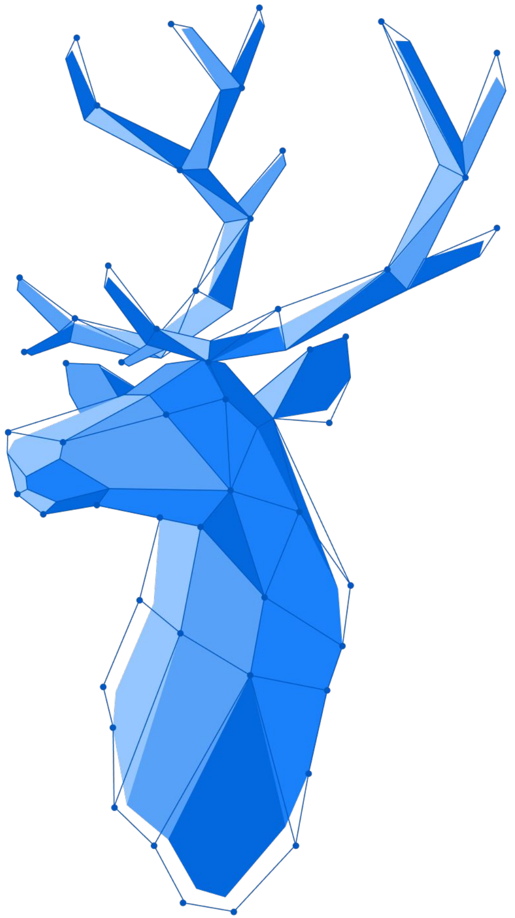
vaadin}>

Router API:

Enabling Routing and Navigation



Vaadin training set

Vaadin Foundation

- Introduction
- Layouting
- Creating Forms
- Data Lists with Grid
- **Routing and Navigation**
- Theming and Styling Applications

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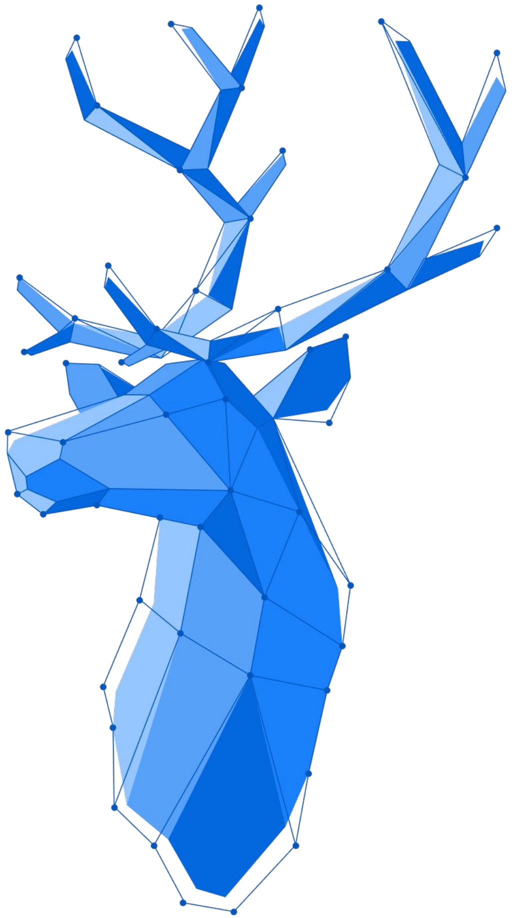
Agenda

- Part 1:Router basics
- Part 2: Navigation API
- Part 3: Application Layout
- Part 4: Navigation Lifecycle

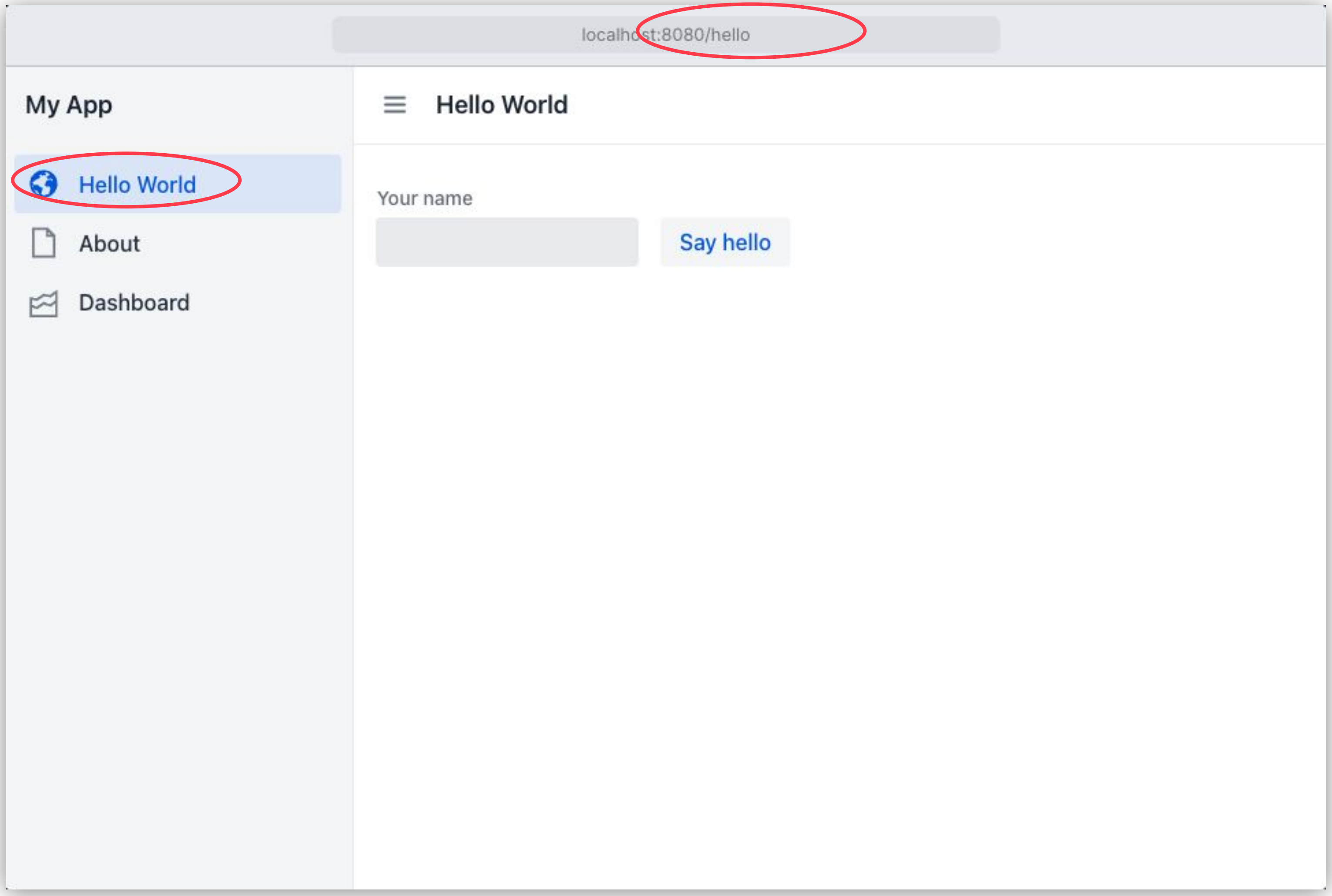
Each part has an exercise.

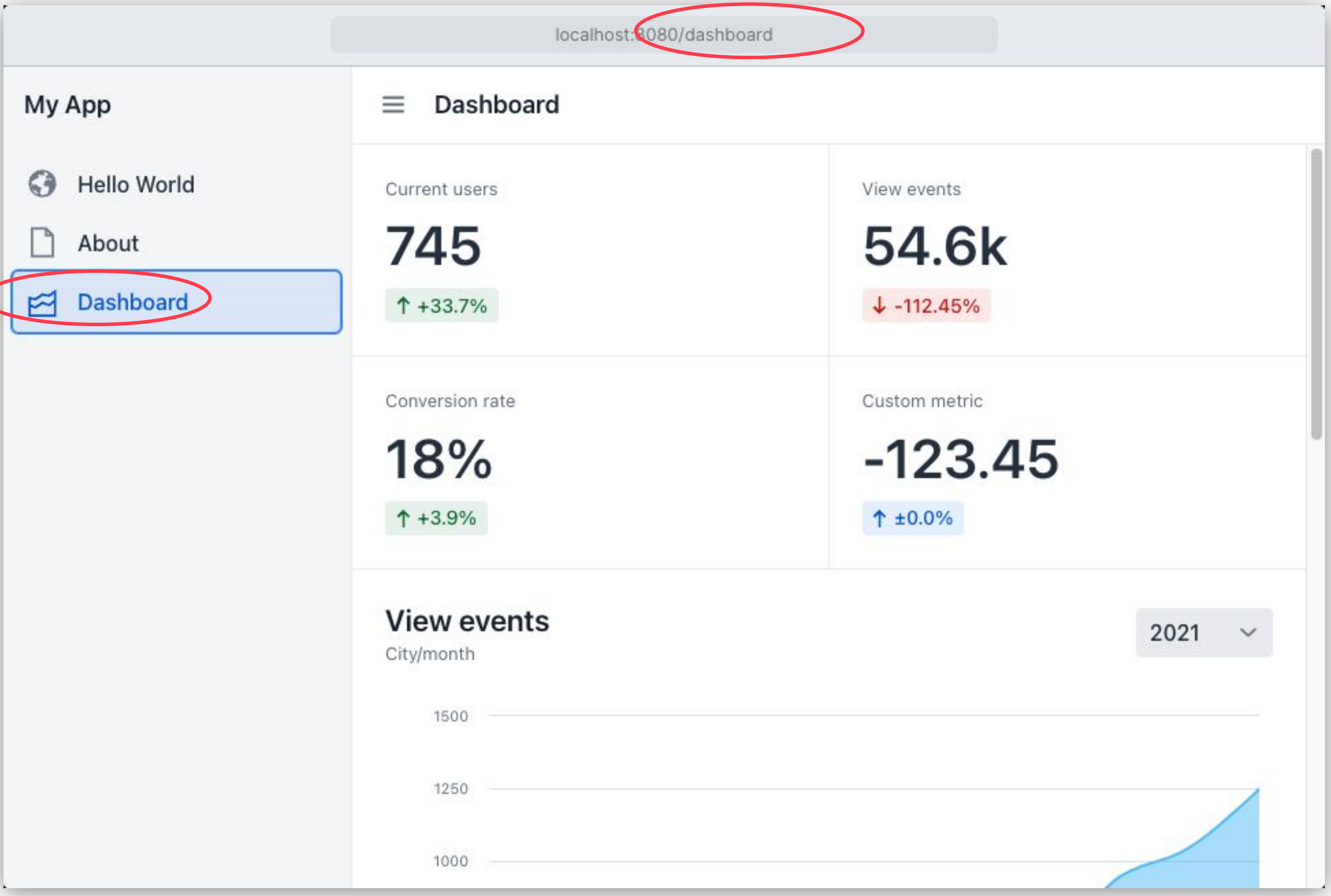


Router API, Part 1

Router basics

$$\underbrace{\textbf{https://yourdomain.com/app}}_{\text{Application URL}}\underbrace{\textbf{/view}}_{\text{Route}}$$


localhost:8080/hello
My App
Hello World
About
Dashboard
Hello World
Your name
Say hello



Current users
745
↑ +33.7%

View events
54.6k
↓ -112.45%

Conversion rate
18%
↑ +3.9%

Custom metric
-123.45
↑ ±0.0%

View events
City/month

The **Router API** enables navigation and linking for your web app:

1. Navigating to a specific view and data using URLs (“deeplinking”)

2. Updating browser’s address bar

3. Keep registry of available views

How to enable routing?

@Route

Routing can be enabled by adding the @Route annotation to any component class definition:

```
@Route("home")
public class HomeView extends VerticalLayout {}
```

@Route

@Route takes a String parameter for the desired URL path, e.g.

