Vue.js Framework

Internet Engineering

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Pooya Parsa

Professor: Bahador Bakhshi

CE & IT Department, Amirkabir University of Technology

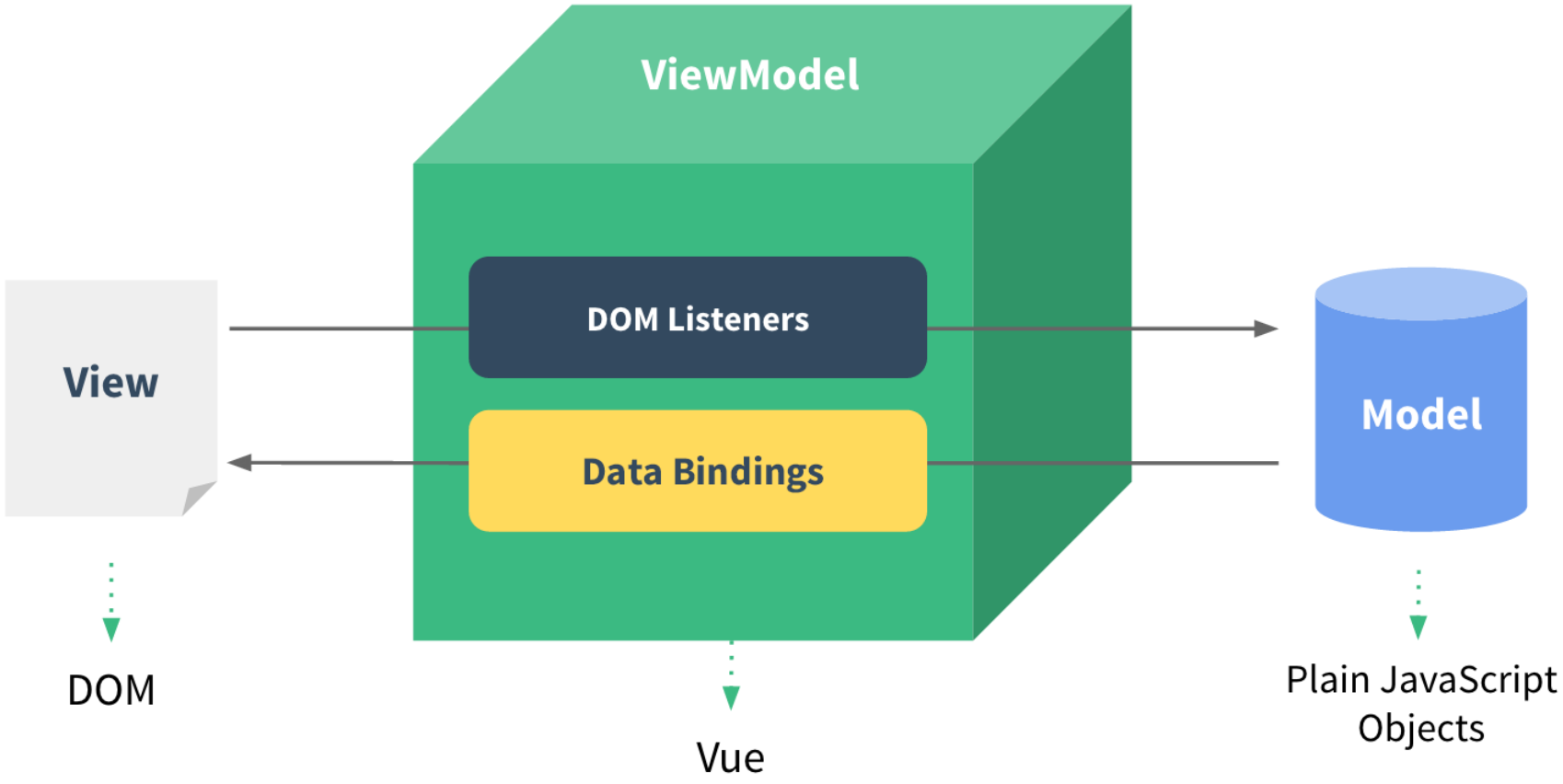
Outline

- Introduction to Vue.js
- The Vue instance
- Declarative Rendering
- Event Listeners & Input handling
- v-if and v-for Directives
- Computed Props
- Components

