ArcGIS API for JavaScript

Using Frameworks

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slides: https://git.io/JvVtP

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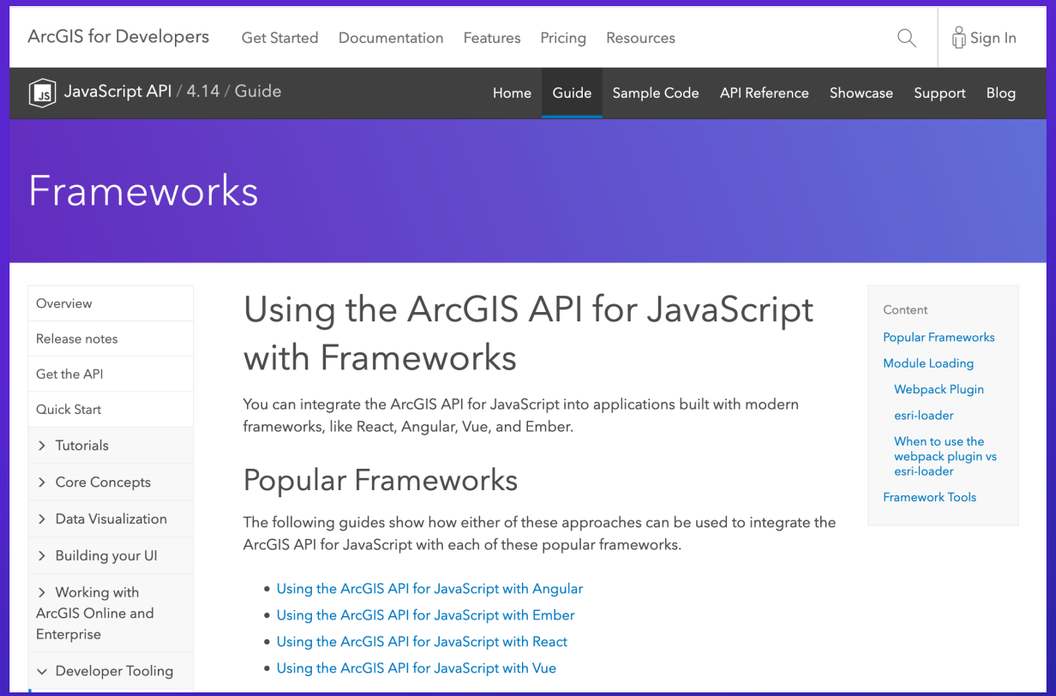
ArcGIS API Framework Guides



ArcGIS

ArcGIS

1. `Map`
    - `basemap`, `portalItem`, ...

ArcGIS

1. `Map`
   - `basemap`, `portalItem`, …
2. `View`
   - `map`
   - `container`
   - …

Framework

Framework

1. global state
    - router
    - store

Framework

1. global state
   - router
   - store
2. `render(<App>, '#root')`

```
<Layout>
  <Parent>
    <Child>
```

Component as bridge

Framework

```
<App />
 <Layout>
  <Parent>
```

ArcGIS

```
<MapComponent />
```

Component as bridge

Framework

```
<App />
 <Layout>
  <Parent>
```

-> state -> render -> DOM ->

```
<MapComponent />
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ArcGIS

Component as bridge

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<App />
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-> state -> render -> DOM ->

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ArcGIS

```
new Map()
new View()
```

Component as bridge

Framework

```
<App />
 <Layout>
  <Parent>
```

-> state -> render -> DOM ->

`<MapComponent />`

<- state <- callback <- handler <-

ArcGIS

```
new Map()
new View()
```

Component Lifecycle

3 important phases:

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1. after initial render

```
this.view = new View()
```

Component Lifecycle

3 important phases:

1. after initial render

   ```
   this.view = new View()
   ```

3. before destroy

   ```
   this.view.container = null
   ```

Component Lifecycle

3 important phases:

1. after initial render
   `this.view = new View()`
2. update
   `this.view.zoom = this.zoom`
3. before destroy
   `this.view.container = null`

Loading the ArcGIS API

Install with `npm` or `yarn`, then:

