VueJS

Build amazing Apps

while smiling (-:

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The enter of the JS frameworks

- Web development has changed…
  - HTML is being used to build applications instead of documents
- For **large scale** projects, we just cannot get around with plain *javascript* or *jquery* any more
- We need a powerful framework to support all various aspects and life cycle of a web application

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Good frameworks bring along

- A solid foundation so we can focus on our unique challenge
- Good separation of concerns
- Making the app easier to extend, maintain, and test

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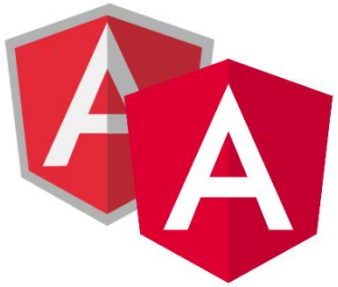
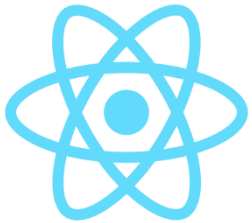
The enter of the JS frameworks

- We had Angular1 (now called angularJS)
  - It was great but had built-in problems
- React solved one of those problems
  - But took an idealistic approach
- New Angular has entered the scene
  - But is so complicated
- Vue is like a fresh breeze of air!





What's VueJS

- Framework for building user interfaces.
- Easy to pick up and integrate with other libraries or existing projects.
- Capable of powering modern progressive web applications

  – Here is an Hello World fiddle.

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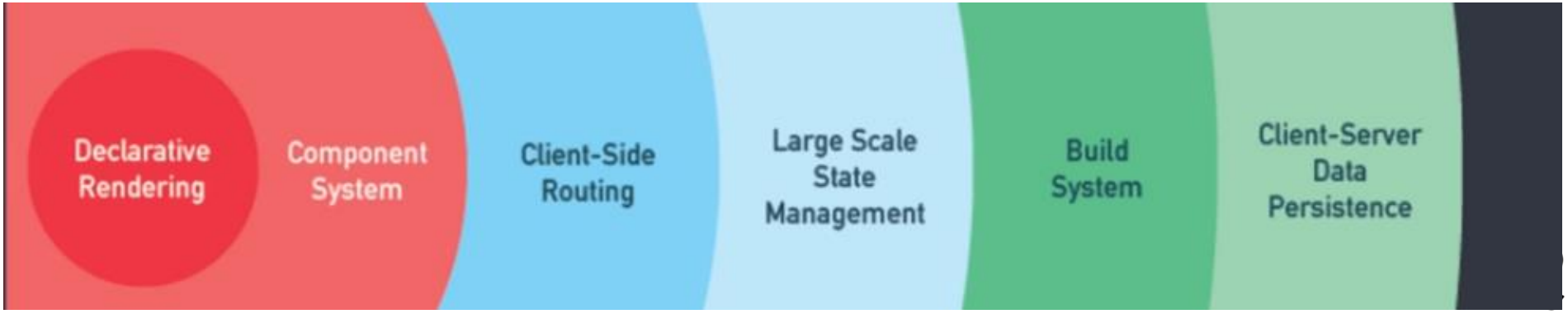
Why VueJS

- Its amazingly simple
  - It has great documentation
- Its battle tested
  - Used in large successful projects
- It can be used to build any app
  - simple to large applications
- Its small – 19KB!
  - minified and gziped



Feature Rich

Declarative Rendering

Render data to the DOM using template syntax:

```
<div id="app">
    <span>
        {{ msg}}
    </span>
</div>
```

```
var app = new Vue({
  el: '#app',
  data: {
      msg: 'Hello Vue!‘ + Date.now()
  }
})
```

Conditional Rendering

Toggle the presence of an element

```
<p v-if="shouldRender"> Best P Ever </p>
```

```
<h1 v-if="ok">Yes</h1>
<h1 v-else>No</h1>
```

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Conditional Rendering v-if

```
<div v-if="type === 'A’”>
    Aba
</div>
<div v-else-if="type === 'B’”>
    Baba
</div>
<div v-else-if="type === ‘S’”>
    Saba
</div>
<div v-else>
    Not A/B/S
</div>
```

Loops

Looping through an array:

```
<ul>
  <li v-for="(pet, idx) in pets">
      Pet {{idx}} - {{ pet.name  }}
  </li>
</ul>
```

Handling Events

Use the v-on directive to attach event listeners that invoke methods on our Vue instances:

```
<span v-if=“toShow">
   Hello {{userName}}
</span>
<button v-on:click=“toShow = !toShow“>
    Toggle
</button>
```

Event handling

We use the v-on directive to listen to DOM events and run some JavaScript when they're triggered.

```
<button v-on:click="counter += 1">Add 1</button>
<p>The button above has been clicked {{ counter }} times.</p>
```

Usually, we will use methods:

```
<button v-on:click="greet">Greet</button>
```

```
methods: {
  greet (event) {
    // `this` inside methods points to the Vue instance
    alert('Hello ' + this.userName + '!')
    // `event` is the native DOM event
    console.log(event.target)
  }
}
```

Event handling

we can also use methods in an inline JavaScript statement:

```
<button v-on:click="say('hi')">Say hi</button>
<button v-on:click="warn('Sure?', $event)">Submit</button>

methods: {
  warn(message, event) {
    // now we have access to the native event
    if (!confirm(message)) event.preventDefault()
  },
  say(msg) {console.log(msg)}
```

Note: passing 'this' from the template will pass the window (not useful)

Two way data binding

The v-model directive makes two-way binding between form input and our model

```
<p>{{ message }}</p>
<input v-model="message">
```

Interpolations

- Using the double-curly: {{ x }} to render a value to the DOM is called Interpolation
- You can render a valid JS expression, e.g:

  {{ (isValid)? msg + '!' : 'Err at' + Date.now() }}

- Side Note: you cannot use *anything* inside interpolation
  - Only few globals are accessible.

v-bind

- Use the **v-bind** directive to bind data to properties:
  - <a v-bind:href = “book.purchaseUrl"
  - <img v-bind:title = “book.name“ v-bind:src = “book.imgUrl”

- NOTE - we cannot use interpolations inside property values (bad code: <a href="{{url}}">)

Binding HTML Classes

We can pass an object to *v-bind:class* to dynamically toggle classes:

```
<div class="static“
      v-bind:class="{ active: isActive, 'text-danger': hasError }">
          Thanks!
</div>
```

```
data: {
  isActive: true,
  hasError: false
}
```

Renders: `<div class="static active">Thanks!</div>`

Computed

Make our UI more declarative:

computed properties are cached
based on their reactive dependencies!

