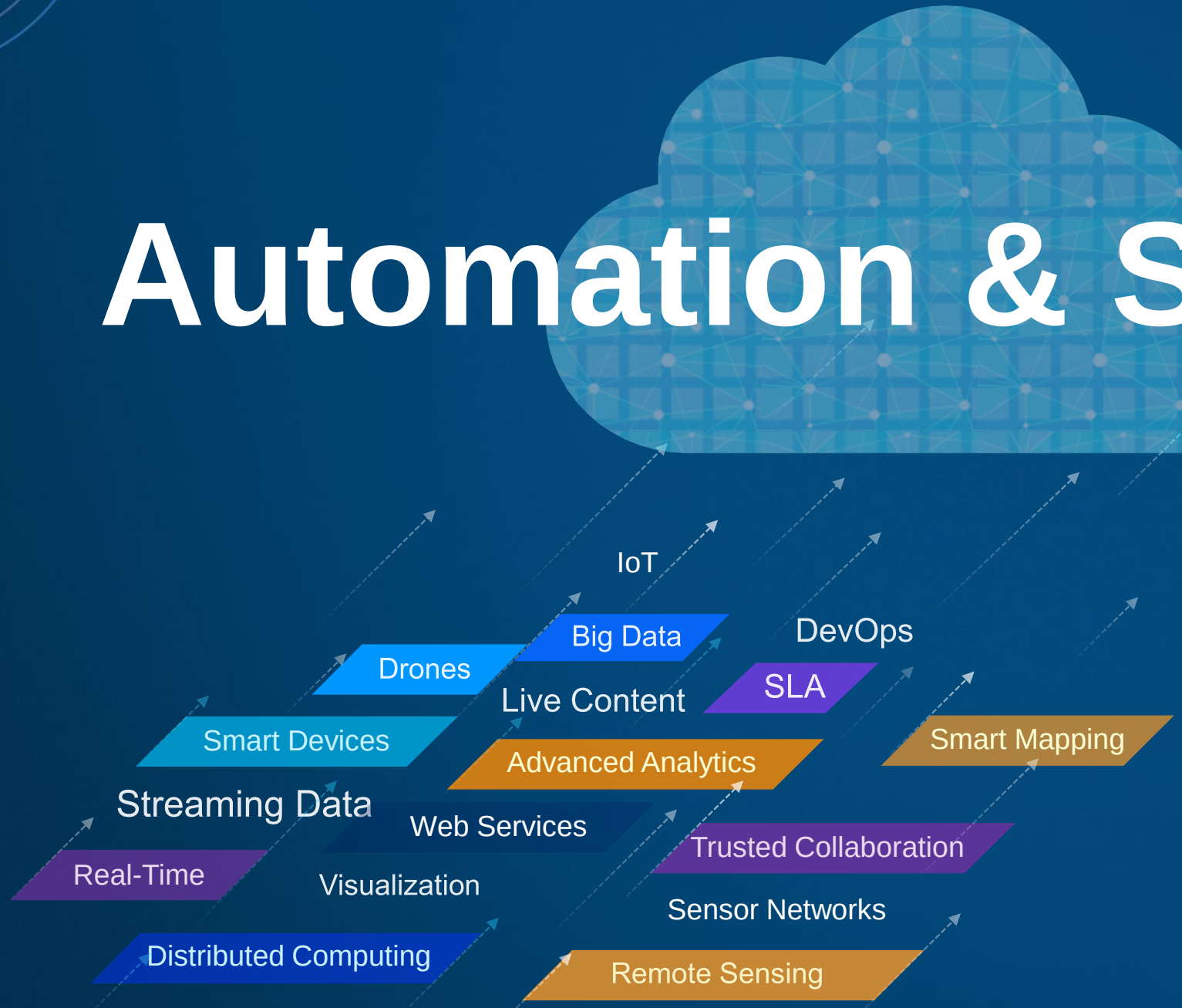
Introduction to ArcGIS Python API

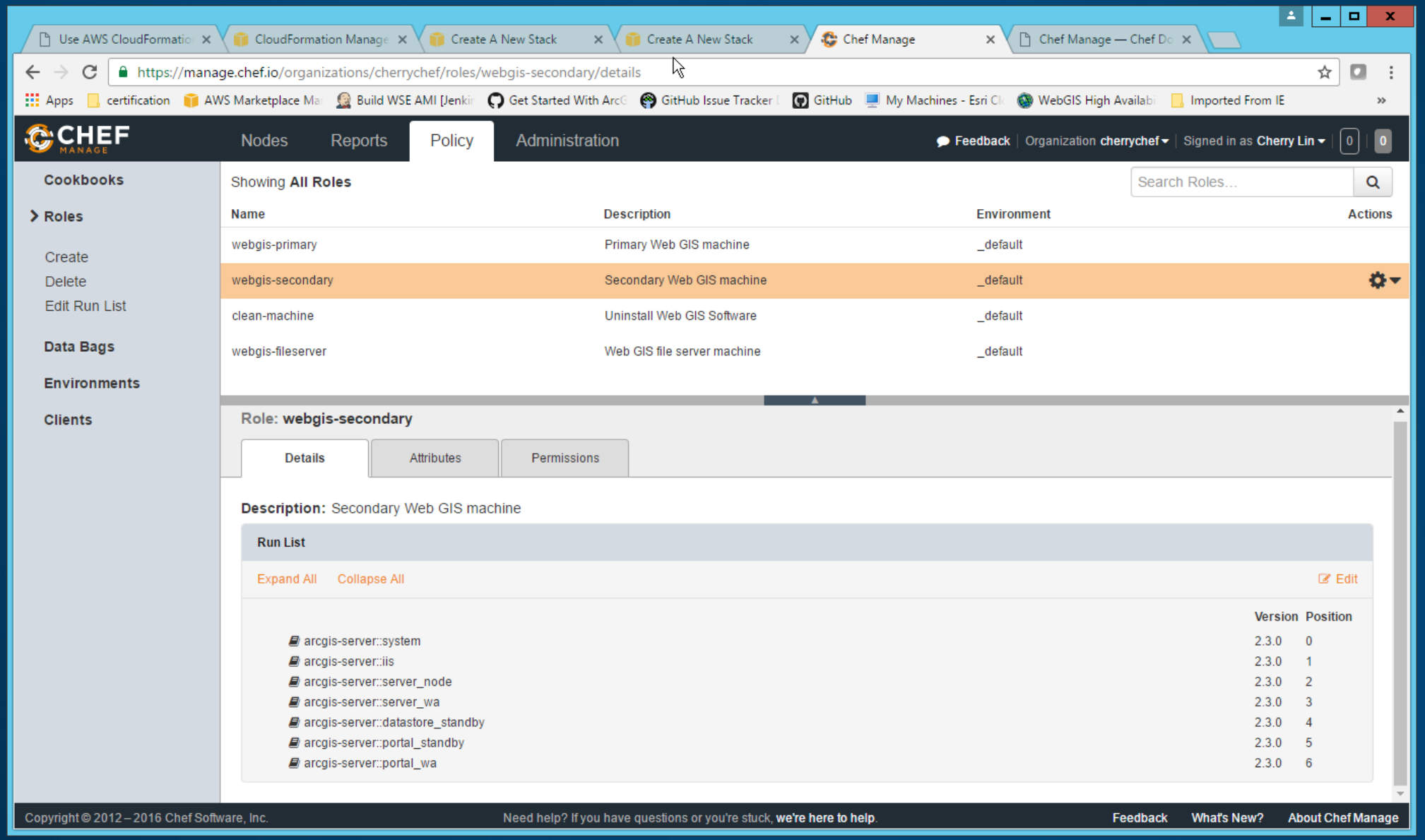
Bill Major

Automation & Scripting



Automate and Script your Web GIS

Chef – automate infrastructure (install, configure)



Chef – achieve speed, scale, and consistency … for your DevOps

Administrator: Command Prompt

```
c:\chef>chef-solo -j C:\chef\roles\webgis-windows-metro.json
{:config_missing=>true}
[2016-01-06T14:03:44-08:00] WARN: ****************************************
[2016-01-06T14:03:44-08:00] WARN: Did not find config file: C:\chef\solo.rb, usi
ng command line options.
[2016-01-06T14:03:44-08:00] WARN: ****************************************
