



# Vue Fundamentals

## Module – Data and bindings

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## For visuals – add Bootstrap

- There are (a lot!) of other Vue-optimized UI-frameworks
  - We can cover them later
  - We now just add default Bootstrap to get some basic styling



<https://getbootstrap.com/>

# Adding Bootstrap to a Vue project


```
npm install bootstrap [--save]
```

- Bootstrap for basic styling and components
- JQuery and Popper.js for components functionality (Bootstrap 4)
- **NO NEED TO INSTALL** jquery and popper in Bootstrap 5+

In `main.js`, add:

```
// Bootstrap styling  
import 'bootstrap';  
import 'bootstrap/dist/css/bootstrap.min.css';
```

# What are we going to build

 Vue vacation picker

## Australia

Capital: Sydney **(expensive)**


[<< Back](#) [Forward >>](#) [Hide details](#)

### Australia

6

Australia

Sydney



One of the biggest attractions of Australia is Uluru, which lies approximately in the middle of the continent. The iconic Sydney Opera house and Sydney Harbour bridge attract millions of visitors each year.

**Expensive!**

# Data binding

- Vue knows four ways of data binding:
  - Simple Data binding Expressions: `{{ ... }}`
  - Attribute binding with `v-bind:`
  - Event binding with `v-on:`
  - Two-way binding with `v-model`

# Building an app: VacationPicker

- We're going to build a simple vacation picker.
  - Data comes from a separate `.js`-file (but will come from a real db in the future!)
- Requirements
  1. User can cycle through different destination countries
  2. User can show/hide details for each destination
  3. User can add trips to countries to a shopping cart
  4. Shopping cart can be send to the backend for processing

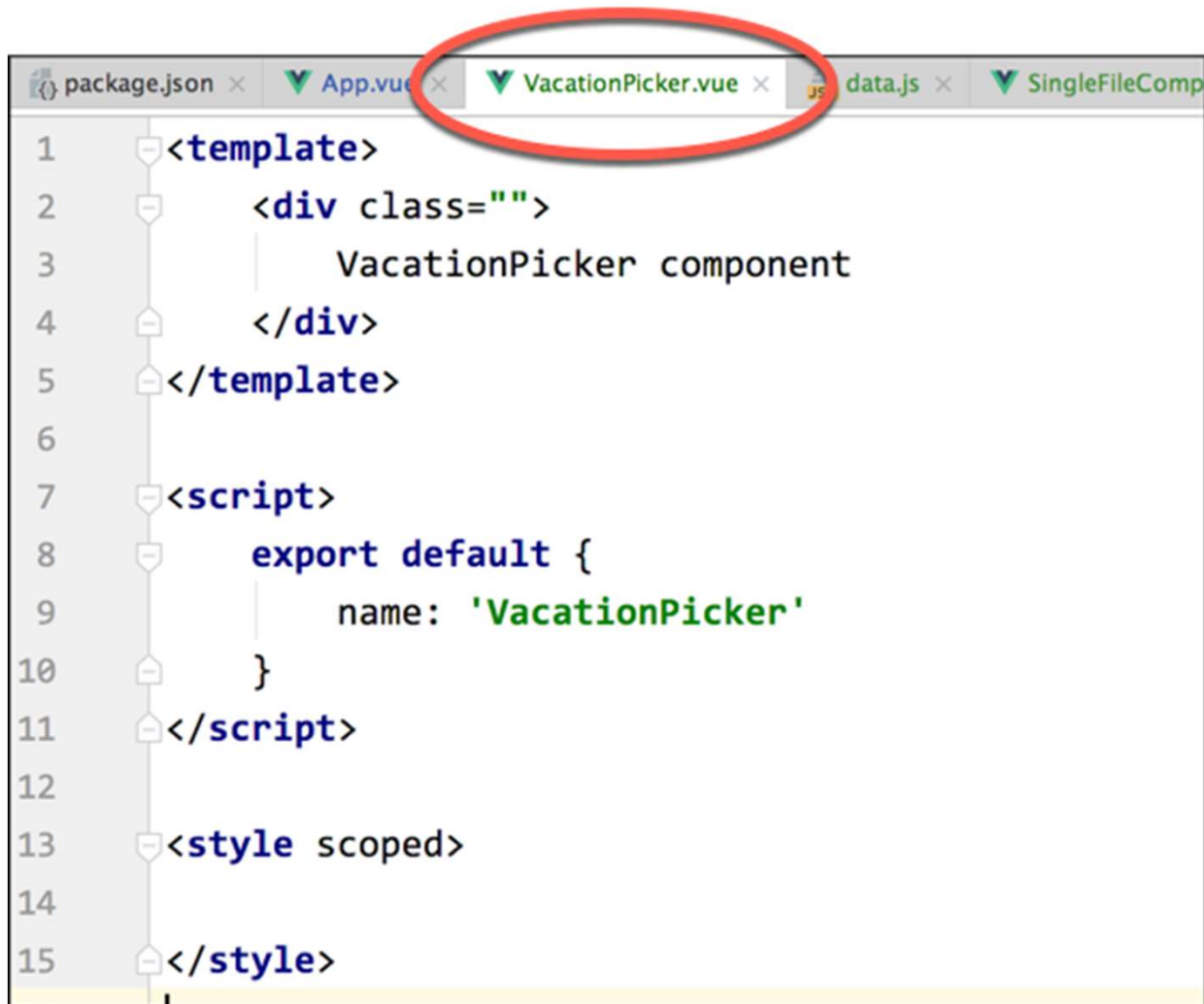
# Creating the data file

```
// data.js - holding an array of country/capital data.  
// This of course will come from a real db in the future.  
const data = {  
  countries: [  
    {  
      id: 1,  
      name: 'USA',  
      capital: 'Washington',  
      cost: 1250,  
      details: 'United States are among the most visited country in the world.',  
      img: 'washington.jpg'  
    },  
    {  
      id: 2,  
      name: 'Netherlands',  
      capital: 'Amsterdam',  
      cost: 795,  
      details: 'The capital of the Netherlands, Amsterdam, is over 1000 years old.',  
      img: 'amsterdam.jpg'  
    },  
    { ...  
  }  
}
```