Instead of:

{{ msg.split('').reverse().join('') }}

```
<p> {{ msg }} </p>
<p> {{ reversedMsg }}  </p>
```

```
var vm = new Vue({
  el: '#example',
  data: {
    msg: 'Hello'
  },
  computed: {
    reversedMsg() {
      // `this` points to the vm instance
      return this.msg.split('').reverse().join('')
    }
  }
})
```

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Binding HTML Classes – from data

The class object does not have to be inlined, so this reads better:

```
<div class="static” v-bind:class="classObject"></div>

data: {
  classObject: {
    active: true,
    'text-danger': false
  }
}
```

```
<div class="static active"></div>
```

(nice, but even better thing is coming next slide)

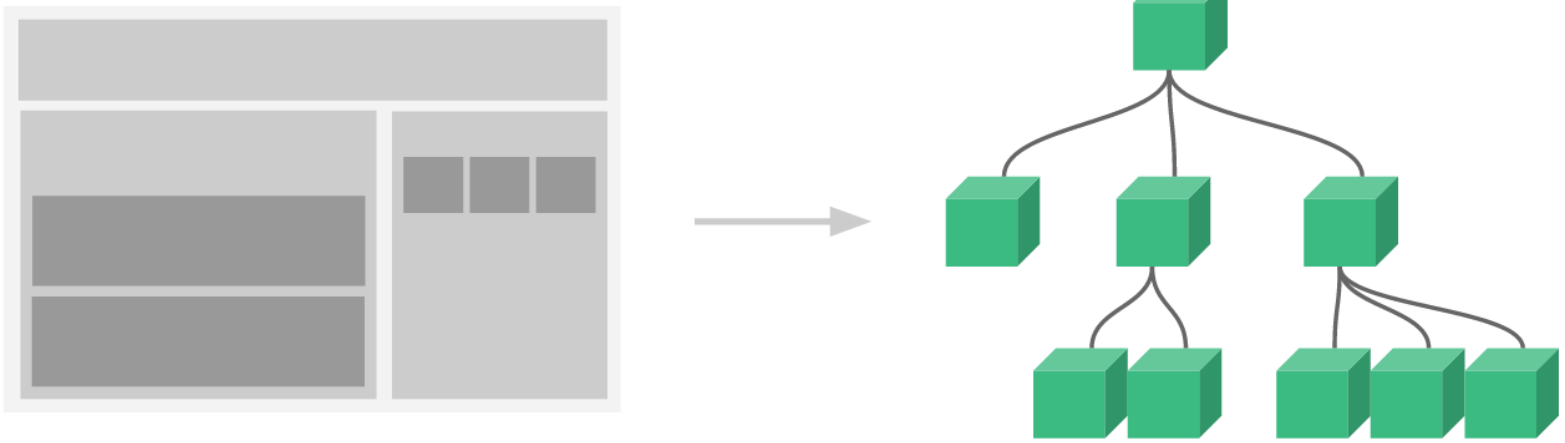
Binding HTML Classes – with computed

Best strategy is using a computed property:

```
<div v-bind:class="classObject"></div>
```

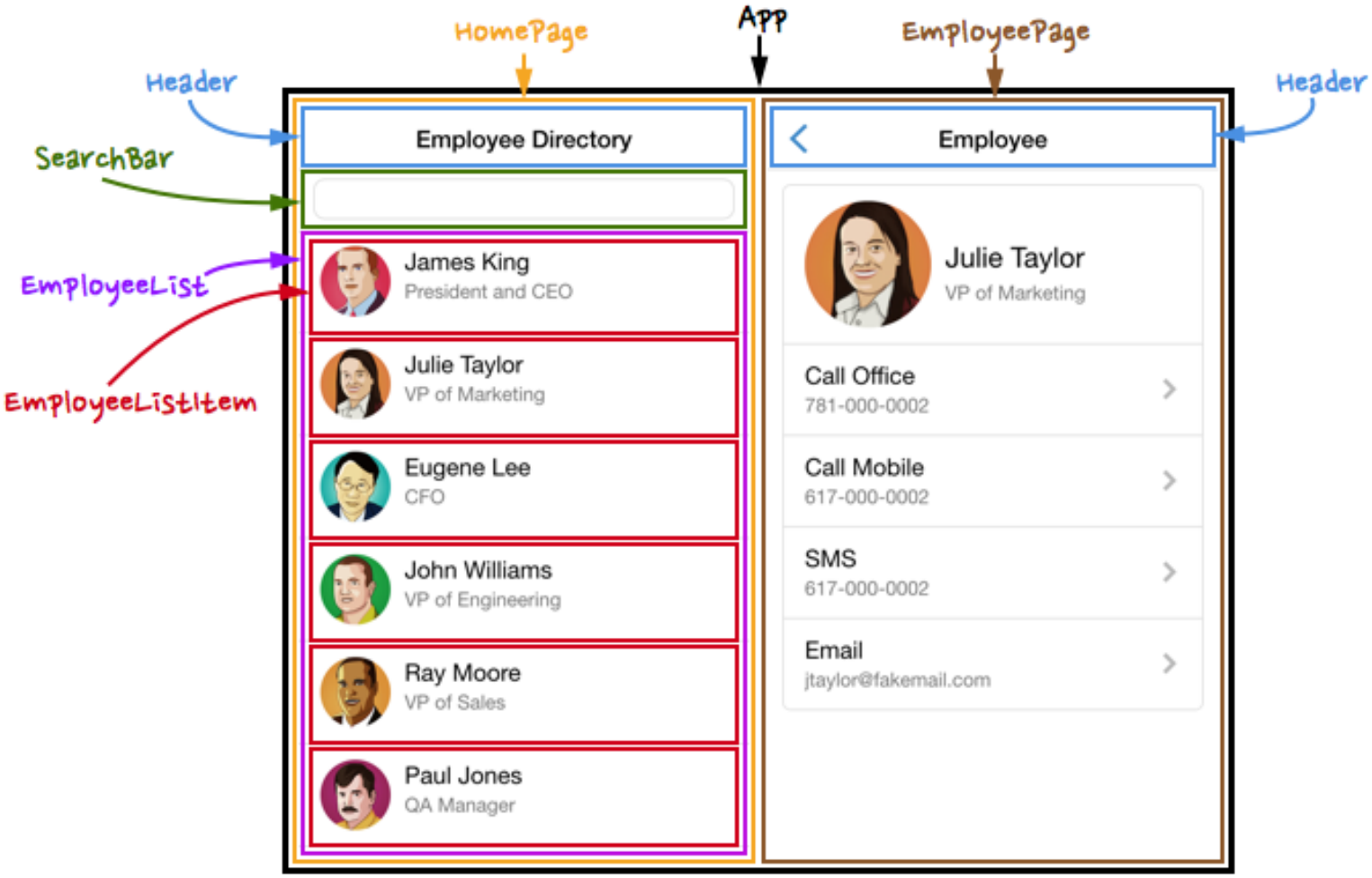
```
data: {
  isActive: true,
  error: null
},
computed: {
  classObject() {
    return {
      active: this.isActive && !this.error,
      'text-danger': this.error && this.error.type === 'fatal',
    }
  }
}
```

