Fundamental Component Design Patterns

2019

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JURASSIC PARK
RIVER ADVENTURE


WANTED
BY THE MINISTRY OF MAGIC
BELLATRIX LESTRANGE
BELLATRIX LESTRANGE IS A KNOWN DEATH EATER.
CONVICTED MURDERER. FUGITIVE FROM AZKABAN.
APPROACH WITH EXTREME CAUTION!
IF YOU HAVE ANY INFORMATION CONCERNING
THIS PERSON, PLEASE CONTACT YOUR
NEAREST AUROR OFFICE.
REWARD
THE MINISTRY OF MAGIC IS OFFERING A REWARD OF 1,000 GALLEONS
FOR INFORMATION LEADING DIRECTLY TO THE ARREST OF BELLATRIX LESTRANGE

Before we get started...

Before we get started...

All resources will be available online

https://www.twitter.com/bencodezen

For the social media folks

@bencodezen - #ConnectTech

The Progressive JavaScript Framework

WHY VUE.JS? GET STARTED GITHUB

Approachable

Already know HTML, CSS and JavaScript? Read the guide and start building things in no time!

Versatile

An incrementally adoptable ecosystem that scales between a library and a full-featured framework.

Performant

20KB min+gzip Runtime
Blazing Fast Virtual DOM
Minimal Optimization Efforts

The Progressive JavaScript Framework

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Component Basics

Navbar.vue

```
<template>
  <ul>
    <li class="nav-item">
      <a href="/Home">Home</a>
    </li>
    <li class="nav-item">
      <a href="/About">About</a>
    </li>
    <li class="nav-item">
      <a href="/Contact">Contact</a>
    </li>
  </ul>
</template>
```

Navbar.vue

```vue
<template>
  <ul>
    <li class="nav-item">
      <a href="/Home">Home</a>
    </li>
    <li class="nav-item">
      <a href="/About">About</a>
    </li>
    <li class="nav-item">
      <a href="/Contact">Contact</a>
    </li>
  </ul>
</template>
```

NavItem.vue

```vue
<template>
  <li class="nav-item">
    <a :href="`/${label}`">
      {{ label }}
    </a>
  </li>
</template>
```

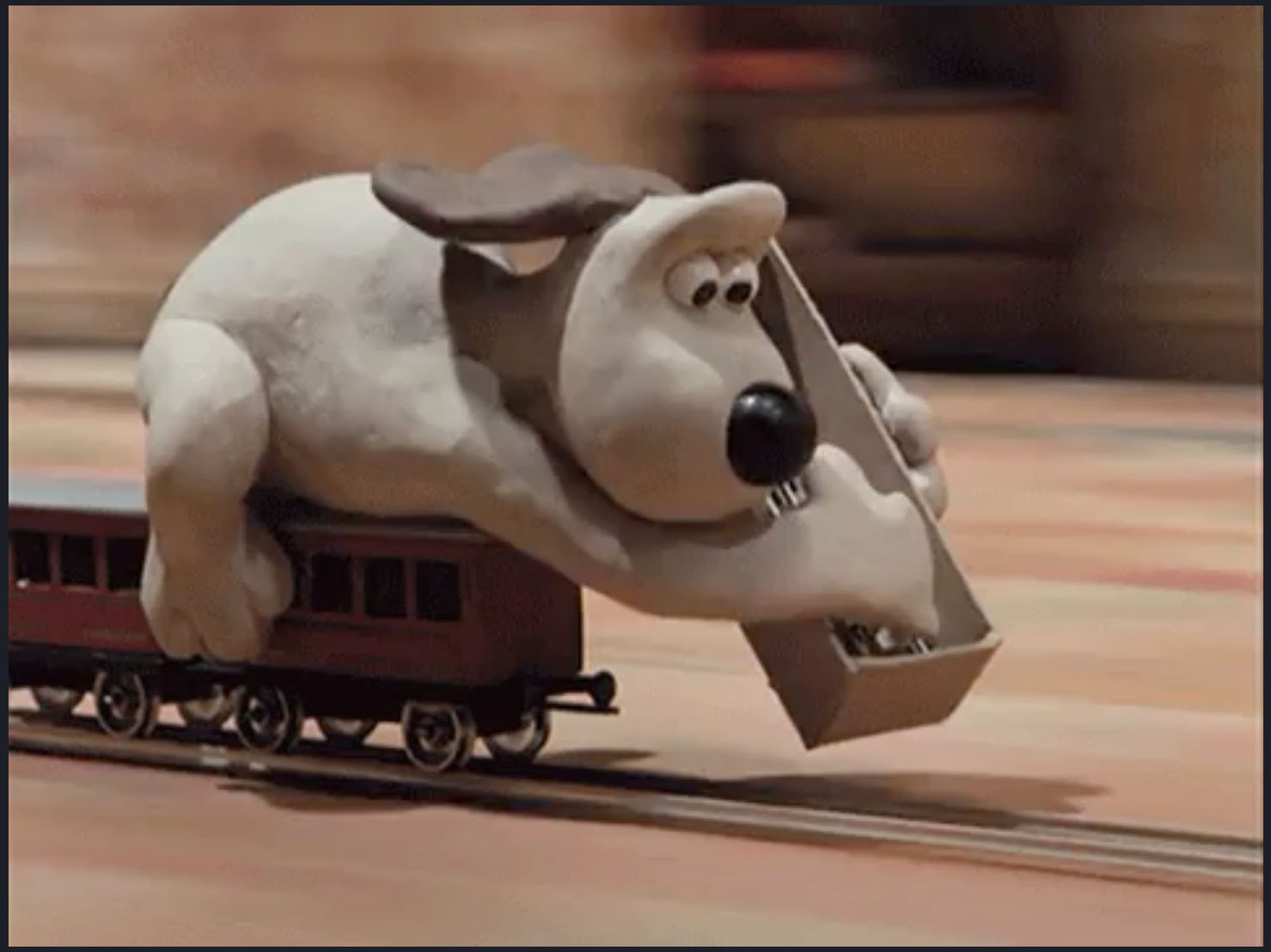
Navbar.vue

```
<template>
  <ul>
    <li class="nav-item">
      <a href="/Home">Home</a>
    </li>
    <li class="nav-item">
      <a href="/About">About</a>
    </li>
    <li class="nav-item">
      <a href="/Contact">Contact</a>
    </li>
  </ul>
</template>
```

