



Administering Your Web GIS

George Bochenek

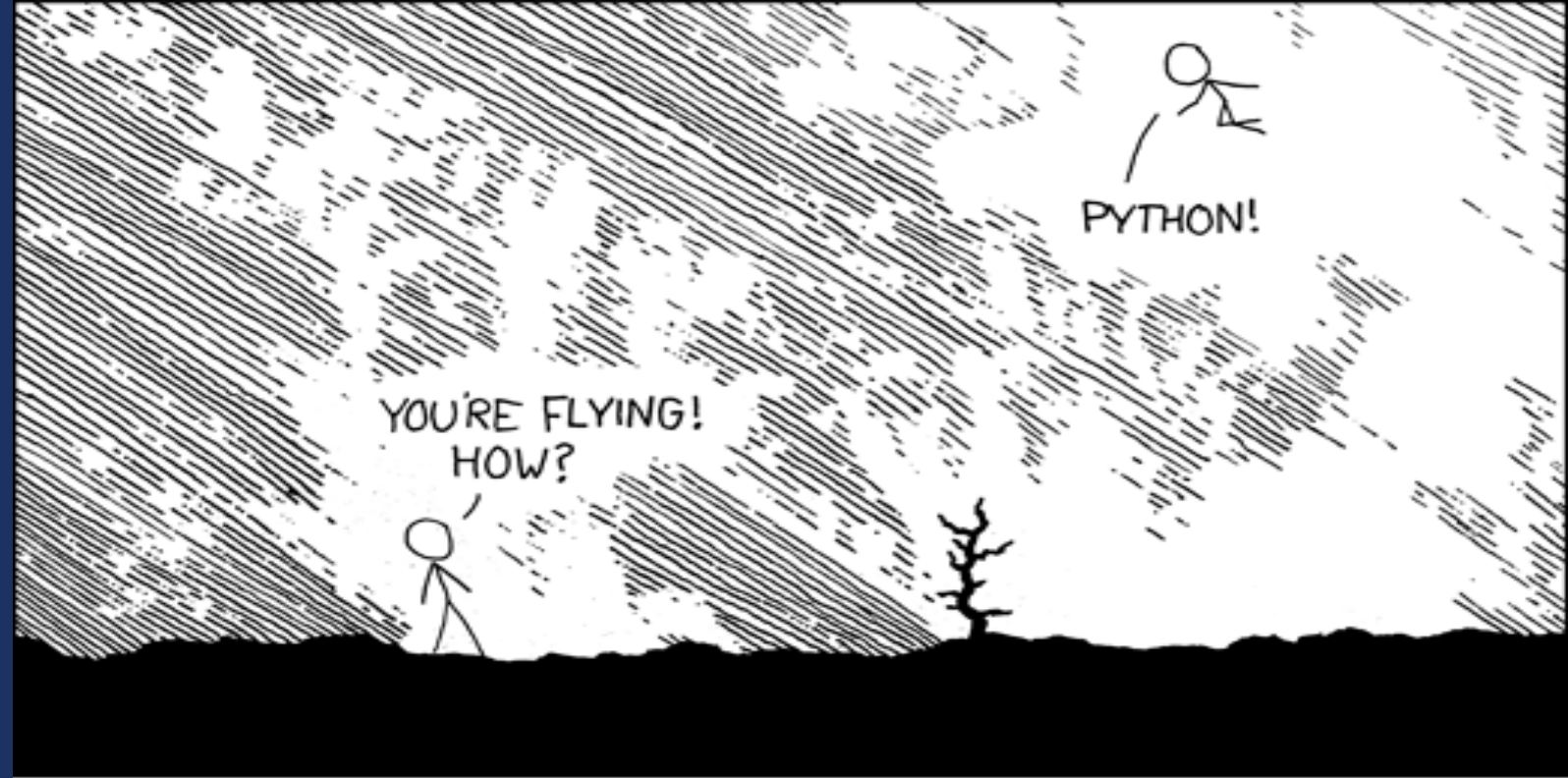
Andrew Chapkowski

2019 ESRI
FEDERAL GIS CONFERENCE
WASHINGTON, DC

Overview

- **Basics of the ArcGIS API**
 - Why Python?
 - What is the Python API?
 - What is Inside the API?
 - Using the GIS Object
- **Content**
 - Searching
 - Adding, Removing, Updating Items
 - Cloning
- **Users**
 - Accessing User Content
 - Creating, deleting, updating Users
 - Managing Credits
- **Groups**
 - Adding Content, Users and Items
- **Automating Tasks**
- **Outside of Jupyter**

Why Python?



YOU'RE FLYING!
HOW?



I LEARNED IT LAST
NIGHT! EVERYTHING
IS SO SIMPLE!

HELLO WORLD IS JUST
print "Hello, world!"

I DUNNO...
DYNAMIC TYPING?
WHITESPACE?

COME JOIN US!
PROGRAMMING
IS FUN AGAIN!
IT'S A WHOLE
NEW WORLD
UP HERE!

BUT HOW ARE
YOU FLYING?

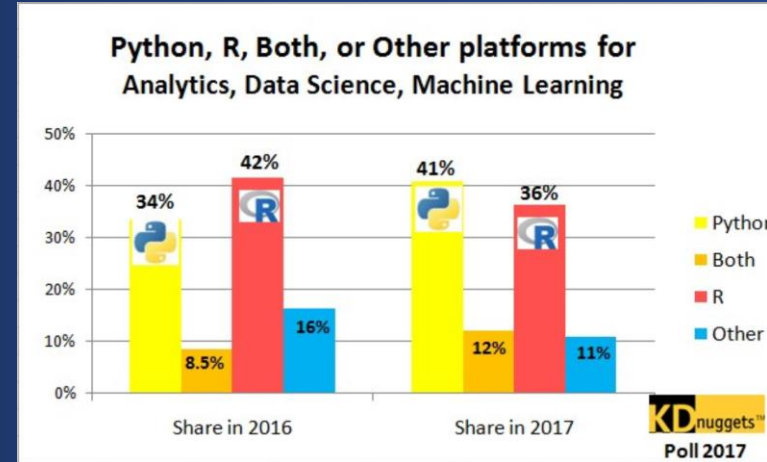
I JUST TYPED
import antigravity
THAT'S IT?

