Enhancing Web Applications with VueJs

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Session Materials

Web Frameworks come and go - frequently. **VueJs** is yet another Web Framework (YAWF), but I think you'll find that VueJs is a bit different than most other frameworks. Unlike most of its peers VueJs is not specific to building full featured client side SPA (Single Page Applications) which it supports, but it also addresses much simpler scenarios of enhancing existing simple HTML pages.

The focus of this article is on VueJs as a **drop in JavaScript Framework** that you can use in simple function HTML pages (rather than full featured SPAs) or in server generated HTML pages. Specifically I'll use Web Connection for my server side examples since it fits the FoxPro target audience of this paper, but the concepts really can be used with any kind of server framework - I use these concepts frequently with ASP.NET Core for example.

Framework Overload

So why use Vue? It is after all another framework and there are tons of them out there.

I've used a number of JavaScript frameworks, and even though I have become a big fan VueJs, I tend to still use **Angular** as my primary framework to build full blown SPA applications. Vue also supports full blown SPA development with a full blown CLI and **WebPack** based build system for bundling, packagin and support tooling. A framework like Angular or Vue with the full build process in place, works well for complex SPA applications.

But you see, most of the big Web Frameworks are just that: Big and bulky. They require a large amount of bootstrap code just to load even a hello world application. More so, most require a complex **build process** that pulls in 100's of megabytes of dependencies, just to produce the final HTML output which often is also quite large (in the 100's of Kilobytes) especially for simple things.

If you're building a full featured, large Single Page Application front end for a complex enterprise application, that's perfectly fine. These build processes provide a number of other benefits such as automatically bundling and packing of resources, translating CSS from SCSS, LESS, provide tooling for testing and much more.

But it's **overkill** when you just want to drop a partial component into an existing page or add a small list of items into an existing static or server rendered HTML page. In fact, using a full SPA framework that's next to impossible to do effectively today (although Web Component proposals for many frameworks are aiming to change that some).

More Options with Vue

Where Vue really differentiates itself from other frameworks is that it can also easily be dropped into existing HTML pages using a single script reference, which allows Vue to be used more along the lines of how jQuery used to be dropped in to provide **incremental enhancement** to HTML pages.

Vue provides most of the functionality of other big frameworks that require full build processes, with just a single, small (38kb compressed) library. This means that with VueJs **it's very easy to enhance existing static or server rendered HTML pages** with easy JavaScript in much the same way that **jQuery** could be used in the past as a simple drop-in to any page. In fact, VueJs can take over many if not most of the features that jQuery used to provide using declarative programming and model design.

> **jQuery's Fall From Grace**
>
> Even though jQuery has fallen out of favor over the years in favor of bigger frameworks, it is still very useful especially for simple page processing. Many of jQuery's features have been co-opted directly by the HTML DOM, but there are still many, many useful helpers that come in handy as well as built-in AJAX callback functionality that's easy to use. Although there's much less need for jquery in applications that use modern databinding, almost every application I built with client side code still benefits from jQuery. I say out of favor perhaps, but not down for the count just yet.

Why use a a JavaScript Framework?

VueJs - like many of the other frameworks like Angular, React, Ember, Aurelia etc. - is a Model binding framework, that at it's heart provides an MVC/MVVM (Model Vue Controller, Model View Viewmodel) data binding framewo0rk.

At the highest level all frameworks are based on a simple concept:

- A JavaScript data model that describes the data to be bound
- A template inside of HTML that describes how to render the data
- Some bootstrap code that binds the model to a template
- Code that reacts to events and fires your JavaScript code

The key feature of VueJs and other frameworks is data binding, which actually can affect more than what you traditionally think of as data, such as display attributes and UI state. While you will always want to bind actually data values like a name, date or description, you may also want to bind state data such as wether an item is enabled or disable, whether it's visible or whether it has a specific CSS class or style associated with it. All of this can be handled through the declarative HTML syntax of VueJs.

Just like you can easily bind data to a `ControlSource` in FoxPro, VueJs allows you to bind data to an HTML element or its attributes. Unlike FoxPro though, the databinding in Vue is much more flexibile as it allows you to bind to any property of each element. You can bind to the most common `innerText`, `innerHTML` and `value` elements of course, but you can also easily bind a `title`, `class`, `style` or `disabled` attribute. Essentially you can bind to any attribute that an element supports and bind to any event including custom user generated DOM events.

This is very powerful as it allows the framework to abstract the DOM away almost entirely. Rather than pushing data items individually into the DOM every time a value changes, you can simply set a property value on the model, and the framework takes care of updating the HTML DOM based on the template bindings on the page.

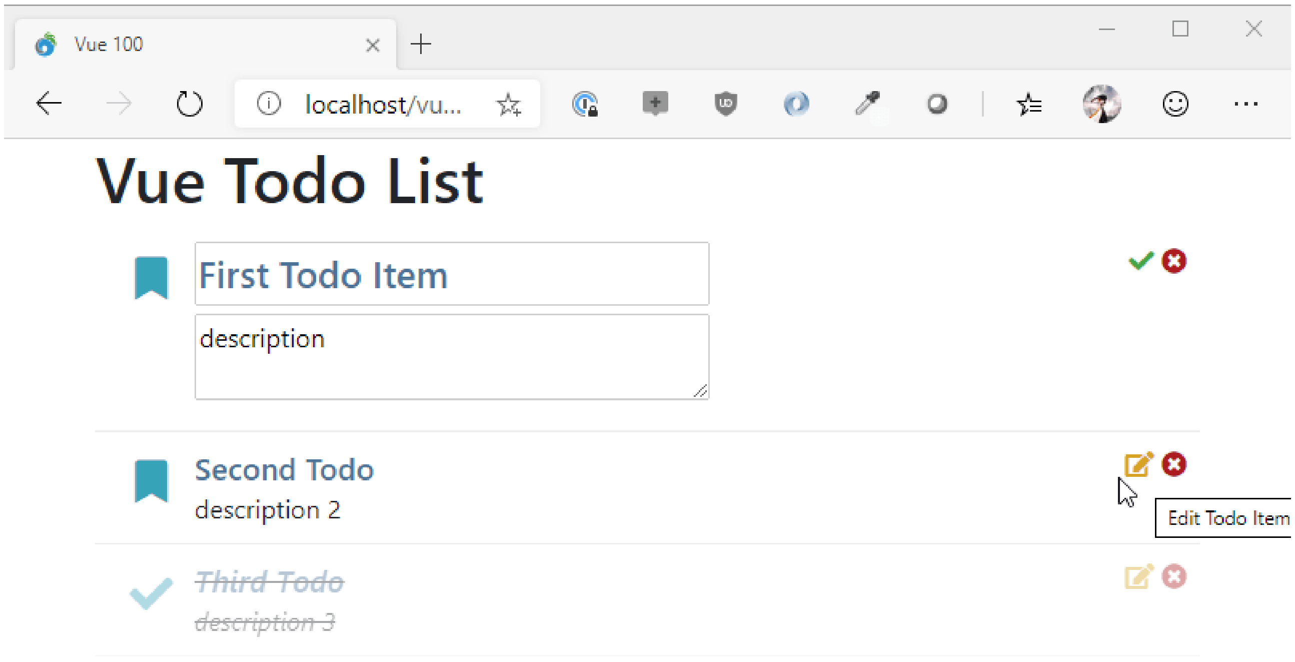
First look at Vue Syntax

To give you an idea what a Vue ‘HTML template’ along with the model binding code looks like here's a simple example of a list of items displayed with display and editable fields:

```html
<div id="todoApp">

<h1>{{appName}}</h1>

<div class="todo-item"
     v-bind:class="{completed: todo.completed}"
     v-for="todo in todos" >

    <div class="todo-content"
         v-on:click="toggleCompleted(todo)">

        <div class="todo-header">
            <div v-if="!todo.isEditing" >
                {{todo.title}}
            </div>
            <div v-else>
                <input type="text"  ref="todoTitle"
                        v-model="todo.title"
                        class="todo-header inline-editor" />
            </div>
        </div>
        <div v-if="!todo.isEditing" style="min-height: 25px;" >
            {{todo.description}}
        </div>
        <div v-else>
            <textarea v-model="todo.description"
                      class="inline-editor"></textarea>
        </div>
    </div>
</div>
</div>

<script>
// create the view model separately - more options this way
var vm = {
    appName: "Vue Todo List",
    todos: [
        {
          title: "todo 1",
          description: "description",
          completed: false,
          isEditing: false
        },
        { ... },
        { ... }
    ],
    toggleEditMode: function(todo) { todo.isEditing = !todo.isEditing },
    toggleCompleted: (todo)=> todo.completed = !todo.completed
 }

// initialize the model
// initialize the model
var app = new Vue({
    el: '#todoApp',
    data: function() {
       return vm;  // bind the model to the view
    }
});
<script>
```

Looking at the HTML and the Vue template syntax it should be pretty easy to discern what this page does, and that's part of the appeal of using a databinding framework. The templates look pretty much like normal HTML with some additional attributes and some binding expressions.

If you run this page here's what it looks like (with some added edit and remove buttons that I get to later):



Vue Todo List

First Todo Item
description

Second Todo
description 2

~~Third Todo~~
~~description 3~~

It's a pretty simple page, yet there's a lot going on in this example actually. There's literally no code to update the DOM as all the rendering is taken care of by rendering data from the model (the `vm` instance). Even operations like changing the edit state of an item and displaying a completely separate view, or toggling the completed state are simply updating a model value (`todo.completed = !todo.completed` for example) that is then immediately reflected in the UI.

The Vue specific tags are those that start with `v-` like `v-bind`, `v-model`, `v-if`, `v-else` and so on. There are also special directives like the binding a `v-bind:class` or `v-bind:style`, where you can provide a class value to describe behavior like class names or styles.

The code to hook this up is also very simple - you create a model of data which typically is an object with properties and potentially nested properties/arrays that contains the data that is to be rendered into the View. Each simple value can be bound to `v-text` or via `{{ property }}` or - for nested objects - `{{ property.childproperty }}` bindings.

Because data binding in VueJs is **reactive**, any change you make to the model is immediately reflected in the HTML view, so when you change the `vm.todos` array or any of the Todo items inside of it, the template is immediately refreshed and the data updated.

The important point is this:

> VueJs, not your own JavaScript code is responsible for updating the HTML DOM. Your code can just update the model data to update the HTML displayed on the screen. Note that you **still** can update HTML via the DOM, but generally your aim is to let the model do the work whenever possible.

All the tedious DOM update logic of poking values into the UI via code (ie. `$("#appname").text(vm.appname)`) and more importantly the more complex scenario of updating a list of data via code, is not necessary . Instead you simply assign a value to a model (`vm.todos[0].title = "Updated Todo Item"`) and that value immediately displays.

Imperative vs. Declarative

If you come from classic style of JavaScript programming using raw JavaScript or jQuery, you likely have used manual updates via code, where you **imperatively** write each change into the HTML document.

