Python Map Automation: Advanced arcpy.mapping and Migration to ArcGIS Pro

Jeff Barrette

Jeff Moulds

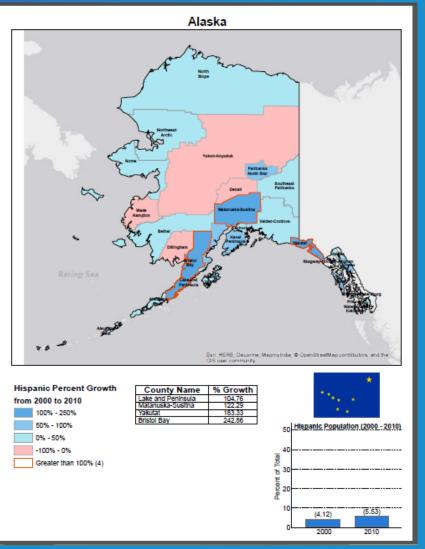
arcpy.(m)a(p)ping samples

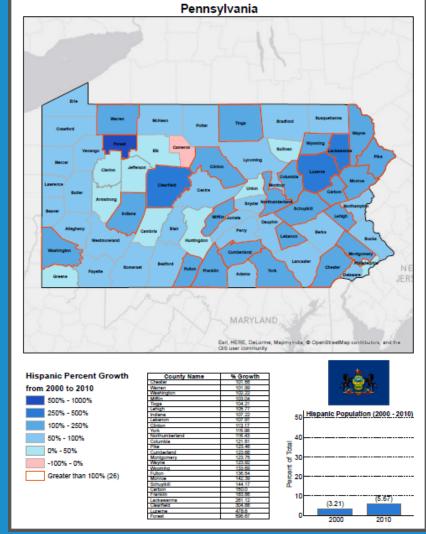
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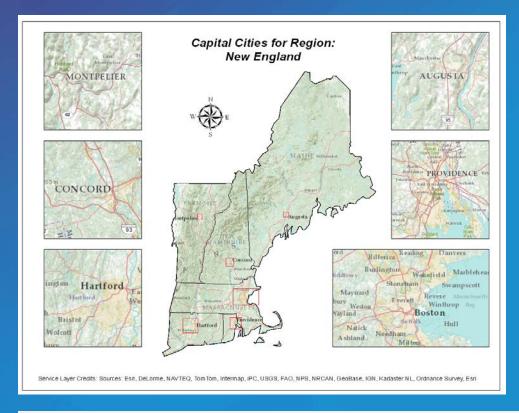


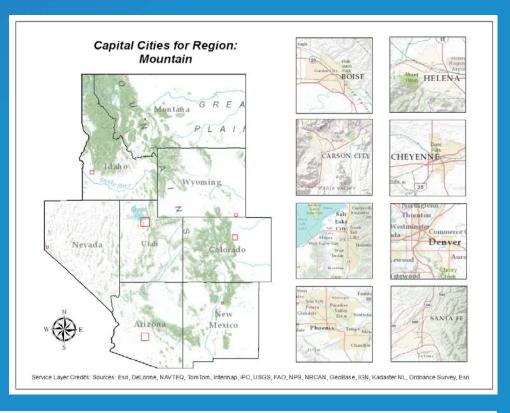
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Warren	101.99
Washington	102.22
Mifflin	103.04
Tioga	104.21
Lehigh	105.77
Indiana	107.22
Lebanon	107.91
Clinton	113.17
York	115.98
Northumberland	116.43
Columbia	121.51
Pike	123.46





