Vue Router

Need A Router?

- Many applications do not need router features
- Signs a router is needed
  - want URL to change when different “pages” (or views) are rendered
    so they can be bookmarked and identified by search engines
  - need non-trivial routing logic
    including actions before or after route changes
    and conditionally enabling some route changes
  - need to provide data to new route components
  - have a large number of pages
- If needed, often only basic features are needed

Non-router Approach

- Store current route name in application state
  - such as in Vuex which is covered in next section
- Change route by modifying route name in state
- Test current route name using directives **`v-if`**, **`v-else-if`**, and **`v-else`** to select component to render
  - typically done in top component

```
<template>
  <div id="app">
    <About v-if="route === 'about'" />
    <Products v-else-if="route === 'products'" />
    <Home v-else />
  </div>
</template>

<script>
import {mapState} from 'vuex';
import store from './store';
import About from './components/About.vue';
import Home from './components/Home.vue';
import Products from './components/Products.vue';

export default {
  name: 'App',
  components: {About, Home, Products},
  computed: {
    ...mapState({
      route: state => state.route
    })
  },
  store
};
</script>
```

Vue Router Overview

- Most popular routing library for Vue
- Developed by and maintained by Vue team
- Maps URLs to components
- Supports navigation between “pages”
  using **`<router-link>`** elements
- Current route can also be changed from JavaScript code
- Current route is rendered in a **`<router-view>`** element
  - typically rendered by top-most component

Installing

- When creating a project with Vue CLI, select “Router” feature
  - will start with two configured routes named “**`home`**” and “**`about`**”
- When not using Vue CLI, install with
  `npm install vue-router`

Setup ...

- Route configuration is typically done in **`src/router.js`**
- When using Vue CLI and “Router” feature is selected, this file will be created
- When not created through Vue CLI, create this file manually
- Content should be similar to the following

```
import Vue from 'vue';
import Router from 'vue-router';
// Import app-specific view components here.

Vue.use(Router);

export default new Router({
  mode: 'history', // doesn't use "hash routing"
  base: process.env.BASE_URL, // defaults to /; usually not needed
  routes: [ // array of route definition objects
    {path: '/some-url', component: SomeComponent},
    // more route definition objects go here
  ]
});
```

more on this later

`path` is part of URL after domain

... Setup

- **`src/main.js`** should import **`Router`** object
  exported from **`router.js`**
  and configure Vue to use it as follows

```
import Vue from 'vue';
import App from './App.vue'; // top component
import router from './router';

new Vue({
  router, // tells Vue to use router
  render: h => h(App)
}).$mount('#app'); // "app" is id specified in public/index.html
```

"h" is short for "hyperscript", but is really the **`createElement`** function

Rendering Route Components

- Top component, typically defined in **`src/App.js`**, is common place to create links to routes
- If **`<a>`** tags are used, each click on them will result in a call to the server and loss of application state
- Using **`<router-link>`** elements instead avoids this and processes route changes entirely in browser
- Example

```
<template>
  <div id="app">
    <nav>
      <router-link to="/">Home</router-link>
      <router-link to="/page1">Page 1</router-link>
      <router-link to="/page2">Page 2</router-link>
    </nav>

   <router-view/>
  </div>
</template>
```

route components will render here

Directory Structure

- Some Vue apps place components associated with routes in `src/view` directory instead of `src/components`
- Not required

Route Data

- In route definition objects,
  `path` string values can contain colon-prefixed parts
  to allow data to be passed when route is changed
    - example: **`/fruit/:name`**
- In components rendered by a route change
    - **route parameters** are stored in **`this.$route.params`**
        - an object where keys are names after colons and values are their values
        - example path is **`/fruit/banana`**
    - **query parameters** are stored in **`this.$route.query`**
        - an object where keys are query parameter names and values are their values
        - example path is **`/fruit/banana?color=yellow&size=small`**
    - **hash value** is stored in **`this.$route.hash`**
        - a string that is the value including a leading **`#`**
        - example path is **`/fruit/banana#uncommon`**

