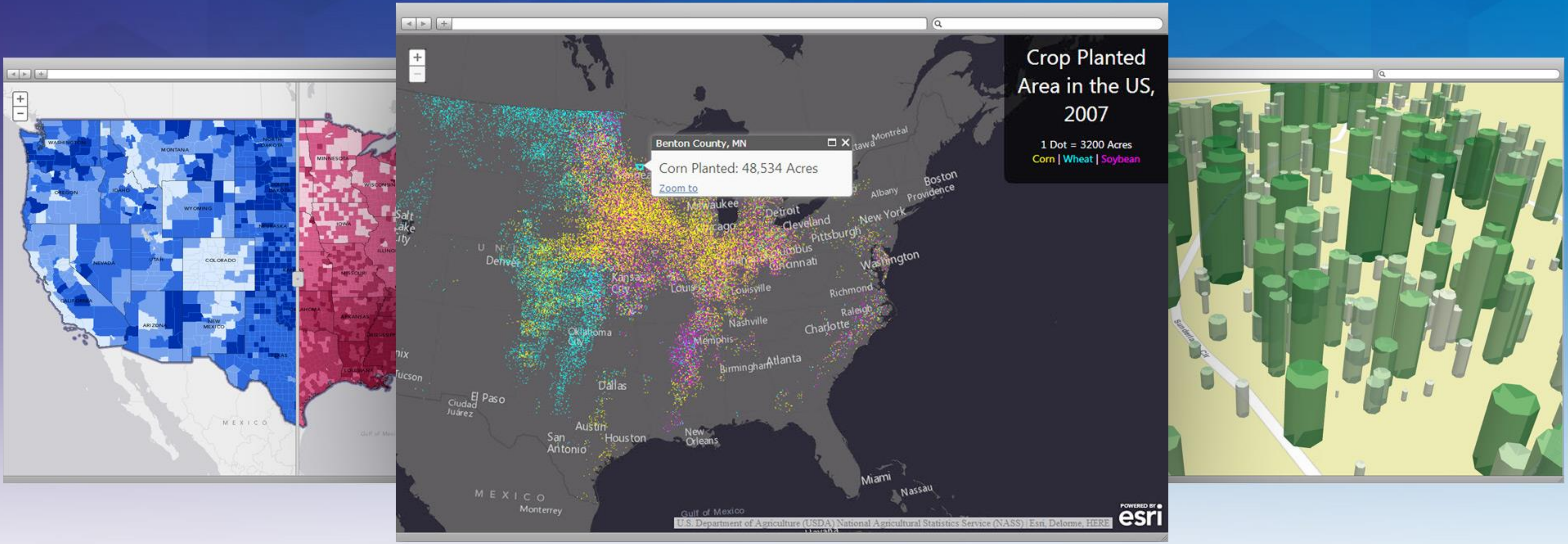
Developing Web Apps with the ArcGIS API for JavaScript

Julie Powell | European User Conference | October 2014

ArcGIS API

FOR JAVASCRIPT



Crop Planted Area in the US, 2007

1 Dot = 3200 Acres

Corn | Wheat | Soybean

Benton County, MN

Corn Planted: 48,534 Acres

Zoom to

U.S. Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) | Esri, Delorme, HERE

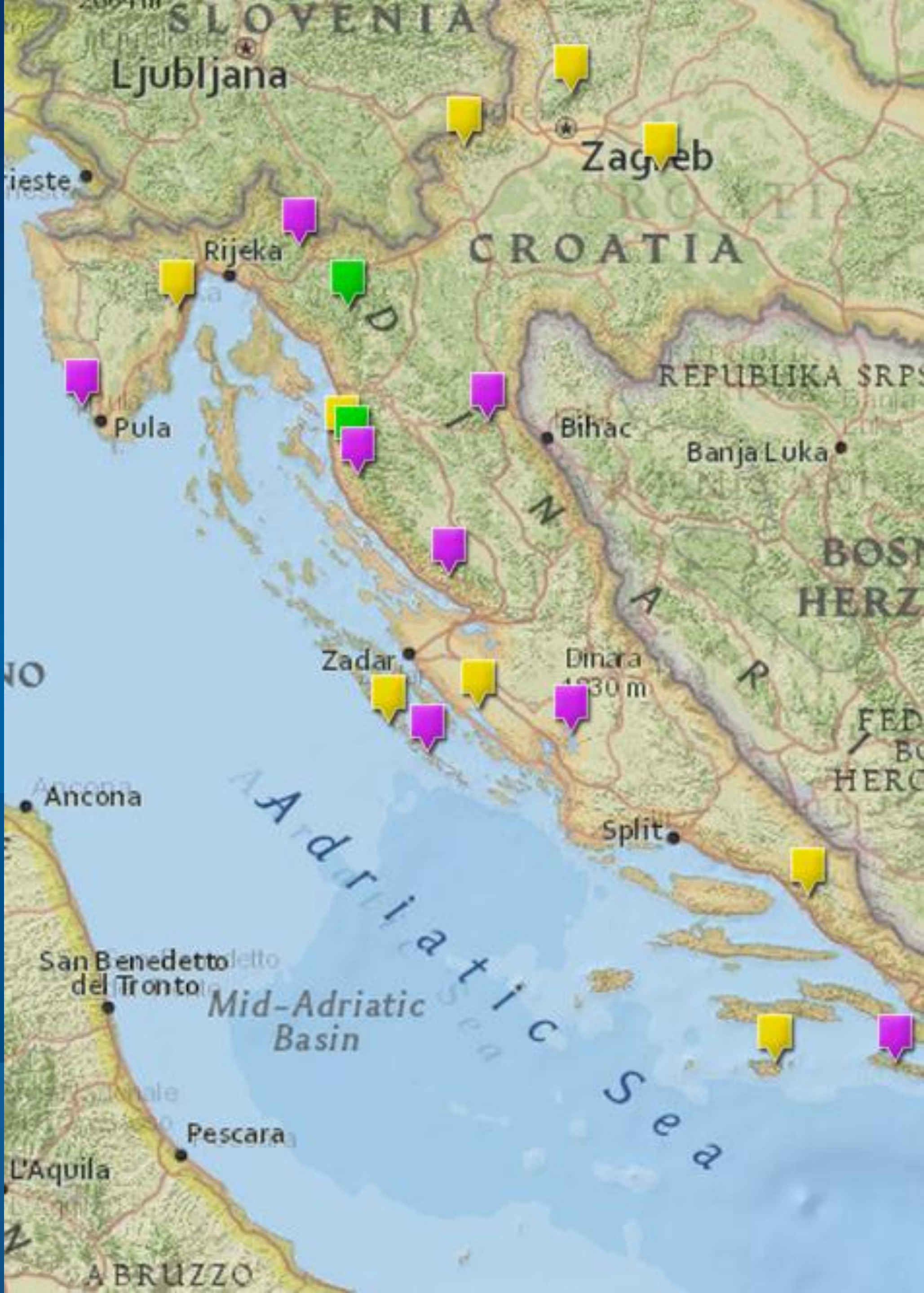
BUILD ONCE

USE EVERYWHERE

Developing with the JS API

- Adding data to your map
- Data visualization
- Build in capabilities
- Configurable apps
- Road ahead

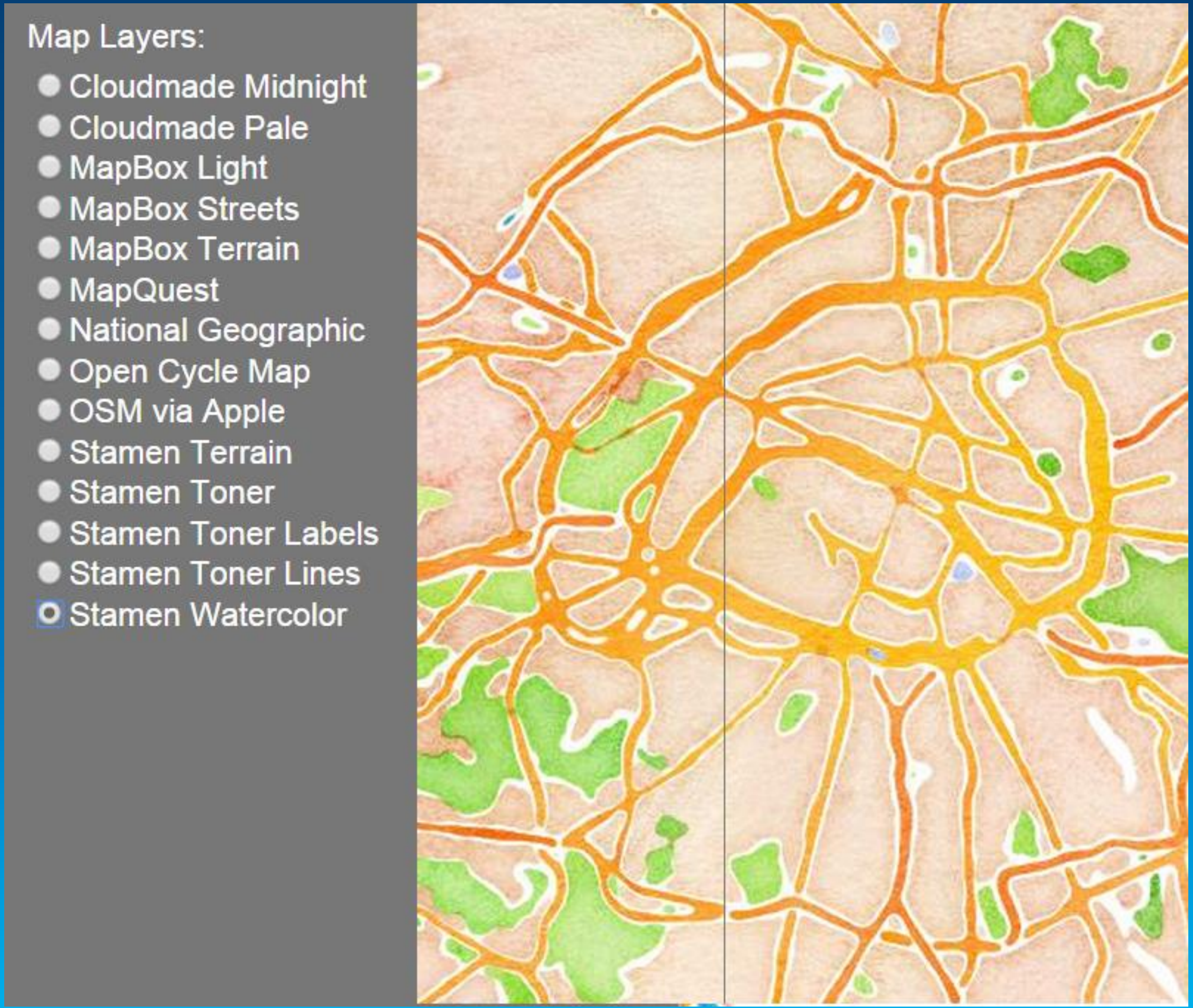
Working with your data



Add Layers

- Dynamic Map Layers
- Tiled Layers
- Feature Layers
- CSV **(new)**
- KML
- GeoRSS
- Image Layers
- Stream Layer **(new-ish)**
- WMS, WMTS
- Web Tiled Layer

Shown: Web Tiled Layer

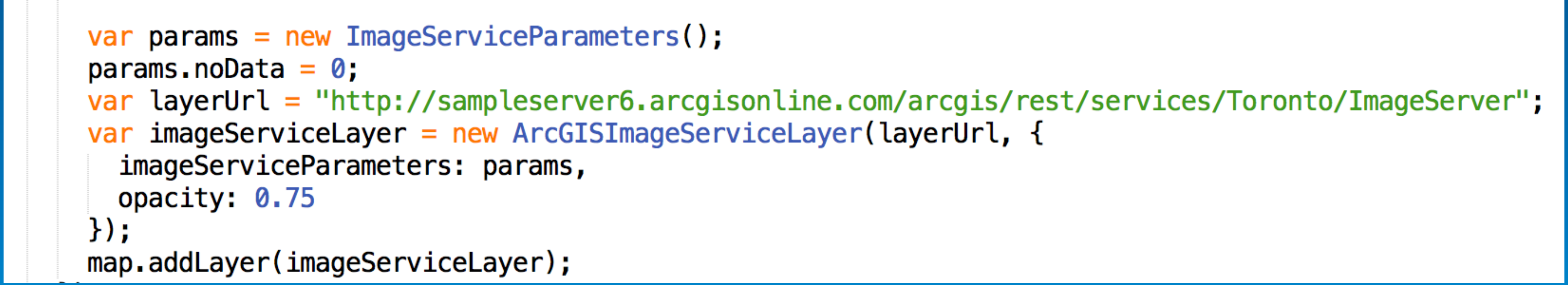


Map Layers:

○ Cloudmade Midnight
○ Cloudmade Pale
○ MapBox Light
○ MapBox Streets
○ MapBox Terrain
○ MapQuest
○ National Geographic
○ Open Cycle Map
○ OSM via Apple
○ Stamen Terrain
○ Stamen Toner
○ Stamen Toner Labels
○ Stamen Toner Lines
◉ Stamen Watercolor

Layer coding pattern

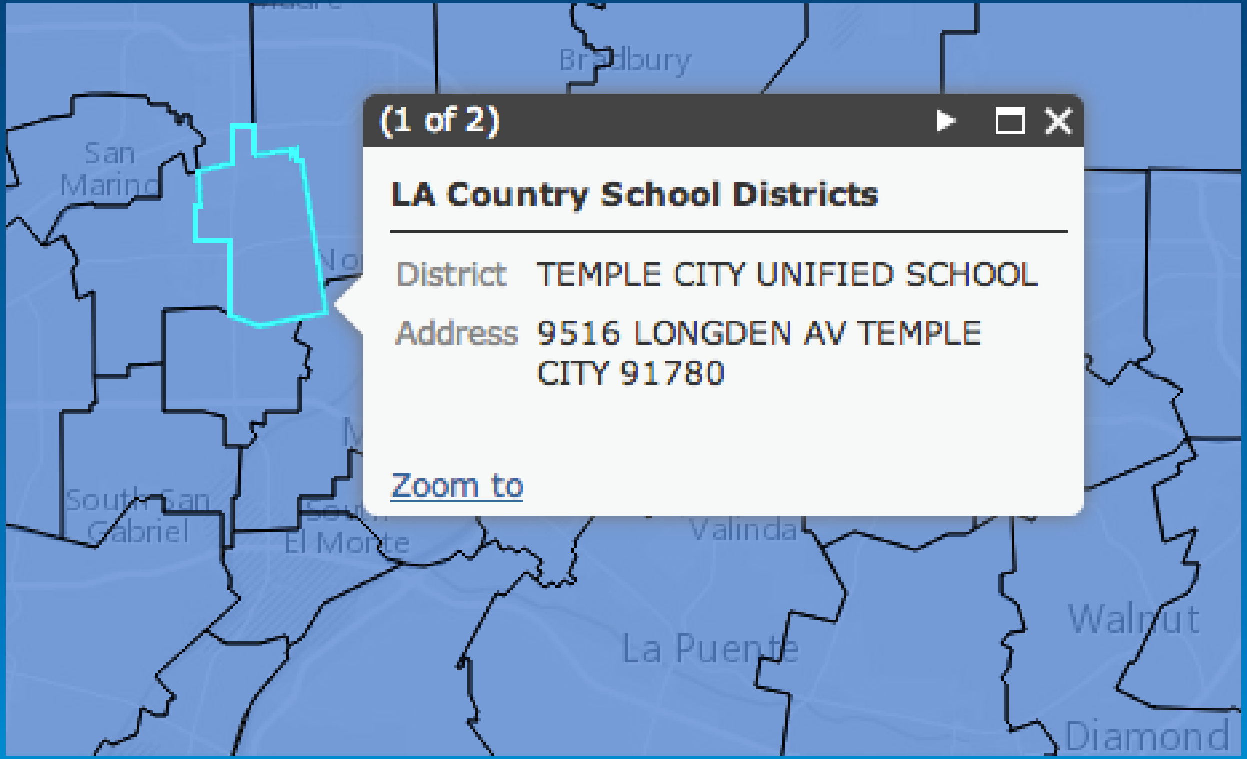
- Create layer
- Specify layer specific properties
- Add to map



```
var params = new ImageServiceParameters();
params.noData = 0;
var layerUrl = "http://sampleserver6.arcgisonline.com/arcgis/rest/services/Toronto/ImageServer";
var imageServiceLayer = new ArcGISImageServiceLayer(layerUrl, {
  imageServiceParameters: params,
  opacity: 0.75
});
map.addLayer(imageServiceLayer);
```

Adding layers – Feature layers

- Vector data
- Interactive
  - Editing, selection
- Attribute and spatial queries
- Popups



(1 of 2)

LA Country School Districts

District TEMPLE CITY UNIFIED SCHOOL

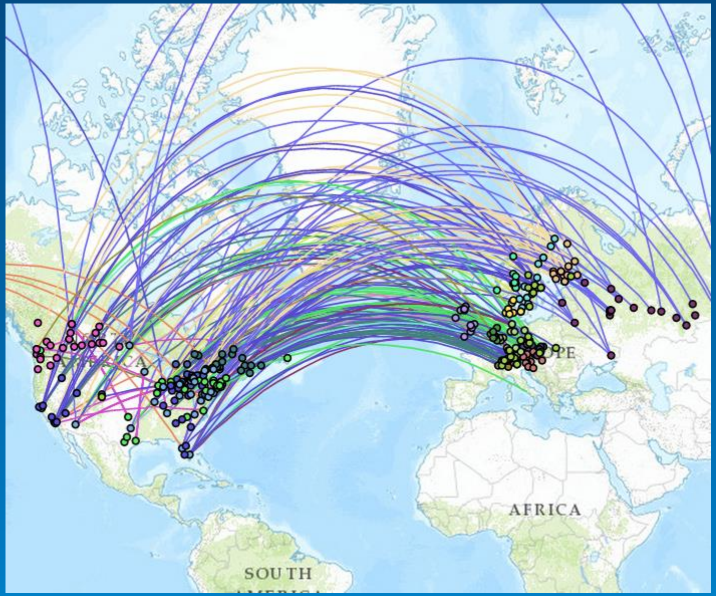
Address 9516 LONGDEN AV TEMPLE CITY 91780

Zoom to

How to get the best of both worlds: Performance and Data Interaction

Selection-only Feature Layers

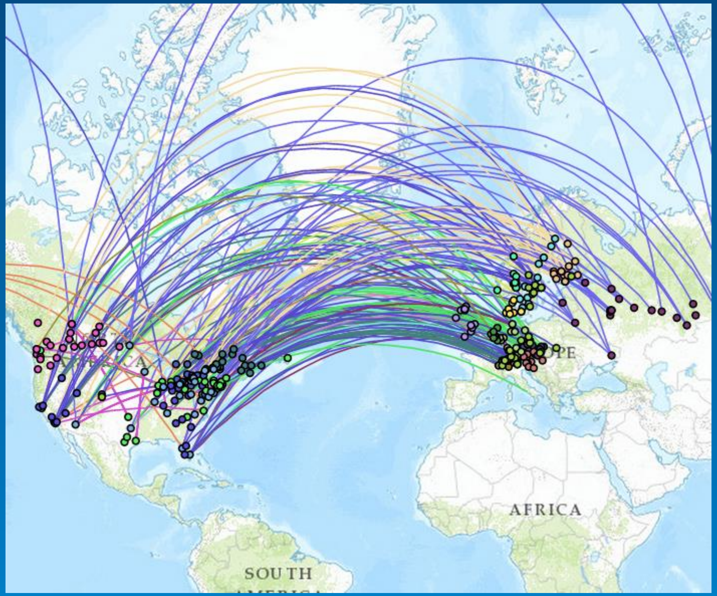
Layer added as DYNAMIC



- All features displayed (no limit)
- No geometries on client
- No interaction
- Just an image sent to client

+

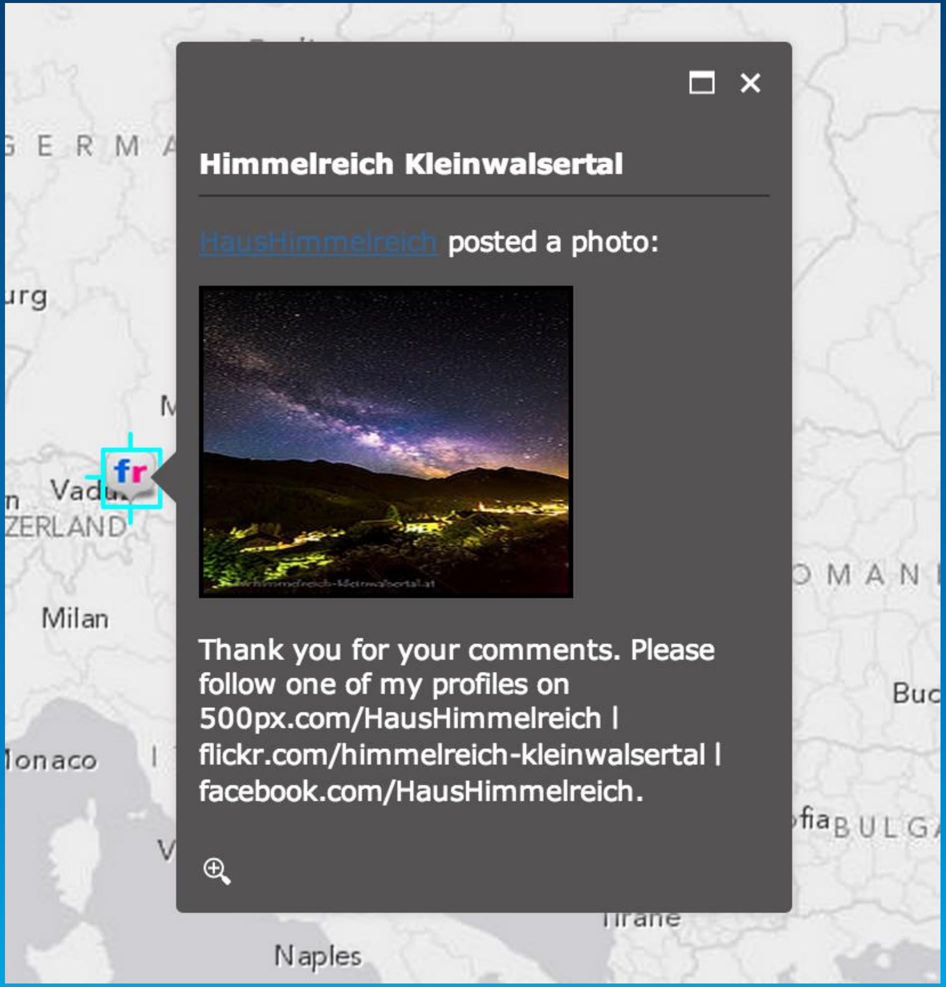
Layer added as FEATURES/Selection only



- Full feature interaction
- Features only sent when selected
- Geometry
- Attributes

Popups

- Add interactivity
- Information about …
  - a location
  - a feature
  - the results of an address search
- Customizable



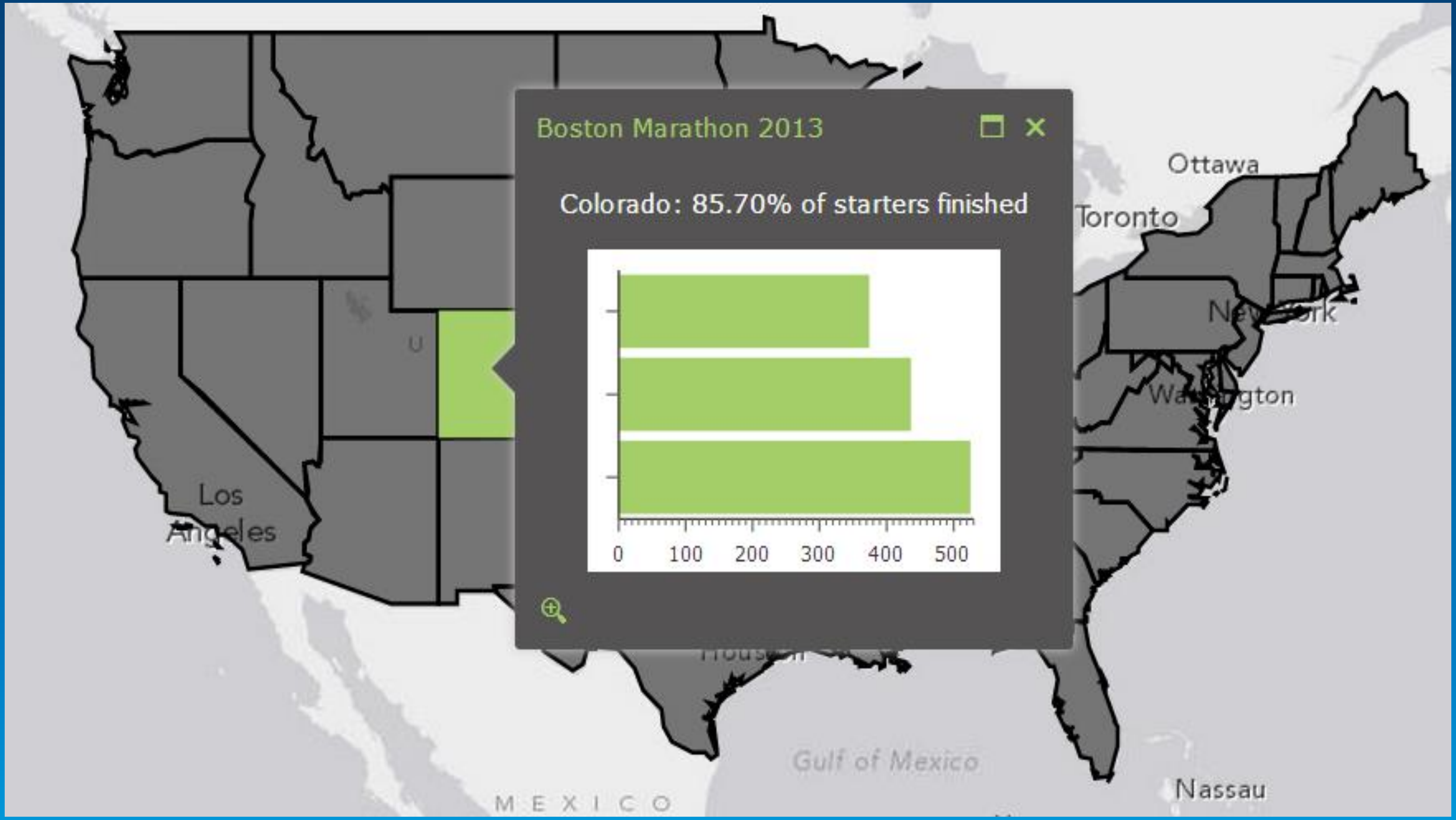
Himmelreich Kleinwalsertal

HausHimmelreich posted a photo:

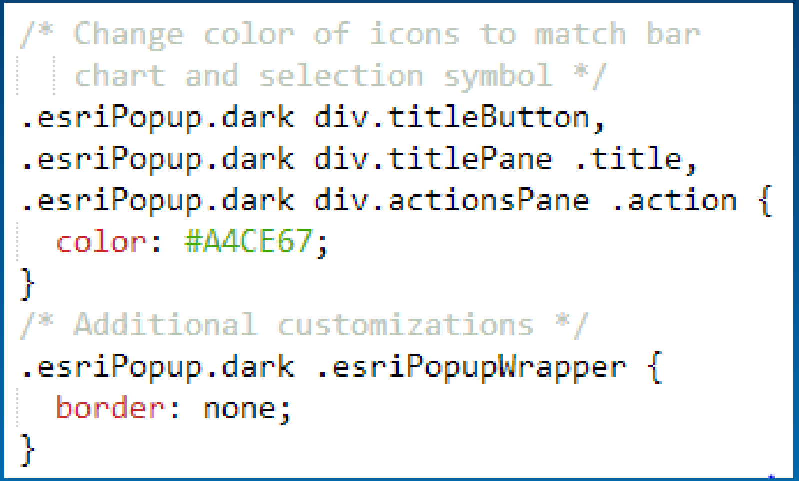
Thank you for your comments. Please follow one of my profiles on 500px.com/HausHimmelreich | flickr.com/himmelreich-kleinwalsertal | facebook.com/HausHimmelreich.

