GIScience

Web GIS

Image from NASA:
https://commons.wikimedia.org/wiki/File:Earth_Western_Hemisphere_transparent_background.png#filelinks

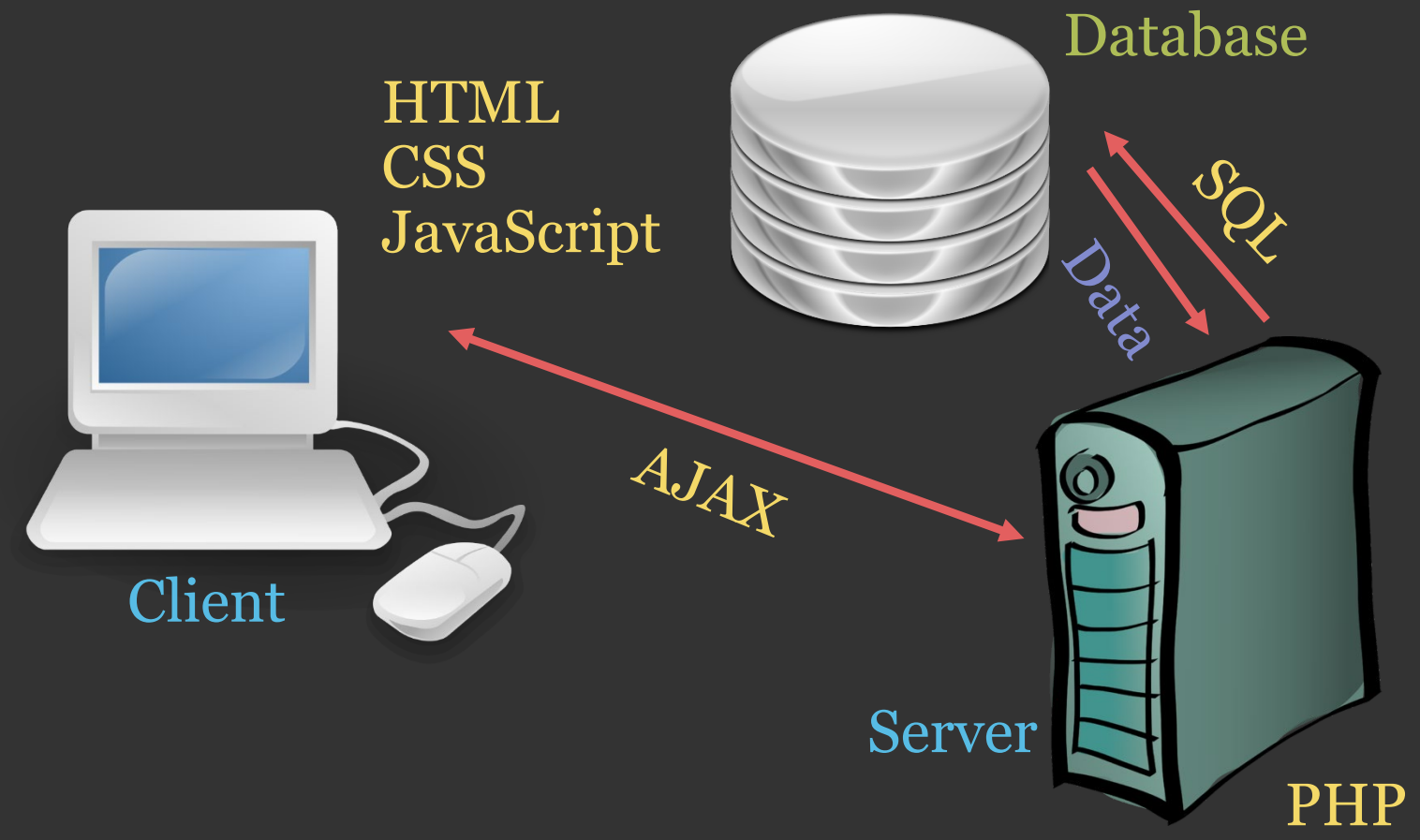
WV VIEW

AmericaView℠
Empowering Earth Observation Education
AmericaView.org - Est. 2003

Web GIS

Client-Server Architecture

- Client = computers, tablets, phones, etc.
- Multiple clients can interact with one server
- Client requests data from server
- Server processes request and returns result
- Client does something with result



https://commons.wikimedia.org/wiki/File:Oxygen480-places-server-database.svg

https://commons.wikimedia.org/wiki/File:Scribley_PC_clip_art.png

By OpenClipart - OpenClipart, CC0, https://commons.wikimedia.org/w/index.php?curid=721320

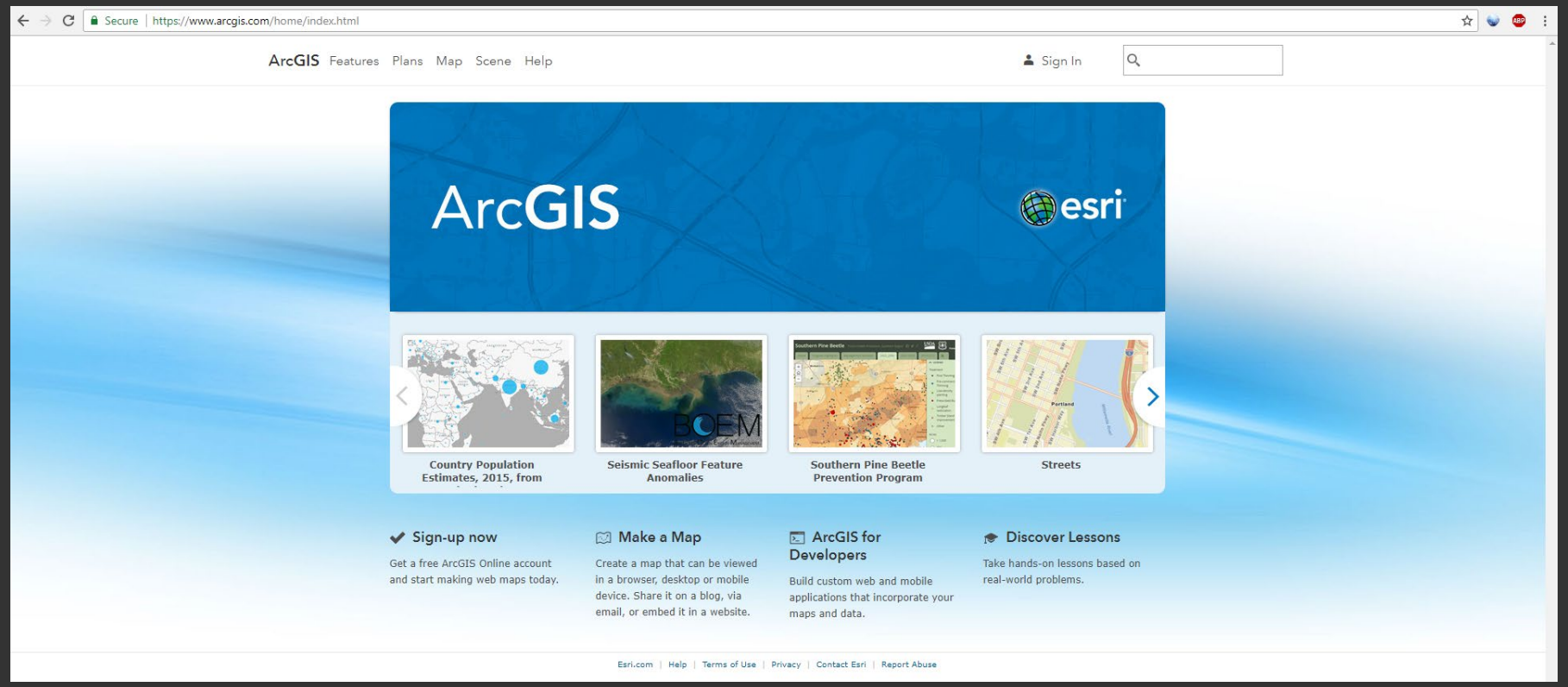
Web 2.0

Websites that emphasize:

- User-generated content
- Usability (ease of use, even by non-experts)
- Interoperability (this means that a website can work well with other products, systems, and devices) for end users

ArcGIS Online

- Allows you to create maps and host content for use on the Web

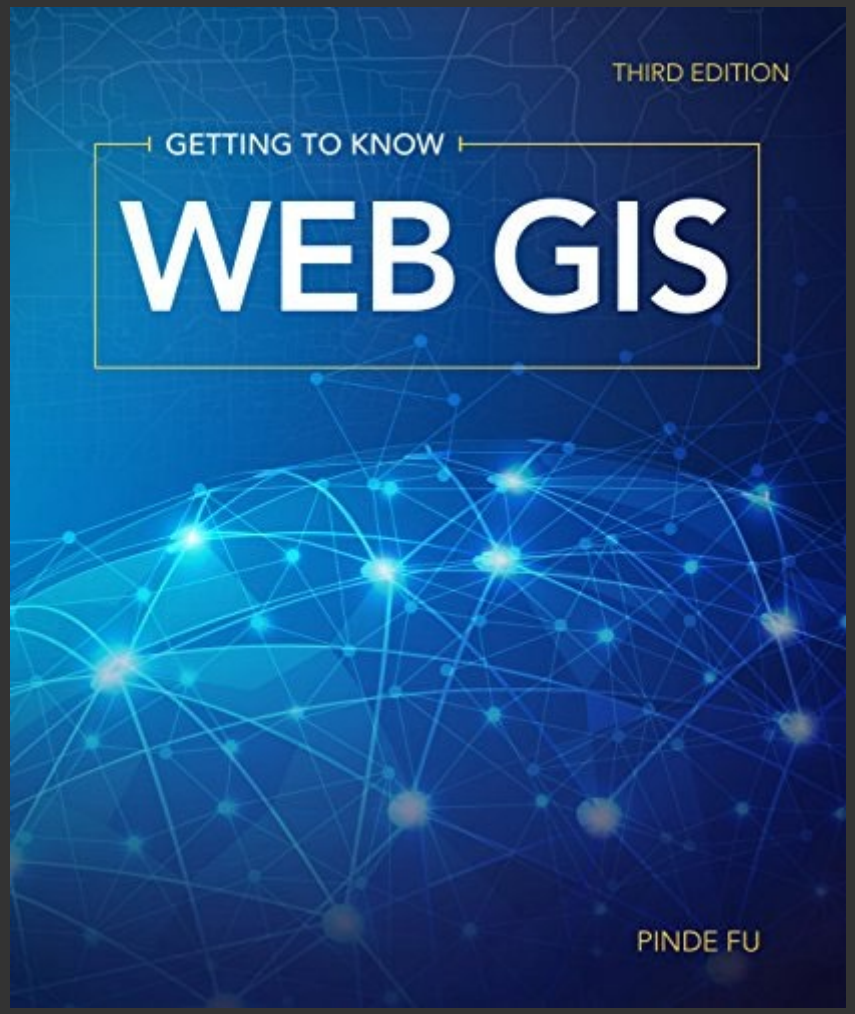


https://www.arcgis.com/home/index.html

ArcGIS Online

- Created by ESRI
- Integrated with ArcGIS Pro
- Can obtain a free account with limited access
- Can pay for an account and use more advanced functionality
  - Organization accounts
  - Allotted credits

Learn Web GIS



https://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=353&moduleID=0

User Types

Viewer = allows member to view items that have been shared with them by other ArcGIS Online users.

Editor = allows member to view and edit items that have been shared with them by other ArcGIS Online users.

Field Worker = allows member to view and edit items that have been shared with them by other ArcGIS Online users with a primary focus on field apps.

Creator = allows member to view, edit, create, and share content.

GIS Professional = allows member to view, edit, create, and share content. Member also has access to the ArcGIS Pro desktop application.

Roles

Viewer = allows member to view items that have been shared with them by other ArcGIS Online users. The member will also be able to join groups within the organization.

Data Editor = allows the member to view and edit data. The member will also be able to join groups within the organization.

User = allows member to view items that have been shared with them by other ArcGIS Online users. Users can also create maps and apps, edit features, add items, share content, and create groups.

Publisher = allows member to have all the privileges of users plus the ability to publish features and map tiles as hosted web layers.