Our example: a simple JavaScript object, holding an array with countries and some (fake) data, don't forget to `export` it!

# Importing the data

Create a new component, `VacationPicker.vue` with default content.

A screenshot of a code editor with several tabs at the top: 'package.json', 'App.vue', 'VacationPicker.vue' (which is selected and circled in red), 'data.js', and 'SingleFileComp'. The main editor area shows the default template and script for the 'VacationPicker' component. The template section (lines 1-5) contains a single div with the text 'VacationPicker component'. The script section (lines 7-11) contains an 'export default' block with the component name 'VacationPicker'. The style section (lines 13-15) is currently empty.

```
1 <template>
2   <div class="">
3     VacationPicker component
4   </div>
5 </template>
6
7 <script>
8   export default {
9     name: 'VacationPicker'
10  }
11 </script>
12
13 <style scoped>
14
15 </style>
```



# Importing data

- Use default `import` statement for the `data.js` file
- Data is made available via a `data: {...}` property on the component

```
12 <script>
13   // import the country data
14   import data from '../data/data';
15
16   export default {
17     name: 'VacationPicker',
18     data() {
19       return {
20         // make data available in app
21         data
22       }
23     }
24   }
25 </script>
```

## Best practice for data

***"Component data must be a function."***

*When using the `data` property on a component (i.e. anywhere except on `new Vue`), the value must be a function that returns an object."*