... I ALSO SAMPLED
EVERYTHING IN THE
MEDICINE CABINET
FOR COMPARISON.

BUT I THINK THIS
IS THE PYTHON.

Why Python?

- Popularity
- Productivity
- Interoperability
- Solves the “two-language” problem
- Scientific Python ecosystem
- Community

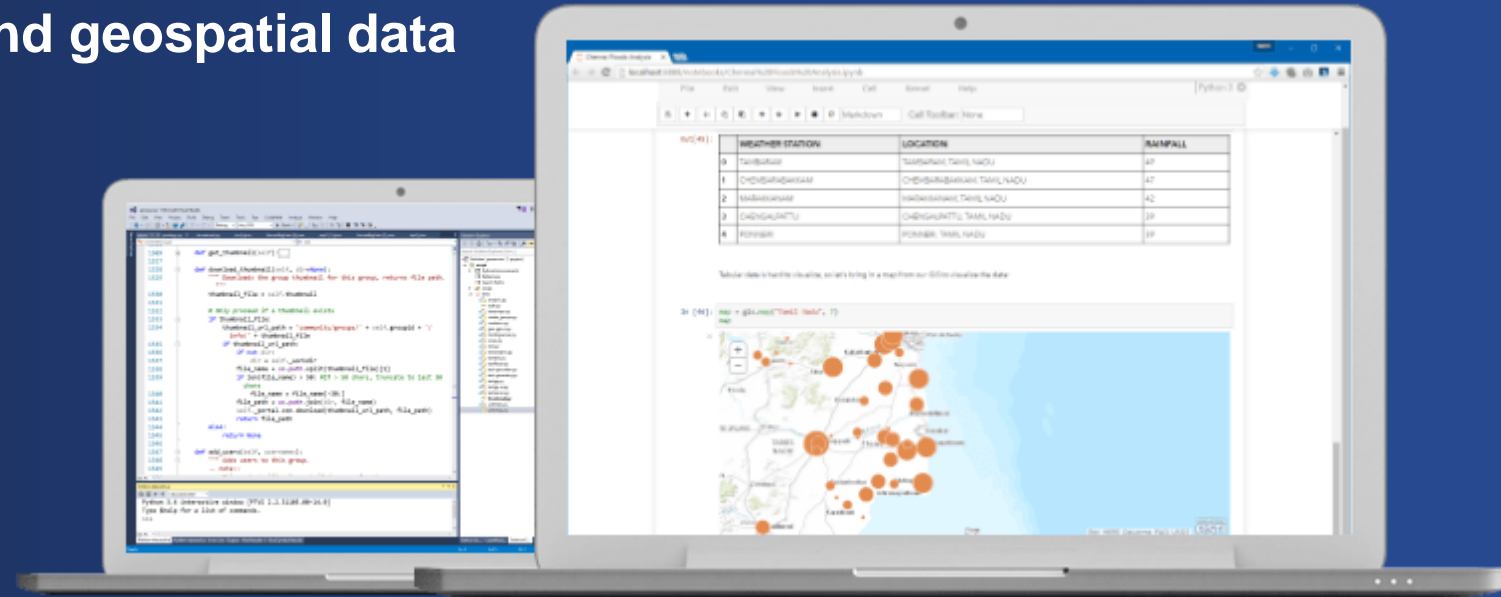


CAME FOR THE
LANGUAGE
STAYED FOR THE
COMMUNITY



What is the Python API?

- Library for working with maps and geospatial data
- Powered by Web GIS
- Simple collection of tools
 - Raster/Vector Analysis
 - Geocoding
 - Routing/Directions
 - Content/User Management
- Manages Infrastructure



What's Inside?



ArcGIS for Developers | [Get Started](#) | [Documentation](#) | [Features](#) | [Pricing](#) | [Support](#) | [Sign In](#)

Scripting and Automation / **ArcGIS API for Python (1.5.2)**

ArcGIS API for Python

[Install the API](#)


Version 1.5.2 - December 2018

[Guide](#) | [Sample Notebooks](#) | [API Reference](#) | [Community](#)


ArcGIS API for Python library for spatial analysis, mapping and GIS

ArcGIS API for Python library for working with maps and geospatial data, powered by web GIS. It provides simple and efficient access to Esri's ArcGIS REST API for vector and raster analysis, geocoding, map making, routing and directions, as well as for organizing and managing data with users, groups and information items. In addition to working with your own data, the library enables access to ready to use maps and integrated geographic data from Esri and other authoritative sources. It also integrates well with the scientific Python ecosystem and includes rich support for Pandas and Jupyter notebook.


[Install the API](#) | [Get started](#) | [View samples](#)



Understand your GIS



Manage your GIS



Perform Spatial Analysis

The GIS Class

Using the GIS

- The GIS class provides access to the enterprise system
- Supports multiple logins methods
- Leverages ArcGIS Pro Authentication
 - Used for enterprise security
- Support profiles
 - Credentials do not get stored in scripts!

```
▶ In [1]: from arcgis.gis import GIS
```


Creating a Profile

- Profiles allow for user to take advantage of credential stores on local systems
- Works on both Mac, Windows and Linux

```
from arcgis.gis import GIS  
gis = GIS(profile='dev_summit_2019')
```

Creating a Profile

- Profiles allow for user to take advantage of credential stores on local systems
- Works on both Mac, Windows and Linux

```
[dev_summit_2019]  
date_modified = 2019-01-03 08:51:03.063834  
username = geodev2019
```

