ArcGIS API for Python: Introduction to Scripting your Web GIS

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2019 ESRI DEVELOPER SUMMIT

What is the ArcGIS API for Python

ArcGIS for Developers | Get Started | Documentation | Features | Pricing | Support | Sign In

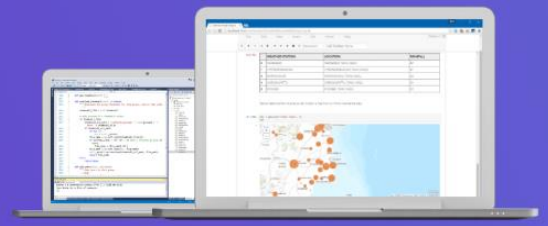
Scripting and Automation / **ArcGIS API for Python (1.6.0)**

ArcGIS API for Python

Install the API

Version 1.6.0 · February 28, 2019

Home | Guide | Sample Notebooks | API Reference | Community



A powerful Python library for spatial analysis, mapping and GIS

ArcGIS API for Python is a Python library for working with maps and geospatial data, powered by web GIS. It provides simple and efficient tools for sophisticated vector and raster analysis, geocoding, map making, routing and directions, as well as for organizing and managing a GIS with users, groups and information items. In addition to working with your own data, the library enables access to ready to use maps and curated 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

This "hello world" style notebook shows how to get started with the GIS and visualize its contents.

› Get started with the GIS class

Manage your GIS

The ArcGIS API for Python provides APIs and samples for ArcGIS Online administrators to manage their online organization.

› Clone a portal

Perform Spatial Analysis

Call sophisticated spatial analysis tools that work with online content, using a few lines of code.

› Chennai floods analysis

ArcGIS API for Python and ArcPy

ArcGIS API for Python

- Script against a portal
  - ArcGIS Online or ArcGIS Enterprise
  - Python 3.x
- Analysis, Portal Admin, Content Creation, Big Data Analysis