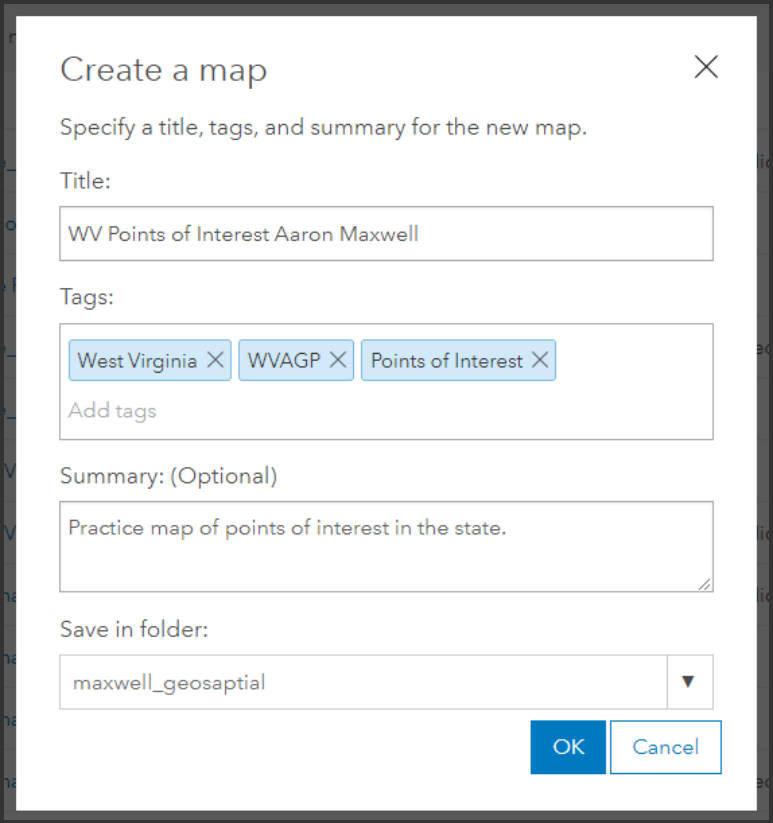
Administrator = allows member the same privileges as publishers plus the ability to manage the organizational account and other users.

Administrative Tasks

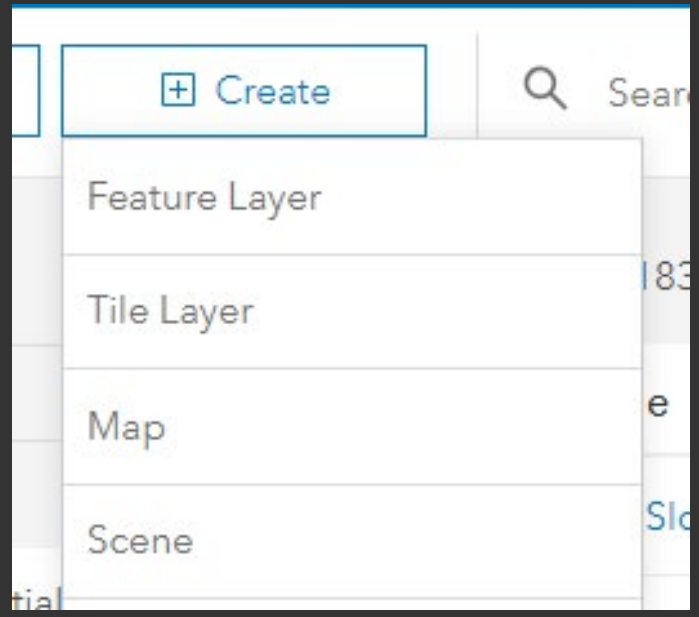
- Invite new members
- Change user type and roles
- Delete members/content
- Reset passwords
- Manage add-on licenses
- Manage and allocate credits
- Change/manage organizational settings

	A	B	C	D	E	F
1	Last Name	First Name	Email	Username	Role	User Type
2	A last name	A first name	email@something.com	newuser1	Publisher	Creator
3						

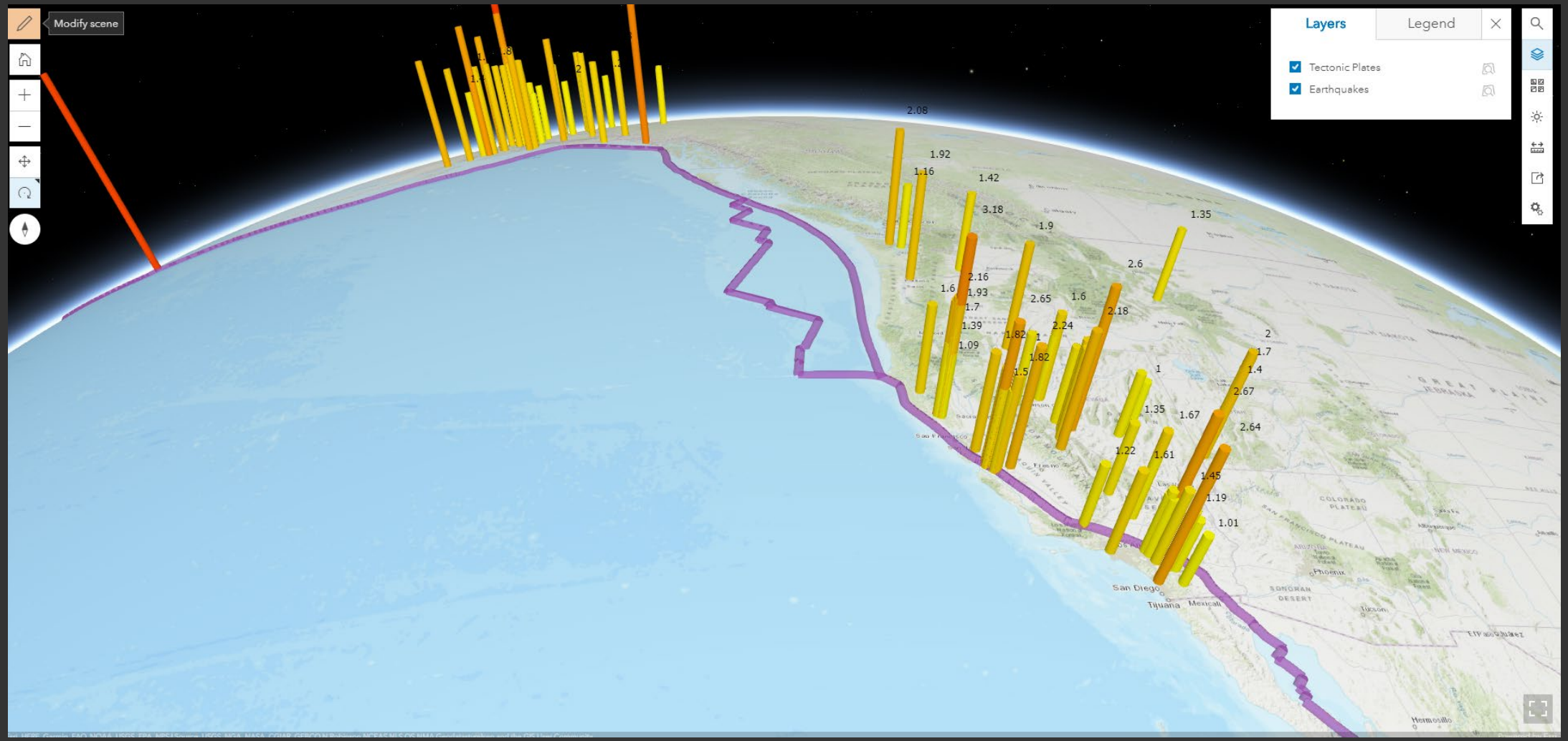
Create a Web Map



- Stored in your ArcGIS Online Content



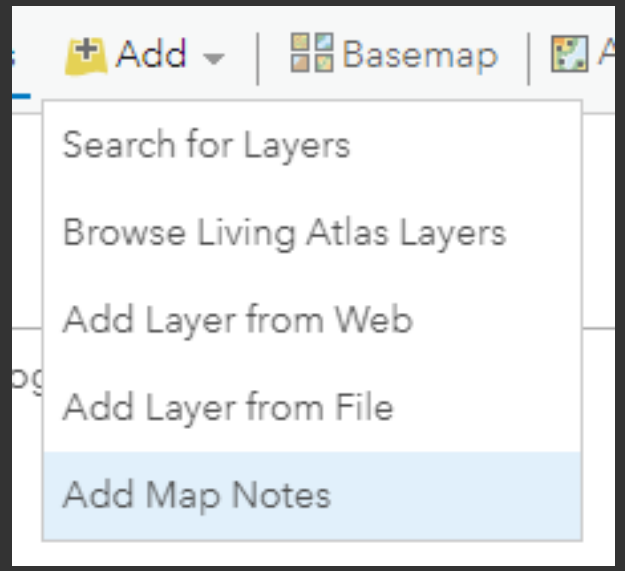
3D Web Maps

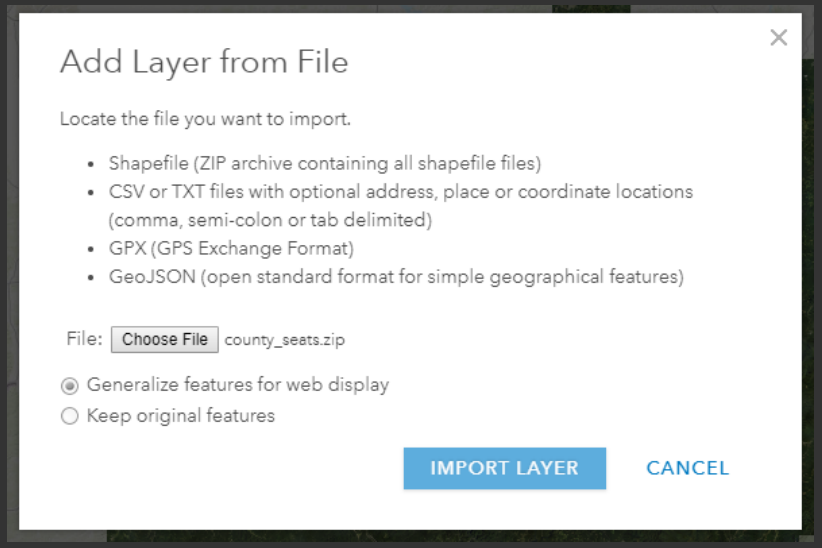

Modify scene
Layers
Legend
Tectonic Plates
Earthquakes
San Diego
Tijuana
Mexicali
Phoenix
Tucson
Hermosillo
COLORADO PLATEAU
SONORAN DESERT
GREAT PLAINS

Adding Data

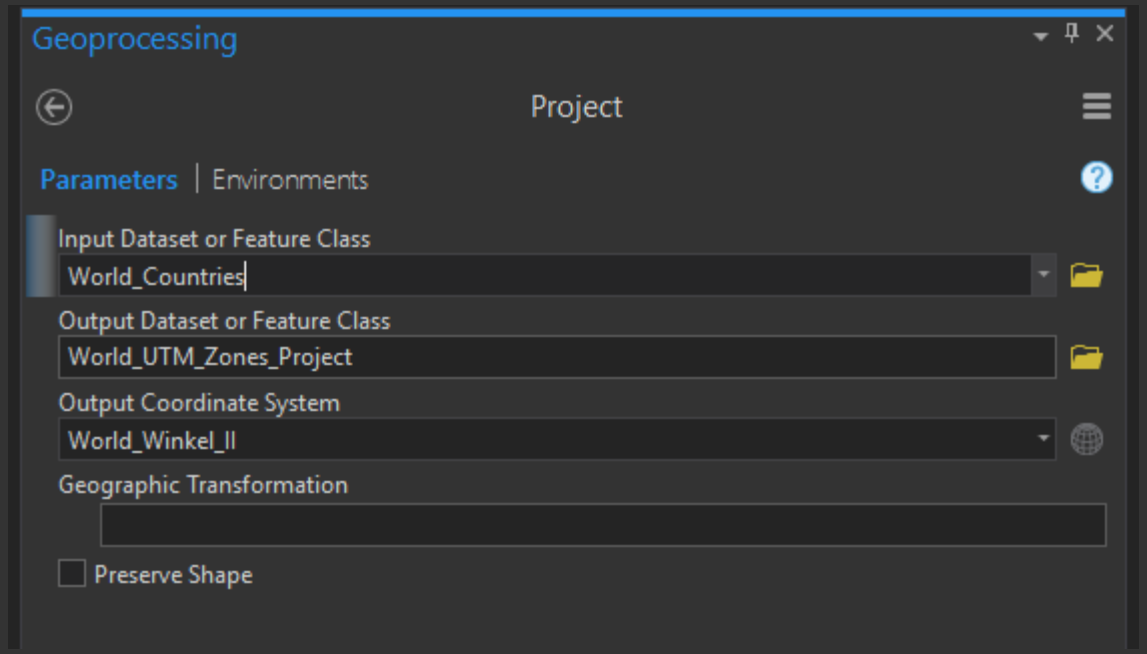
1. Connect to data on a REST service
2. Publish maps/data from ArcGIS Pro
3. Upload data to ArcGIS Online as CSV, shapefile, or GeoJSON
4. Create a new hosted feature layer
5. Can use ESRI content