Creating a Popup

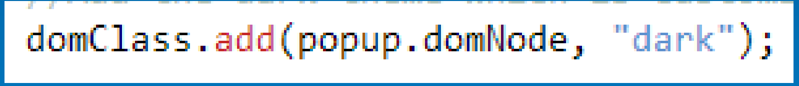
Example: Dark Theme



Colorado: 85.70% of starters finished



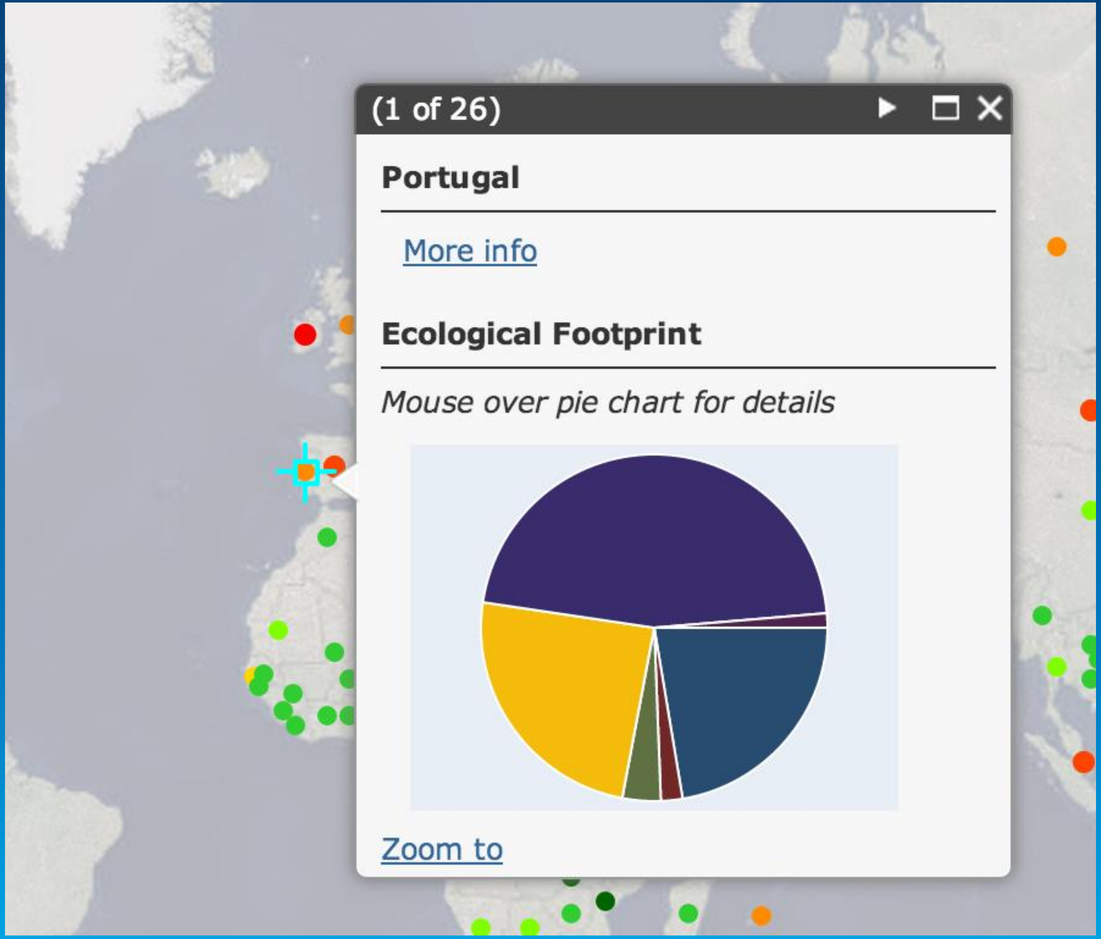
```
/* Change color of icons to match bar
   chart and selection symbol */
.esriPopup.dark div.titleButton,
.esriPopup.dark div.titlePane .title,
.esriPopup.dark div.actionsPane .action {
  color: #A4CE67;
}
/* Additional customizations */
.esriPopup.dark .esriPopupWrapper {
  border: none;
}
```



```
domClass.add(popup.domNode, "dark");
```

Tip: Simplify code using a web map

- esri/arcgis/utils
  - createMap
  - getLegendLayers


(1 of 26)

Portugal

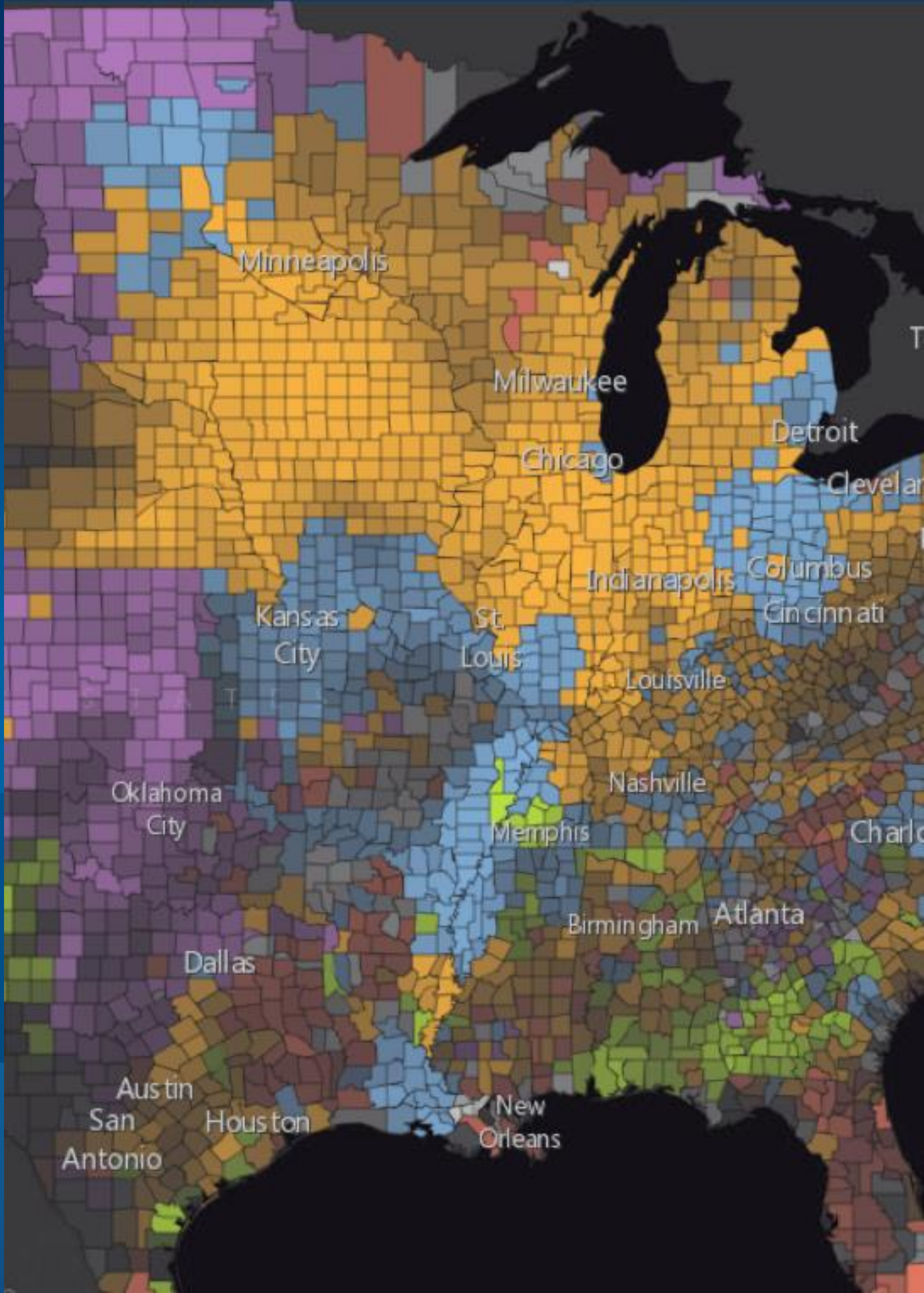
More info

Ecological Footprint

Mouse over pie chart for details

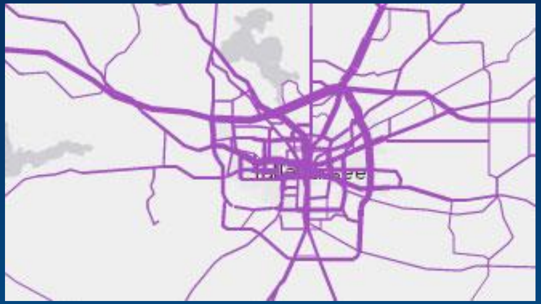
Zoom to

Data Visualization



Data Visualization

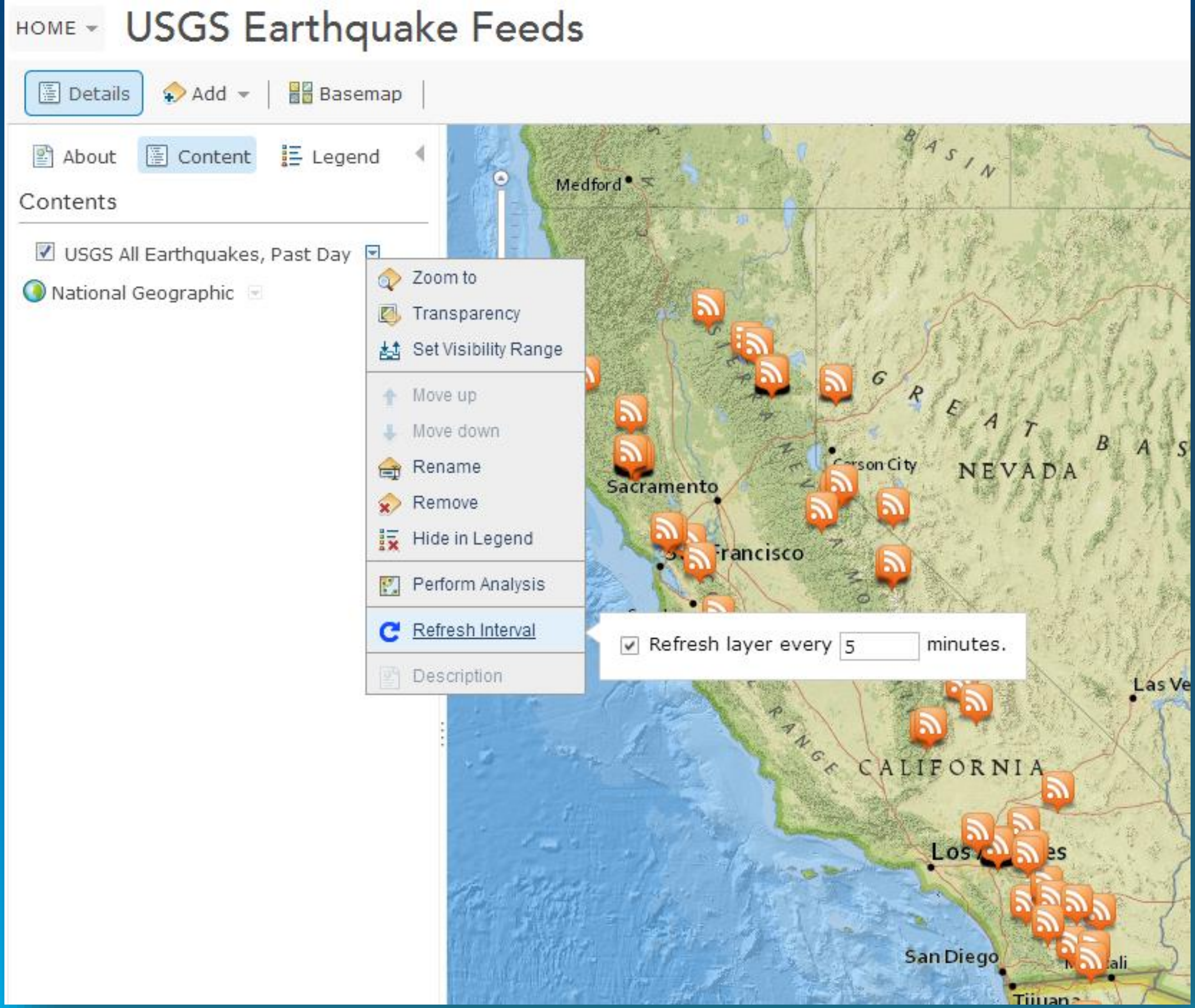
- Three new properties on renderer
  - Rotation
  - Proportional symbol
  - Color (ramp)
- Dot density renderer
- Scale dependent renderer
- Stylize features with CSS



Sunderland Cir
East Ln
land Cir

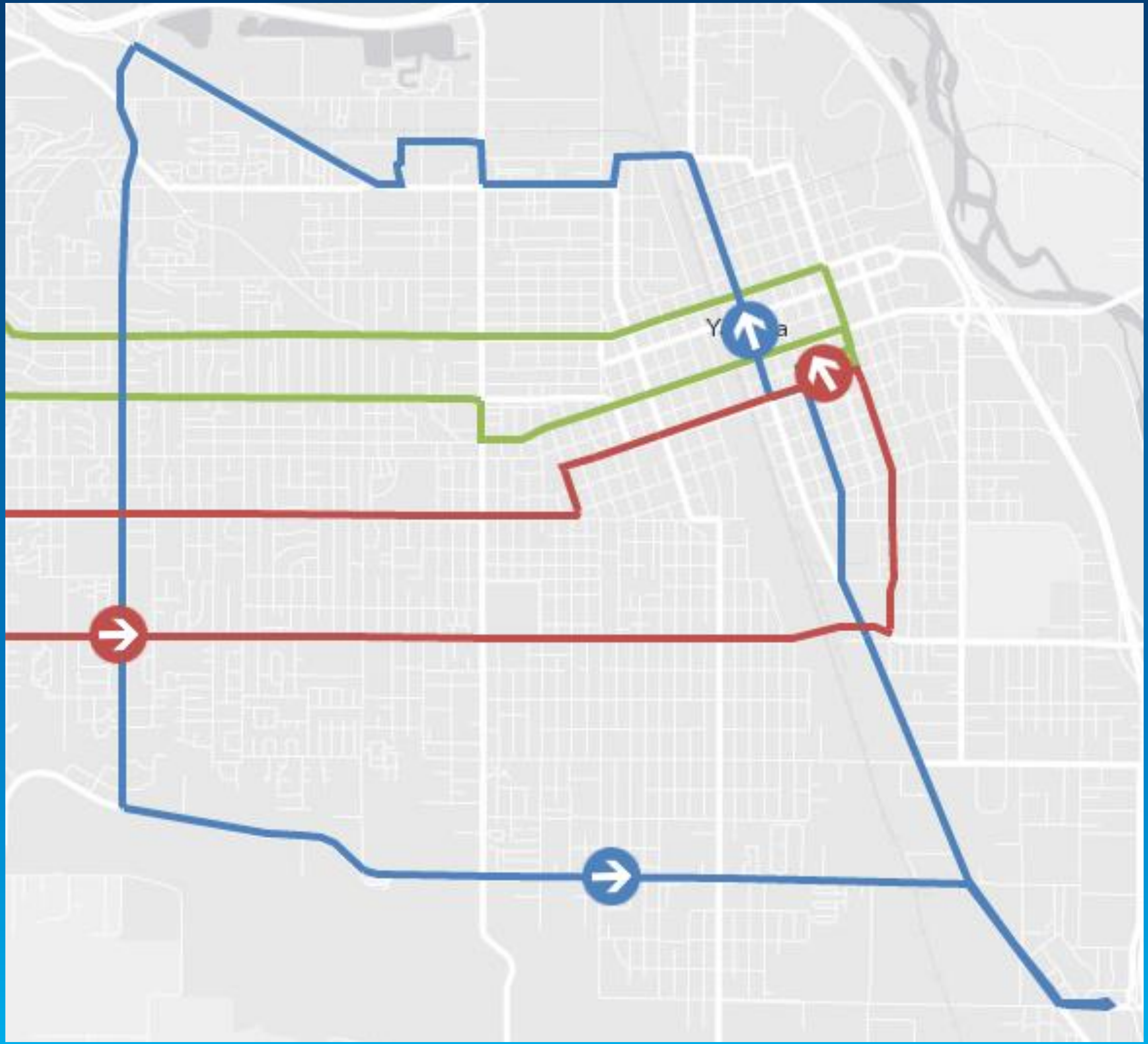
Kansas City
St. Louis
Louisvil
Oklahoma City
Nashville
Memphis
Birmingham
Dallas

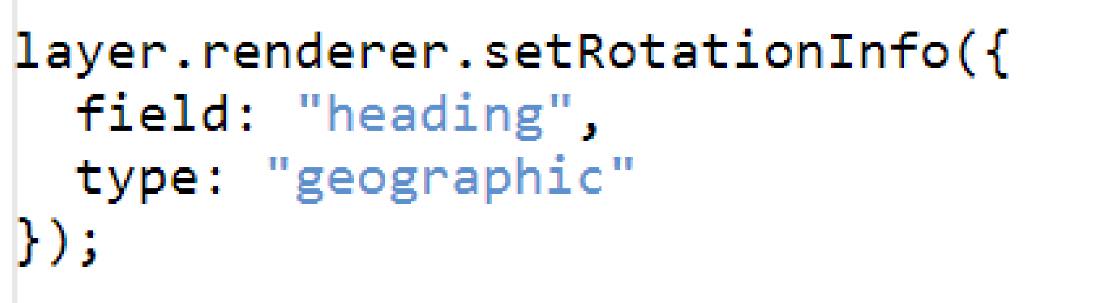
Layer Refresh (3.7)



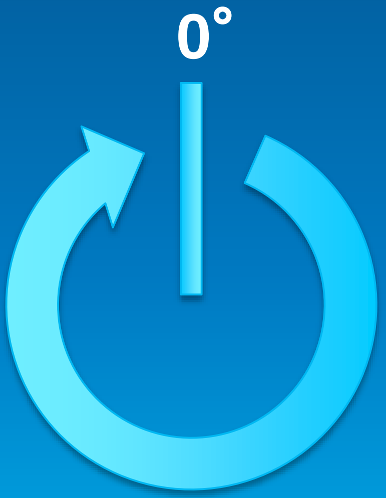
☑ Refresh layer every 5 minutes.