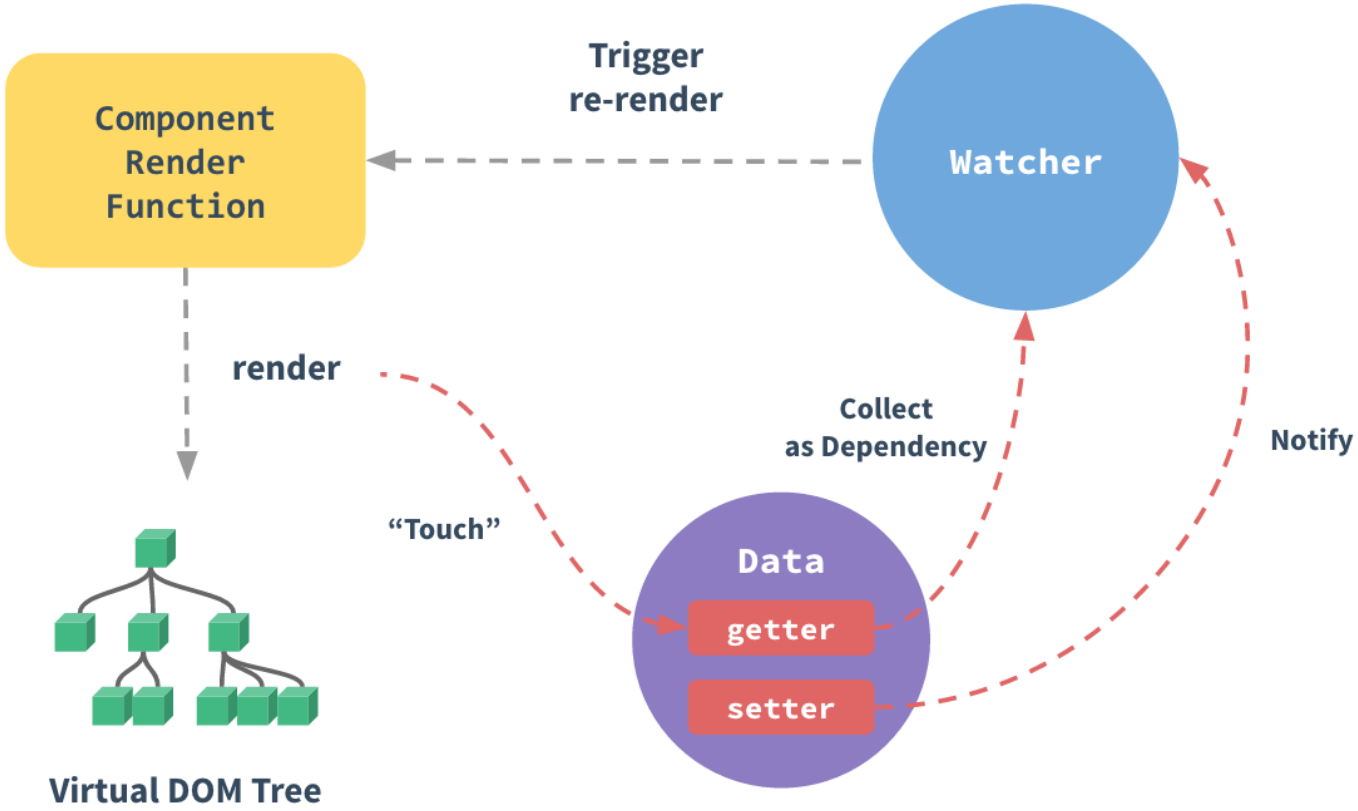
What is Vue.js

- A **progressive framework** for building user interfaces.
- Created by evan you when he was working at Google Creative Labs in 2013.
- Pronounced /vjuː/, like **view!**