Navbar.vue

```
<template>
  <ul>
    <NavItem label="Home"></NavItem>
    <NavItem label="About"></NavItem>
    <NavItem label="Contact"></NavItem>
  </ul>
</template>
```

Why Components?



Build things faster

No more repetitive code

Less bugs means you can relax

TECHNIQUE

Props

Navbar.vue

```
<script>
export default {
  props: ['label']
}
</script>

<template>
  <li class="nav-item">
    <a :href="`/${label}`">
      {{ label }}
    </a>
  </li>
</template>
```

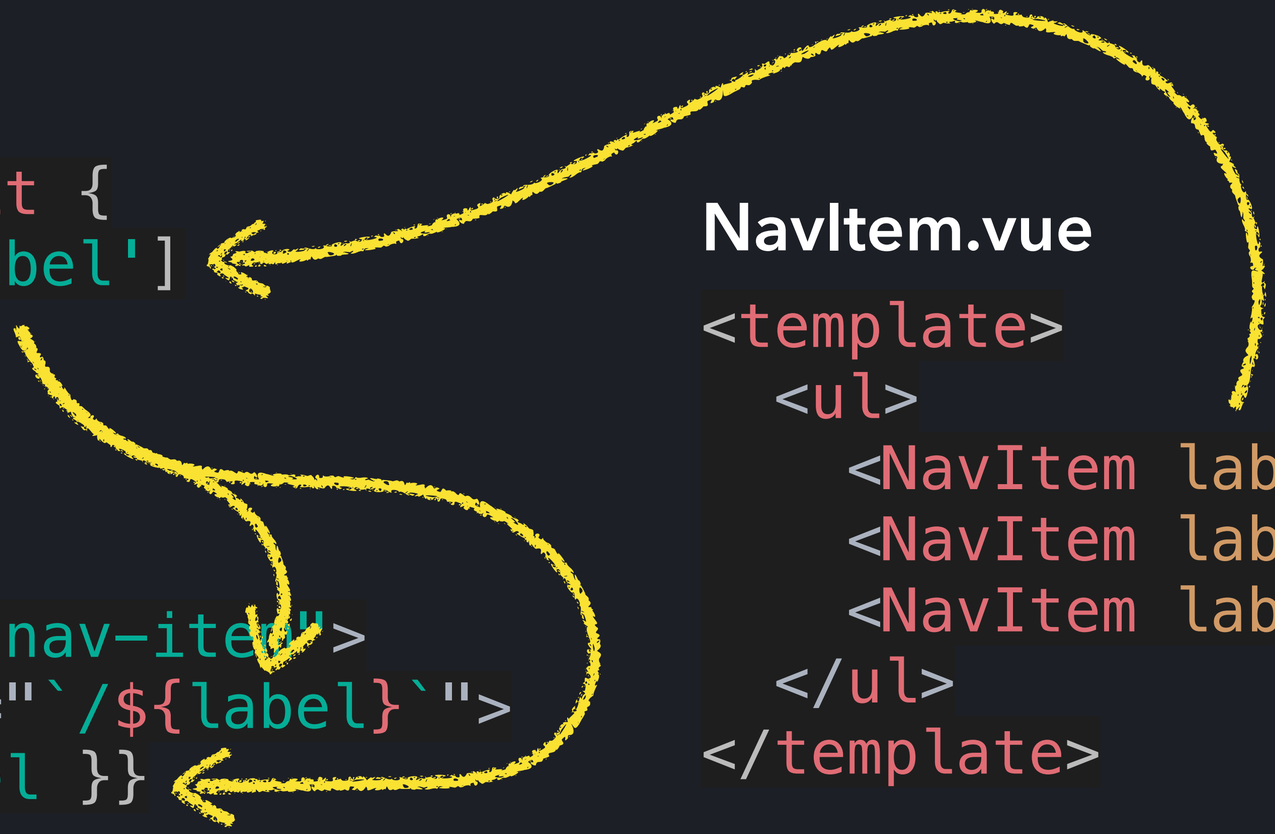
Navbar.vue

```
<script>
export default {
  props: ['label']
}
</script>

<template>
  <li class="nav-item">
    <a :href="`/${label}`">
      {{ label }}
    </a>
  </li>
</template>
```