With VueJs on the other hand, you only **declaratively** make changes to the model data, which in turn triggers VueJs to update the HTML template with the newly updated model data. The framework is smart enough to detect which specific properties have changed and updates only those HTML elements that effectively have changes.

To demonstrate here are a couple of examples:

Using an imperative approach with jQuery:

javascript

```javascript
// Imperative using jQuery
var total = 200, subtotal = 100;

// throughout the page life cycle
$("#invoiceSubTotal",subtotal);
$("#invoiceTotal",total);
```

Using a Declarative approach with VueJs:

```javascript
// One binding time setup at start of page
var vm = {
    total: 0,
    subtotal: 0
};

// bind the model to the view
var app = new Vue({
    el: '#myApp',
    data: function() {
       return vm;
    }
});

...

// throughout the page life cycle

// updates the HTML view that are bound to these values
vm.total = 200;
vm.subtotal = 100;
```

In theory a VueJs (or any other framework) page/application should never (or at least very rarely) access the HTML DOM directly and instead update the model that drives the HTML display. Using the model to update is preferred because:

- It's much easier to write that code
- Performance is better for bulk DOM updates
- Less error prone (ie. if you rename an HTML element code still works)
- No dependencies on specific DOM features (or even browser/mobile features)

Vue Basics

At a high level Vue is not very different from other frameworks. There are a handful of key features that Vue provides.

- Inline HTML Templates
- Declarative directives (`v-for` , `v-if` , `v-show` etc.)
- Model → Template Binding (`v-text` , `v-html` , `{{ }}` , `v-bind:attr`)
- Two-way Model Binding (`v-model`)
- Event Binding (`v-on:event`)

The idea is pretty simple and similar to other frameworks. During the page's startup you do the following:

- You create a data model
- You add properties to your model for data

- You can nest objects or use arrays
- You add method for event handlers
- You create a Vue instance
- You attach the Vue instance to a DOM element
- You attach your model to the Vue instance

Let's break all that down step by step.

Before I dive in let's create a simple HTML page first that'll hold the example. I'm using the sample folder here and am pulling in the Bootstrap CSS library, FontAwesome and VueJs from a local store. They just make things look nicer, but don't affect any of the operations here.

```html
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">

<head>
    <title>Vue 100</title>

    <meta charset="utf-8" />
    <meta http-equiv="X-UA-Compatible" content="IE=edge" />
    <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1" />
    <meta name="description" content="" />

    <link rel="shortcut icon" href="./favicon.ico" type="image/x-icon" />
    <meta name="apple-mobile-web-app-capable" content="yes" />
    <meta name="apple-mobile-web-app-status-bar-style" content="black" />
    <link rel="apple-touch-icon" href="./touch-icon.png" />

    <link rel="icon" href="./touch-icon.png" />
    <meta name="msapplication-TileImage" content="./touch-icon.png" />

    <link href="./lib/bootstrap/dist/css/bootstrap.min.css" rel="stylesheet" />
    <link href="./lib/fontawesome/css/all.min.css" rel="stylesheet" />
    <link href="todo.css" rel="stylesheet" />

    <!-- <script src="https://cdn.jsdelivr.net/npm/vue/dist/vue.js"></script> -->
    <script src="./lib/vue/dist/vue.js"></script>
</head>
<body>
    <div id="todoApp">

      <!-- page content here -->

    </div>
</body>
</html>
```

The key item specifically relevant here is the inclusion of VueJs:

```html
<!-- <script src="https://cdn.jsdelivr.net/npm/vue/dist/vue.js"></script> -->
<script src="./lib/vue/dist/vue.js"></script>
```

Start with a Model

Generally it's best to start with a model of data that you want to bind. It's not required of course, but I find it helps to think about the data you are going to render first. Let's start with the simplest thing possible.

Personally I like to create my model separately from the View object and then pass that to Vue rather than defining the model directly on the Vue object as the document shows. The reason for this is that I like to create a locally scoped variable that I can access for my model so that I can **always reference** the model and not have to rely on the sometimes unpredictable nature of the `this` reference in JavaScript.

So I start with a model, which is just a JavaScript object map. You can create a class or function closure which in JavaScript also behavior like objects. for the following I use a Object Map.

> Ideally you'll want to put script code into a separate JavaScript file, but for this first example I'll use a `<script>` tag in the HTML page.

At the bottom of the HTML page before the `</body>` tag add the following:

```javascript
<script>
// create this first for a script wide reference
var vm = {};
vm = {
    appName: "Todo Application"
}

// bind the model to the todoApp Id/Element in the HTML
var app = new Vue({
    el: '#todoApp',
    data: function() {
       return vm;  // bind the model to the view
    }
});
```

So I create the model first, followed by creating an instance of the Vue object.

The Vue instance is created and the two key items that are set on the passed in object map are:

- **el**: The DOM Element to bind the model to using CSS syntax
  (`#` means *Id of todoApp*)
- **data**: A JavaScript function that returns the model

The `data` object can either be an object instance or a function. The Vue docs recommend a function because it allows initialization code to be added **just before the model is loaded** which is after the DOM has loaded. In this method I simply return my Vue model.

The object you pass can contain many other options, including a list of filters, locally used components, and much more. For now all we want is the model.

Add the HTML Template

The term HTML template may be confusing, because in reality you are not creating a seperate 'template' but rather writing the Vue template syntax directly into your existing HTML document. So in the area where above it says `<!-- page content here -->` you can now add the following:

```html
<h1>{{ appName }}</h1>
```

If you open the HTML page in the browser now you should see the "Todo Application" displayed as a big header string. If you change your code and change `appName` to a different value you can see the value updated.

Dynamic Updates

The first binding works but it's not very dynamic. Let's do something slightly more interesting by adding a value that will dynamically change. Let's go back to the model and add a new property and an initialization function:

Let's add a couple a new property to the model and initialize the model. What I'll do is add a little time update mechanism that shows the current time updating every second by adding a `time` property and an `initialize()` function:

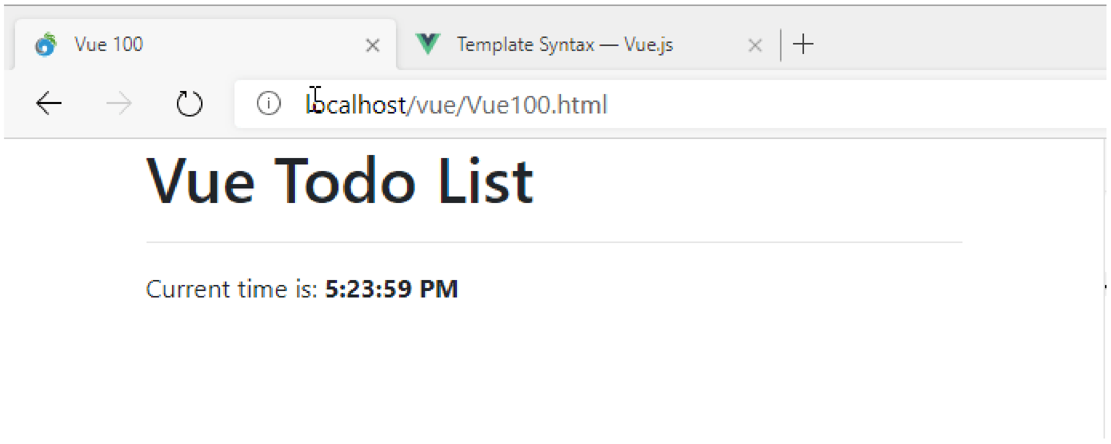
```javascript
// create the view model separately - more options this way
var vm = {
    appName: "Vue Todo List",
    time: new Date(),
    initialize: function() {
        setInterval(function() { vm.time = new Date() },1000);
    }
 }

// initialize the model
var app = new Vue({
    el: '#todoApp',
    data: function() {
        vm.initialize();
        return vm;  // bind the model to the view
    }
});
```

`time` holds a JavaScript data, and when the model is initialized I explicitly create a timer (`setInterval`) that refreshes every second and creates a new date. IOW, every second the `vm.time` property is updated and should update the HTML with the new time.

To make this work we'll need to update the template:

```html
<h1>{{ appName }}</h1>
<hr>
<p>Current time is: <b>{{time.toLocaleTimeString()}}</b></p>
```

When you run this now you'll see the time updating every second:



Vue Todo List

Current time is: **5:23:59 PM**

While maybe not impressive to look at, it's pretty powerful. It demonstrates neatly how you can update just the model data - `vm.time` in this case, and see that change reflected immediately in the HTML. Every second when the interval timer fires, it updates the model and that change updates the HTML in the browser.

You don't write code to update the HTML DOM, you write code to simply change values on the model.

Vue checks the model for changes and when a change is detected fires a DOM update cycle that renders the affected parts of the template. Cool, right?

Note that you can bind data in a few different ways. The **mustache syntax** used above is very descriptive, but it won't work for all controls because it requires a control that can

```html
<p>Current time is:
<b v-text="time.toLocaleTimeString()"></b>
```

If you need to bind raw HTML instead you can use `v-html` instead of `v-text`:

```html
<div v-html="getRenderedMarkdown()"></div>
```

DataBinding in Vue

`v-text` and `v-html` binding are **content** bindings meaning they bind the content that are directly rendered into the HTML between the brackets.

For binding element attributes you use `v-bind:attribute`. For example to bind the title attribute in the header you might use:

```html
<h1 v-bind:title="appName + ' ' + time.toLocaleTimeString()">{{appName}}</h1>
```

An alternate slightly simpler syntax is:

```html
<h1 :title="appName + ' ' + time.toLocaleTimeString()">{{appName}}</h1>
```

The `:` is a shortcut for `vbind:`. Although shorter I often find `v-bind` more descriptive.

Now when you hover over the document title you should see the title in a tool tip and the tool tip text will change every second to reflect the time as well.

The expression above brings up an important point:

> Vue 'expressions' are **raw JavaScript** and you can pretty much use any valid JavaScript expression inside of a `v-bind` directive or a `{{ }}` expression. Unlike other frameworks that use pseudo JavaScript that uses special parsing, in Vue you can simply use raw JavaScript for native functions or your own code as long as you can reference it through your model.

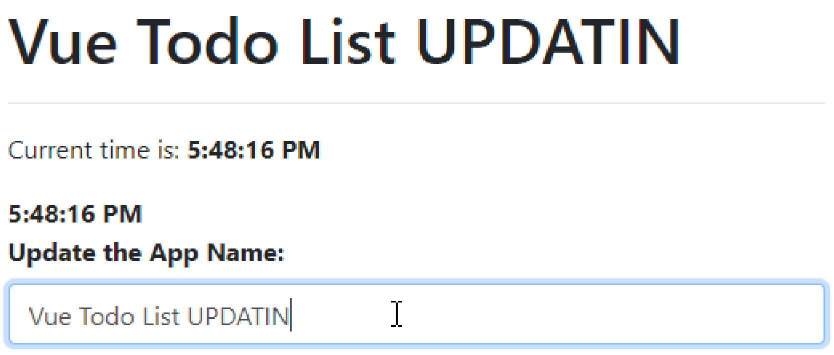
Editing Data

Displaying data is nice, but you also need to update data in your model from input created in the user interface. Vue supports two-way databinding via the `v-model` directive which allows you to bind a model value to a control in much the same way as `v-bind` does, but also supports **binding back** to the data source. You can use `v-model` with any of the HTML input elements.