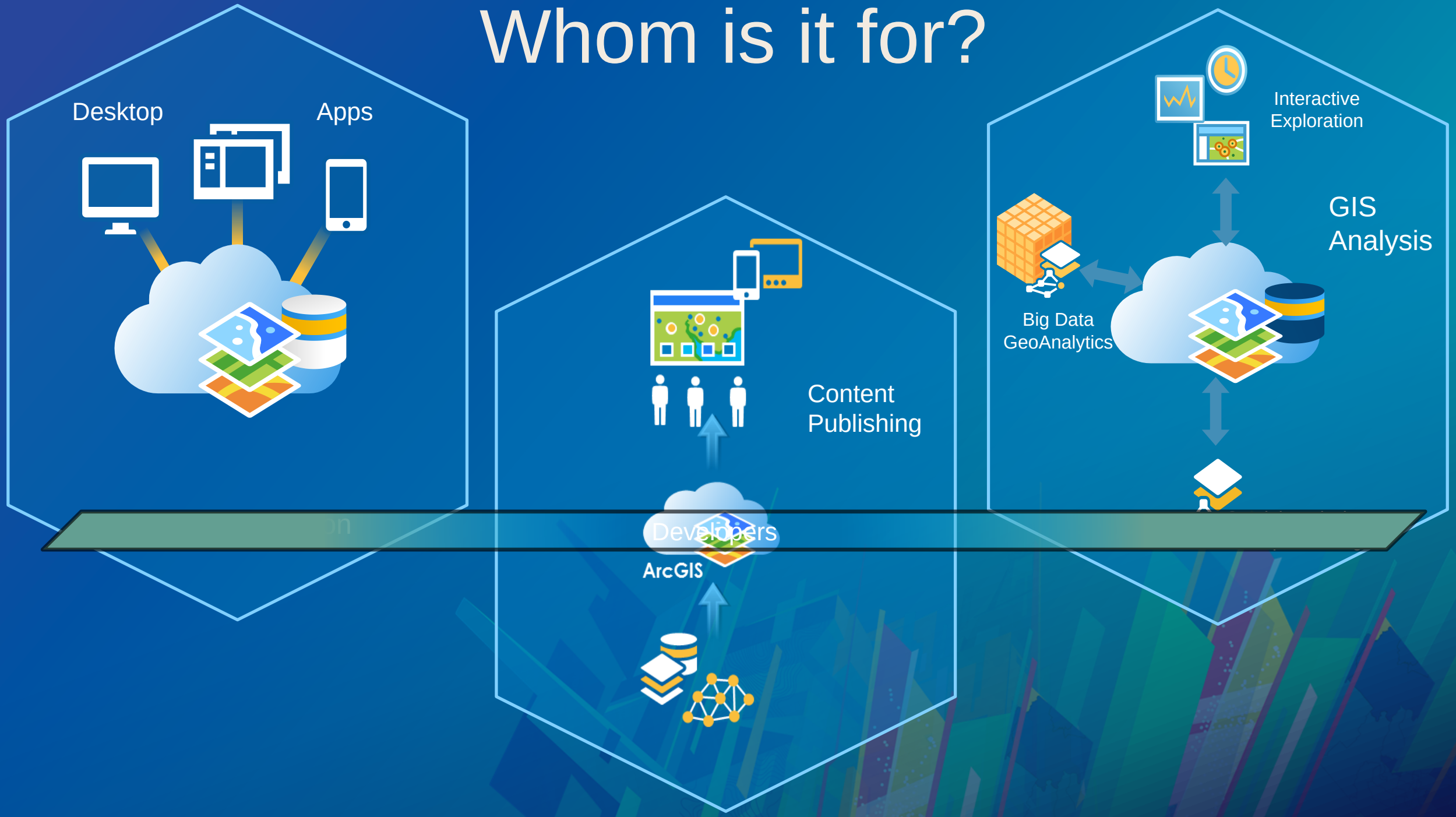
ArcPy

- ArcGIS Desktop
  - ArcMap – Python 2.x
  - ArcGIS Pro – 3.x
- Mostly geoprocessing
- Some map automation

Four different groups working with the ArcGIS API for Python

- Org Administrators
- Content Publishers
- GIS Analysts and Data Scientists
- Power Users/Developers

Whom is it for?



Automate Web GIS management

- Populate portal with users, groups
- Clone portals
- Re assign user content
- Perform comprehensive content search
- Determine item relationship
- Create reports of users, their items

