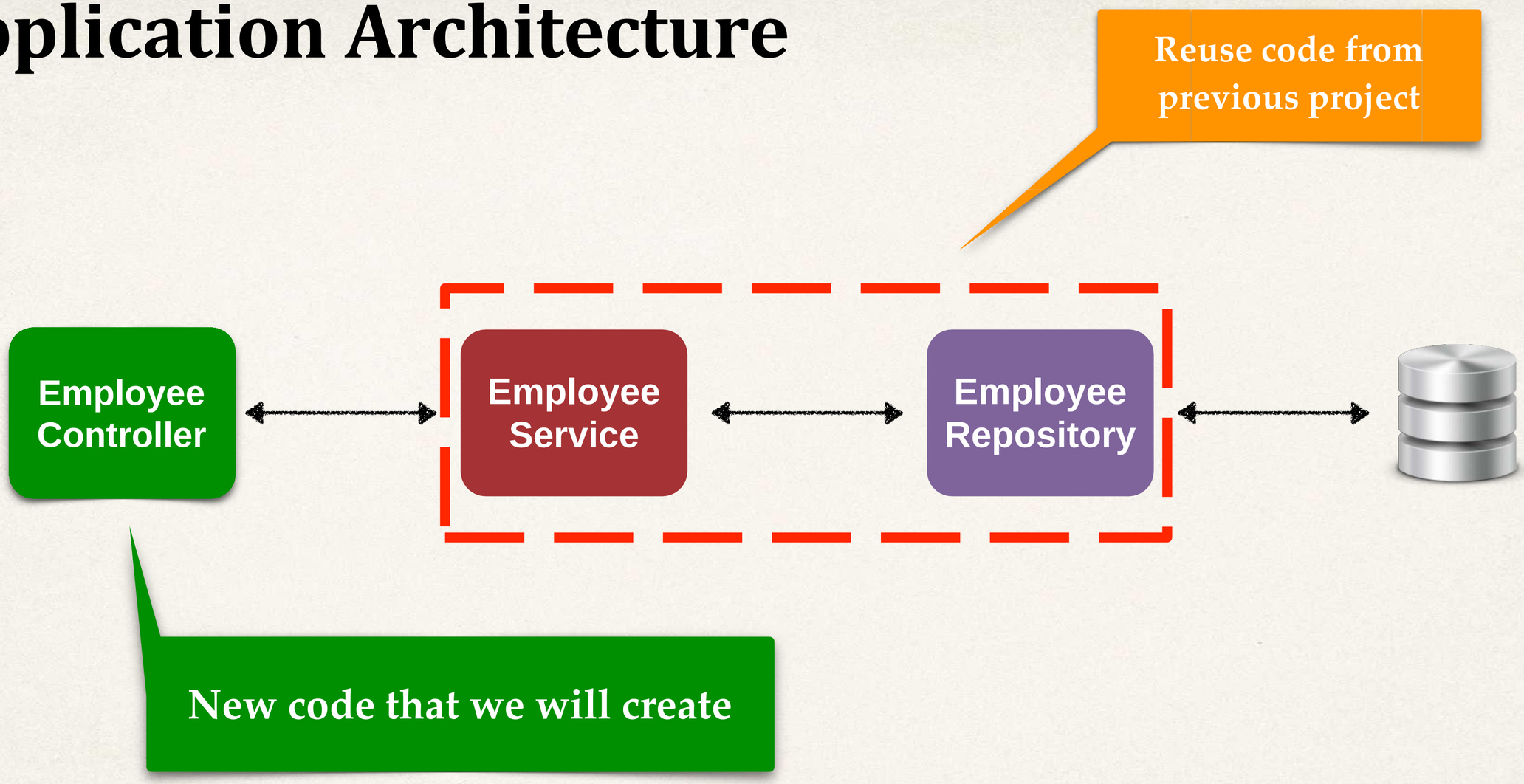
Thymeleaf + Spring Boot



Big Picture



Application Architecture



Project Set Up

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

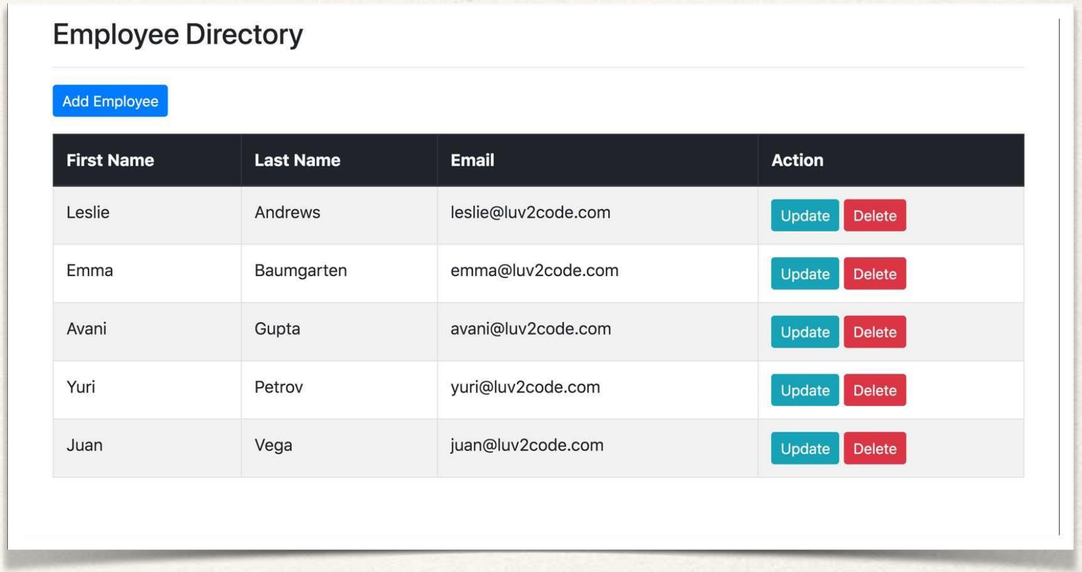
- Add **`EmployeeService`**, **`EmployeeRepository`** and **`Employee`** entity
  - Available in one of our previous projects
  - We created all of this code already from scratch … so we'll just copy/paste it