Working with GIS

- Provides access to site's settings
 - Access the system properties
- Gives access to manager classes
 - User
 - Group
 - Content
 - Etc...
- Product Version (New at 1.5.2)

```
gis.version
```

```
[6, 4]
```

```
gis.properties
```

```
{,
  "portalThumbnail": null,
  "region": "US",
  "rotatorPanels": [
    {
      "id": "banner-4",
      "innerHTML": "<img src='images/banner-4.jpg' style='-webk
px; -o-border-radius:0 0 10px 10px; border-radius:0 0 10px 10px
ion:absolute; bottom:80px; left:80px; max-height:65px; width:66
om/sharing/rest/portals/self/resources/thumbnail.jpg?token=SECU
atLeading esriTrailingMargin025' style='margin-bottom:0; max-he
-bottom:0; line-height:normal; font-family:HelveticaNeue,Verdan
ons Development</span></div>"
    }
  ],
  "showHomePageDescription": true,
  "staticImageUrl": "http://static.arcgis.com/images",
  "storageQuota": 2199023255552,
  "storageUsage": 8577010158,
  "stylesGroupQuery": "title:\"Esri Styles\" AND owner:esri_en"
```

```
gis.update_properties({ "key" : "values" })
```

Working with GIS

- **Provides access to site's settings**
 - Access the system properties
- **Gives access to manager classes**
 - User
 - Group
 - Content
 - Etc...
- **Product Version (New at 1.5.2)**

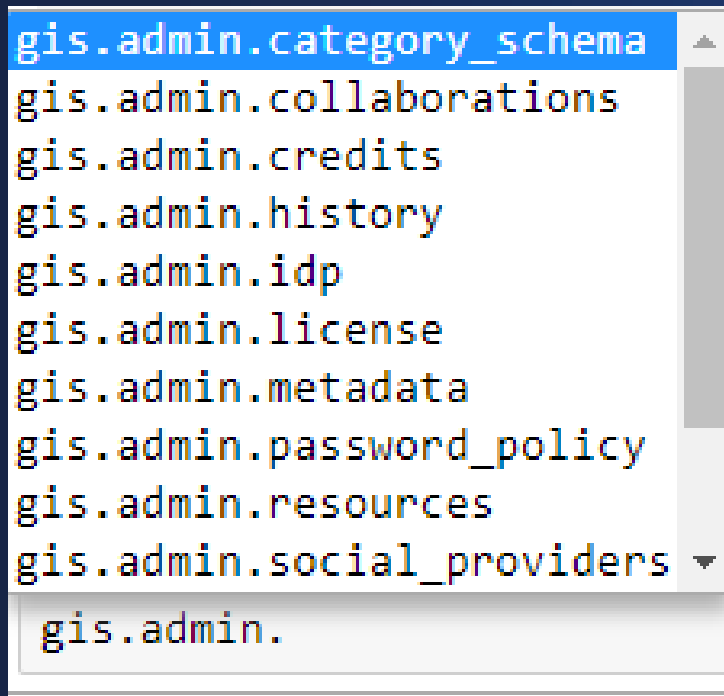
```
In [ ]: gis.admin
gis.content
In [ ]: gis.groups
gis.map
In [ ]: gis.properties
gis.update_properties
gis.url
In [ ]: gis.users
gis.version
In [ ]: gis.
```



GIS.admin

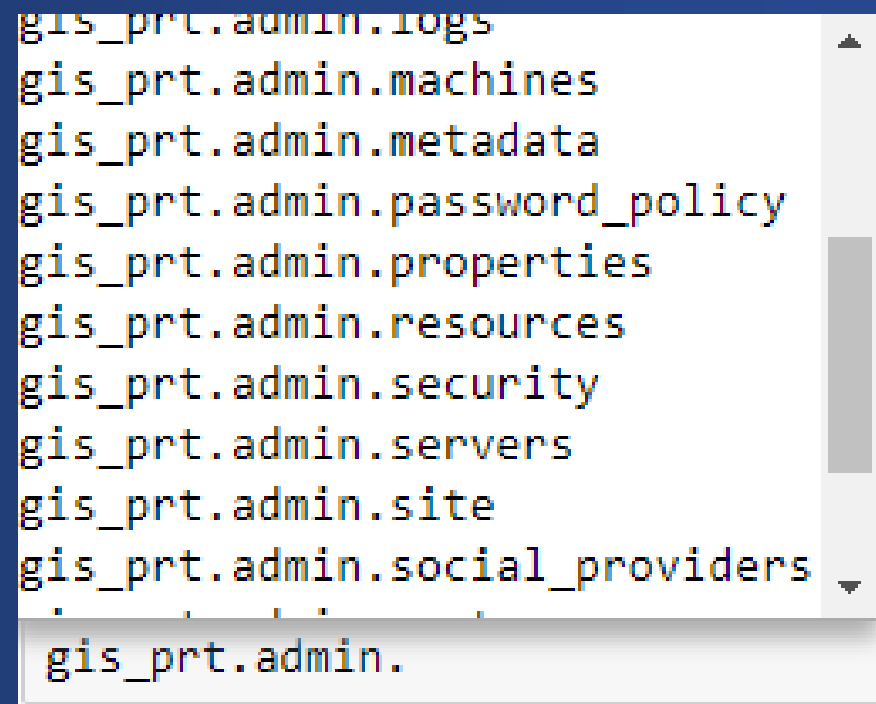
The admin Property

- Differs if you are using Online vs Enterprise
- Manages the nuts and bolts of the system

A screenshot of a web-based admin interface for ArcGIS Online. It shows a list of administrative properties in a scrollable container. The first item, 'gis.admin.category_schema', is highlighted in blue. Below the list is a search bar containing the text 'gis.admin.'. The list includes: gis.admin.category_schema, gis.admin.collaborations, gis.admin.credits, gis.admin.history, gis.admin.idp, gis.admin.license, gis.admin.metadata, gis.admin.password_policy, gis.admin.resources, gis.admin.social_providers, and gis.admin.

```
gis.admin.category_schema
gis.admin.collaborations
gis.admin.credits
gis.admin.history
gis.admin.idp
gis.admin.license
gis.admin.metadata
gis.admin.password_policy
gis.admin.resources
gis.admin.social_providers
gis.admin.
```