Route to Same Component

- When navigating to a route that is same as current route, but with different route parameters
  - same component will be used
  - lifecycle methods for creating and mounting the component will not be called again
- A **`watch`** on **`$route`** property can be used to do things after a route parameter change
- Example

```
watch: {
  $route(to, from) {
    // Do things after route parameter change.
  }
}
```

Route Change From Code

- Component methods can change current route
  by calling **`this.$router.push(newRouteUrl)`**
  - pushes new URL on to history stack so
    browser back button can be used to return to previous URL
  - example ahead
- Alternatively call **`this.$router.replace(newRouteUrl)`**
  - replaces current URL at top of the history stack so
    browser back button will not return to previous URL

Wildcards

- To match any URL not matched by another route, use `*` for path
- `*` can also be used as a wildcard in any path part
- Matching string is held in `$route.params.pathMatch`

- Regular expressions can also be used in route paths

- It is possible for a URL to match more than one route path
  - when this happens, the first matching route path in the order defined is selected

Hash Routing

- Technique where URLs contain **`#`** character
- Changes in URL before hash are handled by server
- Changes after hash are handled in browser
- By setting router **`mode`** to **`history`** (as was done earlier) the same functionality is achieved without hash characters which results in better looking URLs
  - default mode is **`"hash"`** which uses hash routing
- Use of hash routing is not recommended

Router Example ...

main.js

```
import Vue from 'vue';
import App from './App.vue';
import router from './router';

Vue.config.productionTip = false;

new Vue({
  router,
  render: h => h(App)
}).$mount('#app');
```

prevents following message in devtools console on startup:
"You are running Vue in development mode.
Make sure to turn on production mode when deploying for production.
See more tips at https://vuejs.org/guide/deployment.html"

router.js

```
import Vue from 'vue';
import Router from 'vue-router';
import Fruit from './views/Fruit.vue';
import Home from './views/Home.vue';

Vue.use(Router);

export default new Router({
  mode: 'history',
  routes: [
    {path: '/fruit/:name', component: Fruit},
    {path: '*', component: Home}
  ]
});
```

Home.vue

```
<template>
  <div class="Home">
    This is the home page.
  </div>
</template>

<script>
export default {
  name: 'Home'
};
</script>
```

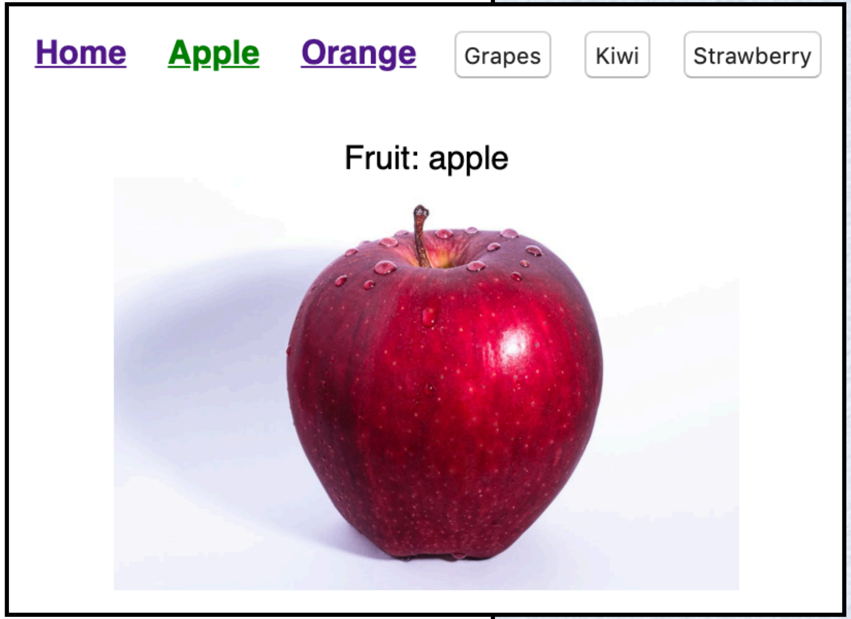
... Router Example ...