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

Development Process - Big Picture

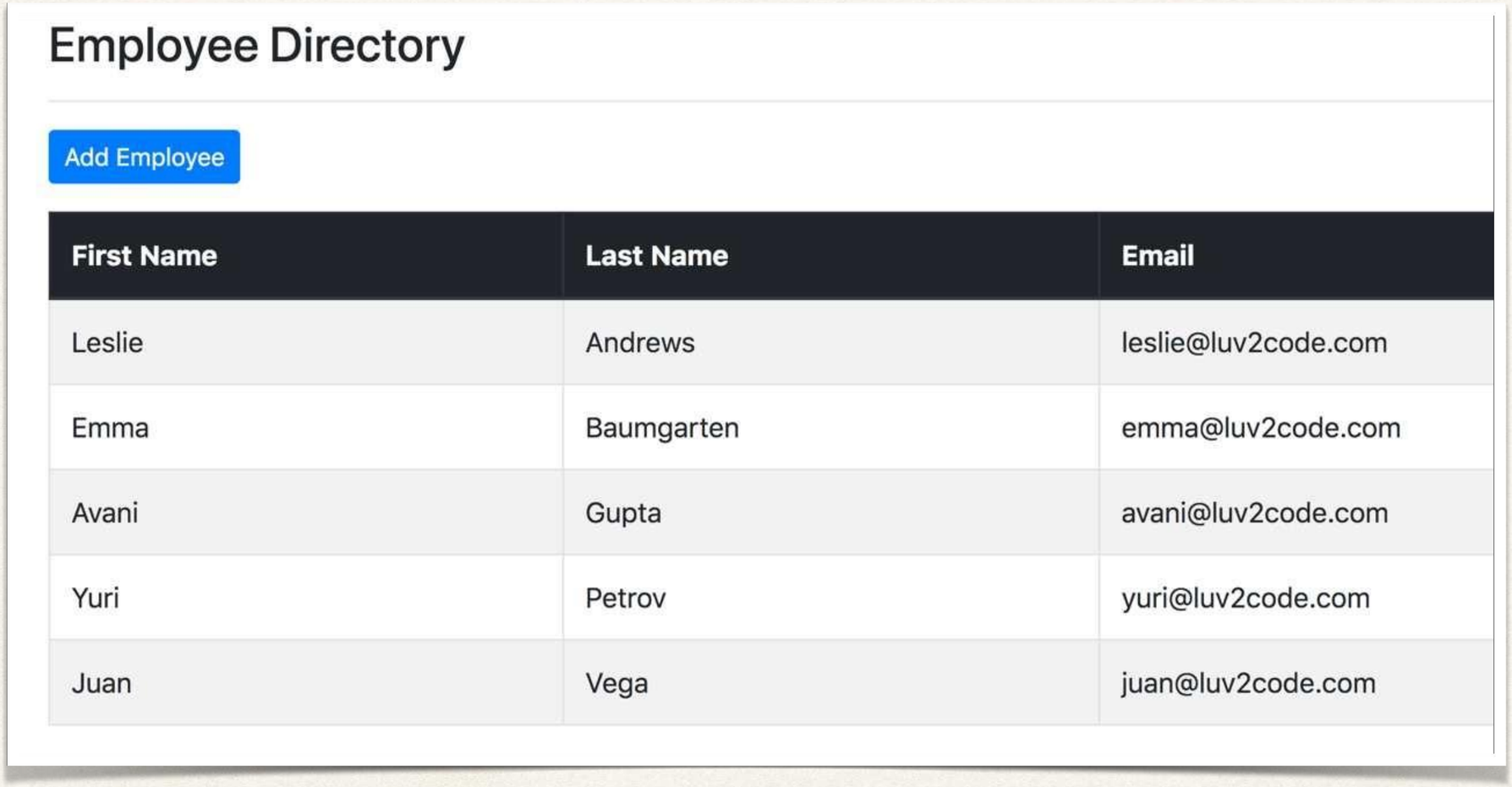
Step-By-Step

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



Thymeleaf - Add Employee

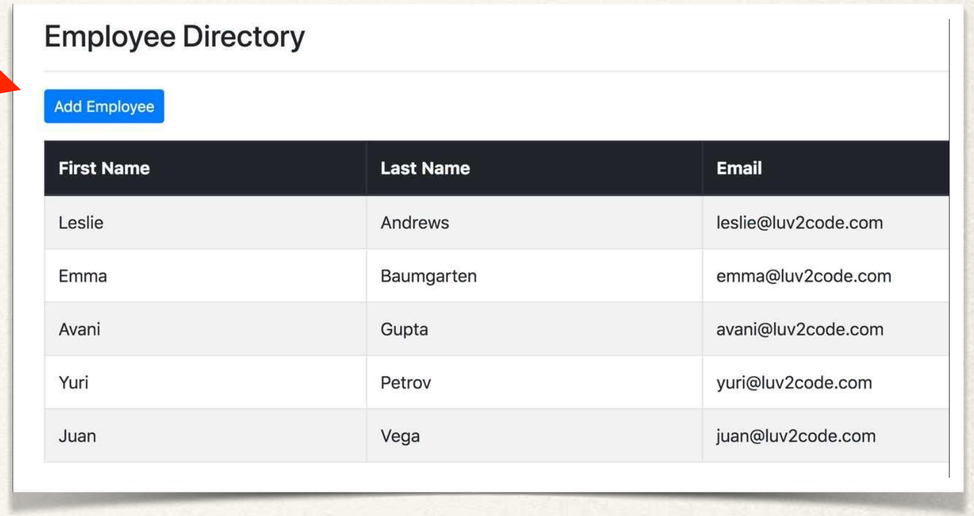
Add Employee - DEMO



Add Employee

Step-By-Step

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

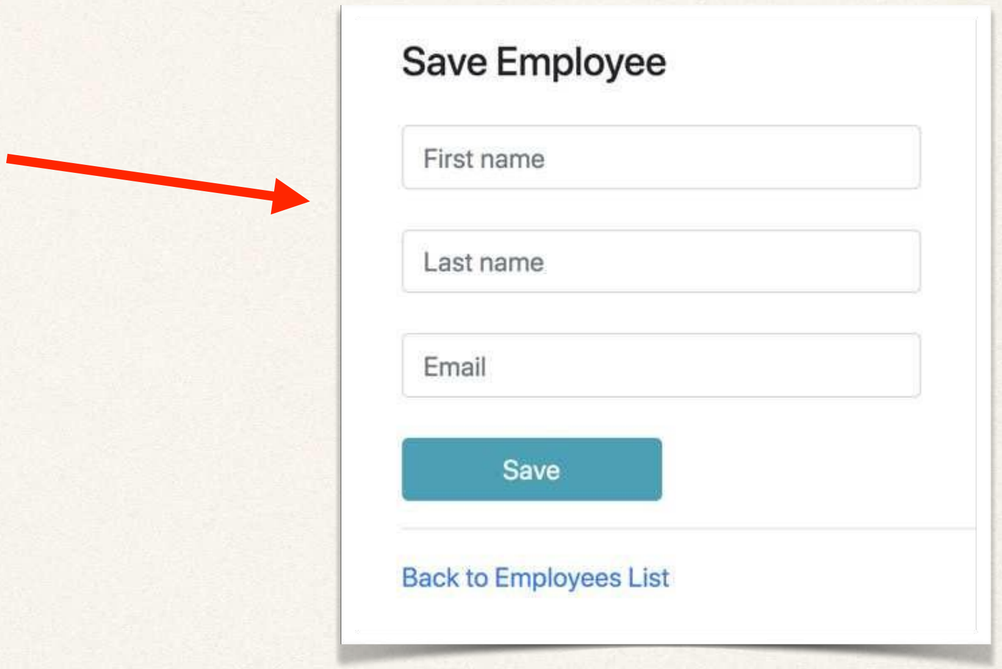


Add Employee

Step-By-Step

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