- `@Route("home")`
- `@Route("some/path")`
- `@Route("")` - this is the root (and default) path

@Route

What if you want multiple URLs to point to the same class?

```
localhost:8080
localhost:8080/home
```

@Route

What if you want multiple URLs to point to the same class?

```
localhost:8080
localhost:8080/home
```

```java
@Route("")
@RouteAlias("home")
public class HomeView extends VerticalLayout {
      …
}
```

Additional routes can be added with **@RouteAlias**

URL parameters?

$$\underbrace{\text{https://yourdomain.com/app}}_{\text{Application URL}}/\underbrace{\text{view}}_{\text{Route}}/\underbrace{\text{12345/…}}_{\text{Parameter(s)}}$$

Enable URL Parameters handling

To accept URL parameters, the component needs to implement the **HasUrlParameter** interface.

URL Parameters for navigation targets

This example demonstrates the concept:

```
@Route("greet")
public class GreetingComponent extends Div implements HasUrlParameter<String> {
     @Override
     public void setParameter(BeforeEvent event, String parameter) {
          setText(String.format("Welcome %s!", parameter));
     }
}
```

If you navigate to the address “`appdomain.com/greet/vaadin`” the result is the message “Welcome vaadin!”. The parameter is mandatory - trying to navigate to “`appdomain.com/greet/`” will not work without extra configuration.

Optional Parameters

The parameter can be defined as optional by using @OptionalParameter in the method. Not providing a parameter in the URL and not having @OptionalParameter will not match the route class which expects a parameter.

```
@Route("greet")
public class OptionalComponent extends Div implements HasUrlParameter<String> {
      @Override
      public void setParameter(BeforeEvent event,
                               @OptionalParameter String parameter) {
            if (parameter == null) {
                  setText("Welcome anonymous");
            } else {
                  setText(String.format("Welcome %s!", parameter));
            }
      }
}
```

Wildcard Parameters

In case more parameters are wanted (e.g. greet/one/two/three or greet/42/edit), the URL parameter can also be marked as a wildcard with @WildcardParameter. Only String type wildcards are supported:

```java
@Route("greet")
public class WildcardComponent extends Div implements HasUrlParameter<String> {
     @Override
     public void setParameter(BeforeEvent event,
                              @WildcardParameter String parameter) {
          if (parameter.isEmpty()) { // note this is never null
               setText("Welcome anonymous");
          } else {
               setText(String.format("Handling parameter %s!", parameter));
          }
     }
}
```

What about query parameters?

Query Parameters for navigation targets

The router will accept these parameters by default, but will not do anything with them:

`http://example.com/products`**`?name`**`=laptop`**`&color`**`=red`

Route templates

To access even more complex URL patterns, you can use Route Templates. URL parameters don’t have to be at the end of the string - you can use templates like /users/:userId/edit, where the :userId is the parameter variable. More complex template patterns and regular expressions are also supported - the following would also be a valid route template:

```
product/:identifier/:category?/resource/:id([0-9]*)/:path*
```

Using Route Templates

Route templates are defined in the Route value string, so they won't be used through the HasUrlParameter interface. Instead, you access them in a BeforeEnter navigation event listener. We'll cover navigation lifecycle events in more detail later.

```java
@Route("user/:userID/edit")
public class UserProfileEdit extends Div implements BeforeEnterObserver {

      private String userID;

      @Override
      public void beforeEnter(BeforeEnterEvent event) {
            userID = event.getRouteParameters().get("userID").get();
      }
}
```

Overlapping route definitions?

More specific route definitions override the generic ones if multiple Route definitions cover the same URL:

```
@Route("greet")
public class OptionalComponent extends Div implements HasUrlParameter<String> {
      @Override
      public void setParameter(BeforeEvent event, @OptionalParameter String parameter) { … }
}
```

VS

```
@Route("greet/training")
public class TrainingComponent extends Div { … }
```

When navigating to **`appdomain.com/greet/training`**, you will end up with **TrainingComponent** being loaded, not the OptionalComponent, even though the base URL (greet) is the same. The same logic applies for Route Templates - an exact match wins, then come required parameters and last wildcards.

Dynamic Routes

Registering new routes dynamically

Dynamic Routes

In addition to using the static Route annotations, you can define any number of additional routes dynamically. This is very useful when you need to change mappings because e.g. data changes, or permissions for the user changes mid-session.

There are two classes of dynamic routes, both have their uses:

- Session scope routes
- Application scope routes

Both scopes are managed through the **RouteConfiguration** utility class.

Session scope dynamic routes

Session scope refers to the current user of the application; similar to e.g. the Spring session scope. This scope starts when a user opens the application for the first time, and ends when the user either logs out or the session closes by itself after a timeout.

Session scope routes hence only work for a single user, and will not work when the user logs in again unless they are re-registered. They are great for e.g. permission-based navigation, where you allow specific users access to specific views:

```java
// Only this user gets the admin access
RouteConfiguration.forSessionScope().setRoute("admin", AdminView.class);
```

Session scope dynamic routes

Routes can also be removed, but you’ll need to be very specific when you do this.

```
// The AdminView will not be available anymore
RouteConfiguration.forSessionScope().removeRoute(AdminView.class);
```

You can for example remove a base path while keeping more complex ones:

```
// Remove the "/users" path but keep e.g. "/users/123"
configuration.removeRoute("users", UsersView.class);
```

Application scope dynamic routes

The Application scope is the application uptime, from deployment to shutdown. It is independent of user sessions, meaning this scope manages routes for all users.

All @Route configurations are placed in the application scope registry. You can add and remove routes from it any time, but the best place is at application startup (before users arrive) in a ServiceInitListener:

```java
public void serviceInit(ServiceInitEvent event) {
      // Example: add this view only when in development
      if (!event.getSource().getDeploymentConfiguration().isProductionMode()) {
            RouteConfiguration.forApplicationScope().setRoute("crud", DBCrudView.class);
      }
}
```

Listening to Route changes

If you change routes dynamically in your application, you might also want to update e.g. menu items when the changes occur; e.g. any RouterLinks you created before the change might now be invalid.

The RouteConfiguration class has methods to get all registered routes, as well as adding listeners for when routes change. You can use this functionality to update your app dynamically:

```java
RouteConfiguration.forSessionScope().addRoutesChangeListener(event -> {
     List<RouteBaseData<?>> addedRoutes = event.getAddedRoutes();
     List<RouteBaseData<?>> removedRoutes = event.getRemovedRoutes();
});
```

Route lookup order

Since there are a few different ways to create routes, in what order are they evaluated?

Session Routes override Application routes:

`http://yourdomain.com/users/42`

↓

Session scope routes

1. That exact route?
2. Partial route with mandatory parameter?
3. Matching wildcard route?

↓

Application scope routes

1. That exact route?
2. Partial route with mandatory parameter?
3. Matching wildcard route?

↓

Not found

Router error and exception handling

Exception-based routing error views

You can define specific Components to handle routing-time Exceptions of certain types with the HasErrorParameter interface.

These work as navigation targets (just as components with @Route), but instead of having a specific URL, they are loaded as needed.

```java
throw new ProductNotFoundException();
```

$\downarrow$

```java
public class ProductErrorView extends
        VerticalLayout implements
        HasErrorParameter<ProductNotFoundException> {
            ...
```

Exception-based error views

Exception type (class) is checked first, after which super types are checked.

```
public class ProductErrorView extends
        VerticalLayout implements
        HasErrorParameter<ProductNotFoundException> {
                ...
```

```
public class GenericErrorView extends
        VerticalLayout implements
        HasErrorParameter<RuntimeException> {
                ...
```

Exception-based error views

Specific Exception types may have only one handler class. This is checked when the app starts.

```
public class ProductErrorView extends
        VerticalLayout implements
        HasErrorParameter<ProductNotFoundException> {
                ...
```

```
public class AnotherView extends
        VerticalLayout implements
        HasErrorParameter<ProductNotFoundException> {
                ...
```

Router-specific error views

The Router API includes a few bespoke Exception classes for handling common cases with the same method as in the generic case, such as a basic 404 when trying to navigate to an unknown path:

```java
public class RouteNotFoundView extends Div implements
             HasErrorParameter<NotFoundException> {

      @Override
      public int setErrorParameter(BeforeNavigationEvent event,
            ErrorParameter<NotFoundException> parameter) {

            getElement().setText("Could not navigate to route" +
                  event.getLocation().getPath());
            return 404;
      }
}
```

Changing the Page Title

Static page titles

For simple, non-changing page titles, you can use the PageTitle annotation:

```
@PageTitle("Home Page")
@Route("home")
class HomeView extends Div {

      HomeView(){
            setText("This is the home view");
      }
}
```

Dynamic page titles

If the title depends on data and you need to update it HasDynamicTitle is your friend. The getPageTitle() method is called after the component is attached.

```java
@Route(value = "blog")
class BlogPost extends Component implements HasDynamicTitle {
      private BlogPostData currentPost;

      @Override
      public String getPageTitle() {
            return "Blog: " + currentPost.getTitle();
      }
}
```

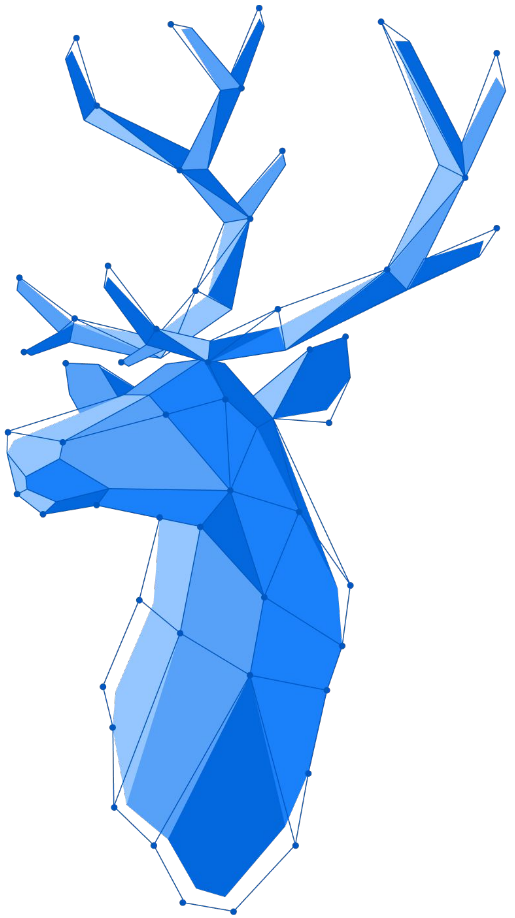
Dynamic page titles

In addition, you can update the page title anytime using the following snippet:

```
UI.getCurrent().getPage().setTitle("42");
```

Summary, Part 1

- How to enable routing
- URL parameters
- Dynamic Routes
- Router error handling
- Changing the page title