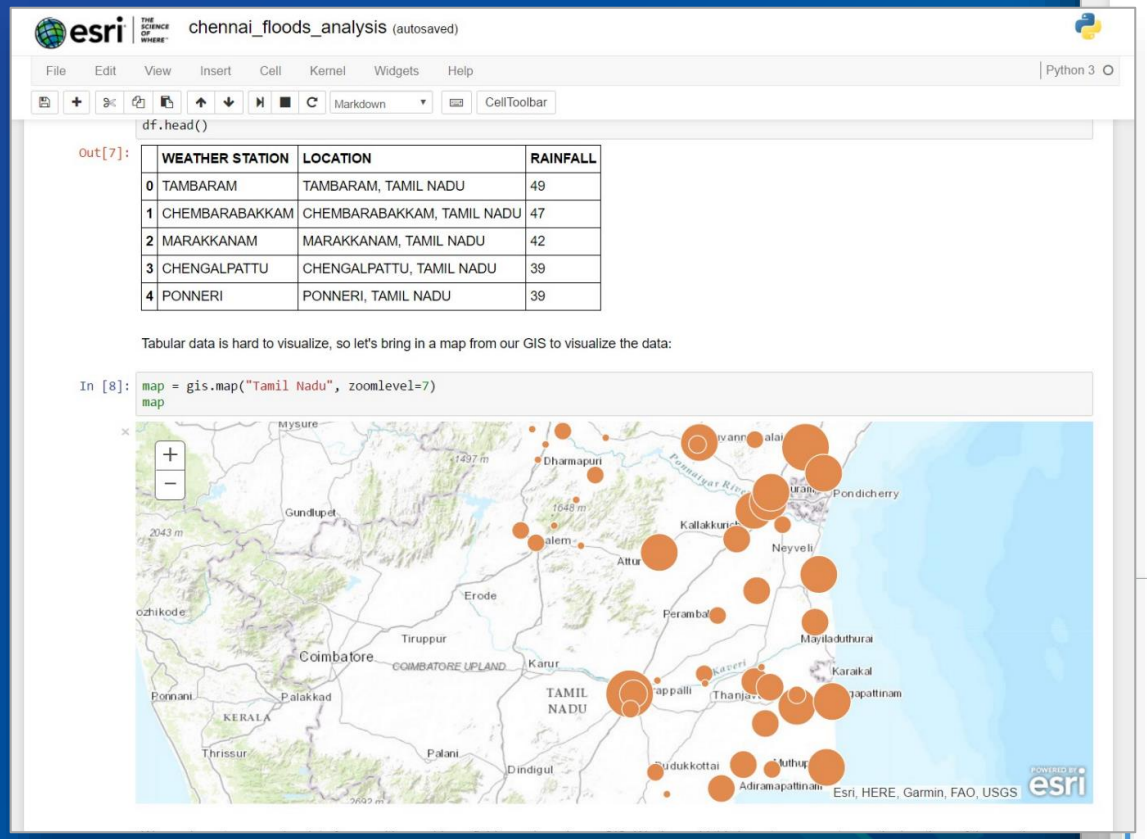
Automate content creation

- Automate content publishing during off peak hours
- Update tiles and features from a known database
- Replicate development environment content to production
- Inspect and update items with broken service links

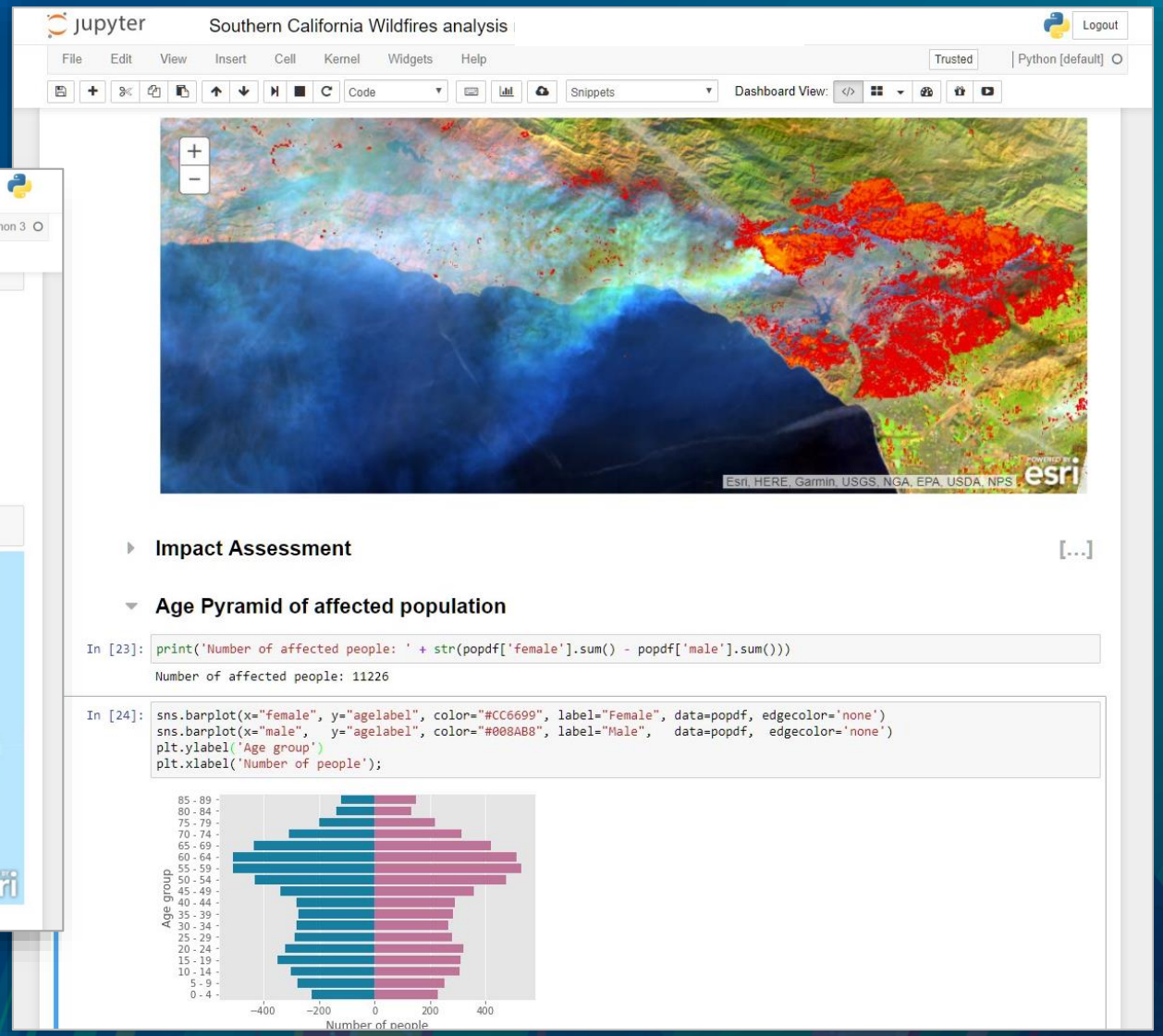
Reproducible research

- Access big data tools programmatically
- Utilize rich 3rd party Python packages for data analysis
- Create rich charts, graphs, embed 2D and 3D maps in Jupyter Notebook environment
- Share your research with data and notes with peers

