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

Client-Side Web GIS

Introduction

WV VIEW

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

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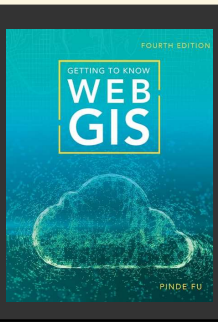
Book Recommendation



https://www.esri.com/en-us/esri-press/browse/getting-to-know-web-gis-fourth-edition

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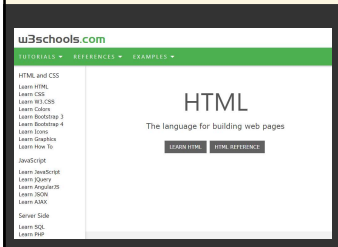
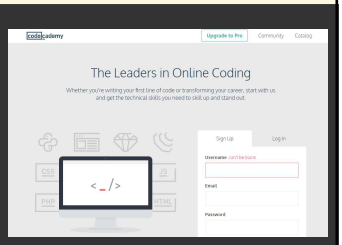
Learning to Code



https://www.w3schools.com/



https://www.codecademy.com/

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Book Recommendation

https://www.oreilly.com/library/view/html-css/9781118206911/

https://www.oreilly.com/library/view/javascript-and-jquery/9781118531648/

https://www.wiley.com/en-us/PHP+%26+MySQL%3A+Server+side+Web+Development-p-9781119149217

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Udemy

- Introduction to web programming for GIS applications: https://www.udemy.com/course/introduction-to-web-programming-for-gis-applications/
- Server-side web GIS applications with Leaflet and PostGIS: https://www.udemy.com/course/server-side-web-gis-applications-with-leaflet-and-postgis/
- Mobile GIS data collection apps with Leaflet and PostGIS: https://www.udemy.com/course/mobile-gis-data-collection-apps-with-leaflet-and-postgis/

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How the Web Works

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Clients and Servers

- Server = provider of resources or services
- Client = requester of services
- Multiple clients can connect to one server
- Internet allows these connections

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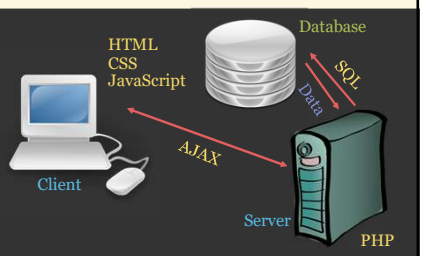
Client-Server Architecture

- 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

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Client-Side Web Languages

- HTML (Hypertext Markup Language) = used to create the basic structure and content of a webpage

https://www.w3schools.com/html/default.asp

- CSS (Cascading Style Sheets) = used to design the webpage (where everything is placed and how it looks)

https://www.w3schools.com/css/default.asp

- JavaScript = define the interactive elements of a webpage that helps to engage the users

https://www.w3schools.com/js/default.asp

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AJAX

- AJAX = Asynchronous JavaScript And XML
- Allows web pages to be updated asynchronously by exchanging data with a web server
- Makes it possible to update parts of a page without reloading the whole page

https://www.w3schools.com/whatis/whatis_ajax.asp

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Server-Side Web Languages

- PHP (PHP: Hypertext Preprocessor) = server-side scripting language that is free and executed on the server.
  - Generate dynamic page content
  - Create, open, read, write, delete, and close files on server
  - Collect form data
  - Send and receive cookies
  - Add, delete, and modify data in a database
  - Control user access
  - Encrypt data

https://www.w3schools.com/PHP/DEfaULT.asP

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Node.js

- Run JavaScript on the server
- Generate dynamic page content
- Create open, read, write, delete, and close files on the server
- Collect form data
- Add, delete, modify data in your database

https://www.w3schools.com/nodejs/default.asp

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Server-Side Web Languages

- SQL (Structure Query Language) = allows you to access and manipulate databases
  - Execute queries against databases
  - Retrieve data from a database
  - Insert records into a database
  - Update records in a database
  - Create new databases
  - Create new tables in a database
  - Create stored procedures in a database
  - Create views in a database
  - Set permissions on tables, procedures, and views

https://www.w3schools.com/sql/

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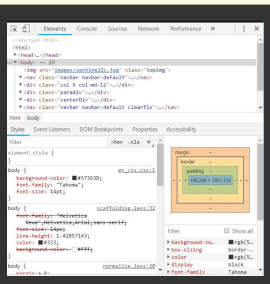
The DOM

- DOM = Document Object Model
- HTML is parsed by the browser to create the DOM
- Attempt to convert the structure and content of the HTML document into an object model represented as a node tree
- Browser uses this model to render the webpage



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Anatomy of URL

- URL (Uniform Resource Locator) = address for things on the web

http://www.wvgis.wvu.edu/lidar/

- Protocol = declares how your web browser should communicate with a web server
  - HTTP (Hypertext Transfer Protocol)
  - FTP (File Transfer Protocol)
  - Etc.
- Domain Name = identifies a website
- Path = file or directory on the web server