Exercise 1

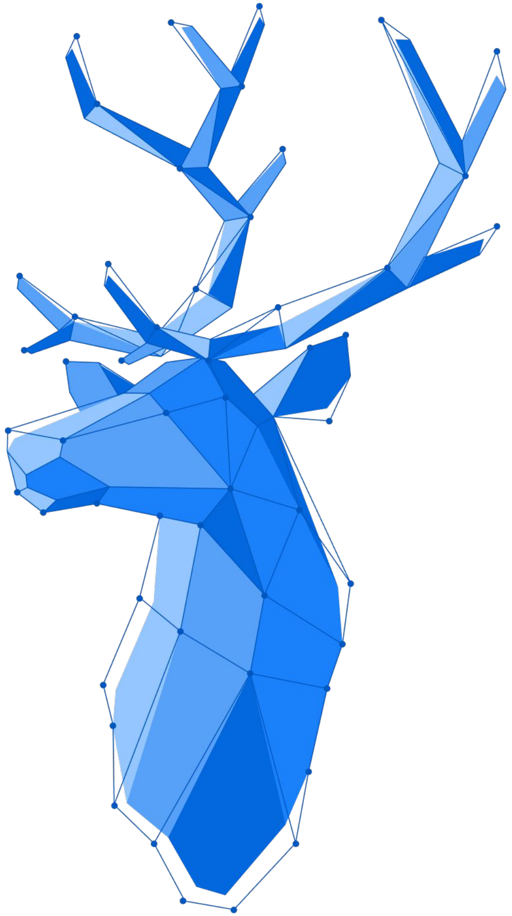
Enable Routing in your application

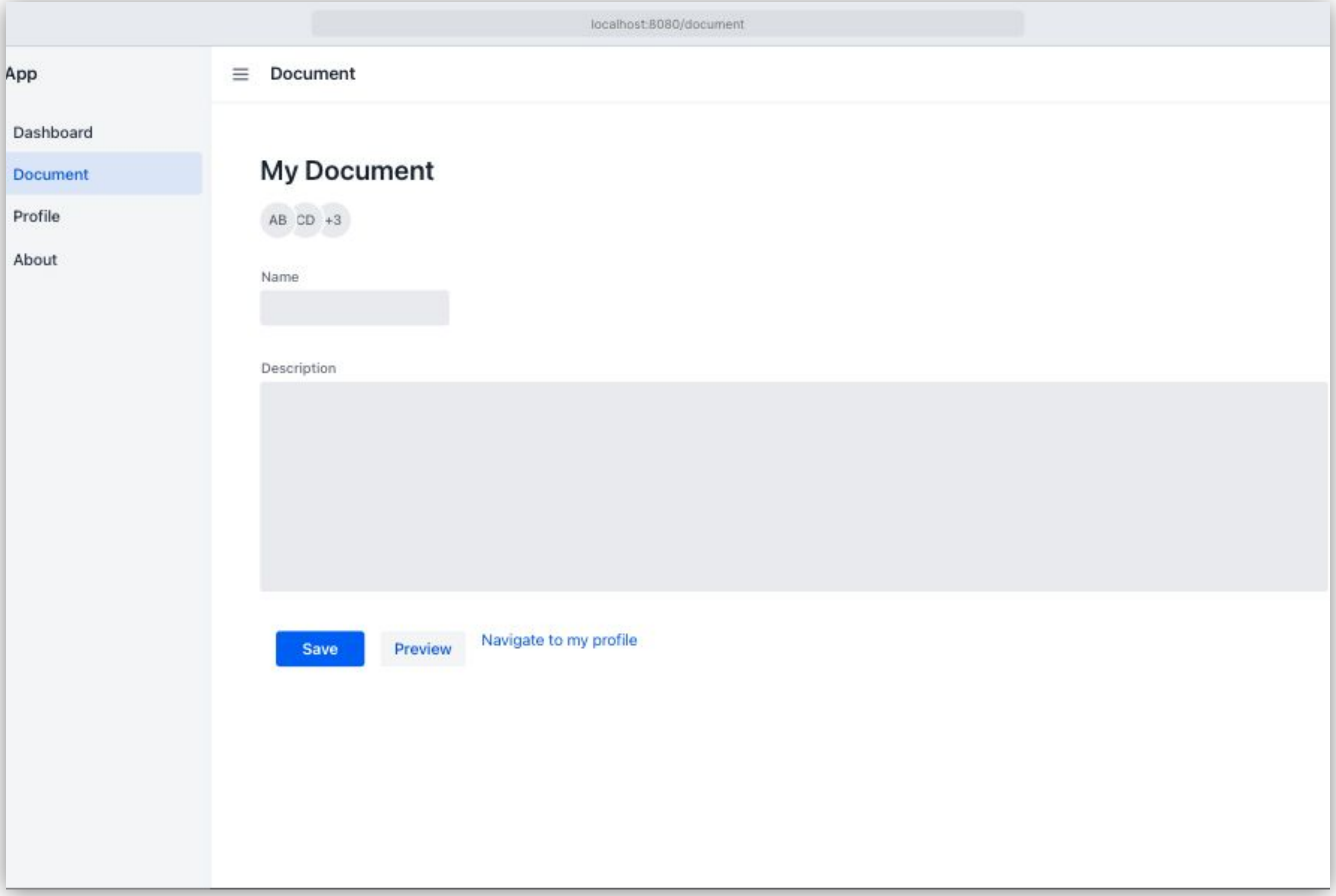
Router API, Part 2

Navigation: Adding navigation into your application

Recap, part 1

- How to enable routing
- URL parameters
- Dynamic Routes
- Router error handling
- Changing the page title





localhost:8080/document

App

Dashboard

Document

Profile

About

Document

My Document

AB CD +3

Name

Description

Save Preview Navigate to my profile

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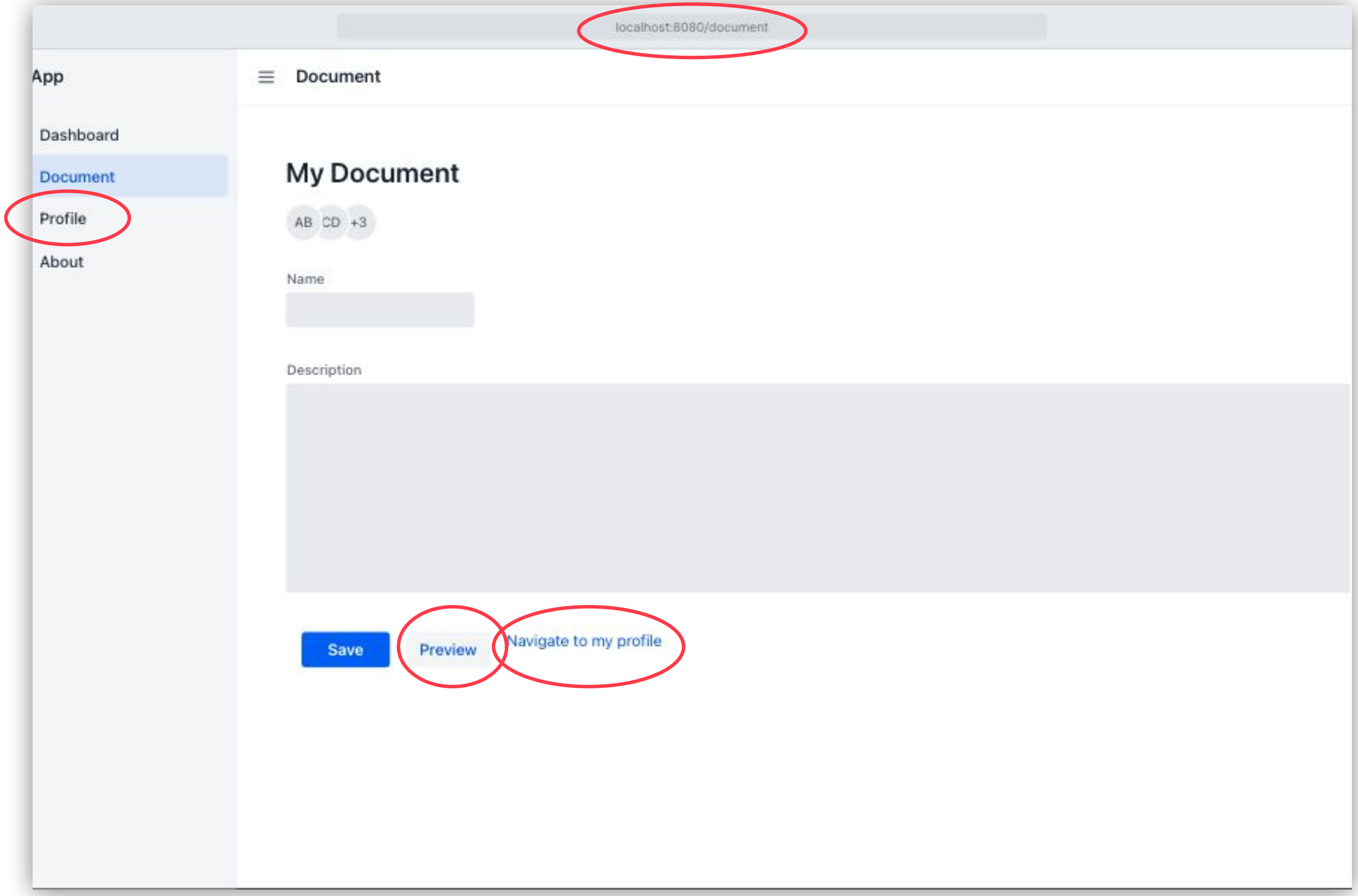
localhost:8080/document

App

Dashboard

Document

Profile

About

Document

My Document

AB CD +3

Name

Description

Save

Preview

Navigate to my profile

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Navigation

The easiest way to create navigation links in your UI is to use the RouterLink component:

```
Div menu = new Div();
menu.add(new RouterLink("Home", HomeView.class));
menu.add(new RouterLink("Products", ProductView.class, productId));
```

This will give you a normal HTML link that takes you to the given class. The Router will parse out the correct path from the Route annotation for you.

Using a RouterLink instead of an Anchor (normal link) gives you the advantage of not having a full page reload, as RouterLink understands that this is an in-app link. Conversely, RouterLinks do not work on external addresses, you should use Anchor for those.

Navigation

If you need more control over navigation (e.g. giving parameters) or don’t want to use RouterLinks to trigger navigation, then you can use the UI.navigate() API.

```
Button button = new Button("Navigate to Company page");
button.addClickListener(e -> button.getUI().ifPresent(ui ->
            ui.navigate("company")
));
```

Navigation

If you need more control over navigation (e.g. giving parameters) or don’t want to use RouterLinks to trigger navigation, then you can use the UI.navigate() API.

```
Button button = new Button("Navigate to Company page");
button.addClickListener(e -> button.getUI().ifPresent(ui ->
          ui.navigate(CompanyView.class)
));
```

Navigation

If you need more control over navigation (e.g. giving parameters) or don't want to use RouterLinks to trigger navigation, then you can use the UI.navigate() API.

```java
Button button = new Button("Navigate to Company page");
button.addClickListener(e -> button.getUI().ifPresent(ui ->
           ui.navigate(CompanyView.class, "team") // navigate with parameter
));
```

Navigation

As RouterLinks are plain <a> elements in the browser, they are also friendly to assistive technology like screen readers. For this reason, you should prefer RouterLinks over “invisible” navigation whenever possible.