2. Create HTML form for new employee



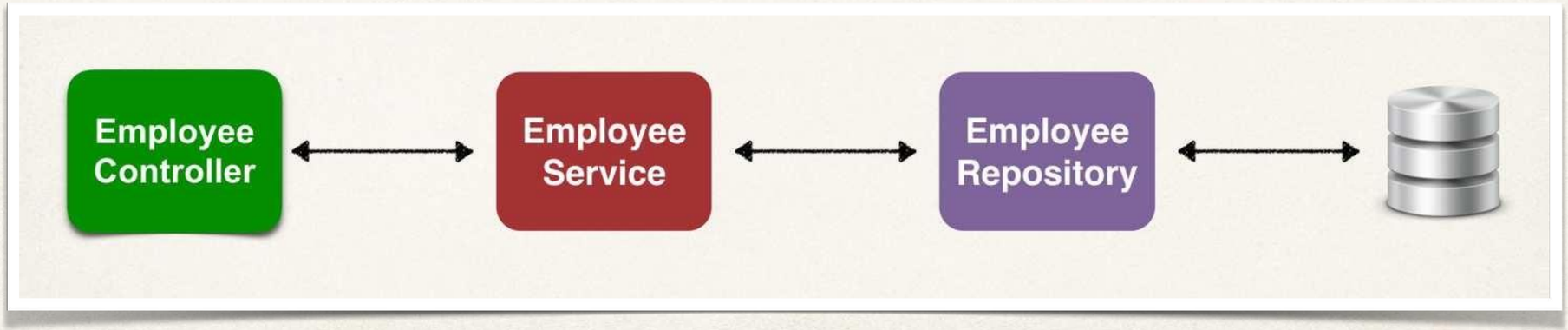
Add Employee

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

Button
Button Primary
Button Small
Margin Bottom, 3 pixels

Docs on Bootstrap styles: getbootstrap

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 - /thymeleaf-create-form*

Step 2: Create HTML form for new employee

Empty place holder
Thymeleaf will handle real work

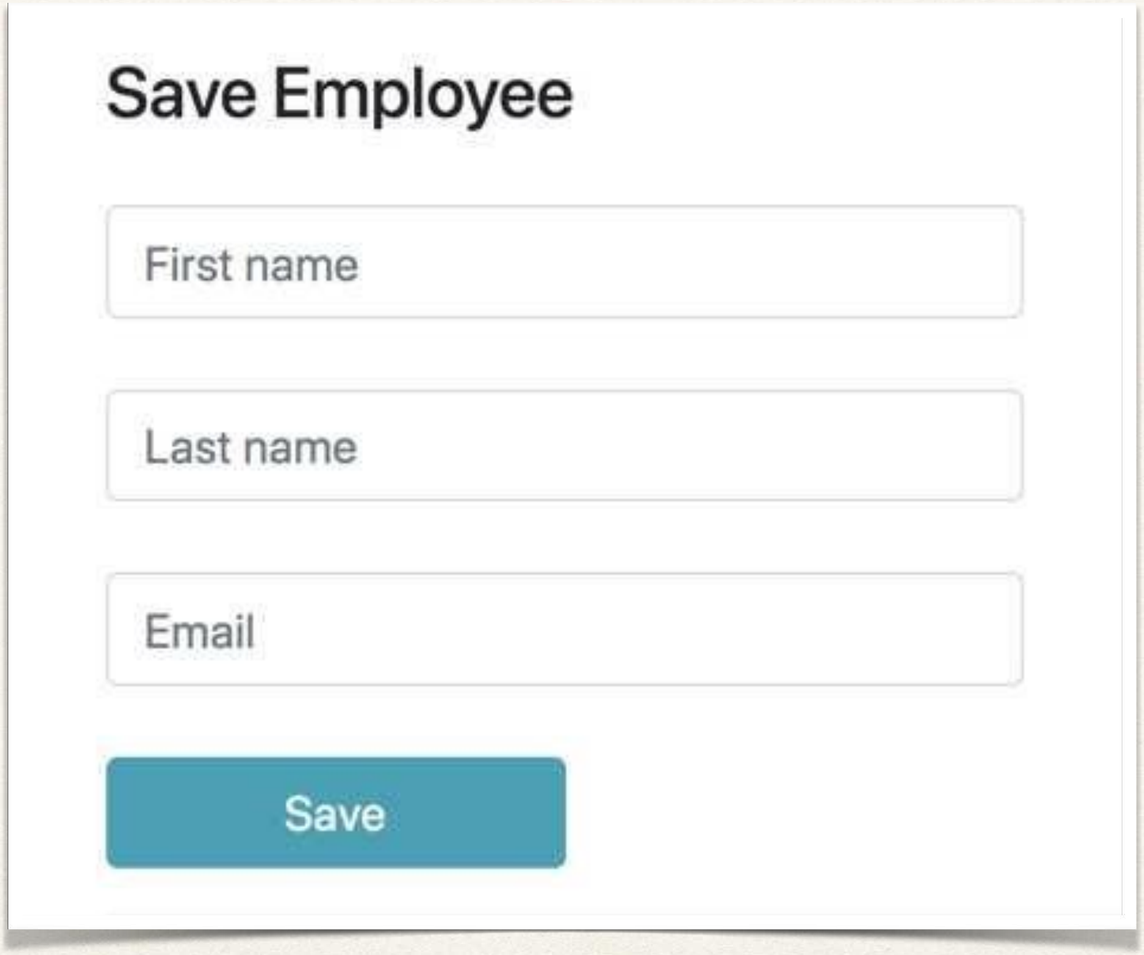
Real work
Send form data to
/employees/save