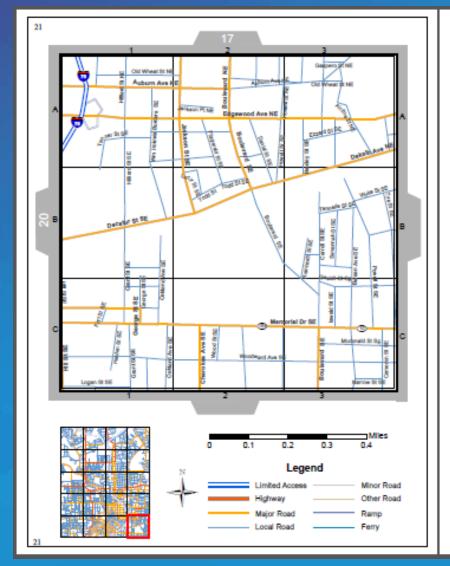
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	4	Middle Atlantic	[0.25,0.25,10.5,8.0,-9355063,4655409,-8021560,5671411,5000000]	[0.5,5.87,2.2	[0.53,3.26	[0.53,0.64,	≺Null>	≺Null>	≺Null>	≺Null>	≺Null>	[5.49,7.78,9.75,1.49]	
	5	Mountain	[0.25,0.25,10.5,8.0,-13512281,3592054,-9511773,6640060,15000000]	[6.47,6.38,1.	[6.47,4.49	[6.47,2.55,	[6.47,0.62,	[8.63,6.4,1.	[8.63,4.47,1.	[8.65,2.54,1.	[8.66,0.63,	[3.46,7.79,1.09,1.37]	
	6	New England	[0.25,0.25,10.5,8.0,-8659058,4932580,-7058854,6151782,6000000]	[0.5,6.0,2.25	[0.5,3.5,2.	[0.5,1.0,2.2	[8.5,6.0,2.2	[8.5,3.5,2.2	[7.15,1.0,3.6	≺Null>	≺Null>	[5.55,7.85,4.31,6.3]	
	7	Pacific	[0.25,0.25,10.5,8.0,-19482949,1675259,-6147923,11835279,50000000]	[8.5,6.0,2.25	[8.5,3.5,2.	[8.5,1.0,2.2	[4.87,4.8,2.	[1.13,1.39,	≺Null>	≺Null>	≺Null>	[5.81,7.79,7.01,2.94]	
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arcpy.(m)a(p)ping samples

http://esriurl.com/8899

Advanced Web Map Printing with Python

Web API / Web AppBuilder



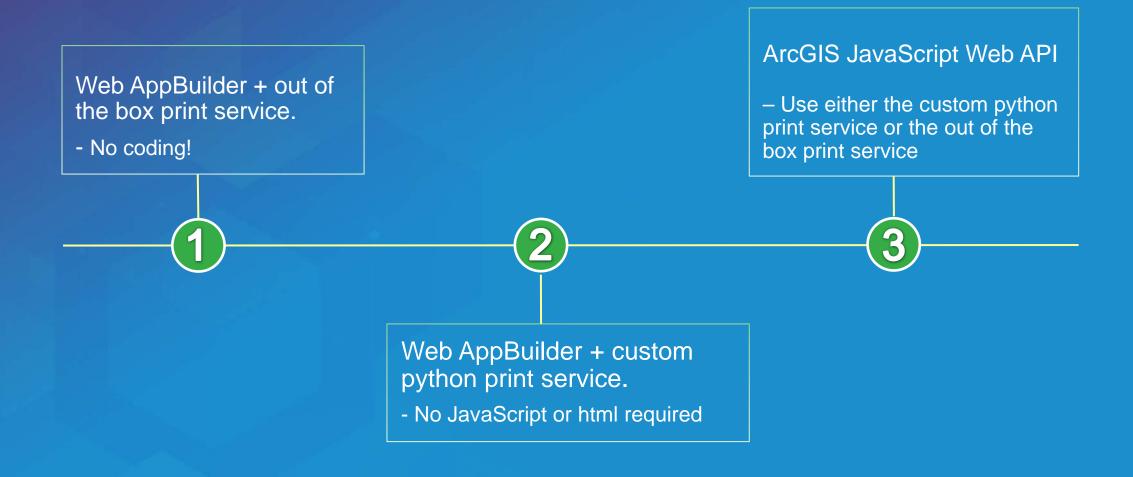
arcpy.mapping

High quality vector output (e.g. PDF)





Three Web Map printing development paths



Related Session: Enabling High-Quality Printing in Web Applications (Wednesday @ 10:30 Demo Theater 6) Also search your agenda for "Web AppBuilder" – many sessions!

Advanced server printing with arcpy.mapping

- Full capabilities of arcpy.mapping:
 - Swap out service layers for local vector data for <u>vector PDF output</u>
 - Export using advanced options
 - Export data driven pages
 - Export to PDF and insert additional pages (title page, reports, etc.)
 - Controlling the appearance of the legend
 - Etc.
- Return a printer-friendly output file (PDF, PNG, etc.)