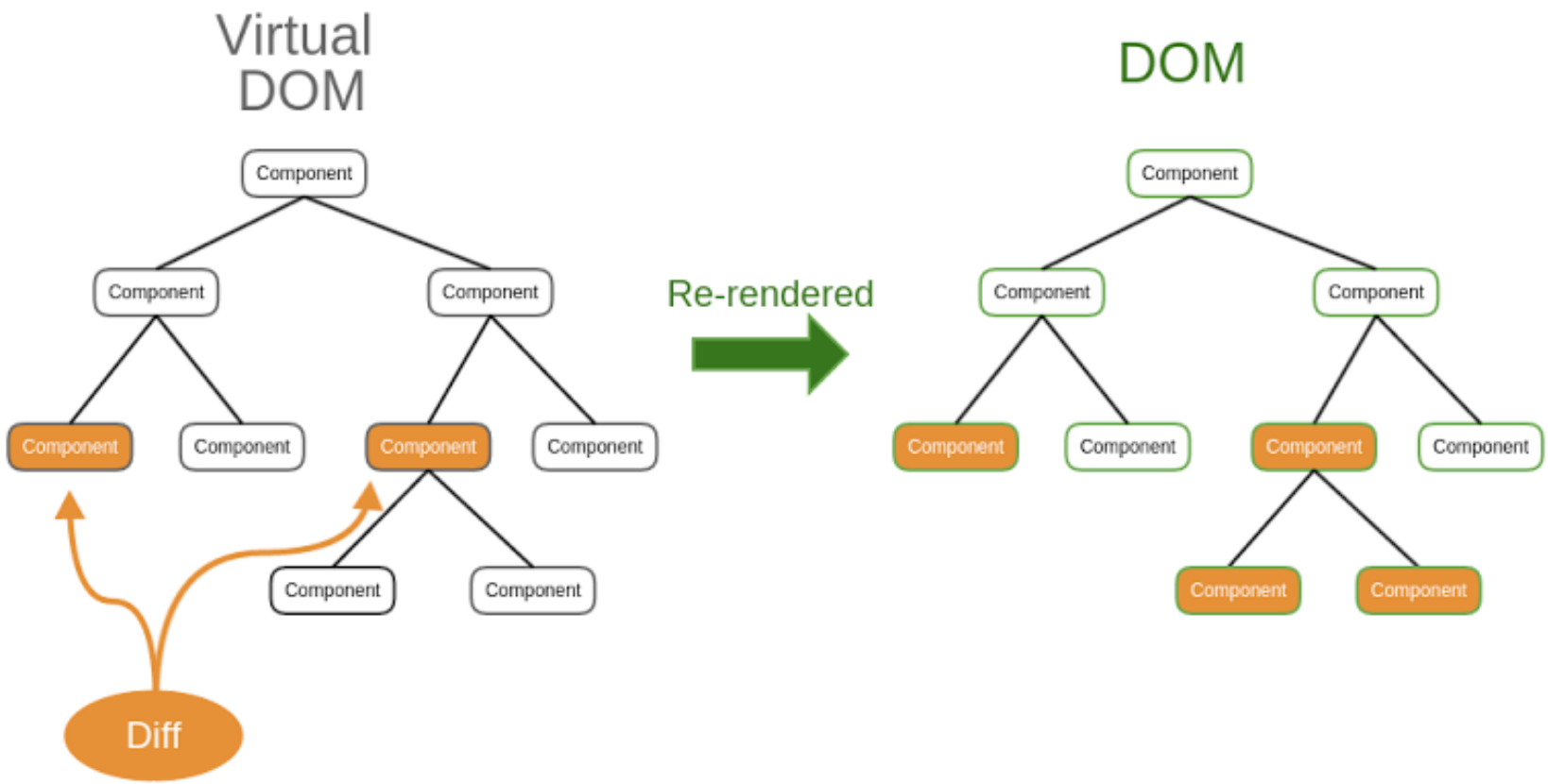
MVVM Architecture Pattern



Reactivity


Trigger
re-render
Component
Render
Function
Watcher
render
Collect
as Dependency
Notify
"Touch"
Data
getter
setter
Virtual DOM Tree

Virtual DOM


Virtual DOM
Component
Component
Component
Component
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Component
Component
Component
Component
Diff
Re-rendered
DOM
Component
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Component
Component
Component

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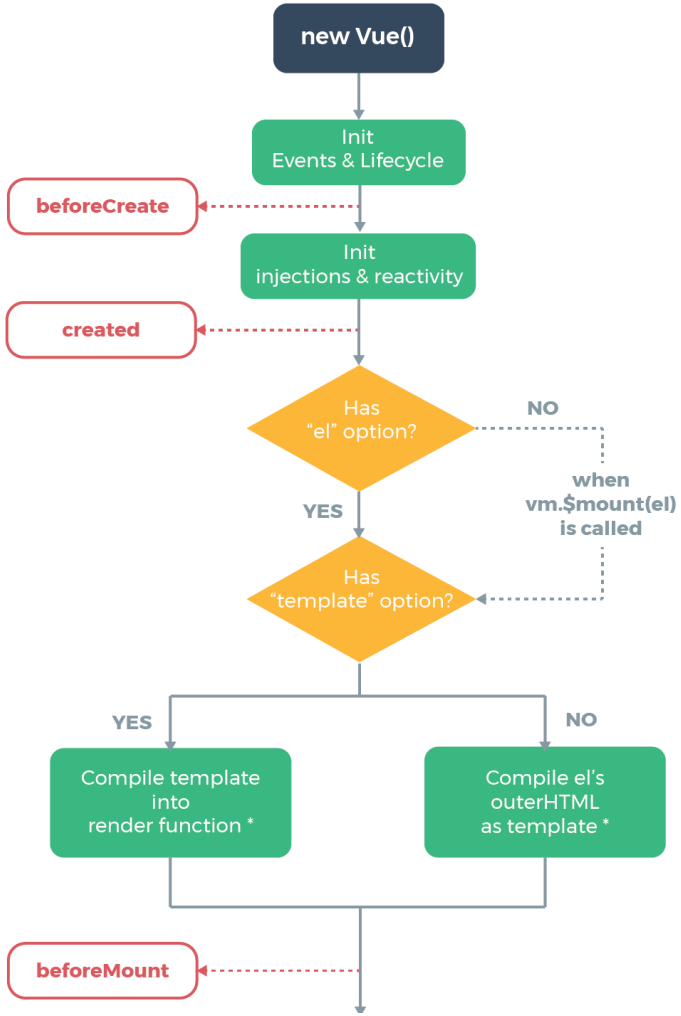
The Vue Instance

- Every Vue application starts by creating a new **Vue instance** with the Vue function:

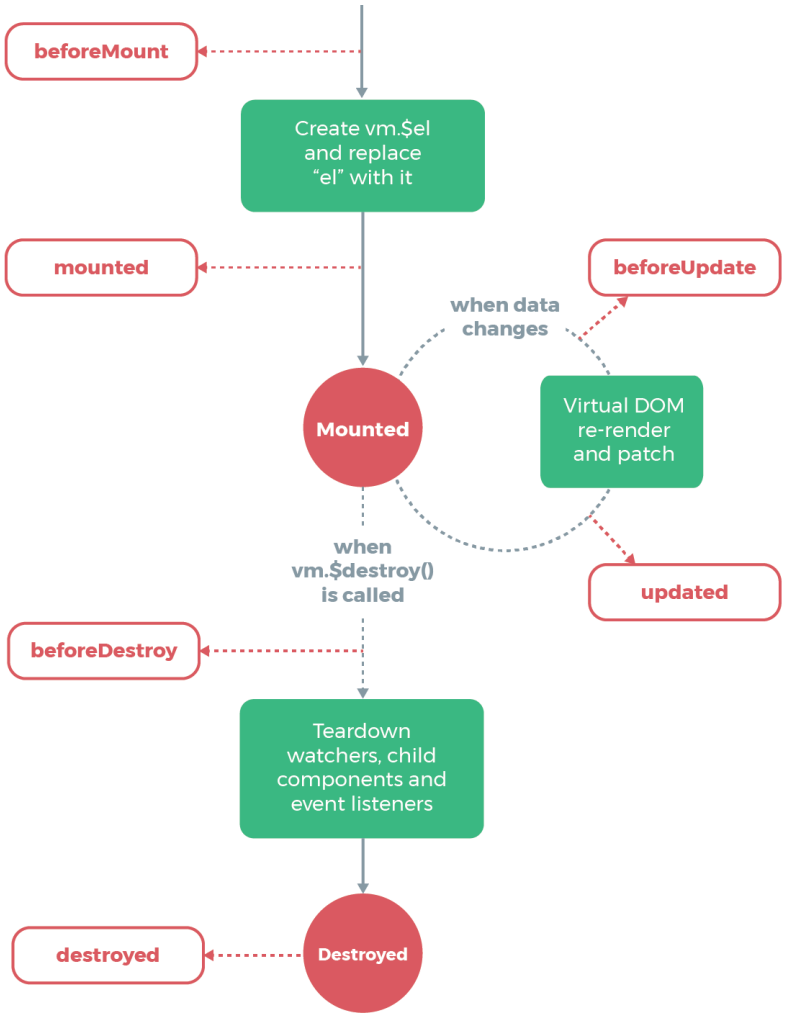
```
<script>
var vm = new Vue({
  // options
})
</script>
```

- As a convention, we often use the variable vm (short for ViewModel) to refer to our Vue instance.
- A Vue application consists of a **root Vue instance** created with new Vue, optionally organized into a tree of nested, reusable components.