```
import Map from 'esri/Map';
import MapView from 'esri/views/MapView';
```

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right?

😎 @arcgis/webpack-plugin 👍

... but

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... but

Must be using webpack 😳

😎 @arcgis/webpack-plugin 👍

... but

Must be using webpack 🙄

ArcGIS API 4.7+ only

😎 @arcgis/webpack-plugin 👍

... but

Must be using webpack 😳

ArcGIS API 4.7+ only

Must be able to configure webpack

 ArcGIS API 3.x? 

 CLI blocks access to webpack config? 

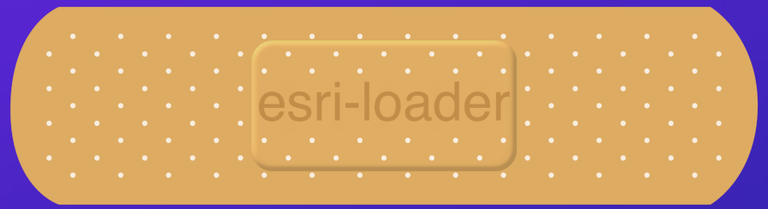
 Don't *want* to config webpack? 

ArcGIS API 3.x?

CLI blocks access to webpack config?

Don't *want* to config webpack?

No problem. Try esri-loader



Works with ArcGIS API 3.x

Works with ArcGIS API 3.x *and* 4.x

Works with *any* module loader

Works with *any* framework

Installing esri-loader

```
npm install --save esri-loader
```

Installing esri-loader

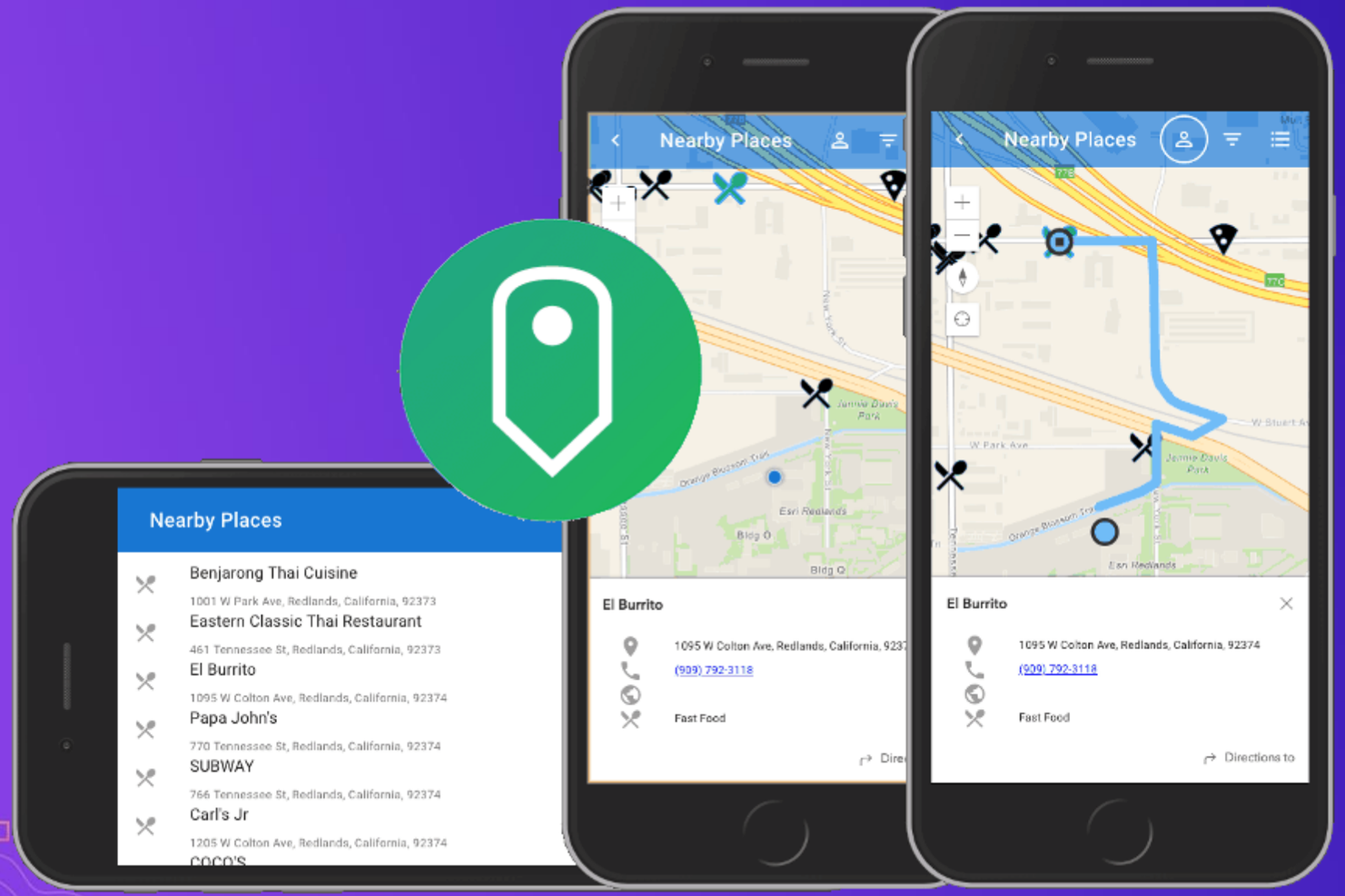
```
yarn add esri-loader
```

Using `loadModules()`