<https://vuejs.org/v2/style-guide/#Component-data-essential>

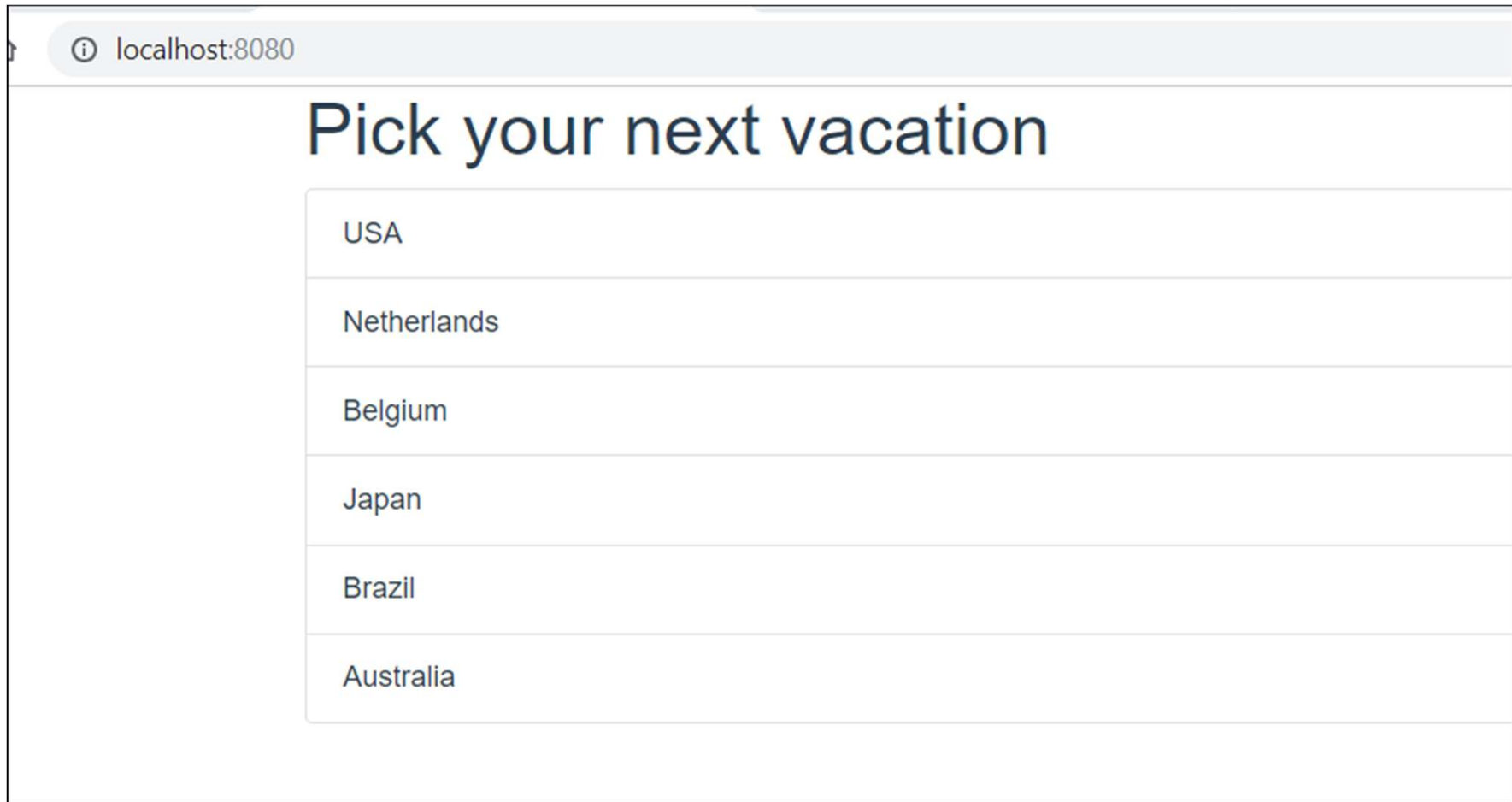
# Binding to the data

Use the `v-for` directive to render a list of items, based on an array

```
<ul class="list-group">
  <li class="list-group-item" v-for="country in data.countries">
    {{country.name}}
  </li>
</ul>
```