App.vue

```
<template>
  <div class="app">
    <nav>
      <router-link to="/">Home</router-link>
      <router-link to="/fruit/apple">Apple</router-link>
      <router-link to="/fruit/orange">Orange</router-link>
      <button @click="showFruit('grapes')">Grapes</button>
      <button @click="showFruit('kiwi')">Kiwi</button>
      <button @click="showFruit('strawberry')">Strawberry</button>
    </nav>
    <router-view />
  </div>
</template>

<script>
export default {
  methods: {
    showFruit(name) {
      // This demonstrates routing from code
      // instead of from a <router-link>.
      this.$router.push('/fruit/' + name);
    }
  }
};
</script>

<style scoped>
  ...
</style>
```



Fruit: apple

... Router Example ...

Fruit.vue

```
<template>
  <div>
    <div>Fruit: {{ name }}</div>
    <img :alt="name" :src="imageUrl">
  </div>
</template>

<script>
/* eslint-disable no-console */
export default {
  name: 'Fruit',
  computed: {
    imageUrl() {
      return `/images/${this.name}.jpeg`;
    },
    name() {
      return this.$route.params.name;
    }
  },
  beforeRouteUpdate(to, from, next) {
    const name = to.path.split('/')[2];
    if (name === 'kiwi') {
      alert('No kiwi please!');
    } else {
      next(); // allows navigation
    }
  },
```

Vue Router adds "in-component guards" including this, `beforeRouteEnter`, and `beforeRouteLeave`.

Fruit.vue

```
  watch: {
    // After route change ...
    $route(to, from) {
      console.log(
        'Fruit.vue watch $route: switched from',
        from.path,
        'to',
        to.path
      );
      const {name} = this.$route.params;
      console.log('Fruit.vue watch $route: name =', name);
    }
  }
};
</script>

<style scoped>
img {
  height: 200px;
}
</style>
```

Per Route Guards

- Can add `beforeEnter` method to component definition objects
- Takes `to`, `from`, and `next` parameters
  - `to` and `from` are `Route` objects that describe current and target routes
  - `next` is a function that must be called to allow navigating to route
  - if `next` is not called, navigation will not take place

Styling

- **`<a>`** element produced by **`<router-link>`** of active route is given CSS class name **`router-link-exact-active`**
- Can use to style current route link differently from others
- Example

```
<template>
  <div class="app">
    <nav>
      <router-link to="/">Home</router-link>
      <router-link to="/fruit/apple">Apple</router-link>
      <router-link to="/fruit/orange">Orange</router-link>
    </nav>
    <router-view />
  </div>
</template>

<script>
...
</script>

<style scoped>
nav a.router-link-exact-active {
  color: green;
}
</style>
```

Accessing Routes

- All components are injected with the properties `$router` and `$route`
- `this.$router` is a `Router` object
  - described on next slide
- `this.$route` is a `Route` object
  - described in two slides

Router Objects

- Properties
  - **app** - root Vue instance
  - **mode** - mode that router is using; supported values are:
    - **hash** - uses hash routing
    - **history** - uses HTML5 History API
    - **abstract** - useful for server-side rendering
  - **currentRoute** - current route
- Methods - “global navigation guards”
  - `beforeEach((to, from, next) => { ... })`
  - `beforeResolve((to, from, next) => { ... })`
    - "called right before the navigation is confirmed, after all in-component guards and async route components are resolved"
  - `afterEach((to, from) => { ... })`

to and **from** parameters are **Route** objects; **next** is a function that should be called to allow navigation to proceed

`Route` Objects

- Properties
  - **`path`** - absolute path URL
  - **`fullPath`** - like **`path`**, but includes query parameters and hash, if any
  - **`name`** - name of route if named
  - **`params`** - an object where keys are path parameter names and values are their values
  - **`query`** - an object where keys are query parameter names and values are their values
  - **`hash`** - part of **`fullPath`** that starts with and includes **`#`**
  - **`redirectedFrom`** - name of route redirected from, if any
  - **`matched`** - array containing descriptions of nested routes; advanced feature
- Methods
  - none