NavItem.vue

```
<template>
  <ul>
    <NavItem label="Home" />
    <NavItem label="About" />
    <NavItem label="Contact" />
  </ul>
</template>
```



Navbar.vue

```
<script>
export default {
  props: ['label']
}
</script>

<template>
  <li class="nav-item">
    <a :href="`/${label}`">
      {{ label }}
    </a>
  </li>
</template>
```

NavItem.vue

```
<template>
  <ul>
    <NavItem label="Home" />
    <NavItem label="About" />
    <NavItem label="Contact" />
  </ul>
</template>
```

Navbar.vue

```
<script>
export default {
  props: {
    label: {
      type: String,
      required: true,
      default: 'Home'
    }
  }
}
</script>
```

Navbar.vue

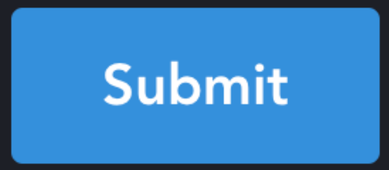
```
<script>
export default {
  props: {
    label: {
      type: String,
      default: 'Home'
    }
  }
}
</script>
```

Let’s do a little thought experiment…

Hat tip to Damian Dulisz

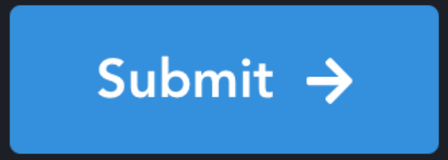
Task 1

Create a button component that can display text specified in the parent component



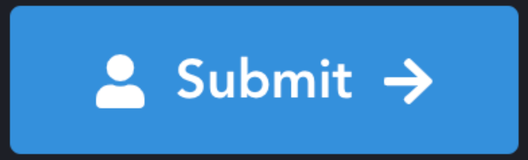
Task 2

Allow the button to display an icon of choice on the right side of the text



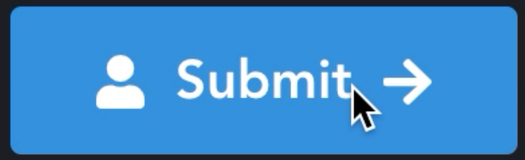
Task 3

Make it possible to have icons
on either side or even both sides



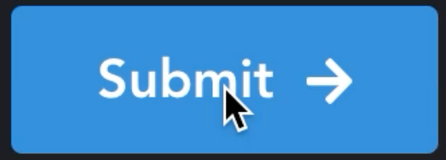
Task 4

Make it possible to replace everything with a loading spinner



Task 5

Make it possible to replace
an icon with a loading spinner



```
<template>
  <button type="button" class="nice-button">
    {{ text }}
  </button>
</template>

<script>
export default {
  props: ['text']
}
</script>
```

```
<template>
  <button type="button" class="nice-button">
    <SpinnerIcon v-if="isLoading" color="#fff" size="12px">
    <template v-else>
      <template v-if="iconLeftName">
        <SpinnerIcon v-if="isLoadingLeft" color="#fff" size="6px">
        <AppIcon v-else :icon="iconLeftName"/>
      </template>
      {{ text }}
      <template v-if="iconRightName">
        <SpinnerIcon v-if="isLoadingRight" color="#fff" size="6px">
        <AppIcon v-else :icon="iconRightName"/>
      </template>
    </template>
  </button>
</template>

<script>
export default {
  props: ['text', 'iconLeftName', 'iconRightName', ‘isLoading’,
'isLoadingLeft', 'isLoadingRight']
}
</script>
```

```
<template>
  <button type="button" class="nice-button">
    <PulseLoader v-if="isLoading" color="#fff" size="12px">
    <template v-else>
      <templa
        <Puls
        <Appl
      </templ
      {{ text
      <templa
        <Puls
        <Appl
      </templ
    </templat
  </button>
</template>

<script>
export defaul
  props: ['text', 'iconLeftName', 'iconRightName', 'isLoading',
'isLoadingLeft', 'isLoadingRight']
}
</script>
```

```
<template
  <button
    {{ te
  </butto
</templat

<script>
export de
  props:
}
</script>
```

```
<template>
  <button type="button" class="nice-button">
    {{ text }}
  </button>
</template>

<script>
export default {
  props: ['text']
}
</script>
```

Let’s call it the props-based solution

props-based solution

Is it wrong?

props-based solution

Is it wrong?