Generating URLs programmatically

When you need to generate or modify a route, you can get any of the preconfigured route Strings from the Router class:

```java
@Route("path")
public class PathComponent extends Div { … }


// returns ‘path’
String route = RouteConfiguration.forSessionScope().getUrl(PathComponent.class);
```

Generating URLs programmatically

The API supports parameters, of course:

```
@Route("path")
public class PathComponent extends Div implements HasUrlParameter { … }


// returns ‘path/test’
String route = RouteConfiguration.forSessionScope().getUrl(PathComponent.class, "test");
```

Generating URLs programmatically

Note that the Router only returns the path inside the app deployment context; to get the full path, you can use VaadinServletRequest:

```
StringBuffer url = VaadinServletRequest.getCurrent().getRequestURL();
```

Passing data between views in Java

Most of the UI.navigate methods used in routing return the actual instance of the target view as an Optional. This allows the possibility of communicating between your views in Java:

```
@Route("user")
public class UserView extends Div {
   public init(User user) {
      Button button = new Button(
        "Edit " + user.getName(),
         event -> {
            getUI().navigate(UserEditor.class)
               .ifPresent(editor -> editor.editUser(user));
            });
         add(button);
      }
      /* ... */
}
```

```
@Route("edit")
public class UserEditor extends Div {
   public void editUser(User user) {
      // do something with user
   }
}
```

Passing data between views in Java

Note that using the server-side data passing mechanism doesn’t automatically update any URL parameters; if you want your views to be deep-linkable, you’ll need to do that yourself.

```java
public void editUser(User user) {
       // do actual UI changes
       createFormForUser(user);
       // update the URL
       updateUrlParameters(user);
}


private void updateUrlParameters(User user) {
       // generate the wanted URL, in this case with the user ID parameter
       String deepLinkingUrl = RouteConfiguration.forSessionScope().getUrl(getClass(), user.getId());
       // updating does not reload the page or cause navigation
       getUI().get().getPage().getHistory().replaceState(null, deepLinkingUrl);
}
```

Adding Query parameters

You can use the QueryParameters through a helper class which takes in a Map:

```
Button button = new Button("Navigate to my view");
button.addClickListener(e -> {
      Map<String, List<String>> parameters = new HashMap();
      parameters.put("param", Arrays.asList("value"));
      QueryParameters queryParameters = new QueryParameters(parameters);
      button.getUI().ifPresent(ui -> ui.navigate("myView", queryParameters));
});
```

Adding Query parameters

And you don’t need to use the hardcoded string:

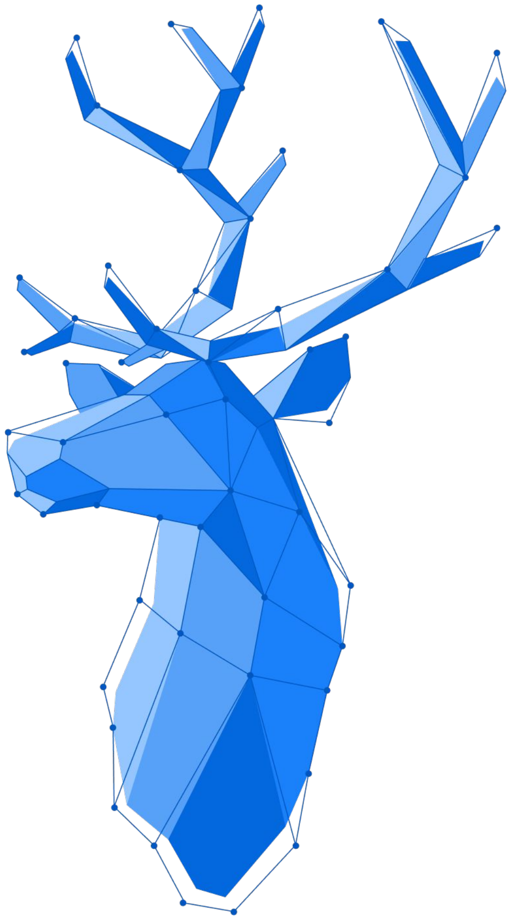
```
Button button = new Button("Navigate to my view");
button.addClickListener(e -> {
      Map<String, List<String>> parameters = new HashMap();
      parameters.put("param", Arrays.asList("value"));
      QueryParameters queryParameters = new QueryParameters(parameters);
      String viewUrl = UI.getCurrent().getRouter().getUrl(MyView.class);
      button.getUI().ifPresent(ui -> ui.navigate(viewUrl, queryParameters));
});
```

How to receive the query parameters?

You can use **BeforeEnterEvent** or **AfterNavigationEvent** to parse the incoming query parameters. We’ll discuss about this in Part 4.

Summary, Part 2

- Navigation
- Generating URLs
- Passing data between views in Java
- Programmatic Query parameters

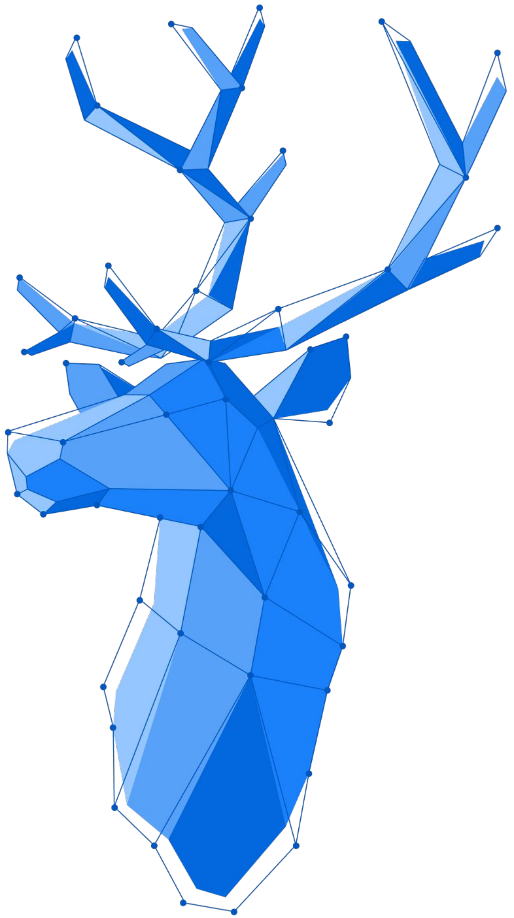


Exercise 2

Add navigation

Summary, Part 2

- Navigation
- Generating URLs
- Passing data between views in Java
- Programmatic Query parameters

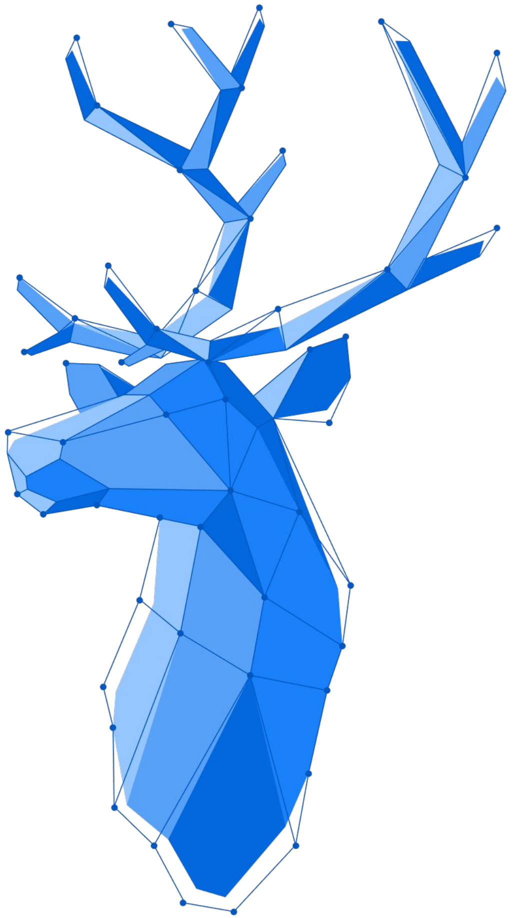


Router API, Part 3

Application Layout

Recap, parts 1–2

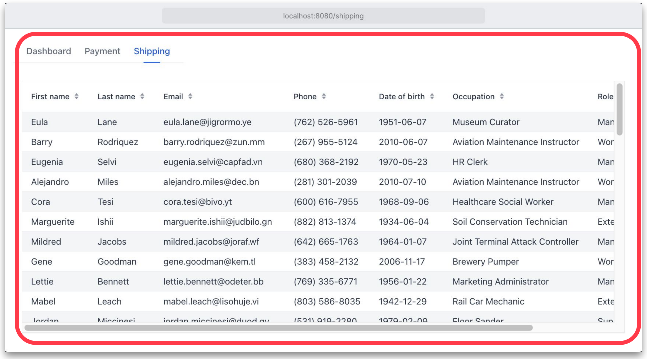
- How to enable routing
- URL parameters
- Navigation
- Passing parameters and data between views



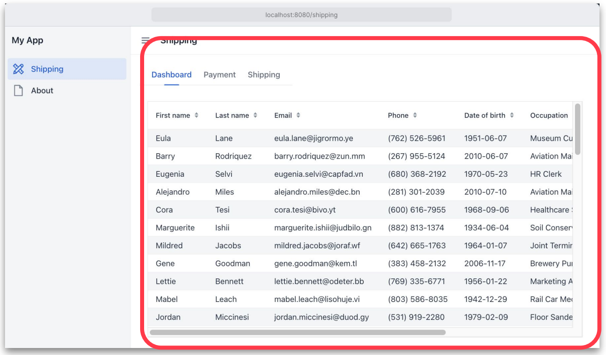
Managing the Application Layout

When defining routes using **@Route("path")**, the component will, by default, be rendered inside the **<body>** tag of the page.

But what if you want a header, or a menu, visible on each page?



First name	Last name	Email	Phone	Date of birth	Occupation	Role
Eula	Lane	eula.lane@jigrormo.ye	(762) 526-5961	1951-06-07	Museum Curator	Man
Barry	Rodriquez	barry.rodriquez@zun.mm	(267) 955-5124	2010-06-07	Aviation Maintenance Instructor	Wor
Eugenia	Selvi	eugenia.selvi@capfad.vn	(680) 368-2192	1970-05-23	HR Clerk	Man
Alejandro	Miles	alejandro.miles@dec.bn	(281) 301-2039	2010-07-10	Aviation Maintenance Instructor	Wor
Cora	Tesi	cora.tesi@bivo.yt	(600) 616-7955	1968-09-06	Healthcare Social Worker	Man
Marguerite	Ishii	marguerite.ishii@judbilo.gn	(882) 813-1374	1934-06-04	Soil Conservation Technician	Exte
Mildred	Jacobs	mildred.jacobs@joraf.wf	(642) 665-1763	1964-01-07	Joint Terminal Attack Controller	Man
Gene	Goodman	gene.goodman@kem.tl	(383) 458-2132	2006-11-17	Brewery Pumper	Wor
Lettie	Bennett	lettie.bennett@odeter.bb	(769) 335-6771	1956-01-22	Marketing Administrator	Man
Mabel	Leach	mabel.leach@lisohuje.vi	(803) 586-8035	1942-12-29	Rail Car Mechanic	Exte
Jordan	Miccinesi	jordan.miccinesi@duod.gy	(531) 919-2280	1979-02-09	Floor Sander	Sup



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Alejandro	Miles	alejandro.miles@dec.bn	(281) 301-2039	2010-07-10	Aviation Ma
Cora	Tesi	cora.tesi@bivo.yt	(600) 616-7955	1968-09-06	Healthcare
Marguerite	Ishii	marguerite.ishii@judbilo.gn	(882) 813-1374	1934-06-04	Soil Conser
Mildred	Jacobs	mildred.jacobs@joraf.wf	(642) 665-1763	1964-01-07	Joint Termi
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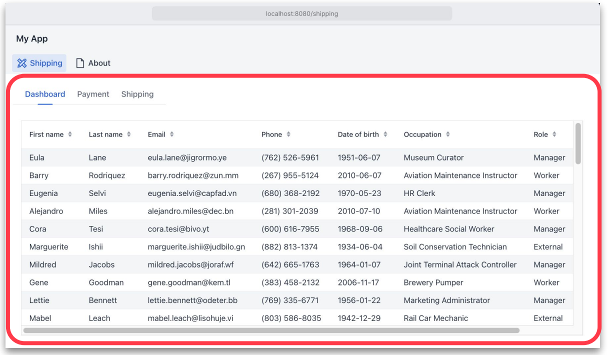
Mabel	Leach	mabel.leach@lisohuje.vi	(803) 586-8035	1942-12-29	Rail Car Me
Jordan	Miccinesi	jordan.miccinesi@duod.gy	(531) 919-2280	1979-02-09	Floor Sande