Named and Nested Routes

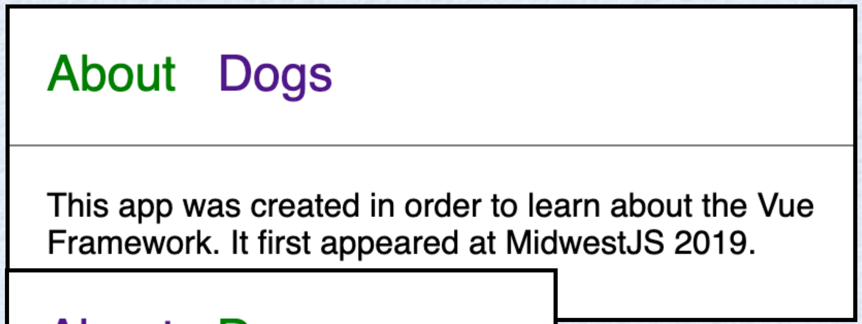
- Vue Router also supports
  - named routes
  - named views
  - nested named views
- These are advanced topics that most applications do not need

More

- For more detail on vue-router
  see https://router.vuejs.org/guide/

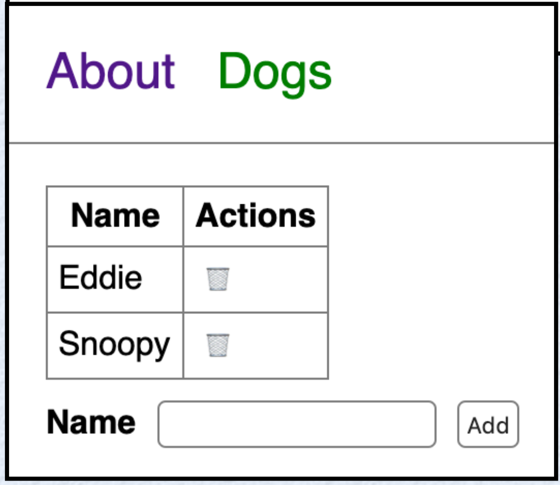
Exercise ...

- Add use of Vue Router in dog app ...
- **`npm install vue-router`**
- Create **`src/router.js`**
- Create **`src/components/About.vue`**



About Dogs

This app was created in order to learn about the Vue Framework. It first appeared at MidwestJS 2019.



About Dogs

Name	Actions
Eddie	🗑
Snoopy	🗑

Name [ ] Add

router.js

```
import Vue from 'vue';
import Router from 'vue-router';
import About from './components/About.vue';
import Dogs from './components/Dogs.vue';

Vue.use(Router);

export default new Router({
  mode: 'history', // doesn't use hash routing
  routes: [
    {path: '/about', component: About},
    {path: '/dogs', component: Dogs},
    {path: '*', redirect: '/about'}
  ]
});
```

About.vue

```
<template>
  <div>
    This app was created in order to
    learn about the Vue Framework.
    It first appeared at MidwestJS 2019.
  </div>
</template>

<script>
export default {
  name: 'About'
};
</script>
```

… Exercise …

- Modify **`main.js`**
  - `import router from './router';`
  - add `router` property in object passed to `new Vue()`

```
new Vue({
  router,
  render: h => h(App)
}).$mount('#app');
```

… Exercise

- Modify **`App.vue`**
  - replace **`<Dogs />`** in template with this

```
<nav>
  <router-link to="/about">About</router-link>
  <router-link to="/dogs">Dogs</router-link>
</nav>
<router-view />
```

  - remove this since components used are now specified in **`router.js`**

```
components: {
  Dogs
}
```

  - add this stying and verify that you understand it

```
#app > div {
  padding: 20px;
}

body {
  margin: 0;
}

nav {
  border-bottom: solid gray 1px;
  padding: 20px;
}

nav a {
  font-size: 24px;
  margin-right: 20px;
  text-decoration: none;
}

nav a.router-link-exact-active {
  color: green;
}
```