Rotation

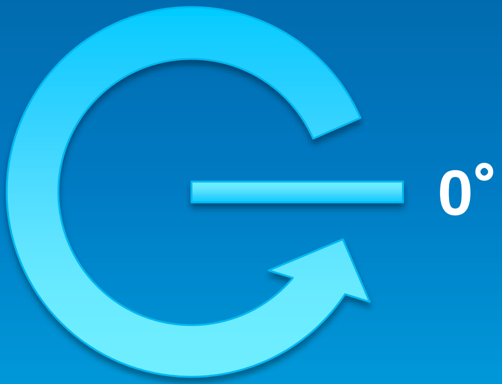




```
layer.renderer.setRotationInfo({
  field: "heading",
  type: "geographic"
});
```

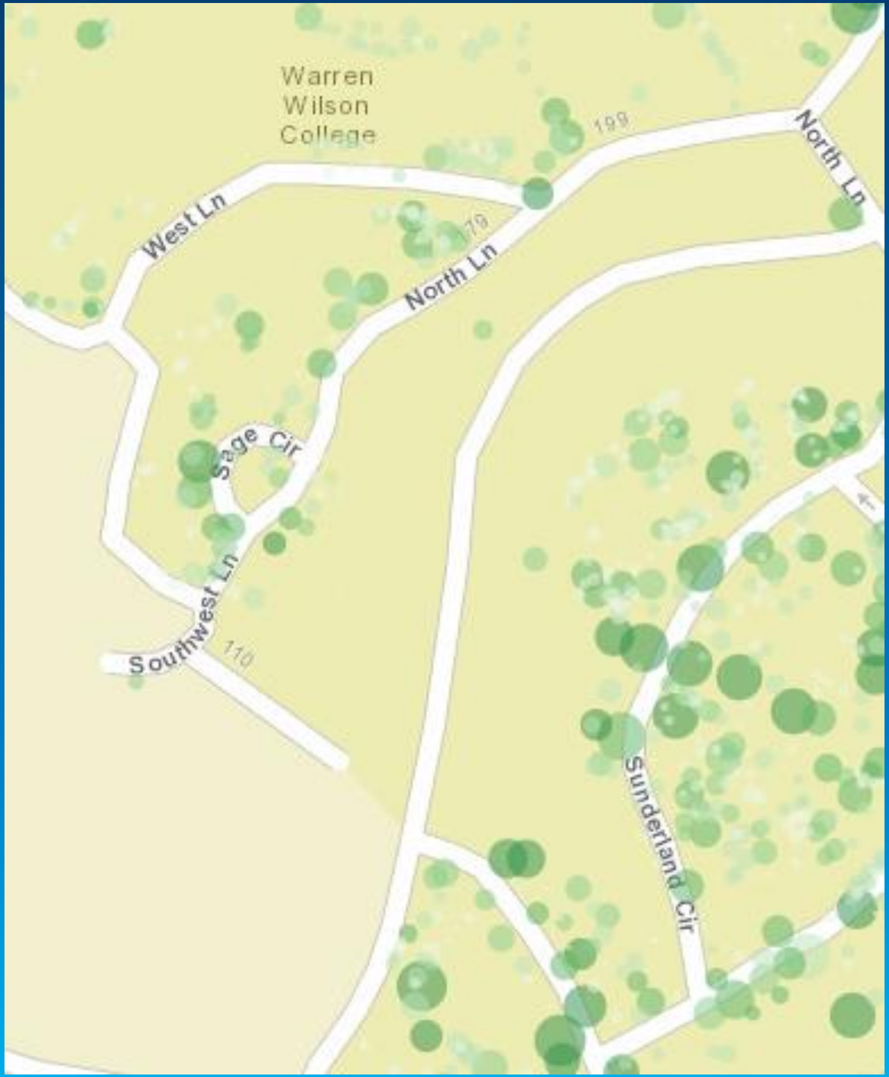


Geographic

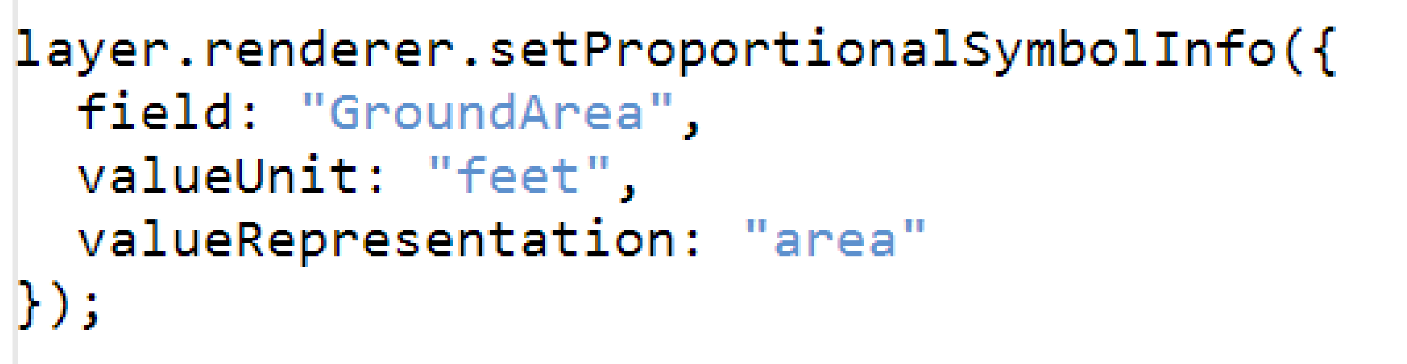


Arithmetic

Proportional Symbol

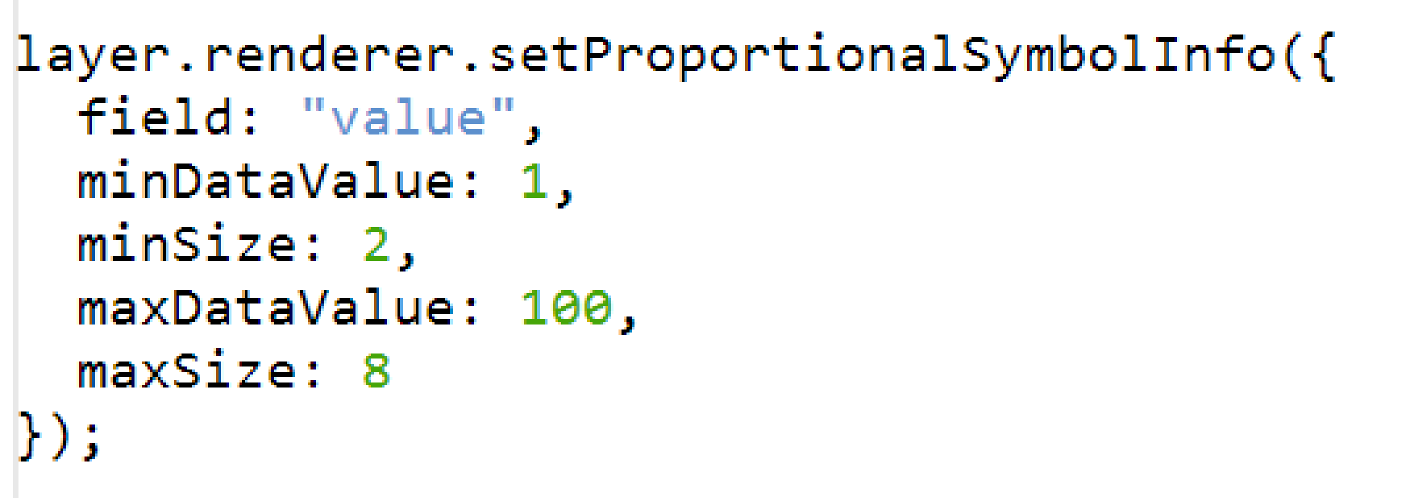


Distance-based quantity



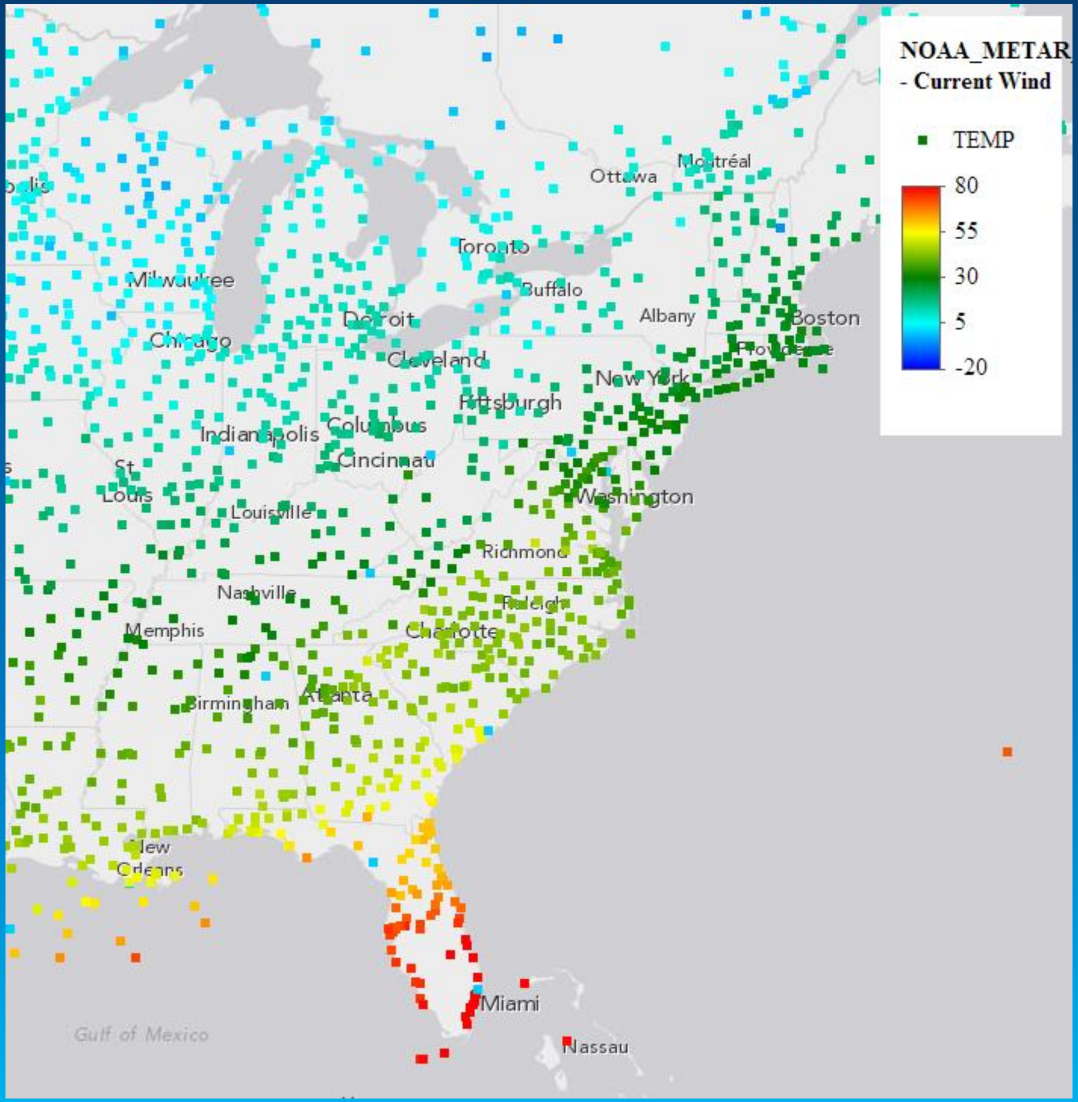
```
layer.renderer.setProportionalSymbolInfo({
  field: "GroundArea",
  valueUnit: "feet",
  valueRepresentation: "area"
});
```

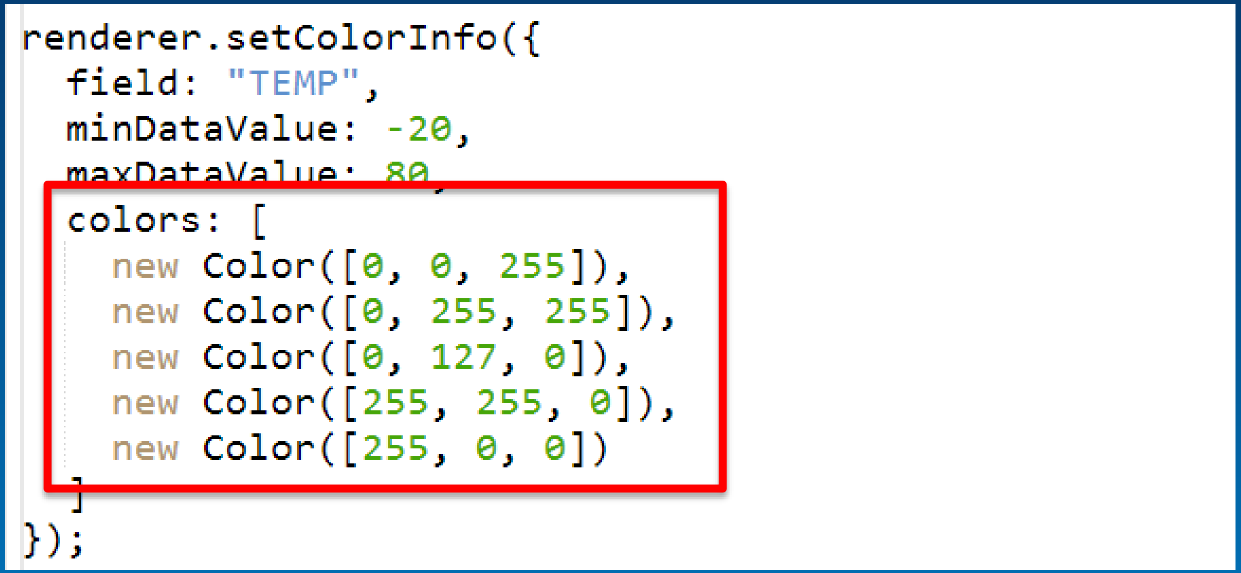
Non-distance-based quantity



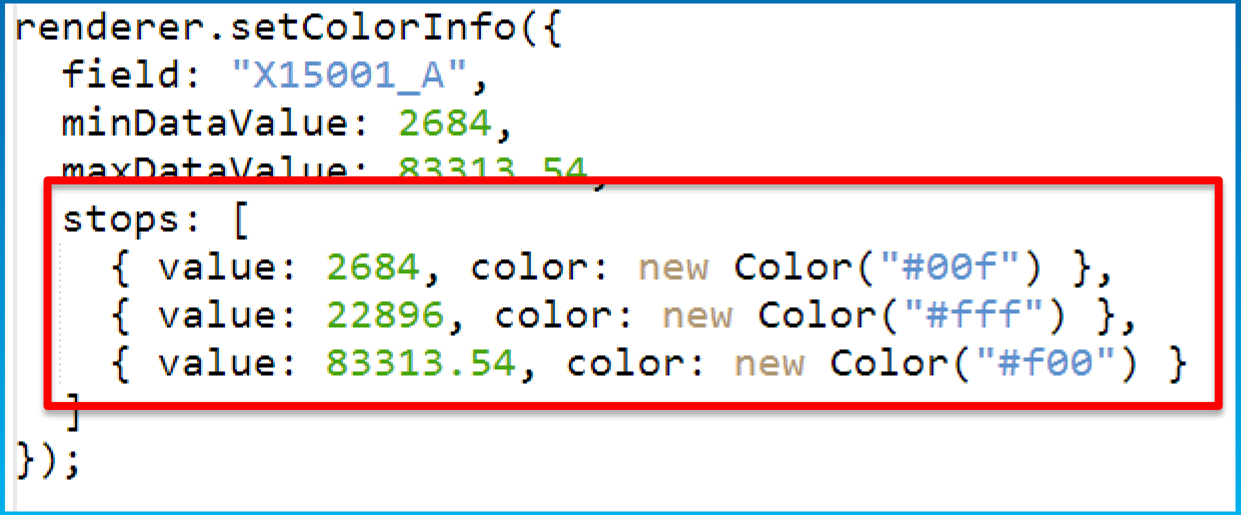
```
layer.renderer.setProportionalSymbolInfo({
  field: "value",
  minDataValue: 1,
  minSize: 2,
  maxDataValue: 100,
  maxSize: 8
});
```

Continuous Color (color ramp)



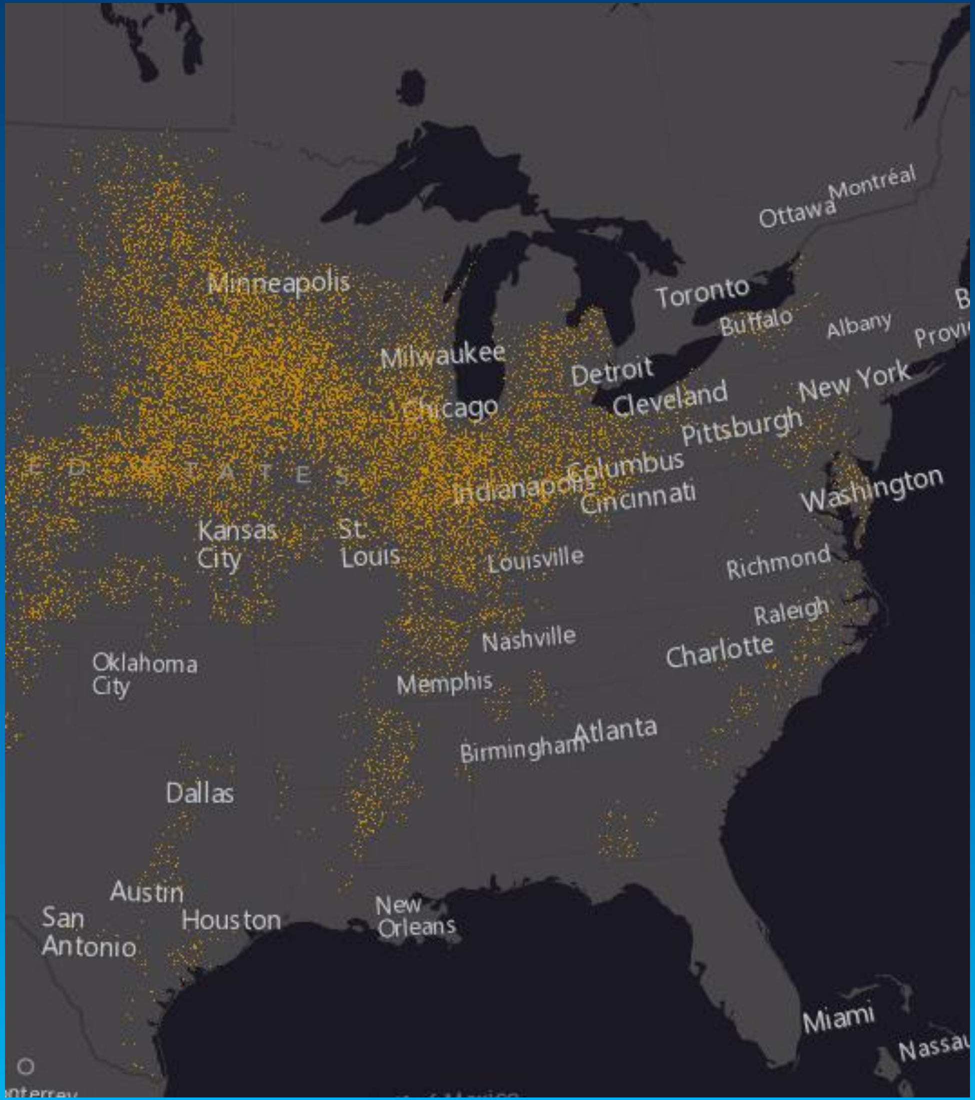


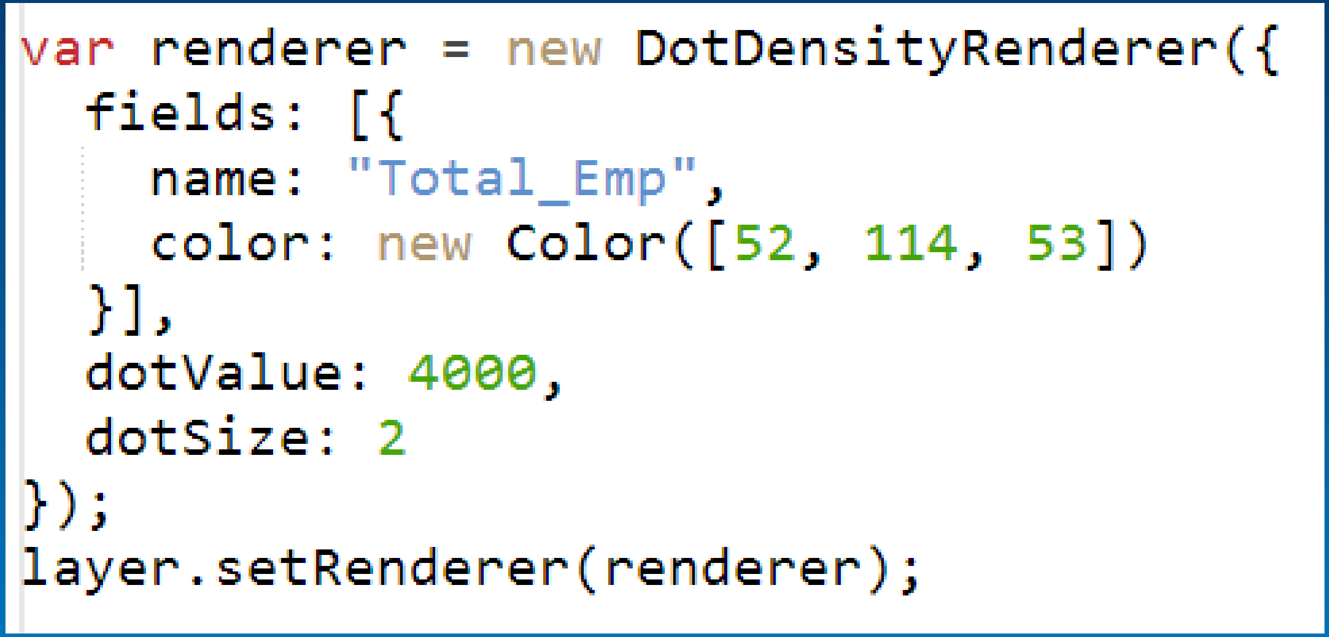
```
renderer.setColorInfo({
  field: "TEMP",
  minDataValue: -20,
  maxDataValue: 80,
  colors: [
    new Color([0, 0, 255]),
    new Color([0, 255, 255]),
    new Color([0, 127, 0]),
    new Color([255, 255, 0]),
    new Color([255, 0, 0])
  ]
});
```



```
renderer.setColorInfo({
  field: "X15001_A",
  minDataValue: 2684,
  maxDataValue: 83313.54,
  stops: [
    { value: 2684, color: new Color("#00f") },
    { value: 22896, color: new Color("#fff") },
    { value: 83313.54, color: new Color("#f00") }
  ]
});
```

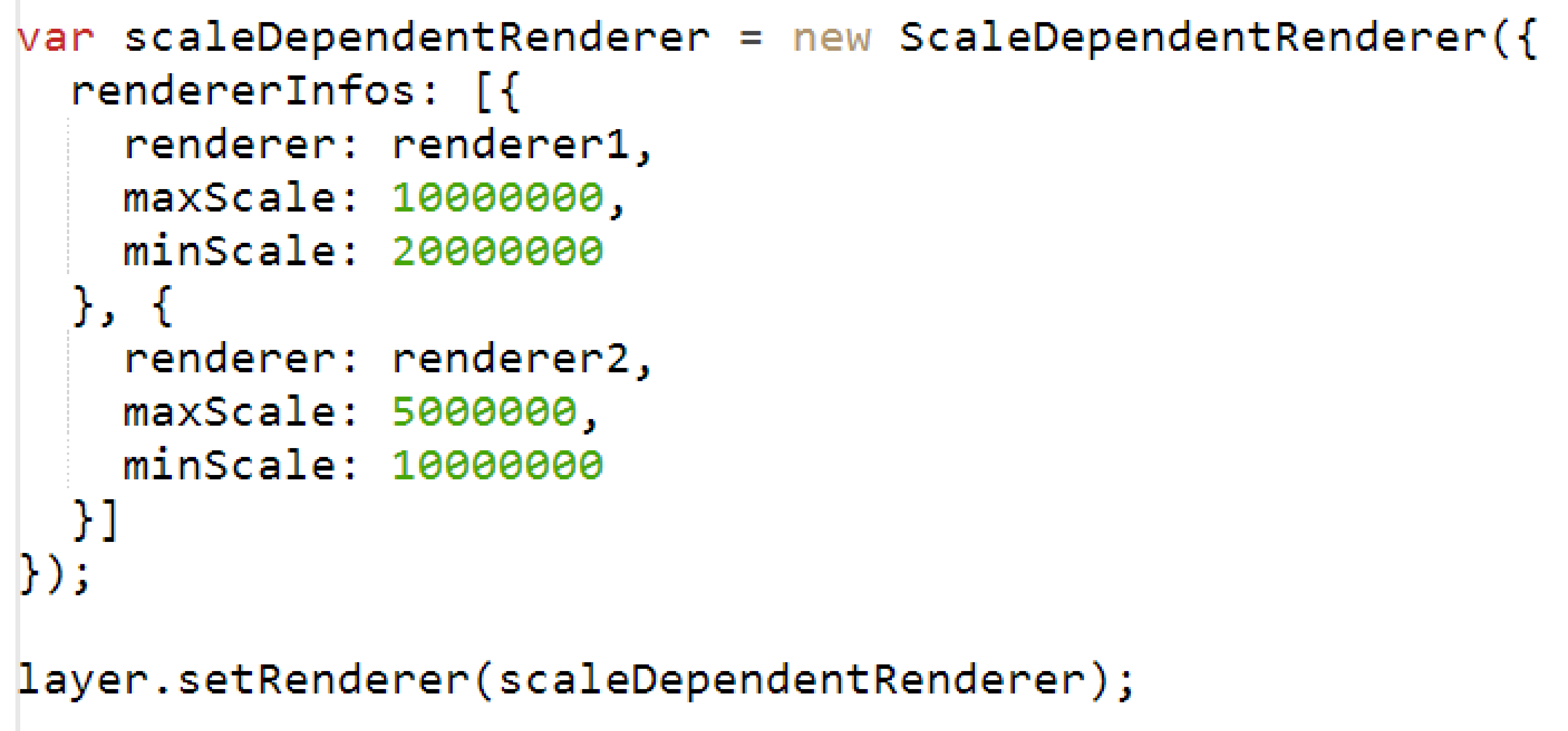
Dot Density





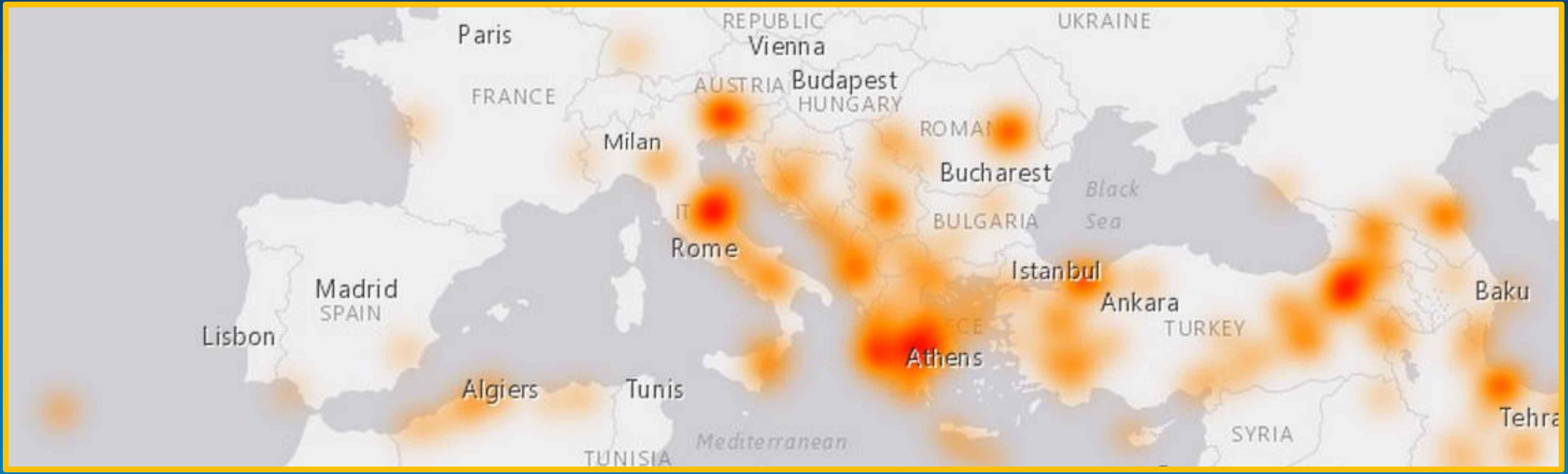
```
var renderer = new DotDensityRenderer({
  fields: [{
    name: "Total_Emp",
    color: new Color([52, 114, 53])
  }],
  dotValue: 4000,
  dotSize: 2
});
layer.setRenderer(renderer);
```