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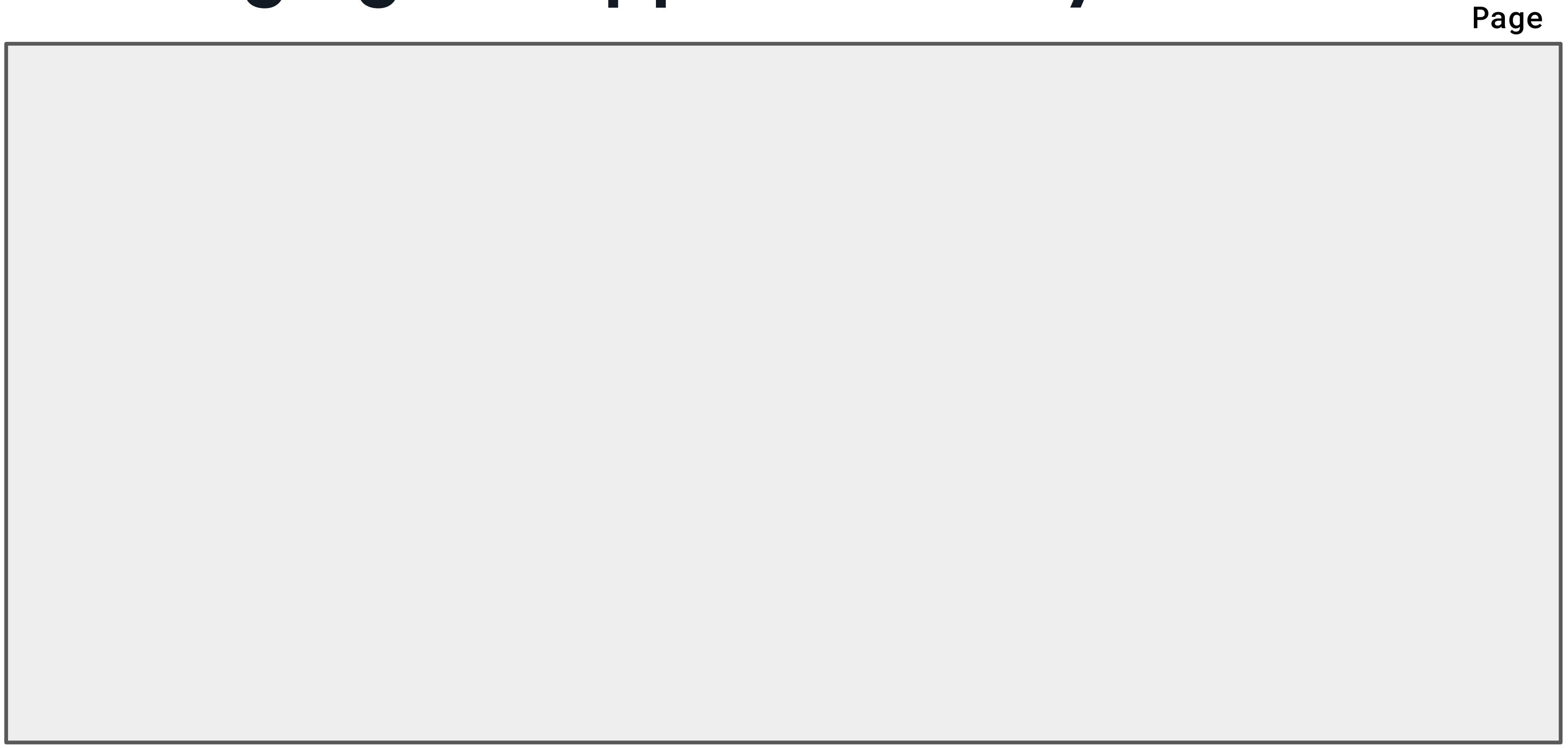
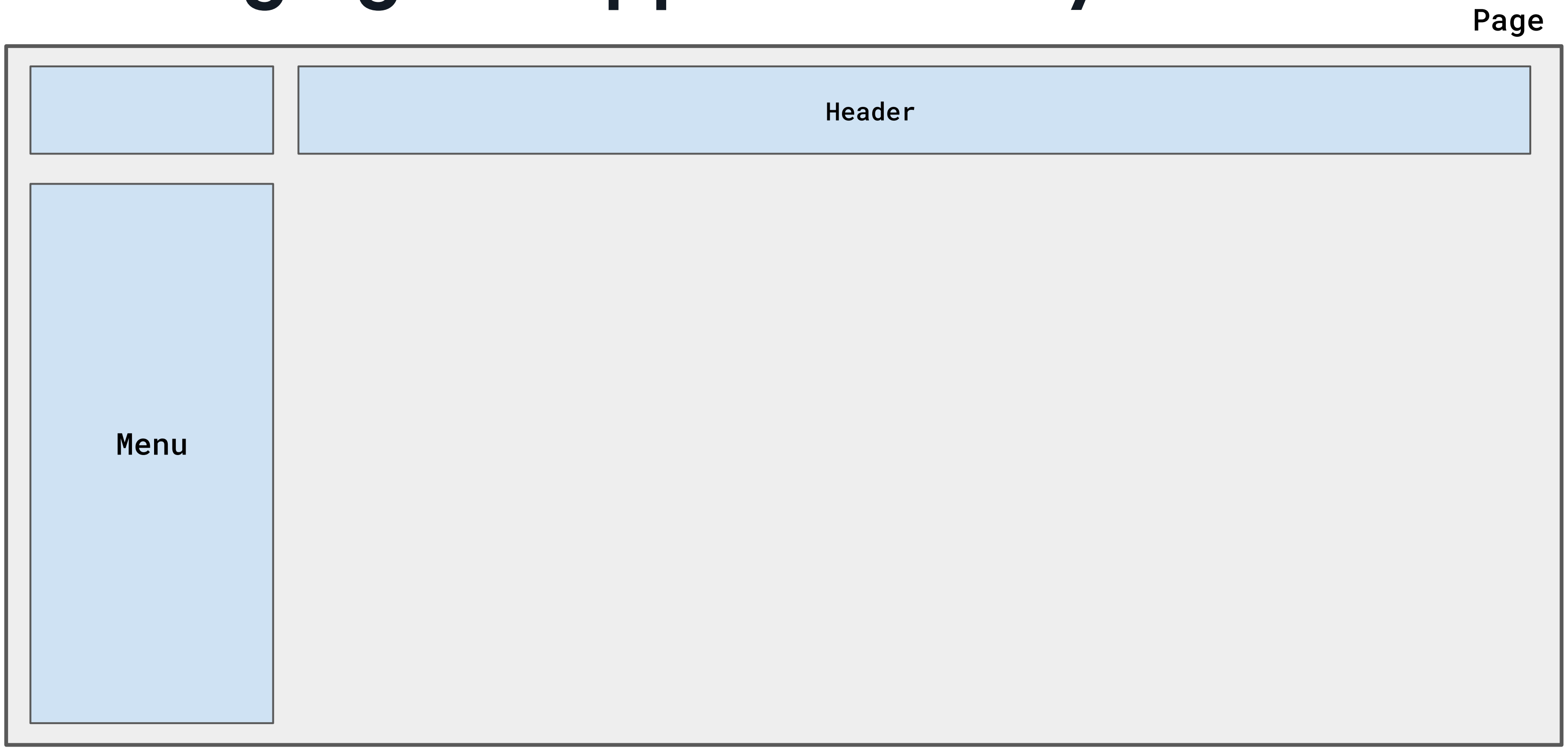
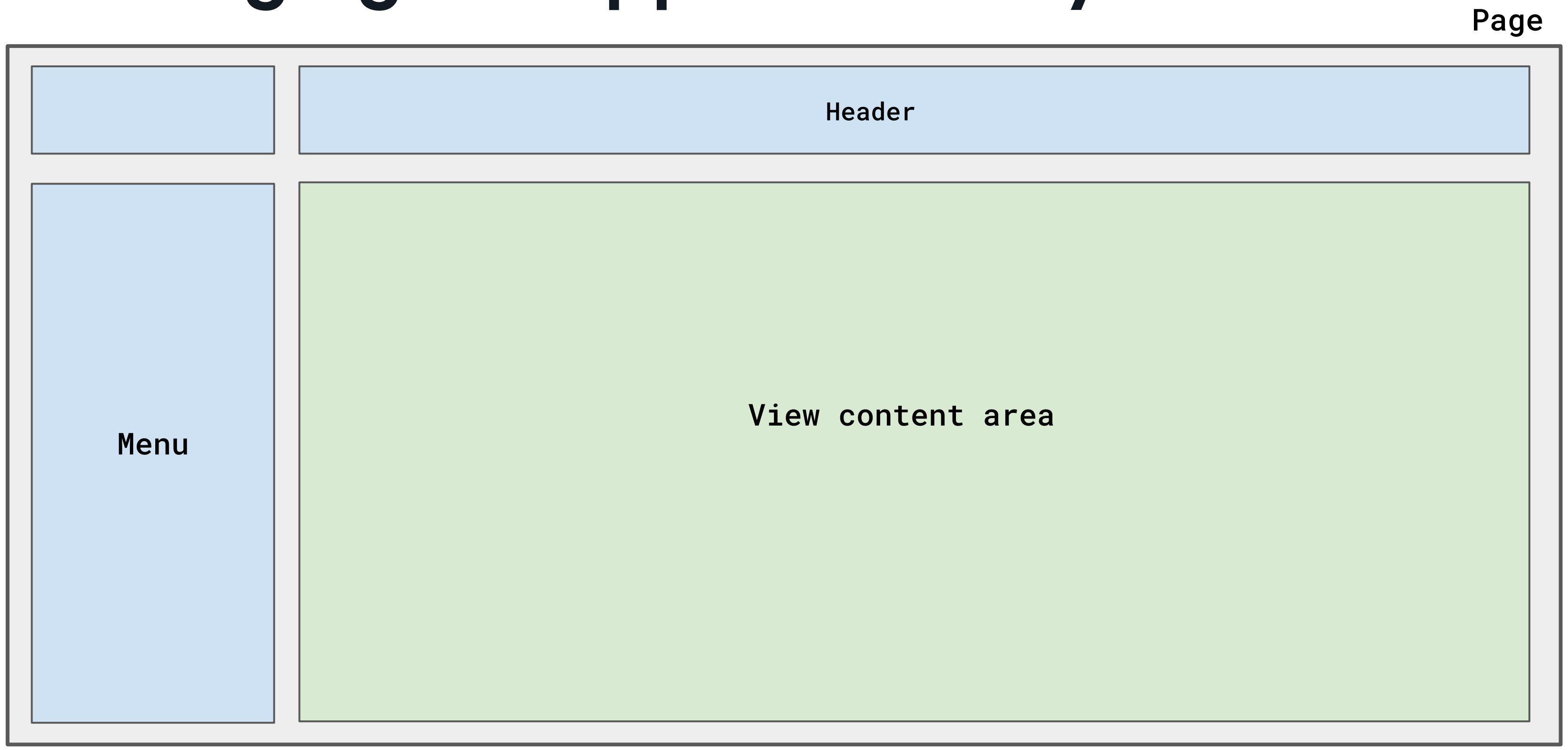
Managing the Application Layout