Components



Building UI with Components

Web apps today are made out of *components:*



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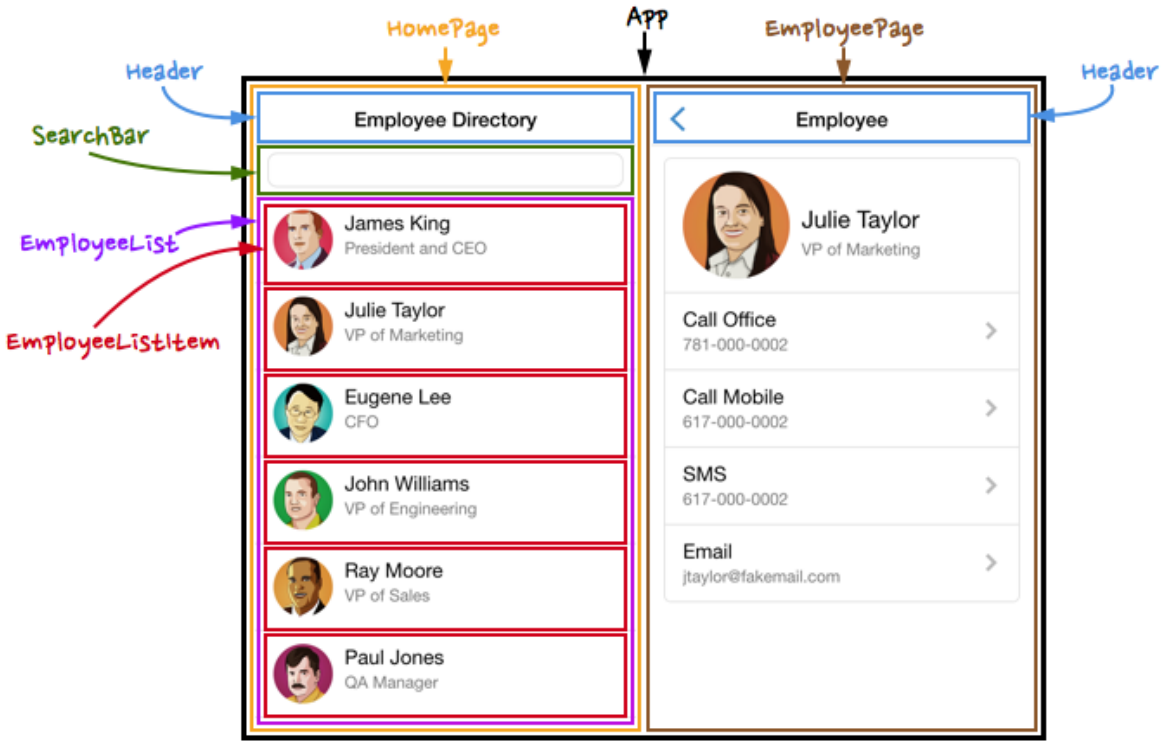
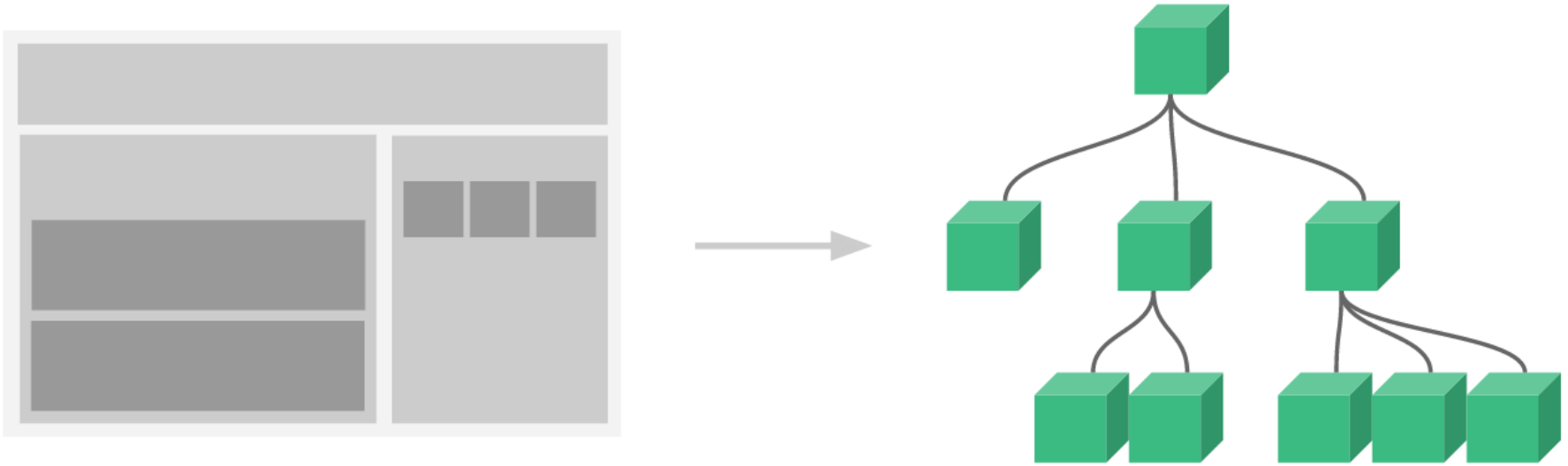
Define: Component

- A component is a small, reusable chunk of code, markup and style that is responsible for one job.
- That job is often to render some HTML