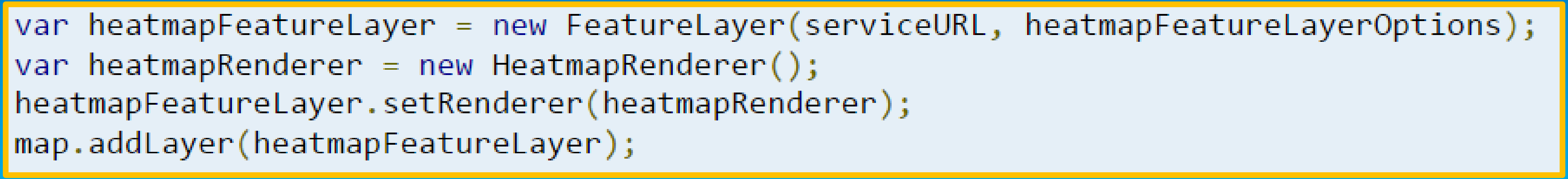
Scale Dependent Renderer



```
var scaleDependentRenderer = new ScaleDependentRenderer({
  rendererInfos: [{
    renderer: renderer1,
    maxScale: 10000000,
    minScale: 20000000
  }, {
    renderer: renderer2,
    maxScale: 5000000,
    minScale: 10000000
  }]
});

layer.setRenderer(scaleDependentRenderer);
```

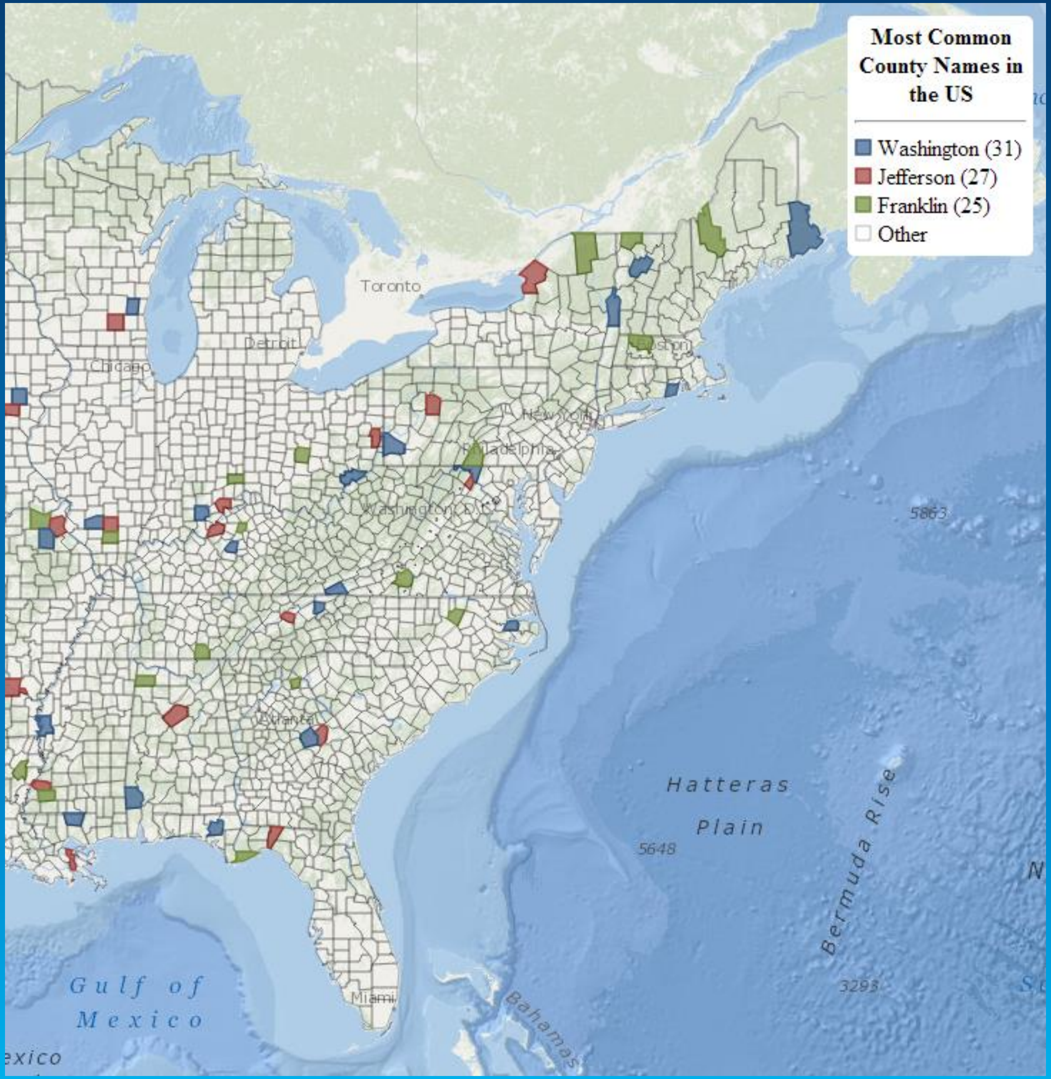
New Heat Map Renderer! (beta)



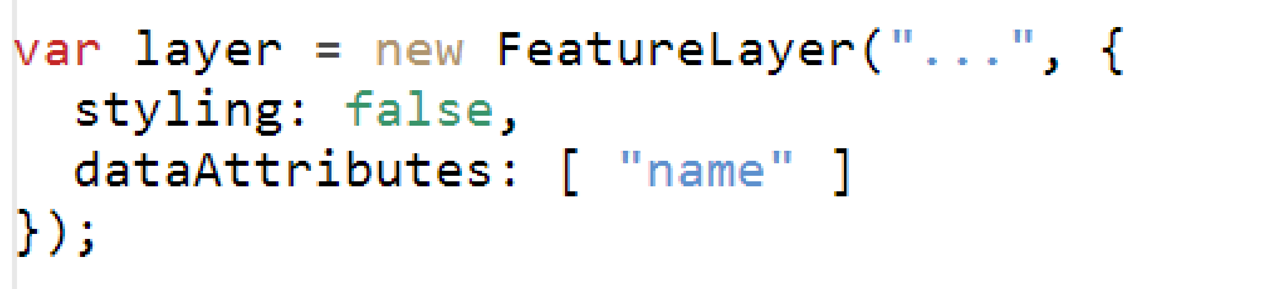


```
var heatmapFeatureLayer = new FeatureLayer(serviceURL, heatmapFeatureLayerOptions);
var heatmapRenderer = new HeatmapRenderer();
heatmapFeatureLayer.setRenderer(heatmapRenderer);
map.addLayer(heatmapFeatureLayer);
```

Stylize Features with CSS

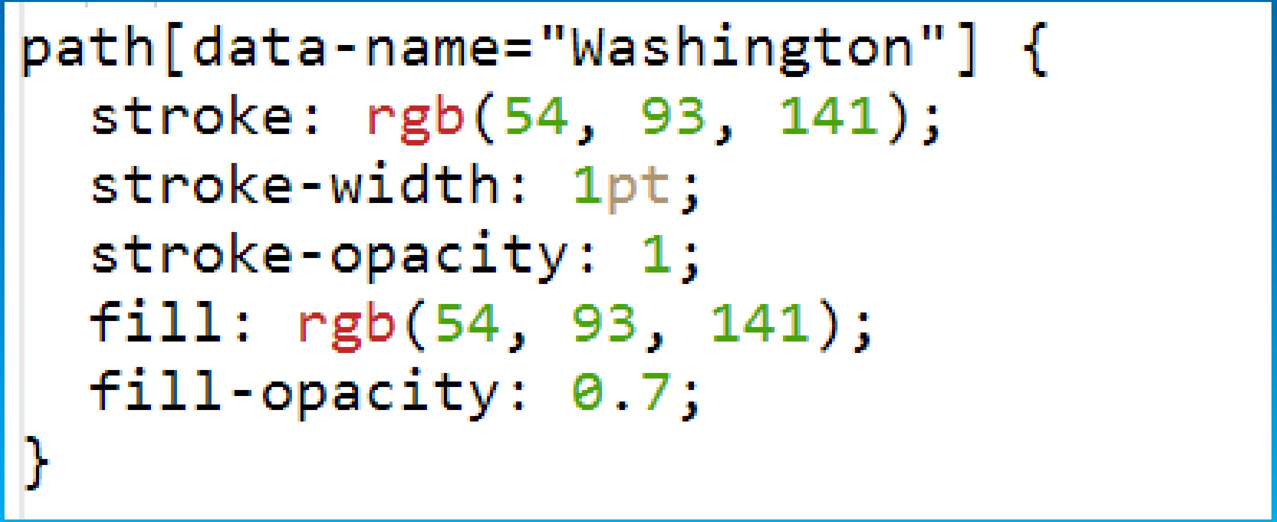


JavaScript



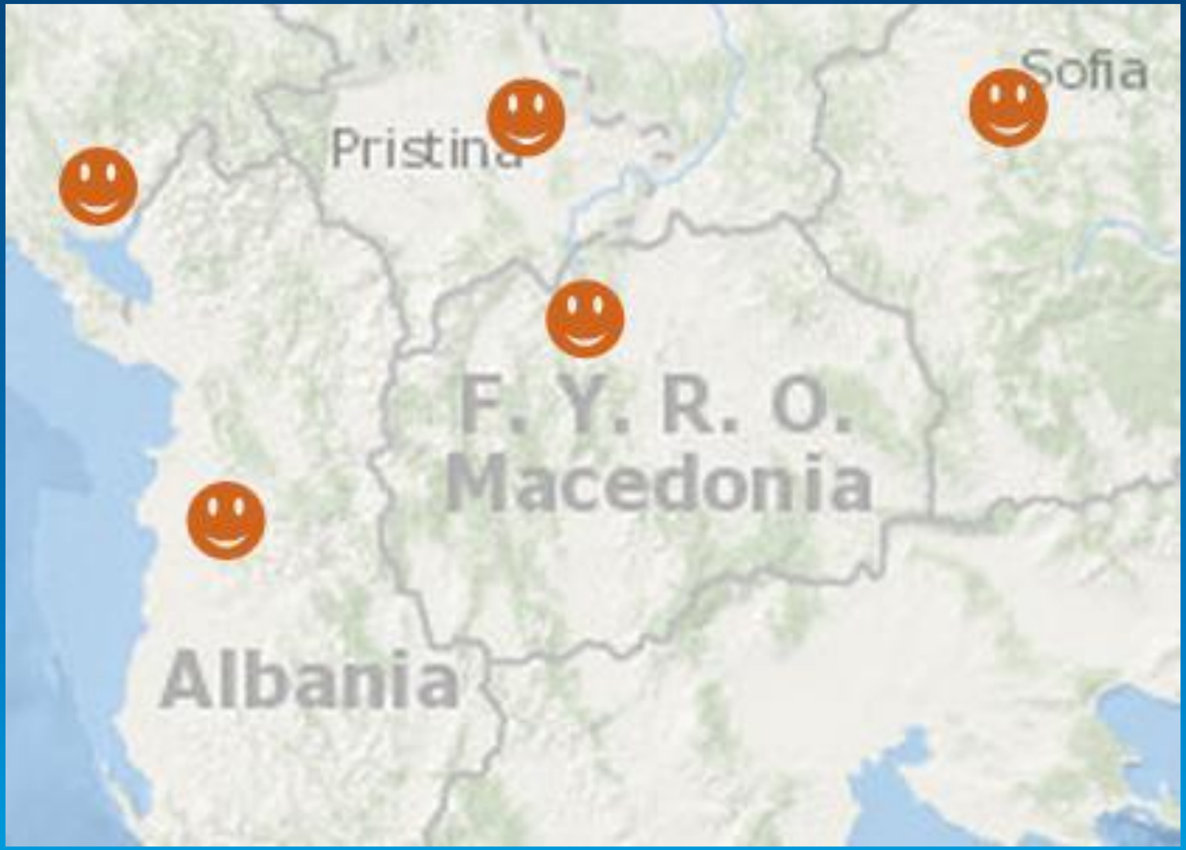
```
var layer = new FeatureLayer("...", {
  styling: false,
  dataAttributes: [ "name" ]
});
```

CSS

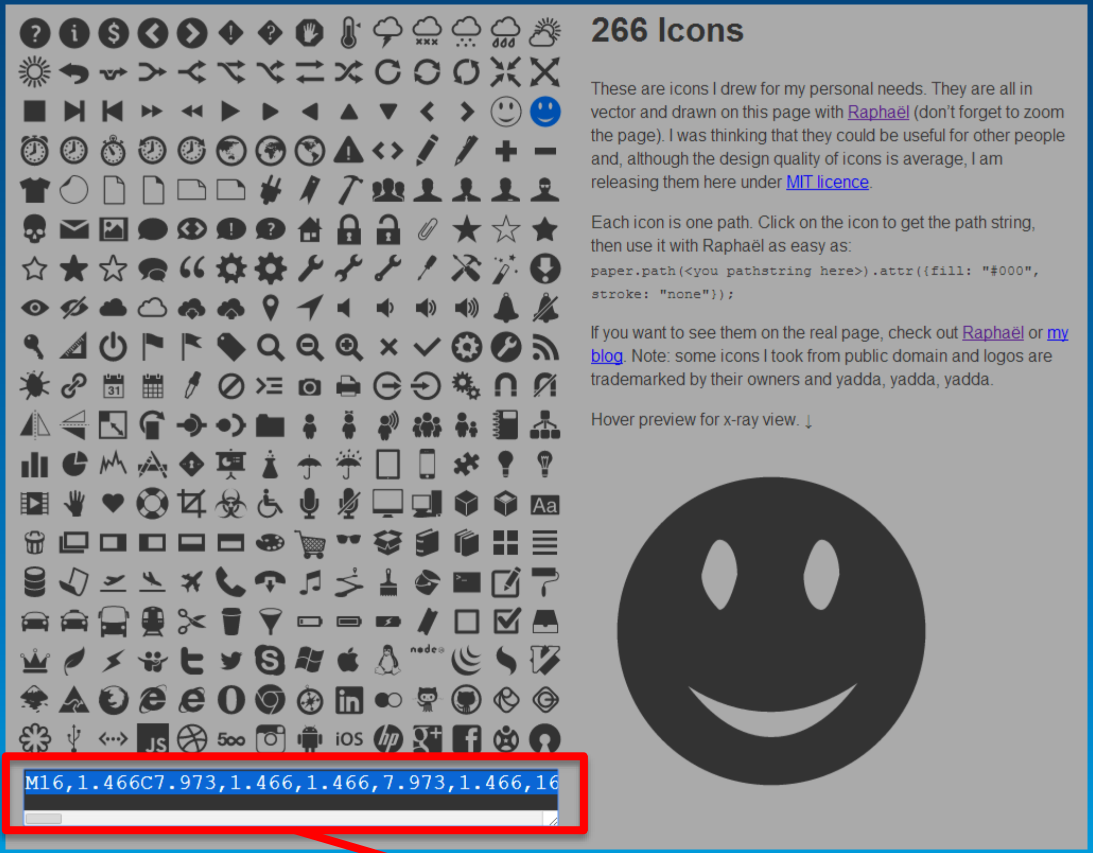


```
path[data-name="Washington"] {
  stroke: rgb(54, 93, 141);
  stroke-width: 1pt;
  stroke-opacity: 1;
  fill: rgb(54, 93, 141);
  fill-opacity: 0.7;
}
```

Set SVG Path for SimpleMarkerSymbol



http://raphaeljs.com/icons/



266 Icons

These are icons I drew for my personal needs. They are all in vector and drawn on this page with Raphaël (don't forget to zoom the page). I was thinking that they could be useful for other people and, although the design quality of icons is average, I am releasing them here under MIT licence.

Each icon is one path. Click on the icon to get the path string, then use it with Raphaël as easy as:

```
paper.path(<you pathstring here>).attr({fill: "#000",
stroke: "none"});
```

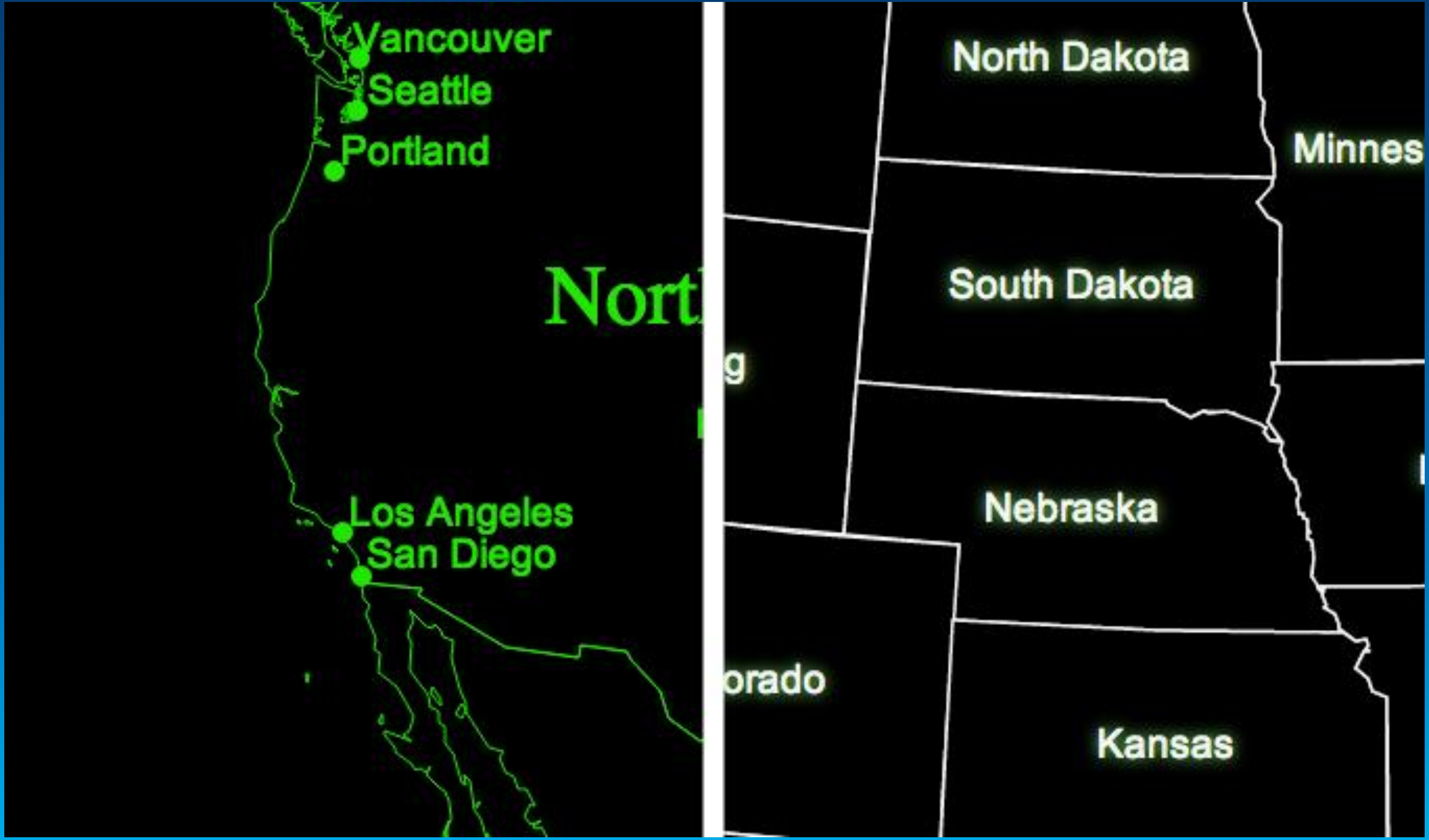
If you want to see them on the real page, check out Raphaël or my blog. Note: some icons I took from public domain and logos are trademarked by their owners and yadda, yadda, yadda.

Hover preview for x-ray view. ↓

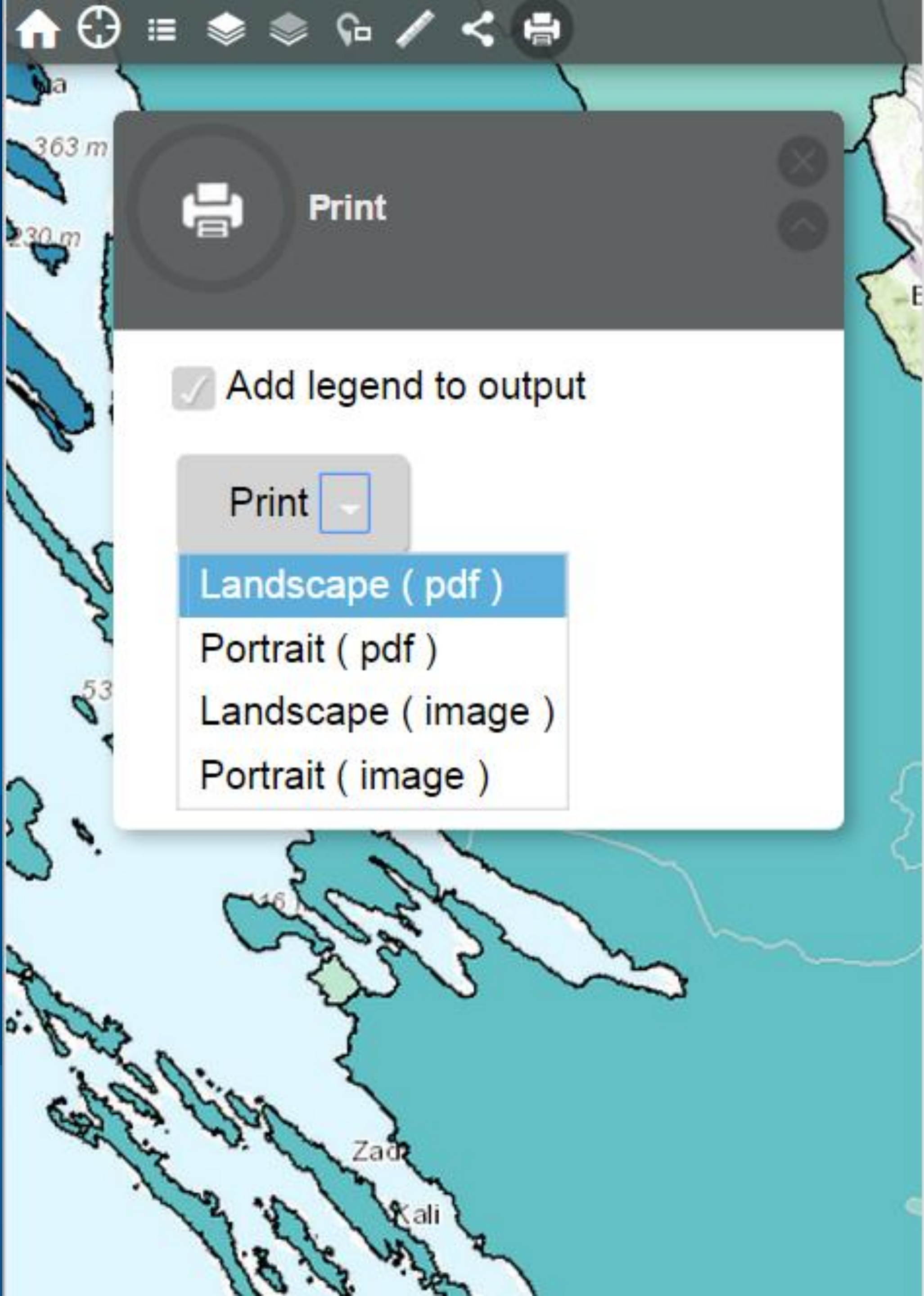
```
M16,1.466C7.973,1.466,1.466,7.973,1.466,16
```

```
var symbol = new SimpleMarkerSymbol().setPath("M0,-15 12.5,-2.5 ... 0 1,0 -36,0")
```