No.

It does the job.

props-based solution

Is it good, then?

props-based solution

Is it good, then?

Not exactly.

props-based solution

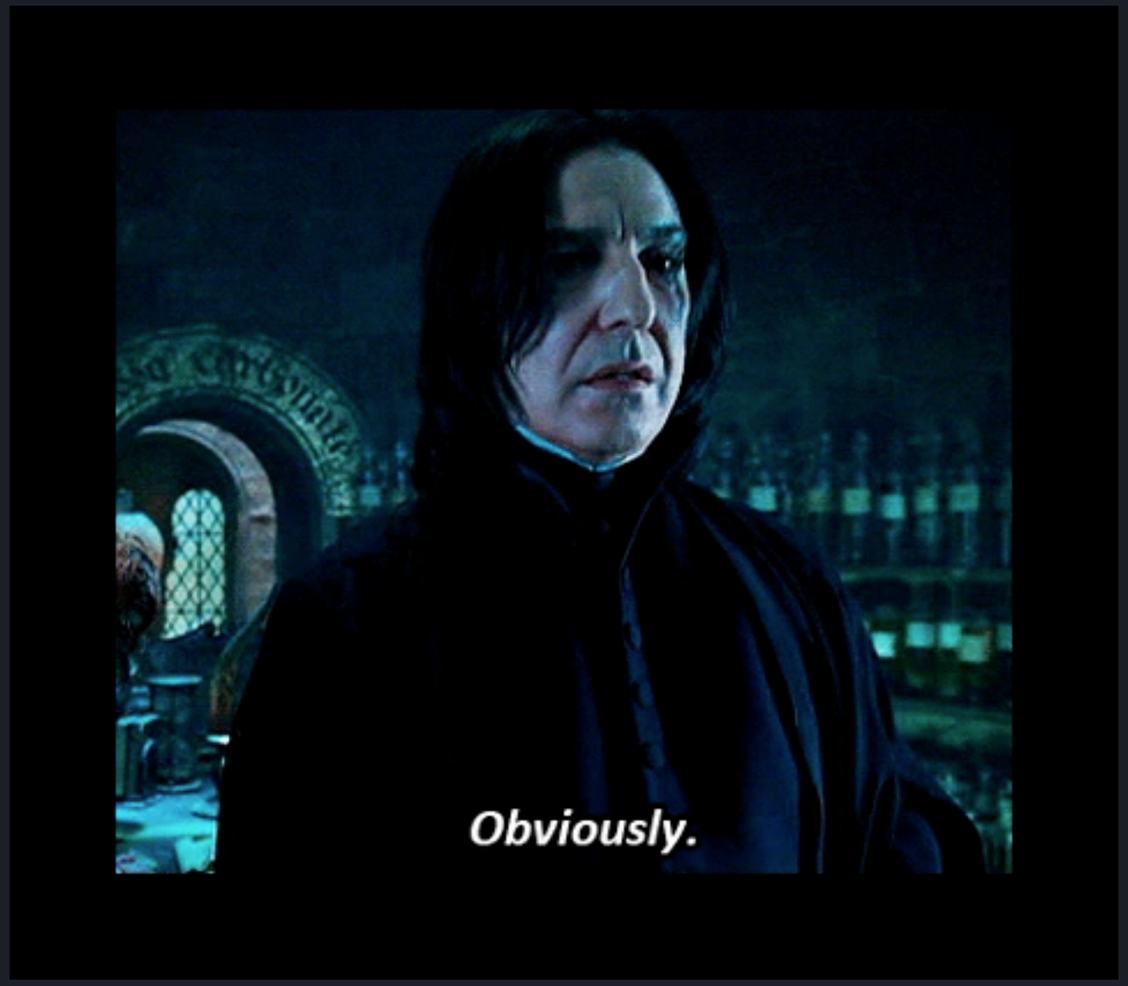
Problems

props-based solution

Problems

- New requirements increase complexity
- Multiple responsibilities
- Lots of conditionals in the template
- Low flexibility
- Hard to maintain

Is there a better another alternative?



Is there a better another alternative?

