This slide is not here

Let's talk about

web apps

The web is simple

The client makes a request
The server returns HTML
The client displays HTML

Except when its not simple...

The client makes a request
The server returns data
The client generates HTML

Client side apps give you power at the cost of complexity

Until...

Hotwire: HTML over The Wire

Noel Rappin (@noelrap)
https://www.joinroot.com
http://noelrappin.com

#_hotwire_html_over_the_wire

We are going to

- Discuss Hotwire's structure
- Use a bunch of Turbo features on a site
- Augment them with a little Stimulus
- See where we are on time

Follow along...

https://github.com/noelrappin/railsconf2021_hotwire

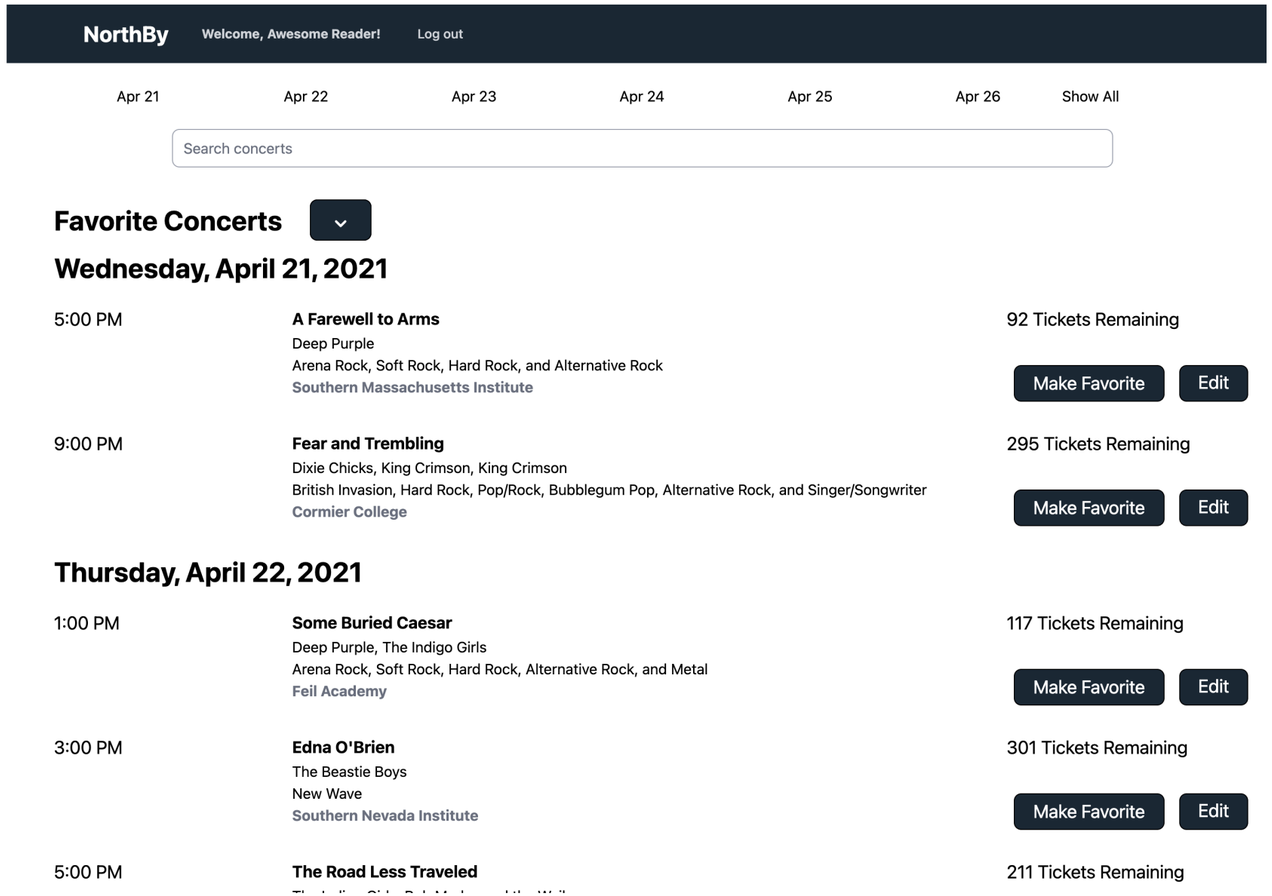
These slides are in the repo as PDF

And as Markdown

The markdown has all the code changes

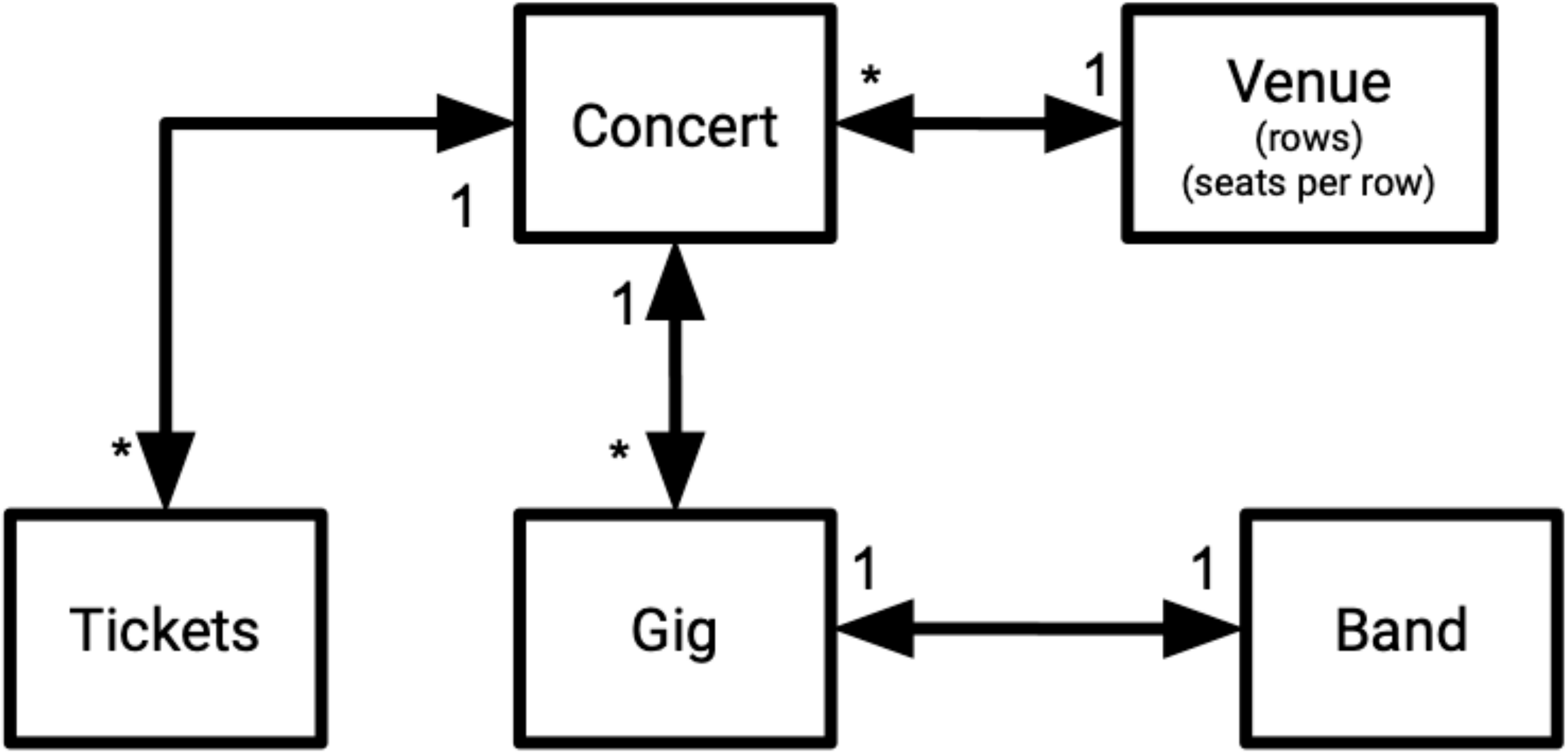
Each step has a different branch

Here's our sample app



The login is

email: `areader@example.com`
password: `awesome`


Concert
Venue
(rows)
(seats per row)
Tickets
Gig
Band
1
*
1
1
*
*
1
1

It's not a complete app

We're going to augment this page with Hotwire

Hotwire is: Turbo and Stimulus

Server side rendering

- Regular HTML
- Navigation via turbo frames
- Form submit and turbo stream
- Client-side CSS switch
- Generic Stimulus controller
- Specific Stimulus controller

Turbo Drive

Rebranding of Turbolinks

Automatically handles navigation in the background

Updates DOM without reloading page

Makes a page transition appear faster

But it applies to an entire page

What if we want to only refresh part of a page?