Simpler – LabelLayer (3.7, 3.10)



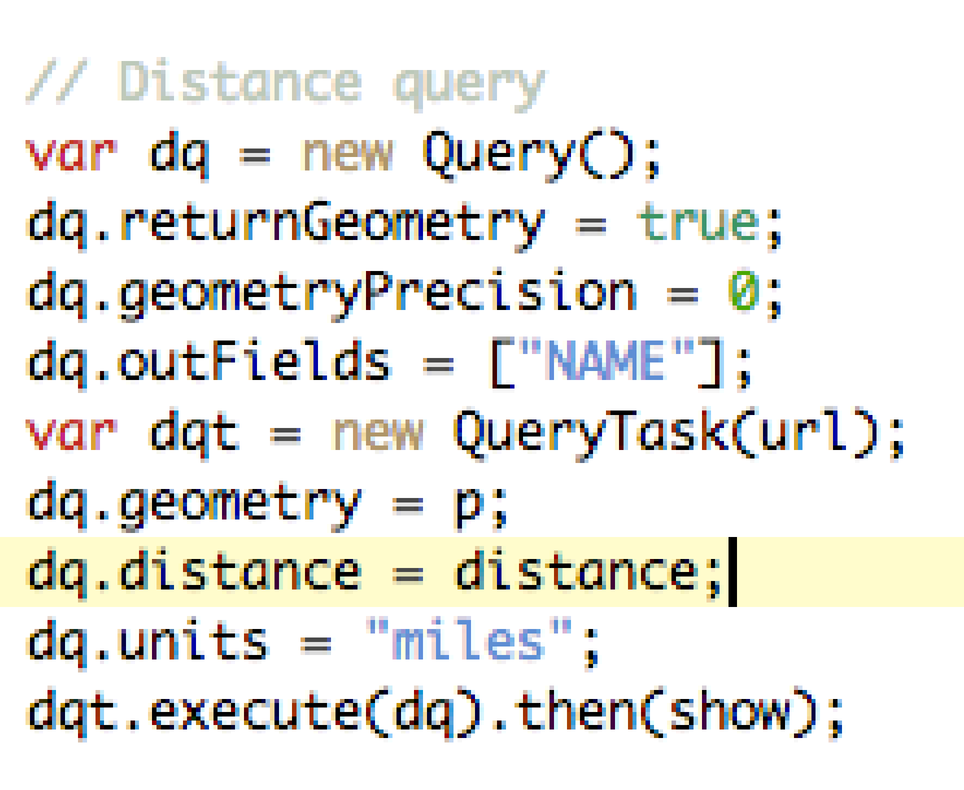
Build in Capabilities



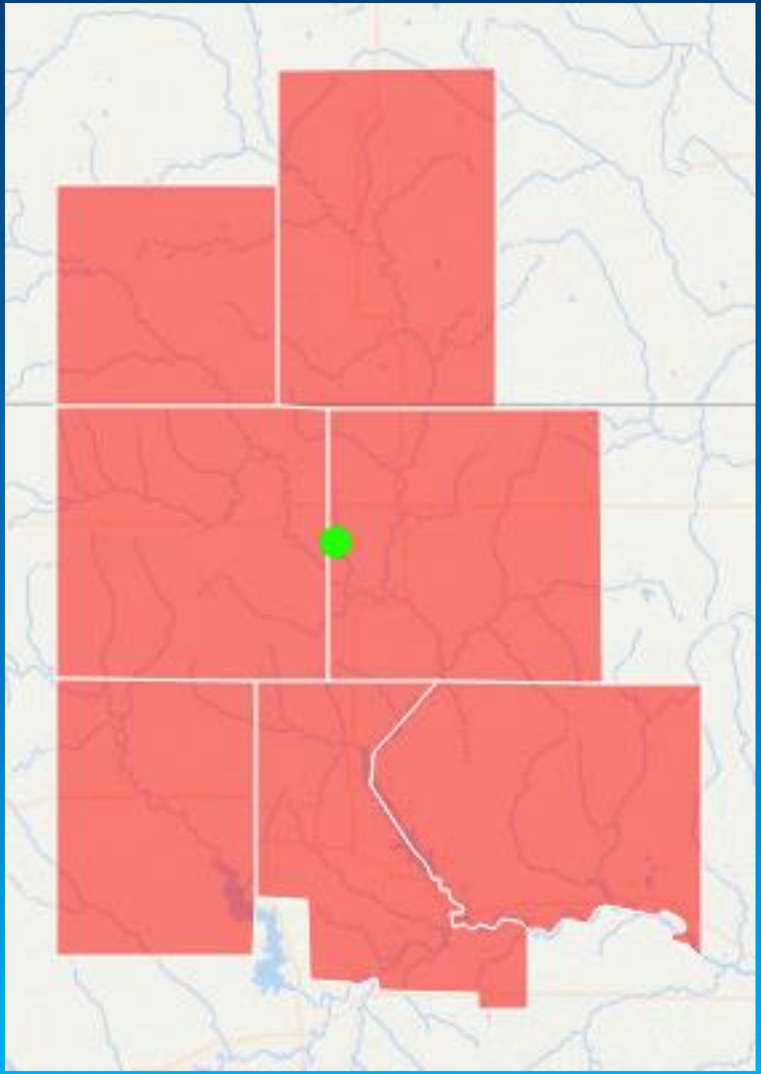
Print

☑ Add legend to output

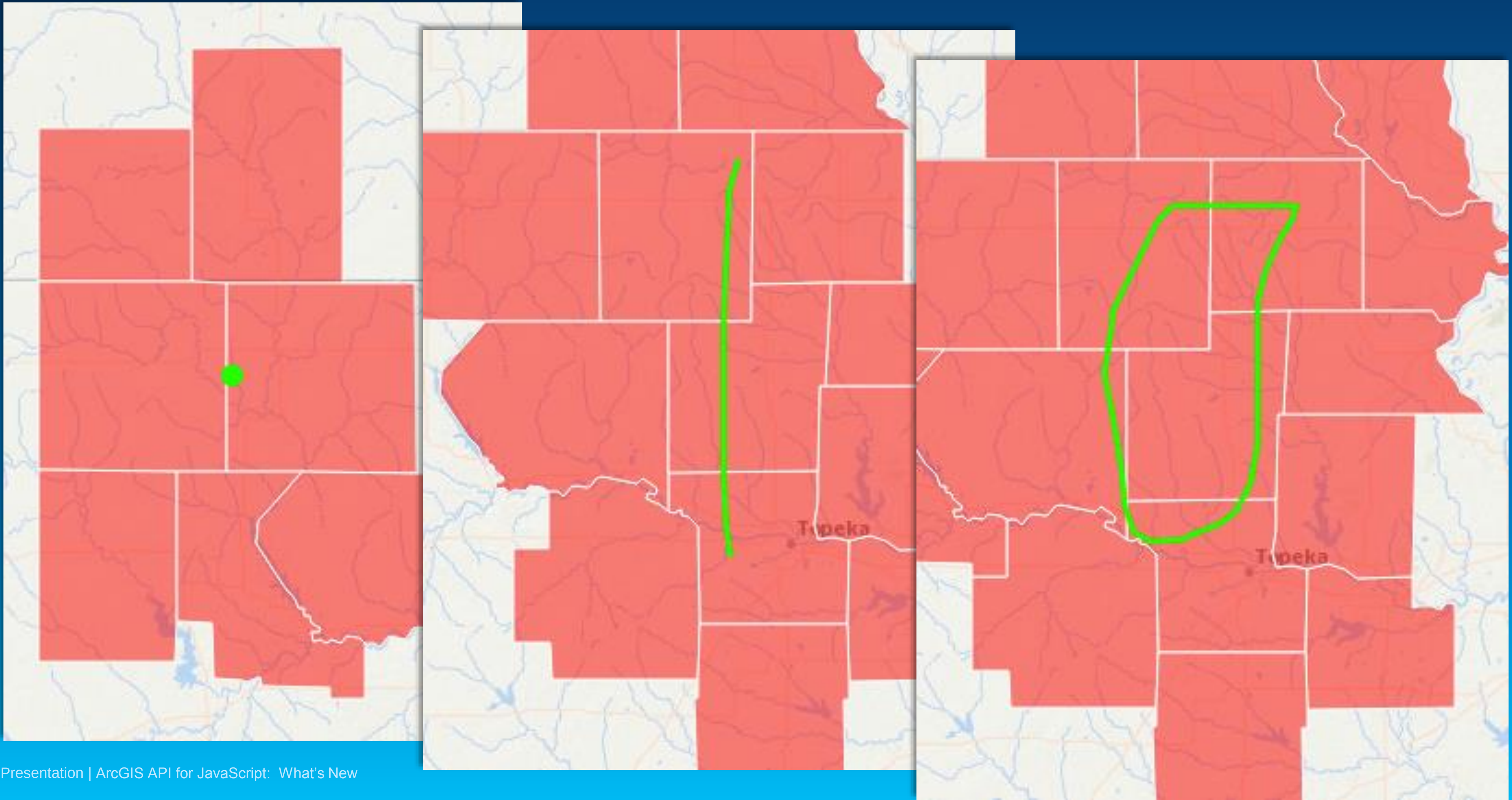
Querying – point and distance (3.9)



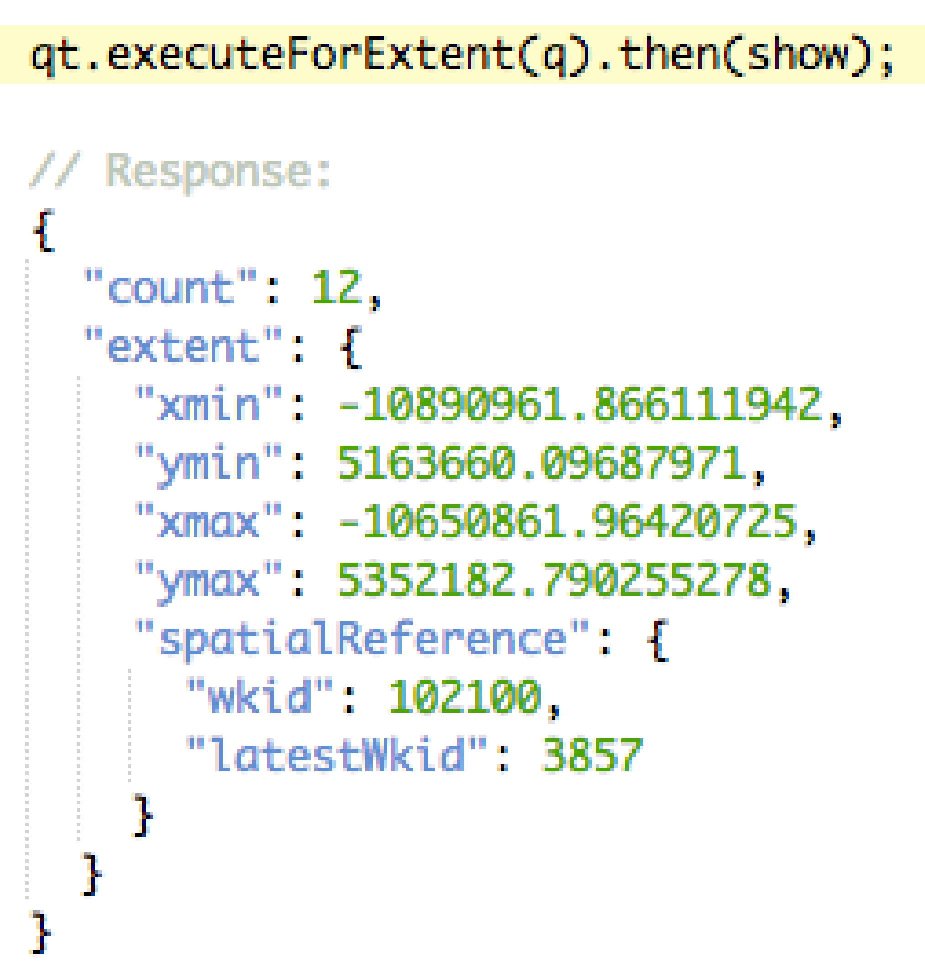
```
// Distance query
var dq = new Query();
dq.returnGeometry = true;
dq.geometryPrecision = 0;
dq.outFields = ["NAME"];
var dqt = new QueryTask(url);
dq.geometry = p;
dq.distance = distance;
dq.units = "miles";
dqt.execute(dq).then(show);
```



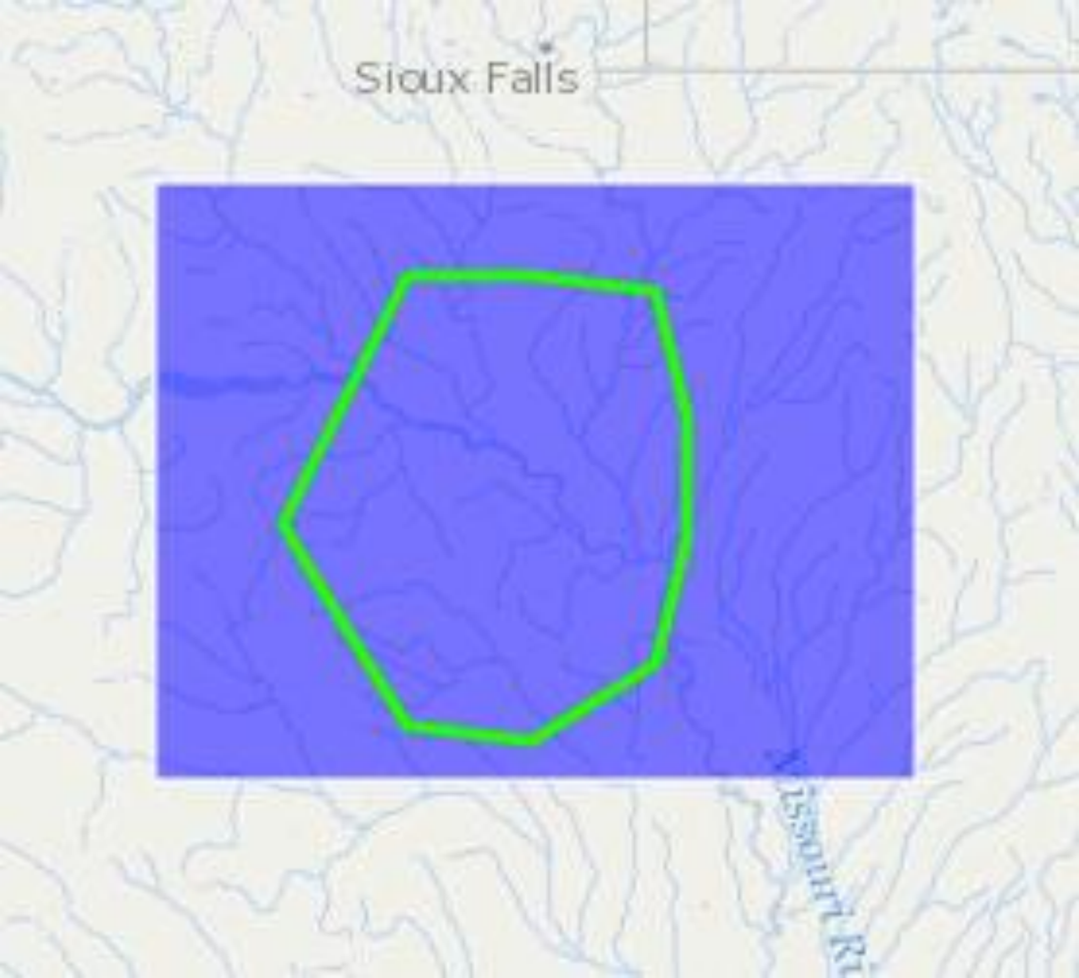
Querying – *geometry* and distance (3.9)



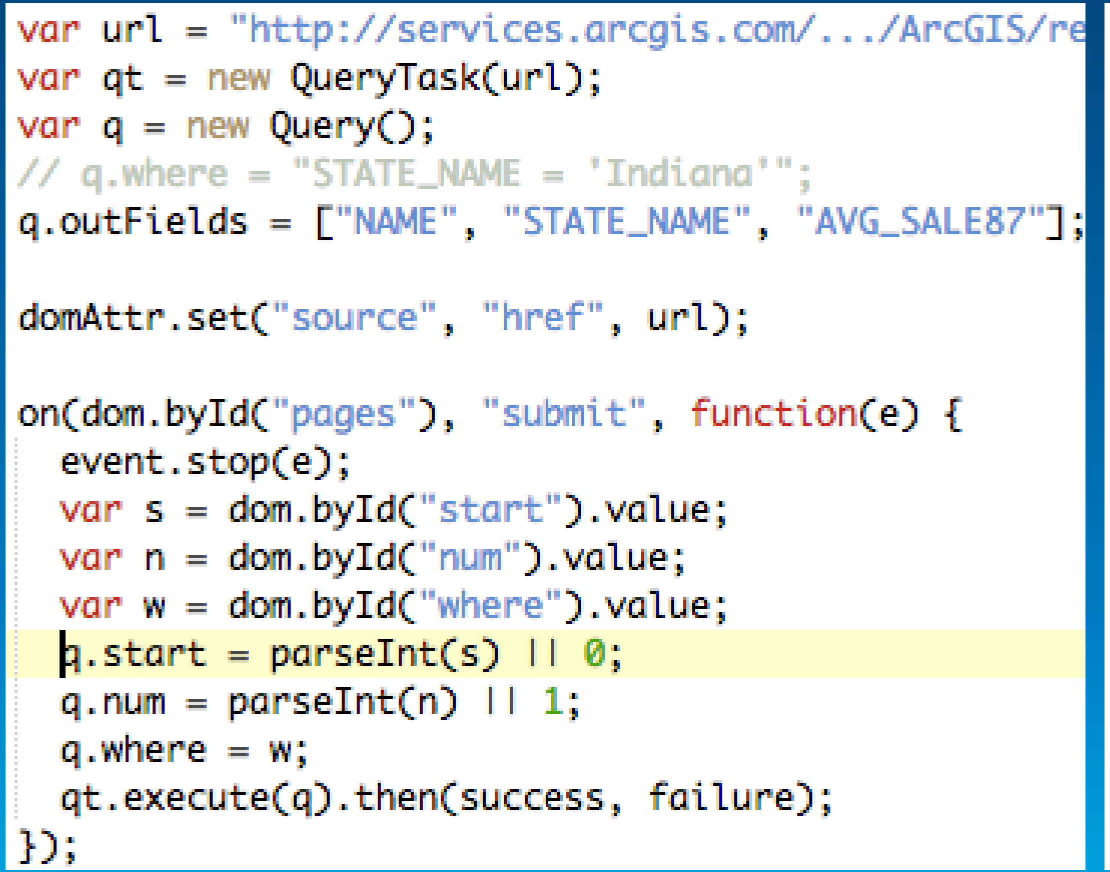
Querying – extent of results (3.9)



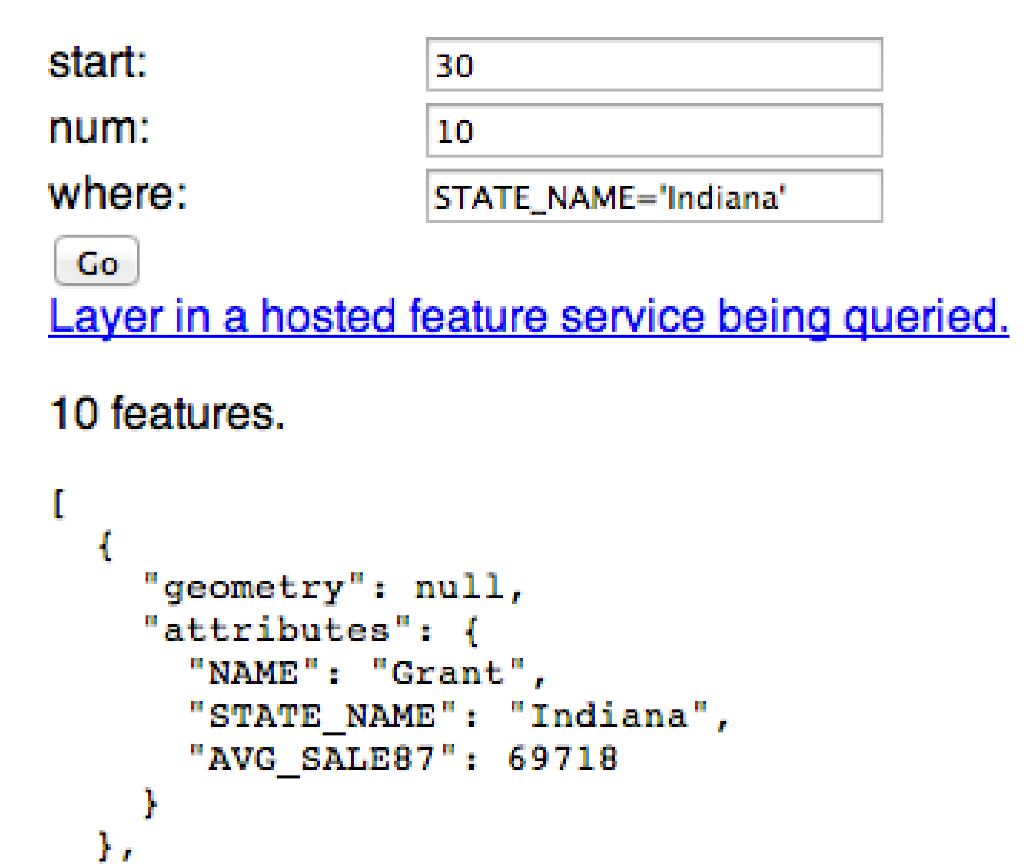
```
qt.executeForExtent(q).then(show);

// Response:
{
  "count": 12,
  "extent": {
    "xmin": -10890961.866111942,
    "ymin": 5163660.09687971,
    "xmax": -10650861.96420725,
    "ymax": 5352182.790255278,
    "spatialReference": {
      "wkid": 102100,
      "latestWkid": 3857
    }
  }
}
```



Query Paging (3.9)



```
var url = "http://services.arcgis.com/.../ArcGIS/re
var qt = new QueryTask(url);
var q = new Query();
// q.where = "STATE_NAME = 'Indiana'";
q.outFields = ["NAME", "STATE_NAME", "AVG_SALE87"];

domAttr.set("source", "href", url);

on(dom.byId("pages"), "submit", function(e) {
  event.stop(e);
  var s = dom.byId("start").value;
  var n = dom.byId("num").value;
  var w = dom.byId("where").value;
  q.start = parseInt(s) || 0;
  q.num = parseInt(n) || 1;
  q.where = w;
  qt.execute(q).then(success, failure);
});
```



start: 30

num: 10

where: STATE_NAME='Indiana'

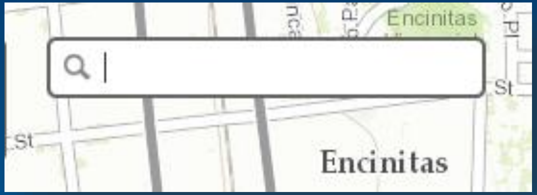
Layer in a hosted feature service being queried.

10 features.