ArcGIS + Jupyter = ❤️



	WEATHER STATION	LOCATION	RAINFALL
0	TAMBARAM	TAMBARAM, TAMIL NADU	49
1	CHEMBARABAKKAM	CHEMBARABAKKAM, TAMIL NADU	47
2	MARAKKANAM	MARAKKANAM, TAMIL NADU	42
3	CHENGALPATTU	CHENGALPATTU, TAMIL NADU	39
4	PONNERI	PONNERI, TAMIL NADU	39



It all starts with your GIS

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

In [2]:
```
gis = GIS('https://deldev.maps.arcgis.com', 'demo_deldev')
```

In [3]:
```
enterprise = GIS('https://python.playground.esri.com/portal', 'arcgis_python',
```

Search for content

In [34]:
```
rest_content = gis.content.search("DC Restaurants", item_type= "Feature Layer", max_items=10)
rest_content
```

Out[34]:
```
[<Item title:"Restaurants (Washington DC) HeatMap" type:Feature Layer Collection owner:cgabris_blueraster>,
 <Item title:"DC_TapIt" type:Feature Layer Collection owner:mbass6_GISandData>,
 <Item title:"Sidewalk Cafe" type:Feature Layer Collection owner:DCGISopendata>,
 <Item title:"restaurants_dc" type:Feature Layer Collection owner:sfoss_solutions>,
 <Item title:"Restaurants CSUSM AT_fieldworker" type:Feature Layer Collection owner:tanou001>,
 <Item title:"Commercial Kitchen Food Incubator Space" type:Feature Layer Collection owner:DCGISopendata>,
 <Item title:"restaurant" type:Feature Layer Collection owner:lkt_151119_lktmc>,
 <Item title:"Parking Meters" type:Feature Layer Collection owner:Justin.Mank@SMGOV.NET_smgov>,
 <Item title:"Restaurants (Washington DC)" type:Feature Layer Collection owner:cgabris_blueraster>,
 <Item title:"New Business Openings in DC (2013)" type:Feature Layer Collection owner:wdcep>]
```

In [36]:
```
from IPython.display import display
for item in rest_content:
    display(item)
```

Restaurants (Washington DC) HeatMap

Feature Layer Collection by cgabris_blueraster
Last Modified: October 23, 2017
0 comments, 1,167 views

DC_TapIt
Tap It is a DC program identifying restaurants and other establishments that allow individuals to refill their water bottles for free.