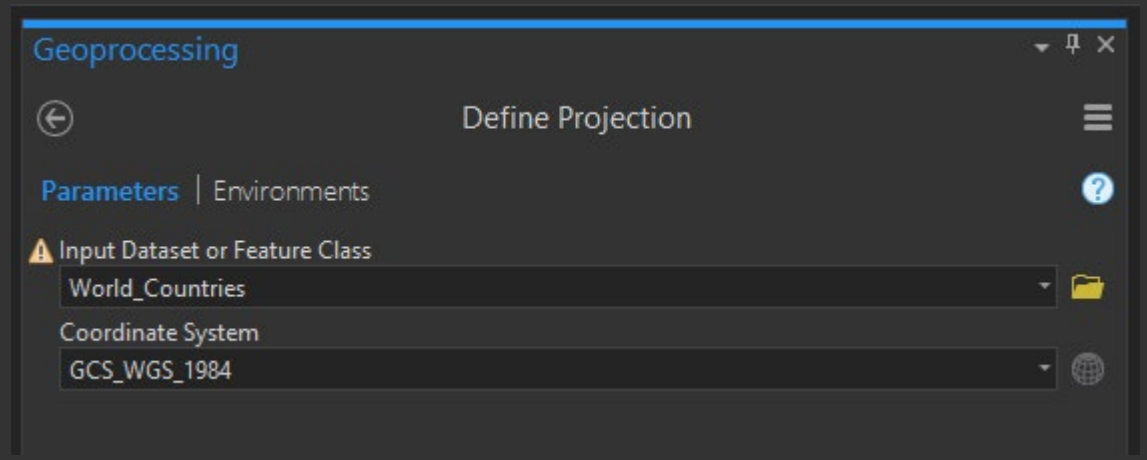
*Should use WGS84 or Web Mercator



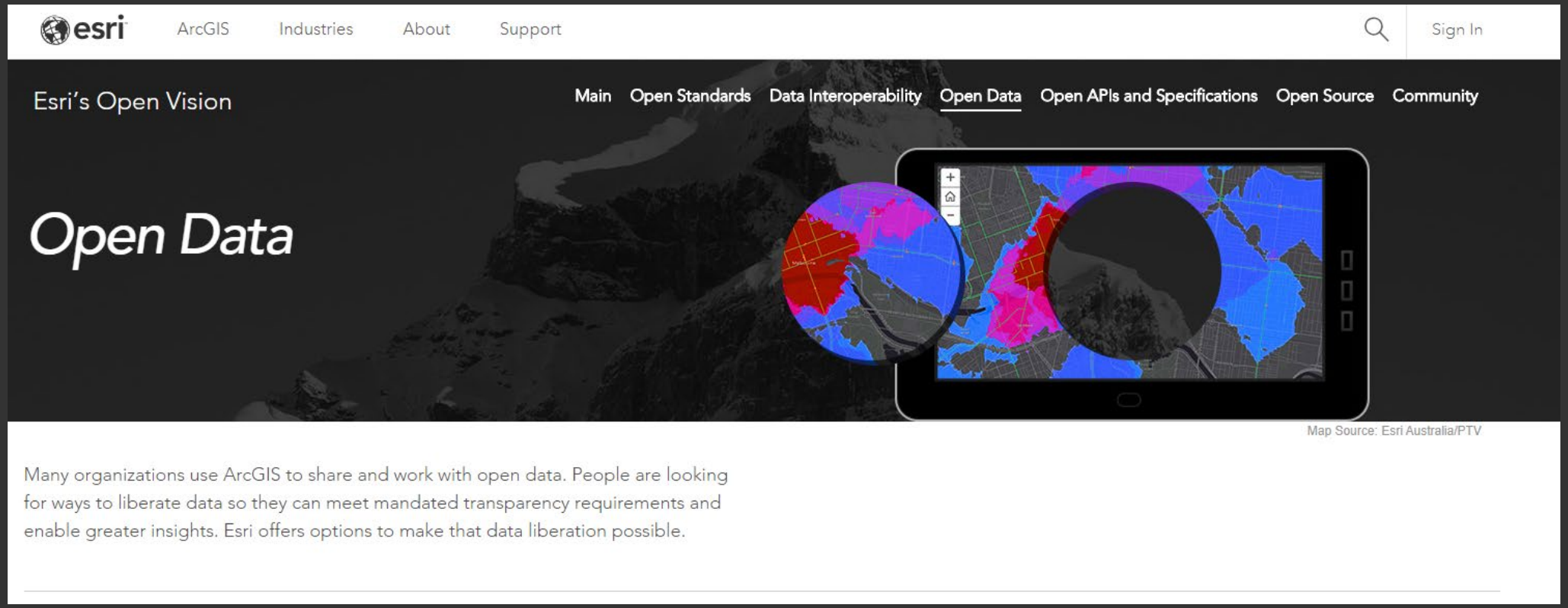


Transforming Projections and Datums in ArcGIS



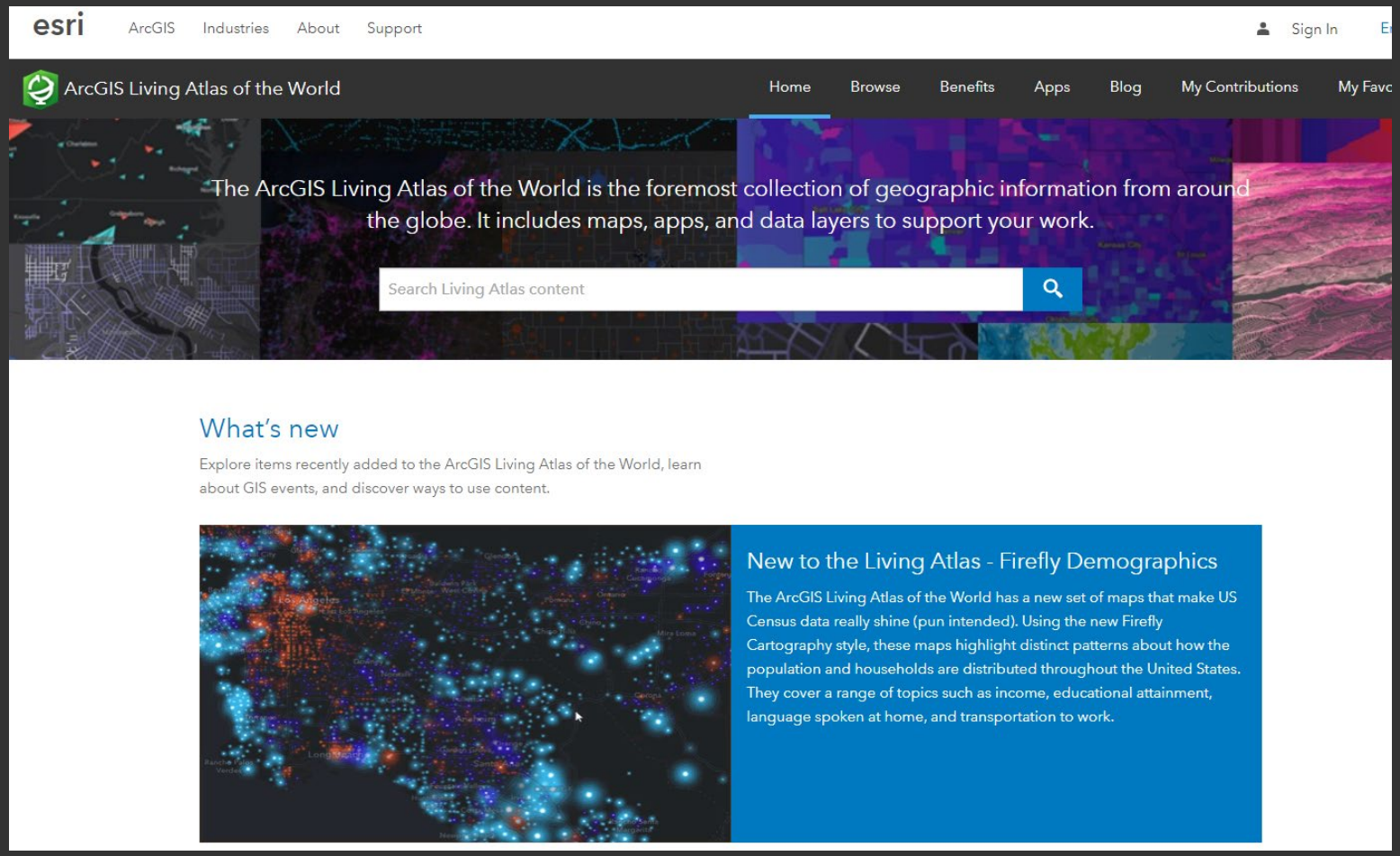


ESRI Open Data



http://www.esri.com/software/open/open-data

ArcGIS Living Atlas of the World



https://livingatlas.arcgis.com/en/

Map Services From the West Virginia GIS Tech Center

Home | Static Maps | Interactive Maps | GIS Data/Services

GISData/Services

WV GIS Technical Center GIS Services

All the services listed are available on the WV GIS Technical Center REST Service Directory. If there is a data service you think should be, please contact Frank LaFone.

Web:https//services.wvgis.wvu.edu/ArcGIS/rest/services

ArcMap:services.wvgis.wvu.edu/ArcGIS/services

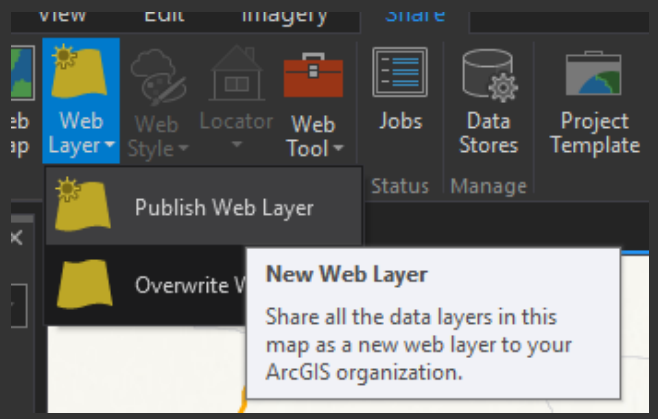
Imagery - Leaf Off

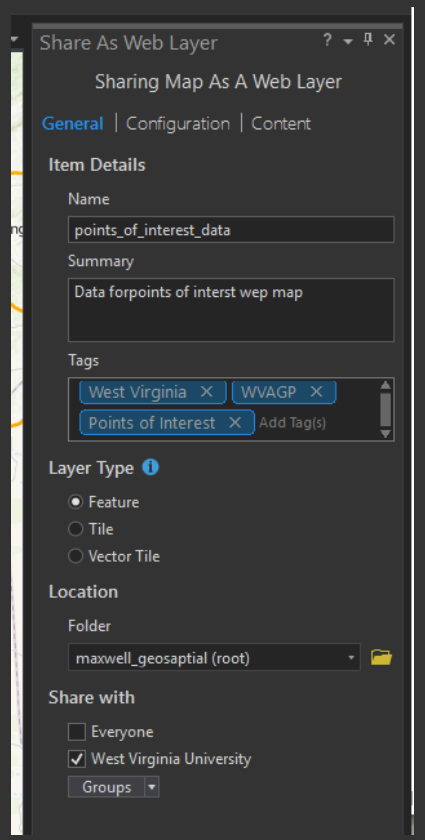
Name	Description	Projection	Date	Information	REST Services
WV Aerial Photo Mixed Resolution	Sheriff's imagery updated with more recent and higher resolution (typically 6") local imagery	Web Mercator	2010-2017	Link	Link
Sheriff Association 2010-2012	12" (rural) and 4" (urban) pixel resolution, mostly leaf-off. 4" denoted by magenta boxes. Largest viewing scale 1:282	Web Mercator	2010-2012	Link	Link
WV SAMB 2003 2ft WebMercator	2-ft pixel resolution	Web Mercator	2003	Link	Link

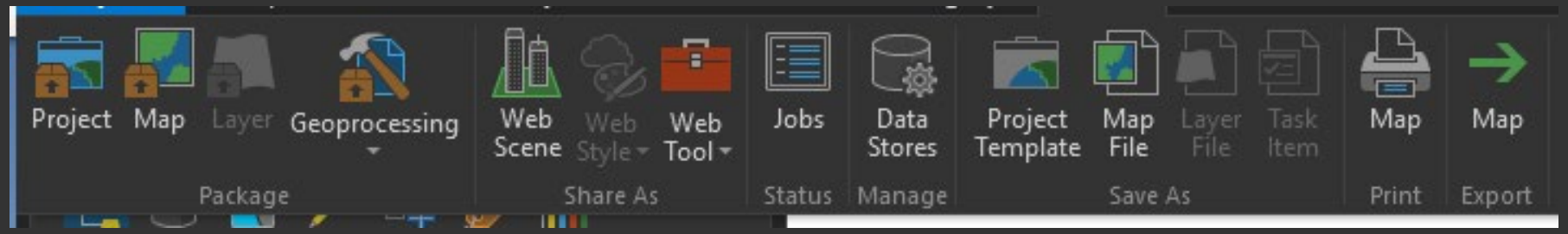
https://www.mapwv.gov/gis_services.html

ArcGIS Pro to ArcGIS Online

- It is possible to create a map in ArcGIS Pro and create a service from it that can be used in a web map