Let's add inline editing

Turbo Frames

We're going to make this change first, then explain it

Branch workshop_01

/app/views/concerts/_concert.html.erb

/app/views/concerts/_form.html.erb

```
<%= turbo_frame_tag(dom_id(concert)) do %>
  THE WHOLE FILE
<% end %>
```

app/controllers/concert_controller.rb

```
def show
  if params[:inline]
    render(@concert)
    return
  end
end
```

app/controllers/concert_controller.rb

```
def create
  @concert = Concert.new(concert_params)
  respond_to do |format|
    if @concert.save
      format.html { redirect_to @concert, notice: "" }
      format.json { render :show, status: :created, location: @concert }
    else
      format.html { render :new, status: :unprocessable_entity }
      format.json { render json: @concert.errors, status: :unprocessable_entity }
    end
  end
end
```

And that works. Really.

How?

Custom HTML Tag

```
<turbo-frame id="concert_16">
</turbo-frame>
```

Inside a turbo frame:

All Navigation stays within the frame

Unless otherwise specified

The returned HTML is parsed and looks for a Turbo Frame matching the DOM ID

If there is no matching frame, the frame goes blank

This means we can reuse the edit page inline, even though the edit page has more stuff

It also means we could have sent the whole page in response to the form submit, and it would have worked, but had worse performance

Two fun tricks

```
<turbo-frame id="concert_16" src="/concerts/16" loading="lazy">
  LOADING DISPLAY
</turbo-frame>
```

`src` means "load from that URL after the page loads"