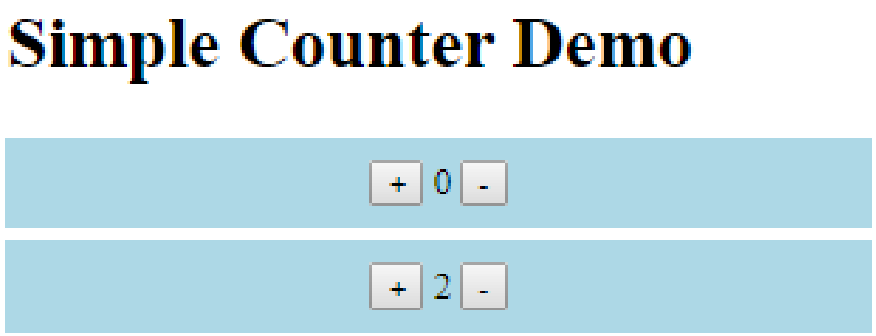
Components architecture

Building big applications from small, self-contained, reusable components.



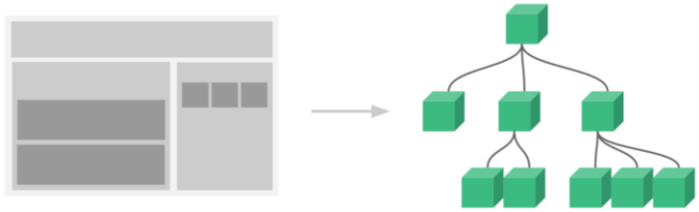
Components architecture

Example: simple-counter component



Composing with Components

The UI is broken to small pieces:



```
Vue.component('user-info', {
    template: '<section>{{user.name}}</section>'
})
Vue.component('car-details', {
    template: '<section> Car Details </section>'
})
```

components - global

This is how we register a global component:

```
// register
Vue.component('my-component', {
  template: '<div>A custom component!</div>'
})
// create a root instance
new Vue({
  el: '#example'
})
```

```
<div id="example">
  <my-component></my-component>
</div>
```

WILL RENDER:

```
<div id="example">
  <div>A custom component!</div>
</div>
```

It is a good practice to adhere to the W3C rules for custom tag names
(tldr : all-lowercase, must contain a hyphen)

components – data()

Most of the options that can be passed into the Vue constructor can be used in a component, with one special case:
data must be function.

```
var Comp = {
  template: '<div>A custom component!</div>‘,
  data() {
    return {};
  }
}
```

components – created()

Called (by Vue) when the component gets created:

```
var Comp = {
  template: '<div>A custom component!</div>‘,
  created() {
    console.log(‘Alive’, this);
  }
}
```

Props with binding

Similar to binding normal properties on native dom elements, we can also use **v-bind** for dynamically binding props of a component to data on the parent.

```
<input v-bind:value="myPet.name">
<h1 v-bind:title="desc">Hello</h1>

<pet-play v-bind:pet="myPet"></pet-play>


<!– Caveat: this passes down plain strings -->
<comp some-prop="value"></comp>
<comp some-prop="1"></comp>
```

Passing Props

This is how:

```
Vue.component('todo-item', {
  props: ['todo'],
  template: '<li>{{ todo.text }}</li>'
})
```

```
<ol>
  <todo-item v-for="item in myList" v-bind:todo="item"></todo-item>
</ol>
```

Using v-on with Custom Events

Every Vue instance can Trigger an event with: this.$emit(eventName)

```
<div id=“app">
<p>{{ total }}</p>
<button-counter v-on:increment="incrementTotal"></button-counter>
<button-counter v-on:increment="incrementTotal"></button-counter>
</div>
```

See full demo here

Composing components

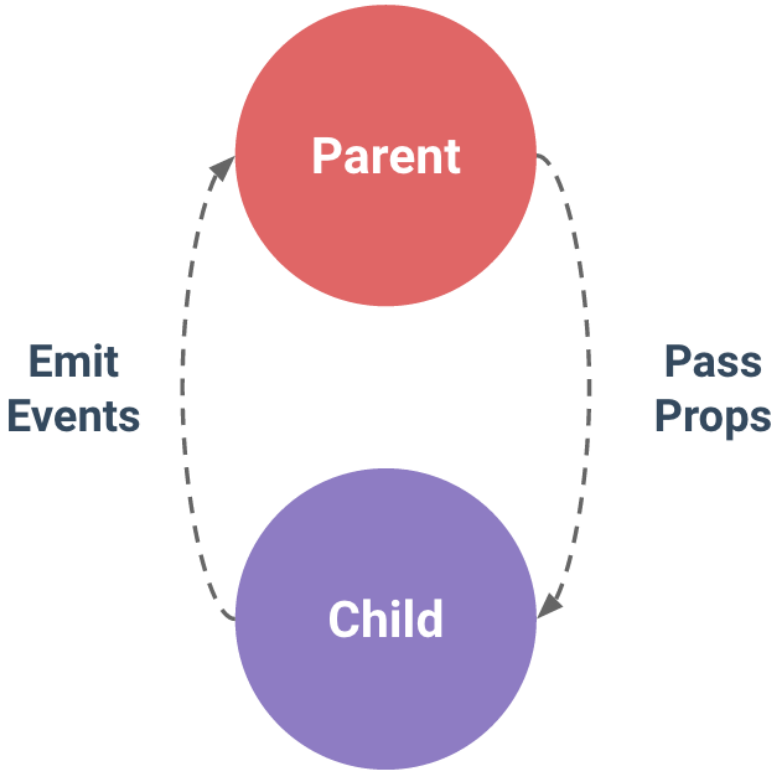
Components are meant to be used together, most commonly in parent-child relationships.

This is achieved via: **props down, events up**

```
Vue.component('child', {
  props: [msg'],
  template: '<span>{{ msg }}</span>'
})
```

Using it:

```
<child msg="hello!"></child>
```



List Rendering v-for

Rendering component in a loop and passing inputs to props:

```
<item-preview
        v-for="(item, index) in items"
        v-bind:item="item"
        v-bind:index="index">
</item-preview>
```

Shorthands

Vue.js provides special shorthand for two of the most often used directives, v-bind and v-on

```
<!-- full syntax -->
<a v-bind:href="url"></a>

<!-- shorthand -->
<a :href="url"></a>
```

```
<!-- full syntax -->
<a v-on:click="doSomething"></a>

<!-- shorthand -->
<a @click="doSomething"></a>
```

No worries - these chars are syntactically valid in HTML and they do not appear in the final rendered markup anyways.