ArcGIS Online

A screenshot of a web-based admin interface for the ArcGIS Enterprise System. It shows a list of administrative properties in a scrollable container. The list includes: gis_prt.admin.logs, gis_prt.admin.machines, gis_prt.admin.metadata, gis_prt.admin.password_policy, gis_prt.admin.properties, gis_prt.admin.resources, gis_prt.admin.security, gis_prt.admin.servers, gis_prt.admin.site, gis_prt.admin.social_providers, and gis_prt.admin.

```
gis_prt.admin.logs
gis_prt.admin.machines
gis_prt.admin.metadata
gis_prt.admin.password_policy
gis_prt.admin.properties
gis_prt.admin.resources
gis_prt.admin.security
gis_prt.admin.servers
gis_prt.admin.site
gis_prt.admin.social_providers
gis_prt.admin.
```

Enterprise System

Site History

```
import datetime
import pandas as pd
dt = datetime.datetime.now() - datetime.timedelta(days=25)
history_csv = gis.admin.history(dt, num=10000)
```

```
df = pd.read_csv(history_csv)
df[['actor', 'action', 'created_utc', 'request']].head(12)
```

	actor	action	created_utc	request
0	Andrew Solutions	login	Dec 9, 2018 4:16:13 PM	/sharing/oauth2/signin
1	gslver-arcsolutions	login	Dec 9, 2018 4:25:11 PM	/sharing/rest/oauth2/token
2	gslver-arcsolutions	login	Dec 9, 2018 4:52:11 PM	/sharing/rest/oauth2/token
3	gslver-arcsolutions	login	Dec 9, 2018 5:19:11 PM	/sharing/rest/oauth2/token
4	gslver-arcsolutions	login	Dec 9, 2018 5:46:11 PM	/sharing/rest/oauth2/token
5	gslver-arcsolutions	login	Dec 9, 2018 6:12:11 PM	/sharing/rest/oauth2/token

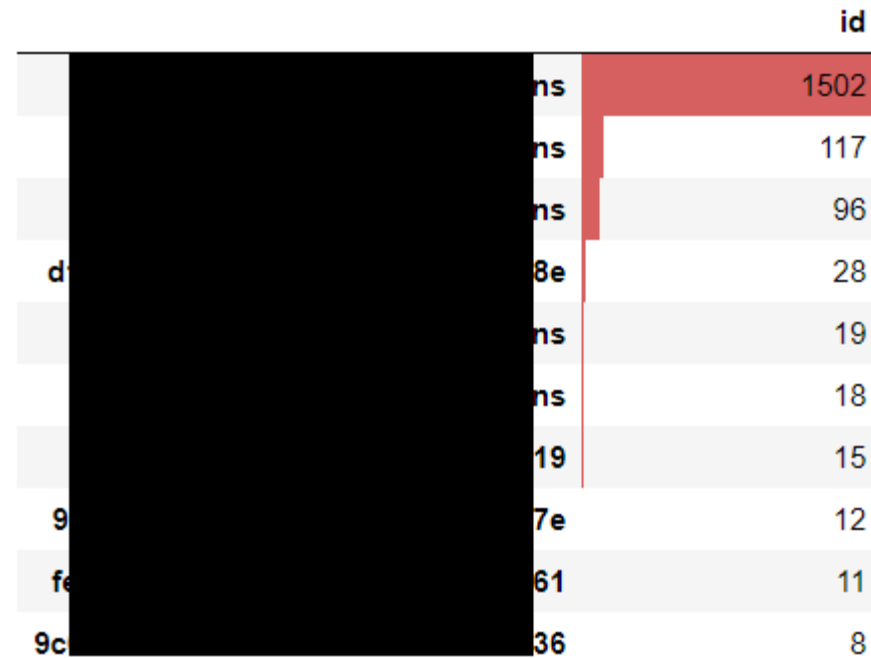
- Quickly Obtain a Snapshot of What Users Do
- Find Power Users
- Discover Trends

Site History

- Graphing Data is Easy with Pandas!

```
s = df['id'].value_counts().nlargest(10)
```

```
(  
    pd.DataFrame(s)  
    .style  
    .bar(color='#d65f5f')  
)
```



Managing Credits

- The currency of ArcGIS Online
- Credit allow you to host, use and manage premium content
- Geocoding and Network Analysis Use Credits
- By default, managing of credits is **disabled!**

```
credits.allocate("geodev0", 10)
```

True

Working with Logs

- Provide access to underlying system information
- Helps to figure out issues with a server, site or service
- Update the settings configuration
- Query for issues
- Available on Local Enterprises

```
logs = gis_prt.admin.logs  
logs
```

<Logs at <https://python.playground.esri.com/portal/portaladmin/logs>>

```
logs.settings
```

```
{'logDir': '/gisdata/arcgisportal/logs/',  
 'logLevel': 'WARNING',  
 'maxErrorReportsCount': 10,  
 'maxLogFileAge': 90,  
 'usageMeteringEnabled': False}
```


Query the Logs Example

```
import pandas as pd
import datetime
logs = gis_prt.admin.logs
dt = datetime.datetime.now() - datetime.timedelta(days=10)
message = logs.query(dt)['logMessages']
df = pd.DataFrame(message)
df.head()
```

	code	elapsed	machine	message	methodName	process	source	thread	time	type	user
0	219999		10.0.0.250	Sign in error: Invalid username or password s...		30379	Sharing	13	1546442011249	WARNING	
1	219999		10.0.0.250	Failed to export item '匹兹堡.zip' (id:9239a55f1...		30379	Sharing	13	1545894327331	SEVERE	arcgis_python
2	219999		10.0.0.250	Failed to export item 'Heart_attack_incidence...		30379	Sharing	13	1545894229444	SEVERE	arcgis_python
3	219999		10.0.0.250	Failed to export item 'Heart_attack_incidence...		30379	Sharing	13	1545894117477	SEVERE	arcgis_python
4	219999		10.0.0.250	Sign in error: Invalid username or password s...		30379	Sharing	13	1545839572861	WARNING	