`lazy` means "wait to load until the element is visible"

Possible to cache the page structure and have it filled in

One problem: Our links broke

Branch workshop_02

Making the link work

app/views/concerts/_concert.html.erb

```
<%= link_to(concert.name, concert, "data-turbo-frame": "_top") %>
```

Making the favorite button work

app/views/favorites/_list.html.erb

```
<%= turbo_frame_tag("favorite-concerts") do %>
   REST OF FILE
<% end %>
```

app/views/concerts/_concert.html.erb

```
<% if current_user.favorite(concert) %>
  <%= button_to(
        "Remove Favorite",
        favorite_path(id: current_user.favorite(concert)),
        method: "delete",
        form: {data: {"turbo-frame": "favorite-concerts"}},
        class: SimpleForm.button_class)%>
<% else %>
  <%= button_to("Make Favorite",
        favorites_path(concert_id: concert.id),
        method: "post",
        form: {data: {"turbo-frame": "favorite-concerts"}},
        class: SimpleForm.button_class) %>
<% end %>
```

app/controllers/favorites_controller

```
class FavoritesController < ApplicationController
  def index
  end

  def create
    Favorite.create(user: current_user, concert_id: params[:concert_id])
    render(partial: "favorites/list")
  end

  def destroy
    @favorite = Favorite.find(params[:id])
    @favorite.destroy
    render(partial: "favorites/list")
  end

  private def favorite_params
    params.require(:concert_id)
  end
end
```

We don't have to change `_favorite`...

This also works

Almost -- the body of the page doesn't change

This is a job for...