Vue Lifecycle Diagram



Vue Lifecycle Diagram



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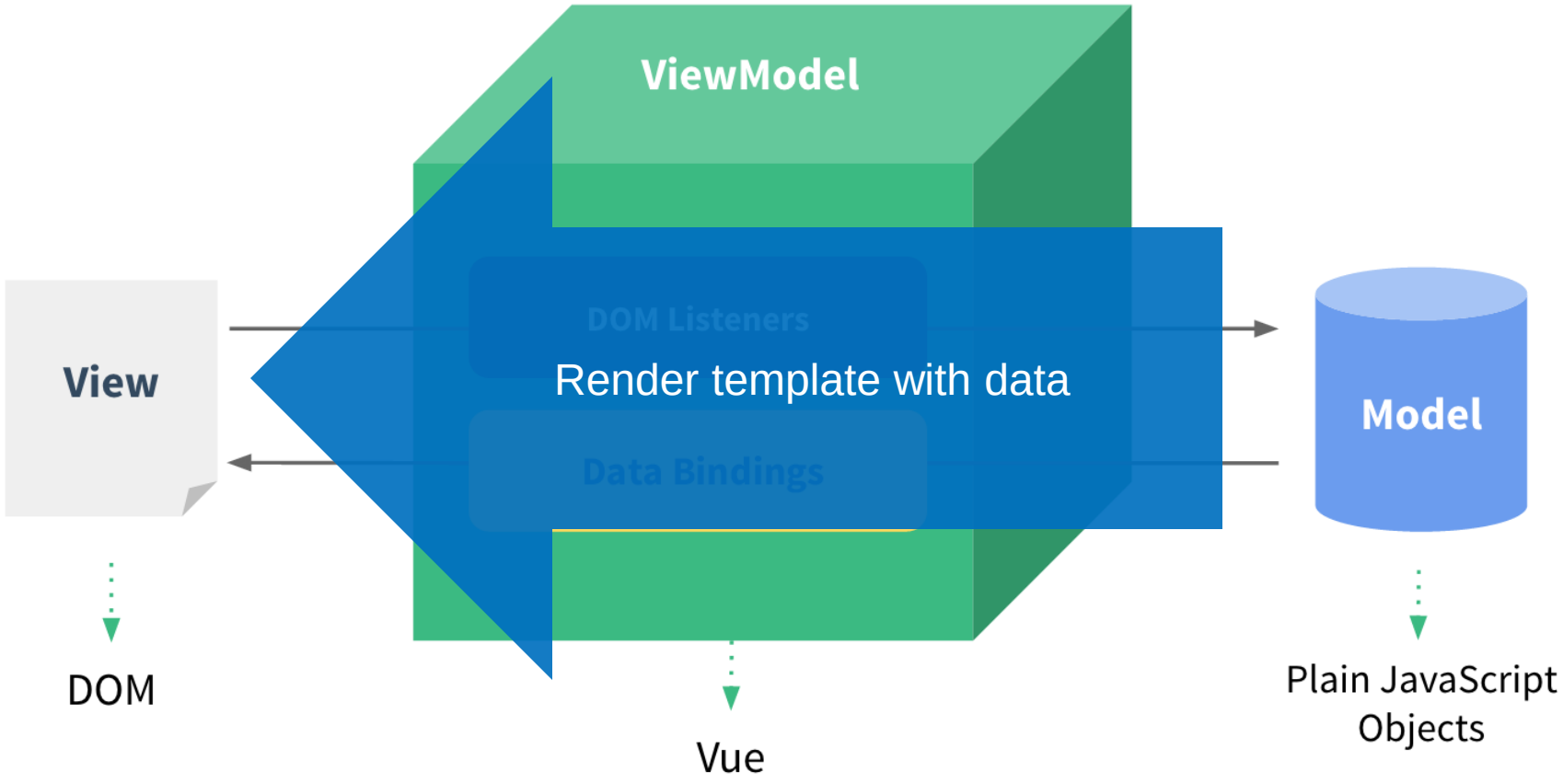
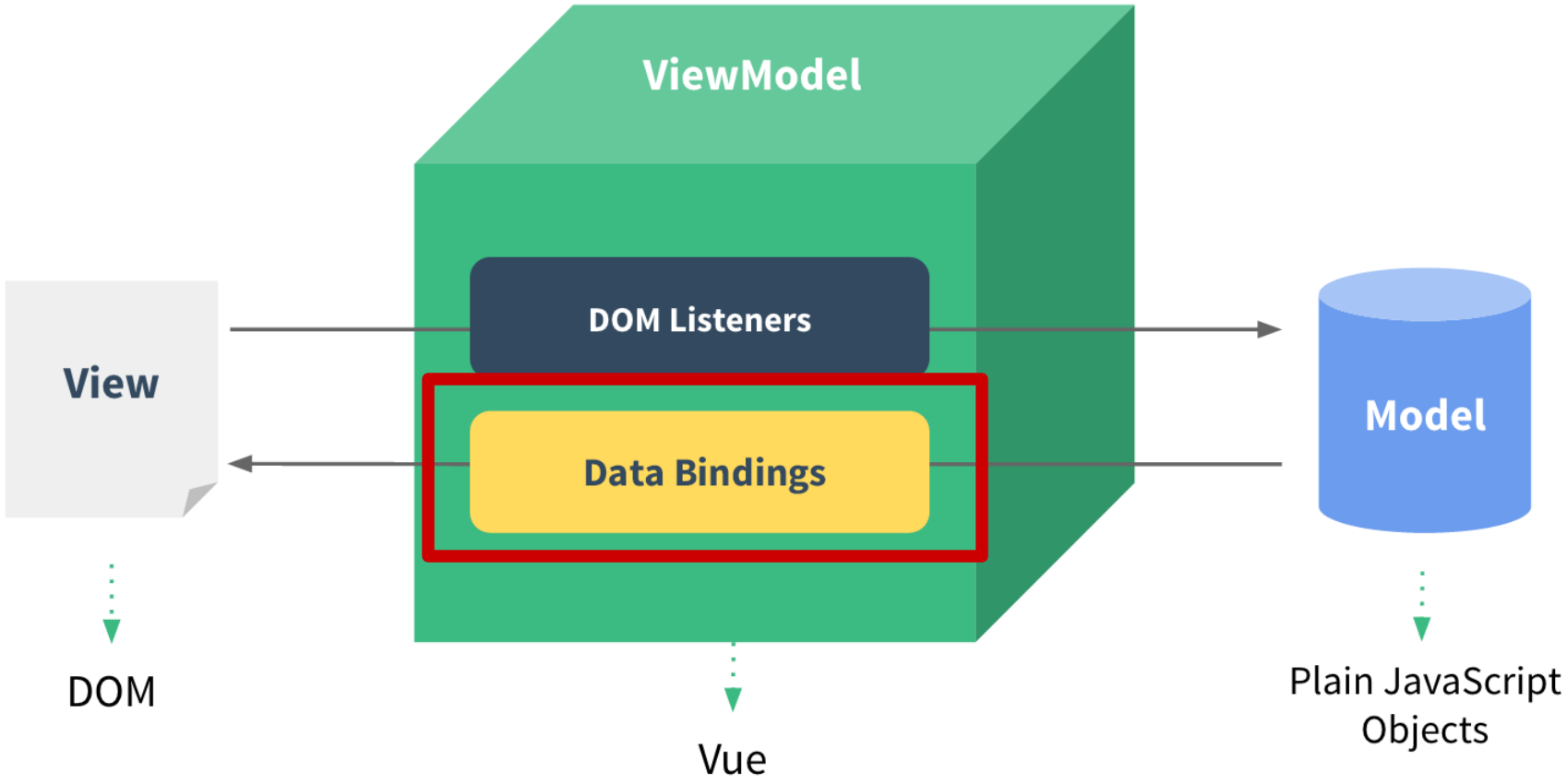
Declarative Rendering