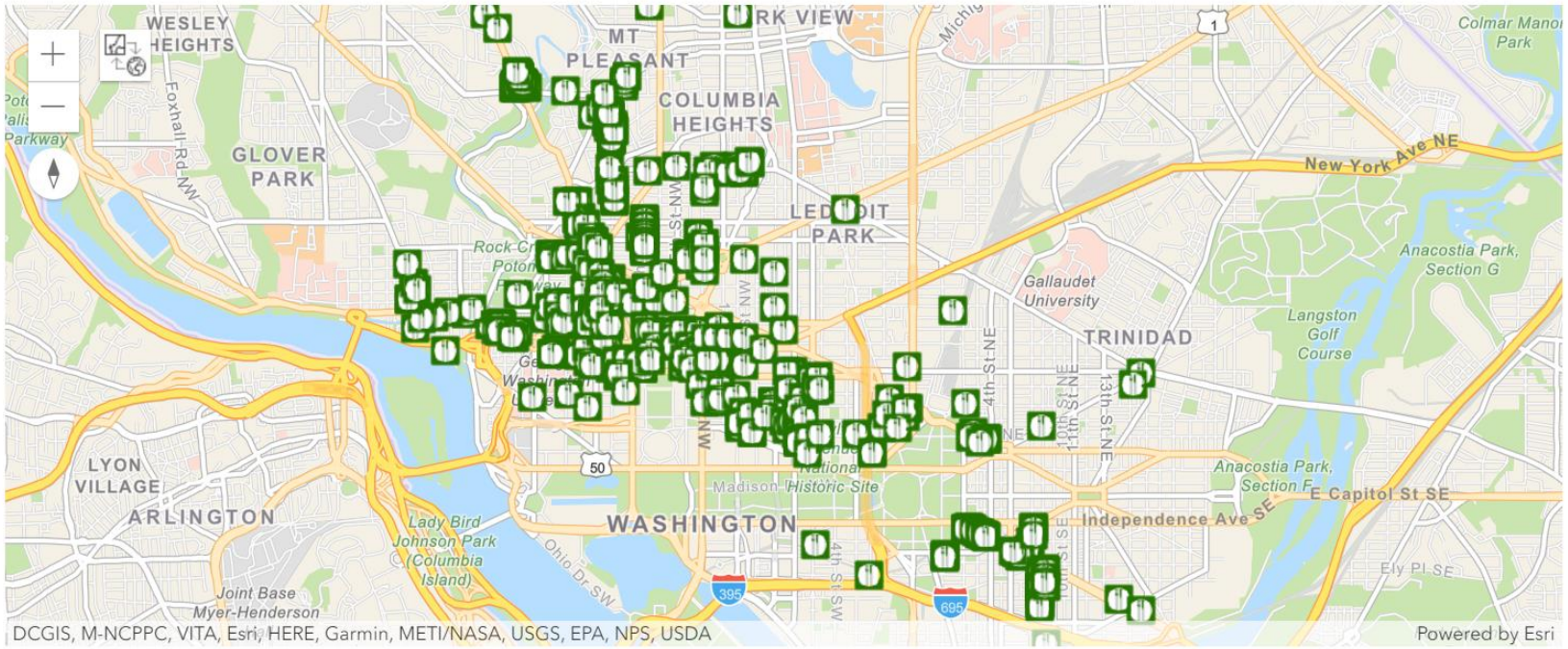
Feature Layer Collection by mbass6_GISandData
Last Modified: October 26, 2014
0 comments, 112 views

Sidewalk Cafe
This data is used for the planning and management of Washington, D.C. by local government agencies.

Feature Layer Collection by DCGISopendata
Last Modified: January 29, 2018
0 comments, 150 views