TECHNIQUE

Slots

Recommended solution

Recommended solution

```
<template>
  <button type=“button" class=“nice-button“>
    <slot />
  </button>
</template>
```

```
<template>
  <button type=“button" class=“nice-button“>
    <slot/>
  </button>
</template>
```

Usage:

```
<AppButton>
  Submit
  <PulseLoader v-if="isLoading" color="#fff" size="6px"/>
  <AppIcon v-else icon=“arrow-right”/>
</AppButton>
```

Default Slot

```
// navigation-link.vue
<a
  v-bind:href="url"
  class="nav-link"
>
  <slot></slot>
</a>
```

```
<navigation-link url="/profile">
  <span class="fa fa-user”/>
  Your Profile
</navigation-link>
```

Named Slots

```
// base-layout.vue
<div class="container">
  <header>
    <slot name="header"></slot>
  </header>
  <main>
    <slot></slot>
  </main>
  <footer>
    <slot name="footer"></slot>
  </footer>
</div>
```

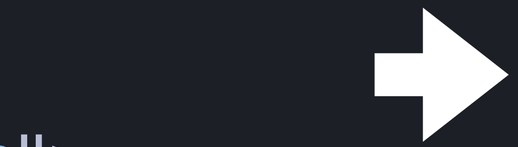
```
<base-layout>
  <template slot="header">
    <h1>Here might be a page title</h1>
  </template>

  <p>A paragraph for the main content.</p>
  <p>And another one.</p>

  <p slot=“footer">
    Here's some contact info
  </p>
</base-layout>
```

Scoped Slots

```
// todo-list.vue
<ul>
  <li
   v-for="todo in todos"
   :key=“todo.id"
  >
    <slot :todo="todo">
      <!-- Fallback content -->
      {{ todo.text }}
    </slot>
  </li>
</ul>
```



```
<todo-list :todos="todos">
  <template slot-scope="scope">
    <AppIcon
      v-if="scope.todo.completed"
      icon="checked"
    />
    {{ scope.todo.text }}
  </template>
</todo-list>
```

Scoped slots

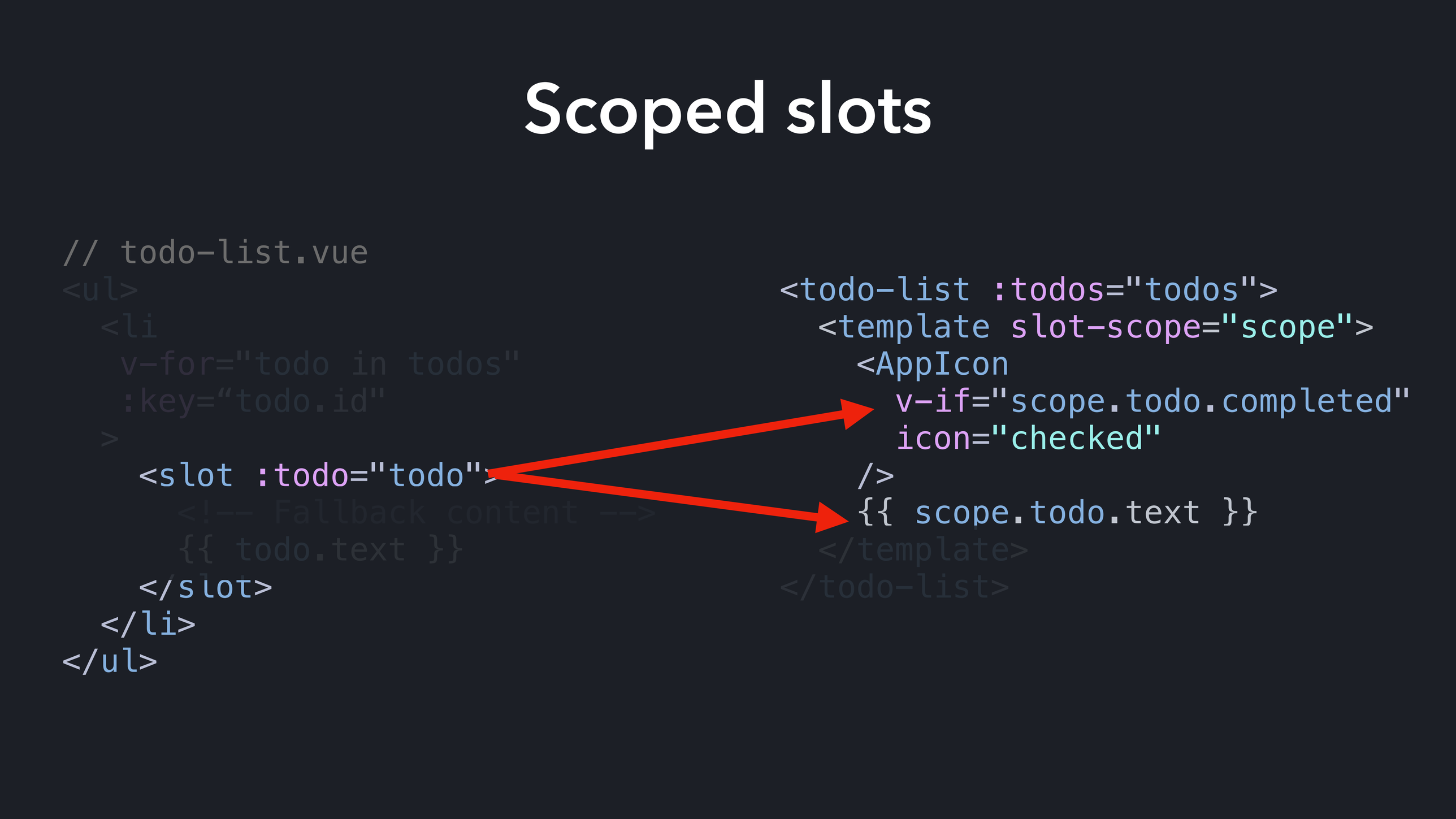
```
// todo-list.vue
<ul>
  <li
   v-for="todo in todos"
   :key="todo.id"
  >
    <slot :todo="todo">
      <!-- Fallback content -->
      {{ todo.text }}
    </slot>
  </li>
</ul>
```

```
<todo-list :todos="todos">
  <template slot-scope="scope">
    <AppIcon
      v-if="scope.todo.completed"
      icon="checked"
    />
    {{ scope.todo.text }}
  </template>
</todo-list>
```