Turbo Streams

Turbo Streams allows to change multiple page sections in a few different ways in one payload

```
<turbo-stream action="ACTION" target="TARGET">
  <template>
    OUR HTML GOES HERE
  </template>
</turbo-stream>
```

Turbo Streams is different from Turbo Frames

Multiple Turbo Stream payloads can be in the same response

Turbo Frames can only affect one DOM ID

Turbo Streams allows for different HTML actions (append, prepend, remove, replace, update)

Turbo Frames can only update

Turbo Streams match any DOM element ID

Turbo Frames only matches other Turbo Frames

Turbo Streams happen automatically on form submit

Turbo Frame happens on all navigation (except forms that return 200)

Turbo Stream processing does NOT happen on normal GET requests

Turbo Streams are meant to be enhancements

Ideally, they allow you to reuse existing templates

A Turbo Stream submit is a Rails format

Branch workshop_03

app/controllers/favorites_controller.rb

```
class FavoritesController < ApplicationController
  def index
  end

  def create
    @favorite = Favorite.create(
      user: current_user,
      concert_id: params[:concert_id]
    )
  end

  def destroy
    @favorite = Favorite.find(params[:id])
    @favorite.destroy
  end

  private def favorite_params
    params.require(:concert_id)
  end
end
```

app/views/favorites/create.turbo_stream.erb

```
<%= turbo_stream.append("favorite-concerts-list", @favorite) %>
<%= turbo_stream.replace(dom_id(@favorite.concert), @favorite.concert) %>
```

app/views/favorites/destroy.turbo_stream.erb

```
<%= turbo_stream.remove(dom_id(@favorite)) %>
<%= turbo_stream.replace(dom_id(@favorite.concert), @favorite.concert) %>
```

Okay, that gets us where we started...

Let's add animation

You can do this without Turbo, but it's harder

Branch workshop_04

This uses the animate.css library for animation effects

app/views/favorites/create.turbo_stream.erb

```
<%= turbo_stream.append("favorite-concerts-list") do %>
  <%= render(@favorite, animate_in: true) %>
<% end %>
<%= turbo_stream.replace(dom_id(@favorite.concert), @favorite.concert) %>
```

app/views/favorites/_favorite.html.erb

```
<%- concert = favorite.concert %>
<%- animate_in ||= false %>
<article class="my-6 animate__animated
                <%= animate_in ? "animate__slideInRight" : "" %>"
         id="<%= dom_id(favorite) %>"
         data-animate-out="animate__slideOutRight">
 # AND SO ON
</article>
```

Animation out is trickier, because Turbo removes the item, we need to capture that

Event hooks

app/packs/entrypoints/application.js

```
document.addEventListener("turbo:before-stream-render", (event) => {
  if (event.target.action === "remove") {
    const targetFrame = document.getElementById(event.target.target)
    if (targetFrame.dataset.animateOut) {
      event.preventDefault()
      const elementBeingAnimated = targetFrame
      elementBeingAnimated.classList.add(targetFrame.dataset.animateOut)
      elementBeingAnimated.addEventListener("animationend", () => {
        targetFrame.remove()
      })
    }
  }
})
```

Turbo Streams are especially good over ActionCable

Branch workshop_05

Uses Redis

If you have docker

```
docker run --rm -it -p 6379:6379
redis:latest
```

Otherwise

config/cable.yml

```
development:
  adapter: async
```

Note: all the partials have been scrubbed to not use `current_user`

app/views/schedules/show.html.erb

```
<%= turbo_stream_from(@user, :favorites) %>
```

app/models/favorite.rb

```
after_create_commit -> do
  Turbo::StreamsChannel.broadcast_stream_to(
    user, :favorites,
    content: ApplicationController.render(
      :turbo_stream,
      partial: "favorites/create",
      locals: {favorite: self}
    )
  )
end

after_destroy_commit -> do
  Turbo::StreamsChannel.broadcast_stream_to(
    user, :favorites,
    content: ApplicationController.render(
      :turbo_stream,
      partial: "favorites/destroy",
      locals: {favorite: self}
    )
  )
end
```