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

</form>
```

Our model attribute

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

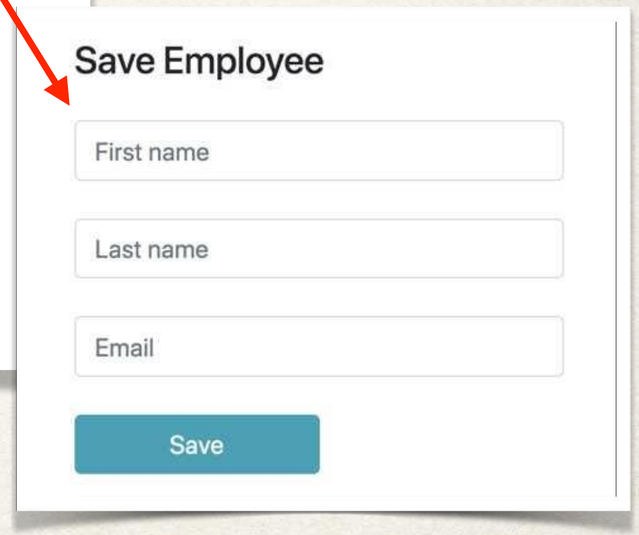
Step 2: Create HTML form for new employee



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:

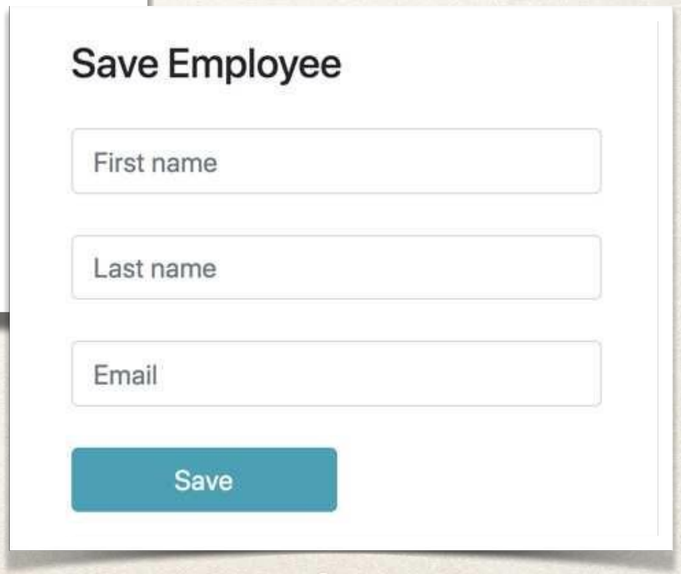
employee.setFirstName(…)
…
employee.setLastName(…)

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>
</form>
```

Apply Bootstrap styles

Form control
Margin Bottom: 4 pixels
Width: 25%

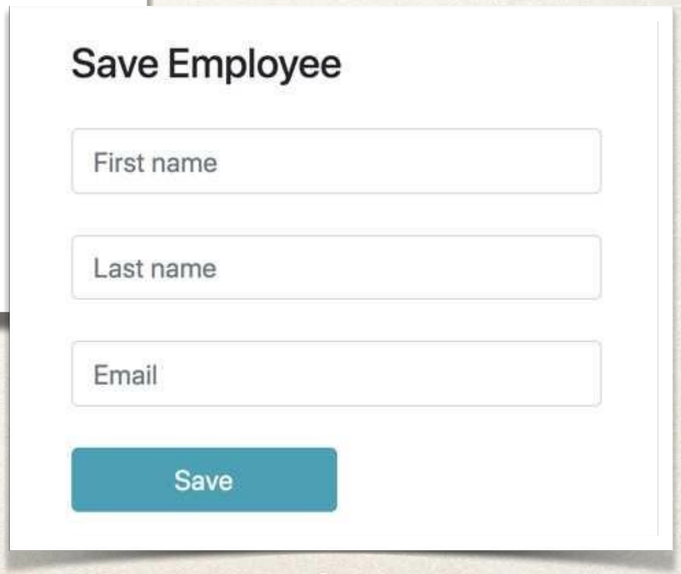


Step 2: Create HTML form for new employee

```
<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

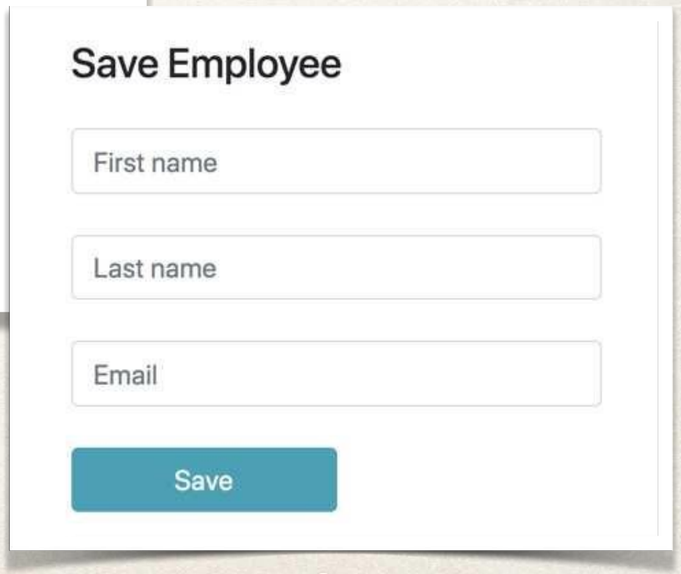


Step 2: Create HTML form for new employee