Scoped slots

```
// todo-list.vue
<ul>
  <li
   v-for="todo in todos"
   :key="‘todo.id"
  >
    <slot :todo="todo">
      <!-- Fallback content -->
      {{ todo.text }}
    </slot>
  </li>
</ul>
```

```
<todo-list :todos="todos">
  <template slot-scope="scope">
    <AppIcon
      v-if="scope.todo.completed"
      icon="checked"
    />
    {{ scope.todo.text }}
  </template>
</todo-list>
```



Destructuring slot-scope

```
<todo-list :todos="todos">
  <template slot-scope="scope">
    <AppIcon
      v-if="scope.todo.completed"
      icon="checked"
    />
    {{ scope.todo.text }}
  </template>
</todo-list>
```

```
<todo-list :todos="todos">
  <template slot-scope="{ todo }">
    <AppIcon
      v-if="todo.completed"
      icon="checked"
    />
    {{ todo.text }}
  </template>
</todo-list>
```

Use slots for:

- Content distribution (like layouts)
- Creating larger components by combining smaller components
- Default content in Multi-page Apps
- Providing a wrapper for other components
- Replace default component fragments

Use scoped slots for:

- Applying custom formatting/template to fragments of a component
- Creating wrapper components
- Exposing its own data and methods to child components

Slots changes in Vue v2.6

What’s new in v2.6

Unified `v-slot` directive

```
<base-layout>
  <template slot="header">
    <h1>Here might be a page title</h1>
  </template>

  <p>Main content.</p>
  <p>And another one.</p>

  <template slot="footer">
    <p>Here's some contact info</p>
  </template>
</base-layout>
```

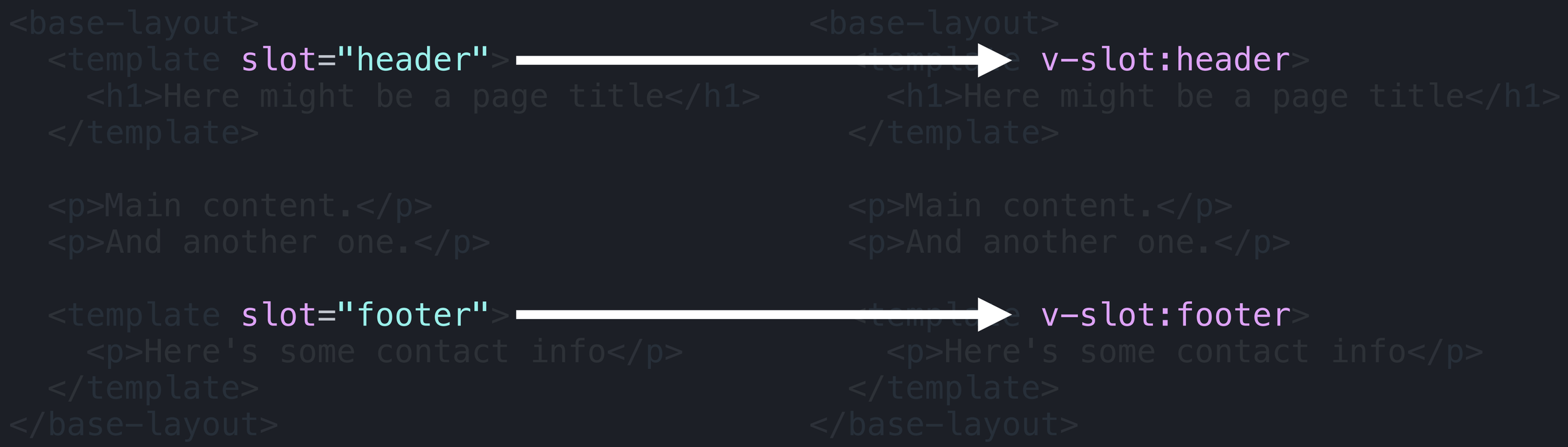
```
<base-layout>
  <template v-slot:header>
    <h1>Here might be a page title</h1>
  </template>

  <p>Main content.</p>
  <p>And another one.</p>

  <template v-slot:footer>
    <p>Here's some contact info</p>
  </template>
</base-layout>
```