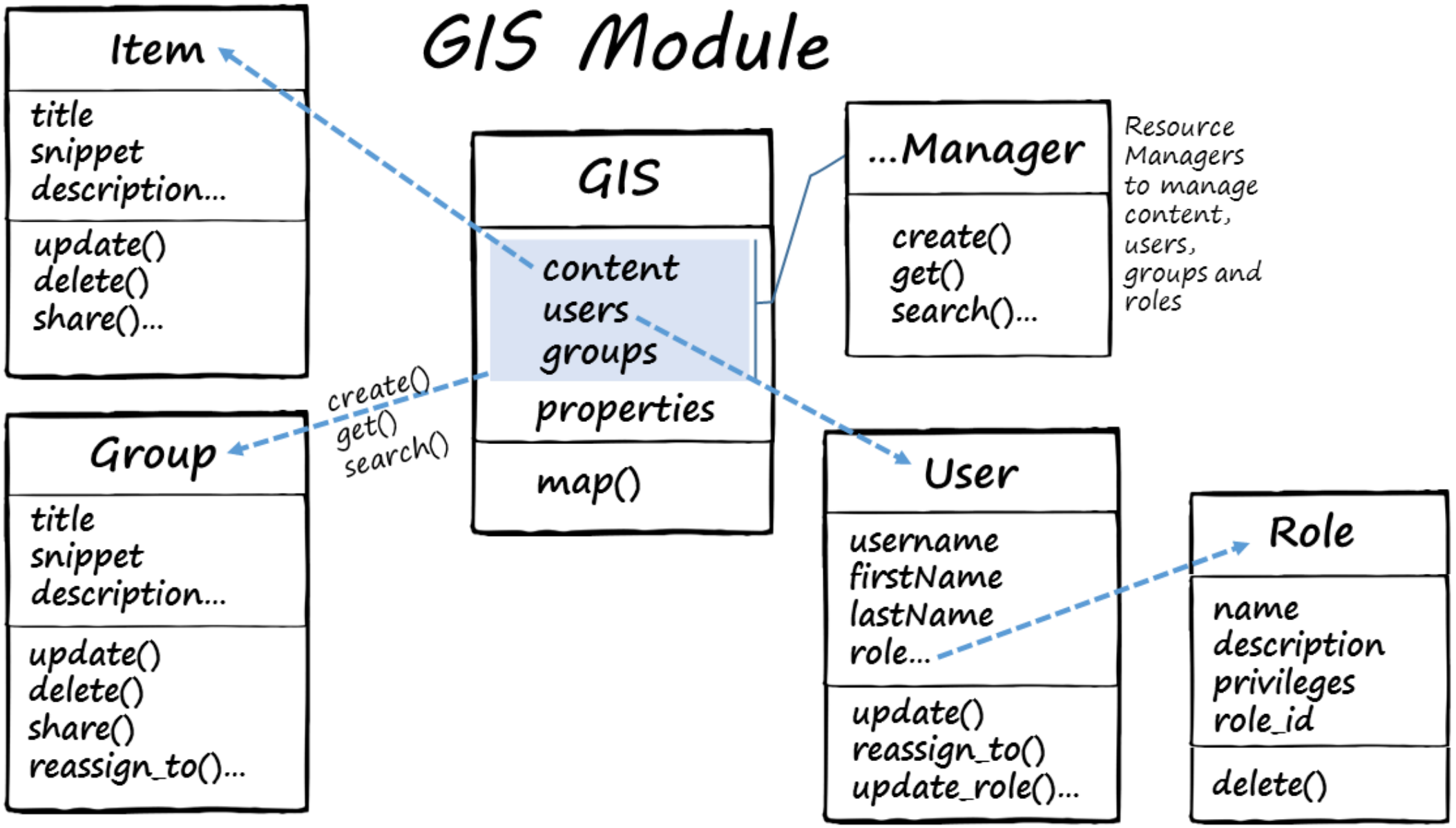
Visualize layers on map widget

In [44]:
```
map=gis.map("Washington, DC, USA")
map
```



In [51]:
```
rest=rest_content[2]
map.add_layer(rest)
```

GIS Module


Item
title
snippet
description...
update()
delete()
share()...
GIS
content
users
groups
properties
map()
...Manager
create()
get()
search()...
Resource Managers to manage content, users, groups and roles
Group
title
snippet
description...
update()
delete()
share()
reassign_to()...
create()
get()
search()
User
username
firstName
lastName
role...
update()
reassign_to()
update_role()...
Role
name
description
privileges
role_id
delete()

How do I get it?

- Try it Live! – https://notebooks.esri.com
- ArcGIS Pro 2.3 – included
- **pip** install arcgis
- **conda install -c esri arcgis**
- **docker pull esridocker/arcgis-api-python-notebook**

<hello-map/>

Different authentication schemes

- anonymous users
- built-in users
- users using LDAP, via
  - Basic authentication
  - Portal tier authentication
- users using Integrated Windows Authentication (IWA) through NTLM or Kerberos
- smart card users / PKI authentication using certificate and key files
- users connected to an ArcGIS Enterprise instance using ArcGIS Pro

Workflows for Org Administrators

```
from IPython.display import display
for group in source_groups:
    target_group = copy_group(target, source, group)
    if target_group:
        display(target_group)
```

Central Services

Summary: The authoritative service catalog.
Description: This Group contains an inventory of map services for our organization. These map services serve as building blocks for all maps and apps throughout the organization.
Owner: admin
Created: April 04, 2017

Compliance

Summary: Regulatory compliance tracking & reporting.
Description: A group dealing with government and industry association regulatory compliance and reporting.
Owner: admin
Created: April 04, 2017

Customer Service, Finance, Billing and Accounting

Summary: The Water & Sewer Billing and Collection Division manage the water and sewer accounts for residents.
Description: Typical types of users and roles that part of this group:Human Resources/PayrollAdministrative Services Officer I, IIAdministrative AideAccountantAccount ClerkPayroll ClerkDepartment AnalystRisk Management Analyst I,II,IIIAccounting TechnicianEngineering TechnicianCommon Task or Responsibilities of the users in this group:Customer ServiceReal Estate ServicesBudgets/Accounting/Long Range Financial PlanningSafety/Risk ManagementFinancingRecords Management/Clerical ServicesAuditingBill Collection and paymentConnections/DisconnectsReduced Rates / Leak AdjustmentsPool AdjustmentIrrigation and Hydrant MetersEmployee Development
Owner: admin
Created: April 04, 2017