Starting Chef Client, version 12.3.0
Compiling Cookbooks...
Converging 28 resources
Recipe: arcgis::system
  * arcgis_server[Verify ArcGIS for Server system requirements] action system
```

```
    - execute the ruby block Wait until portal is available
Recipe: arcgis::federation
  * arcgis_portal[Federate Server] action federate_server (up to date)

Running handlers:
Running handlers complete
Chef Client finished, 53/91 resources updated in 1514.903011 seconds

c:\chef>
```

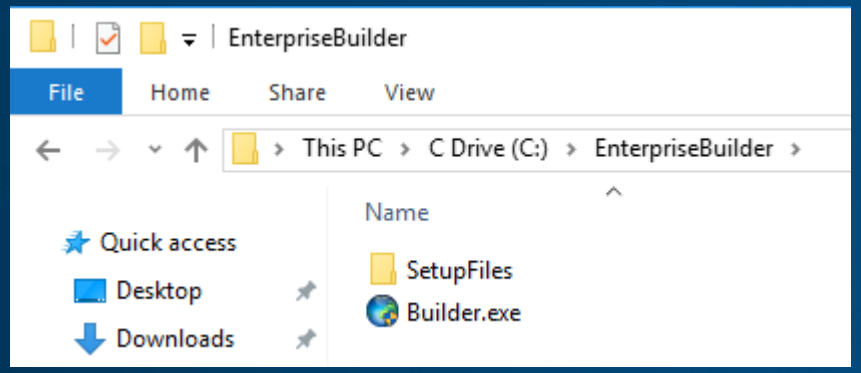
CHEF SUPERMARKET

Cookbooks & Recipes

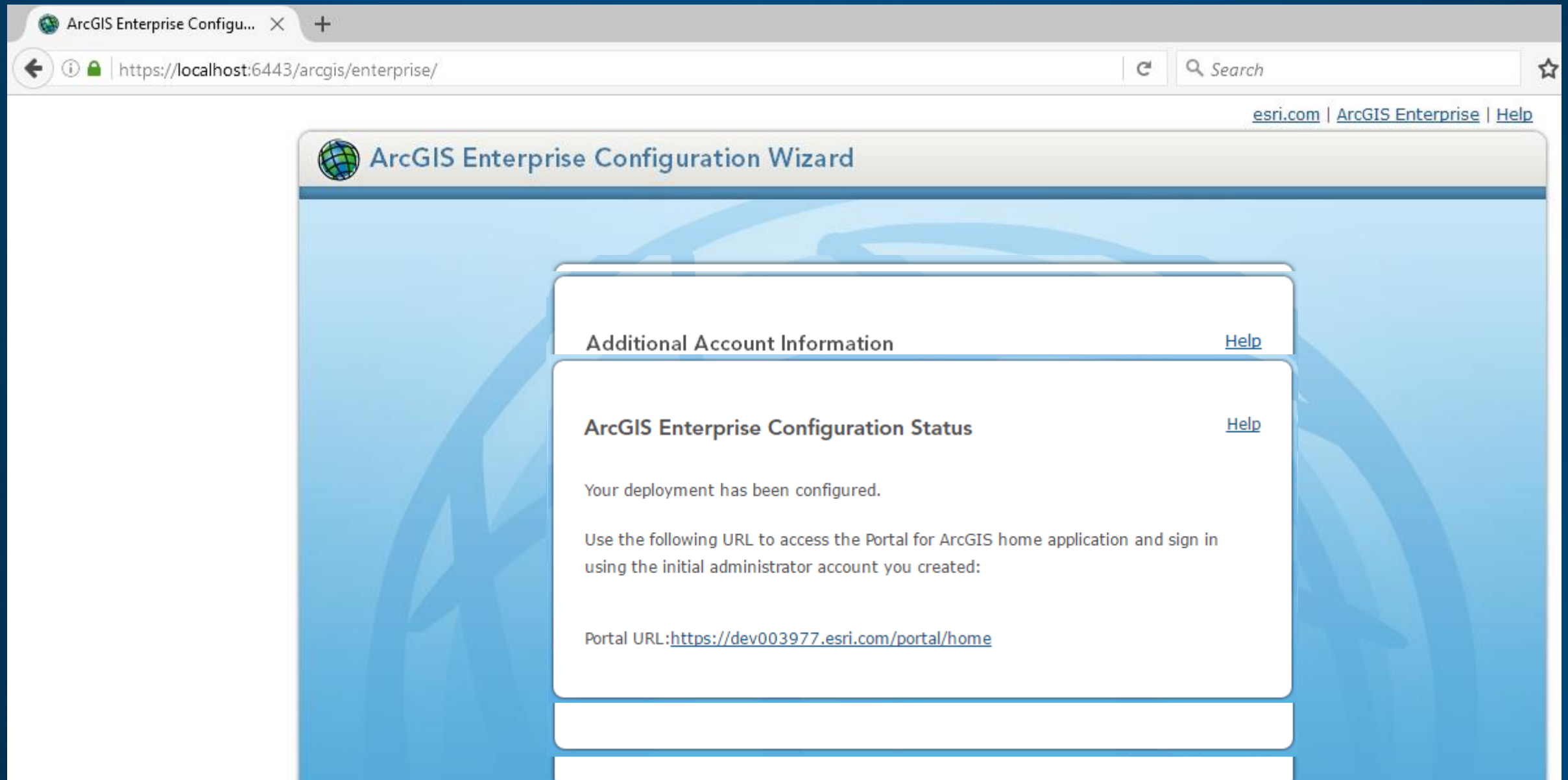
https://supermarket.chef.io/cookbooks/arcgis