<https://vuejs.org/v2/guide/list.html>

# Result

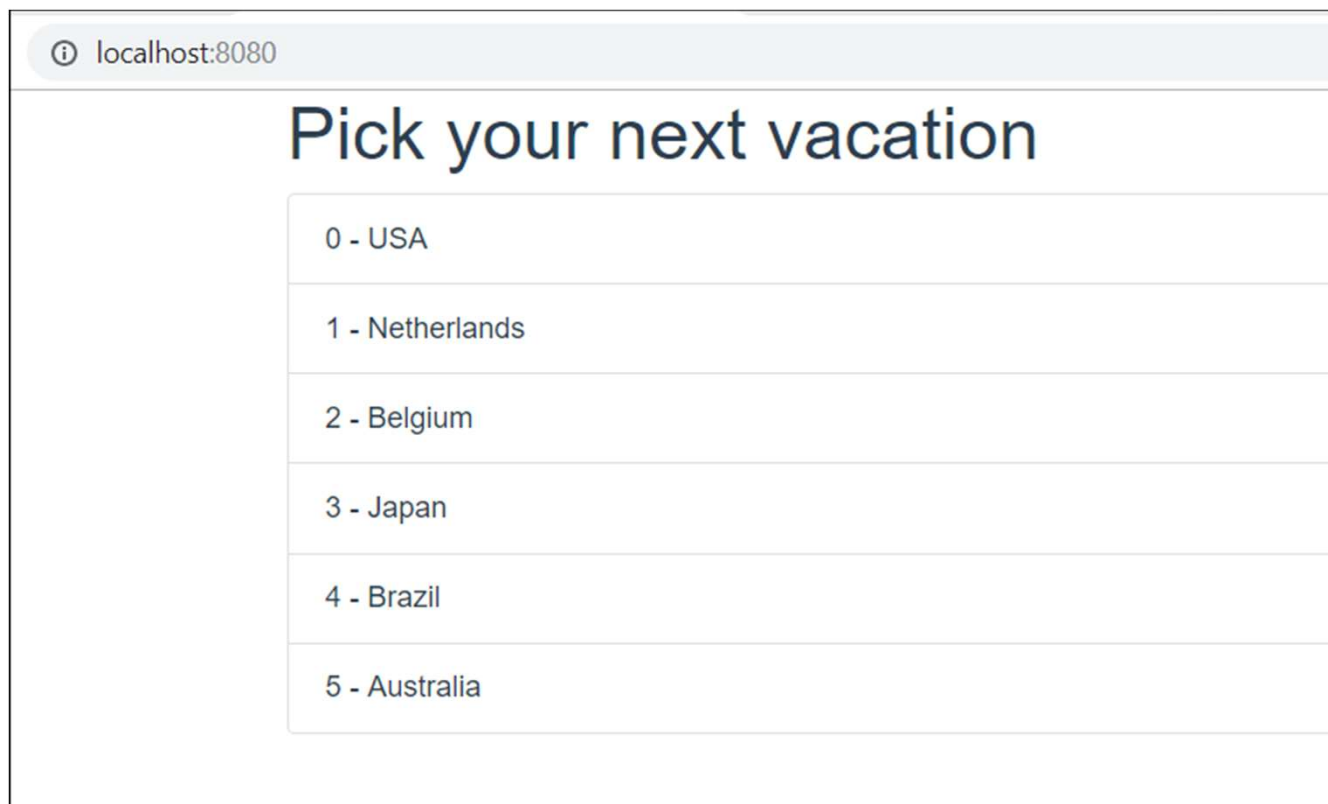


(assumes you updated `App.vue` to include the `VacationPicker` component and update/remove some styles)

## Data binding expression

- Inside `v-for` blocks we have full access to parent scope properties.
  - Use the data binding expression `{{ ... }}` to bind to properties
- `v-for` also supports an optional second argument for the `index` of the current item.

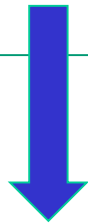
```
<li v-for="(country, index) in data.countries">
  {{ index }} - {{country.name}}
</li>
```



# More data binding

- You can bind to any property exposed by the `data` function:

```
data() {  
  return {  
    // make data available in app  
    data,  
    header: 'Pick your next vacation'  
  }  
}
```



```
<h1>{{ header }}</h1>
```



# Using v-bind

Creating dynamic attributes on HTML- and custom elements



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## Used more often v-bind:

- Add `v-bind:` as prefix to an HTML-property to set it's content
- If you want to add an `id` and `title` attribute for example:

```
<span v-bind:id="country.id"  
      v-bind:title="country.details">  
  {{ index }} - {{country.name}}  
</span>
```