```
import { loadModules } from 'esri-loader';

loadModules([
  "esri/Map",
  "esri/views/MapView"
]).then(([Map, MapView]) => {
  // Code to create the map and view will go here
});
```

Lazy Loading the ArcGIS API



esri-loader

```
 // loads API 1st time
const esriConfig = await loadModules(["esri/config"])
esriConfig.useIdentity = false;
// don't worry, this won't load the API again!
const [Map, MapView] = await loadModules(
  ["esri/Map", "esri/views/MapView"]
);
```

Lazy loads the ArcGIS API by default

@arcgis/webpack-plugin

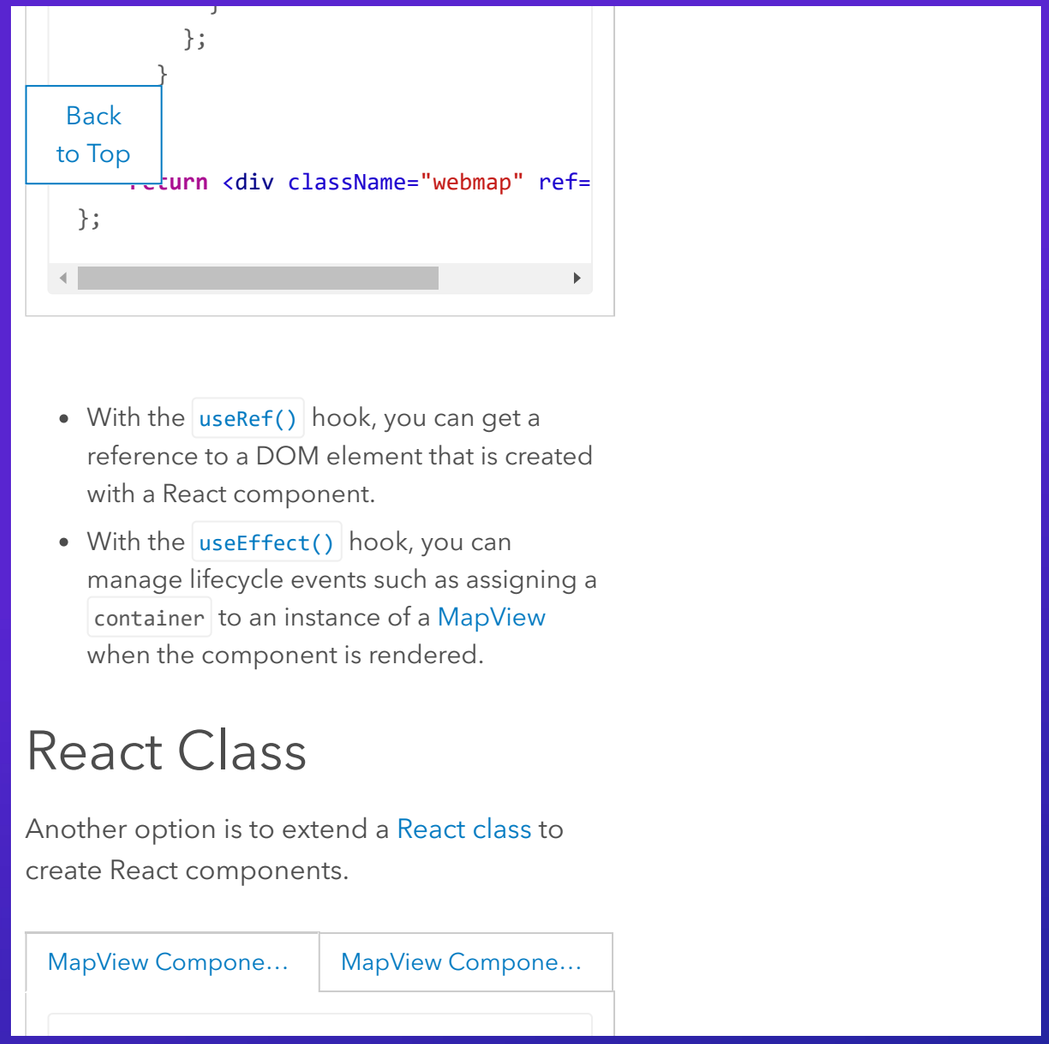
```
async function loadMap (element) => {
  const mapUtils = await import("../utils/map");
  mapUtils.loadMap(element);
};