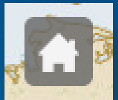
```
[
  {
    "geometry": null,
    "attributes": {
      "NAME": "Grant",
      "STATE_NAME": "Indiana",
      "AVG_SALE87": 69718
    }
  },
```

Widgets

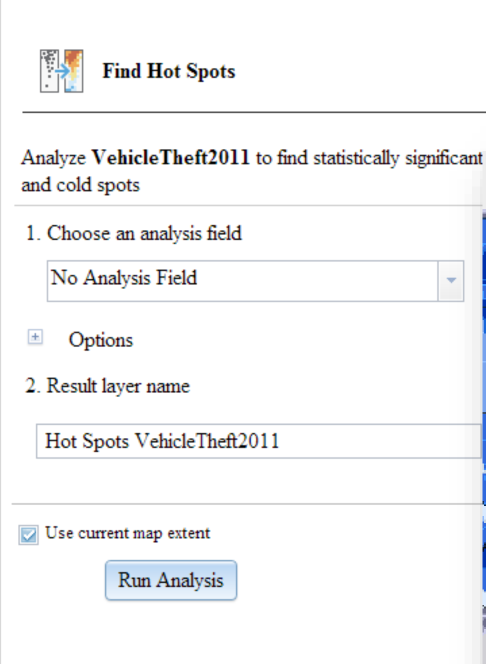
Locator



Home



Analysis



Find Hot Spots

Analyze **VehicleTheft2011** to find statistically significant and cold spots

1. Choose an analysis field

No Analysis Field

⊞ Options

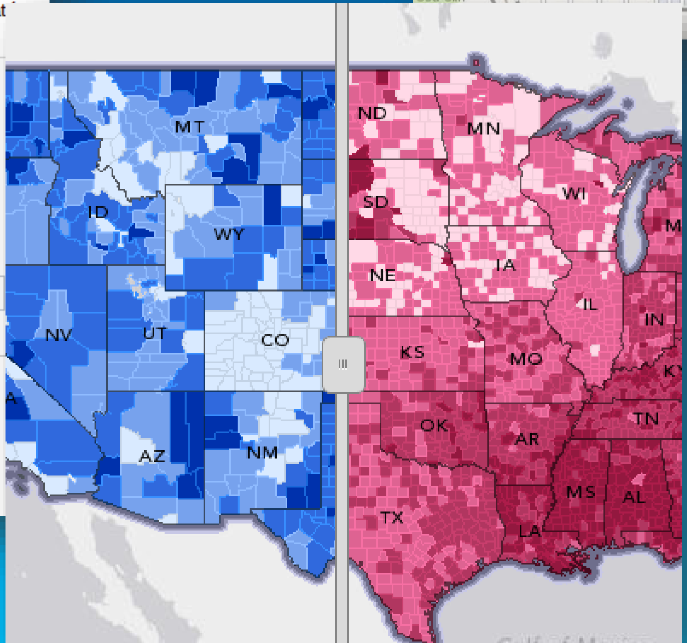
2. Result layer name

Hot Spots VehicleTheft2011

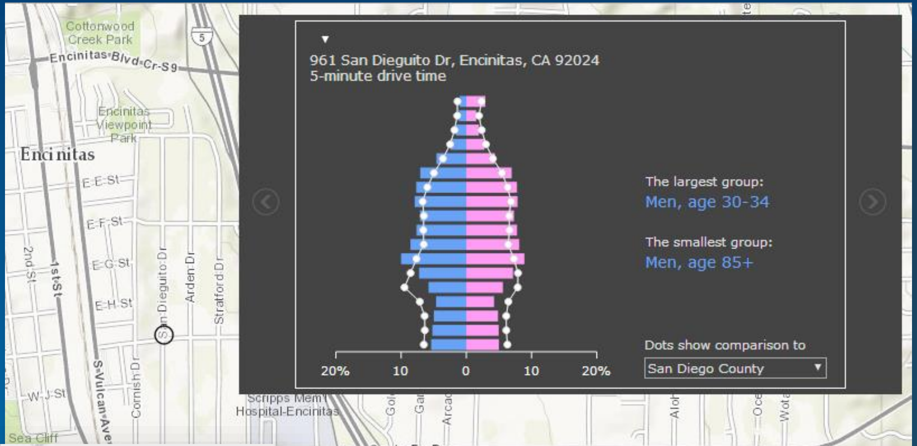
☑ Use current map extent

Run Analysis

Swipe



GeoEnrichment



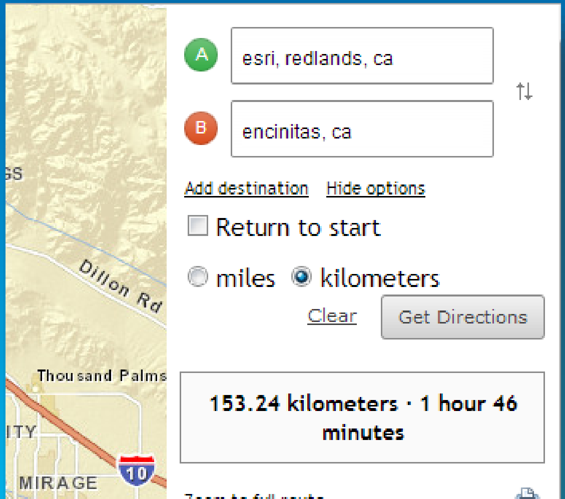
961 San Dieguito Dr, Encinitas, CA 92024
5-minute drive time

The largest group:
Men, age 30-34

The smallest group:
Men, age 85+

Dots show comparison to
San Diego County

Directions



A esri, redlands, ca

B encinitas, ca

Add destination Hide options

□ Return to start

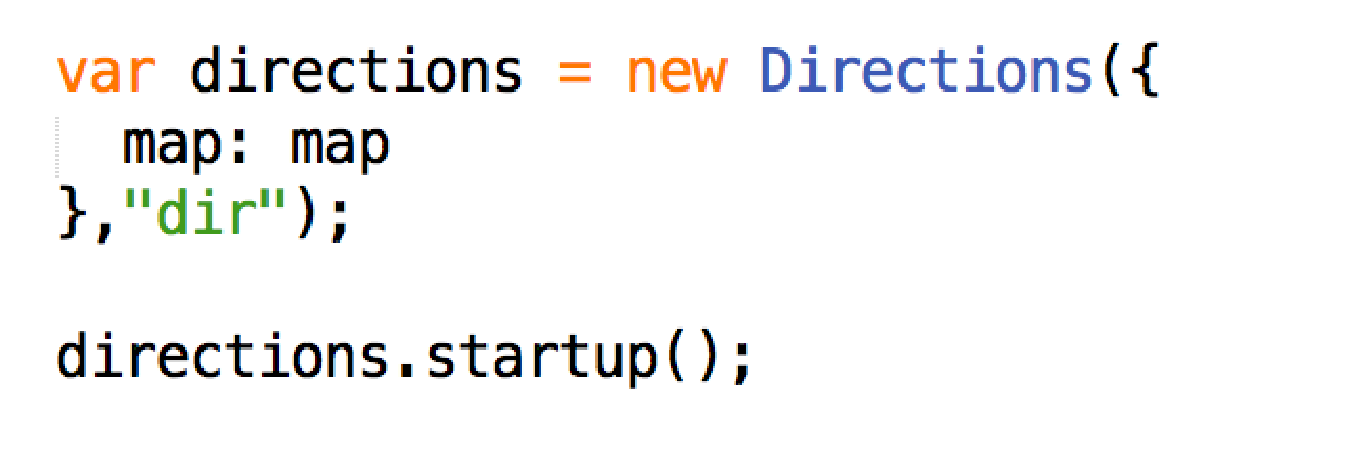
○ miles ● kilometers

Clear Get Directions

153.24 kilometers · 1 hour 46 minutes

Widget coding pattern

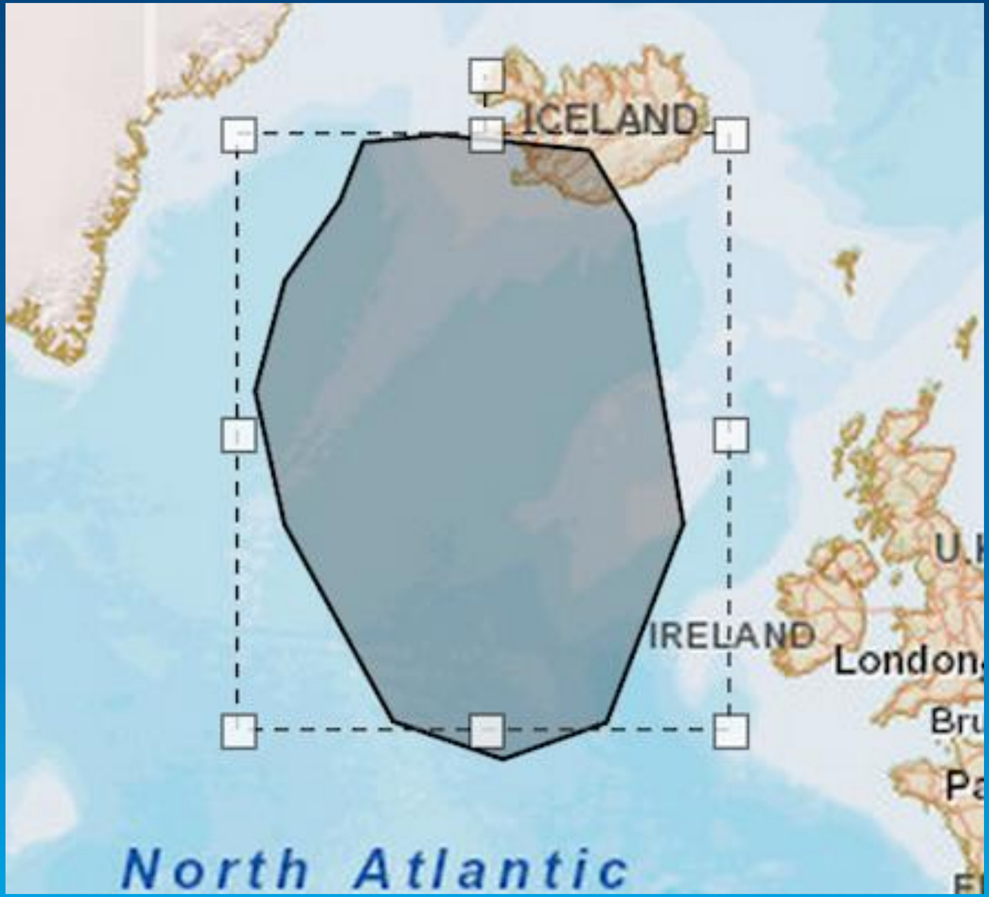
- Create widget
- Set widget properties
- Call startup



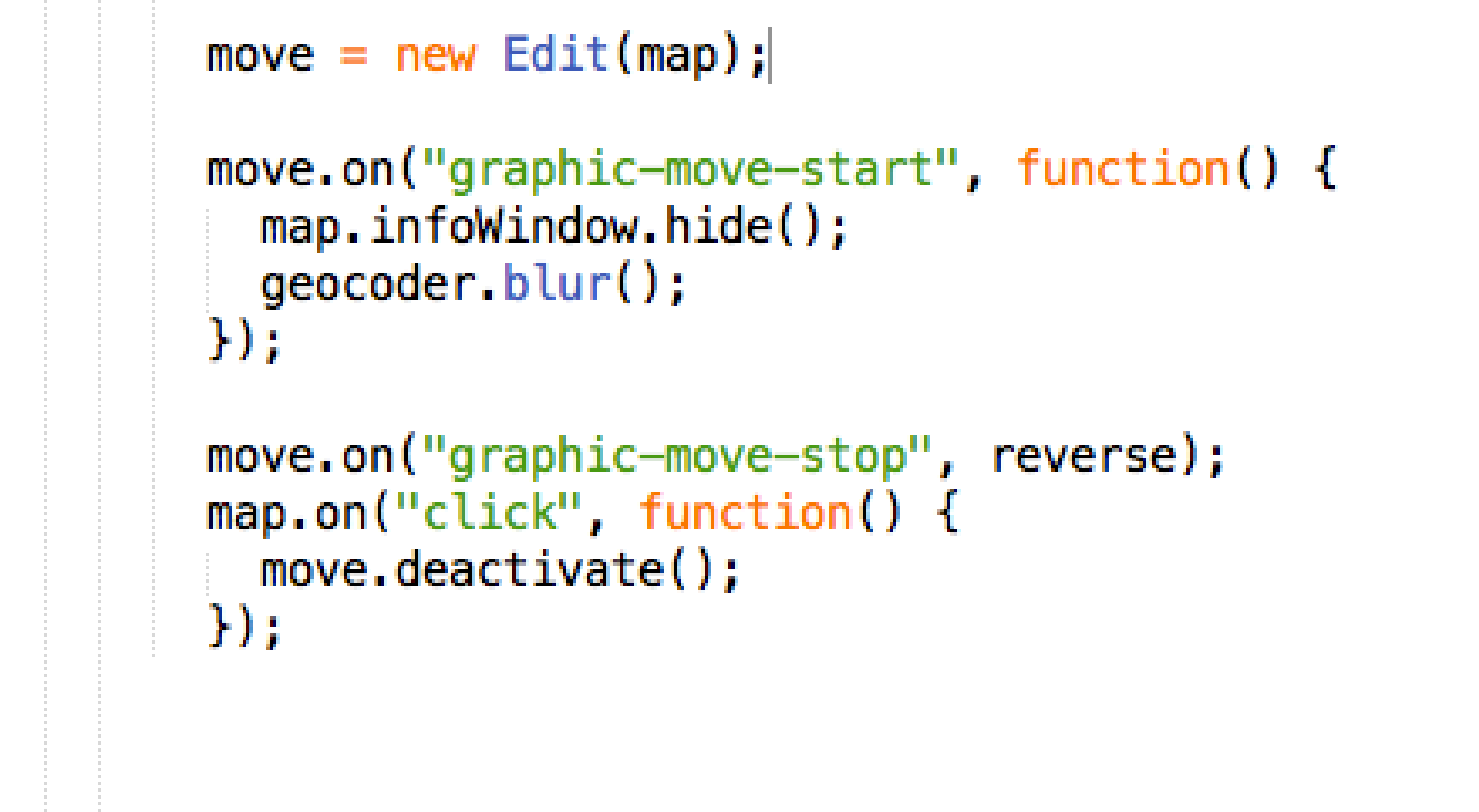
```
var directions = new Directions({
  map: map
},"dir");

directions.startup();
```

Edit geometries

- Helper class
- Edit geometries
  - Move
  - Modify vertices
  - Rotate and scale



Use edit to move graphics



```
move = new Edit(map);

move.on("graphic-move-start", function() {
  map.infoWindow.hide();
  geocoder.blur();
});

move.on("graphic-move-stop", reverse);
map.on("click", function() {
  move.deactivate();
});
```

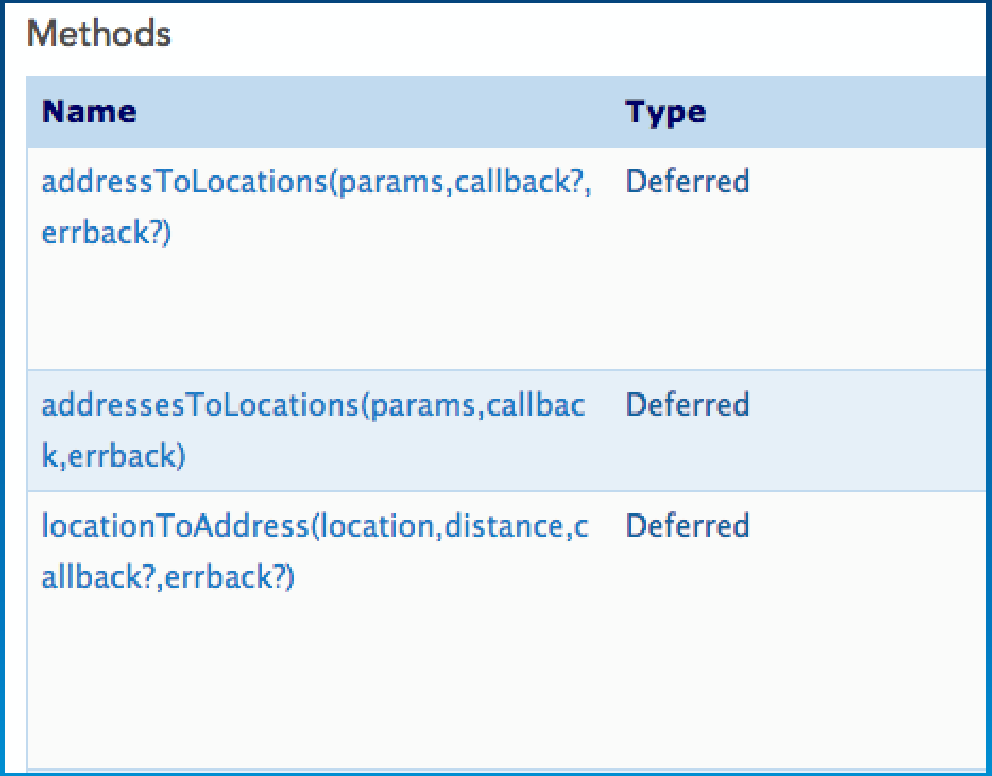
Tasks

- Find Nearest
- Find Address
- Reverse Geocode
- Closest Facility
- And more …

Clay St
Sacramento St
California St
Pine
Western Addition
Bush St
Sutter St
Post St
Presidio Ave
Mayfair Dr
Collins St
Euclid Ave
Lupine Ave
2nd Ave
3rd Ave
4th Ave
Palm Ave
Jordan Ave
Commonwealth Ave
Spruce St
Cook St
Blake St
Geary Blvd
Arguello Blvd
Parker Ave
Anza St
Ewing Ter
University of San Francisco
Masonic Ave
Anzavista Ave
Terra Vista Ave
St Josephs Ave
Ofarrel
Turk St
Rossi Ave
Stanyan St
Willard
Broderick St
boa St

Create a task

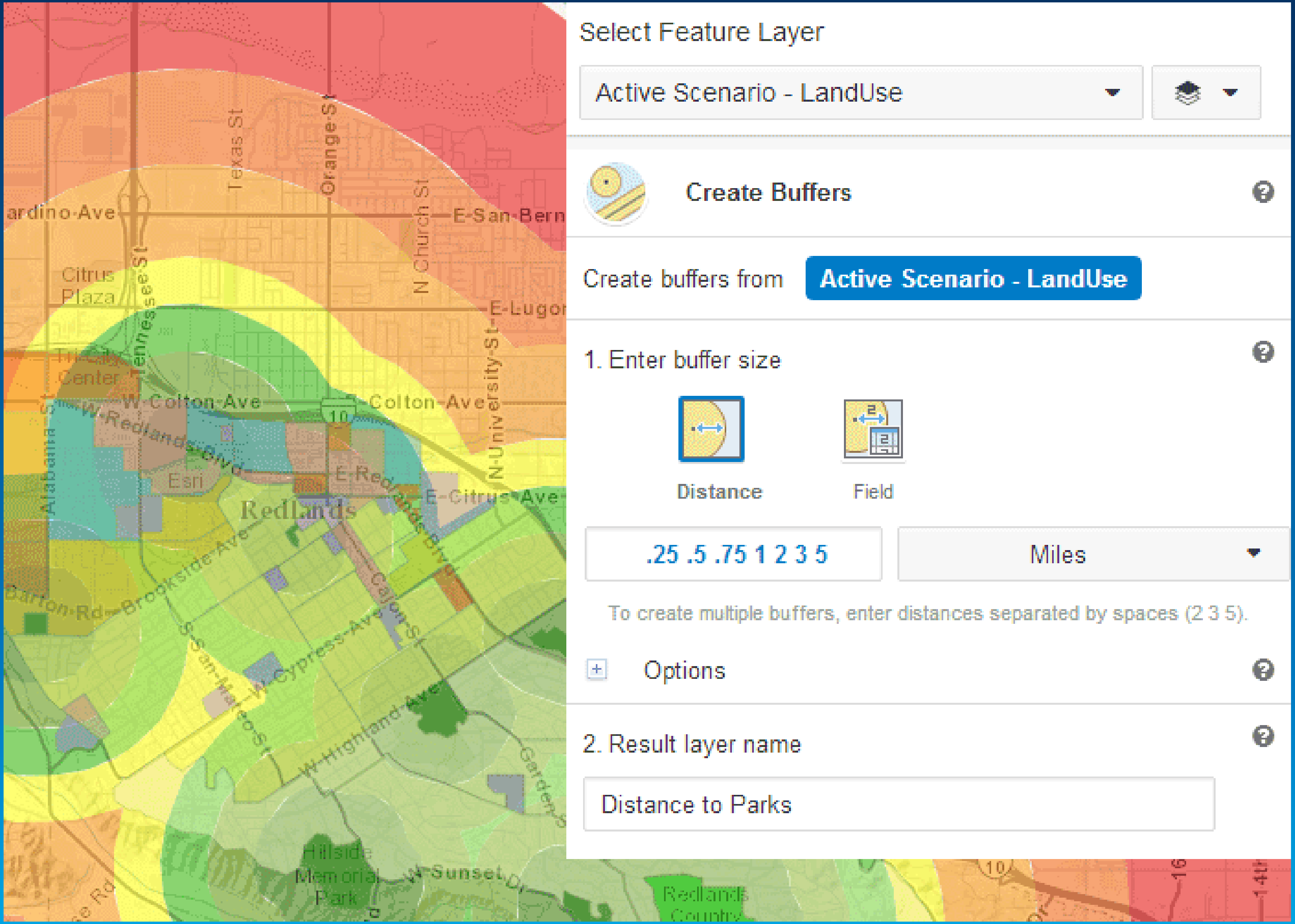
- Create the task
- Execute method
- Handle results



Methods

Name	Type
addressToLocations(params,callback?,errback?)	Deferred
addressesToLocations(params,callback,errback)	Deferred
locationToAddress(location,distance,callback?,errback?)	Deferred

Analysis



Select Feature Layer

Active Scenario - LandUse

Create Buffers

Create buffers from Active Scenario - LandUse

1. Enter buffer size

.25 .5 .75 1 2 3 5 Miles

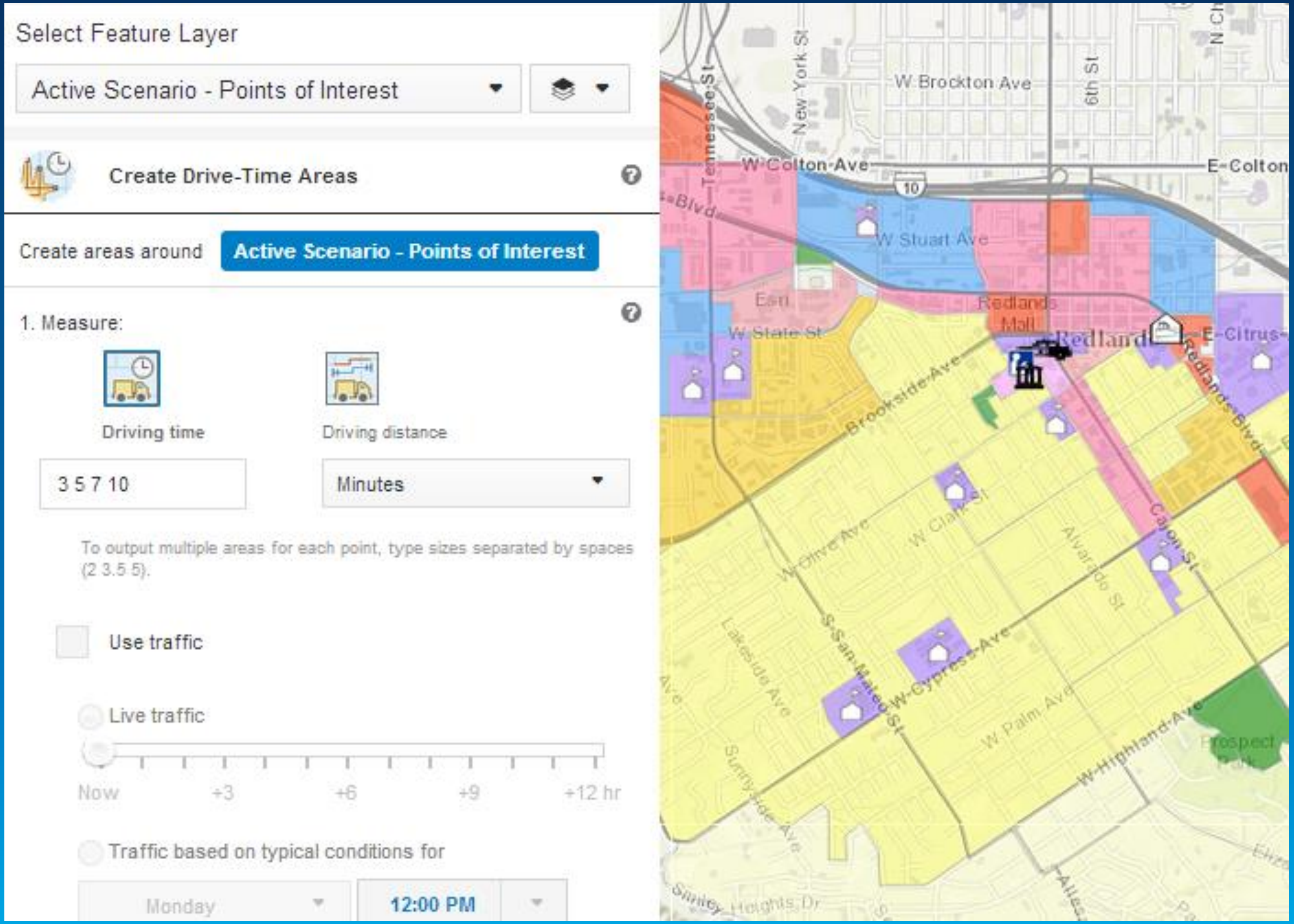
To create multiple buffers, enter distances separated by spaces (2 3 5).

Options

2. Result layer name

Distance to Parks

Analysis



Select Feature Layer

Active Scenario - Points of Interest ▾

Create Drive-Time Areas

Create areas around **Active Scenario - Points of Interest**

1. Measure:

Driving time

Driving distance

3 5 7 10

Minutes ▾

To output multiple areas for each point, type sizes separated by spaces (2 3.5 5).