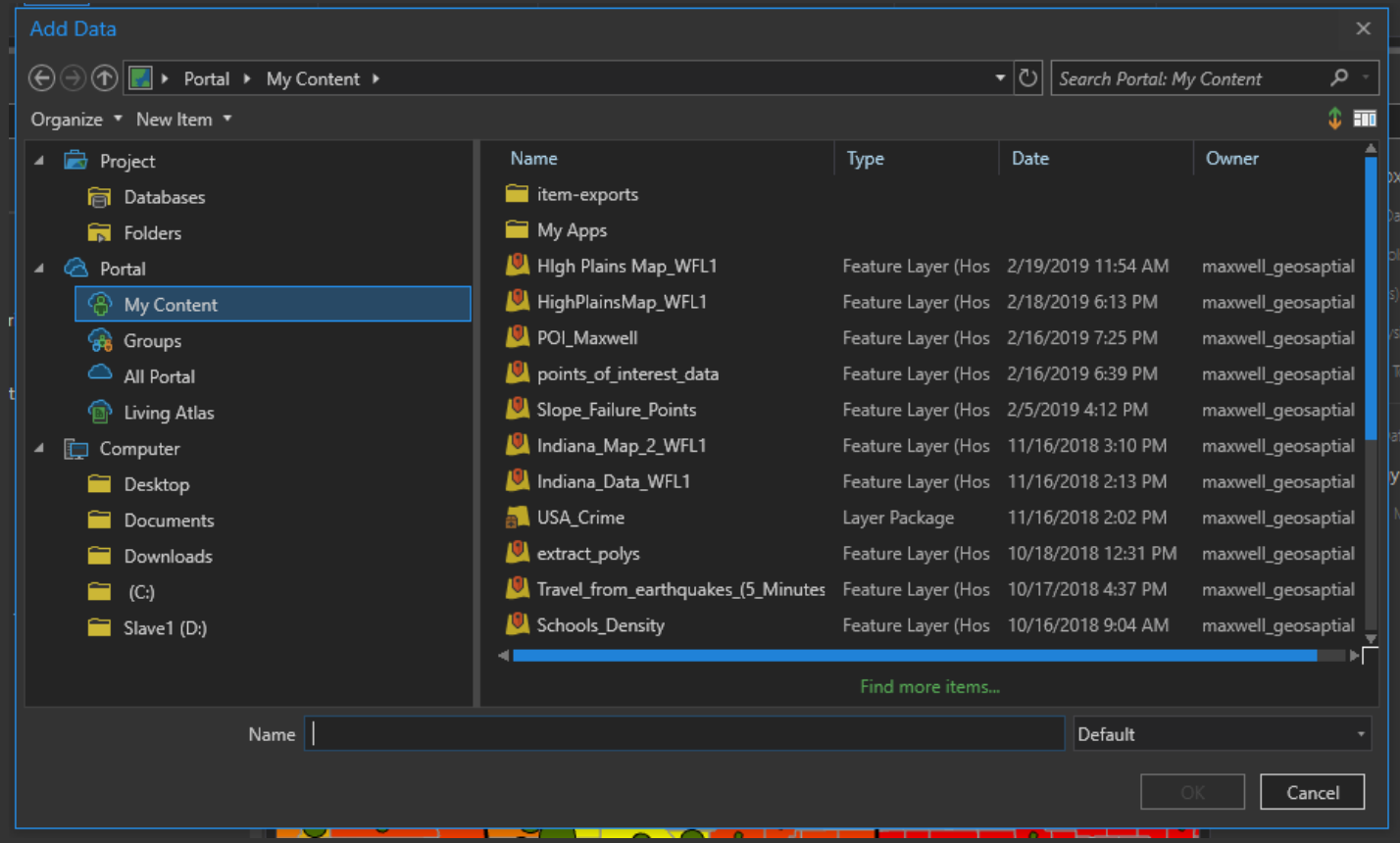






Seeing your ArcGIS Online Content in ArcGIS Pro

- Must be logged in
- Available under My Content



Types of Web Data

Hosted Feature Layer/Feature Layer = allows web clients to retrieve vector features and update feature data on the server. These data are vector data layers that can be symbolized and edited. Feature layers stored on ArcGIS Online under your account are called hosted feature layers.

Raster Tile Layer = map tiles are generated in advance and return maps in an image format, such as JPG, PNG, or GIF. Think of these as pictures of your data that are tiled, can change with scale, and cannot be updated as the data change. When using raster tile layers, you do not have access to the raw geospatial data.

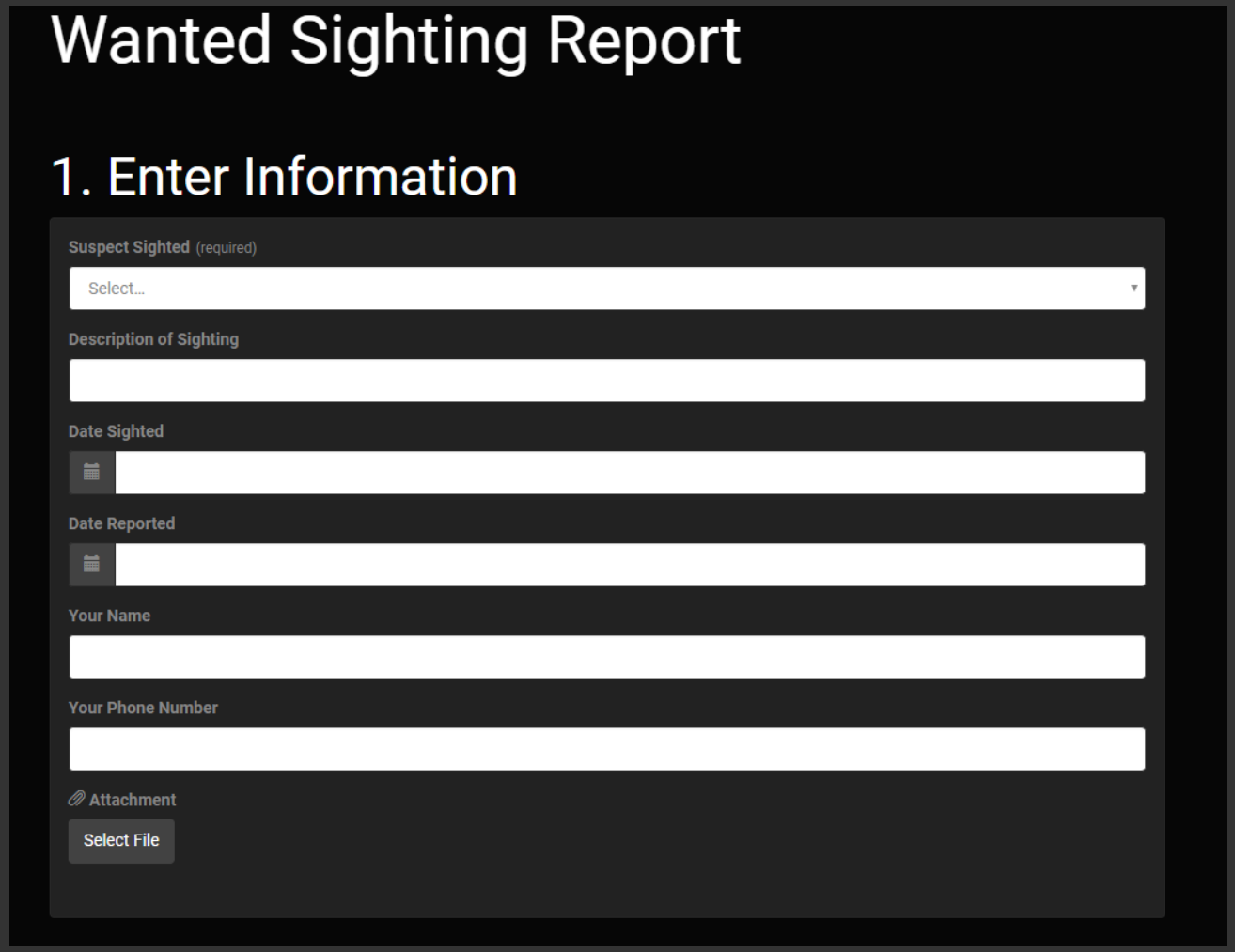
Dynamic Raster Tile Layer = generates maps on the fly and return maps in an image format, such as JPG, PNG, or GIF. Think of these as pictures of your data that are tiled, can change with scale, and can be updated as the data change. When using dynamic raster tile layers, you do not have access to the raw geospatial data.

Map Image Layer = pictures or tiles of the data are sent to the client. However, the vector data from which the tiles originate are still available, so that data can be visualized and queried.

Imagery Layer = allows clients to access raw raster data.

Vector Tile Layers = Cached vector data and the information for rendering the vectors. This format allows you to change the symbology of the layers, which is not possible with dynamic and tiled map services.

Volunteered Geographic Information (VGI)



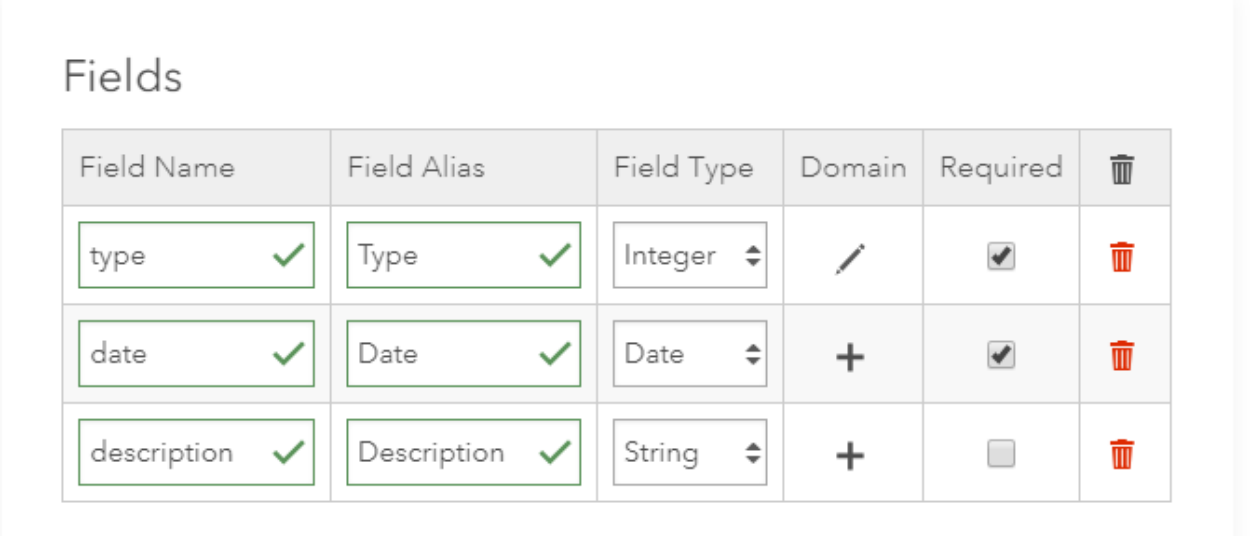
- Allowing users to edit geospatial data using a mobile or web interface
- Users will edited the data made available by the feature service

Location-Based Services (LBS)

- Use real-time geospatial data from a mobile device or smartphone to provide information, entertainment or security
- Since smartphones are GPS enabled, your location information can be integrated into apps

Create a New Hosted Feature Layer

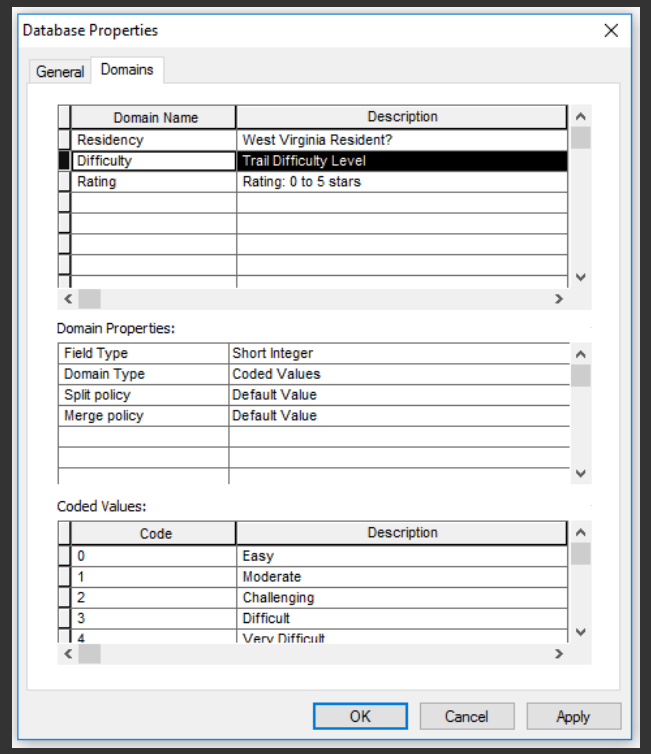
- Define geometry
- Define projection
- Define fields
- Set up domains
- Set up edit access