There are a lot of simpler shortcuts here

app/views/favorites/_create.turbo_stream.erb

```
<%= turbo_stream.append("favorite-concerts-list") do %>
  <%= render(favorite, animate_in: true) %>
<% end %>
<%= turbo_stream.replace(dom_id(favorite.concert)) do %>
  <%= render(favorite.concert, user: favorite.user) %>
<% end %>
```

app/views/favorites/_delete.turbo_stream.erb

```
<%= turbo_stream.remove(dom_id(favorite)) %>
<%= turbo_stream.replace(dom_id(favorite.concert)) do %>
  <%= render(favorite.concert, user: favorite.user) %>
<% end %>
```

app/views/controllers/favorites_controller.rb

```
def create
  @favorite = Favorite.create(
    user: current_user,
    concert_id: params[:concert_id]
  )
  head(:ok)
end

def destroy
  @favorite = Favorite.find(params[:id])
  @favorite.destroy
  head(:ok)
end
```

You can verify this with two browsers side-by-side

Lets make the favorites block show hide based on that button

I'm going to show this, and then explain it

Branch workshop_06

app/views/favorites/list.html.erb

```
<span class="<%= SimpleForm.button_class %> blue-hover ml-6"
      data-controller="flip"
      data-flip-status-value="true"
      data-flip-true-class="rotate-90"
      data-flip-false-class="-rotate-90"
      data-action="click->flip#toggle click->fade#fade">
  <%= image_pack_tag(
        "chevron-right.svg",
        width: 25,
        height: 25,
        class: "inline transform transition-transform duration-1000",
        "data-flip-target": "elementToChange" ) %>
</span>
```

The key bits here are the `data` attributes

A controller is where Stimulus code is executed

Controllers are attached to DOM elements with the `data-controller` attribute

Which matches a file, in this case

`flip_controller.js`

app/packs/controllers/flip_controller.js

```
import { Controller } from "stimulus"

export default class FlipController extends Controller {
  static classes = ["true", "false"]
  static targets = ["elementToChange"]
  static values = { status: Boolean }

  toggle() {
    this.statusValue = !this.statusValue
  }

  statusValueChanged() {
    this.elementToChangeTarget.classList.toggle(
      this.trueClass,
      this.statusValue
    )
    this.elementToChangeTarget.classList.toggle(
      this.falseClass,
      !this.statusValue
    )
  }
}
```

Targets are declared as `data-controllername-target=targetname` **as in** `data-flip-target=elementToChange`

Targets are declared in the controller

- `elementToChangeTarget`
- `elementToChangeTargets`
- `hasElementToChangeTarget`

Values and Classes

```
data-flip-status-value=true
data-flip-true-class=rotate-90
data-flip-false-class=-rotate-90
```

- `this.statusValue`
- `this.statusValueChanged()` (called on startup)
- `this.trueClass`
- `this.hasTrueClass`

Actions

```
data-action="click->flip#toggle"
```

action -> controller # method

So the action calls the toggle method
which changes the value
which calls the change hook

Change hooks get called whenever the property or underlying DOM attribute are changed.

app/views/favorites/list.html.erb

```
<section class="my-4"
          id="favorite-section"
          data-controller="fade"
          data-fade-status-value="true"
          data-fade-clean-value="true"
          data-fade-fade-in-class="fadeInDown"
          data-fade-fade-out-class="fadeOutUp">

<div id="favorite-concerts-list"
         data-fade-target="elementToChange"
         data-action="animationend->fade#animationend
         animationstart->fade#animationstart">
```

app/packs/controllers/fade_controller.js

```
import { Controller } from "stimulus"

export default class FadeController extends Controller {
  static classes = ["fadeIn", "fadeOut"]
  static targets = ["elementToChange"]
  static values = { status: Boolean, clean: Boolean }

  fade() {
    this.statusValue = !this.statusValue
    this.cleanValue = false
  }

  animationend() {
    this.toggleClass("max-h-0", !this.statusValue)
  }

  animationstart() {
    this.toggleClass("max-h-0", false)
  }
```

app/packs/controllers/fade_controller.js

```
  statusValueChanged() {
    if (this.cleanValue) {
      return
    }
    this.toggleClass("animate__animated", true)
    this.toggleClass(`animate__${this.fadeInClass}`, this.statusValue)
    this.toggleClass(`animate__${this.fadeOutClass}`, !this.statusValue)
  }

  toggleClass(cssClass, state) {
    this.elementToChangeTarget.classList.toggle(cssClass, state)
  }
}
```