Data Bindings



Data Bindings

```
<div id="app">
{{ message }}
</div>

<script>
new Vue({
el: '#app',
data: {
  message: 'Hello World!'
}
})
</script>
```

https://codepen.io/pi0/pen/pdKxKZ

Binding attributes

```
<div id="app">
  <img :src="imageSrc" />
</div>

<script>
new Vue({
el: '#app',
data: {
  imageSrc: 'https://lorempixel.com/300/150'
}
})
</script>
```

https://codepen.io/pi0/pen/mqKzgm

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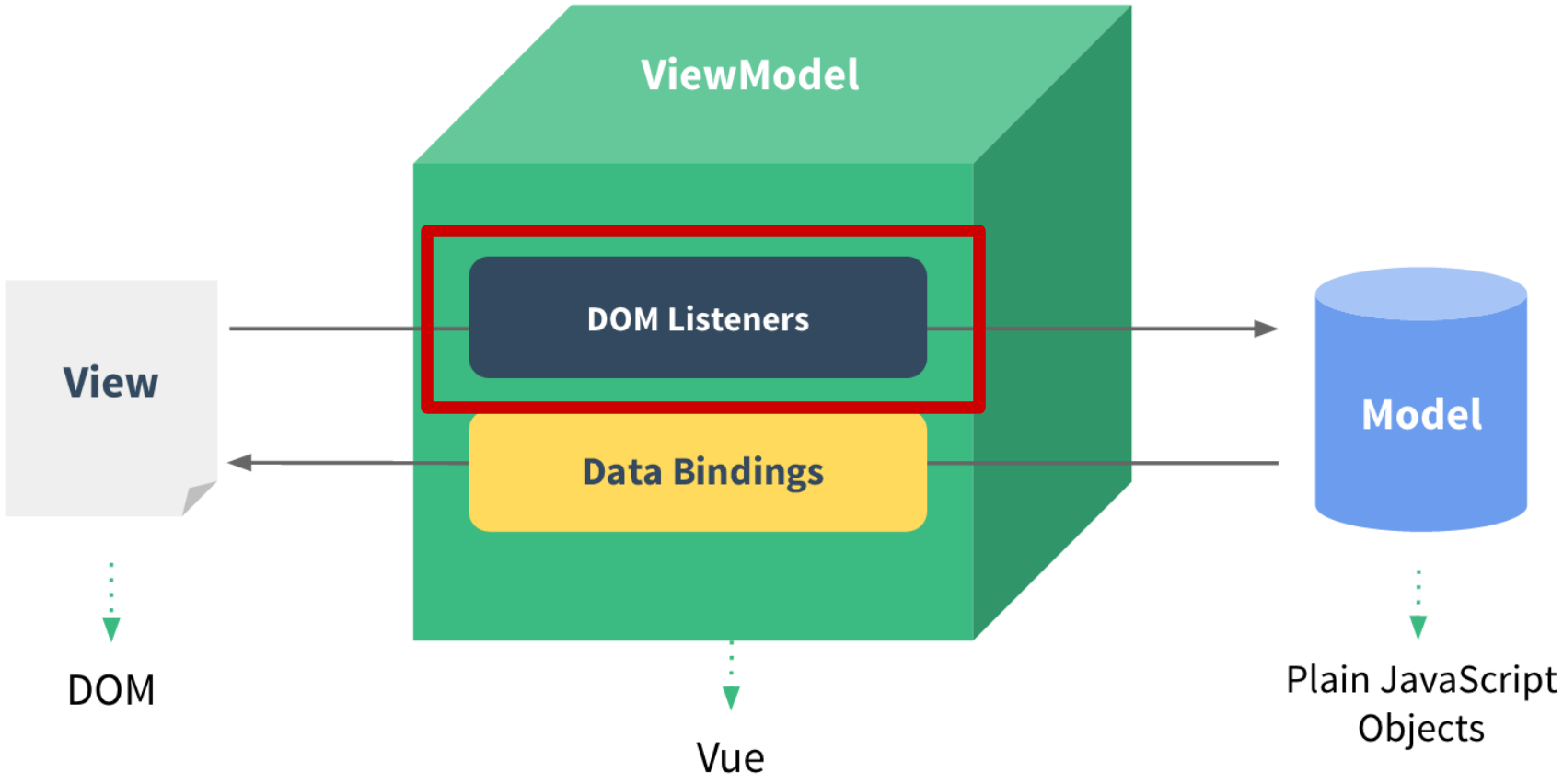
DOM Listeners



DOM Listeners

```
<div id="app">
  <button @click="clicked">Click Me</button>
</div>


<script>
new Vue({
el: '#app',
methods: {
  clicked () {
    alert("HEEY!")
  }
}
})
</script>
```

https://codepen.io/pi0/pen/aVKRPo

Why using listeners in HTML?