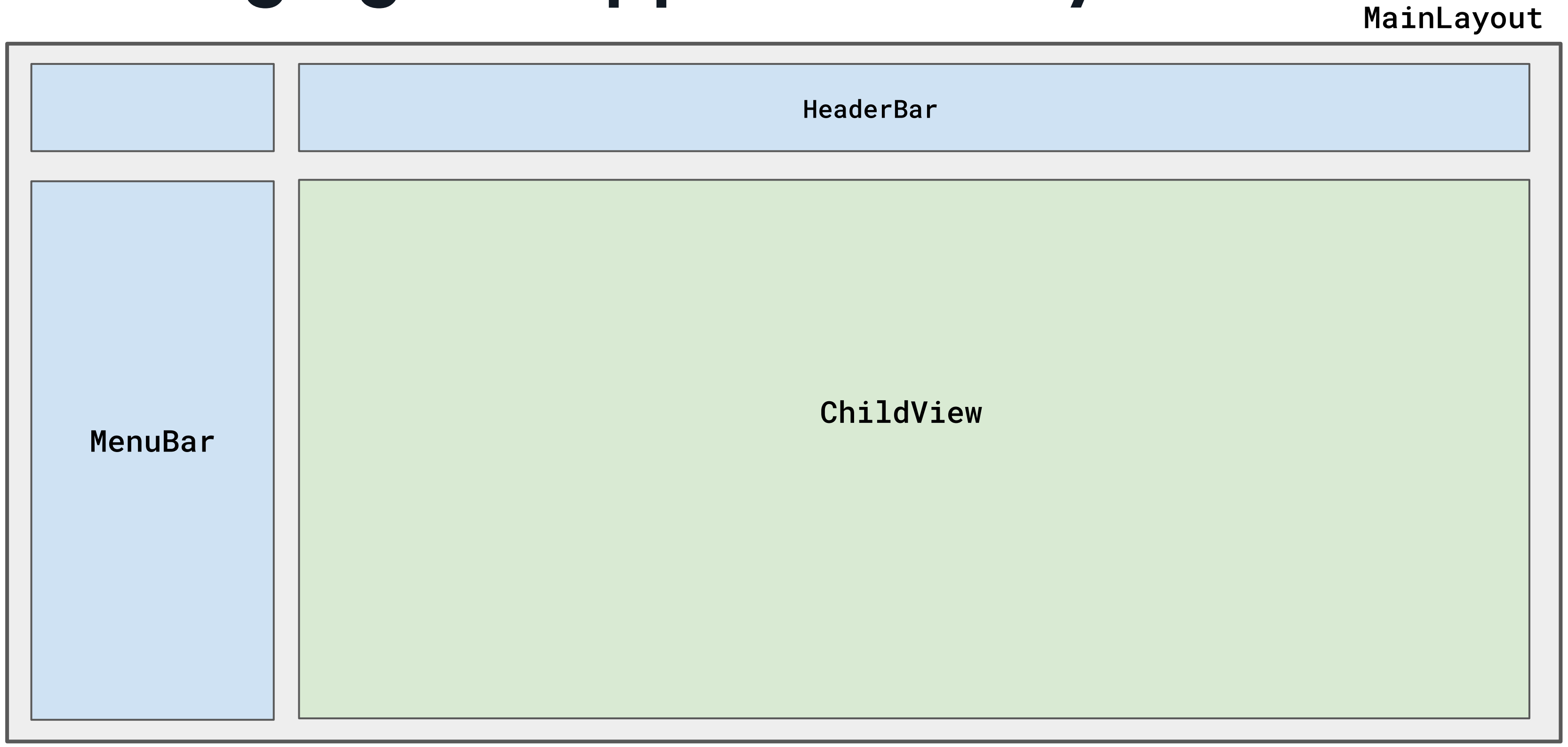
Managing the Application Layout



Managing the Application Layout



Managing the Application Layout



Parent Layouts

A parent Layout can be defined with the layout attribute in the @Route annotation:

```
@Route(value = "company", layout = MainLayout.class)
public class CompanyView extends Div {
      ...
}

@Route(value = "project", layout = MainLayout.class)
public class ProjectView extends Div {
      ...
}
```

When navigating between components that use the same parent class, the parent will be re-used will not update during navigation.

Parent Layouts

Any component used as a parent layout must implement the RouterLayout interface:

```
public class MainLayout extends Div implements RouterLayout {
      ...
}
```

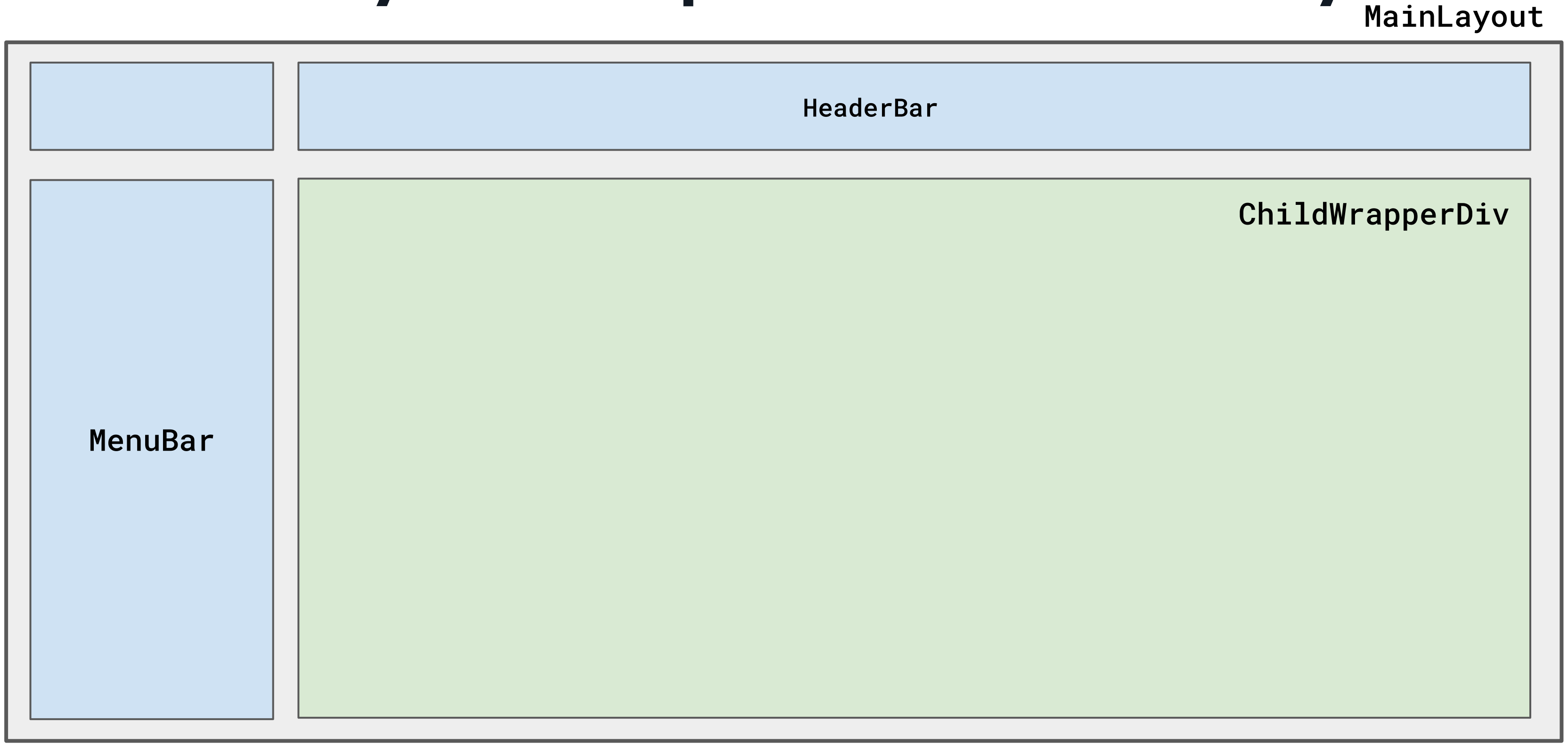
Parent Layouts implement RouterLayout

RouterLayout includes a default (but overridable) method showRouterLayoutContent(), which will appends the child view at the end of its own content:

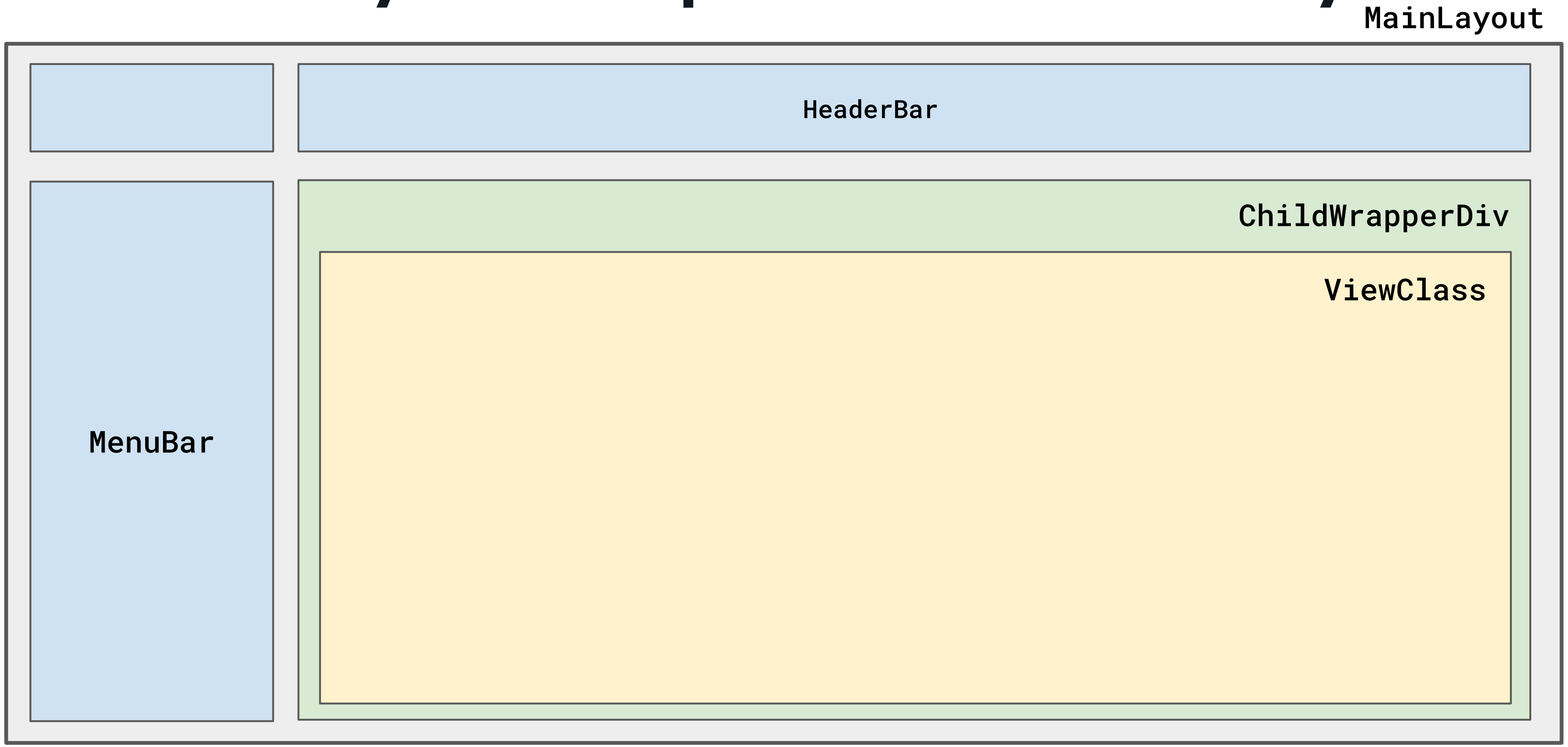
```java
public interface RouterLayout extends HasElement {

    default void showRouterLayoutContent(HasElement content) {
        if (content != null) {
            //No need to care the old content, Router automatically removes it.
            getElement().appendChild(Objects.requireNonNull(content.getElement()));
        }
    }
}
```