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HTTP vs. HTTPS

- HTTPS = Hypertext Transfer Protocol Secure
- Web browser encrypts any information you provide so it can't be understood by a party that intercepts it
- HTTPS is used when sensitive information is transferred or entered

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IP Address

- IP Address = Internet Protocol Address
- Numeric label assigned to each device connected to a computer network
- Network ID = network that the device is part of
- Host ID = designates specific device

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Ports

- Servers make services available to the Internet using numbered ports
- Separate ports will be used for different services
- Clients connect to a service at a specific IP address and a specific port
- IP Address + Port defines address of a particular service on a particular system

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What is an API?

- API = Application Programming Interface
- URLs that provide code and functions that can be used to complete a task on the web
- We will explore the ArcGIS API for JavaScript in this course to make web maps

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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

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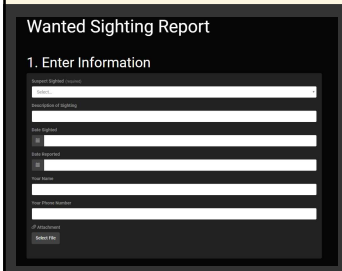
Volunteered Geographic Information (VGI)



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

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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 the apps

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ArcGIS Online

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ArcGIS Online

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

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

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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

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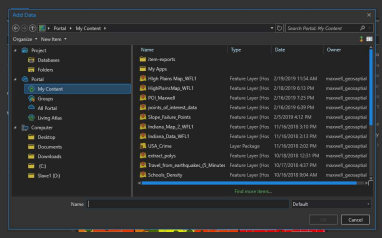
Seeing your ArcGIS Online Content in ArcGIS Pro

- Must be logged in
- Available under Add Data → Portal → My Content



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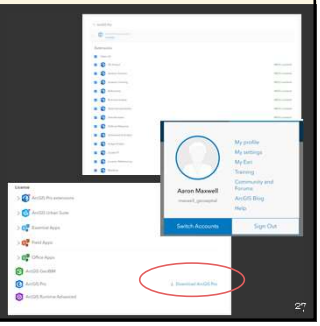
Licensing ArcGIS Pro with ArcGIS Online Account

- Administrator can allow access to ArcGIS Pro for specific user accounts (GIS Professional user type)
- Can also provide access to extensions and other ESRI apps
- Can download ArcGIS Pro from ArcGIS Online once logged in
  - Click on your username
  - Select My settings
  - Navigate to Licenses



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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.
- Mobile 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.

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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.
- Facilitator = publisher privileges plus the ability to invite partnered collaboration members to groups. This includes the privilege to create and manage partnered collaboration groups, invite members from another organization into groups, and create shared update groups.
- Administrator = allows member the same privileges as publishers plus the ability to manage the organizational account and other users.

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Account Information

- Your instructor will assign a user account
- You will have a user type of GIS Professional and a role of Publisher
- You will be able to create and share content
- Your accounts and content will be deleted once the course is completed
- You can use your own account if you prefer, but you must be able to create content and share

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Administrative Tasks

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

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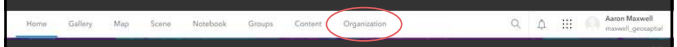
Administrative Tasks

- Administrators will have Organization tab
- Within this tab, administrator can see:
  - overview of Organization account
  - overview of credit usage
  - overview of licenses
  - all member accounts



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Organization Information

- Subscription Number
- License renewal date
- Number of members
- License and credit usage
- Add-on license usage

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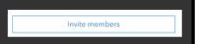
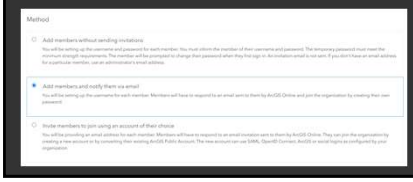
Adding Members

- Organization Tab → Members → Invite Members
- Manually enter info for single new user
- Use formatted CSV file for multiple users



First Name	Last Name	Email	Username	Role	User Type
Example	User	newUser@gmail.com	newUser_AGOL	Publisher	GIS Professional Advanced



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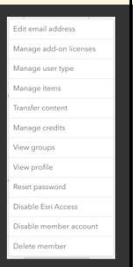
Member Actions

- Edit email address
- Manage add-on licenses
- Manage user type
- Manage items
- Transfer content
- Manage credits
- View groups
- View profile
- Reset password
- Disable/enable ESRI access
- Disable member account
- Delete member



*Deleting a member cannot be undone
*Must delete content before deleting a member
*Can transfer content to another user before deleting a member