  // then later inside the mounted/init...
  loadMap(element);
```

Use dynamic `import()`

React

```
ui = f(s)
```



Using the ArcGIS API for JavaScript with React

Use a ref for the container

```
constructor(props) {
  super(props);
  this.mapRef = React.createRef();
}

render() {
  return (
    <div className="webmap" ref={this.mapRef} />
  );
}
```

Create `Map` and `View` in `componentDidMount()`

```
componentDidMount() {
  const map = new ArcGISMap({
    basemap: 'topo-vector'
  });
  this.view = new MapView({
    container: this.mapRef.current,
    map: map,
    center: [-118, 34],
    zoom: 8
  });
}
```

Clean up in `componentWillUnmount()`

```
componentWillUnmount() {
  if (this.view) {
    // destroy the map view
    this.view.container = null;
  }
}
```

Function Components

```
const NameTag = (props) => { <p>{props.name}</p> }
```

Function Components

```
const NameTag = (props) => { <p>{props.name}</p> }

<NameTag name="Tom" />
```

Function Components

```
const NameTag = (props) => { <p>{props.name}</p> }

<NameTag name="Tom" />
```

- no state
- no way to create refs
- no access to lifecycle methods

React Hooks

@arcgis/webpack-plugin

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```
all --save @arcgis/webpack-plugin
```

esri-loader

```
npm install --save esri-loader
```

React Hooks

React is typically used to create UI components for an application. You can create a React component to display your map using React hooks.

MapView Compone… | MapView Compone…

```
import React, { useEffect, useRef } fro
import ArcGISMap from 'esri/Map';
```

esri-loader-hooks

```
import React from 'react';
import { useWebMap } from 'esri-loader-hooks';

function WebMap() {
  const [ref] = useWebMap('e691172598f04ea8881cd2a4adaa45ba');
  return <div style={{ height: 400 }} ref={ref} />;
}
```

Demo: esri-loader-hooks

Web Map | Web Scene | Map | Scene | Events | Graphics

```
const [ref] = useWebScene(id);
```

Vue

Can use the CLI

```
arcgis create geo-vue -t vue
```

Can use vue-cli

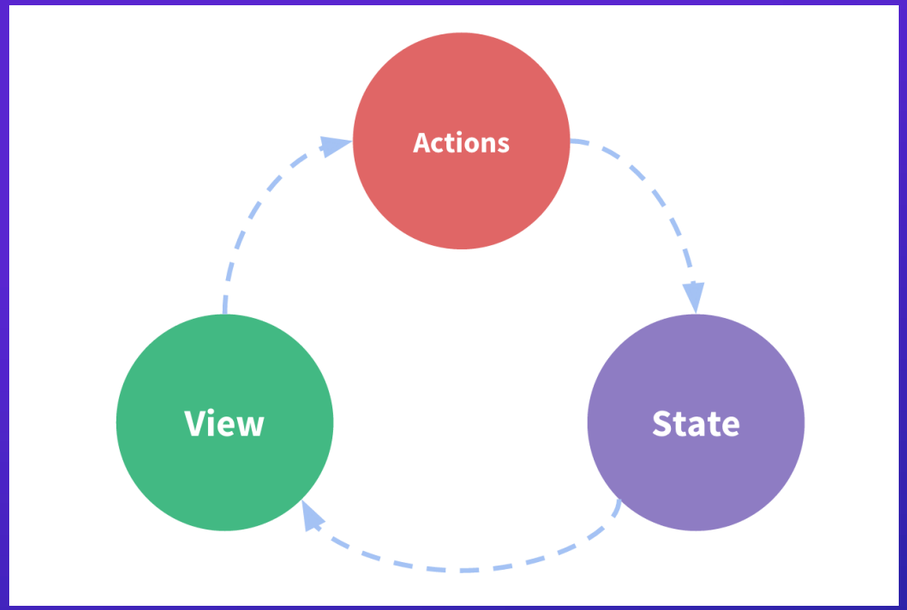
- Requires a little config
- Working user repo