Metadata

```
md = gis.admin.metadata
if md.is_enabled == False:
    md.enable('arcgis')
else:
    print("Metadata is enabled for this site")
```

- Information that describes an item or dataset
- Organizations can enable/disable metadata
- A default metadata style can be set
 - No metadata is ever lost when switching formats

Federated Servers

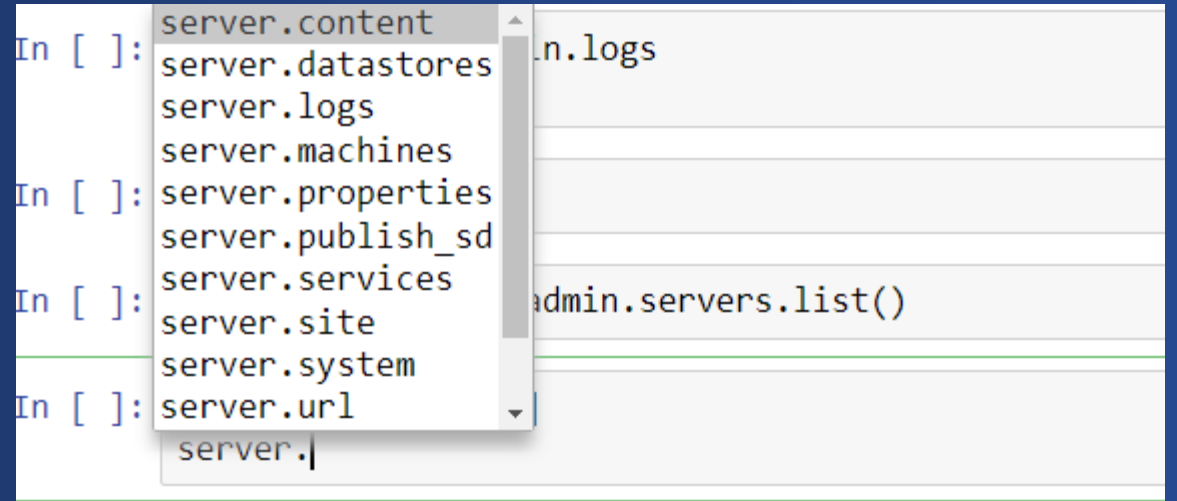
- Enterprise allows for the access of the underlying servers
- Supports hosting, raster, and other types of server
- Let's you configure low level ArcGIS Server machines if they are federated
 - Certificates, logs, etc...

```
gis_prt.admin.servers.list()
```

```
[<Server at https://python.playground.esri.com/server/admin>,  
<Server at https://python-ga.playground.esri.com/server/admin>,  
<Server at https://python-ra.playground.esri.com/arcgis/admin>]
```

A Server Manager

- A single server allows for the access of the ArcGIS Server administration REST API
- Direct publishing of SD file
- Manage:
 - Datastores
 - Logs
 - Machines
 - Services
 - System Properties



The screenshot shows a Jupyter Notebook interface with a dropdown menu open for the variable 'server'. The dropdown lists the following attributes: 'server.content', 'server.datastores', 'server.logs', 'server.machines', 'server.properties', 'server.publish_sd', 'server.services', 'server.site', 'server.system', and 'server.url'. The background shows several code cells with the following content:

```
In [ ]: server.content
In [ ]: server.datastores
In [ ]: server.logs
In [ ]: server.machines
In [ ]: server.properties
In [ ]: server.publish_sd
In [ ]: server.services
In [ ]: server.site
In [ ]: server.system
In [ ]: server.url
```

On the right side of the notebook, there is a cell containing the code `admin.servers.list()`.

Server Management Example



Content

Search for content

```
In [4]: items = gis.content.search('San Diego')
```

```
In [5]: for item in items:  
        display(item)
```



Places to see in San Diego

Places to see in San Diego



Feature Collection by deldev

Last Modified: July 01, 2017

0 comments, 512 views



San Diego attractions web map

Esri Story Maps team member and San Diego resident Rupert Essinger selects some places you might enjoy.