```
<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

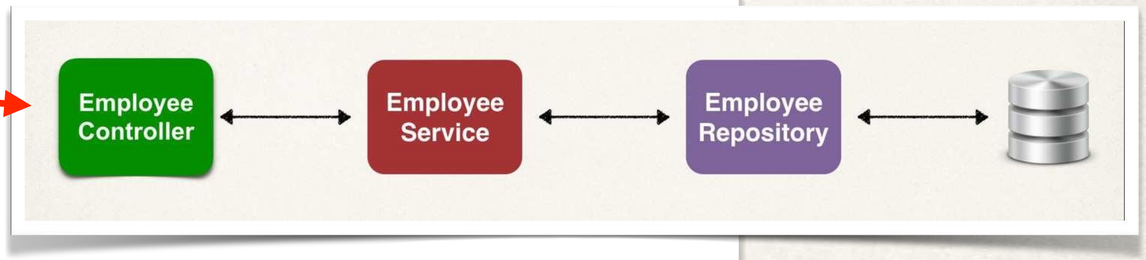
```
@Controller
@RequestMapping("/employees")
public class Employ

   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";
   }
   ...
}
```

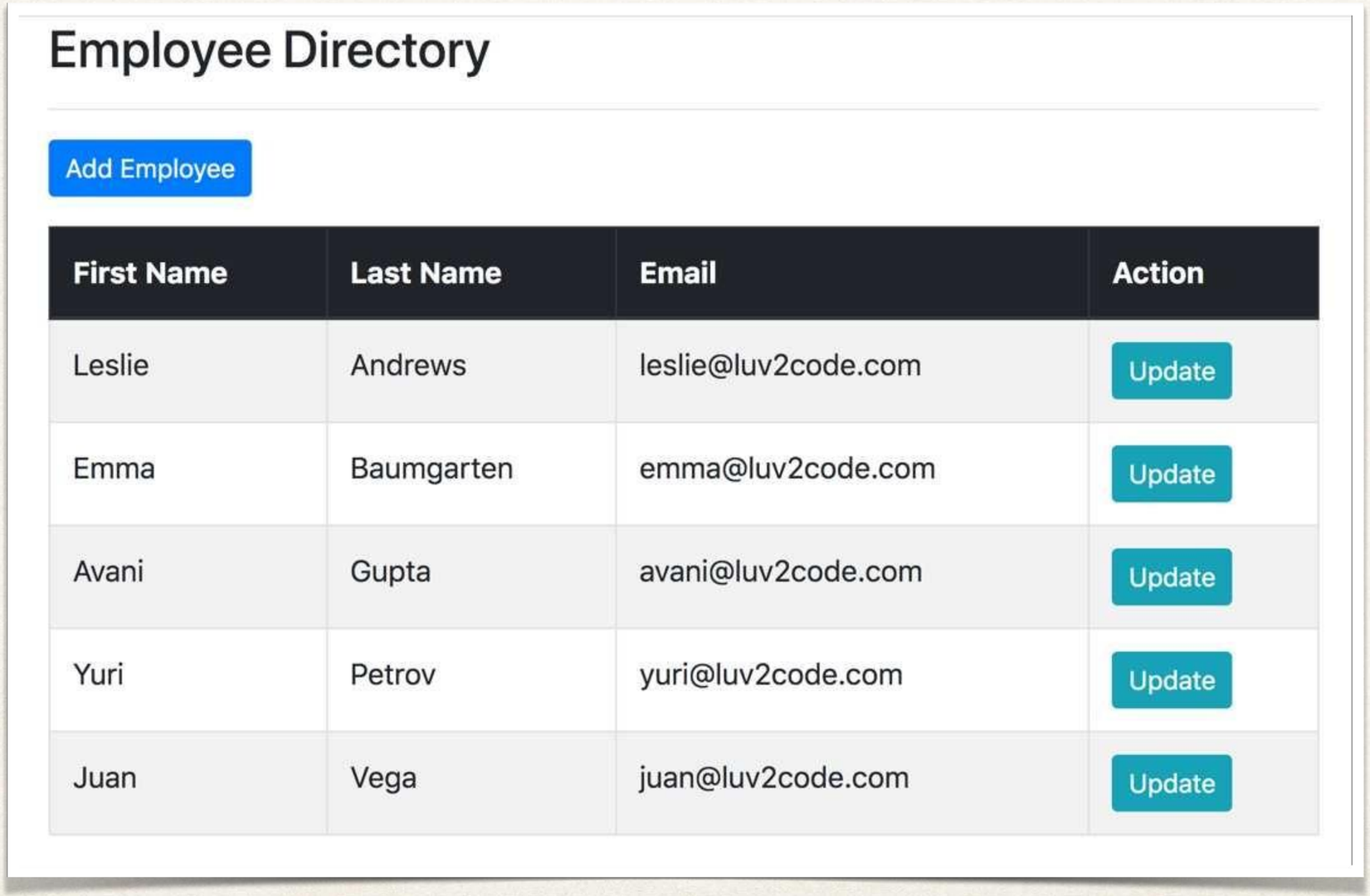
Redirect to request mapping
/employees/list