Here's what this looks like:

```html
<p>
    <label for="">Update the App Name: </label>

    <input type="text"
           class="form-control"
           v-model="appName"
           />
</p>
```

Notice the `v-model="appName"` attribute which binds the app name to the input box. When you now run this, you can type into the edit box and as you type you can immediately the title update:



Vue Todo List UPDATIN

Current time is: **5:48:16 PM**

5:48:16 PM
Update the App Name:

Vue Todo List UPDATIN

What's nice about this is that you can update your model values and immediately see the changes reflected without any sort of update mechanism. If you update a value that triggers changes to another value (like say you add an order item and recalculate a total) those new values are immediately updated.

This functionality makes it very easy to create very interactive applications.

Event Handling

Data binding on its own is powerful but it's not all that useful if you can't fire off actions as well. To do this you can bind DOM events to functions in your model.

Let's add a button to the page that allows resetting the value of the `appName` to its default value after it's been changed, or to an updated value if it hasn't.

```html
<button class="btn btn-primary mt-2"
         v-on:click="resetAppName()">
    <i class="fas fa-recycle" style="color: lightgreen"></i>
    Reset to Default
</button>
```

This hooks the `click` event of the button to an `resetAppName` function in the model:

```javascript
resetAppName: function() {
    if (vm.appName != defaultAppName)
        vm.appName = defaultAppName;
    else
        vm.appName = defaultAppName + " RESET";
}
```

When you click the button the above code fires and you have access to the current model. You can also pass parameters to the function from script, including in scope variables, which is an important and powerful feature we'll look at when look at list binding.

Computed bindings

Vue is also smart enough to do what are basically computed bindings, if you bind to a method in your model:

```javascript
var vm = {};
vm = {
  firstName: "Rick",
  lastName: "Strahl",
  fullName: ()=> vm.firstName + " " + vm.lastName
};
```

You can then embed can then print out the full name like this:

```html
<div>{{ fullName() }}</div>
```

What's nice is that because this is a model function that is bound into the HTML template, if you change `firstName` or `lastName` the name in the UI is still updated.

Conditional Binding

One important thing that UI needs to do is conditionally bind things based on a truthy state. For example, you might want to only and error message display if there's an error message to display.

To create a conditional binding you can use `v-if` which doesn't render an item, or `v-show` / `v-hide` which make the element hidden but still in the document.

I'll use `v-if` here to create the error box:

```javascript
<div class="alert alert-warning" v-if="errorMessage">
    <i class="fas fa-exclamation-triangle" style="color: firebrick"></i>
    {{errorMessage}}
</div>
...
<button class="btn btn-primary " v-on:click="setError()">
    Toggle Error
</button>
```

The idea is if `errorMessage` is empty it doesn't display. When you click the button the error message is toggled, simulating an error that is displayed and cleared.

Then in the model we need an `errorMessage` property and a the `setError()` method that sets the error message whenever the button is clicked:

```javascript
 errorMessage: "",
 setError: function() {
    if (!vm.errorMessage)
        vm.errorMessage = "An error occurred on " + new Date().toLocaleTimeString();
    else
        vm.errorMessage = "";
}
```

If you run and click the button the error message is displayed and hidden after each click. Conditional binding is very useful for toggle states and allows you to easily create multiple states using separate html blocks for on and off states. For example, for a login button you might display a link to the login form when the user is not logged, but display the user name and a link that goes to the user's profile instead.

List Binding

So let's step up a little bit from the basic stuff to something a little more data driven by creating the typical ToDo list app.

To make this a little more interesting I'll use EcmaScript 2015 with native module loading. All ever green browsers - Chrome, Edge, FireFox, Opera - etc now support EcmaScript 2015 so you start taking advantage of these newer browser features **without having to rely on complex build systems**. The module system is one of the nicest features of EcmaScript 2015 because it lets each module determine what dependencies it has without having to load them all into a startup HTML page in the right order.

Anyway, this allows breaking up code easily into multiple source files and reference any dependencies.

- TodoList-LocalData.html - base HTML page
- todoApp.js - entry point JavaScript file, that holds the Vue model
- todo.js - holds a todo item class

This is loaded into an HTML page like this:

```javascript
<script src="./todoApp.js" type="module"></script>
```

Then `todo.js` contains the an individual Todo item class definition which is then loaded by `todoApp.js` - I'm separating this out into a separate file because we'll want to reuse that same class later in another sample page.

```javascript
export class Todo {
    constructor(initial = {}) {
        this.id = null;
        this.title = "Todo";
        this.description = "";
        this.completed = false;
        this.entered = new Date();
        this.isEditing = false;

        if (initial)
            // this allows mapping an object passed for initial values
            Object.assign(this,initial);
    }


    static loadTodos(){
        var todos = [
            new Todo ({
                title: "Make SW Fox travel arrangements",
                description: "Compare fares and use travel site to book flights."
            }),
            new Todo( {
                title: "Prepare for SW Fox",
                description: "Work on Vue Demo and get it done"
            }),
            new Todo( {
                title:"Go windsurfing",
                description: "After work make time to go!"
            }),
            new Todo({
                title: "Drop Everything - It's Windy!",
                description: "It's nuking, let's get in the car and go!"
            })
        ];

        return todos;
    }
}
```

This is modern JavaScript so it looks a lot cleaner than classic JavaScript with classes. This class defines Todo Item class with properties for a title, description and completed status and a few others.

There's a static method call `loadTodos` which creates some dummy data and returns an array of of Todo items.

Note the module syntax. In order to use a items from **module** you have to export them. Here I'm exporting the class. You can have multiple exports in a single file. For example I can subclass Todo and export the subclass as well:

```javascript
export class Todo2 extends Todo {
    constructor(){
        this.notes = "";
    }
}
```

Next I create `todo.js` which imports the data

```javascript
import { Todo } from "./todo.js";
```

which gives me access to the exported class by referencing it. Note that the export here is a class, but it can be **any JavaScript** expression, value or type. Whatever you export you can use as an import. Here todo can be used with `new ToDo()` to create a new todo item.

Here's the code to create an initial View Model, and assign it to Vue:

```javascript
import { Todo } from "./todo.js";

const newTodoText = "*** New Todo";

// create the view model separately - more options this way
var vm = {
    appName: "Vue Todo List",
    todos: Todo.loadTodos(),  // [] array of todos
};


// initialize the model
var app = new Vue({
    el: '#todoApp',
    data: function() {
      return vm;
    }
});
```

The `TodosList-LocalData.html` then has a root element in the page to which Vue is bound.

Here's a really simplified binding setup for this:

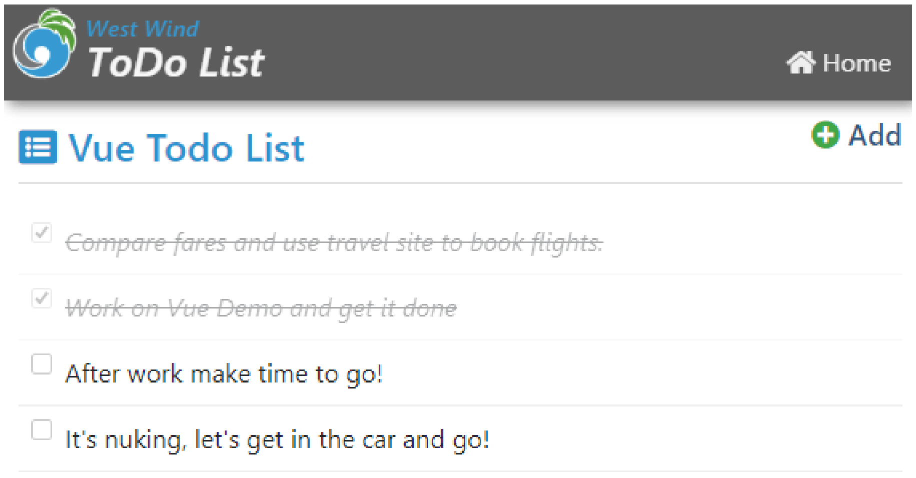
```html
<div id="todoApp">
    ... header stuff

    <div class="page-header-text">
        <i class="fa fa-list-alt"></i> {{ appName }}
    </div>

    ... other layout

    <div>
        <div class="todo-item"
            :class="{completed: todo.completed}"
            v-for="todo in todos" >

            <input type="checkbox"
                    class="float-left mr-2"
                    v-model="todo.completed"  />

            {{todo.description}}
        </div>
    </div>
</div>
```

This tiny bit of markup displays a checkbox to bind to each Todo's `completed` property and also the description. Here's what's pretty cool: Because `completed` is a checkbox and is bound using `v-model` (as we did earlier with the textbox), you can actually toggle the `completed` state on each todo item by clicking the checkbox!

By using a custom `completed` css style:

```css
.completed {
    text-decoration: line-through;
    font-style: italic;
    opacity: 0.4;
}
```

toggling strikes out the todo item and makes it transparent which makes it look disabled:


West Wind
ToDo List
Home

Vue Todo List

Add

- [x] ~~Compare fares and use travel site to book flights.~~
- [x] ~~Work on Vue Demo and get it done~~
- [ ] After work make time to go!
- [ ] It's nuking, let's get in the car and go!

Cool, right? Notice there's no code to manipulate the DOM, not even code to set the model, but instead toggling the checkbox, binds back to the model of an individual Todo item, which causes the state to change and the UI to re-rerender with the now updated styling.