https://github.com/esri/arcgis-cookbook

Enterprise Builder (new at 10.5.1) – first installs ArcGIS Enterprise

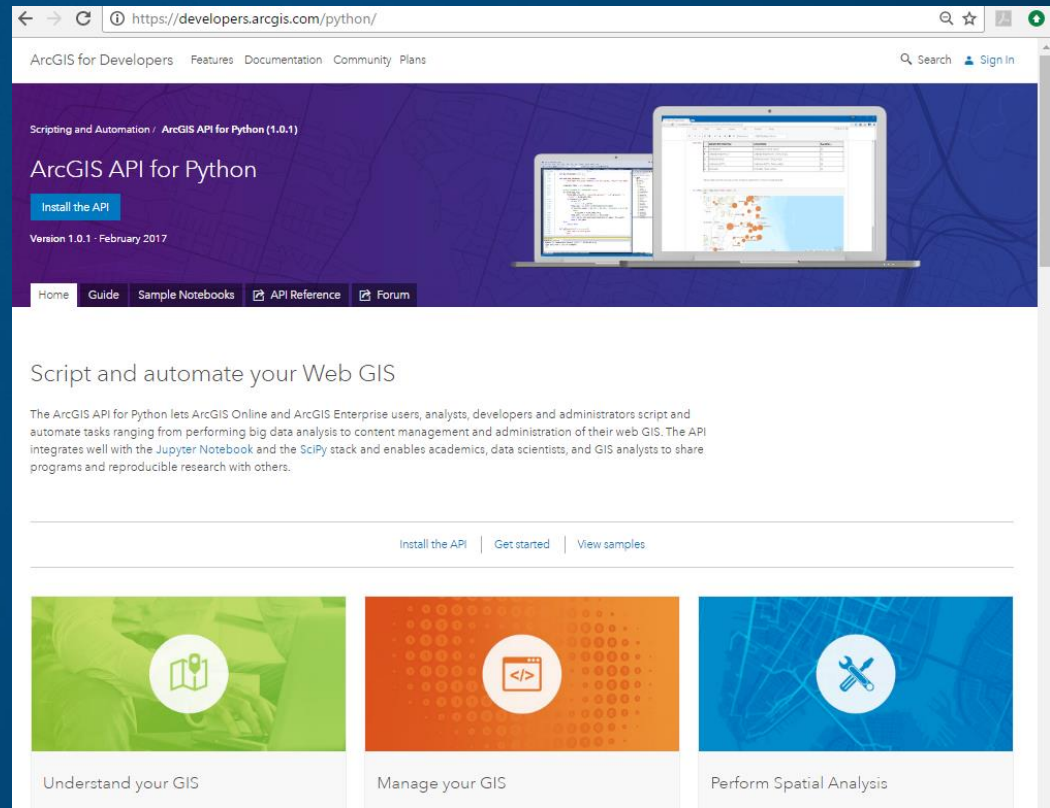


Enterprise Builder (new at 10.5.1) – then configures ArcGIS Enterprise



ArcGIS API for Python

- A new *Python API for your Web GIS*, which could be online or on-premises
  - Modern, powerful, easy-to-use
- For use by anyone who has workflows that require automation or scripting
  - org administrators
  - content publishers
  - analysts and data scientists
  - power users and developers
- Access the power of your Web GIS
  - Including GeoAnalytics and Raster Analytics



Automate Org Administration tasks

- Your GIS could be ArcGIS Enterprise or ArcGIS Online
- Populate your GIS (portal) with users, groups
- Manage user privileges and roles assignments
- Clone portals
- Re-assign user content
- Perform comprehensive content search
- Determine item relationship
- Create reports of users, their items

arcgis.gis module

- GIS
- Item
- User
- Group
- Datastore
- Role
- Layer
- ContentManager
- UserManager
- GroupManager
- DatastoreManager
- RoleManager

Automate Content Management tasks

- Automate content publishing during off peak hours
  - SDs, shapefiles, CSVs
- Update tiles and features from database
- Replicate content from dev to staging to production
- Inspect and update items with broken service links
- Adding / removing item relationships
- Auto-create / assign “my content” for users
- Update web maps, scenes, layers
- Apply delete protection for critical portal assets
- Update item metadata

```
# Loop through each file and publish it as a service
for current_sd_file in sd_file_list:
    item = gis.content.add({}, data_dir + current_sd_file)   # .sd file is uploaded and a .sd
file item is created
    published_item = item.publish()                          # .sd file item is published and a
web layer item is created
    display(published_item)
```

Nursing_home_locations
Presents the locations of Nursing Homes for Department of Social and Health Services, Wasington State. Feature Layer Collection by demo_deldev
Last Modified: December 15, 2016
0 comments, 0 views

WA_DSHS_admin_boundaries
DSHS - Department of Social and Health Services regions defines three geographic areas within the State of Washington, USA for the purposes of administering services to customers and coordinating with partners and stakeholders. Map Image Layer by demo_deldev
Last Modified: December 15, 2016
0 comments, 0 views

Scientific Research and Analysis tasks

- Attach your big data shares, discover data sets, update schema
- Access big data (GeoAnalytics, Raster Analytics) 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
- Create reproducible research products

arcgis.raster module

ImageryLayer

Submodules

arcgis.raster.analytics module

get_datastores

is_supported

generate_raster

interpolate_points

create_viewshed

summarize_raster_within

calculate_density

classify

segment

train_classifier

arcgis.geoanalytics module

get_datastores

is_supported

Submodules

arcgis.geoanalytics.analyze_patterns module

arcgis.geoanalytics.find_locations module

arcgis.geoanalytics.manage_data module

arcgis.geoanalytics.summarize_data module

aggregate_points

join_features

reconstruct_tracks

summarize_attributes

summarize_within

arcgis.geoanalytics.use_proximity module

//#Power// Users can automate any task

- Exploit the power of the ArcGIS platform, using this API

arcgis.features module

- Feature
- FeatureLayer
- Table
- FeatureLayerCollection
- FeatureSet
- FeatureCollection