"Post/Redirect/Get" pattern

For more info see
/post-redirect-get

Thymeleaf - Update Employee

Update Employee - Demo



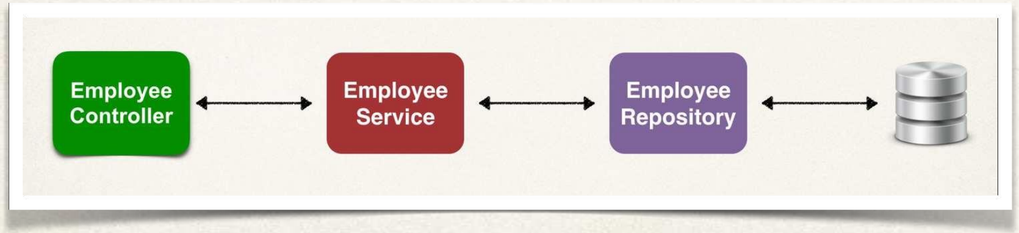
Update Employee

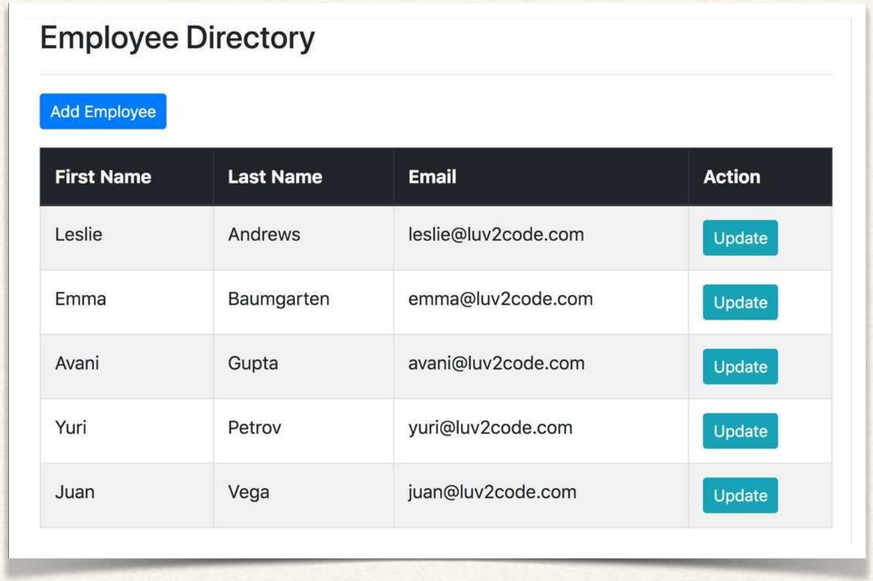
Step-By-Step

1. "Update" button

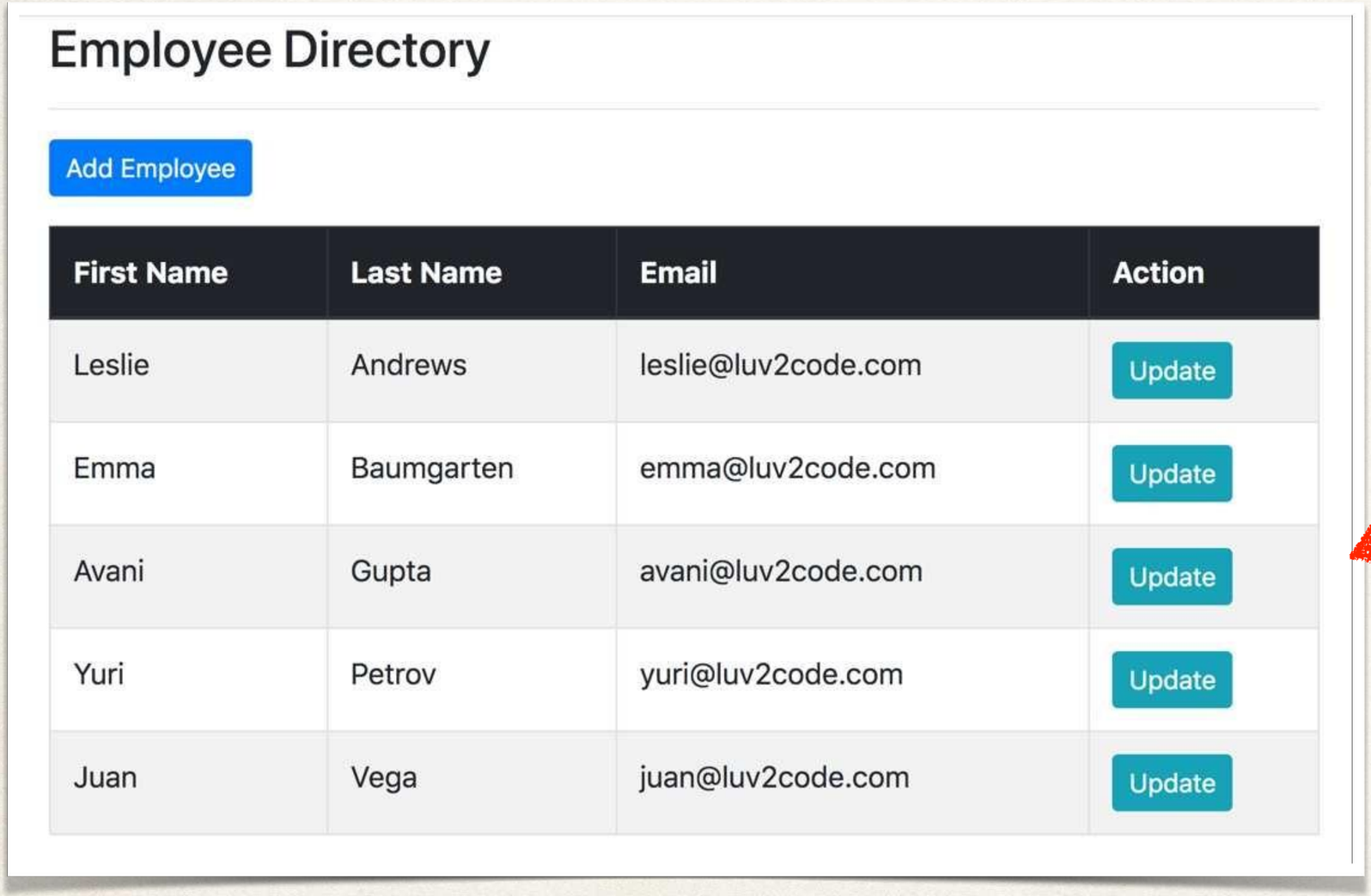
2. Pre-populate the form

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">
    </a>Update

  </td>

</tr>
```

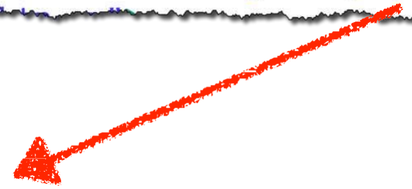
Appends to URL

?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

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" placeholder="Email">

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

</form>
```