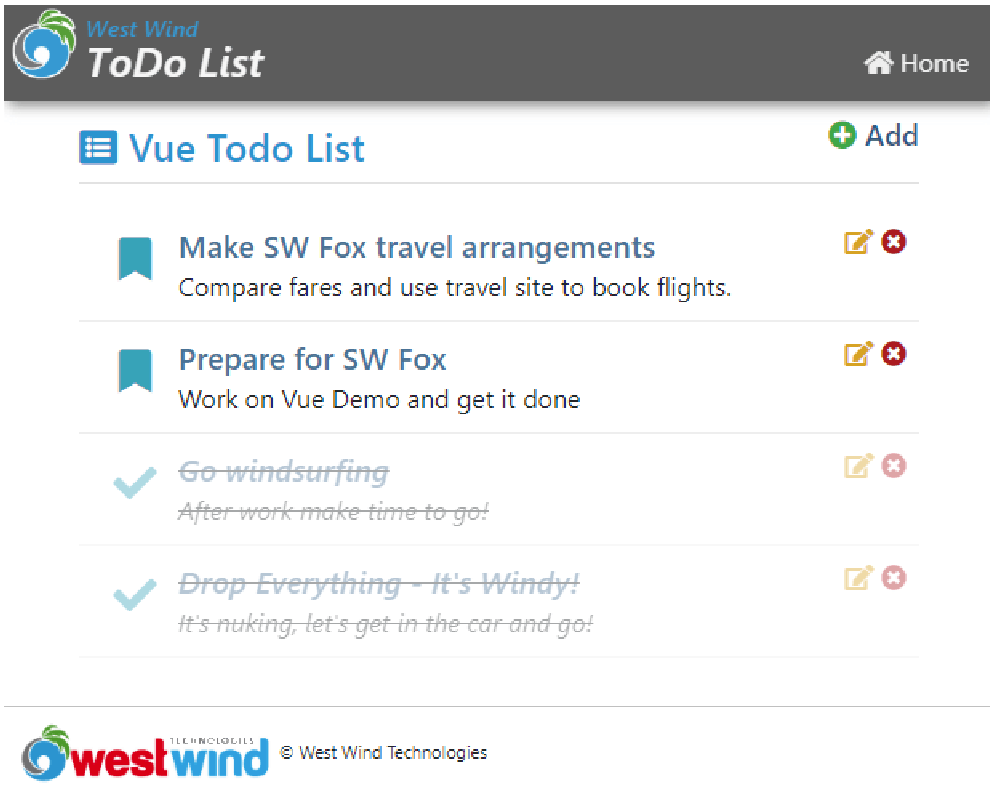
Cool - let's make this look a little nicer. I'm going to add some CSS that makes the list look nicer and adds a few nice touches we'll use later:

```css
.todo-item {
    padding: 8px;
    border-bottom: 1px solid #eee;
    transition: opacity 900ms ease-out;
}
.todo-header {
    font-weight: 600;
    font-size: 1.2em;
    color: #457196;
}
.todo-content {
    padding-left: 30px;
}
.todo-content .fa-check {
    color: green !important;
    font-weight: bold;
    font-size: 1.2em;
}
.completed {
    text-decoration: line-through;
    font-style: italic;
    opacity: 0.4;
}
.inline-editor {
    min-width: 200px;
    width: 50%;
    margin-bottom: 5px;
}

[v-cloak] { display: none; }
```

So let's put this to use and make the Todo items look nicer:

```javascript
<div class="todo-item"
     :class="{completed: todo.completed}"
     v-for="todo in todos" >


    <i class="fa fa-fw float-left text-info"
    style="margin: 10px 10px 20px; font-size: 1.7em"
    v-on:click="toggleCompleted(todo)"
    :class="{'fa-bookmark': !todo.completed,
             'fa-check': todo.completed,
             'text-successs': todo.completed
            }"
    ></i>

    <!-- action icons -->
    <div class="float-right">
    <i class="fa " :class="{
            'fa-edit': !todo.isEditing,
            'fa-check': todo.isEditing,
            'text-success': todo.isEditing
        }"
        @click="toggleEditMode(todo)"
        style="color: goldenrod; cursor: pointer"
        title="Edit Todo Item"
        v-show="!todo.isEditing || todo.title"></i>


    <i class="fa fa-times-circle"
        @click="removeTodo(todo)"
        style="color: firebrick; cursor: pointer"
        title="Remove Todo Item"></i>

    <!-- content -->
    <div class="todo-content">
        <div class="todo-header">
                {{todo.title}}
        </div>
        <div style="min-height: 25px;" >
            {{todo.description}}
        </div>
    </div>
</div>
```

which looks like this:


West Wind
ToDo List
Home
Vue Todo List
Add
Make SW Fox travel arrangements
Compare fares and use travel site to book flights.
Prepare for SW Fox
Work on Vue Demo and get it done
~~Go windsurfing~~
~~After work make time to go!~~
~~Drop Everything - It's Windy!~~
~~It's nuking, let's get in the car and go!~~
© West Wind Technologies

Let's break it down. The Check Toggle is now on the bookmark or check icon on which you can click. So rather than a checkbox, I use an icon as a toggle. To do this a `click` handler is used:

```html
<i class="fa fa-fw float-left text-info"
     :click="toggleCompleted(todo)"
     :class="{'fa-bookmark': !todo.completed,
              'fa-check': todo.completed
            }"></i>
```

I'm using the special `:class` binding to specify styles to display based on a 'truthy' expression. If completed show the check mark - otherwise show the bookmark. This is a powerful feature that makes styling based on state very easy.

Since there's no more checkbox, we have to fire some code to toggle the state. I could do this right inline like this:

```html
:click="toggleCompletd(todo)"
```

but generally a function is a better call as it's unlikely to be so simple. Inside of the `vm` I can now implement the method:

```javascript
toggleCompleted: (todo)=> {
    todo.completed = !todo.completed;
},
```

Notice that the method expects a `todo` item as a parameter. Also note the click handler passes a `todo` item. Vue is smart enough to figure out which item of the array needs to be passed to the function that is called! This makes it very easy to figure out which item needs to be acted upon!

Next, let's implement the Remove button.

```html
<i class="fa fa-times-circle"  v-on:click="removeTodo(todo)" />
```

Same idea - pass the todo to a function in the model:

```javascript
removeTodo: (todo)=> {
    vm.todos = vm.todos.filter((td) => td != todo);
},
```

This code uses the `Array.filter()` function to create a new array that filters out the existing item and assigns it the todo list.

When you now click on the remove button, the item disappears from the list.

Adding Inline Editing

So far, other than completing an item we haven't set up a way to edit the todo items. Let's hook up the edit button:

```html
<i class="fa "
   :class="{'fa-edit': !todo.isEditing,
         'fa-check': todo.isEditing,
         'text-success': todo.isEditing
    }"
    @click="toggleEditMode(todo)"
    title="Edit Todo Item"
    v-show="!todo.isEditing || todo.title"></i>
```

So what this attempts to do is toggle the edit mode on a todo item. The UI class has a `todo.isEditing flag` which is toggled by the function on the model:

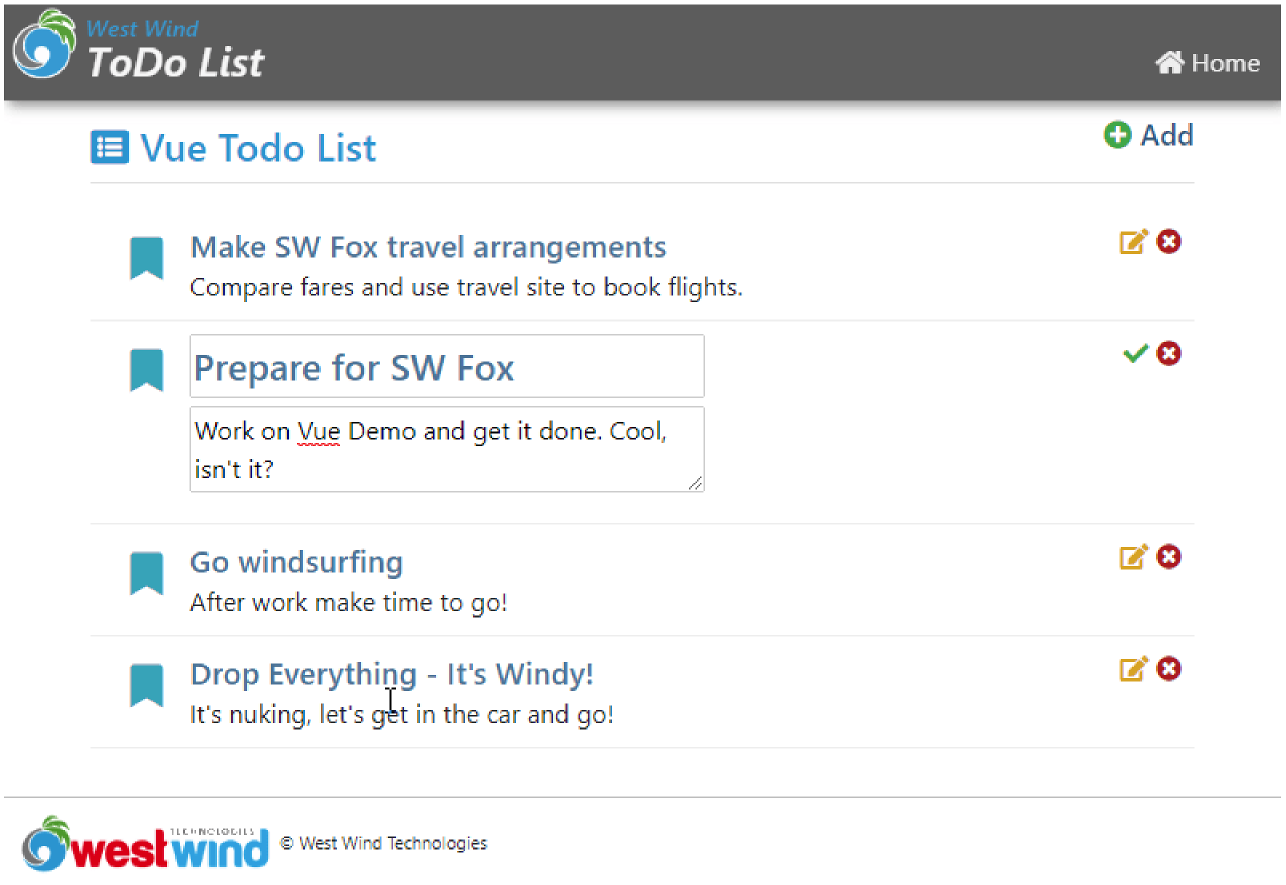
```javascript
toggleEditMode: (todo)=>{
    todo.isEditing = !todo.isEditing;
},
```

To add editing I'm changing the code a little like this:

```html
<!-- content -->
<div class="todo-content">

    <div class="todo-header">
        <div v-if="!todo.isEditing" >
            {{todo.title}}
        </div>
        <div v-else>
            <input type="text"  ref="todoTitle"
            v-model="todo.title"
            class="todo-header inline-editor" />
        </div>
    </div>
    <div v-if="!todo.isEditing" style="min-height: 25px;" >
        {{todo.description}}
    </div>
    <div v-else>
        <textarea v-model="todo.description"
                class="inline-editor"></textarea>
    </div>

</div>
```

Notice the `v-if` and `v-else` directives which conditionally display either the raw text, or an input field or textarea for editing the title and description.

Here's what editing an entry looks like:


West Wind
ToDo List
Home
Vue Todo List
Add
Make SW Fox travel arrangements
Compare fares and use travel site to book flights.
Prepare for SW Fox
Work on Vue Demo and get it done. Cool, isn't it?
Go windsurfing
After work make time to go!
Drop Everything - It's Windy!
It's nuking, let's get in the car and go!
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When done I can click on the check button to essentially toggle the todo's `isEditing=false` state. When I do the view toggles back to display mode and then updated value display.

Pretty cool, right? Without writing any DOM manipulation code we've just made changes to two input fields and update the UI with the new values.

So that works, but now let's take a look and load data from a server and FoxPro running a Web Connection application.