Submodules

- arcgis.features.analyze_patterns module
- arcgis.features.enrich_data module
- arcgis.features.find_locations module
- arcgis.features.manage_data module
- arcgis.features.summarize_data module
- arcgis.features.use_proximity module
- arcgis.features.elevation module
- arcgis.features.managers module

arcgis.network module

- NetworkLayer
- RouteLayer
- ServiceAreaLayer
- ClosestFacilityLayer
- NetworkDataset

Submodules

arcgis.network.analysis module

- solve_vehicle_routing_problem
- find_closest_facilities
- solve_location_allocation
- generate_origin_destination_cost_matrix
- find_routes
- generate_service_areas
- get_travel_modes

arcgis.geocoding module

- Geocoder
- get_geocoders
- geocode
- reverse_geocode
- batch_geocode
- suggest

arcgis.geoprocessing module

- import_toolbox
- DataFile
- LinearUnit
- RasterData

arcgis.mapping module

- WebMap
- WebScene
- MapImageLayer
- MapImageLayerManager
- VectorTileLayer
- export_map
- get_layout_templates

arcgis.realtime module

- StreamLayer

arcgis.schematics module

- SchematicLayers

arcgis.widgets module

- MapView

arcgis.geometry module

- Point
- MultiPoint
- Polyline
- Polygon
- Envelope
- SpatialReference
- Geometry
- areas_and_lengths
- auto_complete
- buffer
- convex_hull
- cut
- density
- difference
- distance
- find_transformation
- from_geo_coordinate_string
- generalize
- intersect
- label_points
- lengths
- offset
- project
- relation
- reshape
- to_geo_coordinate_string
- trim_extend
- union

How do I get the ArcGIS API for Python?

- Distributed via Conda
  - Easiest method to keep up-to-day
- Offline download and installation
  - Best if you start with Anaconda
- Requires Python 3.5+

https://developers.arcgis.com/python/guide/install-and-set-up/

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Scripting and Automation / ArcGIS API for Python (1.0.1) / **Guide**

ArcGIS API for Python

Home | Guide | Sample Notebooks | API Reference | Forum

- Get started
  - Install and set up
  - System requirements
  - Using the Jupyter notebook environment
- API Overview
- The GIS
- Feature data and analysis
- Imagery and raster analysis
- Working with big data
- Using geoprocessing tools
- Finding places with geocoding
- Mapping and visualization

Install using Conda

The ArcGIS API for Python is distributed via conda. Conda is a popular package and environment manager application that helps you install and update packages such as the ArcGIS Python API and their dependencies. You can install the API through two main workflows - install through anaconda or install using ArcGIS Pro. Both are outlined below.

Step: 1 Get Conda

Install the latest version of Anaconda for Python (for Python 3x), if you don't already have conda. The ArcGIS API for Python requires Python 3.5 or higher. If you have installed ArcGIS Pro 1.4 or later, you already have conda.

Step: 2 Install `arcgis` package

To download and install the API in your conda environment, type the following command in your terminal.

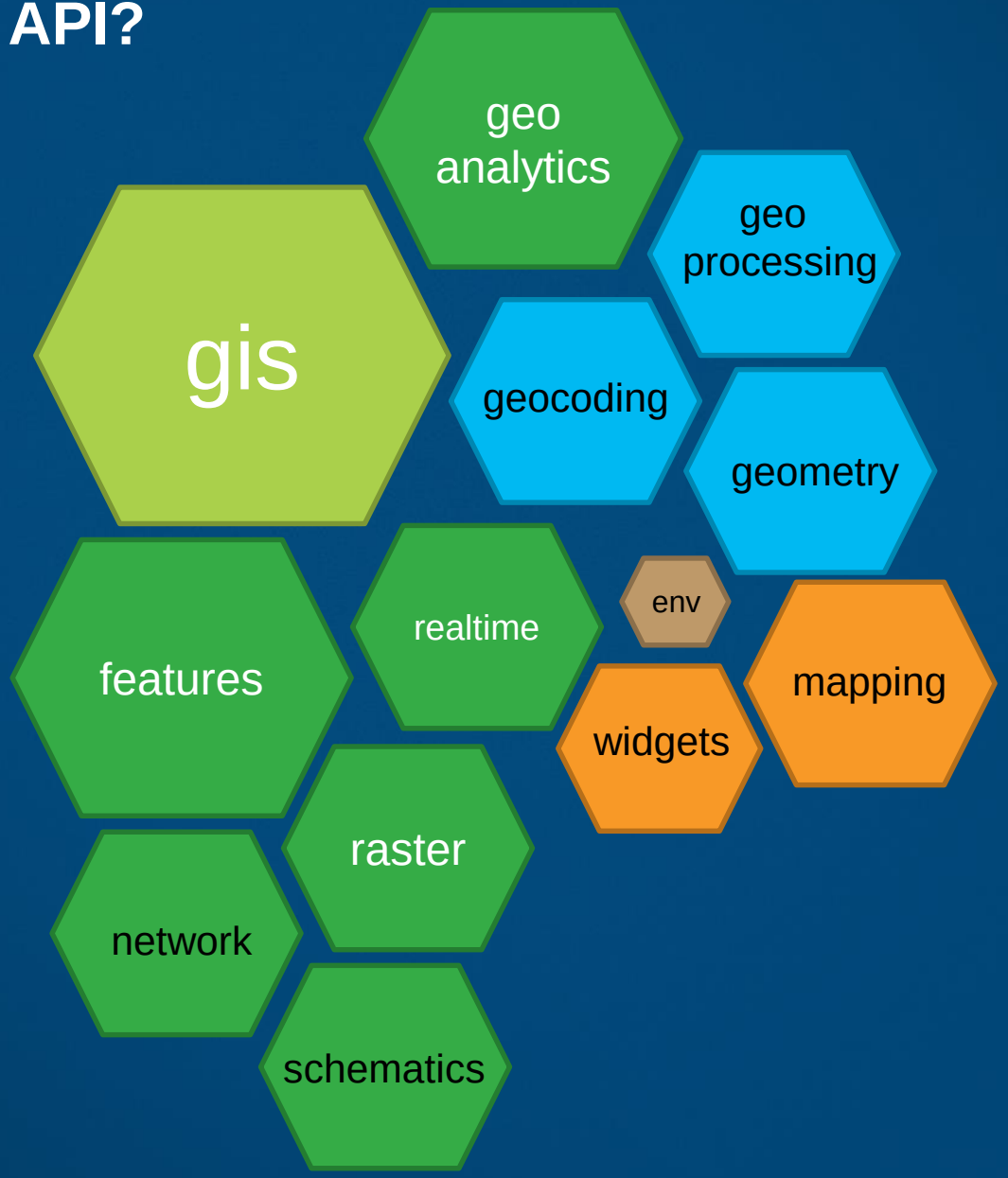
```
conda install -c esri arcgis
```

If you are running a Windows OS, you can type this into your command prompt or PowerShell. If you are running a Mac or Linux OS, you can type this into your terminal application. The screen shot below shows this command being typed into the Windows command prompt.