Web Map by deldev

Last Modified: July 01, 2017

0 comments, 3 views



San Diego Trolley stations

San Diego Trolley stations

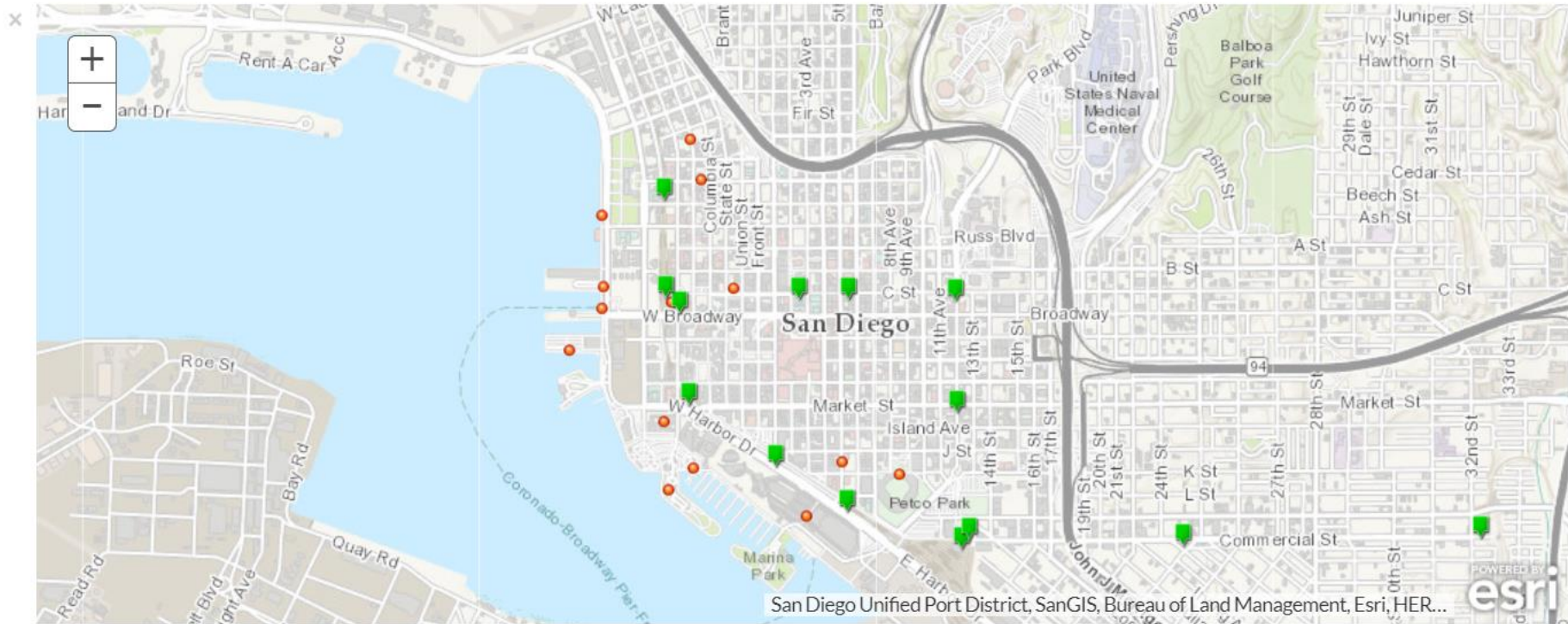


Feature Collection by deldev

Last Modified: June 23, 2017

Visualize layers on map widget

```
In [7]: sdmap = gis.map('San Diego', zoomlevel=14)  
sdmap
```



```
In [8]: sdmap.add_layer(sd_attractions)
```

```
In [9]: sdmap.add_layer(trolley_stations)
```

Creating and Publishing Content

- Content is first added using the ``add`` method
- Item Properties provide information about what you are adding to the Enterprise
- Always provides: title, type and tags at a minimum

Signature: `gis.content.add(item_properties, data=None, thumbnail=None, metadata=None, owner=None, folder=None)`

Docstring:

Adds content to the GIS by creating an item.

.. note::

Content can be a file (such as a service definition, shapefile, CSV, layer package, file geodatabase, geoprocessing package, map package) or it can be a URL (to an ArcGIS Server service, WMS service, or an application).

If you are uploading a package or other file, provide a path or URL to the file in the data argument.

From a technical perspective, none of the item_properties (see table below *Key:Value Dictionary Options for Argument item_properties*) are required. However, it is strongly recommended that arguments title, type, typeKeywords, tags, snippet, and description be provided.

Creating and Publishing Content

**When Adding a Feature Class,
ensure you use the Proper TYPE**

```
fp = r"C:\temp\census.zip"  
content_type = "Shapefile"  
title = "My First Shapefile"  
tags = "Delete Me, Demo, First Data"
```

```
shp_item = gis.content.add(  
    item_properties={  
        "title" : title,  
        "tags" : tags,  
        "type" : content_type  
    },  
    data=fp)
```

shp_item



[My First Shapefile](#)



Shapefile by geodev2019
Last Modified: January 04, 2019
0 comments, 0 views

Creating and Publishing Content

Once Spatial Data is loaded, the data needs to be published so users can query and use the data for analysis or visualization

```
published_item = fgdb_item.publish()  
published_item
```

|



[My First FGDB](#)



Feature Layer Collection by geodev2019
Last Modified: January 04, 2019
0 comments, 0 views

Updating Items

- Items can be modified after put into the Enterprise:
 - Item Properties
 - Underlying Data
 - Metadata
- The `update()` exists off of the Item class and works like the `add()`

shp_item



[My First Shapefile](#)



Shapefile by geodev2019
Last Modified: January 04, 2019
0 comments, 0 views

```
shp_item.update({"title" : "Updated Title"})  
shp_item
```



[Updated Title](#)



Shapefile by geodev2019
Last Modified: January 04, 2019
0 comments, 0 views

Deleting Content

- **Users and Administrators can delete content**
 - User can **ONLY** delete content they own
 - Administrators can delete anyone's content
- **Items develop associations, so a published item cannot have it's source deleted**

```
related_items = published_item.related_items(rel_type='Service2Data',  
                                              direction="forward")  
related_items
```

```
[<Item title:"My First FGDB" type:File Geodatabase owner:geodev2019>]
```

```
published_item.delete()
```

```
True
```

```
for i in related_items:  
    if i.delete():  
        print("Item: {title}, has been removed.".format(title=i.title))  
    else:  
        print("Item: {title}, has not been removed.".format(title=i.title))
```

```
Item: My First FGDB, has been removed.
```

Protecting Items

- Some Items are very important
- Protection prevents deletion
- ArcGIS Online/Enterprise has no UNDO command!

```
fgdb_item.protect(enable=True)  
fgdb_item.delete()
```

Unable to delete item. Delete protection is turned on.

```
fgdb_item.protect(enable=False)  
fgdb_item.delete()
```

True


Users and Groups

Managing Users

- Create new users
- Analyze and adjust license levels

```
britt = users.get("bpoole")
```

britt



[Britt Poole](#)

Bio: None
First Name: Britt
Last Name: Poole
Username: bpoole
Joined: January 23, 2019

```
britt.level
```