Vue devtools

Install vue-devtools extension

- See selected: $vm0

Enough for today....

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Forms

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V-model them all

Building forms is possible using the v-model directive that creates two-way data bindings:

```
<p style="white-space: pre">{{ message }}</p>
<textarea v-model="message" placeholder="add multiple lines"></textarea>

<input type="checkbox" value="Jack" v-model="checkedNames“ />  Jack
<input type="checkbox" value="John" v-model="checkedNames“ /> John

<input type="radio" value="One" v-model="picked"> One
<input type="radio" value="Two" v-model="picked"> Two

<select v-model="selected" multiple>
<option>A</option>
<option>B</option>
<option>C</option>
</select>

<select v-model="selected">
<!-- inline object literal -->
<option v-bind:value="{ number: 123 }">Something</option>
</select>

<button type=“submit" :disabled=“isValid”>Save</button>
```

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v-model modifiers

the v-model directive to create two-way data bindings:

```
<!-- synced after "change" instead of "input" -->
<input v-model.lazy="msg" >

<!-- typecast as a number -->
<input v-model.number="age" type="number">

<input v-model.trim="msg">
```

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More About Event Handling

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Event handling - Event Modifiers

These are event modifiers used with v-on:

- **.stop**
- **.prevent**
- .capture
- .self
- .once

```
<!-- the click event's propagation will be stopped -->
<a v-on:click.stop="doThis"></a>

<!-- the submit event will no longer reload the page -->
<form v-on:submit.prevent="onSubmit"></form>

<!-- modifiers can be chained -->
<a v-on:click.stop.prevent="doThat"></a>

<!-- just the modifier -->
<form v-on:submit.prevent></form>

<!-- use capture mode when adding the event listener -->
<div v-on:click.capture="doThis">...</div>
```

Most are exclusive to native DOM events (.once is not)

```
<!-- only trigger handler if event.target is the element itself -->
<!-- i.e. not from a child element -->
<div v-on:click.self="doThat">...</div>

<!-- the click event will be triggered at most once -->
<a v-on:click.once="doThis"></a>
```

Event handling - Key Modifiers

Key modifiers for v-on when listening for key events:

- .delete (captures both “Delete” and “Backspace” keys)
- .enter
- .tab
- .esc
- .space
- .up
- .down
- .left
- .right

```
<!-- only call vm.submit() when the keyCode is 13 -->
<input v-on:keyup.13="submit">

<!-- same as above -->
<input v-on:keyup.enter="submit">

<!-- also works for shorthand -->
<input @keyup.enter="submit">
```

You can also define custom key modifier aliases via the global config.keyCodes object:

```
// enable v-on:keyup.f1
Vue.config.keyCodes.f1 = 112
```

Event handling – Modifiers Keys

You can use the following modifiers to trigger mouse or keyboard event listeners only when the corresponding modifier key is pressed:

- .ctrl
- .alt
- .shift
- .meta (⌘ **Mac /** ⊞ **windows, etc**)

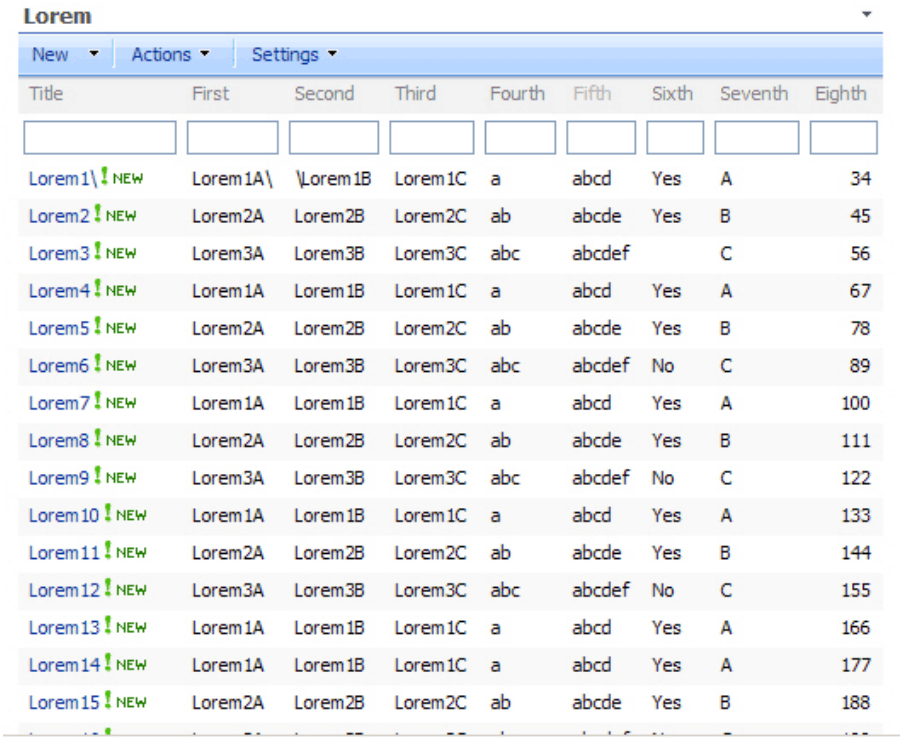
```
<!-- Alt + C -->
<input @keyup.alt.67="clear">

<!-- Ctrl + Click -->
<div @click.ctrl="doSomething">Do something</div>
```

Play here

Displaying Filtered/Sorted Results

- Its common to display a filtered or sorted version of an array without actually mutating or resetting the original data.
- Use a computed property that returns the filtered or sorted array.