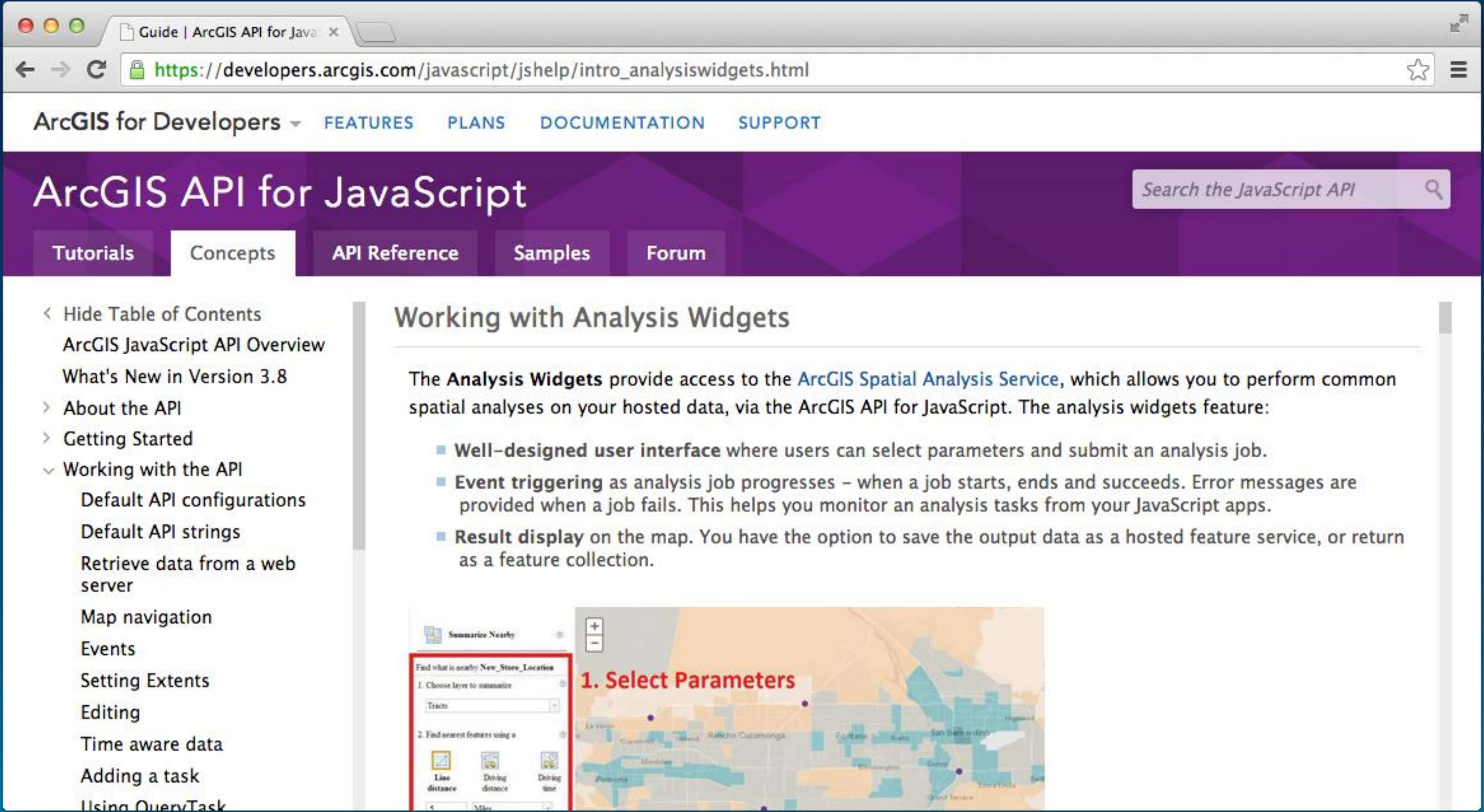
□ Use traffic

○ Live traffic

Now +3 +6 +9 +12 hr

○ Traffic based on typical conditions for

Monday ▾ 12:00 PM ▾



Guide | ArcGIS API for Java
https://developers.arcgis.com/javascript/jshelp/intro_analysiswidgets.html
ArcGIS for Developers
FEATURES
PLANS
DOCUMENTATION
SUPPORT
Search the JavaScript API
Tutorials
Concepts
API Reference
Samples
Forum

ArcGIS API for JavaScript

- Hide Table of Contents
- ArcGIS JavaScript API Overview
- What's New in Version 3.8
- About the API
- Getting Started
- Working with the API
  - Default API configurations
  - Default API strings
  - Retrieve data from a web server
  - Map navigation
  - Events
  - Setting Extents
  - Editing
  - Time aware data
  - Adding a task
  - Using QueryTask

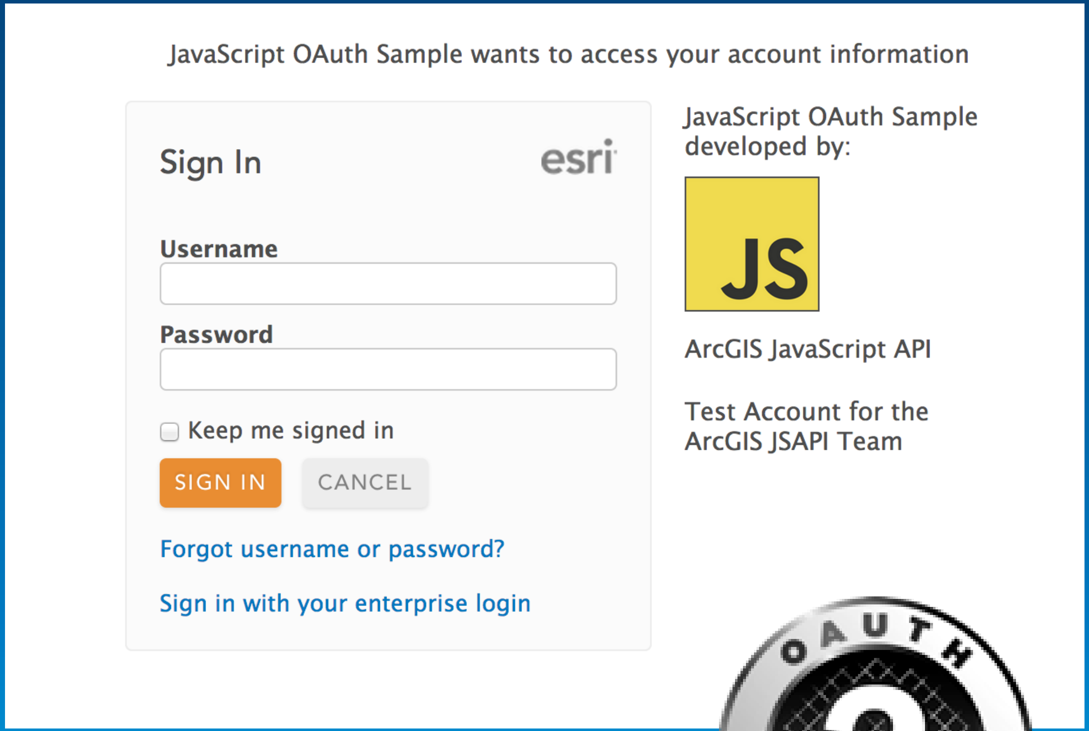
Working with Analysis Widgets

The **Analysis Widgets** provide access to the ArcGIS Spatial Analysis Service, which allows you to perform common spatial analyses on your hosted data, via the ArcGIS API for JavaScript. The analysis widgets feature:

- **Well-designed user interface** where users can select parameters and submit an analysis job.
- **Event triggering** as analysis job progresses – when a job starts, ends and succeeds. Error messages are provided when a job fails. This helps you monitor an analysis tasks from your JavaScript apps.
- **Result display** on the map. You have the option to save the output data as a hosted feature service, or return as a feature collection.

Tip: Adding secure layers

- Identity Manager
- OAuth support



JavaScript OAuth Sample wants to access your account information

Sign In
esri
Username
Password
□ Keep me signed in
SIGN IN
CANCEL
Forgot username or password?
Sign in with your enterprise login
JS

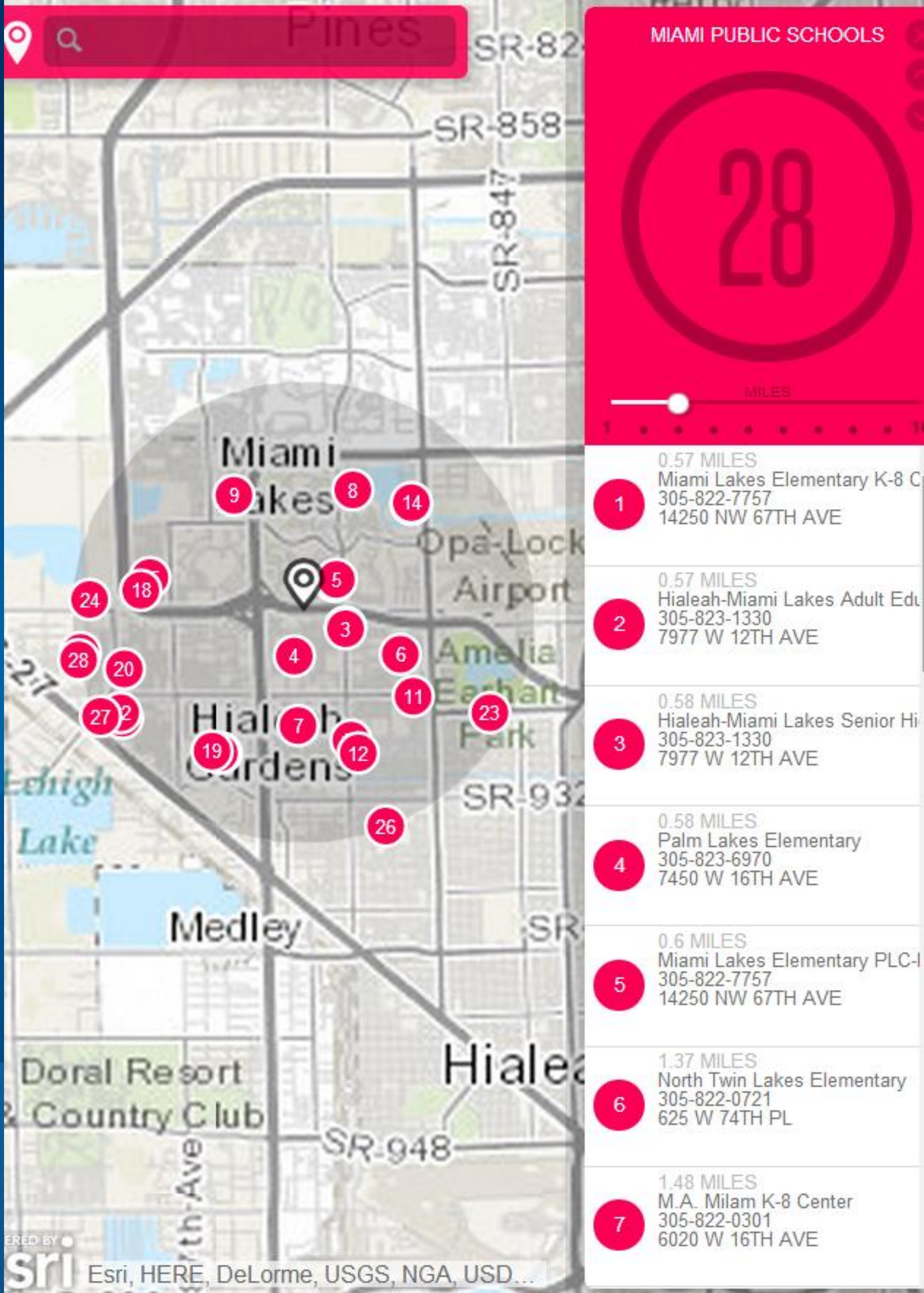
JavaScript OAuth Sample developed by:

ArcGIS JavaScript API

Test Account for the ArcGIS JSAPI Team

Configurable Apps

Web App Templates & Web AppBuilder



MIAMI PUBLIC SCHOOLS

28

MILES

1 0.57 MILES
Miami Lakes Elementary K-8 C
305-822-7757
14250 NW 67TH AVE

2 0.57 MILES
Hialeah-Miami Lakes Adult Edu
305-823-1330
7977 W 12TH AVE

3 0.58 MILES
Hialeah-Miami Lakes Senior Hi
305-823-1330
7977 W 12TH AVE

4 0.58 MILES
Palm Lakes Elementary
305-823-6970
7450 W 16TH AVE

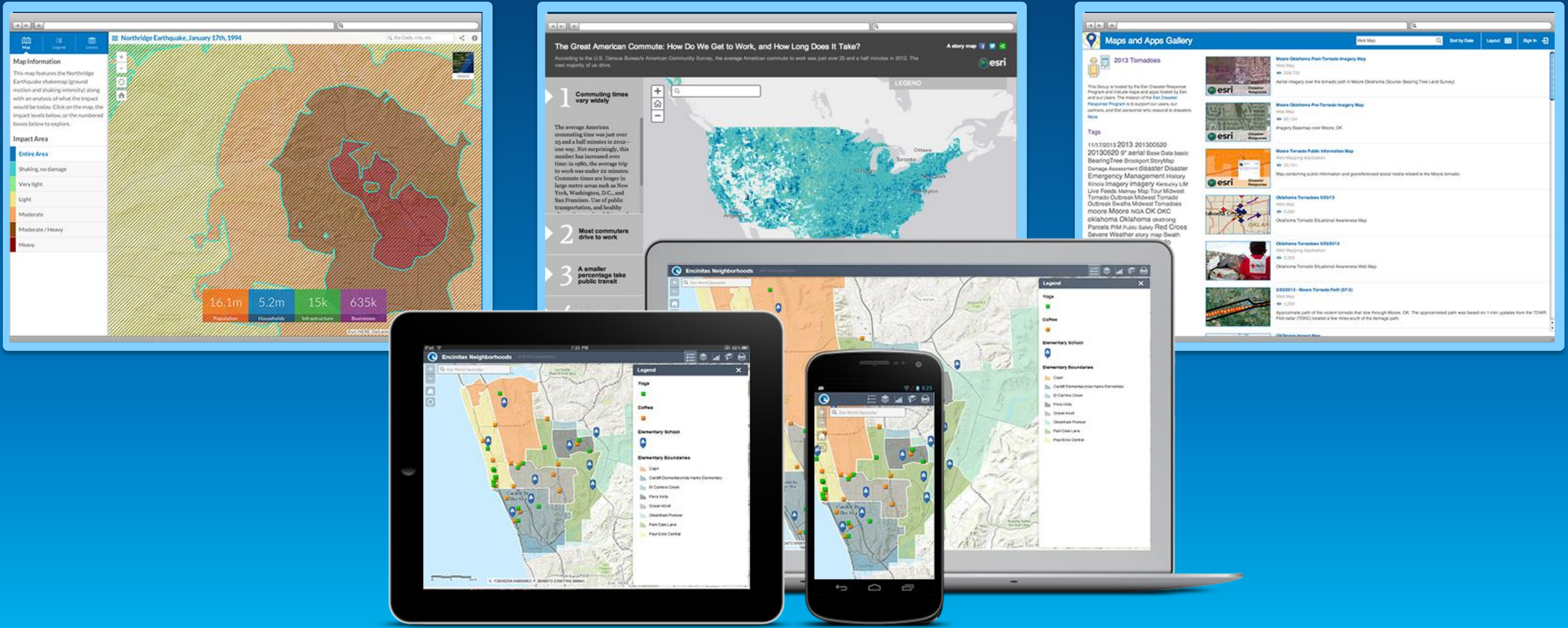
5 0.6 MILES
Miami Lakes Elementary PLC-I
305-822-7757
14250 NW 67TH AVE

6 1.37 MILES
North Twin Lakes Elementary
305-822-0721
625 W 74TH PL

7 1.48 MILES
M.A. Milam K-8 Center
305-822-0301
6020 W 16TH AVE

Configuring Web Apps with ArcGIS

Web App Templates | Web AppBuilder



Map Information

This map features the Northridge Earthquake shakemap (ground motion and shaking intensity) along with an analysis of what the impact would be today. Click on the map, the impact levels below, or the numbered boxes below to explore.

The Great American Commute: How Do We Get to Work, and How Long Does It Take?

According to the U.S. Census Bureau's American Community Survey, the average American commute to work was just over 25 and a half minutes in 2012. The vast majority of us drive.

The average American commuting time was just over 25 and a half minutes in 2012—one way. Not surprisingly, this number has increased over time: in 1980, the average trip to work was under 22 minutes. Commute times are longer in large metro areas such as New York, Washington, D.C., and San Francisco. Use of public transportation, and healthy

This Group is hosted by the Esri Disaster Response Program and include maps and apps hosted by Esri and our Users. The mission of the Esri Disaster Response Program is to support our users, our partners, and Esri personnel who respond to disasters.

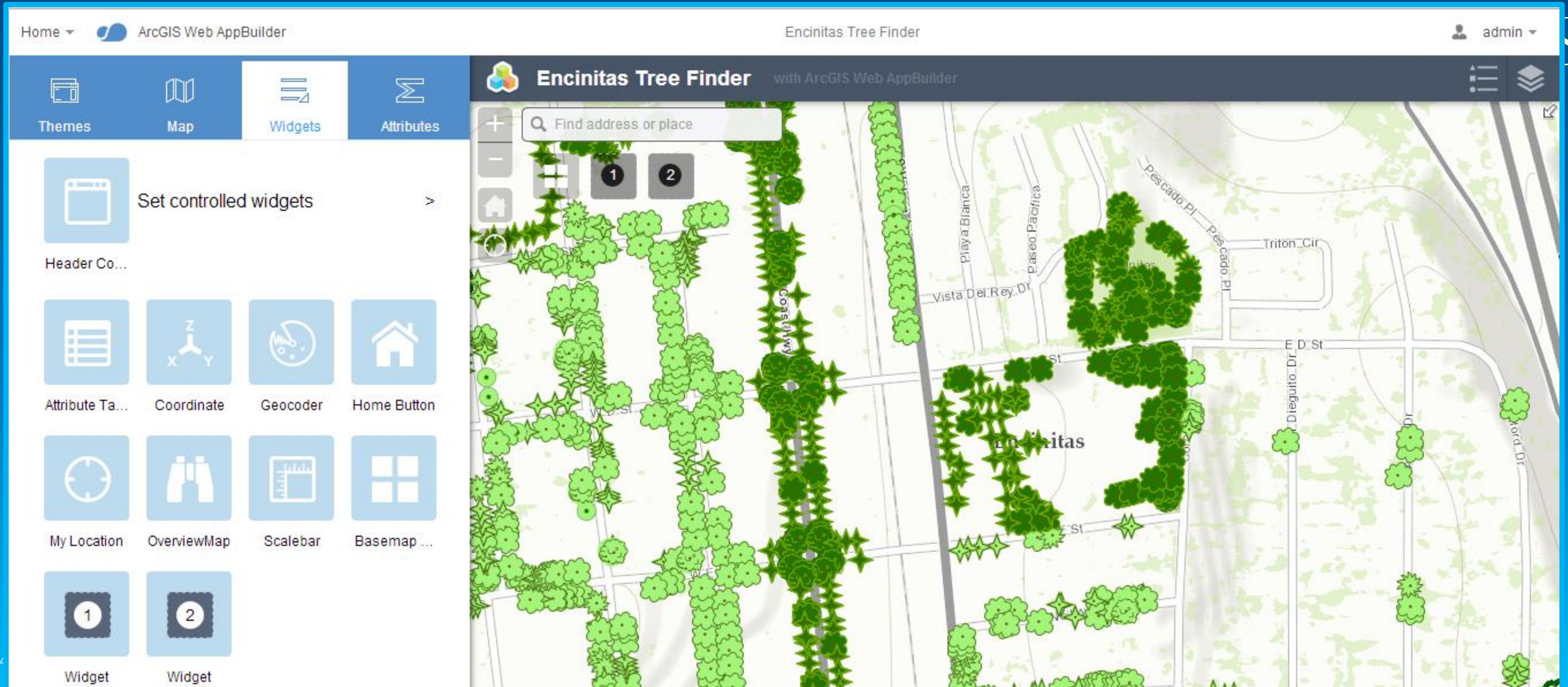
Tags
11/17/2013 2013 20130520 20130520 9" aerial Base Data basic BearingTree Brookport StoryMap Damage Assessment disaster Disaster Emergency Management History Illinois Imagery imagery Kentucky LM Live Feeds Malmay Map Tour Midwest Tornado Outbreak Midwest Tornado Outbreak Swaths Midwest Tornadoes moore Moore NGA OK OKC oklahoma Oklahoma okstrong Parcels PIM Public Safety Red Cross Severe Weather story map Swath
Moore Oklahoma Post-Tornado Imagery Map
Moore Oklahoma Pre-Tornado Imagery Map
Moore Tornado Public Information Map
Oklahoma Tornadoes 5/20/13
Oklahoma Tornadoes 5/20/2013
5/20/2013 - Moore Tornado Path (EF-5)
Encinitas Neighborhoods
Legend
Yoga
Coffee
Elementary School
Elementary Boundaries

Configuring Web Apps with ArcGIS

Many options for using apps to make your map come alive

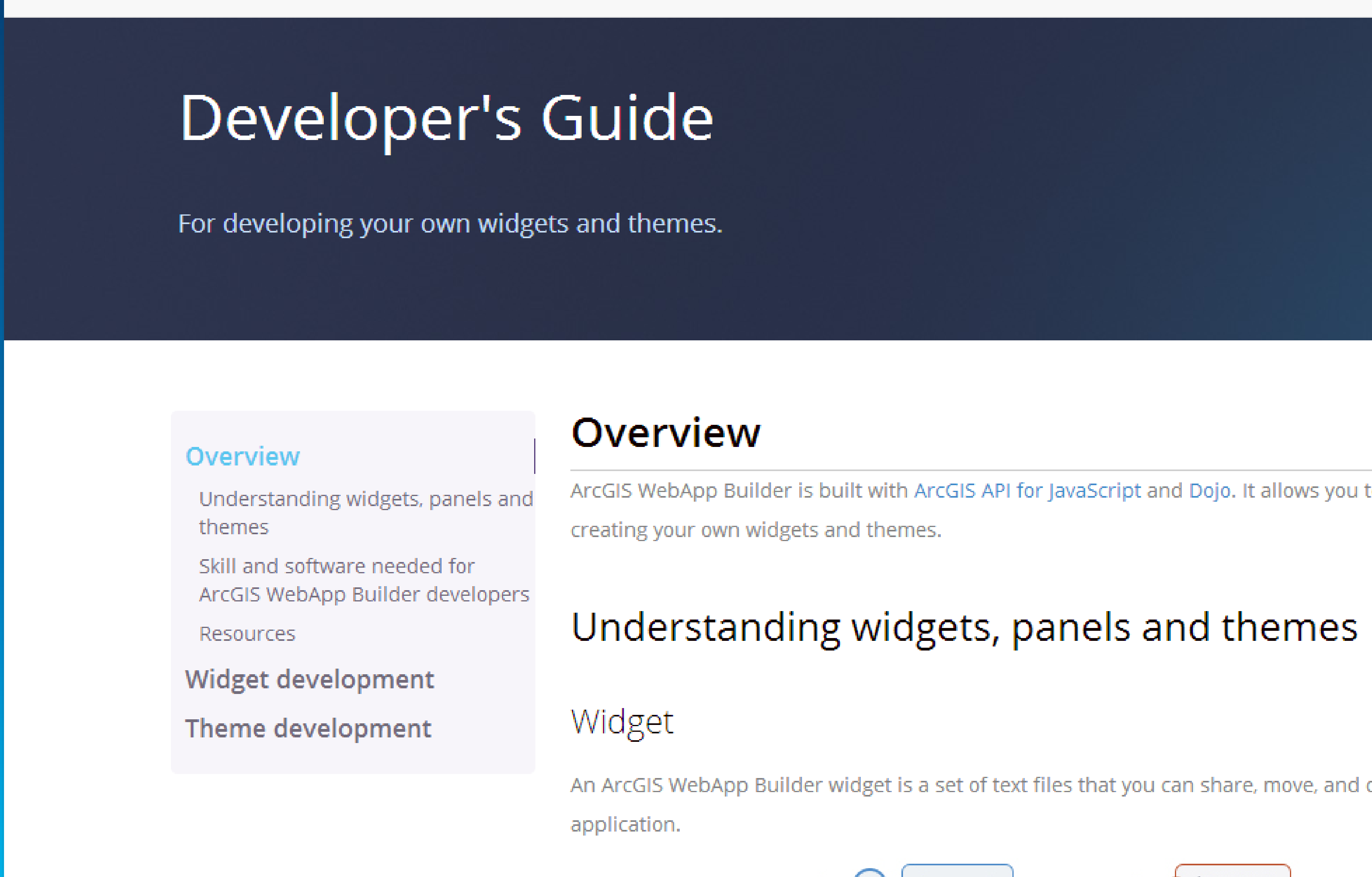
WEB APPBUILDER FOR

S



Extensible: Opportunities for developers and partners

- Extend functionality with custom widgets
- Personalize look & feel with custom themes



Developer's Guide

For developing your own widgets and themes.