Parent Layouts implement RouterLayout



Parent Layouts implement RouterLayout



Parent Layouts implement RouterLayout

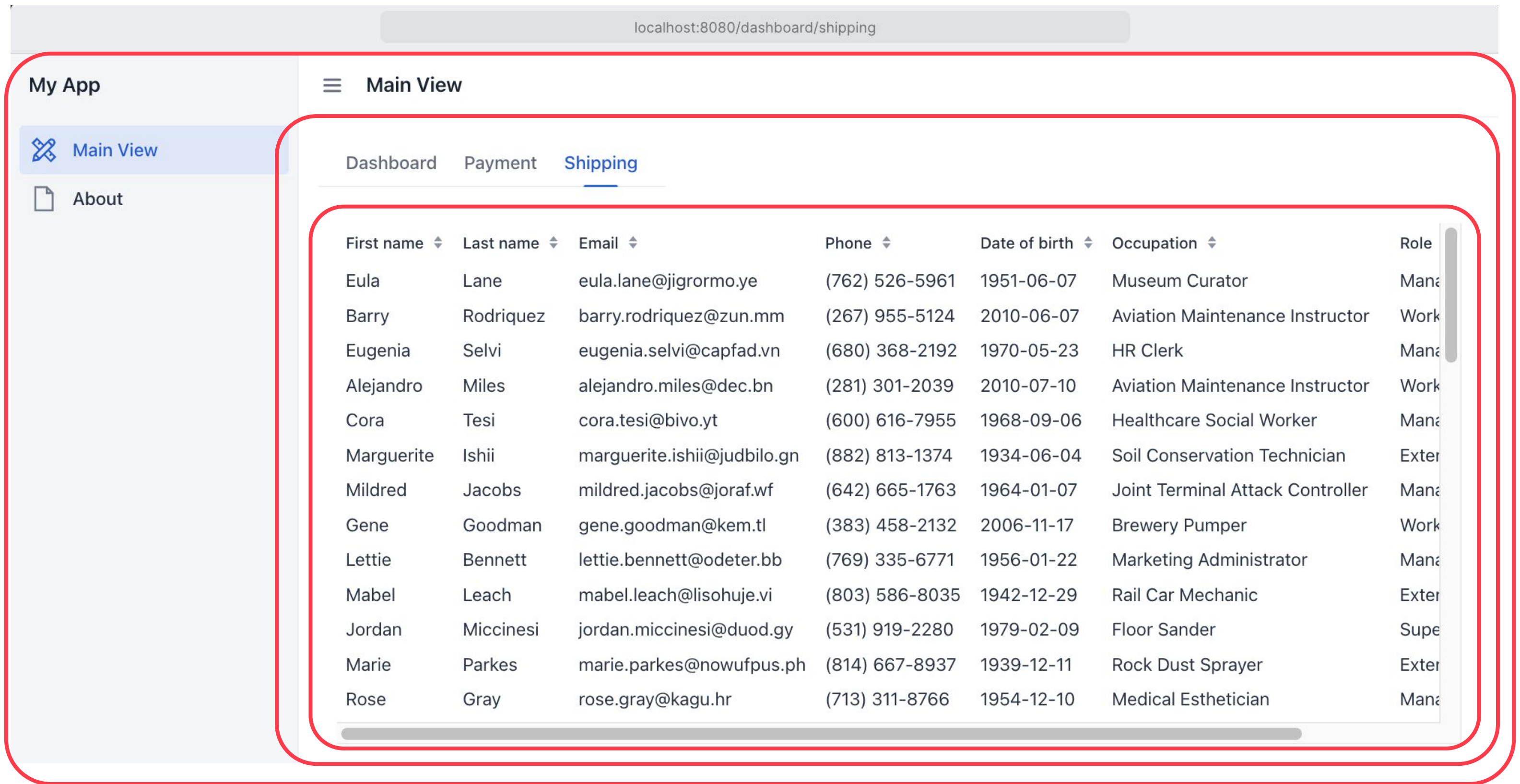
You can override the method for full control over where you place the child element:

```java
public class MainLayout extends VerticalLayout implements RouterLayout {
      private Div childWrapper = new Div();

      @Override
      public void showRouterLayoutContent(HasElement content) {
            // No need to remove the content explicitly, it’s removed by Flow automatically
            childWrapper.getElement().appendChild(content.getElement());
      }
}
```

Multi-level layouting

Multi-level layouting (nesting menus, etc)



First name	Last name	Email	Phone	Date of birth	Occupation	Role
Eula	Lane	eula.lane@jigrormo.ye	(762) 526-5961	1951-06-07	Museum Curator	Mana
Barry	Rodriquez	barry.rodriquez@zun.mm	(267) 955-5124	2010-06-07	Aviation Maintenance Instructor	Work
Eugenia	Selvi	eugenia.selvi@capfad.vn	(680) 368-2192	1970-05-23	HR Clerk	Mana
Alejandro	Miles	alejandro.miles@dec.bn	(281) 301-2039	2010-07-10	Aviation Maintenance Instructor	Work
Cora	Tesi	cora.tesi@bivo.yt	(600) 616-7955	1968-09-06	Healthcare Social Worker	Mana
Marguerite	Ishii	marguerite.ishii@judbilo.gn	(882) 813-1374	1934-06-04	Soil Conservation Technician	Exter
Mildred	Jacobs	mildred.jacobs@joraf.wf	(642) 665-1763	1964-01-07	Joint Terminal Attack Controller	Mana
Gene	Goodman	gene.goodman@kem.tl	(383) 458-2132	2006-11-17	Brewery Pumper	Work
Lettie	Bennett	lettie.bennett@odeter.bb	(769) 335-6771	1956-01-22	Marketing Administrator	Mana
Mabel	Leach	mabel.leach@lisohuje.vi	(803) 586-8035	1942-12-29	Rail Car Mechanic	Exter
Jordan	Miccinesi	jordan.miccinesi@duod.gy	(531) 919-2280	1979-02-09	Floor Sander	Supe
Marie	Parkes	marie.parkes@nowufpus.ph	(814) 667-8937	1939-12-11	Rock Dust Sprayer	Exter
Rose	Gray	rose.gray@kagu.hr	(713) 311-8766	1954-12-10	Medical Esthetician	Mana

Nested Layouts

So far, we've built Routes and mapped them to a parent by using the **layout** parameter of the Route. What if a deeper hierarchy of nesting?

```java
public class MainLayout extends Div implements RouterLayout {...}
```

```java
@Route(value = "view1", layout = MainLayout.class)
public class View1 extends Div {...}
```

```java
@Route(value = "view2", layout = MainLayout.class)
public class View2 extends Div {...}
```

Nested Layouts

Any RouterLayout can also have a @ParentLayout to build layout hierarchies:

```
public class TopLevelLayout extends Div implements RouterLayout {...}
```

```
@ParentLayout(TopLevelLayout.class)
public class MidLayout extends Div implements RouterLayout {...}
```

```
@Route(value = "view1", layout = MidLayout.class)
public class View1 extends Div {...}
```

```
@Route(value = "view2", layout = MidLayout.class)
public class View2 extends Div {...}
```

@ParentLayout annotation

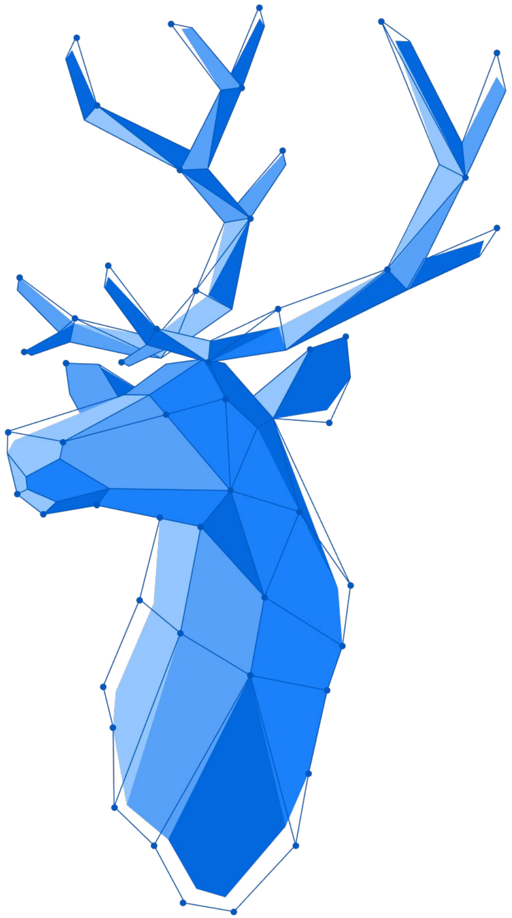
There are no restrictions on the amount of nested layouts.

Note: Normally, a class implementing RouterLayout doesn’t have its own @Route annotation since it only a holder for other views (that have their own @Route).

Any class using the **@ParentLayout** annotation should also be a **RouterLayout** or an error view (`implements` **`HasErrorParameter`**)

Summary, Part 3

- Application Layout
- Parent Layouts
- Multi-Level Layouting

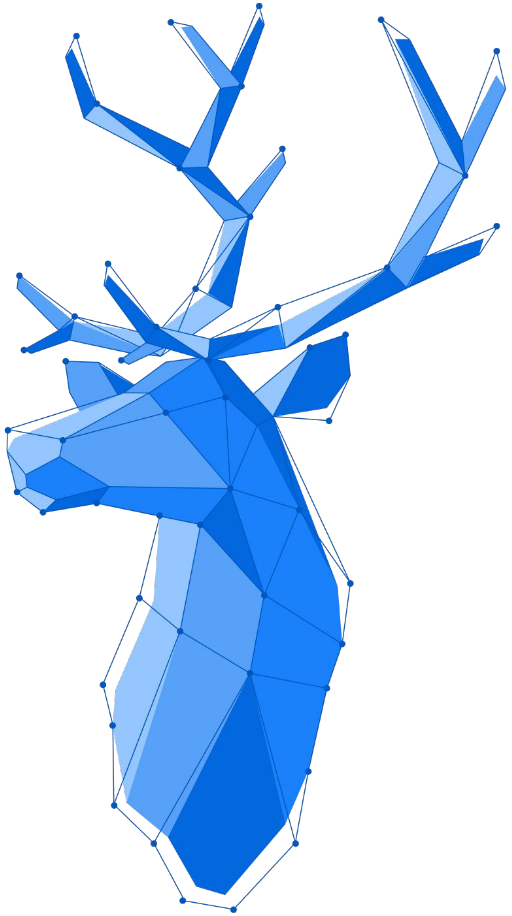


Exercise 3

Application Layout

Summary, Part 3

- Application Layout
- Parent Layouts
- Multi-Level Layouting

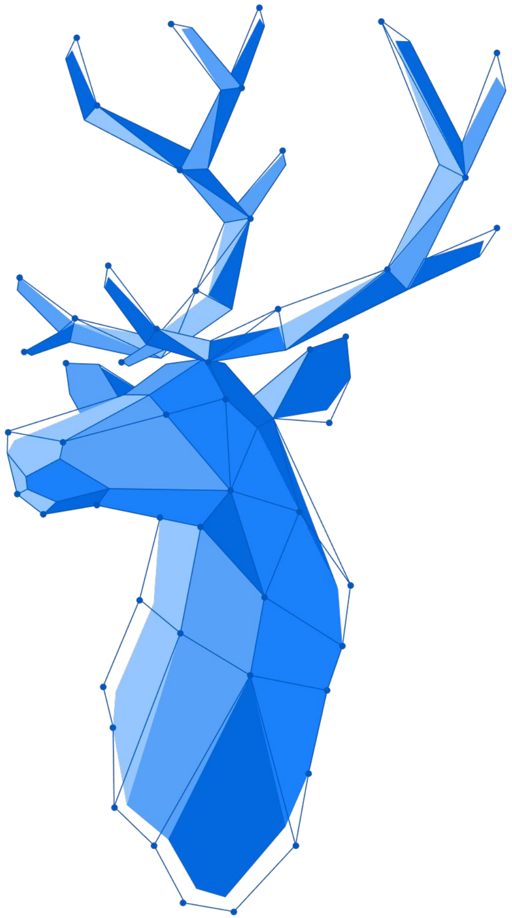


Router API, Part 4

The Navigation Lifecycle

Recap, parts 1–3

- How to enable routing
- URL parameters
- Navigation
- Passing parameters and data between views
- Application Layout
- Parent Layouts
- Multi-Level Layouting

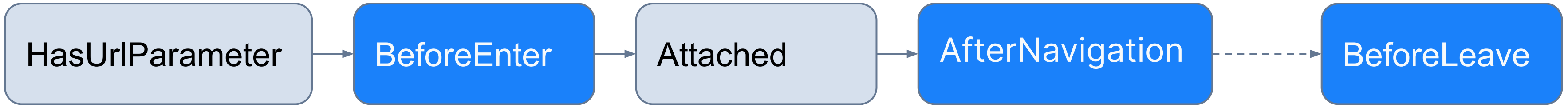


The Navigation Lifecycle

During a navigation event, three events are fired and can be reacted on:

- BeforeEnterEvent → BeforeEnterObserver
- BeforeLeaveEvent → BeforeLeaveObserver
- AfterNavigationEvent → AfterNavigationObserver

Order of the navigation events:



BeforeEnterEvent

The BeforeEnterEvent is fired before the view is rendered.