Lorem

New ▾ Actions ▾ Settings ▾

Title	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth
Lorem1\ ! NEW	Lorem1A\	\Lorem1B	Lorem1C	a	abcd	Yes	A	34
Lorem2 ! NEW	Lorem2A	Lorem2B	Lorem2C	ab	abcde	Yes	B	45
Lorem3 ! NEW	Lorem3A	Lorem3B	Lorem3C	abc	abcdef		C	56
Lorem4 ! NEW	Lorem1A	Lorem1B	Lorem1C	a	abcd	Yes	A	67
Lorem5 ! NEW	Lorem2A	Lorem2B	Lorem2C	ab	abcde	Yes	B	78
Lorem6 ! NEW	Lorem3A	Lorem3B	Lorem3C	abc	abcdef	No	C	89
Lorem7 ! NEW	Lorem1A	Lorem1B	Lorem1C	a	abcd	Yes	A	100
Lorem8 ! NEW	Lorem2A	Lorem2B	Lorem2C	ab	abcde	Yes	B	111
Lorem9 ! NEW	Lorem3A	Lorem3B	Lorem3C	abc	abcdef	No	C	122
Lorem10 ! NEW	Lorem1A	Lorem1B	Lorem1C	a	abcd	Yes	A	133
Lorem11 ! NEW	Lorem2A	Lorem2B	Lorem2C	ab	abcde	Yes	B	144
Lorem12 ! NEW	Lorem3A	Lorem3B	Lorem3C	abc	abcdef	No	C	155
Lorem13 ! NEW	Lorem1A	Lorem1B	Lorem1C	a	abcd	Yes	A	166
Lorem14 ! NEW	Lorem1A	Lorem1B	Lorem1C	a	abcd	Yes	A	177
Lorem15 ! NEW	Lorem2A	Lorem2B	Lorem2C	ab	abcde	Yes	B	188

components - local

It is common to make a component available only in the scope of another instance/component:

```
var Child = {
  template: '<div>A custom component!</div>'
}
new Vue({
  // ...
  components: {
    // <my-component> will only be available in parent's template
    'my-component': Child
  }
})
```

Component Naming Conventions

When registering components (or props), you can use kebab-case, camelCase, or TitleCase. Vue doesn't care.

```
// in a component definition
components: {
// register using kebab-case
'kebab-cased-component': { /* ... */ },
// register using camelCase
'camelCasedComponent': { /* ... */ },
// register using TitleCase
'TitleCasedComponent': { /* ... */ }
}
```

Within HTML templates though, you have to use the kebab-case equivalents:

```
<!-- alway use kebab-case in HTML templates -->
<kebab-cased-component></kebab-cased-component>
<camel-cased-component></camel-cased-component>
<title-cased-component></title-cased-component>
```

Mutating Props

Sometimes, it's tempting to try and mutate a prop:

1. The prop is used to pass in an **initial value**, the child component simply wants to use it as a local data property afterwards;
2. The prop is passed in as a **raw value** that needs to be transformed.

The proper tactics for these use cases are:

```
props: ['initialCounter‘, ‘petName’],
data() {
   return { counter: this.initialCounter }
}

computed: {
  normalizedName: () {
    return this.petName.trim().toLowerCase()
  }
}
```

Caveat: Native Events on Custom Elements

There may be times when you want to listen for a native event on the root element of a component.

In these cases, you can use the .native modifier for v-on. For example:

```
<my-component @click.native="doTheThing"></my-component>
```

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Routing

Going different places

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Routing in a VueJS Application

- download vue-router
- main.js:
  - import routes from './routes.js‘
  - const router = new VueRouter({routes})
  - add router to root Vue
- routes.js:
  - export const routes = [{path: '/car', component: CarDetails}]
- App.js
  - <router-link>
  - <router-view>

- Routing Modes (Hash vs History)
  const router = new VueRouter({routes, mode: 'history'})

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Routing in a VueJS Application

- Navigating from Code (Imperative Navigation):
  this.$router.push('/');
- Setting Up Route Parameters
  Add route: /car/:id
- Fetching and Using Route Parameters
  const carId = this.$route.params.id;

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Routing in a VueJS Application

- Navigating with Router Links
  - Instead of <a> use: <router-link to='/car'>
  - Note it renders an <a> eventually
- Styling Active Links
  - .router-link-active {color: green}

  - ITP: Show a bootstrap nav component as a demo for: tag="li" active-class="active" exact

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Routing in a VueJS Application

- Navigating from Code (Imperative Navigation):
  this.$router.push('/');
- Setting Up Route Parameters
  Add route: /car/:id
- Fetching and Using Route Parameters
  const id = this.$route.params.id

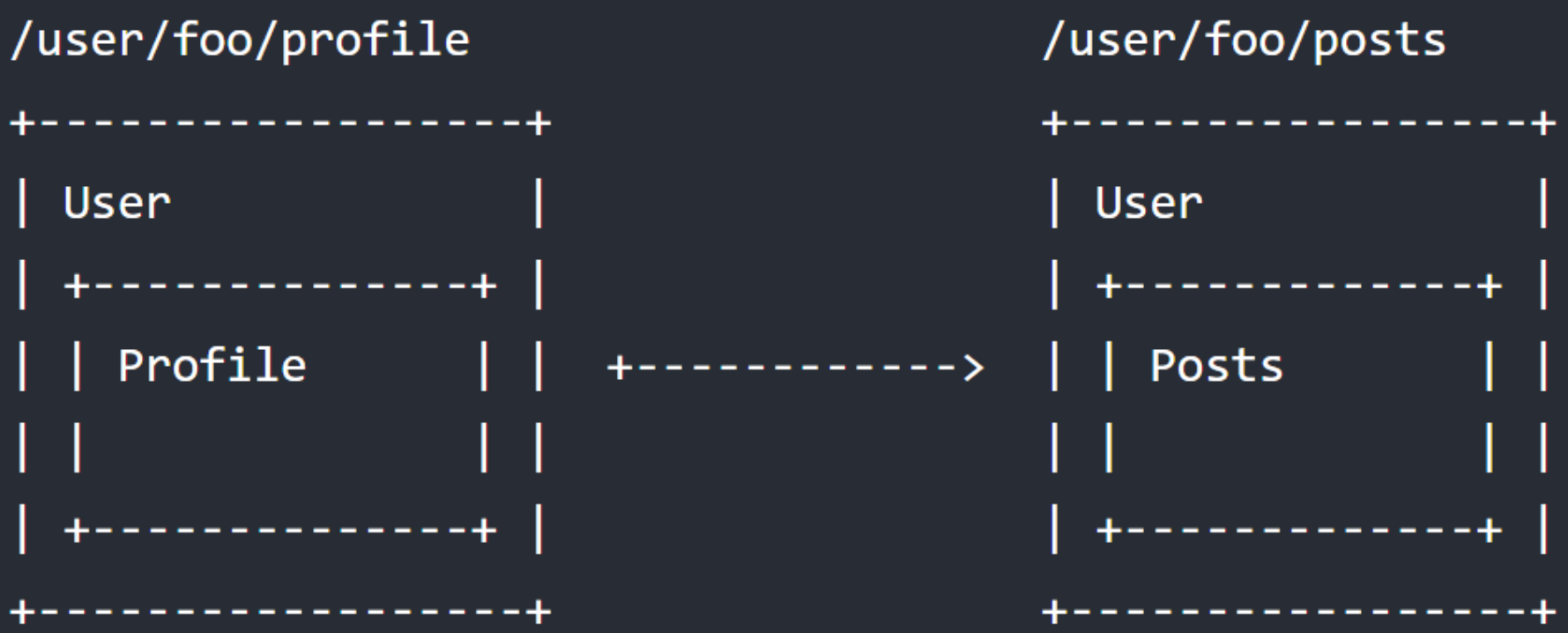
- Reacting to Changes
  in Route Parameters:

```
export default {
    data() {
      return {
          id: this.$route.params.id
      }
    },
    watch: {
        '$route'(to, from) {
            this.id = to.params.id;
        }
    }
    ,
    methods: {
        navigateToHome() {
            this.$router.push('/');
        }
    }
}
```