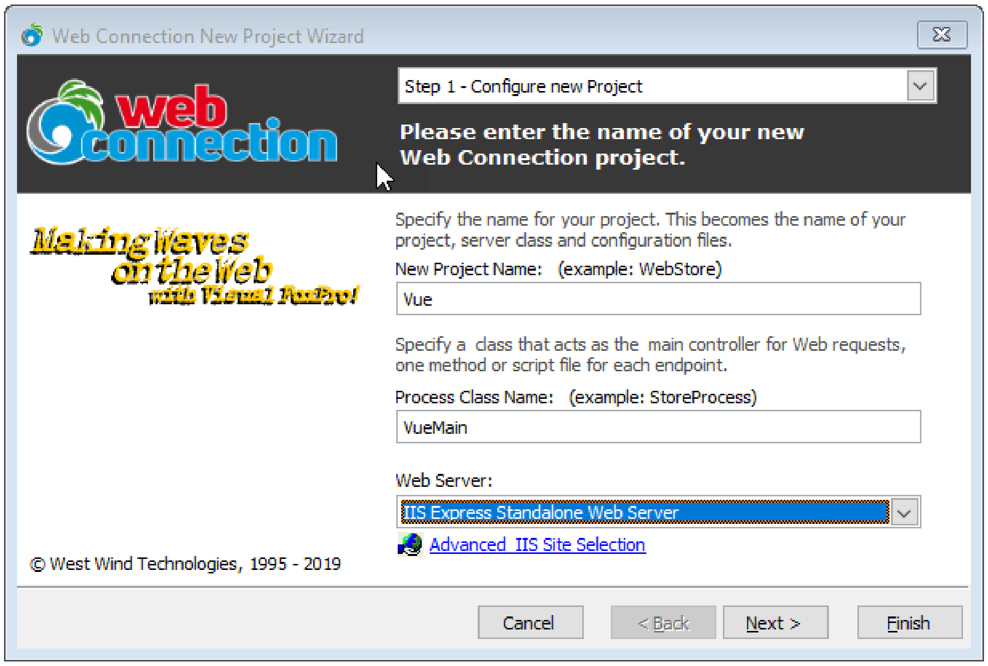
Adding Server Data

So far we've updated local data which means everytime the page reloads, the original data is restored as it's statically recreated. More realistically we'd want to load data from a server.

I'm going to use a **Web Connection Web Server** serving data using FoxPro.

The first step is to create a new project with Web Connection. I'm going to create:

- `Vue` project program and `VueProcess.prg` Process Class


Web Connection New Project Wizard

Step 1 - Configure new Project

Please enter the name of your new Web Connection project.

Specify the name for your project. This becomes the name of your project, server class and configuration files.

New Project Name: (example: WebStore)

Vue

Specify a class that acts as the main controller for Web requests, one method or script file for each endpoint.

Process Class Name: (example: StoreProcess)

VueMain

Web Server:

IIS Express Standalone Web Server

Advanced IIS Site Selection

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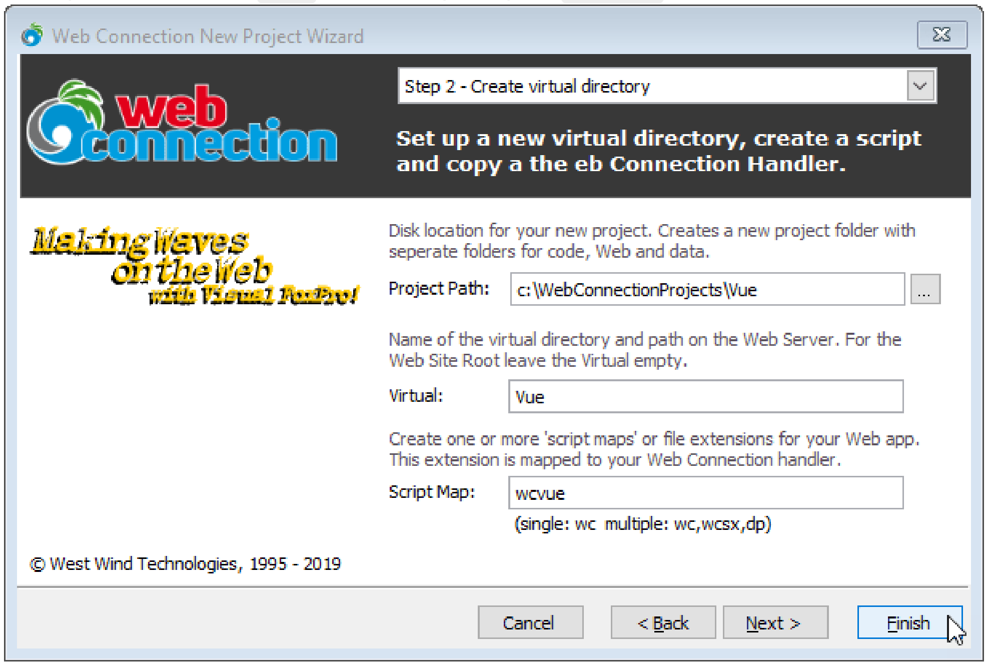
- Set up Virtual called `Vue` and a scriptmap of `.wcvue`


Web Connection New Project Wizard

Step 2 - Create virtual directory

Set up a new virtual directory, create a script and copy a the eb Connection Handler.

Disk location for your new project. Creates a new project folder with seperate folders for code, Web and data.

Project Path: c:\WebConnectionProjects\Vue

Name of the virtual directory and path on the Web Server. For the Web Site Root leave the Virtual empty.

Virtual: Vue

Create one or more 'script maps' or file extensions for your Web app. This extension is mapped to your Web Connection handler.

Script Map: wcvue

(single: wc multiple: wc,wcsx,dp)

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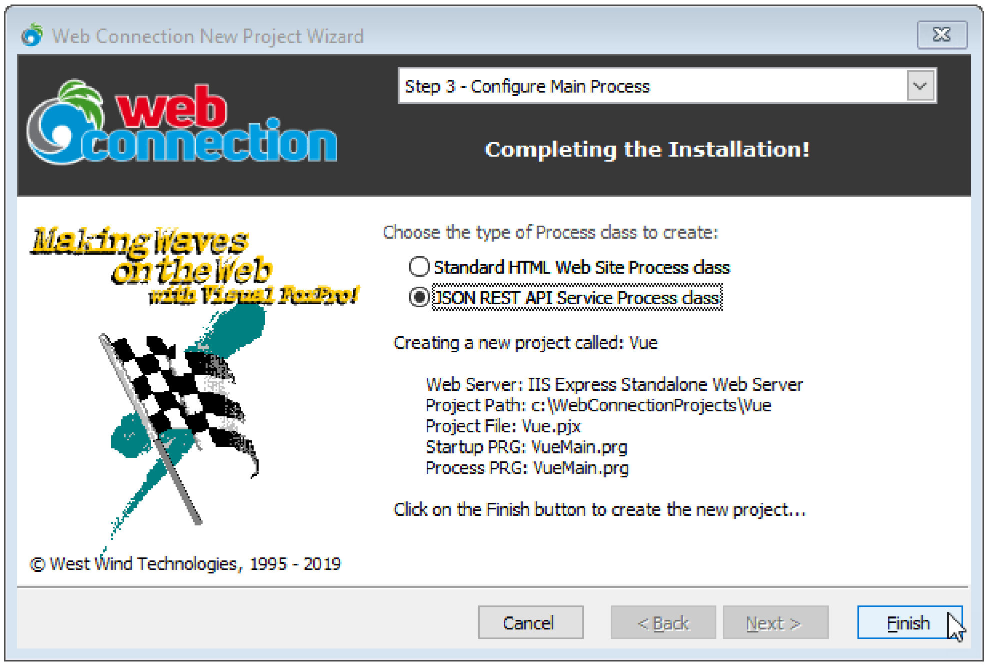
- Finally choose to create a REST Service


Web Connection New Project Wizard
Step 3 - Configure Main Process
Completing the Installation!
Making Waves on the Web with Visual FoxPro!
Cancel
< Back
Next >
Finish

Choose the type of Process class to create:

( ) Standard HTML Web Site Process class
(●) JSON REST API Service Process class

Creating a new project called: Vue

Web Server: IIS Express Standalone Web Server
Project Path: c:\WebConnectionProjects\Vue
Project File: Vue.pjx
Startup PRG: VueMain.prg
Process PRG: VueMain.prg

Click on the Finish button to create the new project...

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This will create a new Web Connection project that's ready to run. It'll open a command window in the project directory and you should be able to run:

```foxpro
launch()
```

to start the project and display a JSON status message.

Once that's working lets add some server side requests to serve todo items. Let's start with the list of todo items. Open `vueprocess.prg` and add:

```foxpro
FUNCTION ToDos()

IF !FILE(".\todos.dbf")
   ReloadData()
ENDIF

SELECT id, title, descript as Description, entered, completed, isEditing ;
     FROM TODOS ;
  ORDER BY entered DESC ;
  INTO CURSOR Tquery

Serializer.PropertyNameOverrides = "isEditing"

RETURN "cursor:TQuery"
ENDFUNC
*   Todos

FUNCTION ReloadData()

if (FILE("todos.dbf"))
   ERASE FILE Todos.dbf
endif

CREATE TABLE TODOS (id v(20), title v(100), descript M, entered T,completed L, isEditing L)

INSERT INTO TODOS VALUES ("1","Load up sailing gear","Load up the car, stock up on food.",;
                        DATETIME(),.f.,.f.)
INSERT INTO TODOS VALUES ("2","Get on the road out East","Get in the car and drive until
you find wind",;
                        DATETIME(),.f.,.f.)
INSERT INTO TODOS VALUES ("3","Wait for wind","Arrive on the scene only to find no wind",;
                        DATETIME(),.f.,.f.)
INSERT INTO TODOS VALUES ("4","Pray for wind","Still waiting!",;
                         DATETIME(),.F.,.F.)
INSERT INTO TODOS VALUES ("5","Sail!","Score by hitting surprise frontal band and hit it
big!",
                        DATETIME(),.F.,.f.)

RETURN .T.
ENDFUNC
* ReloadData
```

This code is simply created in a REST process class which turns each method into a REST endpoint. Any parameters passed are created from deserialized JSON, and you can also look at `Request.QueryString()` to retrieve query values from the URL.

The code then runs the logic to either create a new set of Todos, or returns an existing set. The set can be updated so it can be changed with the data from the client as we go through this demo.