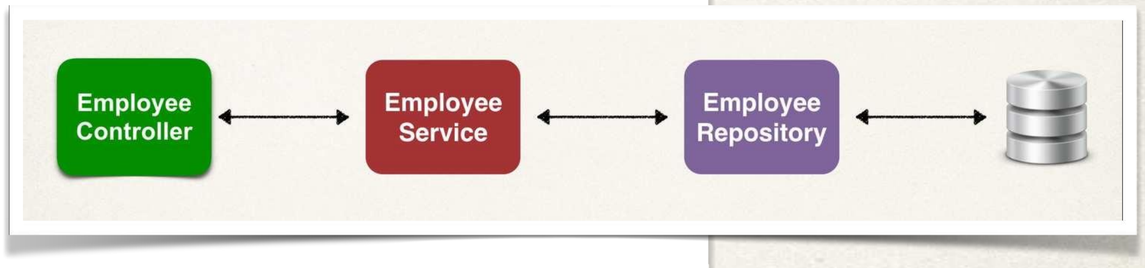
This binds to the model attribute

Tells your app which employee to update

Step 3: Process form data to save employee

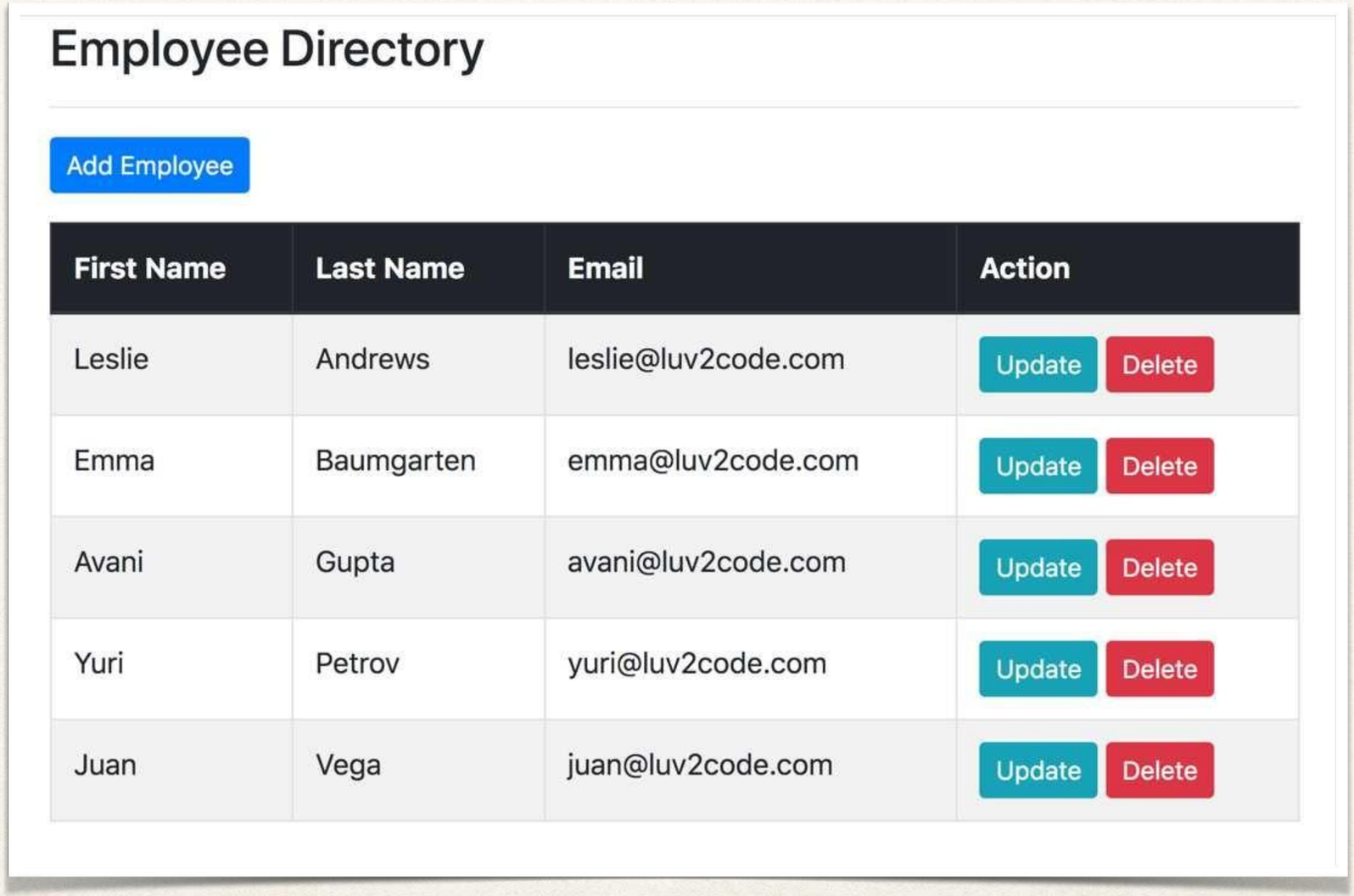
- No need for new code … we can reuse our existing code
- Works the same for add or update :-)

```
@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

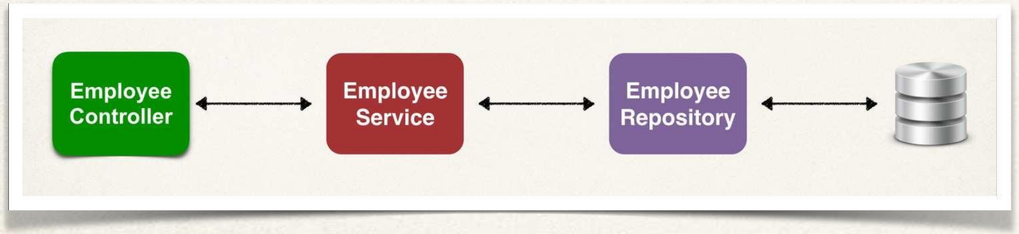