Nested Routes

- Real app UIs are usually composed of components that are nested multiple levels deep.
- It is also very common that the segments of a URL corresponds to a certain structure of nested components

Code Sample Here



Moving to Async Data

Most services work in an async way, returning a promise:

```
IN THE SERVICE:
function query() {
    return Promise.resolve(books);
}


IN THE COMPONENT:
data() {
        return {
            books: []
        }
},
created() {
   booksService.query()
        .then(books => {
            this.books = books;
        })
}
```

Non Parent-Child Communication

- Sometimes two components may need to communicate with one-another but they are not parent/child to each other.
- We can use an empty Vue instance as a **central event bus**:

```
var bus = new Vue()
// in component A's method
bus.$emit('id-selected', 1)

// in component B's created hook
bus.$on('id-selected', (id) => {
// ...
})
```

In more complex cases, you should consider employing a dedicated state-management pattern (Vuex - Discussed later)

Animations

Vue provides a variety of ways to apply transition effects when items are inserted, updated, or removed from the DOM.
This includes tools to:

- Automatically apply classes for CSS transitions and animations
- integrate 3rd-party CSS animation libraries, such as Animate.css
- use JavaScript to directly manipulate the DOM during transition hooks
- integrate 3rd-party JavaScript animation libraries, such as Velocity.js
- Here is a simple example

Using Refs

- Sometimes you might still need to directly access an element
- Note that refs are available only after it is mounted to DOM, use the *mounted*() function
- Example:

```
<div id="parent">
    <div id=“map“ ref=“theMap"></div>
</div>

var elMap = this.$refs.theMap
```

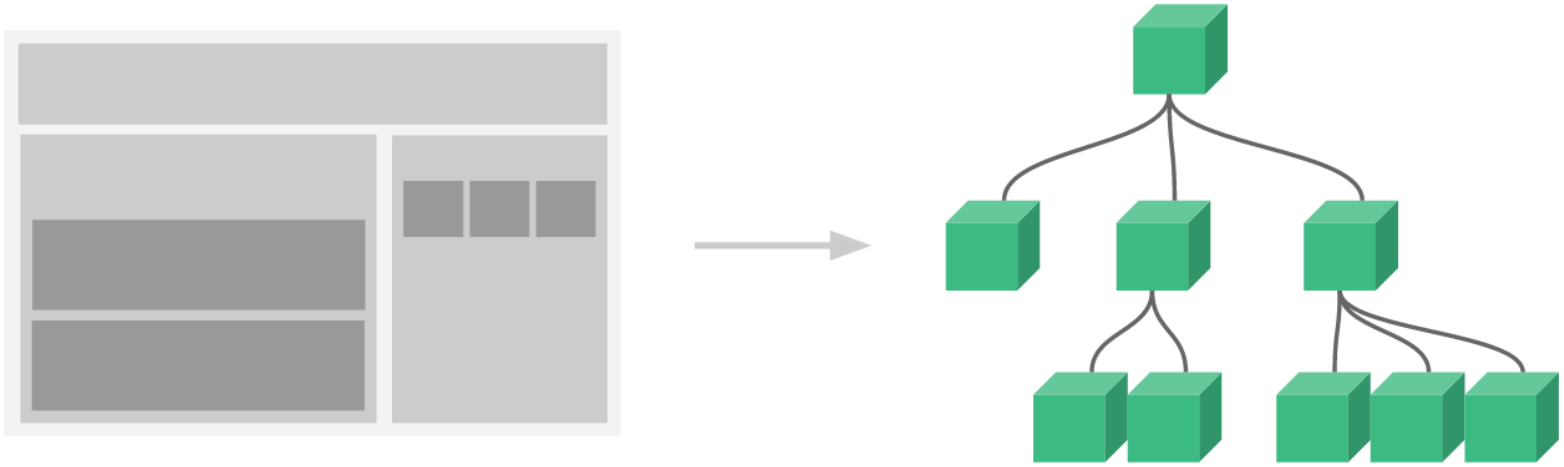
Using Refs

Another Example - you need to set the focus to an input, when some button is clicked:

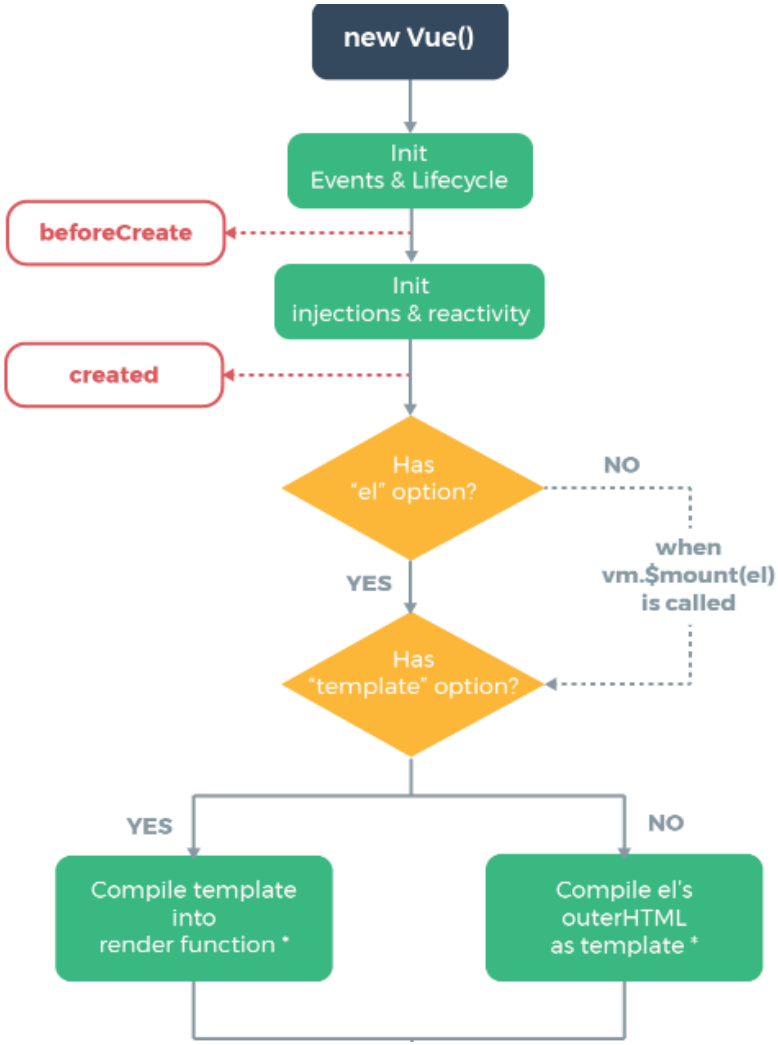
this.$refs['myInput'].focus()
this.$refs.myInput.focus()

Don't over use refs, try to relay on your model whenever possible

Going Deeper



Instance lifecycle



See it in action: https://jsfiddle.net/vyaron/jjL72zj4/

components – data()

Remember that **data must be a function?**

```
var Comp = {
  template: '<div>A custom component!</div>',
  data() {
    return {};
  }
}
```

See what happens If we cheat here

Binding Inline Styles

for the CSS property names,

You can use either camelCase or kebab-case
(use quotes with kebab-case)

```
<div :style="{‘font-style’: fStyle, fontSize: fSize + 'px' }">
   Thanks!
</div>
```

```
data: {
   fStyle: ‘italic',
   fSize: 30
}
```

Binding Inline Styles

It is often a good idea to bind to a style object so that the template is cleaner:

```
<div :style="styleObject"></div>
```

```
computed: {
  styleObject() {
     return {
        color: (this.isHappy)? ‘yellow’ : ‘gray’,
        fontSize: '13px'
     }
  }
}
```

Play here

Conditional Group Rendering - template

Achieve Conditional Groups with v-if on <template>:

```
<template v-if="ok">
  <h1>Title</h1>
  <p>Paragraph</p>
</template>
```

Helps to apply v-if on multiple elements without the need to wrap them in a div

Binding HTML Classes – Array syntax

We can pass an array to *v-bind:class* to apply a list of classes:

```
<div v-bind:class="[activeClass, errorClass]">

<div v-bind:class="[isActive ? activeClass : ‘ ', errorClass]">

<div v-bind:class="[{ active: isActive }, errorClass]">
```

```
data: {
    isActive: true,
    activeClass: 'active',
    errorClass: 'text-danger'
}
```

List Rendering v-for

We can use the v-for directive to render a list of items based on an array:

```
<li v-for="(item, idx) in items">
    {{idx}} - {{ item.name }}
</li>
```

Similar to template v-if, you can also use a <template> tag with v-for to render a block of multiple elements

```
<template v-for="item in items">
  <li>{{ item.name }}</li>
  <li class="divider"></li>
</template>
```

List Rendering v-for

You can also:

```
<span v-for="n in 10">{{ n }}</span>
```

v-for on Object

You can also use v-for to iterate through the properties of an object:

```
<li v-for="(value, key, idx) in person">
    {{ value }}
</li>

data: {
  person: {
    firstName: 'John',
    lastName: 'Doe',
    age: 30
  }
}
```

the key

It is recommended to provide a key with v-for whenever possible

```
<div v-for="item in items" :key="item.id">
<!-- content -->
</div>
```

This helps vuejs effectively correlate our model and dom, and optimize dom elements reuse

The *Key* is a generic mechanism for Vue to identify nodes, which has other uses that are not specifically tied to v-for.

Watchers on the data

- there are times when a custom watcher is necessary
- You want to perform an asynchronous action in response to changing data

Exmple:

```
Ask a yes/no question:
<input v-model="question">
<p>{{ answer }}</p>

watch: {
  question(newQuestion) {
    this.answer = 'Finding your answer...'
    this.getAnswer().then(ans => this.answer = ans)
  }
}
```

https://jsfiddle.net/vyaron/1ek3d48u/3/

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Watchers on the Route

- Watching the route is needed when a component stayed alive, but need to update its data when route is changing
- i.e.: changed from /product/123 to /product/124

```
watch: {
      '$route.params.id’: function(id)
                                { ... }
}
```

- When needed, there is also an imperative API

Conditional Rendering v-show

v-show simply toggles the display CSS property of the element

- Note that v-show **doesn't** support the <template> syntax
- **Nor** does it work with v-else

```
<h1 v-show="ok">Hello!</h1
```

Conditional Rendering v-show

```
<section v-show="isActivated">…</section>

<section v-if    =" isActivated ">…</section>
```

Usage Considerations:

v-if has higher toggle costs while v-show has higher initial render costs.

- Prefer v-show if you need to toggle something very often
- prefer v-if if the condition is unlikely to change at runtime.

VueJS

Components

Dynamic Components

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Dynamic Components

We can use the same mount point and dynamically switch between multiple components using the reserved <component> element and dynamically bind to its is attribute:

```
var vm = new Vue({
  el: '#example',
  data: {
    currentView: 'home'
  },
  components: {
    home: { /* ... */ },
    posts: { /* ... */ },
    archive: { /* ... */ }
  }
})
```

```
<component :is="currentView">
<!-- component changes when vm.currentView changes! -->
</component>
```

Dynamic Components

```
<component :is="currentView">
<!-- component changes when vm.currentView changes! -->
</component>
```

Dynamic Component has 2 extra Lifecycle Hooks: activated(), dectivated()

Keep Alive

If you want to keep the **switched-out components** in memory so that you can preserve their state or avoid re-rendering, you can wrap a dynamic component in a <keep-alive> element:

```
<keep-alive>
    <component :is="currentView">
        <!-- inactive components will be cached! -->
    </component>
</keep-alive>
```