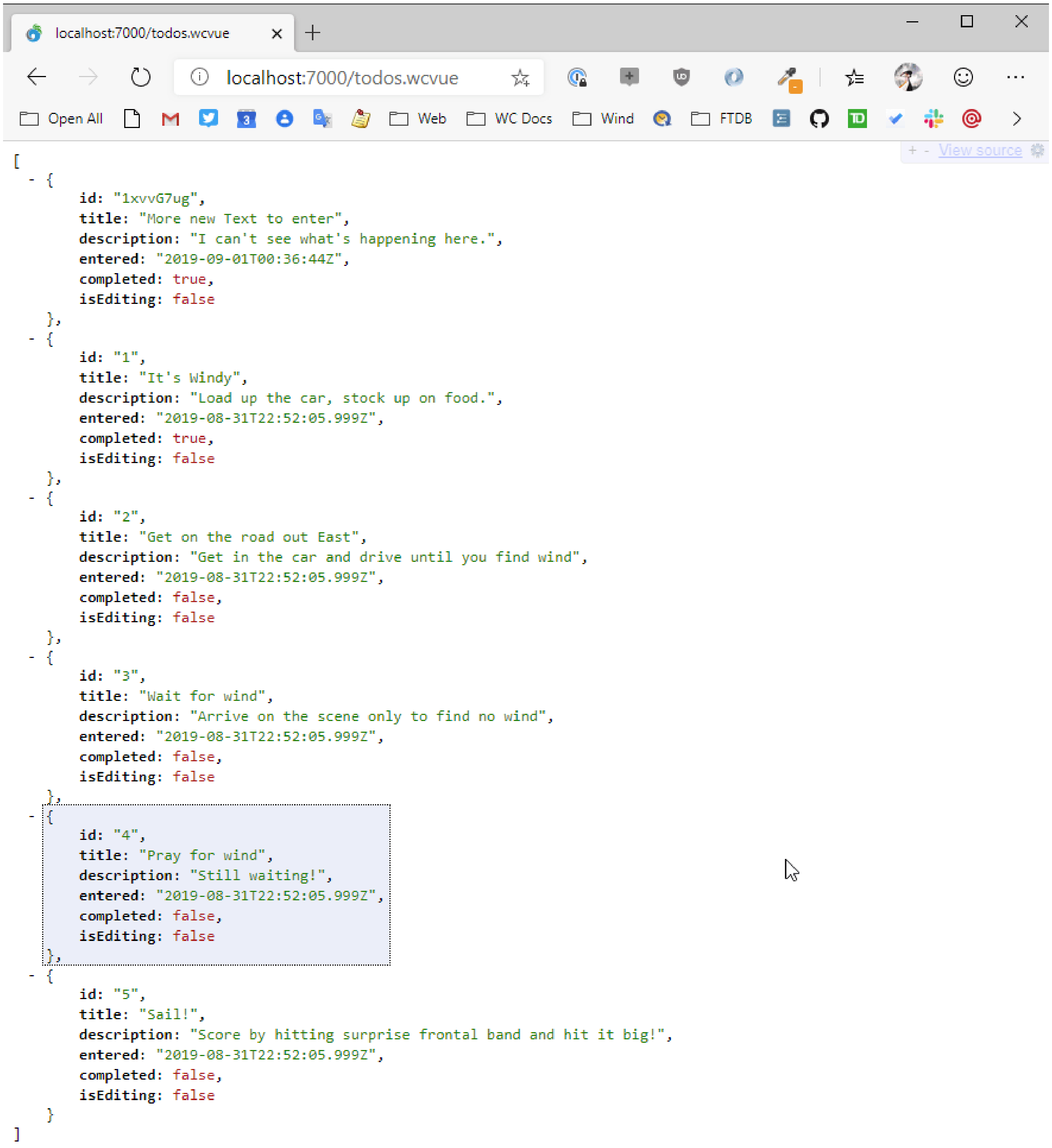
To test this you can navigate to (assuming IIS Express here):

```http
http://localhost:7000/Todos.wcvue
```

For IIS you can use:

```http
http://localhost/vue/Todos.wcvue
```

which gets you:



```
[
  - {
        id: "1xvvG7ug",
        title: "More new Text to enter",
        description: "I can't see what's happening here.",
        entered: "2019-09-01T00:36:44Z",
        completed: true,
        isEditing: false
    },
  - {
        id: "1",
        title: "It's Windy",
        description: "Load up the car, stock up on food.",
        entered: "2019-08-31T22:52:05.999Z",
        completed: true,
        isEditing: false
    },
  - {
        id: "2",
        title: "Get on the road out East",
        description: "Get in the car and drive until you find wind",
        entered: "2019-08-31T22:52:05.999Z",
        completed: false,
        isEditing: false
    },
  - {
        id: "3",
        title: "Wait for wind",
        description: "Arrive on the scene only to find no wind",
        entered: "2019-08-31T22:52:05.999Z",
        completed: false,
        isEditing: false
    },
  - {
        id: "4",
        title: "Pray for wind",
        description: "Still waiting!",
        entered: "2019-08-31T22:52:05.999Z",
        completed: false,
        isEditing: false
    },
  - {
        id: "5",
        title: "Sail!",
        description: "Score by hitting surprise frontal band and hit it big!",
        entered: "2019-08-31T22:52:05.999Z",
        completed: false,
        isEditing: false
    }
]
```

[4]

By default FoxPro serializes data using lower case because FoxPro can't properly determine case for database data in free tables (always upper case returned). You can overide by specifying any property name explicit like this:

```foxpro
Serializer.PropertyNameOverrides = "isEditing"
```

Generally you'll want to do this for any multi-part field names like `lastName`, `homePhone` etc.

Cool - so this works. Let's add a few more functions to handle the same operations we handled on the client todo example. `ToggleTodo()` first:

```foxpro
FUNCTION toggleTodo(loTodo)
LOCAL lcID

IF ISNULLOREMPTY(loTodo)
   ERROR "No Todo item passed."
ENDIF

lcId = loTodo.Id

SELECT * FROM TODOS ;
       WHERE id = lcId ;
       INTO CURSOR TTodo
   IF _Tally = 0
      ERROR "Invalid Todo to update."
   ENDIF

UPDATE Todos SET completed= loTodo.completed WHERE id = lcId

RETURN .T.
```

This is a POST request where the client is meant to post a full `Todo` record which is serialized as JSON, then deserialized and passed as a parameter to this function. The code then sets the value (that was already toggled on the client) and updates the database if the record exists based on the `id` of the record. Simple.

The `Todo()` handler is a little more complex because it handles:

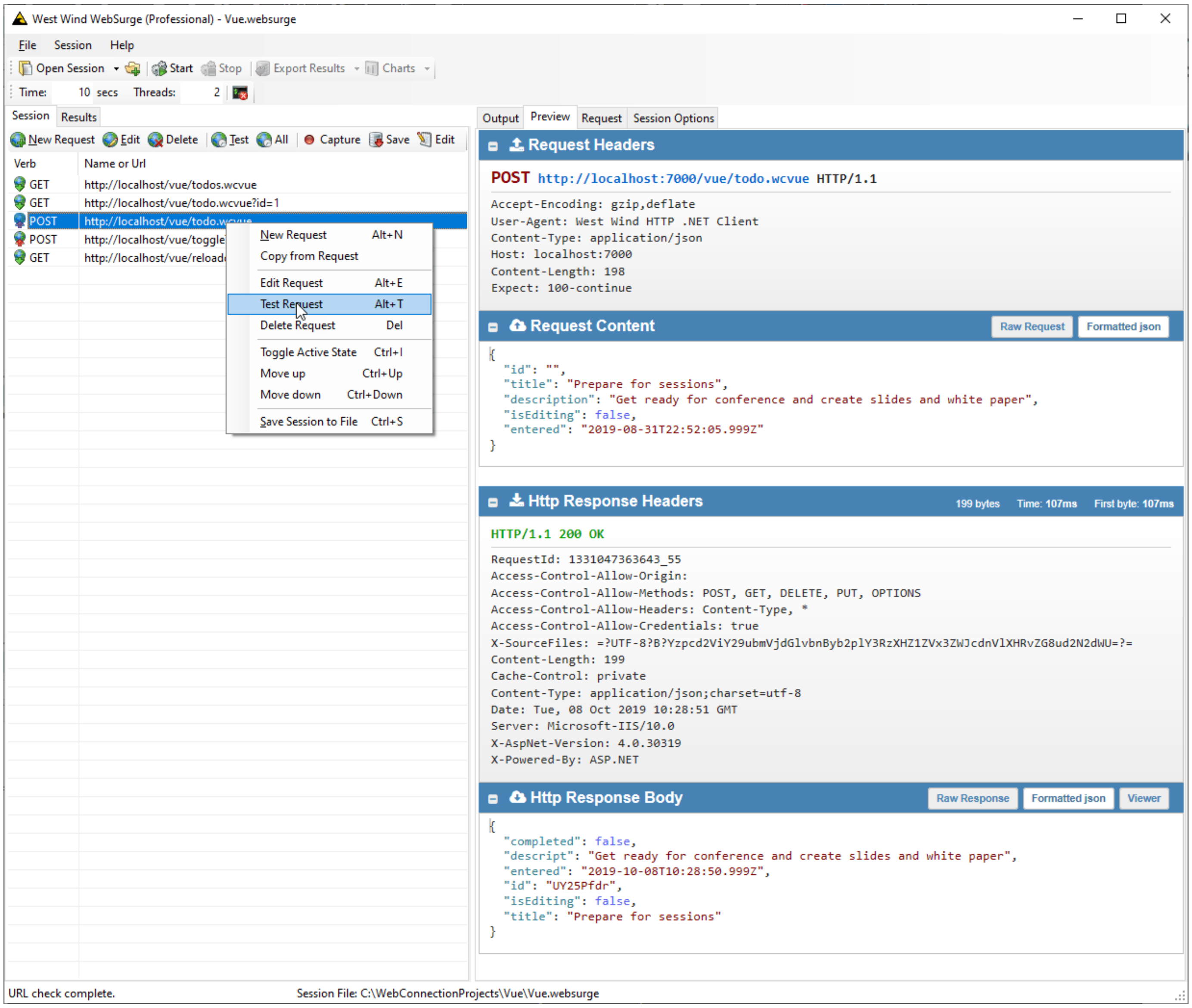
- retrieving Todo item by id
- updating a Todo item
- adding a new Todo item

The single method basically looks at the **HTTP Verb** to determine which action to take.

```foxpro
FUNCTION ToDo(loToDo)

IF !USED("ToDos")
   USE ToDos IN 0
ENDIF
SELECT ToDos

lcVerb = Request.GetHttpverb()

IF lcVerb = "GET"
   lcId = Request.Params("id")
   IF IsNullOrEmpty(lcId)
       ERROR "No Id provided to load a Todo item"
   ENDIF
   SELECT * FROM TODOS ;
       WHERE id = lcId ;
       INTO CURSOR TTodo
   IF _Tally = 0
      ERROR "No Id provided to load a Todo item"
   ENDIF

   SCATTER NAME loTodo MEMO
   RETURN loTodo
ENDIF

IF lcVerb = "PUT" OR lcVerb = "POST"
 IF VARTYPE(loTodo) # "O"
    ERROR "Invalid operation: No To Do Item passed."
 ENDIF

   loTodo.IsEditing = .F.

 llNew = .F.
    LOCATE FOR id == loToDo.id
    IF !FOUND()
  APPEND BLANK
  loTodo.id = GetUniqueId(8)
      loTodo.entered = DATETIME()
  llNew = .T.
 ENDIF
 GATHER NAME loTodo MEMO

 *** Fix for differing field name
 REPLACE descript WITH loTodo.description
 SCATTER NAME loTodo Memo
ENDIF

IF lcVerb = "DELETE"
   lcid =  Request.QueryString("id")
   LOCATE FOR id == lcId
   IF !FOUND() OR EMPTY(lcId)
      Response.Status = "404 Not found"
      ERROR "Invalid Todo - can't delete."
   ENDIF

   DELETE FOR id == lcId
   RETURN .t.
ENDIF

RETURN loTodo
```

To test this you can't easily use a browser except for the GET operation because you actually need to post data to the server.