Let's sort our favorites

Branch workshop_07

app/views/favorites/list.html.erb

```
<div id="favorite-concerts-list"
        data-controller="sort"
        data-fade-target="elementToChange"
        data-action="animationend->fade#animationend animationstart->fade#animationstart">
```

app/views/favorites/_favorite.html.erb

```
<article class="my-6 animate__animated
                <%= animate_in ? "animate__slideInRight" : "" %>"
         id="<%= dom_id(favorite) %>"
         data-animate-out="animate__slideOutRight"
         data-sort-target="sortElement"
         data-sort-value="<%= favorite.sort_date %>">
```

app/packs/controllers/sort_controller.js

```
import { Controller } from "stimulus"

export default class SortController extends Controller {
  static targets = ["sortElement"]

  initialize() {
    const target = this.element
    const observer = new MutationObserver((mutations) => {
      observer.disconnect()
      Promise.resolve().then(start)
      this.sortTargets()
    })
    function start() {
      observer.observe(target, { childList: true, subtree: true })
    }
    start()
  }
```

```
  sortTargets() {
    if (this.targetsAlreadySorted()) {
      return
    }
    this.sortElementTargets
      .sort((a, b) => {
        return this.sortValue(a) - this.sortValue(b)
      })
      .forEach((element) => this.element.append(element))
  }

  targetsAlreadySorted() {
    let [first, ...rest] = this.sortElementTargets
    for (const next of rest) {
      if (this.sortValue(first) > this.sortValue(next)) {
        return false
      }
      first = next
    }
    return true
  }

  sortValue(element) {
    if ("sortValue" in element.dataset) {
      return parseInt(element.dataset.sortValue, 10)
    } else {
      return parseInt(element.children[0].dataset.sortValue, 10)
    }
  }
}
```

Now lets sort the concerts

This one is a little much..

app/controllers/concerts_controller.rb

```
def update
  respond_to do |format|
    if @concert.update(concert_params)
      format.turbo_stream {}
      format.html { render(@concert, locals: {user: current_user}) }
      format.json { render :show, status: :ok, location: @concert }
    else
      format.html { render :edit, status: :unprocessable_entity }
      format.json { render json: @concert.errors, status: :unprocessable_entity }
    end
  end
end
```

app/views/concerts/update.turbo_stream.erb

```
<%= turbo_stream.replace(dom_id(@concert)) do %>
  <%= render(@concert, user: current_user) %>
<% end %>
```

app/views/concerts/_concert.erb

```
<%= turbo_frame_tag(
      dom_id(concert),
      class: "concert",
      "data-sort-target": "sortElement",
      "data-sort-value": concert.start_time.to_i,
      "data-#{concert.start_time.by_example("2006-01-02")}": true) do %>
```