Overview

- Understanding widgets, panels and themes
- Skill and software needed for ArcGIS WebApp Builder developers
- Resources

Widget development

Theme development

Overview

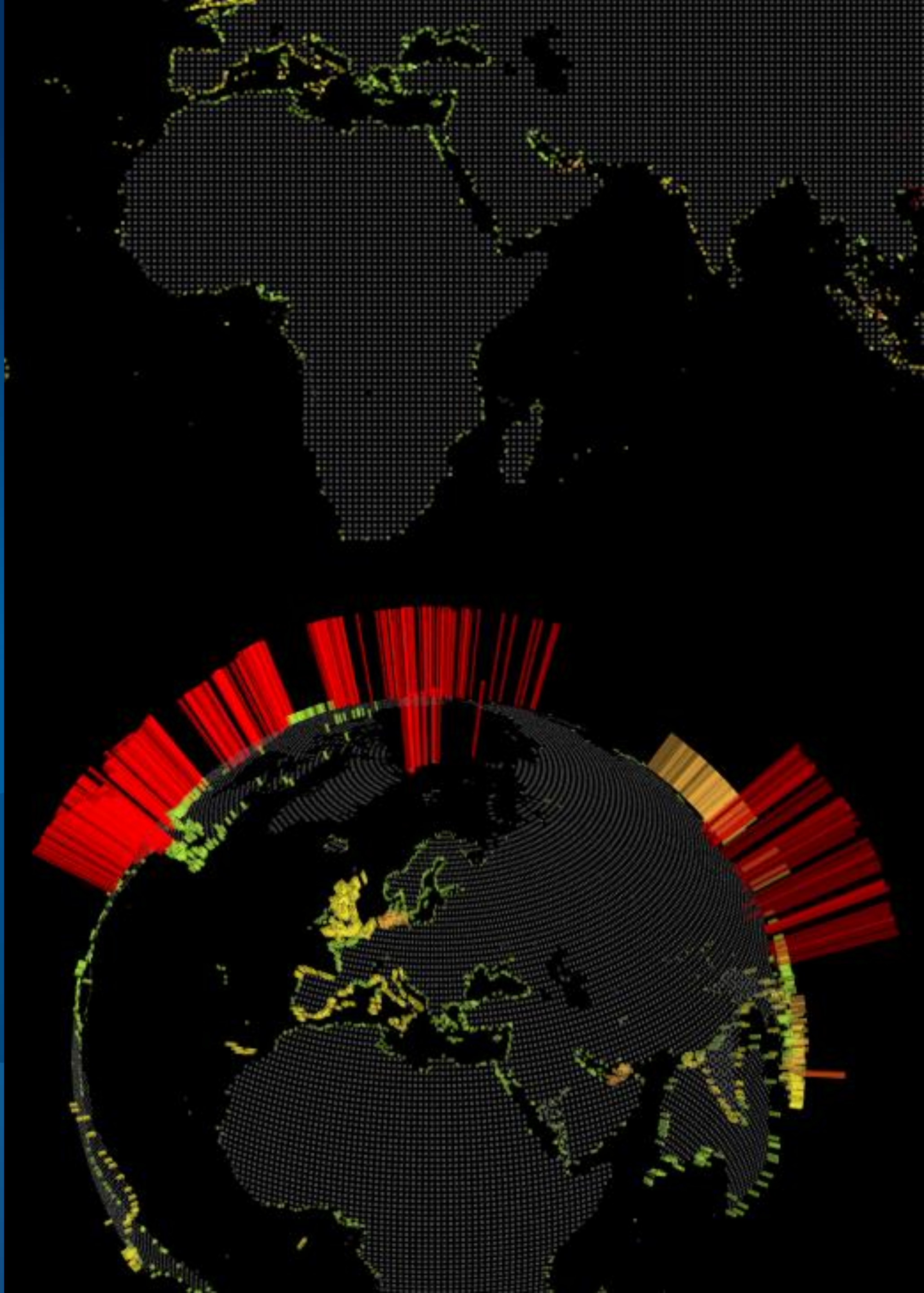
ArcGIS WebApp Builder is built with ArcGIS API for JavaScript and Dojo. It allows you t creating your own widgets and themes.

Understanding widgets, panels and themes

Widget

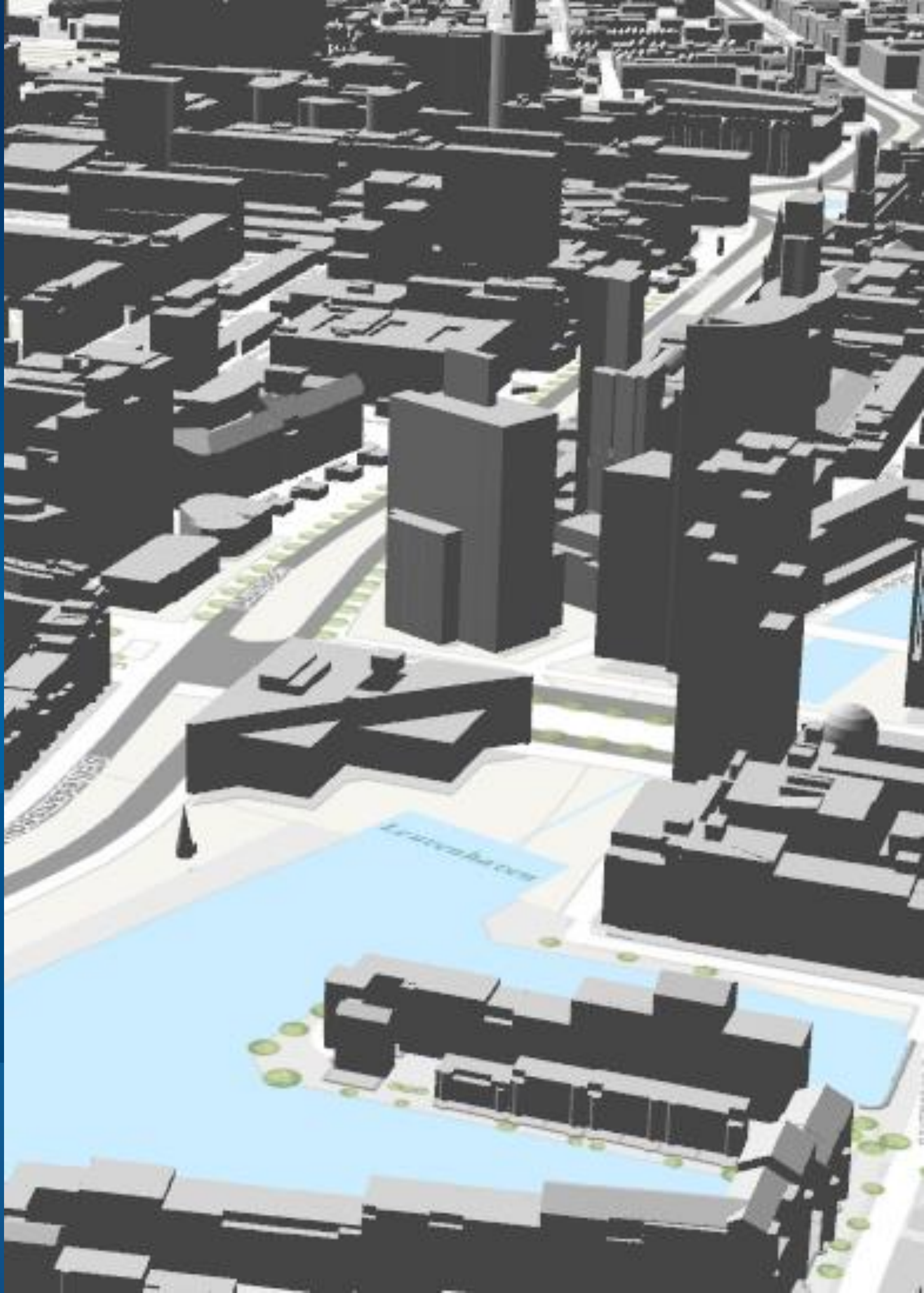
An ArcGIS WebApp Builder widget is a set of text files that you can share, move, and c application.

ArcGIS API for JavaScript Road Ahead

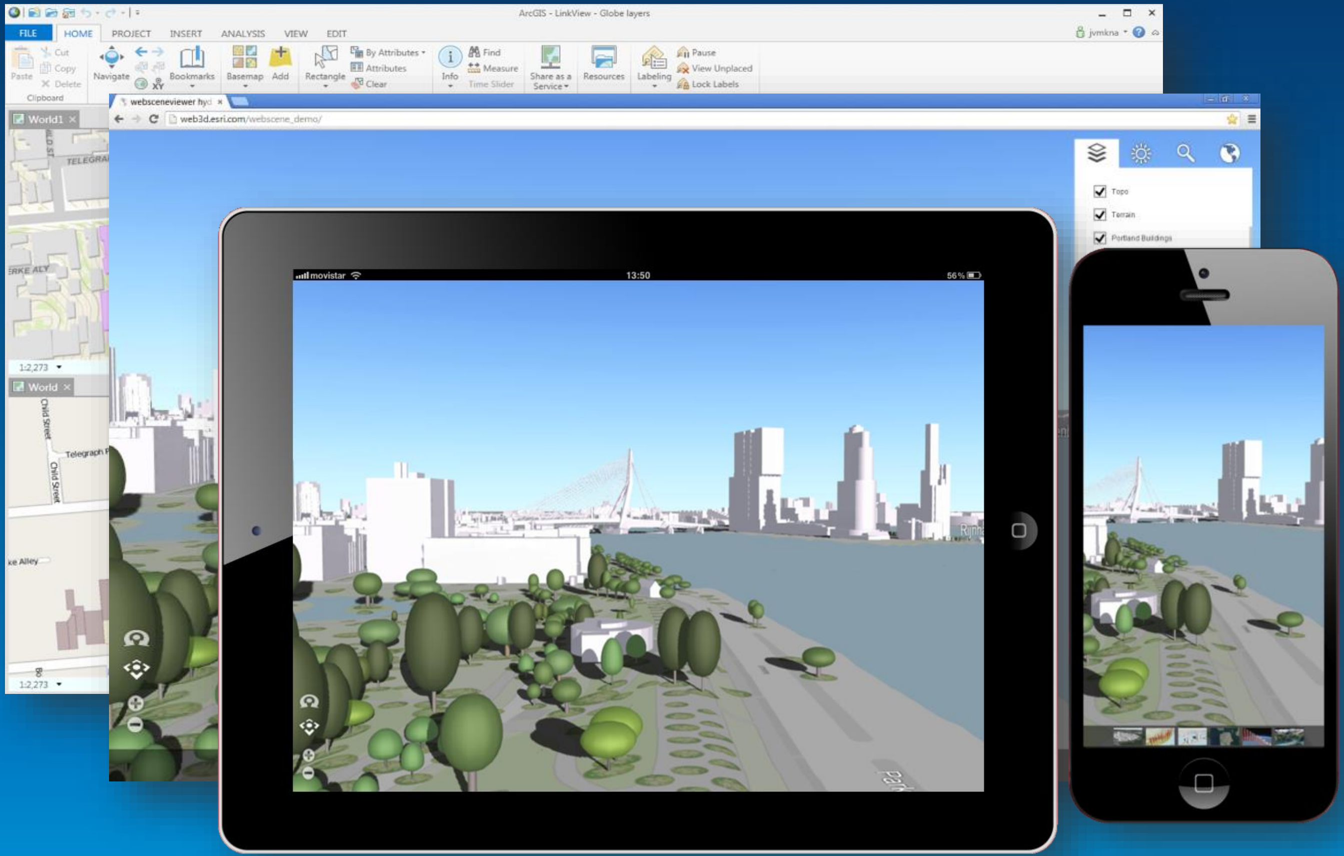


Capabilities

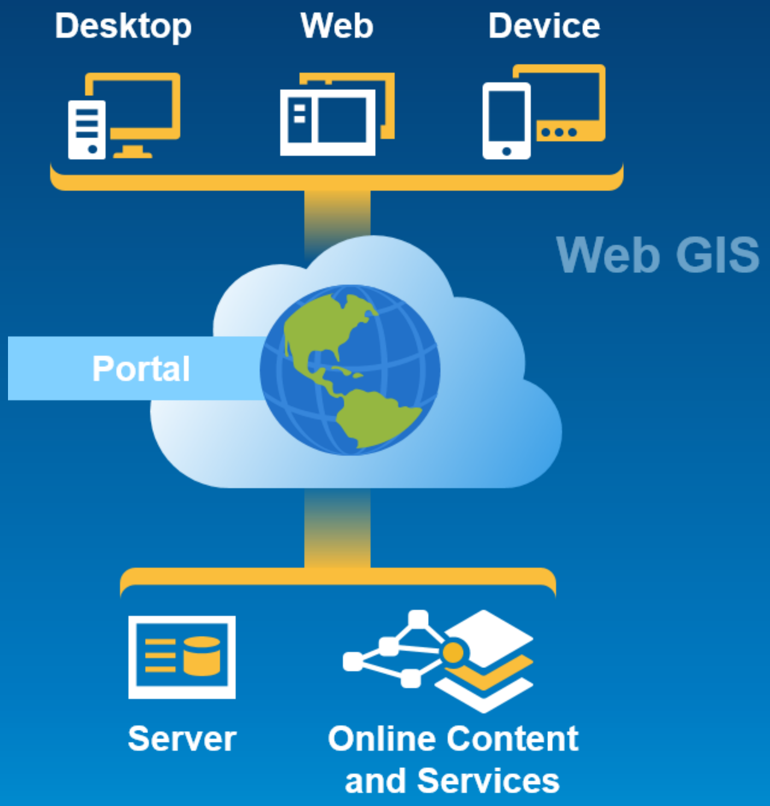
Web 3D



A New Way of Working in 3D

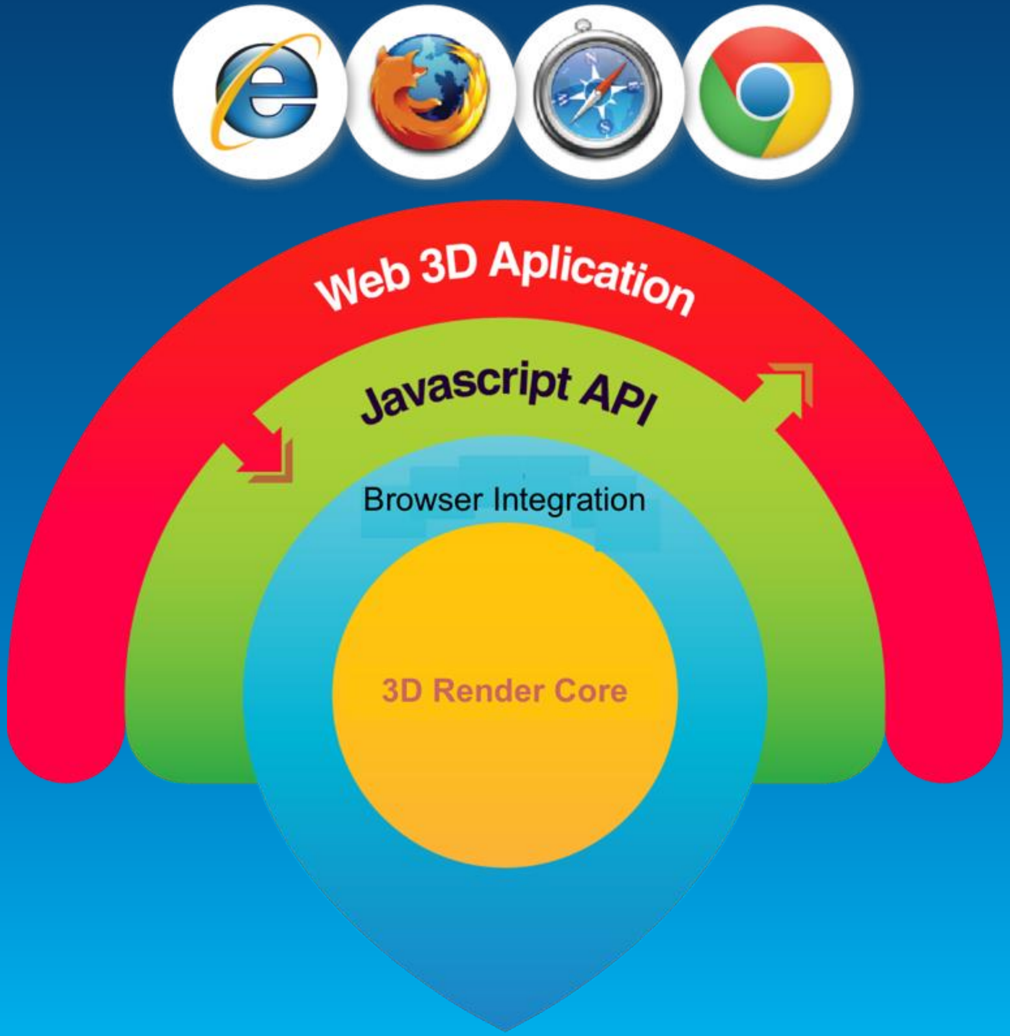


Desktop Web Device



3D across the platform

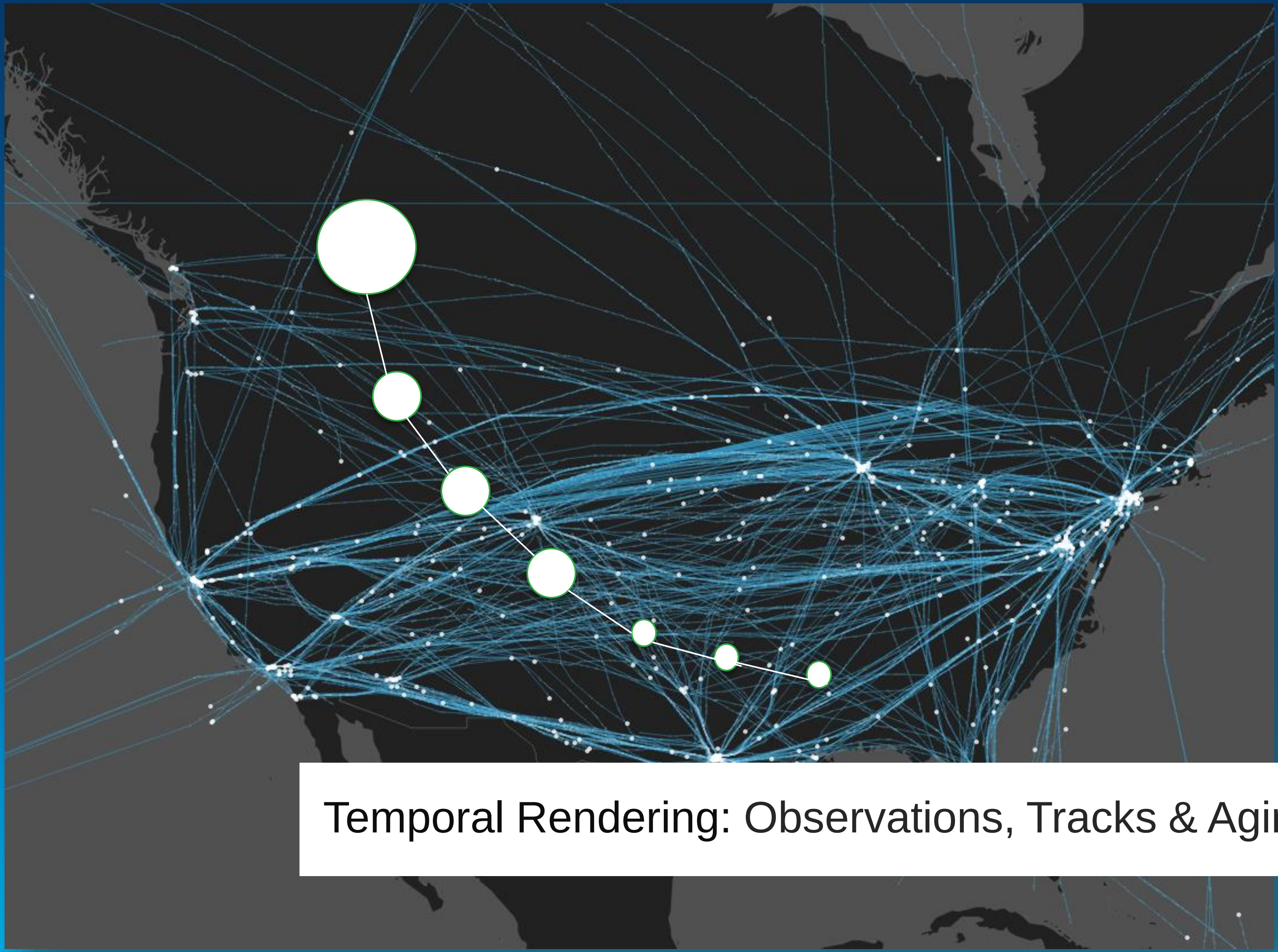
Building 3D Apps



Capabilities

Streaming Data

WebSockets & StreamLayer

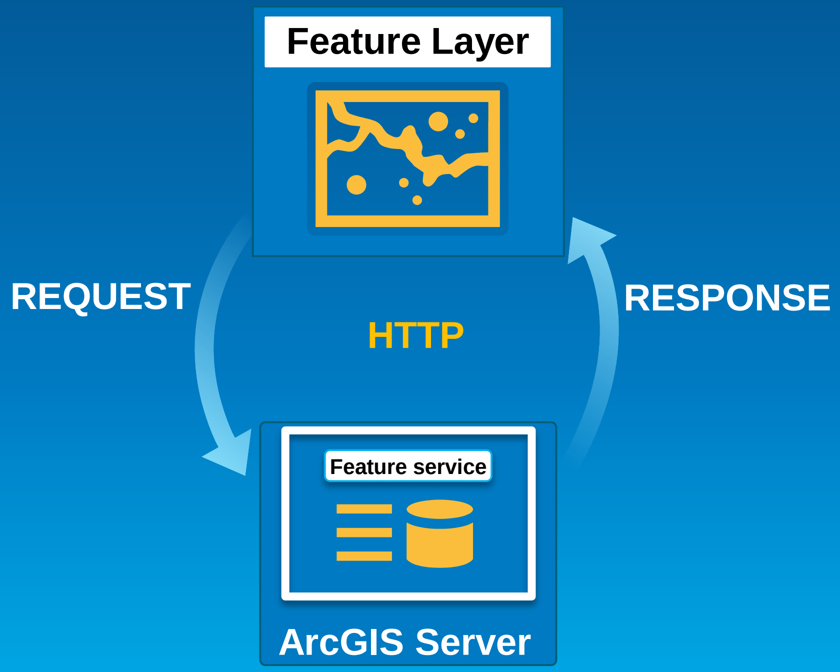


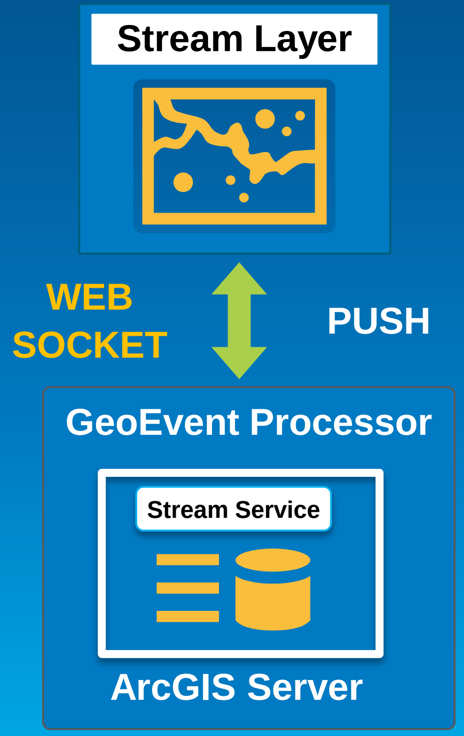
Temporal Rendering: Observations, Tracks & Aging

Stream Layer and Stream Service

- Another type of layer in the Javascript API
  - Introduced in version 3.6

esri/layers/GraphicsLayer
└─ esri/layers/FeatureLayer
  └─ esri/layers/StreamLayer





Other areas…

- Better touch support
  - Editing, drawing, interacting with features
- Responsive widgets
  - Attribute Inspector
  - Measurement
- Updated Widgets
  - Search/geocoding
- New Widgets
  - Attribute table widget
  - Table of contents

- Renderering Options
  - Heatmap
  - Clustering
  - Binning
  - Size symbol based on map scale

Better Integration with the Portal Information Model

- WebMap
  - For developers working with WebMaps
  - For developers looking to author WebMaps

- Layers
  - Create layer from portal item

Releases

3.11 -- Oct 2014

3.12 – Dec 2014

4.0 Beta Q1 2015