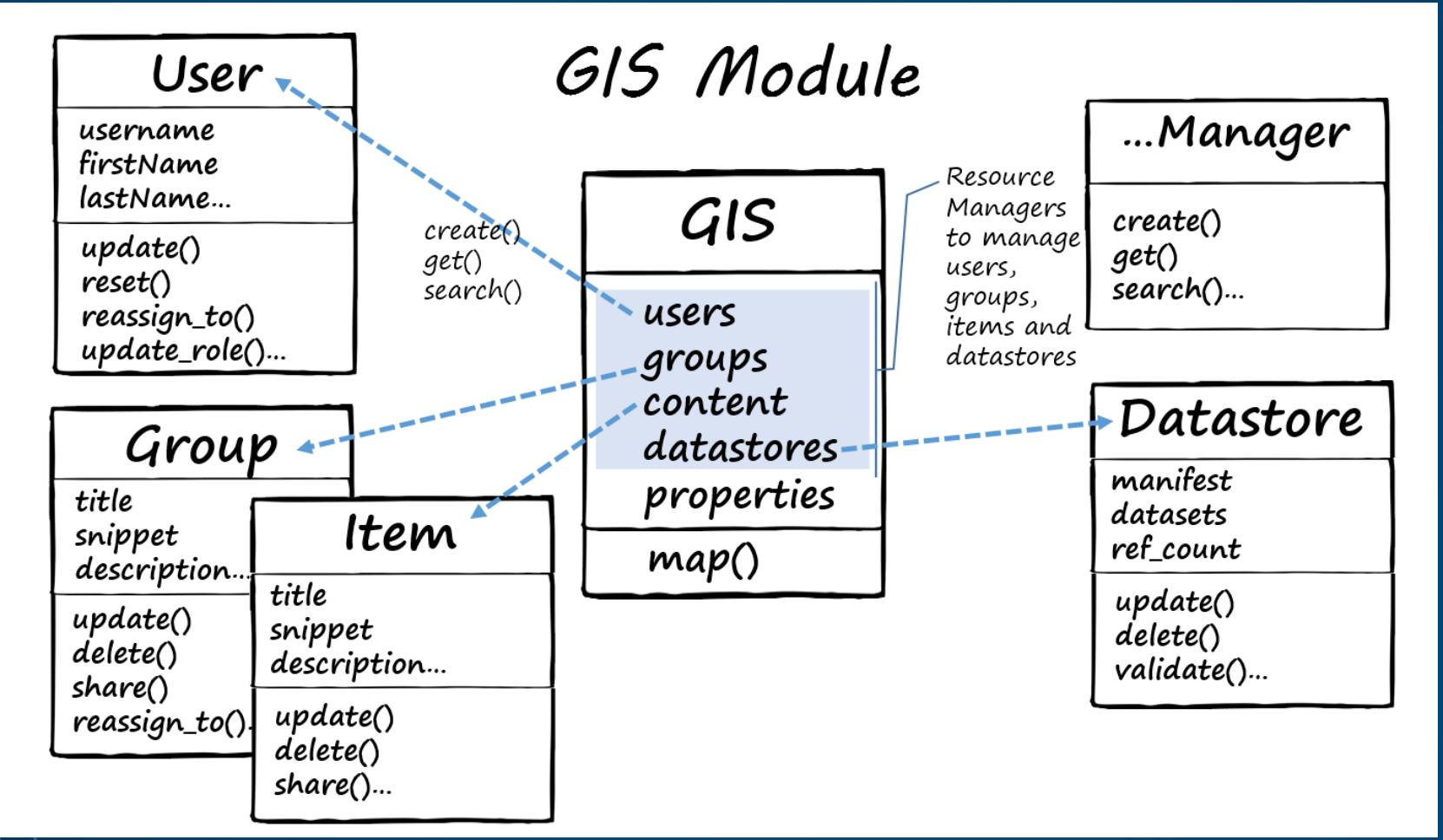
Administrator: C:\windows\system32\cmd.exe

```
C:\code>conda install -c esri arcgis_
```

How do I use the Python API?

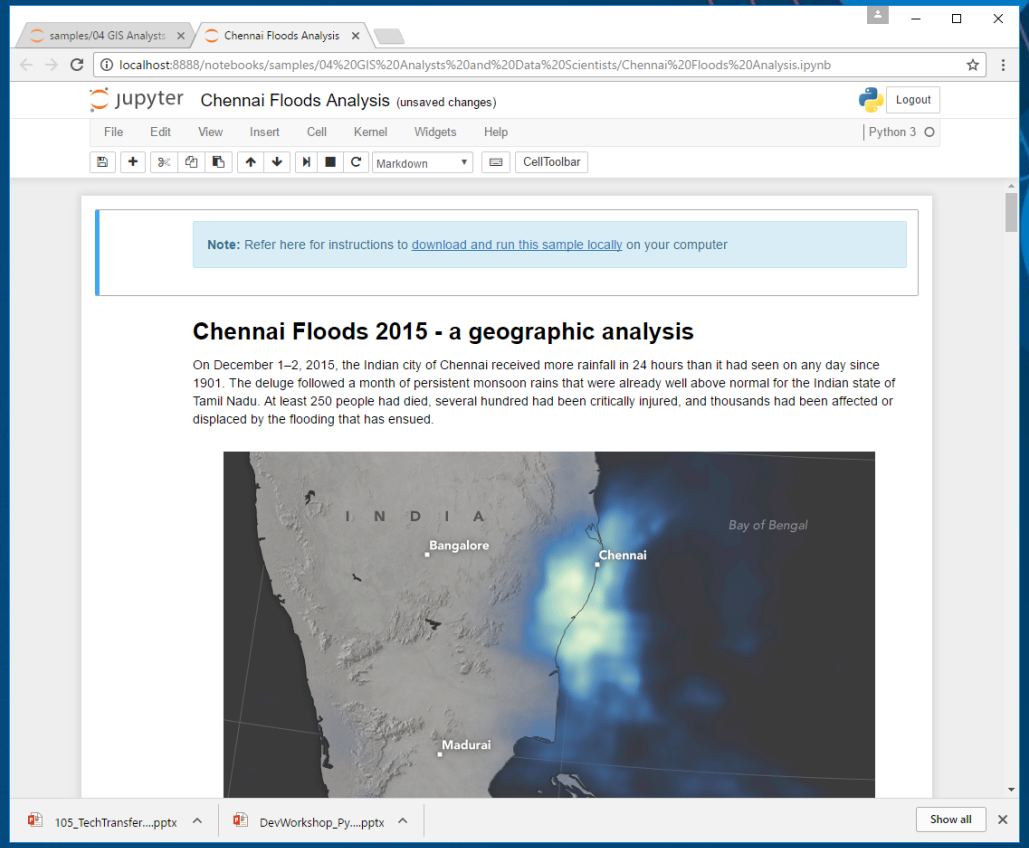


How do I use the Python API?