app/views/schedules/show.html.erb

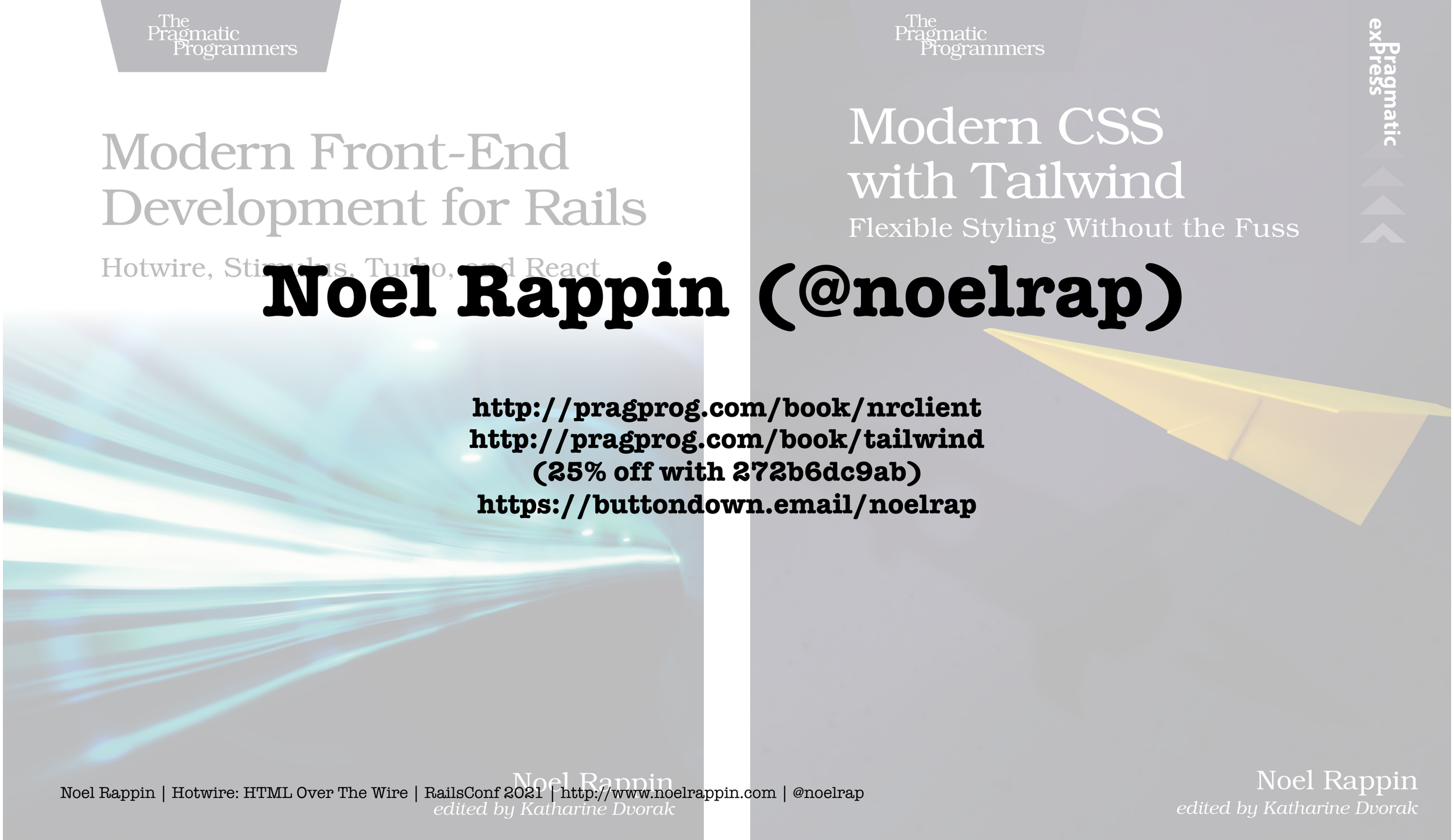
```
<section data-controller="sort">
  <% @concerts.sort_by(&:start_time).each do |concert| %>
    <%= render concert, user: @user %>
  <% end %>
</section>
```

app/views/schedules/show.html.erb

```
<style>
  <% @schedule.schedule_days.each do |schedule_day| %>
    <% today = "data-#{schedule_day.day.by_example("2006-01-02")}" %>
    .concert[<%= today %>]:first-child::before,
    .concert:not([<%= today %>]) + [<%= today %>]::before
    {
        content: "<%= schedule_day.day.by_example("Monday, January 2, 2006") %>";
        font-size: 1.875rem;
        line-height: 2.25rem;
        font-weight: 700;
    }
  <% end %>
</style>
```

This works... kind of

Fin



Noel Rappin (@noelrap)

http://pragprog.com/book/nrclient
http://pragprog.com/book/tailwind
(25% off with 272b6dc9ab)
https://buttondown.email/noelrap