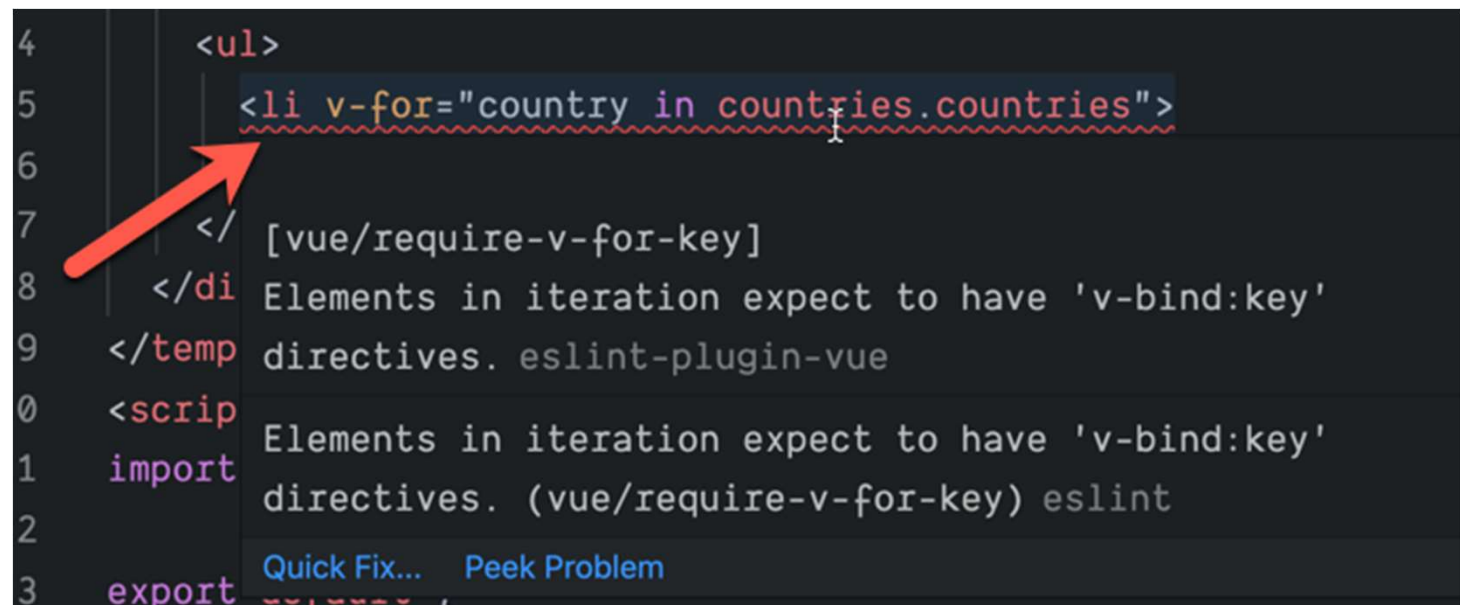
0 - USA
1 - Netherlands
2 - Belgium
3 - Japan

The capital of the Netherlands, Amsterdam, is over 1000 years old.

## Lists: using the v-bind:key property

```
<ul>
  <li v-for="country in countries.countries">
    {{ country.id }} - {{ country.name }}</li>
</ul>
</div>
```

The editor is complaining it is missing a `v-bind:key` directive here



```
4      <ul>
5        <li v-for="country in countries.countries">
6
7      </li> [vue/require-v-for-key]
8    </li> Elements in iteration expect to have 'v-bind:key'
9  </ul> directives. eslint-plugin-vue
10 </div> Elements in iteration expect to have 'v-bind:key'
11 import directives. (vue/require-v-for-key) eslint
12
13 export <script>
```

# Why the key attribute?

- Create a **dynamic** `key` attribute for each element in a repeated collection
- Vue needs to be able (as other frameworks) to **uniquely identify** each element in a list
  - Shadow DOM! Or Virtual DOM
- Solution: use the `v-bind:key` attribute

```
<li class="list-group-item"  
  v-for="country in data.countries"  
  v-bind:key="country.id">
```

## Summary

*The `v-bind` notation can be used on **any attribute** and it is used every time you need the attribute to be **dynamic** (e.g. adjusted from within code)*

# Using shorthand notation :

Same effect: using just `:` as a shorthand notation for `v-bind`:

```
<span :id="country.id"  
      :title="country.details">  
  {{ index }} - {{country.name}}  
</span>
```

1 - Netherlands

2 - Belgium

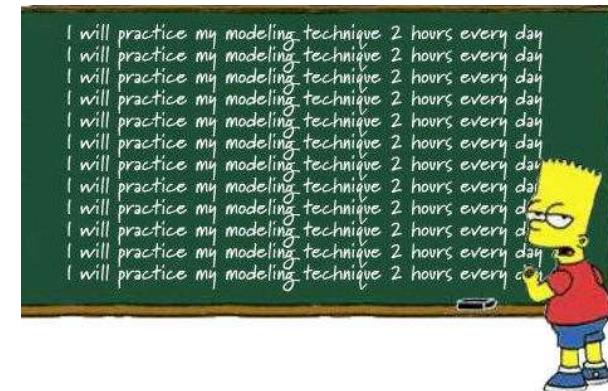
In Belgium they actually speak three different official languages: Flemish, French and German.