- All Vue handler functions and expressions are **strictly** bound to the ViewModel.
- It's easier to **locate the handler** function implementations within your JS code.
- ViewModel code can be **pure logic** and **DOM-free**. This makes it easier to test.
- When a ViewModel is destroyed, all event listeners are **automatically removed**. You don't need to worry about cleaning it up.

Handling User Input

```
<div id="app">
Your name: <input @input="onInput"></input>

Welcome {{ name }}!
</div>

<script>
new Vue({
el: '#app',
data: {
  name: 'Guest User'
},
methods: {
  onInput(e) {
    this.name = e.target.value
  }
}
})
</script>
```

https://codepen.io/pi0/pen/rYKqEE

Handling User Input (v-model)

```
<div id="app">
Your name: <input v-model="name"></input>

Welcome {{ name }}!
</div>

<script>
new Vue({
el: '#app',
data: {
  name: 'Guest User'
}
})
</script>
```

https://codepen.io/pi0/pen/xPzQZZ

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Conditional rendering (v-if)

```
<div id="app">
<input type="checkbox" id="accept" v-model="accepted">
<label for="accept">I accept terms of use</label>

<p v-if="!accepted">Please accept terms!</p>
<p v-else>Thank you!</p>
</div>

<script>
new Vue({
el: '#app',
data: {
  accepted: false
}
})
</script>
```

https://codepen.io/pi0/pen/LOrXWx

List rendering (v-for)

```
<div id="app">
<ul>
 <li v-for="course in courses">
 <input type="checkbox" v-model="selectedCourses" :value="course" />{{ course }}
</li>
</ul>
{{ selectedCourses }}
</div>

<script>
new Vue({
el: '#app',
data: {
  selectedCourses: [],
  courses: ['IE', 'ML', 'BP', 'AP']
}
})
</script>
```

https://codepen.io/pi0/pen/xPzQLE

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Computed props

- Putting too much logic in your templates can make them bloated and hard to maintain and not declarative.
- Computed props are being **cached**.
- Dependencies will be **auto tracked.**

Computed props

```
<div id="app">
<input v-model="a"> * <input v-model="b"> = {{ result }}
</div>

<script>
new Vue({
el: '#app',
data: {
  a: 10,
  b: 10
},
computed: {
  result() {
    return this.a * this.b
  }
}
})
</script>
```

https://codepen.io/pi0/pen/xPzQYR

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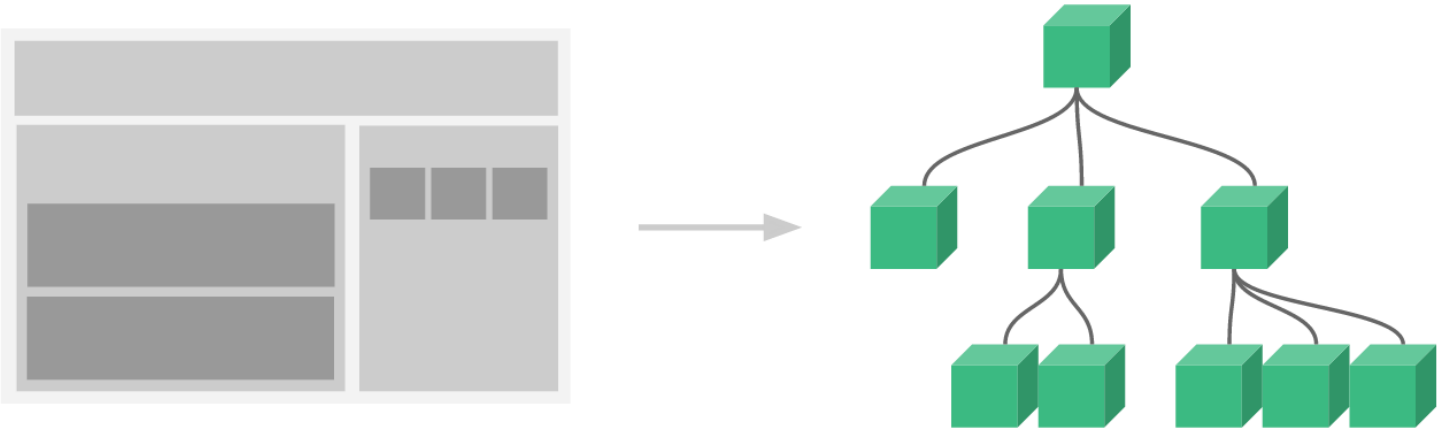
Vue Components

- In Vue, a component is essentially a Vue instance with pre-defined options.
- They help you extend basic HTML elements to encapsulate reusable code.
- Components are one of the most powerful features of Vue.

Composing with Components

- Component are an abstraction that allows us to build large-scale applications composed of small, self-contained, and often reusable components.