Add a Map

```
export default {
    name: 'WebMap',
    async mounted() {
        // Load the API modules
        const { default: WebMap } = await import('esri/WebMap');
        const { default: MapView } = await import('esri/views/MapView');
        const view = new MapView({
          map: new WebMap({ ... }),
          container: this.$el
        });
    }
};
```

State Management

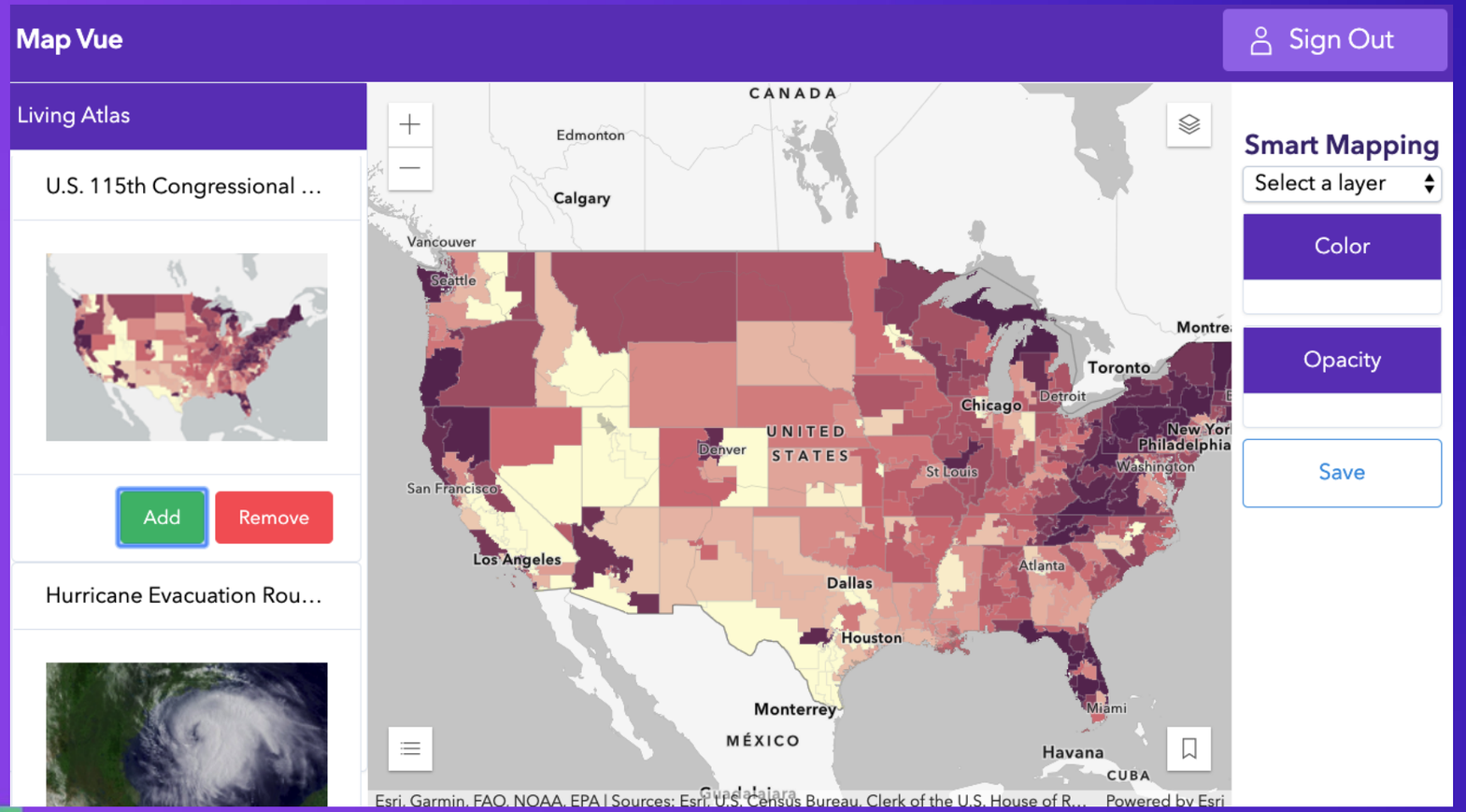
- Vuex



State Management

- XState

Vue Demo


Map Vue
Sign Out
Living Atlas
U.S. 115th Congressional …
Add
Remove
Hurricane Evacuation Rou…
Smart Mapping
Select a layer
Color
Opacity
Save
CANADA
Edmonton
Calgary
Vancouver
Seattle
Toronto
Chicago
Detroit
Denver
UNITED STATES
St Louis
Philadelphia
Washington
San Francisco
Los Angeles
Atlanta
Dallas
Houston
Monterrey
MÉXICO
Miami
Havana
CUBA
Esri, Garmin, FAO, NOAA, EPA | Sources: Esri, U.S. Census Bureau, Clerk of the U.S. House of R…
Powered by Esri

Angular

Angular

Angular helped put the 'E' in Enterprise JS frameworks

Very powerful...highly configurable

With great power comes great responsibility.

https://github.com/Esri/angular-cli-esri-map

Angular

esri-loader is easist approach.

Angular 8 and 9 work with @arcgis/webpack-plugin

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Configure webpack using builders

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Configure webpack using builders

angular-builders/custom-webpack

Angular with esri-loader

```
import { loadModules } from 'esri-loader';


ngOnInit() {

  loadModules([
    "esri/Map",
    "esri/views/MapView"
  ]).then(([Map, MapView]) => {
    // Code to create the map and view will go here
  });
}
```

Angular with @arcgis/webpack-plugin

@angular-devkit/build-angular

Customize build config without ejecting webpack

```
// angular.json - custom configuration

"build": {
  "builder": "@angular-builders/custom-webpack:browser",
  "options": {
    "customWebpackConfig": {
      "path": "./extra-webpack.config.js"
    },
  . . .

"serve": {