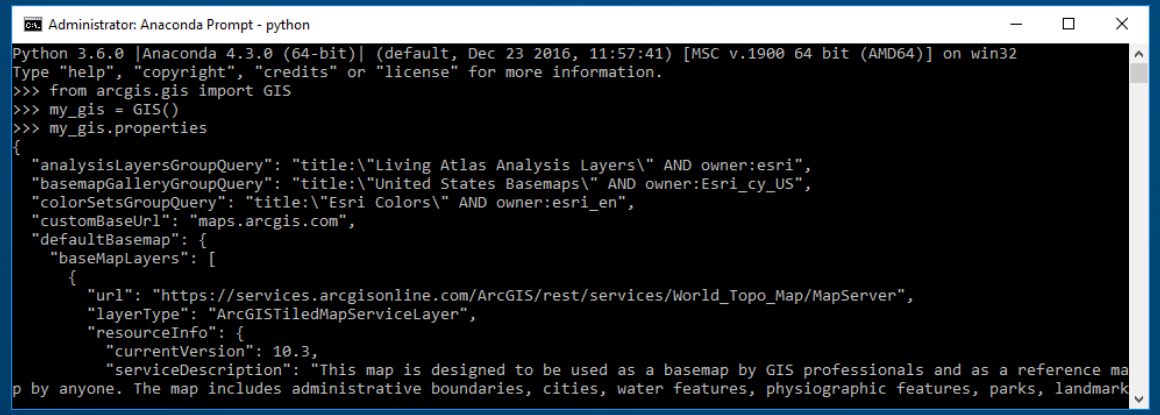


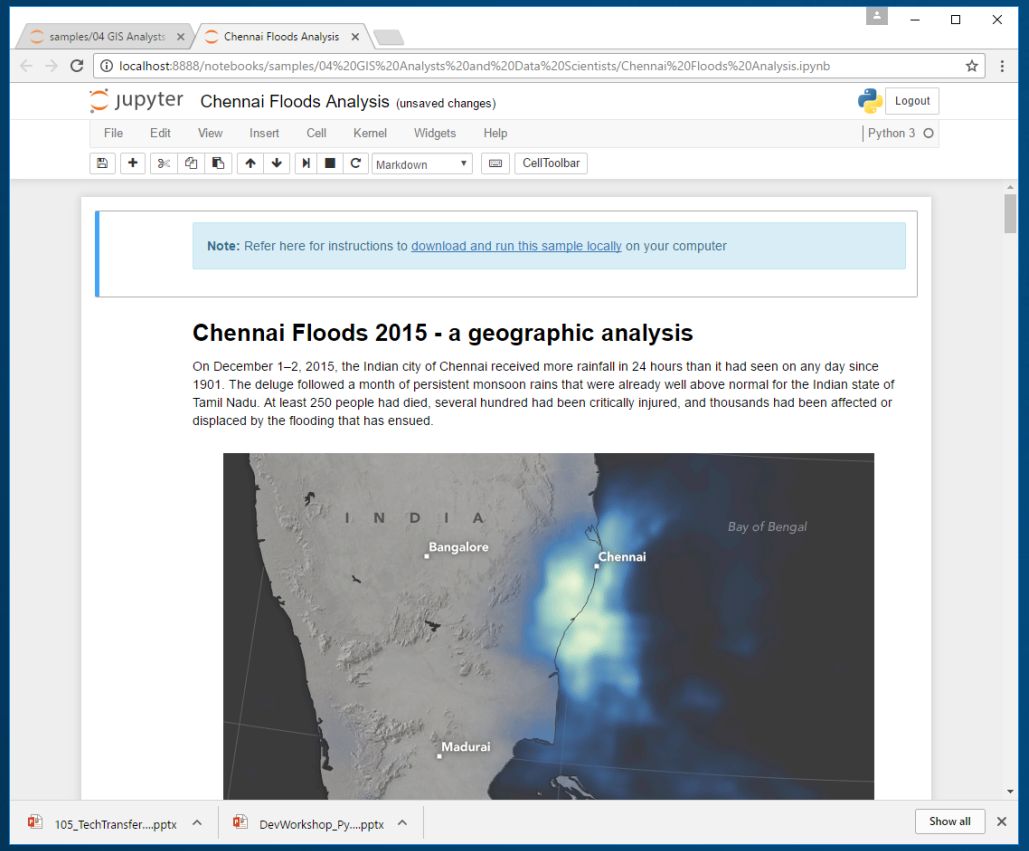
How do I use the Python API?

- **Python Notebooks – Jupyter**



- **Command line**





Demos

As a System Administrator
As a Portal Administrator
As a Content Manager
As an Analyst/Data Scientist

Chef Automation Review

Select Administrator: Windows PowerShell

```
C:\Temp>webgis105.bat
INFO: Copying Chef Client..
        1 file(s) copied.
INFO: Installing Chef Client...
INFO: Copying Chef cookbooks...
INFO: Installing Web GIS ...
Starting Chef Client, version 12.5.1
Compiling Cookbooks...
Recipe: arcgis-server::system
  * chef_gem[multipart-post] action install (up to da
  Converging 64 resources
  * chef_gem[multipart-post] action install (up to da
  * user[arcgis] action create
    - create user arcgis
Recipe: arcgis-server::portal
  * arcgis_server_portal[Update Portal for ArcGIS ser
Recipe: arcgis-server::server
  * arcgis_server_server[Update ArcGIS Server service
Recipe: arcgis-server::datastore
  * arcgis_server_datastore[Update ArcGIS Data Store
Recipe: esri-iis::default
  * windows_feature[NetFx3ServerFeatures] action inst
  * windows_feature[IIS-WebServerRole] action install

  * windows_feature[IIS-ApplicationDevelopment] actio
  * windows_feature[IIS-ISAPIFilter] action install

  * windows_feature[IIS-ISAPIExtensions] action insta

  * windows_feature[NetFx4Extended-ASPNET45] action i

  * windows_feature[IIS-NetFxExtensibility45] action

  * windows_feature[IIS-ASPNET45] action install

  * windows_feature[IIS-WebServerManagementTools] act
  * windows_feature[IIS-ManagementConsole] action ins
  * windows_feature[IIS-ManagementService] action ins

  * windows_feature[IIS-IIS6ManagementCompatibility]

  * windows_feature[IIS-ManagementScriptingTools] act

  * windows_feature[IIS-StaticContent] action install
  * windows_feature[IIS-BasicAuthentication] action i

  * windows_feature[IIS-WindowsAuthentication] action

  * windows_feature[IIS-Metabase] action install (up
  * windows_service[W3SVC] action enable (up to date)
```