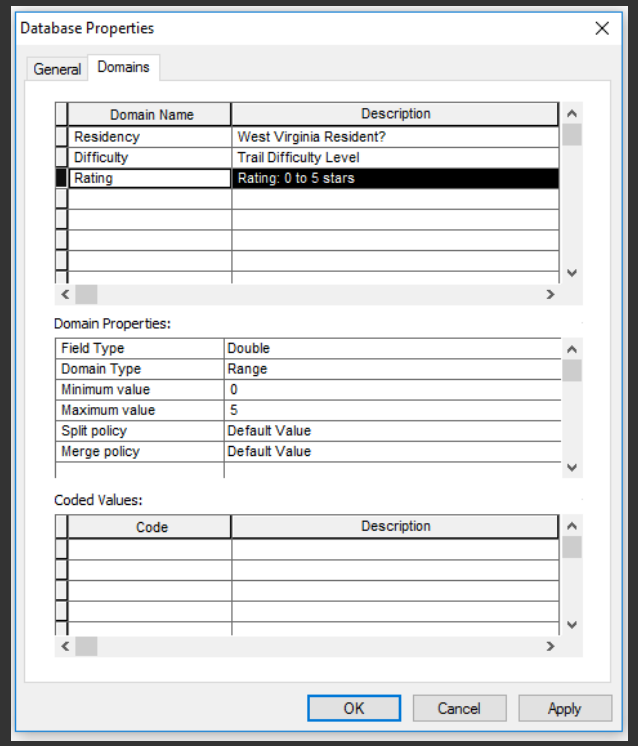


Domains

- Can be used to specify allowed values or entries to a field
- Coded Values = discrete values that represent an allowed entry
- Ranged Values = stipulates that values can only be entered within a given range

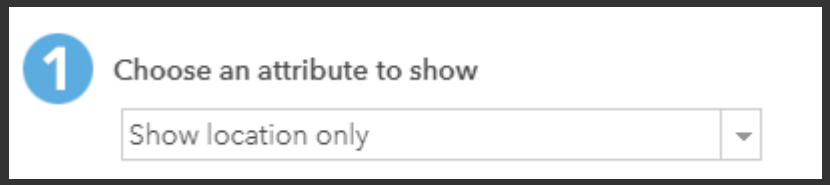
Code	Description
1	Poor
2	Fair
3	Average
4	Good
5	Excellent

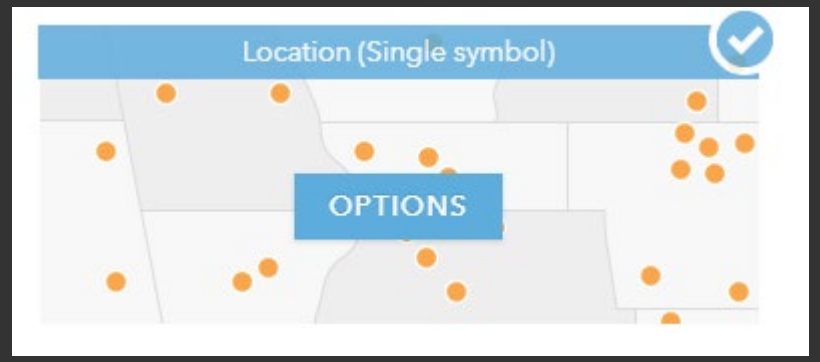


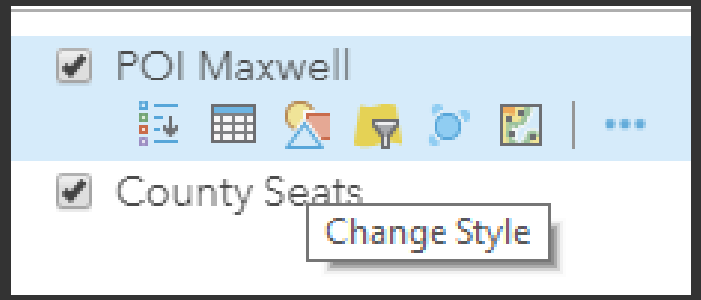


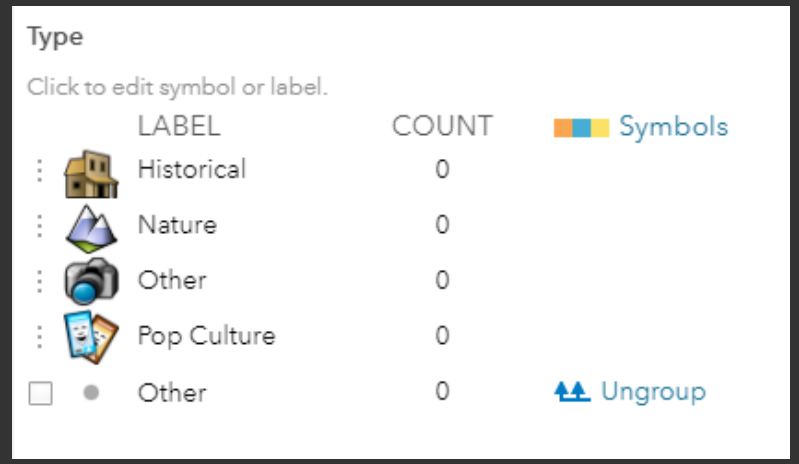
Symbolizing Data

- Many options for symbolizing data
- Easier to change symbology for feature layers



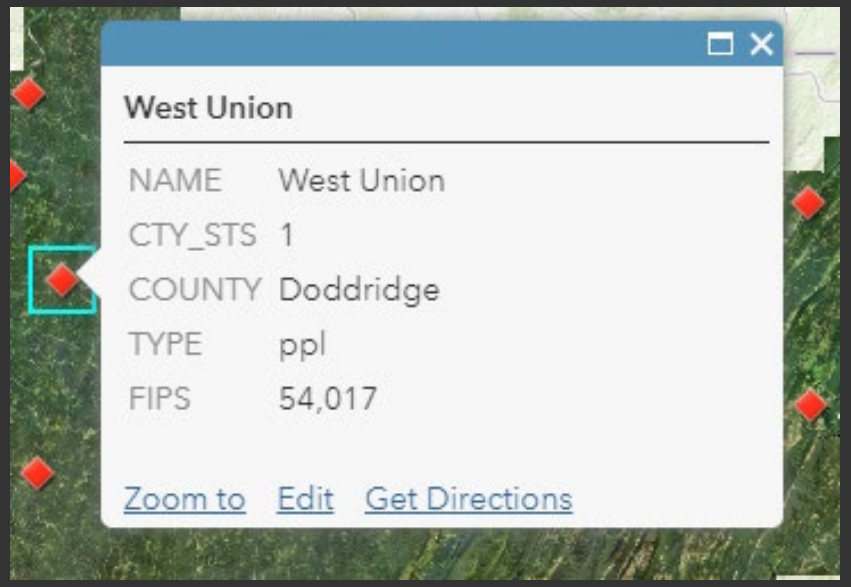


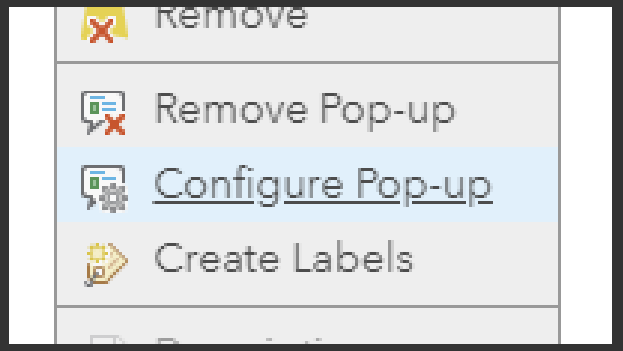




Configure Pop-Ups

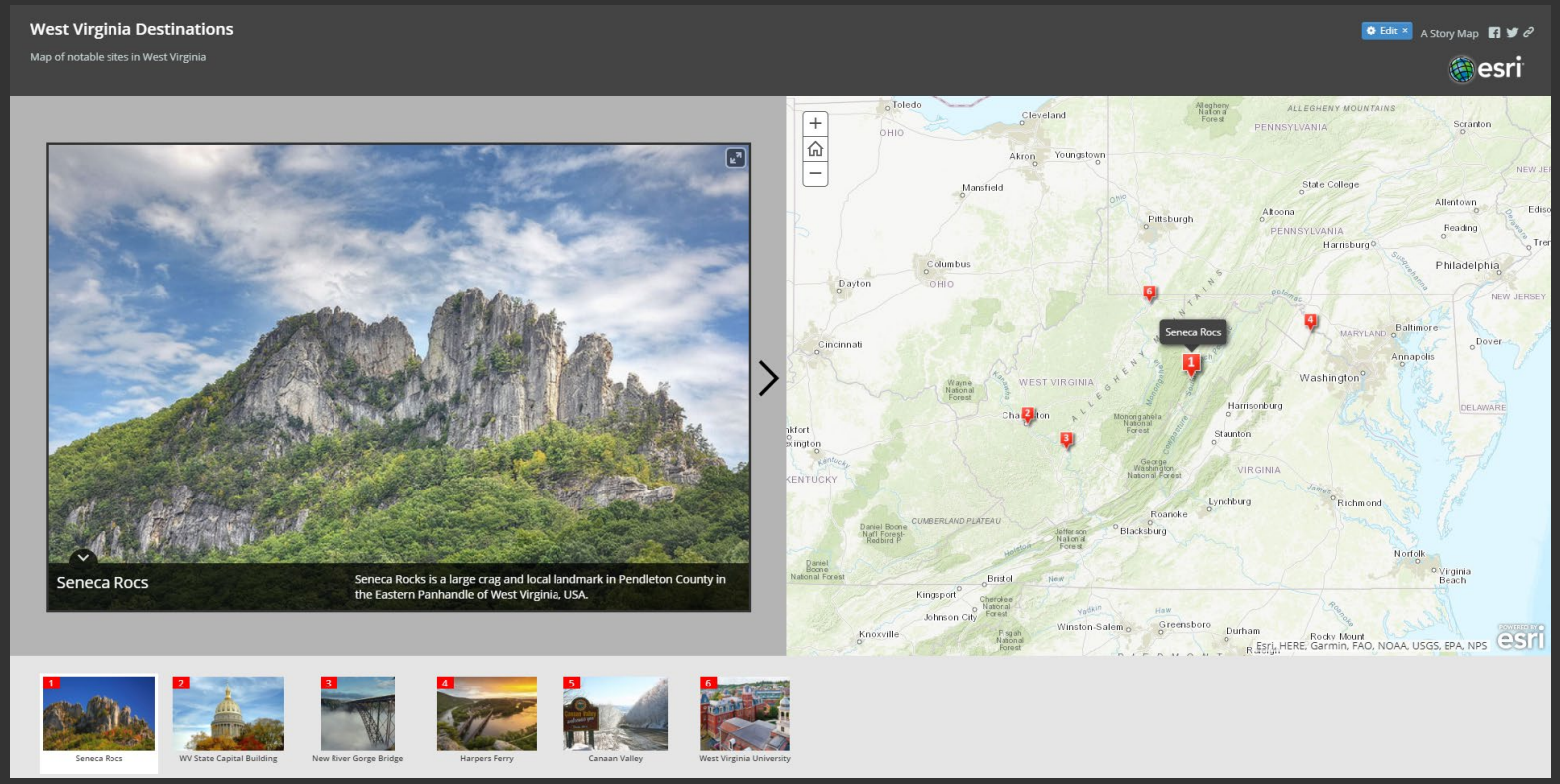
- Change title
- Change visible fields
- Change field alias
- Add images
- Add links
- Add charts