Demographic Content

Summary: Esri demographic data with national coverage
Description: A catalog of Esri provided demographic content for use at the utility.
Owner: admin
Created: April 04, 2017

Workflows for Content Publishers

In [4]:
```
#read the initial csv
csv1 = 'C://Users/davi5720/Downloads/usa_capitals_1.csv'
cities_df_1 = pd.read_csv(csv1)
cities_df_1
```

Out[4]:

	Name	Capital	Year	Population	Area	City_ID	longitude	latitude
0	Alabama	Montgomery	1819	4447100	51609	1	-86.30008	32.38015
1	Alaska	Juneau	1959	626932	589757	2	-134.40679	58.29973
2	Arizona	Phoenix	1912	5130632	113909	3	-112.07580	33.44825
3	Arkansas	Little Rock	1836	2673400	53104	4	-92.27485	34.74870
4	California	Sacramento	1850	33871648	158693	5	-121.49090	38.57933
5	Colorado	Denver	1876	4301261	104247	6	-104.99202	39.74001
6	Connecticut	Hartford	1788	3405565	5009	7	-72.67402	41.76349
7	Delaware	Dover	1787	783600	2057	8	-75.52473	39.15803
8	Florida	Tallahassee	1845	15982378	58560	9	-84.28065	30.43977
9	Georgia	Atlanta	1788	8186453	58876	10	-84.39111	33.74831
10	Hawaii	Honolulu	1959	1211537	6450	11	-157.85788	21.30493
11	Idaho	Boise	1890	1293953	83557	12	-116.19340	43.60761
12	Illinois	Springfield	1818	12419293	56400	13	-89.64360	39.80105

In [5]:
```
#print the number of records in this csv
cities_df_1.shape
```

Out[5]: (13, 8)

In [6]:
```
#add the initial csv file and publish that as a web layer
item_prop = {'title': 'USA Capitals spreadsheet'}
csv_item = gis.content.add(item_properties=item_prop, data=csv1)
csv_item
```

Out[6]:

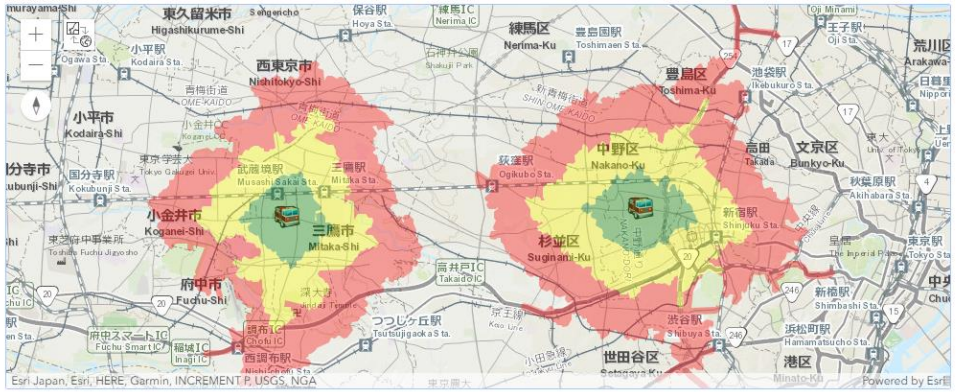
USA Capitals spreadsheet

CSV by dmart23
Last Modified: May 21, 2018
0 comments, 0 views

In [7]:
```
#publish the csv item in a feature layer
cities_item = csv_item.publish()
cities_item
```

Let us display the fire stations on a map

In [6]:
```
map1 = my_gis.map('Tokyo', zoomlevel=12)
map1
```



In [7]:
```
fire_truck_symbol = {"type":"esriPMS",
                     "url":"http://static.arcgis.com/images/Symbols/SafetyHealth/FireTruck.png",
                     "contentType": "image/png", "width":20, "height":20}

map1.draw(fire_station_fset, symbol=fire_truck_symbol)
```