'1'

```
britt.update_level("2")
```

Unable to update user's level. Level user limit reached.

```
gis.admin.system.licenses.properties

{
  "isValid": true,
  "currentRegisteredMembers": 6,
  "maximumRegisteredMembers": 30,
  "expiration": 1548892800000,
  "features": [
    {
      "level": "1",
      "name": "esriPortalLv11",
      "displayName": "Portal for ArcGIS",
      "isValid": true,
      "maximumRegisteredMembers": 25,
      "version": "10.6",
      "expiration": 1548892800000,
      "currentRegisteredMembers": 1
    },
    {
      "level": "2",
      "name": "esriPortalLv12",
      "displayName": "Portal for ArcGIS",
      "isValid": true,
      "maximumRegisteredMembers": 5,
      "version": "10.6",
      "expiration": 1548892800000,
      "currentRegisteredMembers": 5
    }
  ]
}
```


Accessing Other User's Content

- User objects give the ability to find user's content
- Allows administrators to modify, delete and update user content

```
user_manager = gis.users
```

```
george = user_manager.get("gbochenek")
```

george



[George Bochenek](#)

Bio: None
First Name: George
Last Name: Bochenek
Username: gbochenek
Joined: November 19, 2018

```
george.items()
```

```
[<Item title:"NST Demo App" type:Web Mapping Application owner:gbochenek>,  
<Item title:"Top Secret Map" type:Web Map owner:gbochenek>,  
<Item title:"nyc_parks_gardens_hist_sites" type:Feature Layer Collection owner:gbochenek>,  
<Item title:"ESRI_Census_USA" type:Feature Layer Collection owner:gbochenek>,  
<Item title:"Another Web Service" type:Feature Layer Collection owner:gbochenek>,  
<Item title:"Toronto" type:Imagery Layer owner:gbochenek>,  
<Item title:"NDFD_wind" type:Imagery Layer owner:gbochenek>,  
<Item title:"Evacuation Zones" type:Web Map owner:gbochenek>,  
<Item title:"Web Map with Features" type:Web Map owner:gbochenek>,  
<Item title:"Congressional District Demographics" type:Feature Layer Collection owner:gbochenek>,  
<Item title:"USA Median Age" type:Web Map owner:gbochenek>]
```

```
george.items()[0].id
```

```
'70e077daf8054611938597790b84c3fe'
```


Managing Groups

- Create and Share to Groups
- Allows administrators to automate content curation and organization

```
groups = gis.groups  
groups.search()
```

```
[<Group title:"Anti-Shipping Dashboard" owner:portalpub>,  
<Group title:"AppalachianTrail" owner:portalpub>,  
<Group title:"Esri Boundary Layers" owner:esri_boundaries>,  
<Group title:"Esri Demographic Layers" owner:esri_demogra>,  
<Group title:"Featured Maps and Apps" owner:portaladmin>,  
<Group title:"George's Group" owner:portaladmin>,  
<Group title:"IC Portal Team" owner:portalpub>,  
<Group title:"Living Atlas" owner:esri_livingatlas>,  
<Group title:"Living Atlas Analysis Layers" owner:esri_li
```

```
new_group = groups.create(title = "George's Dev Group", tags = ["DC Dev"])
```

new_group



[George's Dev Group](#)

Summary: None

Description: None

Owner: portaladmin

Created: January 28, 2019

```
george.items()[0].share(new_group)
```

```
{'notSharedWith': [], 'itemId': '70e077daf8054611938597790b84c3fe'}
```

```
groups.search("George")
```

```
[<Group title:"George's Dev Group" owner:portaladmin>,  
<Group title:"George's Group" owner:portaladmin>]
```

```
new_group.delete()
```

```
True
```

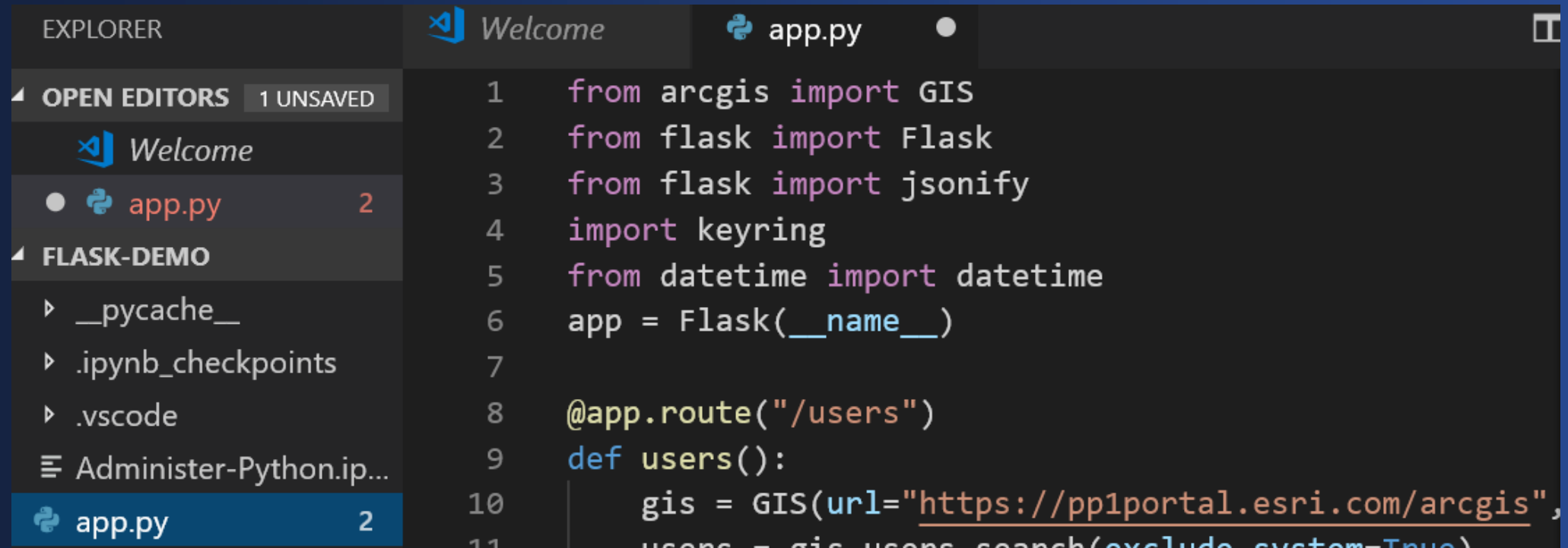
```
groups.search("George")
```

```
[<Group title:"George's Group" owner:portaladmin>]
```