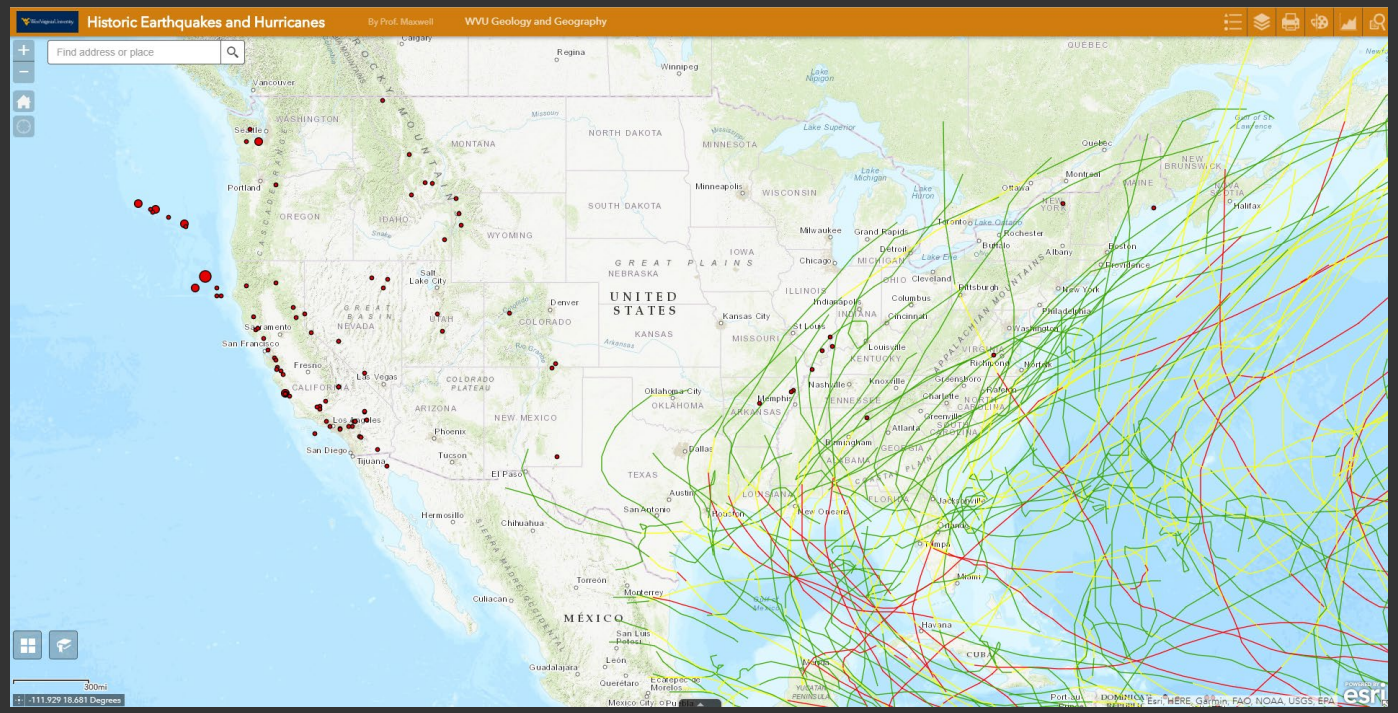
Presenting Your Data

- Configurable Apps = pre-made applications that you can load your layers into (does not require coding)



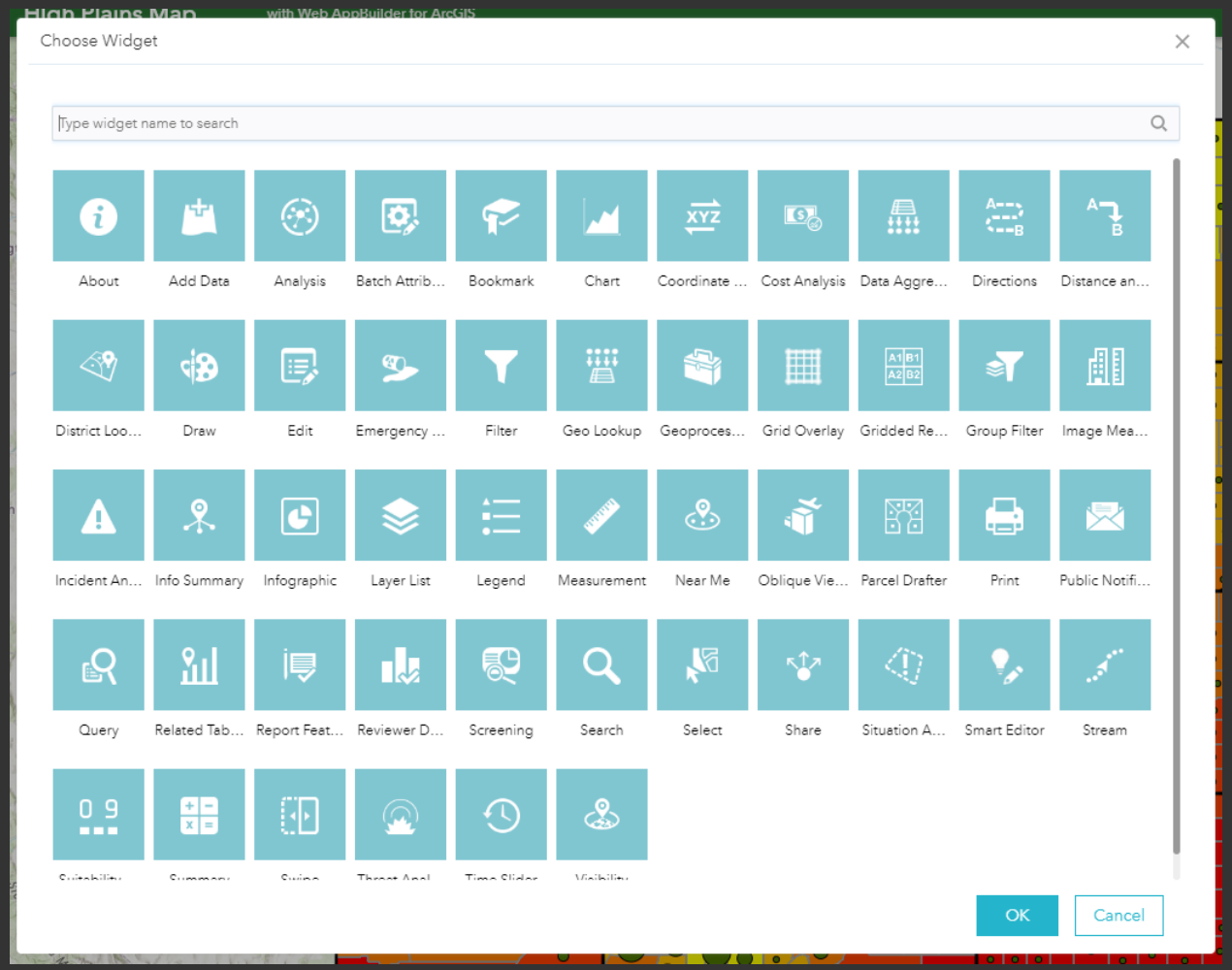
Presenting Your Data

- Web AppBuilder for ArcGIS = offers more functionality and is more flexible and configurable than Configurable Apps (does not require coding, can use pre-made widgets)

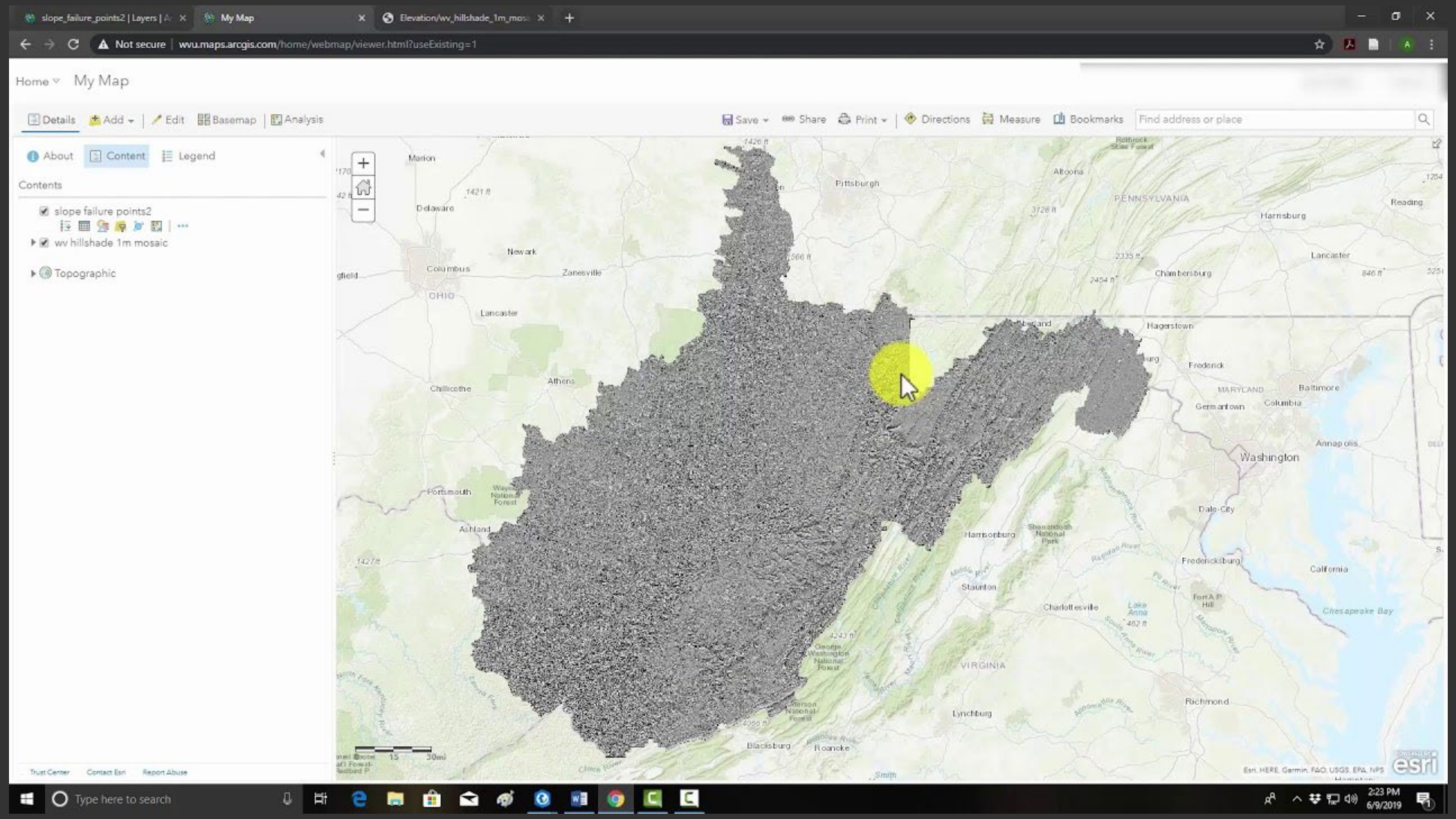


Widgets

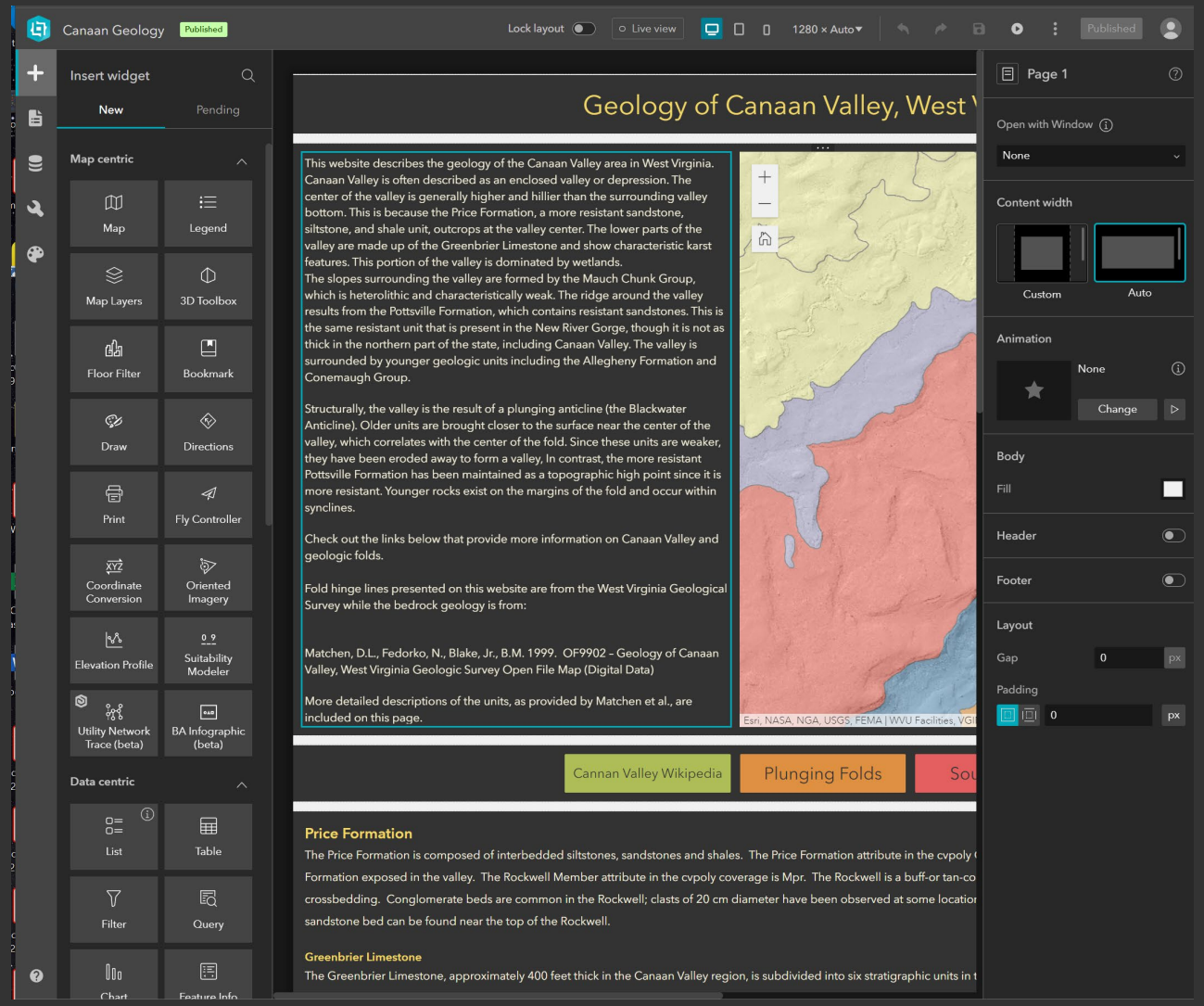
- Add functionality to your map
- Do not require coding
- Common widgets:
  - Basemap Gallery
  - Bookmark
  - Draw
  - Edit
  - Layer List
  - Legend
  - Measure
  - Print
  - Query
  - Select