3 - Japan

4 - Brazil

# Workshop

- Add a data file to your application.
  - You can use `countryData.js` as an example, or build your own data file
  - Use for instance `CustomerData.js` as a blueprint and add your own data
- Import the data file to your application
  - Use the function `data(){ return {...} }` in your component
- Show its contents in a new component, or inside `VacationPicker`, using `v-for`
- Create a `v-bind:key` binding for your data
- Example: `../103-databinding`
- Optional: Experiment with `v-text` and `v-html`





# Using event binding

Handling events from the user interface



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# Binding events with v-on

- You can bind to DOM-events using the `v-on:` syntax
  - Events like `click`, `blur`, `focus`, `mouseover`, etc
  - <https://developer.mozilla.org/en-US/docs/Web/Events>
  - (add the `counter` variable to the `data` property)

```
<h3>{{ counter }}</h3>  
<button v-on:click="counter++">Increase ++ </button>  
<button v-on:click="counter--">Decrease -- </button>
```



Capture click events

3

Increase ++

Decrease --

## Or, use the shorthand notation @

```
<h3>{{ counter }}</h3>
```

```
<button @click="counter++">Increase ++ </button>
```

```
<button @click="counter--">Decrease -- </button>
```



Capture click events

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Increase ++

Decrease --

## More likely, you'll be calling a function

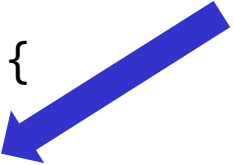
- Functions for components are called `methods`
- They are defined on the component script block
- Methods can accept parameters, like any other function
- Refer to the data of the component using `this.<propertyName>`

```

<h3>{{ counter }}</h3>
<button @click="increase()">Increase ++ </button>
<button @click="decrease()">Decrease -- </button>
...
</template>

<script>
export default {
  ...,
  methods: {
    increase() {
      this.counter++;
    },
    decrease() {
      this.counter--;
    }
  }
  ...
</script>

```



```

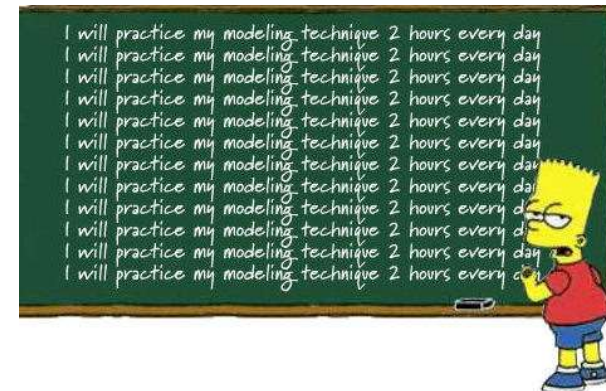
methods: {
  // Long-hand notation:
  increase: function() {
    this.counter++;
  },
  decrease: function() {
    ...
  }
}

```

Vue Style guide: “use shorthand function notation”

# Workshop

1. Add a button to the page that toggles the `disabled` attribute of another button
  1. Tip: create a dynamic `:disabled="isDisabled"` property
2. When a specific country in the list is clicked, show its name and capital in a JavaScript `alert()` box (or use `console.log`)
3. Log the name of the current country and its index/id to the console on a mouseover
  - Use `v-on:` and `@`-notation
  - Example: `../104-eventbinding`





# Computed properties

Binding to more complex properties and update them on changing

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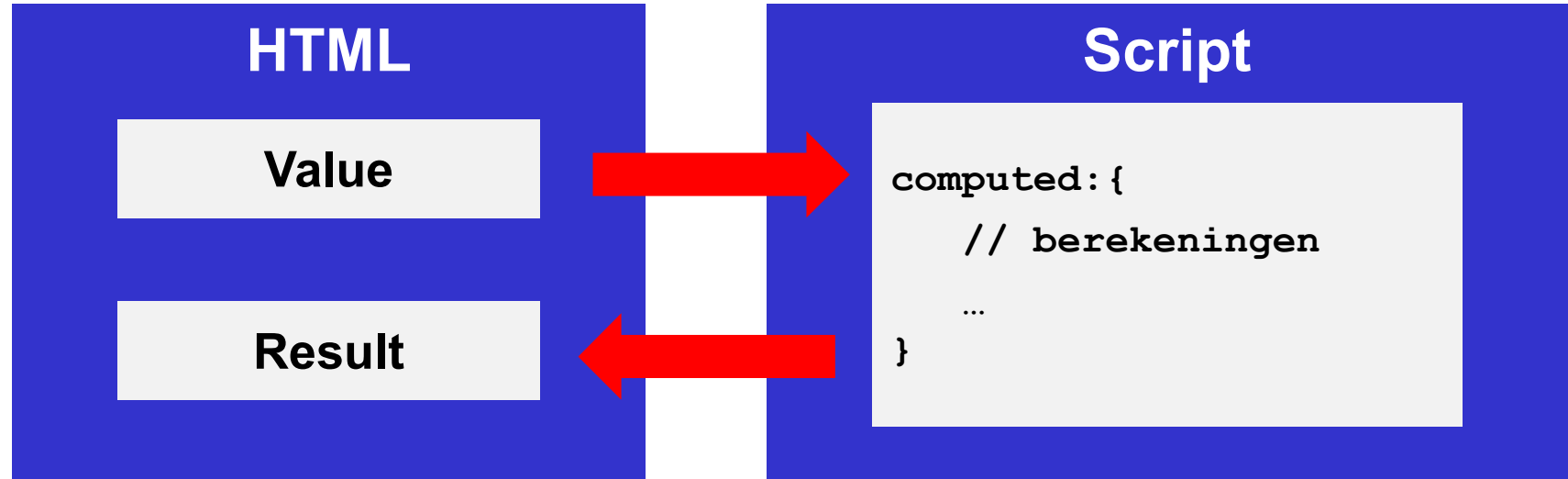