Select Ad

```
  * arcgis_server_webadaptor[Deploy Web Adap

  * arcgis_server_webadaptor[Configure Web A

Recipe: arcgis-server::datastore
  * directory[C:\arcgisdatastore] action cre
    - create new directory C:\arcgisdatastor
    - change owner
  * directory[C:\arcgisdatastore\backup] act
    - create new directory C:\arcgisdatastor
    - change owner
  * arcgis_server_datastore[Update ArcGIS Da
  * arcgis_server_datastore[Install System F
    * windows_firewall_rule[ArcGIS Data Stor

  * arcgis_server_datastore[Unpack ArcGIS Da
  * arcgis_server_datastore[Install ArcGIS D

  * arcgis_server_datastore[Configure arcgis
    * windows_service[ArcGIS Data Store] act
      (up to date)
  * arcgis_server_datastore[Start ArcGIS Dat
  * arcgis_server_datastore[Configure ArcGIS

  * arcgis_server_datastore[Change ArcGIS Da

Recipe: arcgis-server::federation
  * arcgis_server_portal[Federate Server] ac


Running handlers:
Running handlers complete

Deprecated features used!
  Using an LWRP provider by its name (Window
action) instead. at 1 location:
    - C:\chef\cookbooks\windows\resources\feature.rb:32:in `initialize'
  object_store nil currently does not overwrite the value of object_store. This will change in Chef 13,
to explicitly accept nil using "property :object_store, [MyType, nil]", or stop setting this value to ni
    - C:\chef\cookbooks\arcgis-server\recipes\portal.rb:126:in `block in from_file'

Chef Client finished, 39/81 resources updated in 01 hours 36 minutes 41 seconds
ArcGIS Server URL: https:///server
ArcGIS Server Primary Site Administrator: admin/admin
Portal URL: https:///portal
Portal Admin: admin/esri.agp
Done!
Press any key to continue . . .
```

Not secure | https://ps002650.esri.com/portal/home/

Apps | IIS Homepage | ArcGIS Server Manag | AGS Admin | AGS REST | Portal Admin | Portal Sharing | Portal Home | IDT Portal Home | IDT AGS Manager

Home Gallery Map Scene Groups Sign In

Portal for ArcGIS

This is the home page of your ArcGIS Organization. You can easily change this page with your own logos, background image and many other things.

Additionally, you can populate this home page with a collection of featured items such as Web Maps and Web applications to highlight the most useful GIS resources in your organization.

https://developers.arcgis.com/python

https://developers.arcgis.com/python/

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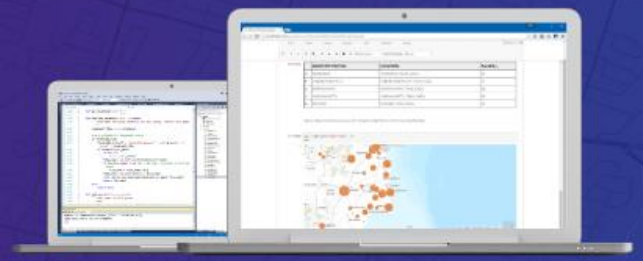
Scripting and Automation / ArcGIS API for Python (1.0.1)

ArcGIS API for Python

Install the API

Version 1.0.1 · February 2017



Home | Guide | Sample Notebooks | API Reference | Forum

Script and automate your Web GIS

The ArcGIS API for Python lets ArcGIS Online and ArcGIS Enterprise users, analysts, developers and administrators script and automate tasks ranging from performing big data analysis to content management and administration of their web GIS. The API integrates well with the Jupyter Notebook and the SciPy stack and enables academics, data scientists, and GIS analysts to share programs and reproducible research with others.

Install the API | Get started | View samples

Understand your GIS

This "hello world" style notebook shows how to get started with the GIS

Manage your GIS

The ArcGIS API for Python provides APIs and samples for ArcGIS Online

Perform Spatial Analysis

Call sophisticated spatial analysis tools that work with online content, using a

https://github.com/Esri/arcgis-python-api

GitHub, Inc. [US] | https://github.com/Esri/arcgis-python-api

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Documentation and samples for ArcGIS Python API https://developers.arcgis.com/python/ Edit

arcgis data-science gis mapping maps python spatial-analysis spatial-data spatial-data-analysis web-mapping Manage topics

159 commits 3 branches 4 releases 4 contributors Apache-2.0

Branch: master New pull request Create new file Upload files Find file Clone or download

AtmaMani committed with rohitgeo minor doc update - gis.map (#79) Latest commit daced76 4 days ago

apidoc	minor doc update - gis.map (#79)	4 days ago
guide	V101 publish packages & clone samples (#77)	4 days ago
samples	V101 publish packages & clone samples (#77)	4 days ago
.gitignore	Merge dev branch into master for 0.2 Beta and Holistic Testing (#24)	5 months ago
LICENSE	Apache 2.0 license specified (#70)	2 months ago
README.md	Updates to reflect v1.0	2 months ago

README.md

ArcGIS Python API

Documentation and samples for the ArcGIS Python API https://developers.arcgis.com/python/