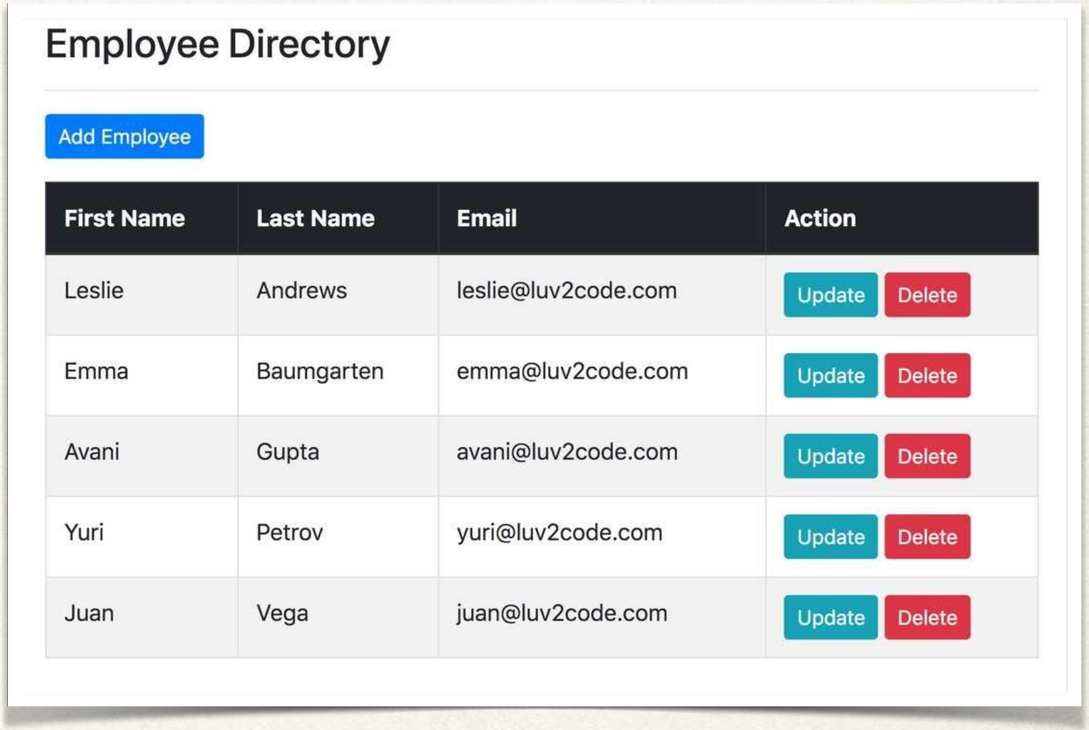
Delete Employee

Step-By-Step

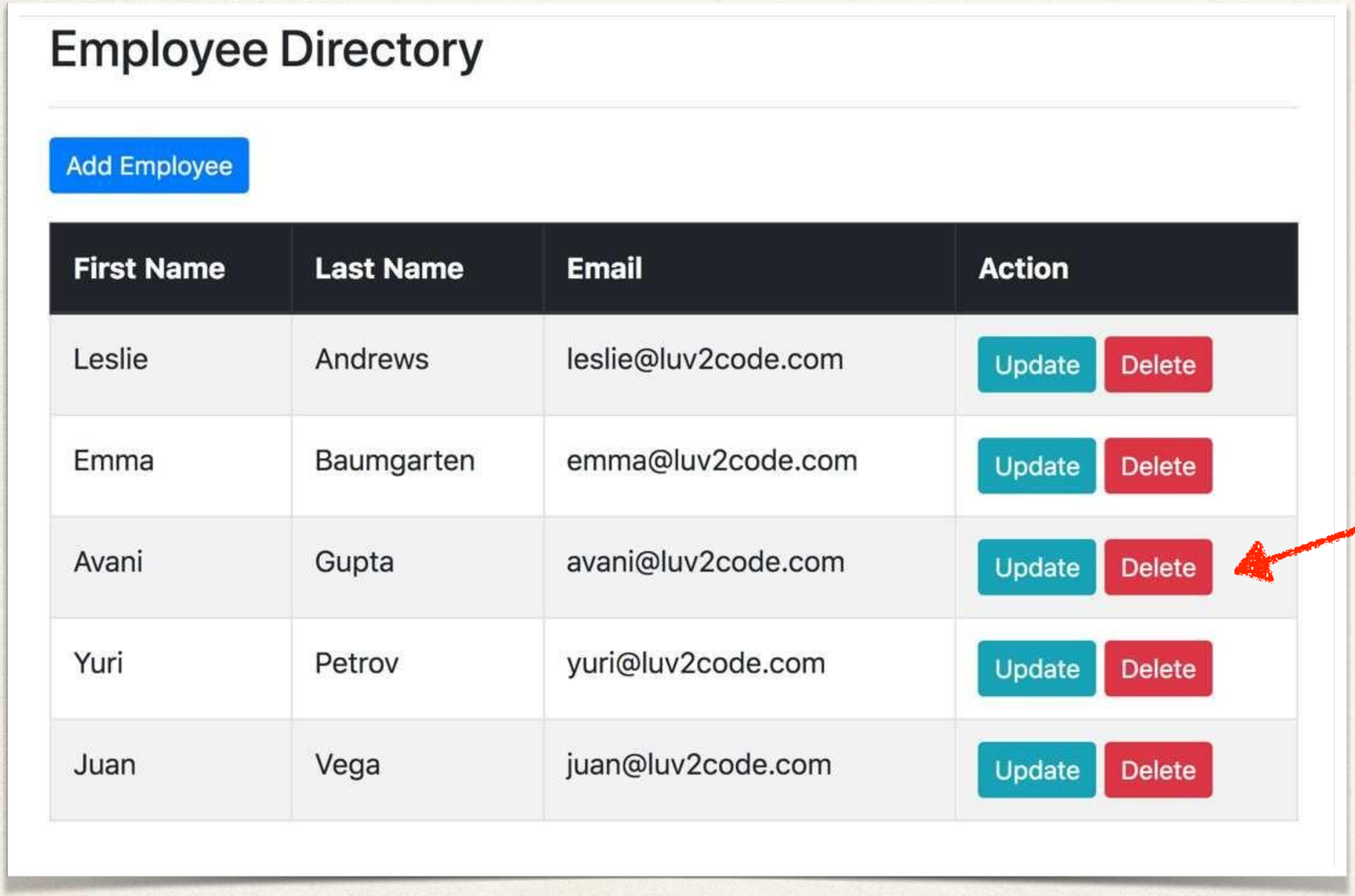
1. Add “Delete” button/link on page

2. Add controller code for “Delete”





Step 1: "Delete" button



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

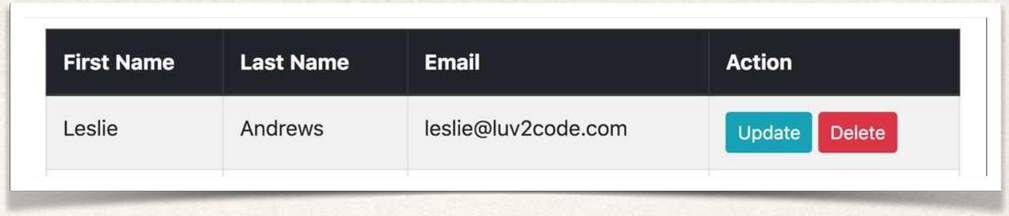
- current employee id embedded in link

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})}"
```