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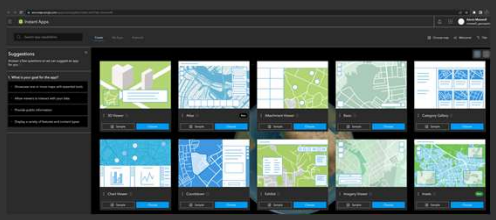
Presenting Your Data

- Instant Apps = pre-made applications that you can load your layers into



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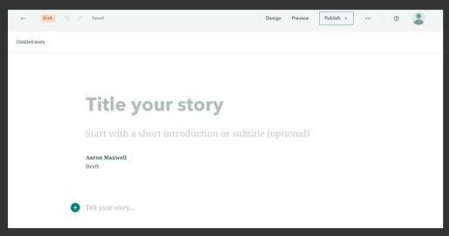
Presenting Your Data

- ArcGIS Storymaps = configurable apps designed for developing narratives using maps, text, and media



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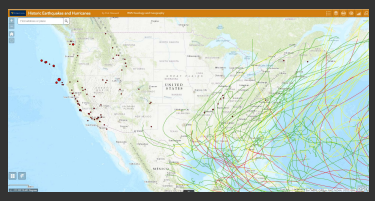
Presenting Your Data

- 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)



*This is being phased out.

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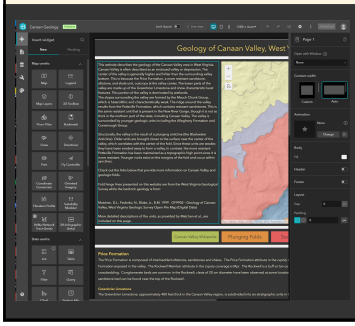
Presenting Your Data



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

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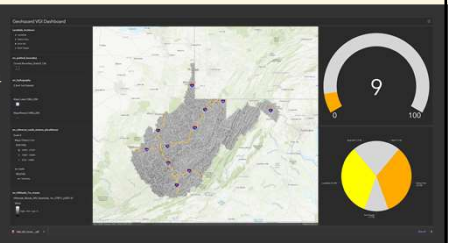
Presenting Your Data

- Dashboards = focused on data visualization and data insights



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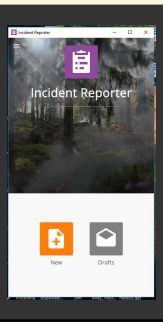
Presenting Your Data

- AppStudio for ArcGIS = allows you to develop mobile apps



https://appstudio.arcgis.com/

*This is being phased out.

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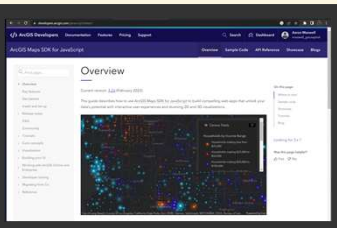
Presenting Your Data

- ArcGIS Maps SDK for JavaScript = offers fully customizable web maps and apps (requires coding)



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

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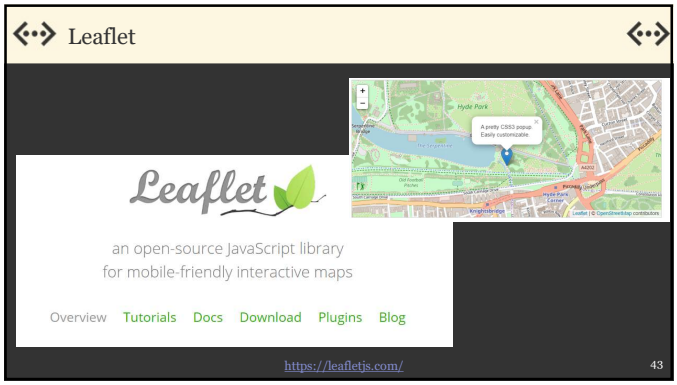
Leaflet
Leaflet
an open-source JavaScript library
for mobile-friendly interactive maps
Overview Tutorials Docs Download Plugins Blog
https://leafletjs.com/
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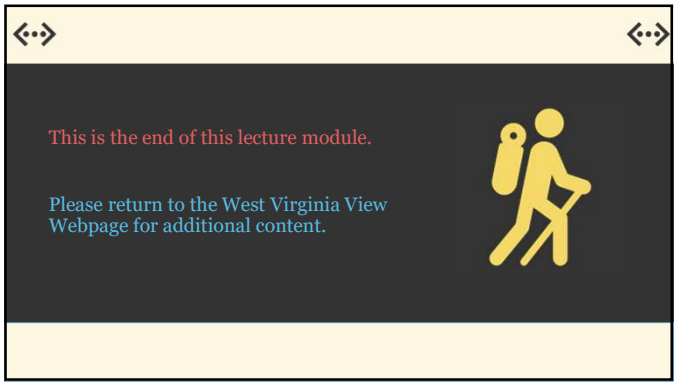
This is the end of this lecture module.
Please return to the West Virginia View Webpage for additional content.

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