  "builder": "@angular-builders/custom-webpack:dev-server",
  "options": {
    "browserTarget": "angular-cli-esri-map:build"
  },
```

extra-webpack.config.js

```
const ArcGISPlugin = require('@arcgis/webpack-plugin');
/**
 * Configuration items defined here will be appended to the end of the existing webpack confi
*/
module.exports = {
  plugins: [new ArcGISPlugin()],
  node: {
    process: false,
    global: false,
    fs: "empty"
  },
  devtool: 'eval'
}
```

Angular with @arcgis/webpack-plugin

```
import Map from "esri/Map";
import MapView from "esri/views/MapView";

ngOnInit() {

  this._map = new Map({
    basemap: this._basemap
  });

  this._view = new MapView({
    container: this.mapViewEl.nativeElement,
    map: this._map
  });
}
```

Angular State Management

- Application state
- Component state
- Shared state
- Router state

Oh so many choices...!

- RxJS
- RxJS + Redux
- NgRx
- NGXS
- angular-redux
- ?

Example RxJS service

https://github.com/andygup/angular-plus-arcgis-javascript-ds2020

```
import { Injectable } from '@angular/core';
import {MapStore} from '../map-store.class';
import { Observable } from 'rxjs';

@Injectable({
  providedIn: 'root'
})
export class MapStateService extends MapStore<any[]> {

  getPoints(): Observable<__esri.Graphic[]> {
    return this.getState();
  }

  addPoint(point: __esri.Graphic) {
    const c = this.getValue();
```

Example service subscriber

https://github.com/andygup/angular-plus-arcgis-javascript-ds2020

```
ngOnInit() {
  // deactivate change detection component and children
  this.changeDetect.detach();
  this.points$ = this.msService.getPoints();
  this.list = this.points$.subscribe({
    next: x => {
      let finalValue: any[];
      if (x.length) {
        finalValue = x.map((val:any) => {
          return val.geometry.latitude + ", " + val.geometry.longitude;
        });
      }
      this.pMessage = finalValue;
      this.changeDetect.detectChanges();
    },
    error: err => console.error('error in subscriber', err),
```