Video: Create App with Web AppBuilder

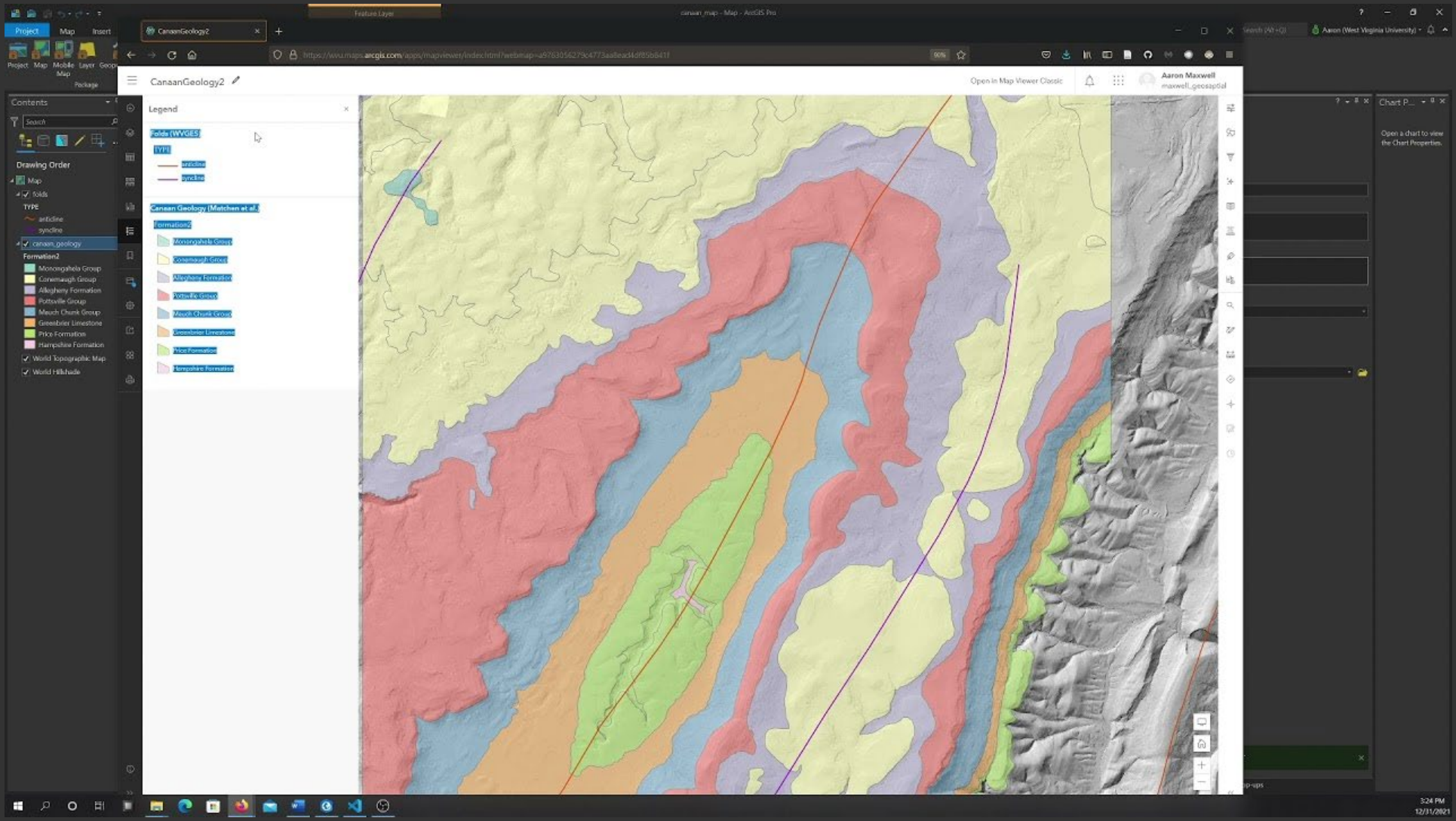


Presenting Your Data



- ArcGIS ExperienceBuilder = web-based tool for generating multi-page websites that do not need to be centered around a map

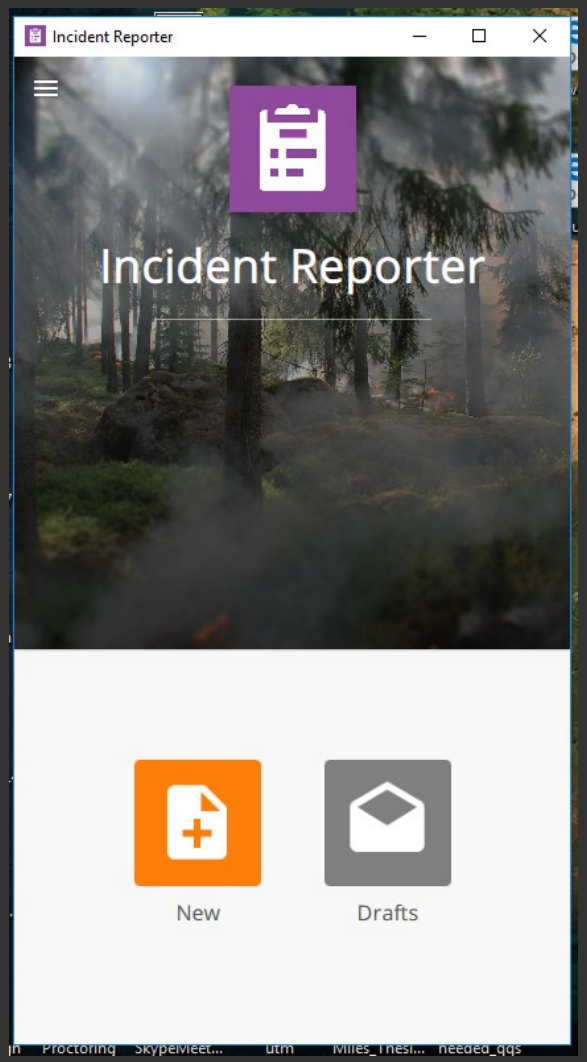
Video: Create App with ExperienceBuilder



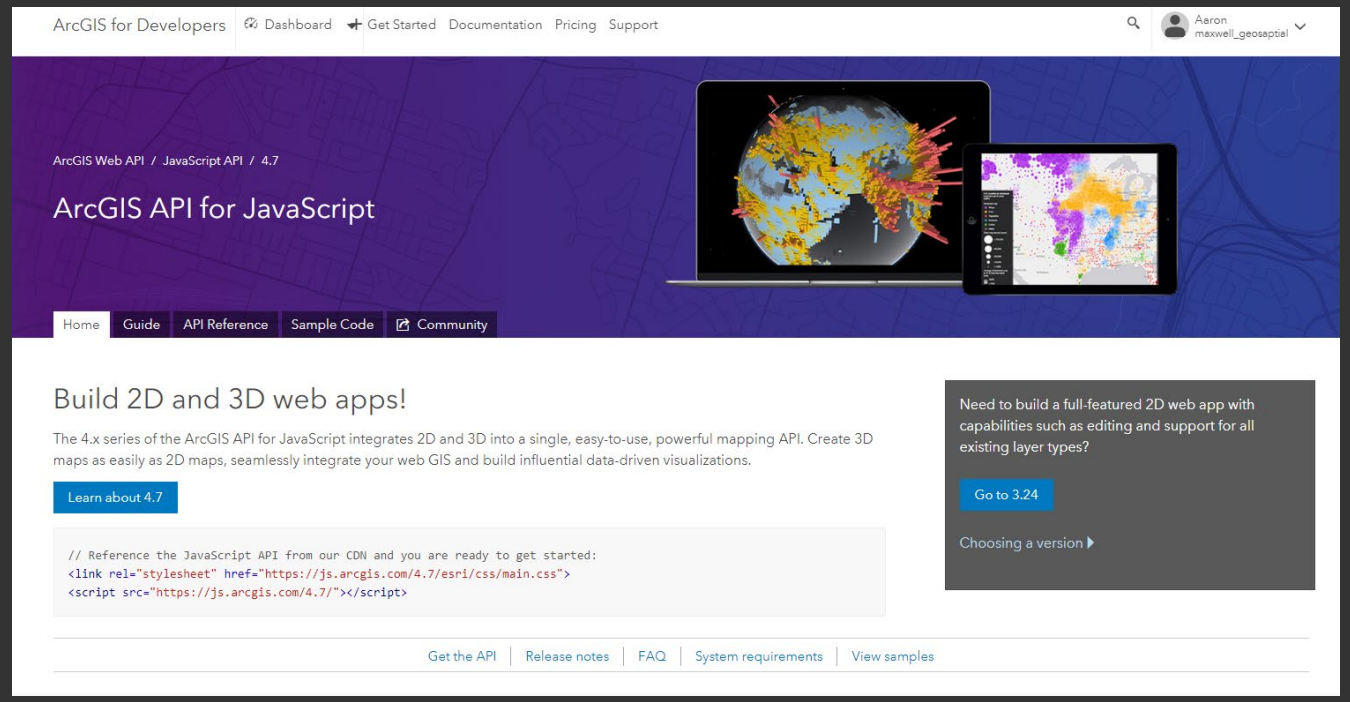
Presenting Your Data

- AppStudio for ArcGIS = allows you to develop mobile apps (does not require coding, works on multiple platforms)

https://appstudio.arcgis.com/



Presenting Your Data



https://developers.arcgis.com/javascript/

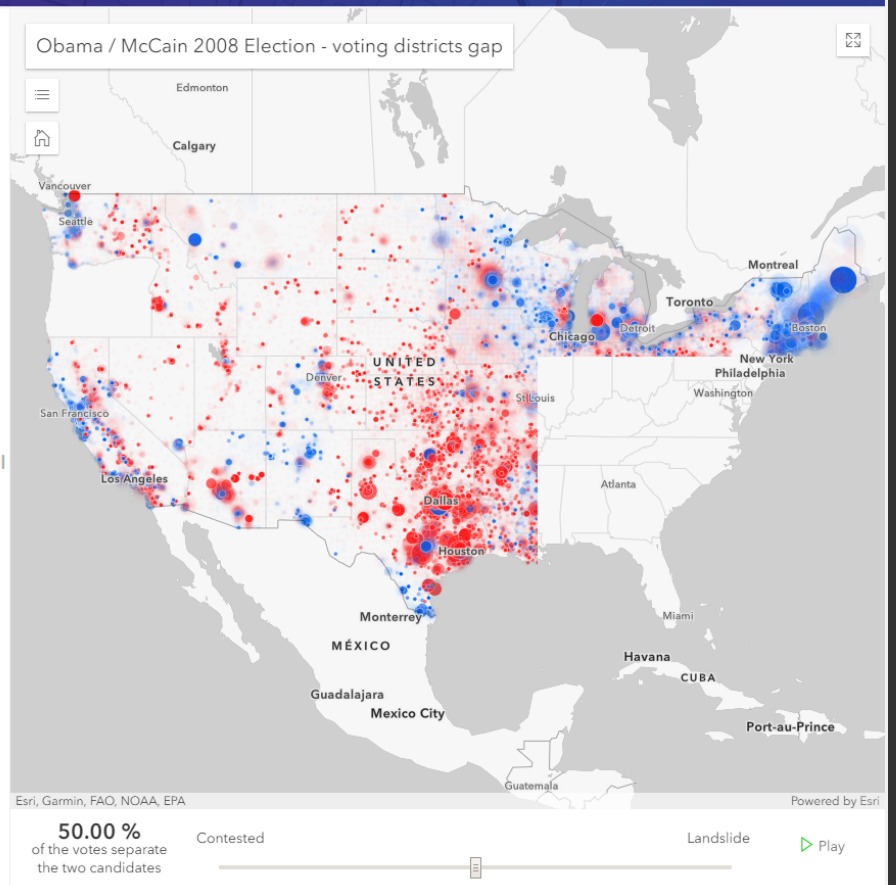
- ArcGIS API for JavaScript = offers fully customizable web maps and apps (requires coding)
- API = Application Programming Interface