Components for large scale apps

- An (imaginary) example of what an app's template might look like with components:

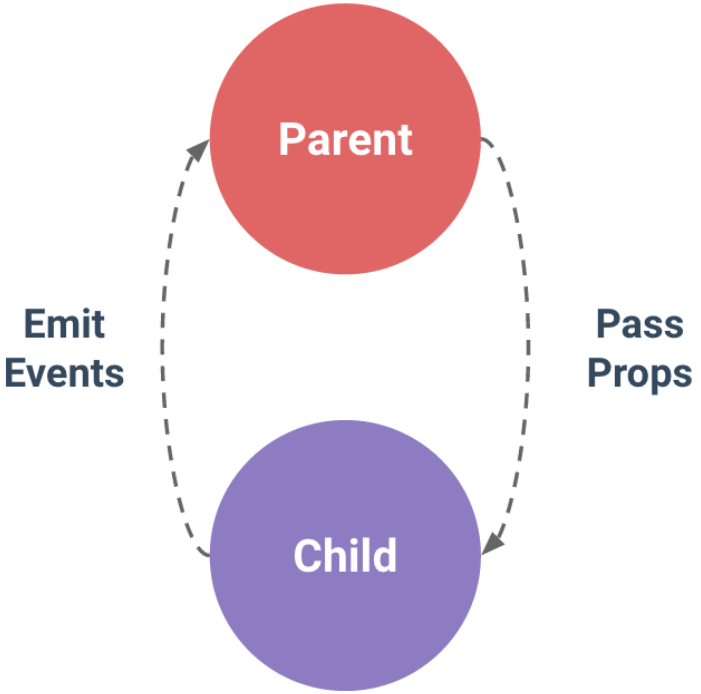
```html
<div id="app">
  <app-nav></app-nav>
  <app-view>
    <app-sidebar></app-sidebar>
    <app-content></app-content>
  </app-view>
</div>
```

Composing Components

- Components are meant to be used together, most commonly in parent-child relationships.
- In Vue, the parent-child component relationship can be summarized as **props down, events up**.
- This prevents child components from accidentally mutating the parent's state, which can make your app's data flow harder to understand.

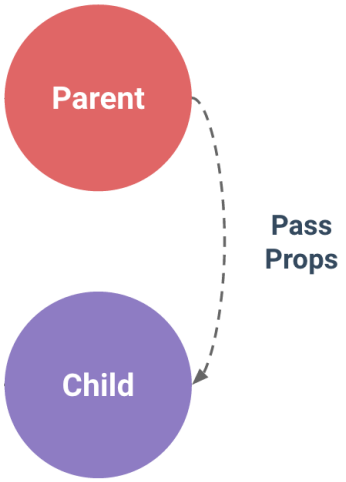
One-Way Data Flow

- Parent passes data down to the child via **props**, and the child sends messages to the parent via **events.**



Component Props

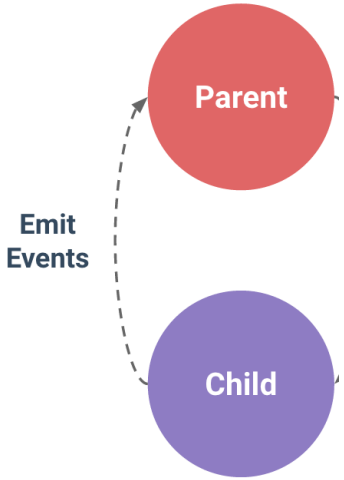
- Every component instance has its own **isolated scope.**
- Data can be **passed down** to child components using **props**.
- A prop is a custom attribute for passing information from parent components.




```html
<child message="hello!"></child>
```

Custom Events

- Every Vue instance implements an **events interface**, which means it can:
  - Trigger an event using $emit(eventName)
  - Listen to an event using
    - $on(eventName)
    - v-on:eventName
    - @eventName




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

Declare a component

- In Vue, a component is essentially a Vue instance with pre-defined options:

```js
// Define a new component called todo-item
Vue.component('todo-item', {
  template: '<li>This is a todo</li>'
})
```

```js
Vue.component('todo-item', {
  // The todo-item component now accepts a
  // "prop", which is like a custom attribute.
  // This prop is called todo.
  props: ['todo'],
  template: '<li>{{ todo.text }}</li>'
})
```

Declare a component

- In more complex projects or when your frontend is entirely driven by JavaScript, these disadvantages become apparent:
- **Global definitions**
  - Force unique names for every component
- **String templates**
  - Lack syntax highlighting and require ugly slashes for multiline HTML
- **No CSS support**
  - While HTML and JavaScript are modularized into components, CSS is conspicuously left out

Single File Components

- In modern UI development, we have found that instead of dividing the codebase into three huge layers (HTML/CSS/JS) that interweave with one another, it makes much more sense to divide them into loosely-coupled components and compose them.
- This is possible using **single-file components** with a .vue extension.

Single File Components

Hello.vue

```vue
<template>
  <p>{{ greeting }} World!</p>
</template>

<script>
module.exports = {
  data: function () {
    return {
      greeting: 'Hello'
    }
  }
}
</script>

<style scoped>
p {
  font-size: 2em;
  text-align: center;
}
</style>
```

Line 21, Column 1 Spaces: 2 Vue Component

References

- http://singlepageappbook.com (2013 - Mikito Takada)
- The Majesty of Vue.js 2 (2017- Alex Kyriakidis, Kostas Maniatis and Evan You)
- https://developers.google.com/web/fundamentals/web-components/customelements
- https://developers.google.com/web/fundamentals/web-components/shadowdom