This event is typically used to reroute / forward navigation requests:

- Check login
- Handle errors

The event can be caught in any Component by implementing the BeforeEnterObserver interface.

BeforeEnterEvent: Reroute dynamically

```
// Events can be observed not only in @Route classes, but also parent layouts
public class MainLayout extends Div implements RouterLayout, BeforeEnterObserver {
      @Override
      public void beforeEnter(BeforeEnterEvent event) {
            if (!isUserLoggedIn) {
                  event.rerouteTo(LoginView.class);
            }
      }
}
```

BeforeEnterEvent: Reroute dynamically

You can also reroute to an error view registered for a particular Exception type:

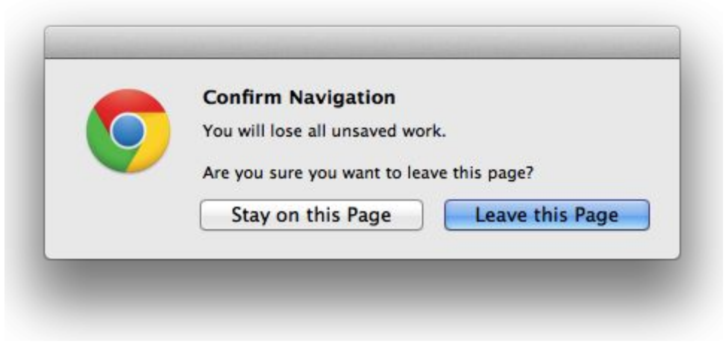
```
public class AuthenticationHandler implements BeforeEnterObserver {
      @Override
      public void beforeEnter(BeforeEnterEvent event) {
            Class<?> target = event.getNavigationTarget();
            if (!currentUserMayEnter(target)) {
                  event.rerouteToError(AccessDeniedException.class);
            }
      }
}
```

BeforeLeaveEvent

The **BeforeLeaveEvent** is fired when a component is removed from the DOM tree (when the Router knows that we should be navigating to another route).

- Clean up view data
- Postpone navigation (‘are you sure you want to leave’ functionality.)

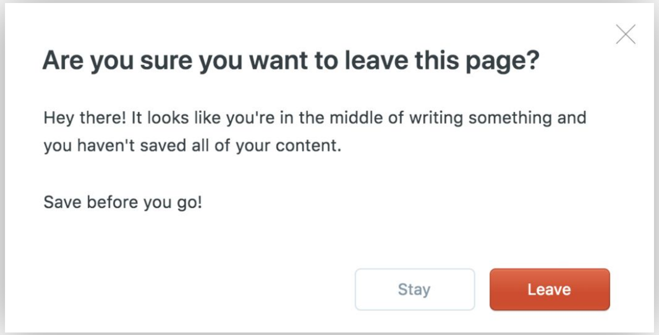
The event can be caught in the Component by implementing the **BeforeLeaveObserver** interface.



Confirm Navigation

You will lose all unsaved work.

Are you sure you want to leave this page?



Are you sure you want to leave this page?

Hey there! It looks like you're in the middle of writing something and you haven't saved all of your content.

Save before you go!

BeforeLeaveEvent: Confirm leave

```java
@Route("signup")
public class SignupForm extends Div implements BeforeLeaveObserver {

   @Override
   public void beforeLeave(BeforeLeaveEvent event) {
       if (this.hasUnsavedChanges()) {
          ContinueNavigationAction action = event.postpone(); // Save navigation action for later
          Dialog confirmDialog = new Dialog();
          Button confirmButton = new Button("Confirm", e -> {
             action.proceed(); // User said ok, continue with the navigation (after this listener is done)
             confirmDialog.close();
          });
          confirmDialog.add(new Text("Are you sure you want to leave?"), confirmButton);
          confirmDialog.open();
       }
   }

}
```

AfterNavigationEvent

Fired during navigation, when the new view is in place and there can not be any more redirects. Useful for updating the UI with the final state:

- updating a separate menu item when we know which item is active.
- Handle incoming QueryParameters

The event can be caught in the Component by implementing the **AfterNavigationObserver** interface.

AfterNavigationEvent: Dynamic page customization

```java
public class SideMenu extends Div implements AfterNavigationObserver {

      Anchor blog = new Anchor("blog", "Blog");

      @Override
      public void afterNavigation(AfterNavigationEvent event) {
            boolean active = event.getLocation().getFirstSegment().equals(blog.getHref());
            blog.getElement().getClassList().set("active", active);
      }

}
```

AfterNavigationEvent: Parsing query parameters

This listener is also a good place to parse the Query parameters and react on them:

```
http://example.com/path/to/page?name=ferret&color=purple
```

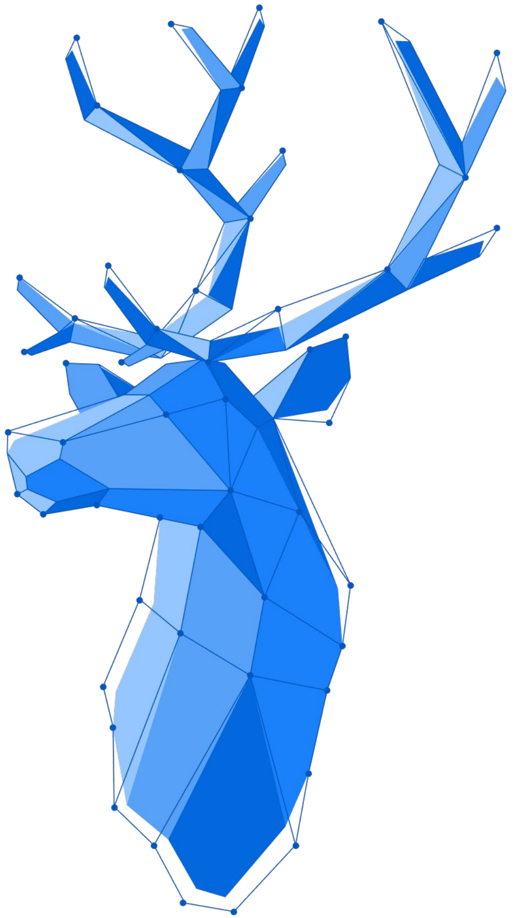
```java
public class MyView extends Div implements AfterNavigationObserver {

      @Override
      public void afterNavigation(AfterNavigationEvent event) {
            QueryParameters queryParameters = event.getLocation().getQueryParameters();
            ...
      }

}
```

Summary, Part 4

- Navigation Lifecycle
- BeforeEnterEvent
- BeforeLeaveEvent
- AfterNavigationEvent

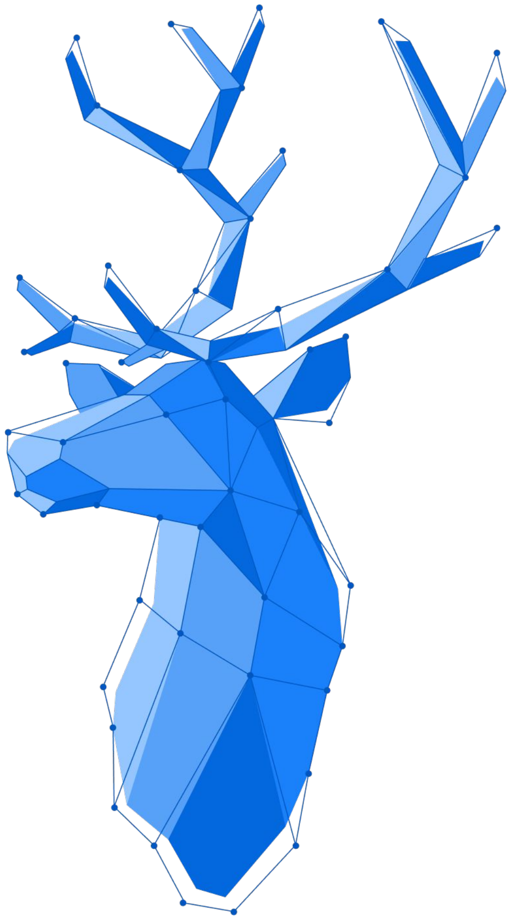


Exercise 4

Setup login

Summary, Part 4

- Navigation Lifecycle
- BeforeEnterEvent
- BeforeLeaveEvent
- AfterNavigationEvent



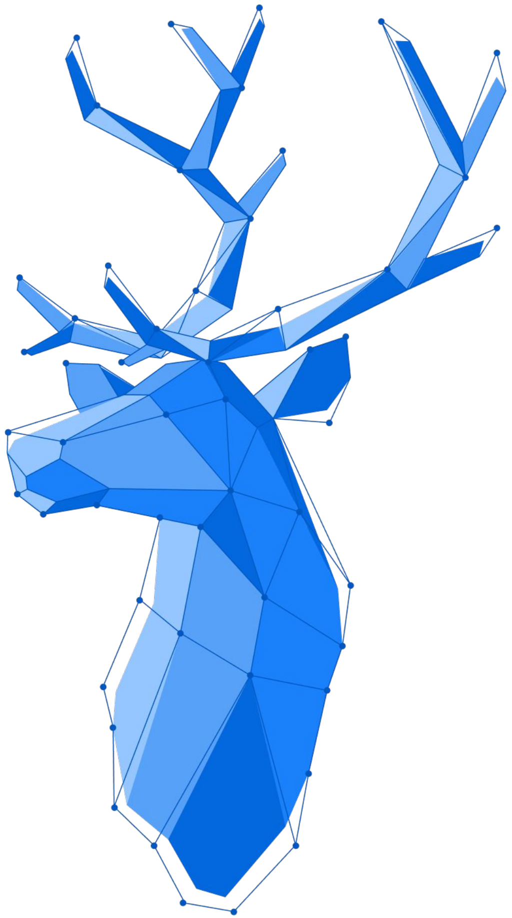
Summary

Enabling Routing:

- @Route
- URL parameters for navigation targets

Navigation:

- RouterLink
- UI.navigate()
- Exception handling during routing



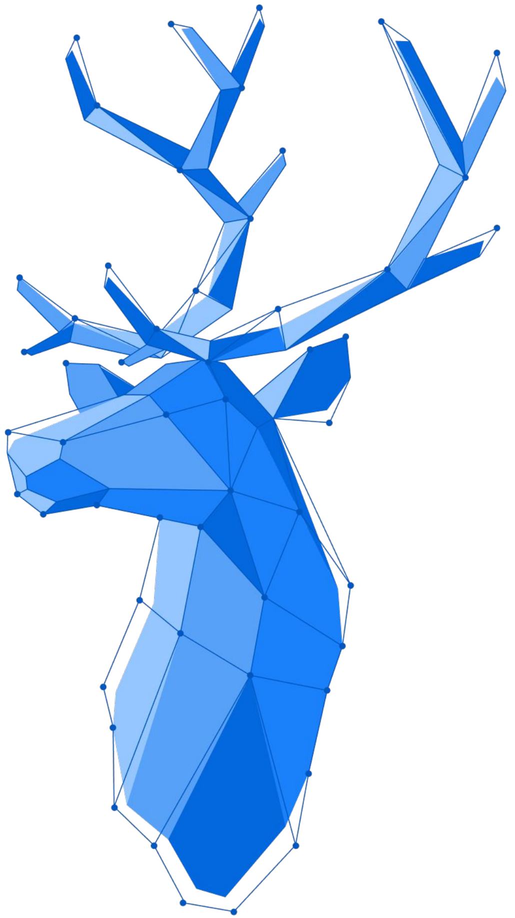
Summary

Application Layout:

- RouterLayout
- Nested layouts with @ParentLayout

Navigation Lifecycle:

- BeforeEnterEvent - redirect in new view
- BeforeLeaveEvent - postpone in current view
- AfterNavigationEvent - initialize new view



Thank you!