You can use a tool like **PostMan** or as I like to use my own product **West Wind WebSurge** which is a load testing tool that can also be used for testing individual urls.


West Wind WebSurge (Professional) - Vue.websurge
File Session Help
Open Session Start Stop Export Results Charts
Time: 10 secs Threads: 2
Session Results
New Request Edit Delete Test All Capture Save Edit
Verb Name or Url
GET http://localhost/vue/todos.wcvue
GET http://localhost/vue/todo.wcvue?id=1
POST http://localhost/vue/todo.wcvue
POST http://localhost/vue/toggle
GET http://localhost/vue/reload
New Request Alt+N
Copy from Request
Edit Request Alt+E
Test Request Alt+T
Delete Request Del
Toggle Active State Ctrl+I
Move up Ctrl+Up
Move down Ctrl+Down
Save Session to File Ctrl+S
Output Preview Request Session Options
Request Headers
Request Content
Raw Request
Formatted json
Http Response Headers
199 bytes Time: 107ms First byte: 107ms
Http Response Body
Raw Response
Formatted json
Viewer
URL check complete.
Session File: C:\WebConnectionProjects\Vue\Vue.websurge

```
POST http://localhost:7000/vue/todo.wcvue HTTP/1.1

Accept-Encoding: gzip,deflate
User-Agent: West Wind HTTP .NET Client
Content-Type: application/json
Host: localhost:7000
Content-Length: 198
Expect: 100-continue
```

```
{
  "id": "",
  "title": "Prepare for sessions",
  "description": "Get ready for conference and create slides and white paper",
  "isEditing": false,
  "entered": "2019-08-31T22:52:05.999Z"
}
```

```
HTTP/1.1 200 OK

RequestId: 1331047363643_55
Access-Control-Allow-Origin:
Access-Control-Allow-Methods: POST, GET, DELETE, PUT, OPTIONS
Access-Control-Allow-Headers: Content-Type, *
Access-Control-Allow-Credentials: true
X-SourceFiles: =?UTF-8?B?Yzpcd2ViY29ubmVjdGlvbnByb2plY3RzXHZ1ZVx3ZWJcdnVlXHRvZG8ud2N2dWU=?=
Content-Length: 199
Cache-Control: private
Content-Type: application/json;charset=utf-8
Date: Tue, 08 Oct 2019 10:28:51 GMT
Server: Microsoft-IIS/10.0
X-AspNet-Version: 4.0.30319
X-Powered-By: ASP.NET
```

```
{
  "completed": false,
  "descript": "Get ready for conference and create slides and white paper",
  "entered": "2019-10-08T10:28:50.999Z",
  "id": "UY25Pfdr",
  "isEditing": false,
  "title": "Prepare for sessions"
}
```

Using a tool like this makes it very easy to debug your server side code without having to run a client side application to hit the server first.

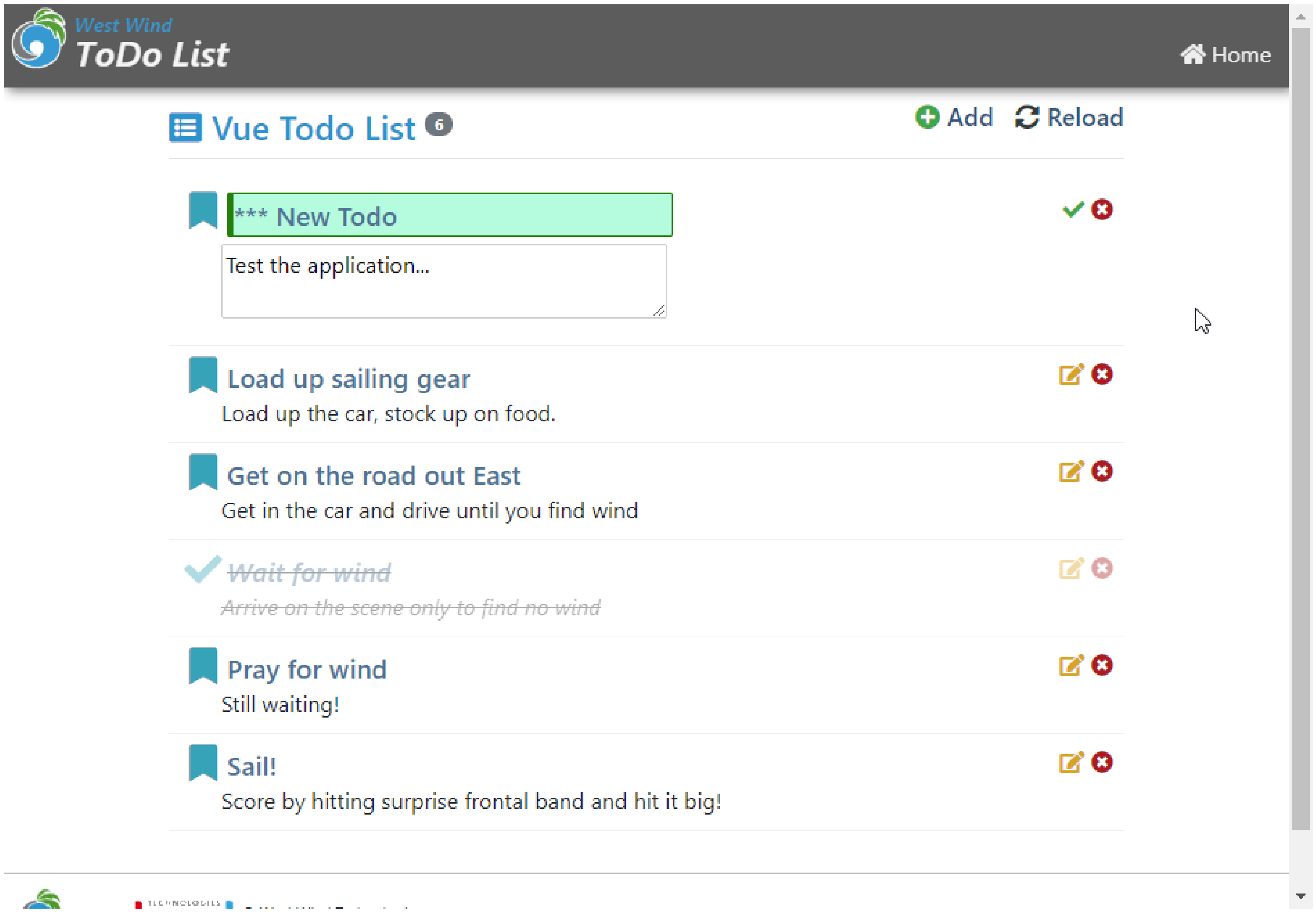
Ok we now have or server API - lets hook it up to the client.

Calling Server Side API Code from the JavaScript Client

The updated application will use the same styling and HTML template logic - all we're going to do is essentially change the View model to get data from the server.

Todo this I copied the original application and renamed the main HTML to `TodoList-RemoveData.html` and `todoAppRemoteData.js`.

Here's what the running application looks like:



*** New Todo
Test the application...

Load up sailing gear
Load up the car, stock up on food.

Get on the road out East
Get in the car and drive until you find wind

~~Wait for wind~~
~~Arrive on the scene only to find no wind~~

Pray for wind
Still waiting!

Sail!
Score by hitting surprise frontal band and hit it big!

The only things that change are the View Model code in `todoRemote.js` so lets jump there first.

```javascript
ar vm = {
    appName: "Vue Todo List",
    todos: [],
    errorMessage: "",

    loadTodos: ()=>{
        vm.errorMessage = null;
        vm.todos = null;
        return ajaxJson("todos.wcvue",null,
            (todos) => vm.todos = todos,
            (error)=> vm.setError(error));
    },
    ...
}
```

So now we're retrieving data from the server and I'm using a Web Connection helper called `ajaxJson()` (in `ww.jquery.js`) here to make the call to the server. You can use `$.ajax()` or `Axios` or the native browser.

`ajaxJson()` is called with a Url, an optional value that is posted to the server, and a pair of functions with a success result that receives the deserialized result data, and an error handler that receives an error object with a `.message` property.

Errors display a message using the `toastr` library which provides pop up messages on the bottom of the screen.

```javascript
setError: (error)=>{
    vm.errorMessage = error.message;
    toastr.error(error.message)
}
```

The `ajaxJson()` call is asynchronous, meaning it returns immediately, leaving the data blank initially. Once the data arrives from the FoxPro server, it is simply assigned to the `vm.todos` which populates the model.

Remember that Vue monitors properties for changes, and so initially it renders with no data and shows an empty list and then when the data arrives renders the list that was retrieved. On the local machine this happens so quick it might as well be instant. On a remote machine with a slow connection it might take a second or so.

Here's what toggling looks like:

```javascript
toggleCompleted: (todo)=> {
    vm.errorMessage = null;
    var newStatus = !todo.completed;
    ajaxJson("toggleTodo.wcvue",
            { id: todo.id, completed: newStatus },
            (status)=> todo.completed = newStatus;
            (error)=>  {
                todo.completed = !todo.completed;  // untoggle
                vm.setError(error);
            }
    );
},
```

The todo comes in and a new value is calculated. The todo status is not immediately changed however, because the call is asynchronous. So the ajax result call is what actually flips the completed value, so that the value is only updated if the call succeeds.

To remove a Todo works in a similar way:

```javascript
removeTodo: (todo)=> {
    ajaxJson("todo.wcvue?id=" + todo.id,null,
        ()=> {
            vm.todos = vm.todos.filter((td) => td != todo);
            toastr.success("Todo removed.");
        },
        vm.setError,
        { method: "DELETE" });

},
```

The call requests to remove the todo with the given id. If the ID is found it's removed on the server and the server returns `.t.`. Only once the call returns do we then filter the data and remove the Todo that has been requested to be removed.

Finally let's look at the `SaveTodo()` function which saves an updated Todo.

```javascript
saveTodo: (todo)=>{
    vm.errorMessage = null;
    ajaxJson("todo.wcvue",todo,
    (td) => {
        // update id from server
        todo.id = td.id;
        todo.completed = td.completed;
        todo.entered = td.entered;
        todo.isEditing = false;

        toastr.success("Todo updated.");
    },
    vm.setError);
},
```

The code passes in a Todo which is sent to the server to be saved. When the result comes back from the server we updated the relevant fields such as an id (for new entries) the server update time, and we explicitly flip the editing flag to `false`.