Life Outside of Jupyter

Automating Tasks with the Python API for ArcGIS

- Use the development tools you're most comfortable with
- Run your tool from the command line
- Schedule Tasks



The screenshot shows the Visual Studio Code interface. On the left, the Explorer sidebar displays the file structure of a project named 'FLASK-DEMO'. The 'app.py' file is selected and highlighted. The main editor area shows the code for 'app.py', which includes imports for the ArcGIS API, Flask, jsonify, and keyring, along with a Flask application setup and a route for '/users'.

```
1 from arcgis import GIS
2 from flask import Flask
3 from flask import jsonify
4 import keyring
5 from datetime import datetime
6 app = Flask(__name__)
7
8 @app.route("/users")
9 def users():
10     gis = GIS(url="https://pp1portal.esri.com/arcgis",
11                users = gis.users_search(exclude_system=True))
```

Make Your Own API





esri

THE
SCIENCE
OF
WHERE

Print Your Certificate of Attendance

Print Stations Located at L Street Bridge

Tuesday

12:30 pm – 6:30 pm
GIS Solutions Expo
Hall D

5:15 pm – 6:30 pm
GIS Solutions Expo Social
Hall D

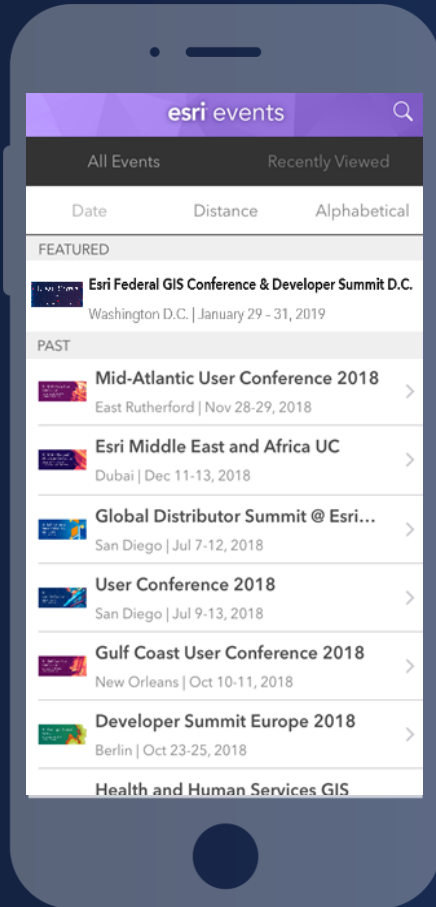
Wednesday

10:45 am – 5:15 pm
GIS Solutions Expo
Hall D

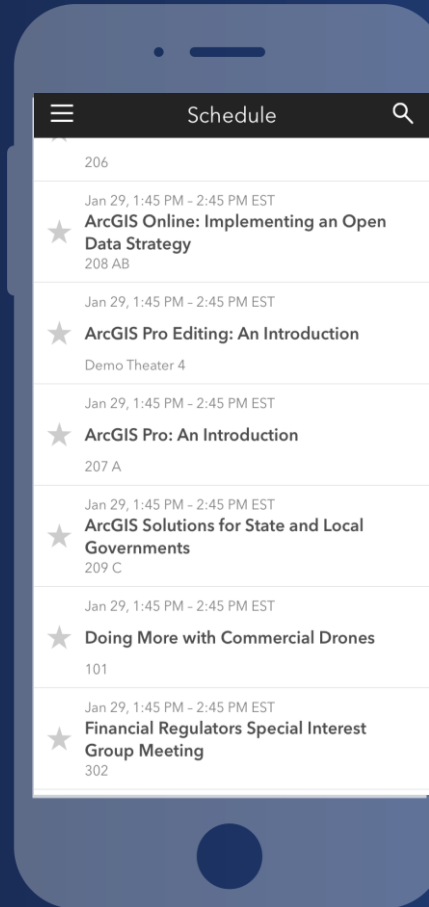
6:30 pm – 9:00 pm
Networking Reception
National Museum of
Natural History

Please Take Our Survey on the App

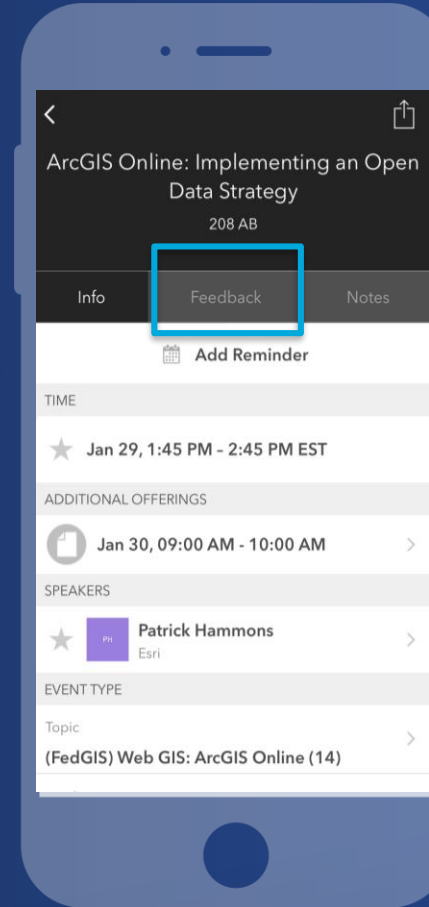
Download the Esri Events app and find your event



Select the session you attended



Scroll down to find the feedback section



Complete answers and select "Submit"