ArcGIS API for JavaScript

ArcGIS API for JavaScript Sandbox

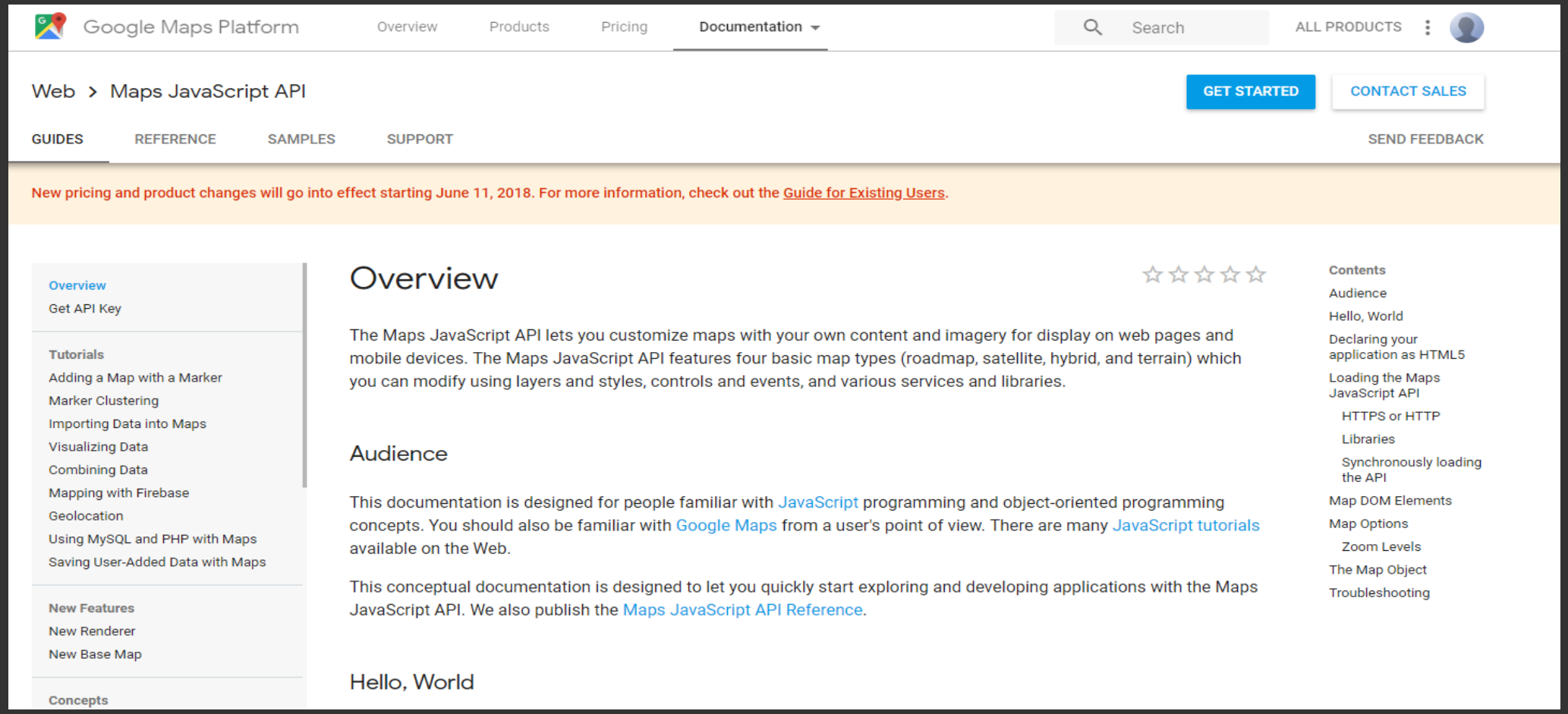
Description | Download | Share | Refresh

```html
<!DOCTYPE html>
<html>

<head>
  <meta charset="utf-8">
  <meta name="viewport" content="initial-scale=1,maximum-scale=1,user-scalable=no">
  <title>Animate opacity visual variable [beta] - 4.7</title>

  <link rel="stylesheet" href="https://js.arcgis.com/4.7/esri/themes/light/main.css">

  <script>
    var dojoConfig = {
      has: {
        // Enable webgl for feature layer in MapView
        "esri-featurelayer-webgl": 1
      }
    };
  </script>

  <script src="https://js.arcgis.com/4.7/"></script>

  <script>
    require([
        "require",
        "esri/Map",
        "esri/layers/FeatureLayer",
        "esri/views/MapView",
        "esri/widgets/Legend",
        "esri/widgets/Home",
        "esri/widgets/Fullscreen",
        "esri/widgets/Expand",
        "dojo/domReady!"
      ],
      function(
        require,
        Map,
        FeatureLayer,
        MapView,
        Legend, Home, Fullscreen, Expand
      ) {

        //--------------------------------------------------------------------------
        //
        //  Setup Map and View
        //
        //--------------------------------------------------------------------------

        var layer = new FeatureLayer({
          url: "https://services.arcgis.com/V6ZHFr6zdgNZuVG0/arcgis/rest/services/votes_popup_final3/FeatureServer/0",
          // don't show precincts that didn't record any votes
          definitionExpression: "(P2008_D > 0) AND (P2008_R > 0)",
          outFields: ["D_Percent", "R_Percent"],
          title: "Voting precincts"
        });
```



https://developers.arcgis.com/javascript/latest/sample-code/sandbox/index.html?sample=visualization-vv-opacity-animate

Google Maps API



https://developers.google.com/maps/documentation/javascript/tutorial

Leaflet

Leaflet

an open-source JavaScript library
for mobile-friendly interactive maps

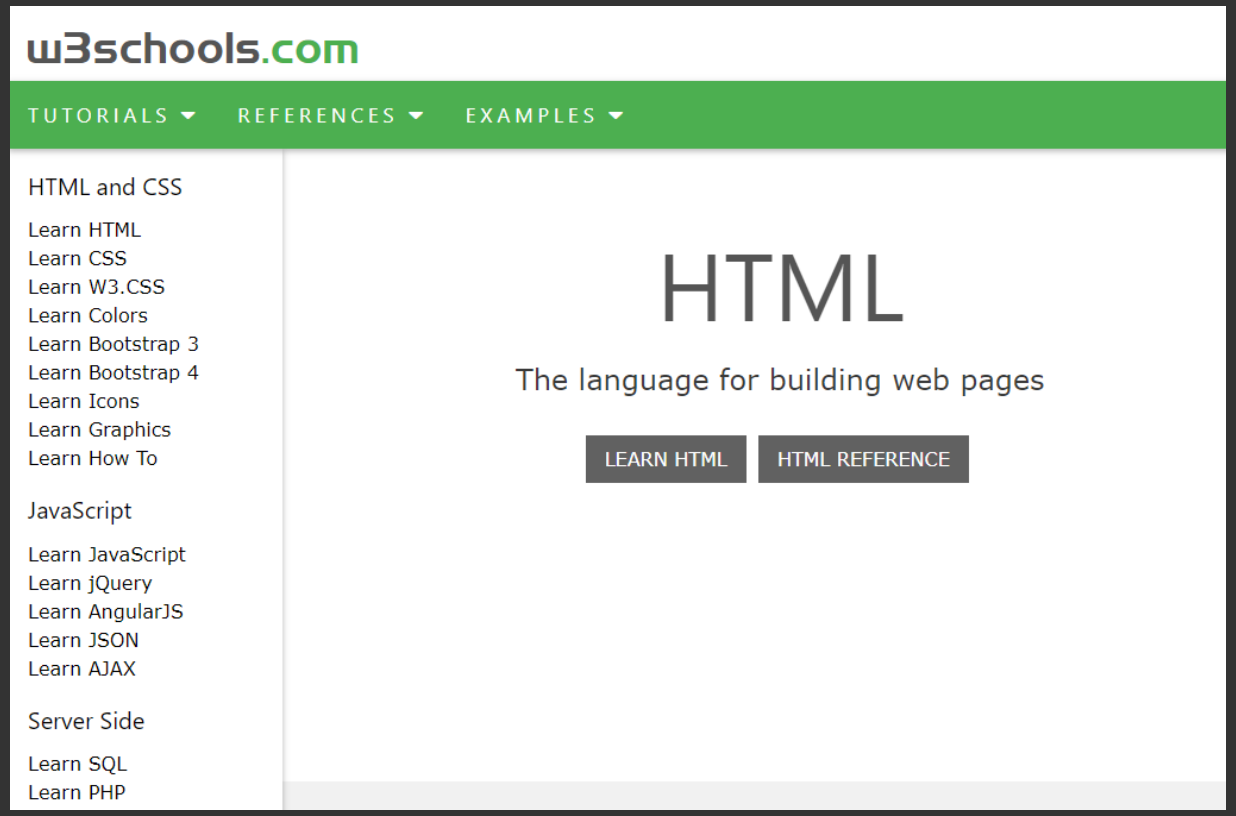
Overview Tutorials Docs Download Plugins Blog

https://leafletjs.com/

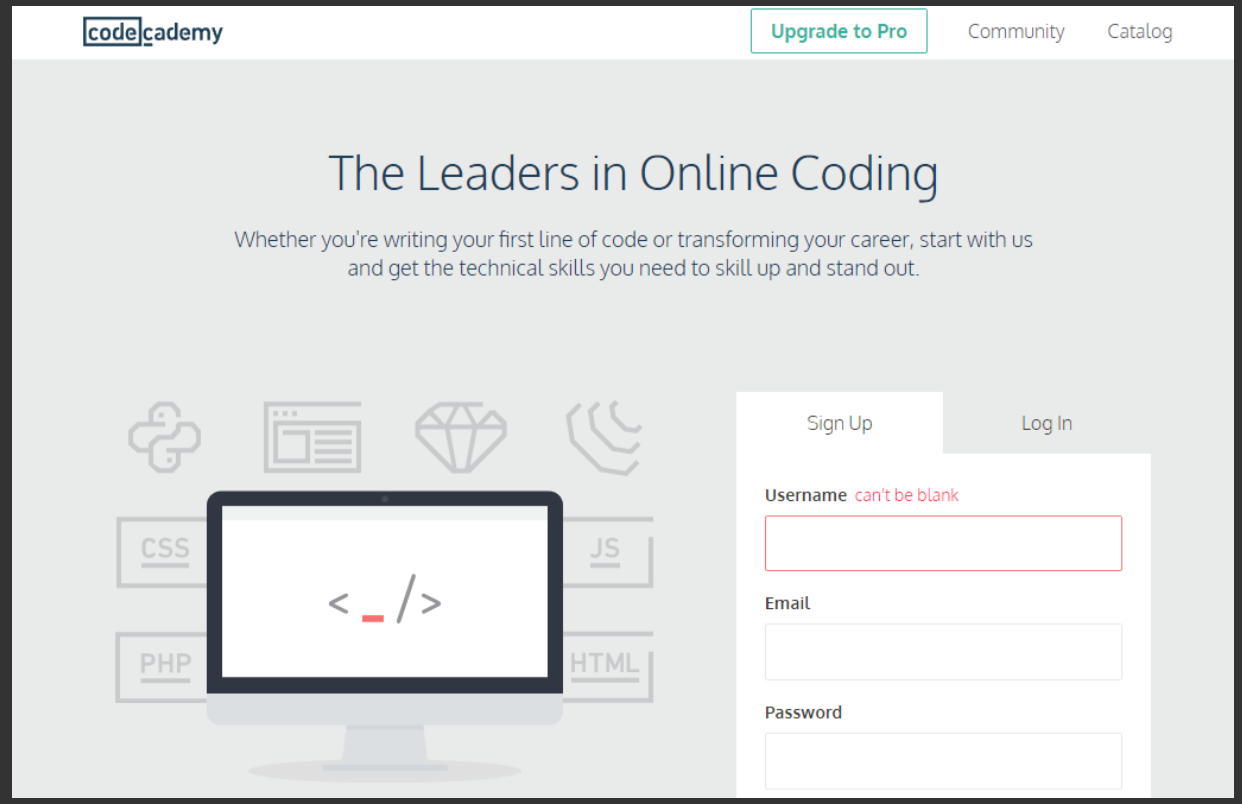
Web Languages

- HTML (Hypertext Markup Language) = used to create the basic structure and content of a webpage
- CSS (Cascading Style Sheets) = used to design the webpage (where everything is placed and how it looks)
- JavaScript = define the interactive elements of a webpage that helps to engage the users

Learning to Code



https://www.w3schools.com/



https://www.codecademy.com/

This is the end of this lecture module.

Please return to the West Virginia View Webpage for additional content.