There are a few more requests but the idea is pretty much the same. As you can see to switch from the memory based Todo list to the server based list required only a little reworking of existing requests and didn't require any changes to the HTML UI - the only changes made were in the View model that's updating data.

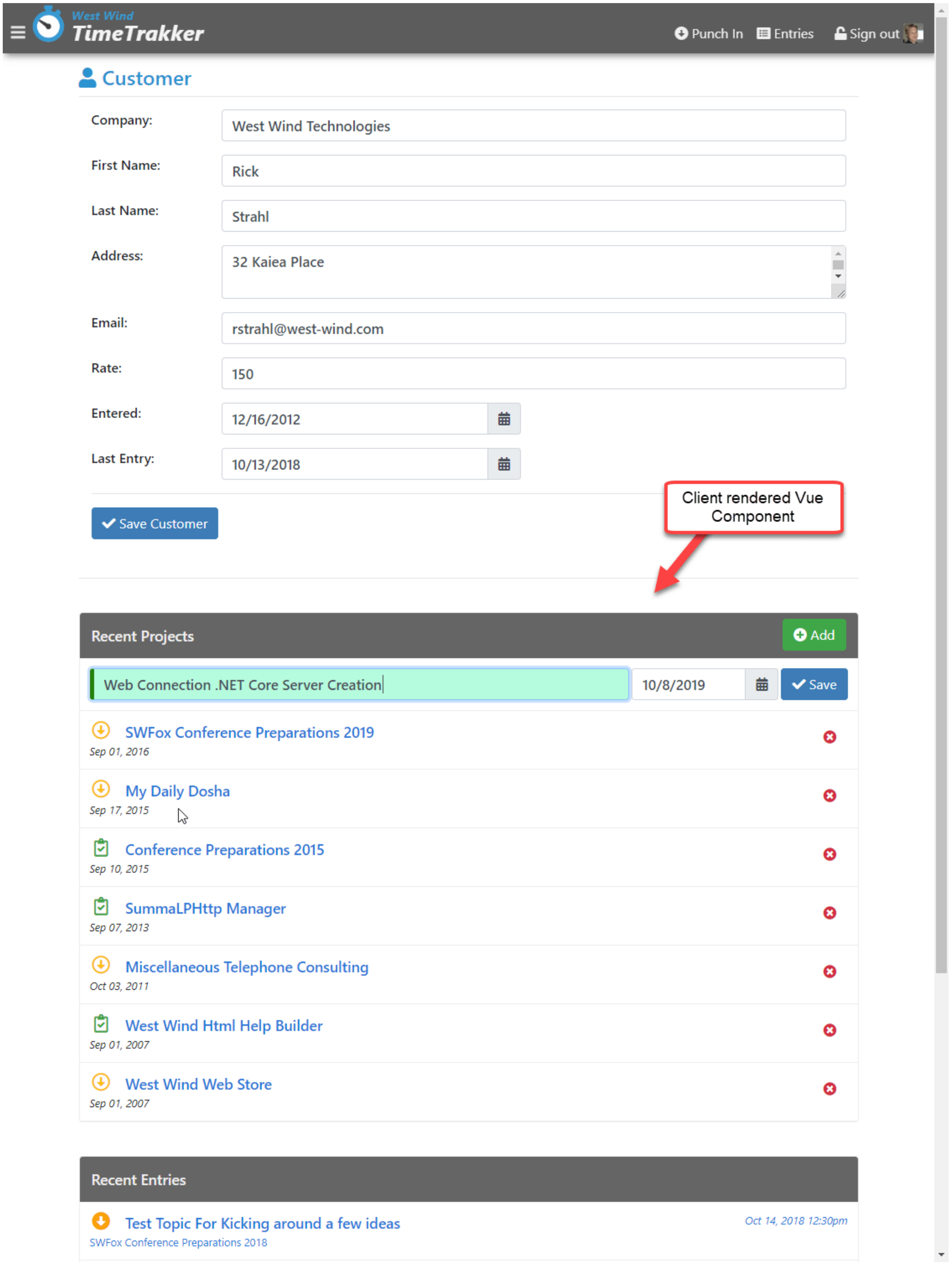
Hybrid Silo Application

So far I've shown what we could call a mini spa. A little self contained application which happened to run for the scope of the entire page. Vue supports adding components and components can be much smaller bits of code that can be combined to make up an application.

But you can also drop an interface like what I've shown here into a larger page as a ‘sub-application’. So imagine you have a larger human resource application running and the todo app is a small sidebar that runs 'on the side' of the larger page.

Vue makes that entirely possible by allowing you to pick a DOM element and take over processing from that DOM element down.

Here's an example in a server rendered Time Trakker application. There's a project list that can be edited and new projects can be added interactively. This is perfect use case for Vue as you can provide interactive editing of content while the rest of the server rendered application continues to be server rendered and behave as you'd expect it. It's essentially an embedded mini-spa application inside of a server rendered page. This one happens to be very simple, but it's quite feasible the that you can have very complex interactions in the sub app.



Customer

Company:	West Wind Technologies
First Name:	Rick
Last Name:	Strahl
Address:	32 Kaiea Place
Email:	rstrahl@west-wind.com
Rate:	150
Entered:	12/16/2012
Last Entry:	10/13/2018

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Let's take a look by starting with the HTML. I've removed the edit code for the moment, so this list is now basically just displaying data that is retrieved separately from the server page after the top part has loaded. In this way the page can lazy load recent project list.

```html
<div class="list" v-bind:class="{'hidden': !ready }">
    <div class="list-header">
        <button type="button" id="btnAdd"
                class="btn btn-success float-right" style="margin-top: -7px"
                v-on:click="addRowVisible = !addRowVisible">
            <i class="fa fa-plus-circle"></i>
            Add
        </button>
        Recent Projects
    </div>

    <div v-for="project in projects"
         class="list-item">
        <a v-on:click="removeProject(project)"
           class="float-right btn">
            <i class="fas fa-times-circle text-danger"></i>
        </a>
        <div class="list-item-header ">
            <i class="float-left fa-2x fa-fw far project-icon "
               v-bind:class="{
                'fa-clipboard-check': project.status == 1,'text-success': project.status ==
1,
                'fa-arrow-alt-circle-down': project.status ==0, 'text-warning':
project.status ==0   }"></i>
            <a v-bind:href="'project.ttk?id=' + project.pk">{{project.projname}}</a>
        </div>
        <div class="small font-italic">
            {{project.entered}}
        </div>
    </div>
</div>
```

This should all look pretty familiar by now. There are mustache bindings to the list fields and a bit of `:class` bindings to make sure the right icon is displayed. That bit is a little messy because it's inline but it's actually pretty straight forward.

The code to do this should also be familar:

```javascript
vm = {
    baseUrl: "./",
    projects: [],
    entries: [],

    newProject: createProject(),
    ready: false,
    addRowVisible: false,

    initialize: function () {
        vm.loadProjects();
    },
    loadProjects: function () {
        ajaxJson(vm.baseUrl + "projects.ttr", null,
            function (projects) {
                vm.projects = projects;
                // don't show projects until loaded
                vm.ready = true;
            }, function (error) {
                console.log(error);
            });
    },
    ...
}

var app = new Vue({
    el: "#CustomerPage",
    data: function () {
        return vm;
    }
});
```

The model has a `projects` property that is populated by an Ajax call. When the data arrives the table is made visible and the data shows.

The more interesting part here is adding and removing records. But again, the process is roughly the same as we saw with the todo list.

To add a new Project a single row is added to the list that provides the editing surface.

```
<div class="responsive-container">
    <input type="text" class="form-control" placeholder="New project name"
           v-model="newProject.projname"
           v-validate="'required|min:3'"
           name="ProjectName" id="ProjectName" />

    <div style="width: 250px;">
        <%= HtmlDateTextBox("StartDate","",[ placeholder="starts on" v-model="newProject.startdate"])
%>
    </div>

    <button type="button"
            class="btn btn-primary"
            @click="saveProject()"
            v-bind:disabled="errors.any() || !newProject.projname">
        <i class="fa fa-check"></i>
        Save
    </button>
</div>

<div class="text-danger" style="margin-top: 6px;" v-show="errors.any()">
    {{errors.first('ProjectName')}}
    {{errors.first('StartDate')}}
</div>
```

A new record is shown for editing when you click the Save button it's sent off to the server.

```javascript
saveProject: function () {

    ajaxJson(vm.baseUrl + "project.ttr", vm.newProject,
        function (project) {
            vm.projects.unshift(project);
            vm.newProject = createProject();
            vm.addRowVisible = false;

            toastr.success("New project added.");
        }, function (error) {
            toastr.error("Couldn't save project." + error.message)
        });
},
```

When the Ajax call returns the project from the server is added to the list of projects using `unshift()` which inserts an item at the beginning. Then there's some cleanup to remove the entered text and hide the add-row by way of an `v-if` flag.

This should give you an idea, what integration into another page looks like. The behavior inside of an existing page is not much different from the way we built the standalone Todo applet.

It's very common to have mini embedded sub-applets like this and Vue is well suited for this type of scenario because it can easily embed into a project.

Some Things to Watch out for

So I've been very positive about Vue and for good reason. It's easy to use, has many very throughtful features that save time, it's fast and lightweight and works with existing applications. Few tools can boast half the claims that Vue makes including many of the other big boy frameworks. Because it is easy to work with and flexible Vue has become very popular.

However there are also a few caveats that you have to watch out for. More and more Vue has been pushed into the realm of build processes, Web Pack and CLIs and while it works great there, that also has had an effect on the plain vanilla JavaScript hosting in that there is a lack of documentation for features using plain Javascript. Many examples assume you using the Vue CLI and a WebPack based module loading approach and transpilation plus `.vue` pages. While that's cool for full SPA applications it's overkill for the scenarios we've discussed here.

Another problem along the same lines is that many components are designed to be used with Vue pages. While supposedly most components should work just fine standalone and through CLI projects, I found many components next to impossible to use with plain ES2015+ JavaScript due to incompatible module loading. Essentially few components support ES2015+ module loading and expect WebPack to fix up all the JavaScript binding nonsense.

Using ES5 style global namespace loading via script is often the only way to get many components to work if at all.

In short, make sure you test any Vue components you might need before jumping in or making assumptions of what works.

Summary

Vue is no longer a new library, but it still has the feel of a breath of fresh air in the stodgy world of JavaScript frameworks that seem to pride themselves of making things ever more cryptic and complicated. Vue is wonderfully light weight and easy to integrate into existing applications.

It's an especially good fit for incrementally enhancing existing server side applications with JavaScript mini-spa or in page applets. I've been using this approach frequently in a number of applications with good results and i like the flexibility it affords by breaking up complex applications into smaller more manageable pages, rather than a massive SPA application.

Resources

- **Slides, White Paper and Samples**