What's new in v2.6

Unified `v-slot` directive



What's new in v2.6

Unified `v-slot` directive

```
<todo-list :todos="todos">
  <template slot="todo" slot-scope="{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

```
<todo-list :todos="todos">
  <template v-slot:todo="{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

What’s new in v2.6

Unified `v-slot` directive

```
<todo-list :todos="todos">
  <template slot="todo" slot-scope="{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

```
<todo-list :todos="todos">
  <template v-slot:todo="{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

What’s new in v2.6

v-slot directive shorthand

```
<todo-list :todos="todos">
  <template v-slot:todo="{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

```
<todo-list :todos="todos">
  <template #todo=“{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

What’s new in v2.6

`v-slot` directive shorthand

```
<todo-list :todos="todos">
  <template v-slot:todo="{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

```
<todo-list :todos="todos">
  <template #todo="{ todo }">
    {{ todo.text }}
  </template>
</todo-list>
```

What’s new in v2.6

Dynamic Slot Names

```
<base-layout>
  <template v-slot:[dynamicSlotName]>
    ...
  </template>
</base-layout>
```

Slots > Props

Composition

With composition, you're less restricted by what you are building at first

>

Configuration

With configuration, you have to document everything and new requirements means new configuration

DESIGN PATTERN

Transparent Components

When passing props, listeners, and attributes...

```
// BaseInput.vue
<template>
  <div>
    <input
      type="text"


    />
  </div>
</template>
```

When passing props, listeners, and attributes...

```
<BaseInput
  @input="filterData"
  label="Filter results"
  placeholder="Type in here..."
/>
```

```
// BaseInput.vue
<template>
  <div>
    <input
      type="text"
    />
  </div>
</template>
```

When passing props, listeners, and attributes...

```
<BaseInput
  @input="filterData"
  label="Filter results"
  placeholder="Type in here..."
/>
```

```
// BaseInput.vue
<template>
  <div>
    <input
      type="text"
    />
  </div>
</template>
```

When passing props, listeners, and attributes...

```
<template>
  <div>
    <input
      type="text"


    />
  </div>
</template>

<script>
export default {
  inheritAttrs: false,
  // ...
}
</script>
```

Both props and attributes, as well as all listeners will be passed to this element instead.

Prevent Vue from assigning attributes to top-level element

When passing props, listeners, and attributes…

```
<template>
  <div>
    <input
      type="text"
      v-bind="{ …$attrs, …$props }"
      v-on="$listeners"
    />
  </div>
</template>

<script>
export default {
  inheritAttrs: false,
  // ...
}
</script>
```

DESIGN PATTERN

Wrap Vendor Components

```
<template>
  <p>
    <FontAwesome icon=“water” />
    <FontAwesome icon="earth" />
    <FontAwesome icon=“fire" />
    <FontAwesome icon="air" />
  </p>
</template>
```

```
<template>
  <p>
    <FontAwesome icon=“water” />
    <FontAwesome icon="earth" />
    <FontAwesome icon=“fire" />
    <FontAwesome icon="air" />
  </p>
</template>
```

```
<template>
  <p>
    <FontAwesome icon=“water” />
    <FontAwesome icon="earth" />
    <FontAwesome icon=“fire" />
    <FontAwesome icon="air" />
  </p>
</template>
```

```
<template>
  <p>
    <FontAwesome icon=“water” />
    <FontAwesome icon="earth" />
    <FontAwesome icon=“fire" />
    <FontAwesome icon="air" />
  </p>
</template>
```

BaseIcon.vue

```
<template>
  <FontAwesomeIcon
    v-if="src === 'fa'"
    :icon="name"
  />
  <span
    v-else
    :class="customIconClass"
  />
</template>
```

Hat tip to Chris Fritz

```
<template>
  <p>
    <BaseIcon src=“fa” icon=“earth” />
    <BaseIcon src=“fa” icon="fire" />
    <BaseIcon src=“fa” icon="water" />
    <BaseIcon src=“fa” icon="water" />
  </p>
</template>
```

DESIGN PATTERN

Provider Components

Problem

What if you only want to expose Data and Methods, but no User Interface?

“Provider” components