ArcGIS Python API

Join the conversation

What's included

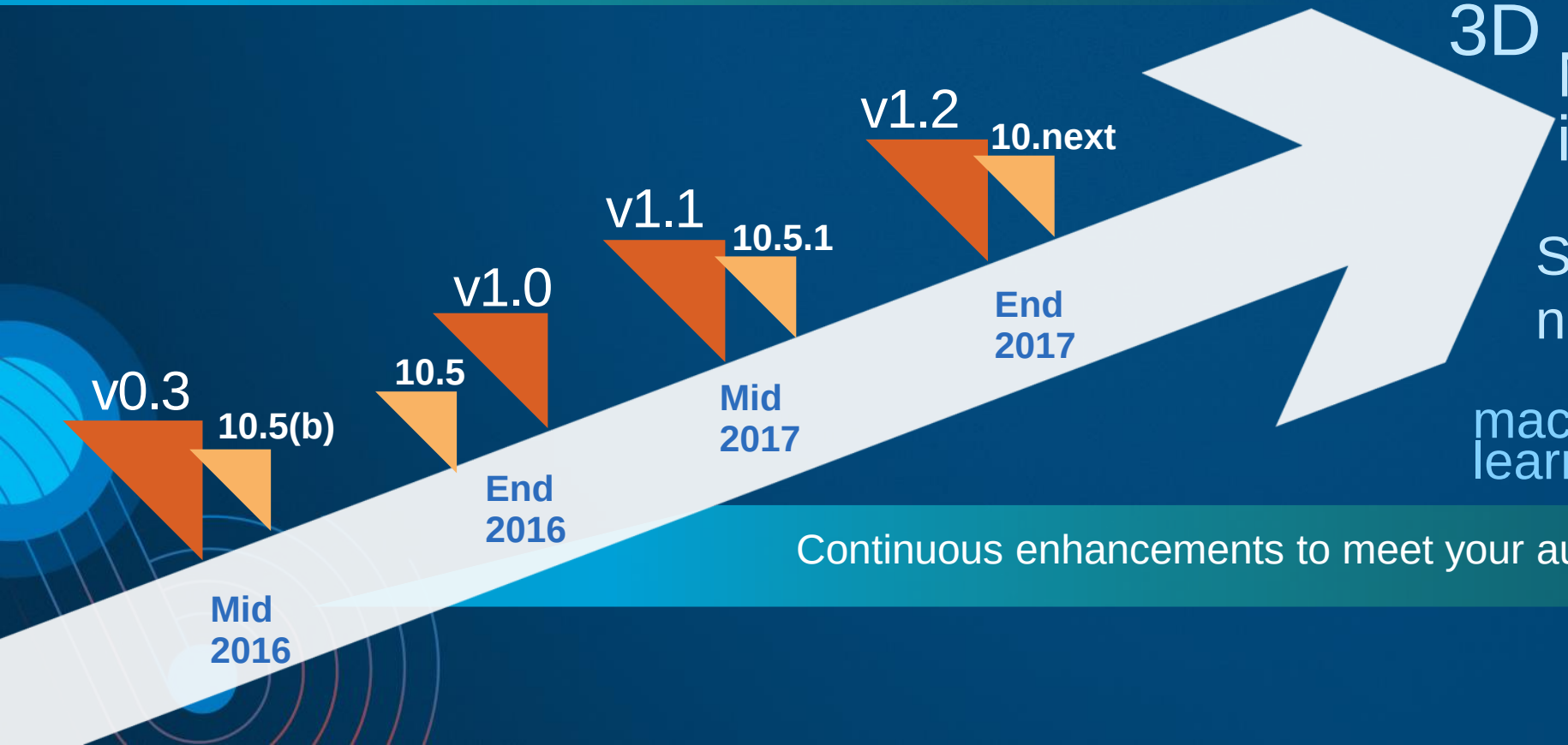
- Documentation
- Sample Notebooks
- Guides

Requirements

- See ArcGIS Python API - Install and Set Up

Road Map

Incremental Software Releases aligned to the ArcGIS platform
(ArcGIS Enterprise, ArcGIS Online)



Smart Mapping
Big Data
Scientific Modeling
GeoAnalytics
Realtime GIS
Raster Analysis
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3D
Live samples
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micro services
Scheduling notebooks
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machine learning
Workflow integrations

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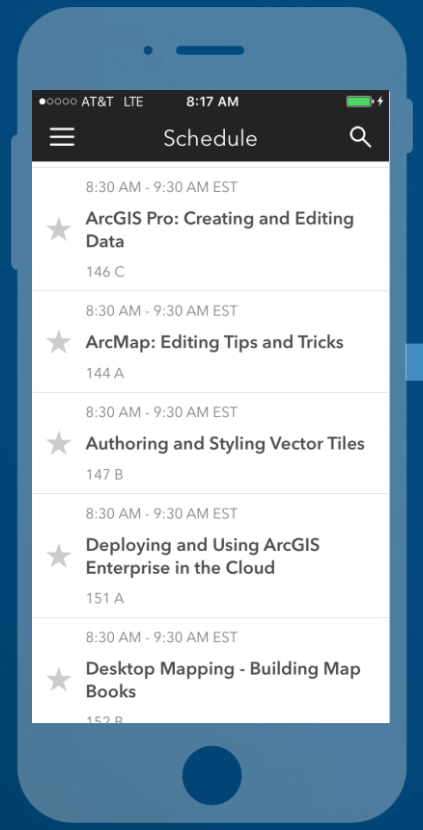
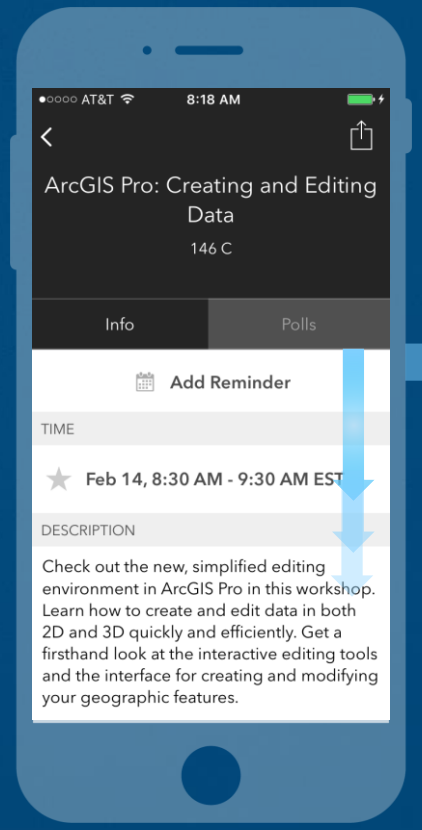
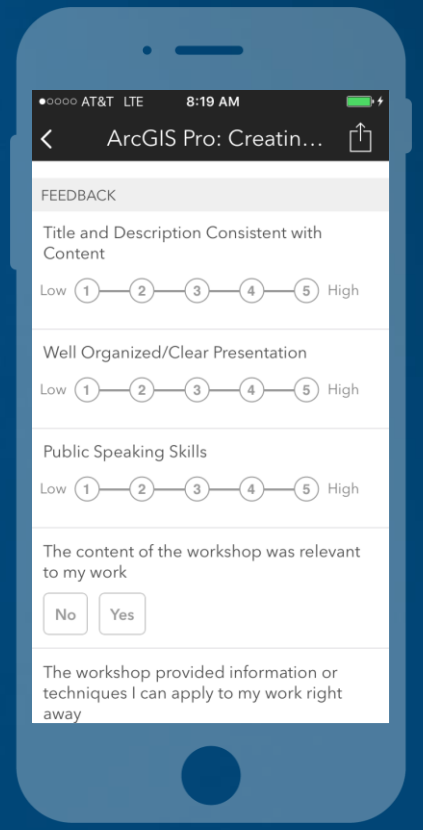
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"



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