Svelte

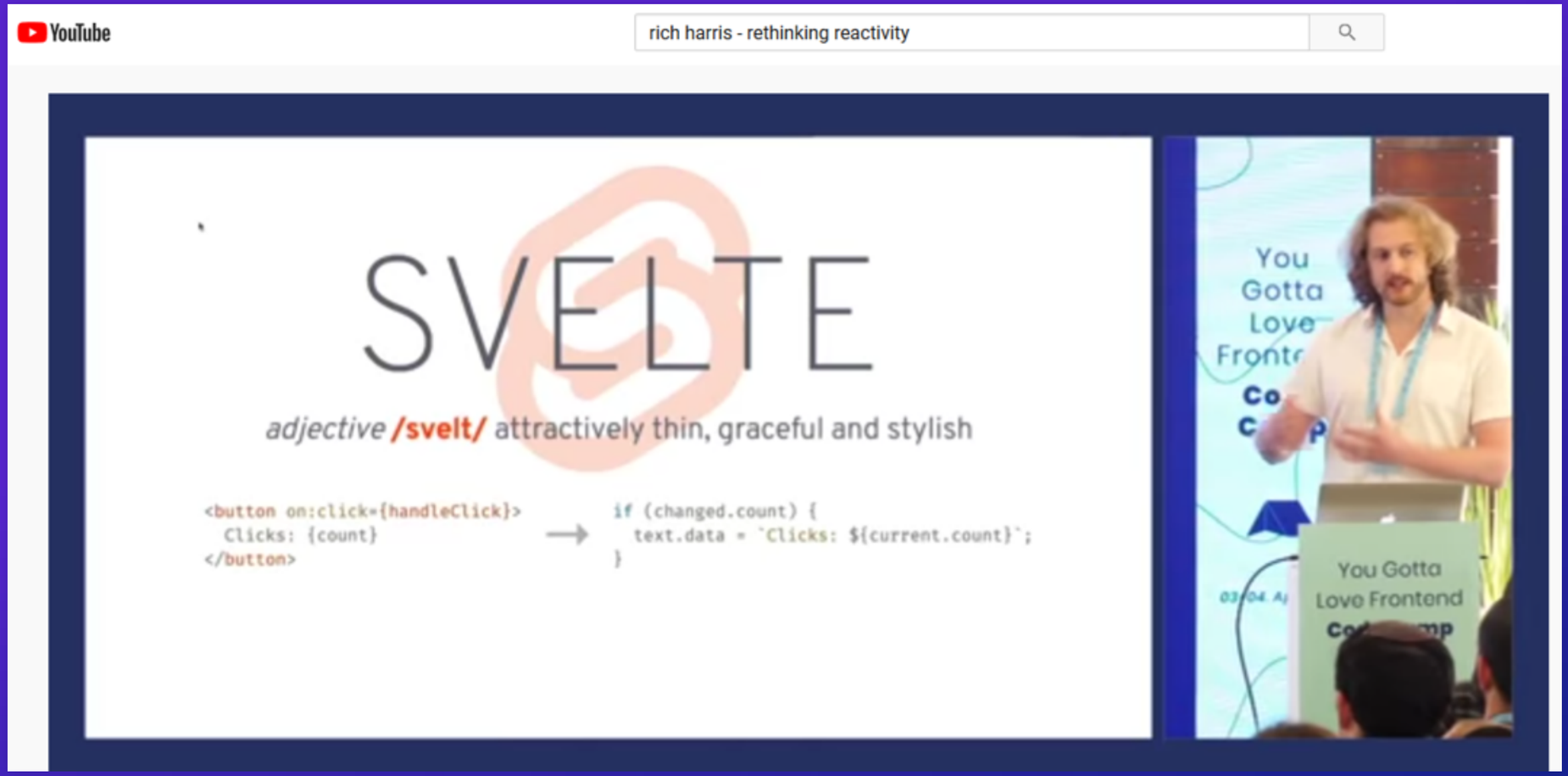
https://svelte.dev

What is Svelte?

- Component Framework
- Reactive (like React or Vue)
- No compiler! Svelte runs at build time

https://github.com/sveltejs/template/blob/master/package.json

Rich Harris – Rethinking Reactivity (YouTube)



Getting Started with Svelte

- Dynamic Attributes
- Nested Components
- Reactivity

ArcGIS API for JavaScript Maps in Svelte

- Use esri-loader:
  - Add it to rollup.config.js
  - Import and use as usual (see github.com/Esri/esri-loader)
- Example: github.com/gavinr/esri-svelte-example

Map in a Svelte Component

https://github.com/jwasilgeo/esri-svelte-basemaps-example

Bonus: Sapper!