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# Architecture of computed properties



# Selecting a specific country

- We want to select a `country` (or `product`, or `employee`, or whatever) when a user clicks on them
- Create a `computed{...}` object on the component that composes and returns the requested data
  - Here: we're setting a property that holds the currently selected index
  - Update the computed property when the index changes
- Computed properties avoid having to do complex computations inside the HTML-view!
- A computed property is only evaluated once its dependencies change

## 1. In the view

```
<li @click="selectCountry(country)"  
    class="list-group-item" v-for="country in data.countries">
```

## 2. On the component

```
methods: {  
  selectCountry(country) {  
    this.selectedCountryIndex = this.data.countries.indexOf(country);  
  }  
},  
computed: {  
  selectedCountry() {  
    return {  
      // use the spread operator to return all properties  
      ...this.data.countries[this.selectedCountryIndex]  
    }  
  }  
}
```

### 3. On the component again

```
<h2>Selected:</h2>
<ul class="list-group">
  <li class="list-group-item">{{ selectedCountry.id}}</li>
  <li class="list-group-item">{{ selectedCountry.name}}</li>
  <li class="list-group-item">{{ selectedCountry.capital}}</li>
  <li class="list-group-item">{{ selectedCountry.details}}</li>
</ul>
```


### 4. Result

### Pick your next vacation

1 - USA
2 - Netherlands
3 - Belgium
4 - Japan
5 - Brazil
6 - Australia

### Selected:

5
Brazil
Brasilia
Brazil is the home of the Amazon river and holds the largest rainforest ecosystem in the world. Rio de Janeiro was host of the 2016 summer Olympic games.



## Computed properties or methods?

“Instead of a computed property, we can define the same function as a method instead. For the end result, the two approaches are indeed exactly the same. However, the difference is that **computed properties are cached based on their dependencies**. A computed property will only re-evaluate when some of its dependencies have changed. ”

## **`v-if` and more computed properties**

- Show a badge when a destination is expensive
- Use `v-if` to render a DOM element if a certain condition is `true`
  - You can use `v-else` and `v-else-if` to render elements (though used less often)

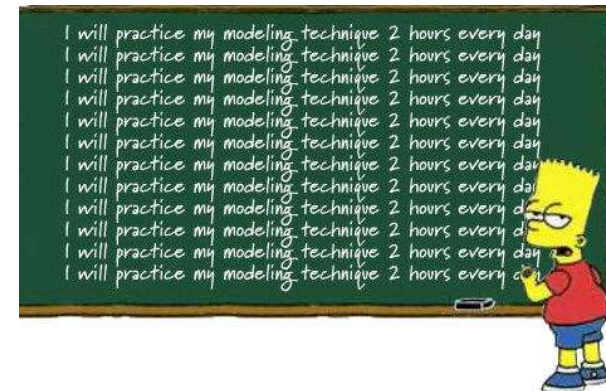
```
<li class="list-group-item" v-if="isExpensive">  
  <span class="badge badge-danger badge-pill">Expensive!</span>  
</li>
```

```
isExpensive() {  
  return data.countries[this.selectedCountryIndex].cost > 4000;  
}
```



# Workshop

1. Create a detail view for your own app.
    1. If an element/data is clicked, show details in the UI
  2. Create a computed property that show a destination as 'on sale' if the cost is less than 1000.
  3. Replace the text `Selected` with the actual name of the selected country
- Use `v-if` where appropriate
  - Example: `../105-computed-properties`





## **v-if VS. v-show**

- There is also a `v-show` directive in Vue
  - `v-show` – or `:hidden` – the element is rendered in the DOM, but hidden afterwards
  - `v-if` – the element is not rendered at all in the DOM
- Documentation:

*"Generally speaking, v-if has higher toggle costs while v-show has higher initial render costs.*

*So prefer v-show if you need to toggle something very often, and prefer v-if if the condition is unlikely to change at runtime."*

<https://vuejs.org/v2/guide/conditional.html>



# Binding to images

We need a bit of WebPack magic here...