```
<ApolloQuery
  :query="require('../graphql/HelloWorld.gql')"
  :variables="{ name }"
>
  <template slot-scope="{ result: { loading, error, data } }">
    <!-- Loading -->
    <div v-if="loading" class="loading apollo">Loading...</div>
    <!-- Error -->
    <div v-else-if="error" class="error apollo">An error occured</div>
    <!-- Result -->
    <div v-else-if="data" class="result apollo">{{ data.hello }}</div>
```

From Vue Apollo by @akryum

```
<ApolloQuery
  :query="require('../graphql/HelloWorld.gql')"
  :variables="{ name }"
>
  <template slot-scope="{ result: { loading, error, data } }">
    <!-- Loading -->
    <div v-if="loading" class="loading apollo">Loading...</div>
    <!-- Error -->
    <div v-else-if="error" class="error apollo">An error occured</div>
    <!-- Result -->
    <div v-else-if="data" class="result apollo">{{ data.hello }}</div>
```

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```
<ApolloQuery
  :query="require('../graphql/HelloWorld.gql')"
  :variables="{ name }"
>
  <template slot-scope="{ result: { loading, error, data } }">
    <!-- Loading -->
    <div v-if="loading" class="loading apollo">Loading...</div>
    <!-- Error -->
    <div v-else-if="error" class="error apollo">An error occured</div>
    <!-- Result -->
    <div v-else-if="data" class="result apollo">{{ data.hello }}</div>
```

From Vue Apollo by @akryum

```
<ApolloQuery
  :query="require('../graphql/HelloWorld.gql')"
  :variables="{ name }"
>
  <template slot-scope="{ result: { loading, error, data } }">
    <!-- Loading -->
    <div v-if="loading" class="loading apollo">Loading...</div>
    <!-- Error -->
    <div v-else-if="error" class="error apollo">An error occured</div>
    <!-- Result -->
    <div v-else-if="data" class="result apollo">{{ data.hello }}</div>
```

From Vue Apollo by @akryum

```
// SelectProvider.vue
export default {
  props: ['value', 'options'],
  data () {
    isOpen: false
  },
  render () {
    return this.$scopedSlots.default({
      value: this.value,
      options: this.options,
      select: this.select,
      deselect: this.deselect,
      isOpen: this.isOpen,
      // and more
    })
  },
  methods: {
    // methods
  }
}
```

“Renderless” components

```
// SelectProvider.vue
export default {
  props: ['value', 'options'],
  data () {
    isOpen: false
  },
  render () {
    // expose everything
    return this.$scopedSlots.default(this)
  },
  methods: {
    // methods
  }
}
```

```
// SelectDropdown.vue
<SelectProvider v-bind="$attrs" v-on="$listeners">
  <template slot-scope="{
    value,
    options,
    select,
    deselect,
    isOpen,
    open,
    close
  }">
    <AppButton @click=“open">
      {{ value || 'Pick one' }}
    </AppButton>
    <AppList v-if="isOpen" :options="options" @select="select"/>
  </template>
</SelectProvider>
```

Popular convention for classifying components

Container

aka smart components, providers

Presentational

aka dumb components, presenters

Container

- Application logic
- Application state
- Use Vuex
- Usually Router views

Presentational

- Application UI and styles
- UI-related state only
- Receive data from props
- Emit events to containers
- Reusable and *composable*
- Not relying on global state

Container

Examples:

`UserProfile, Product, TheShoppingCart, Login`

What is it doing?

Presentational

Examples:

`AppButton, AppModal, TheSidebar, ProductCard`

How does it look?

Should I **always** follow this convention?

Should I **always** follow this convention?

NO

Should I **always** follow this convention?

Not when:

- It leads to premature optimisations
- It makes simple things unnecessarily complex
- It requires you to create strongly coupled components (like feature-aware props in otherwise reusable components)
- It forces you to create unnecessary, one-time-use presenter components

Should I **always** follow this convention?

Instead

- Focus on keeping things simple (methods, props, template, Vuex modules, everything)
- Don’t be afraid to have UI and styles in your containers
- Split large, complicated containers into several smaller ones

Premature optimization is the root of all evil (or at least most of it) in programming.

- Donald Knuth

Data Driven Refactoring

Signs you need more components

- When your components are hard to understand
- You feel a fragment of a component could use its own state
- Hard to describe what what the component is actually responsible for

Components and how to find them?

- Look for similar visual designs
- Look for repeating interface fragments
- Look for multiple/mixed responsibilities
- Look for complicated data paths
- Look for *v-for* loops
- Look for large components


Composition API
http://bit.ly/compositionapi

Thank you!

www.bencodezen.io