Svelte

https://svelte.dev

Ember

https://emberjs.com/

```
module.exports = function(defaults) {

  p = new EmberApp(defaults, {
      {
      loader path can be a CDN path or
      loader: 'https://js.arcgis.com/4.12/
      // all AMD packages used in import st
      packages: ['esri']
    }
  });

  return app.toTree();
};
```

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See the ember-cli-amd documentation for more information on configuration options.

Create a Component

Create an Ember component that uses ArcGIS API for JavaScript modules using either `ember-cli-amd` or `ember-esri-loader`.

MapView Compone… | MapView Compone…

Using the ArcGIS API for JavaScript with Ember

ember-cli-amd

😎 `import Map from 'esri/Map'` 👍

🤠 works ArcGIS API 3.x! 🤠

... but

ember-cli-amd

😎 `import Map from 'esri/Map'` 👍

🤠 works ArcGIS API 3.x! 🤖

... but

📵 can **not** lazy-load the ArcGIS API ☹️

ember-esri-loader

📱 lazy-load the ArcGIS API 👍

Ember Octane

Element Modifiers

```
<div style="height: 400px;" {{did-insert this.loadMap}}></div>
```

Element Modifiers

```
<div style="height: 400px;" {{did-insert this.loadMap}}></div>
```

```
import Component from "@glimmer/component";
import { loadWebMap } from '../utils/map';

export default class EsriMap extends Component {
  loadMap(element) {
    loadWebMap(element, 'f2e9b762544945f390ca4ac3671cfa72');
  }
}
```

Custom Modifiers

```
<div style="height: 400px;" {{webmap @id}}></div>
```

Custom Modifiers

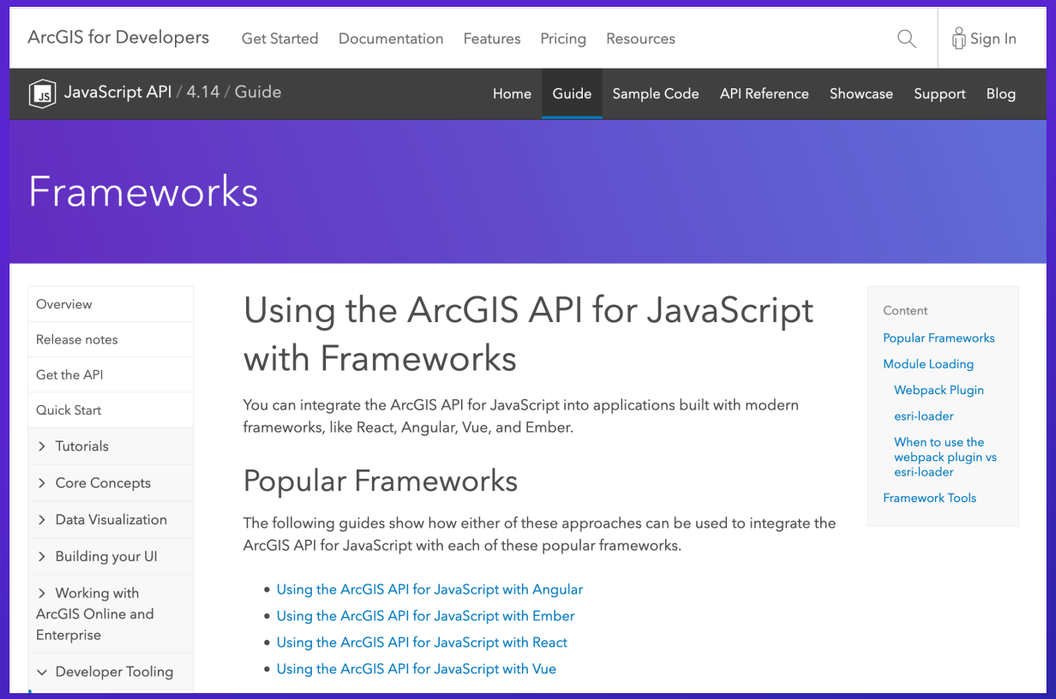
```
<div style="height: 400px;" {{webmap @id}}></div>
```

```
// app/modifiers/webmap.js
import { modifier } from 'ember-modifier';
import { loadWebMap } from '../utils/map';

export default modifier((element, [id]) => {
  const view = loadWebMap(element, id);
  return function cleanUp () {
    view && view.container = null;
  };
});
```

ArcGIS API & Frameworks

Loads of Online Resources



start here


esri
THE
SCIENCE
OF
WHERE