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# Dynamically binding to images

- Vue can not simply interpolate the name of an external resource and re-use it for binding
  - For instance, the `src` attribute of an image.
- So this is invalid:

```
<li class="list-group-item">  
    
</li>
```



Invalid!

# Webpack to the rescue

- Because WebPack builds JavaScript strings of everything, it needs to be able to determine the location of the requested file
- Create a method that returns a string with the correct location:

```
<li class="list-group-item">  
    
</li>
```

```
methods: {  
  ...,  
  getImgUrl(img){  
    console.log(img);  
    return require('../assets/countries/' + img);  
  }  
}
```

...

## Pick your next vacation

- 1 - USA
- 2 - Netherlands
- 3 - Belgium
- 4 - Japan
- 5 - Brazil
- 6 - Australia

## Selected:

1

USA

Washington



United States are among the most visited country in the world.

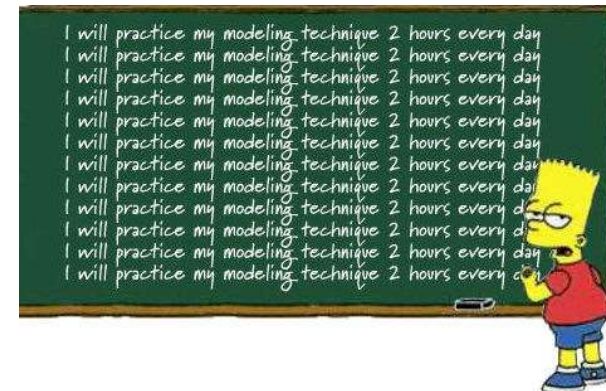
# Workshop

## 1. Static / Absolute:

- Create an array of images in your app, – has to be a complete URL!
- Render them in a `v-for` loop. This can be done at any time.
- See for instance <https://www.youtube.com/watch?v=B8rVlxQm8Cs>.

## 2. Dynamic / Relative

- Add/use an image as property of an object (like with the countries)
  - Render them conditionally/dynamically in the UI, like in the previous slides
  - Use the WebPack `require()` function.
- Example: `../106-image-binding`



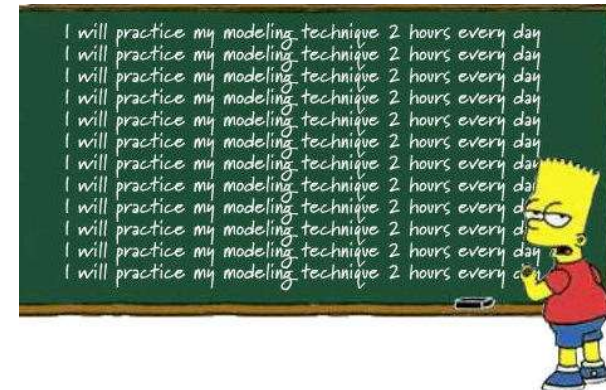
# Checkpoint

- You can import and use third party libraries
- You know the most important data binding concepts of Vue
- `{{ .. }}` for simple data binding expressions
- `v-bind:` or simply `:` for attribute binding
- `v-on:` or simply `@` for event binding
- `v-if` for conditional rendering
- Computed properties that update on a triggered change
- Some WebPack stuff to render images in the UI



# Final Workshop - 1

- Create the app shown in the beginning of the slides
  - One country is visible at a time
  - Its name and capital are shown
  - There are two buttons to cycle through the countries
  - User can hide/show details with a button
  - There are badges if visiting the country is Expensive, or On Sale
- Example: `../110-data-binding-wrap-up`
  - But first try it yourself



# Final Workshop – 2

- Create the same app as before, but in **TypeScript**
  - Start from scratch, choose `TypeScript` as an option
  - Create your components as TypeScript classes
  - Create properties, methods, computed properties (getters) and load the data.
- No Example available