Workflows for Analysts

Resources

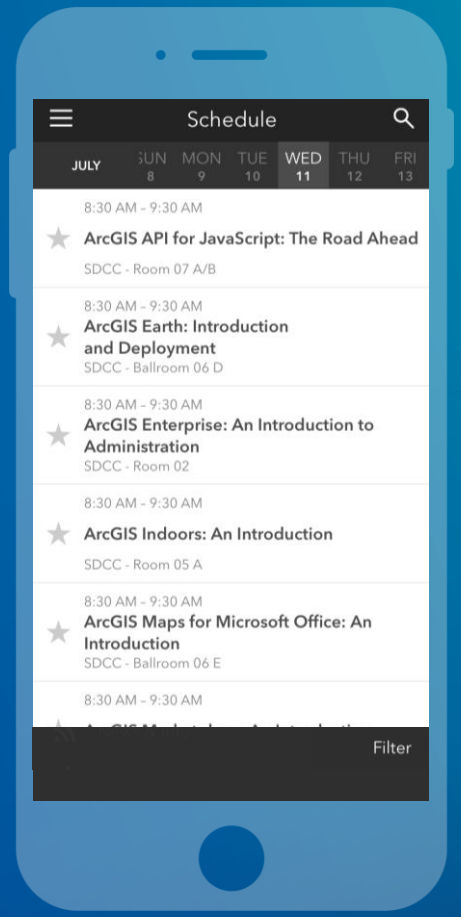
- Website - https://developers.arcgis.com/python/
- GitHub repo - https://github.com/Esri/arcgis-python-api
- Try it Live! - https://notebooks.esri.com
- API Reference - https://esri.github.io/arcgis-python-api/apidoc/html/
- Community - https://community.esri.com/groups/arcgis-python-api/
- Samples shown today - https://git.io/fjToR

Questions?

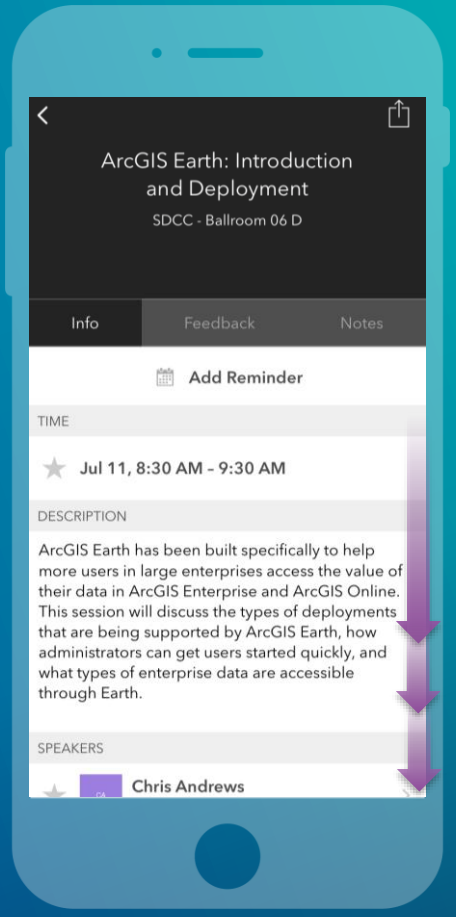
Please Take Our Survey on the App

Download the Esri Events app and find your event

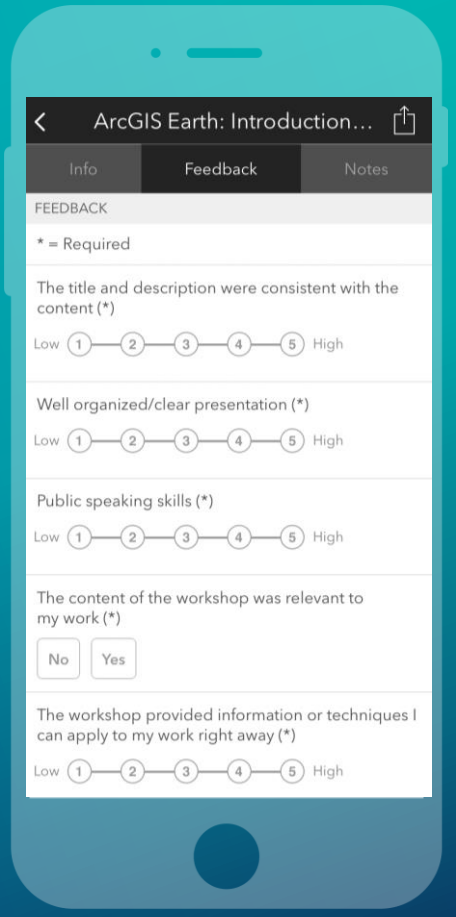
Select the session you attended



Scroll down to find the feedback section



Complete answers and select “Submit”



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