Advanced server printing with arcpy.mapping

 Build web apps with customized versions of the out-of-the-box print service

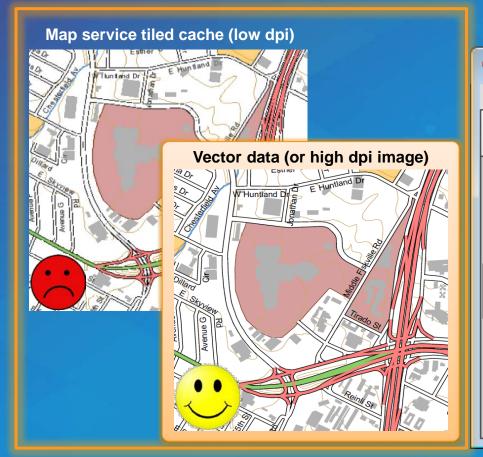


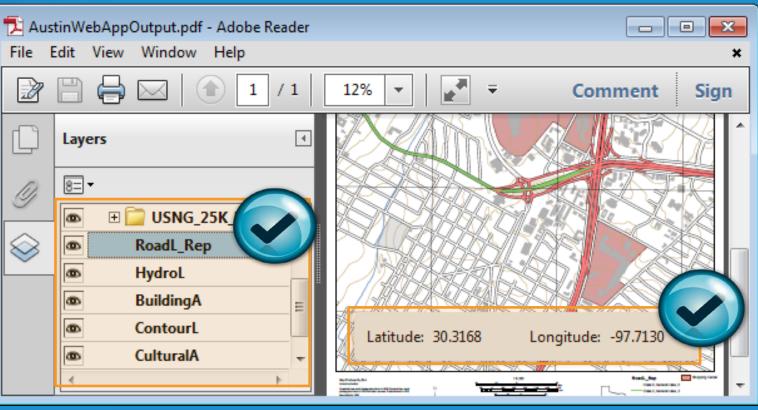
- Arcpy.mapping method for converting Web Maps to Map Documents:
 - ConvertWebMapToMapDocument (webmap_json, {template_mxd}, {notes_gdb}, {extra_conversion_options})
 - Supports client side graphics in your web app.

Demo: Web app to export vector PDF using arcpy.mapping

- Output or print vector layers instead of "flat" image of service layers
 - Vector layers will be staged in template map document

Output PDF viewed in Adobe Reader:





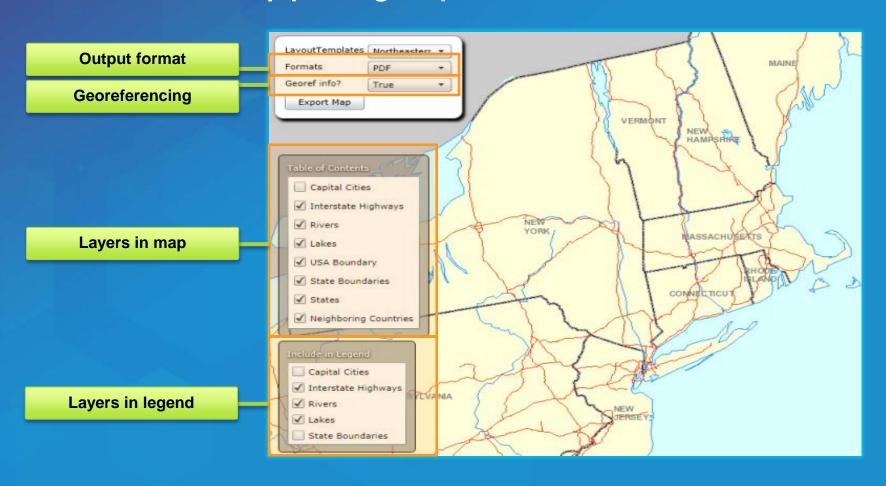
Demo: Web app to export vector PDF using arcpy.mapping

Python code used in custom GP service

```
import arcpy, os, uuid
                                 # Input WebMap json
Get web map JSON
                                 Web Map as JSON = arcpy.GetParameterAsText(0)
                                 # Input Layout template
Get template MXD
                                 Layout Template = arcpy.GetParameterAsText(1)
                                 # The template location in the server registered folder
                                 templatePath = '//gilbert/Austin/Templates'
                                 templateMxd = os.path.join(templatePath, Layout Template + '.mxd')
Create new MXD based on
                                 # Convert the WebMap to a map document
                                 result = arcpy.mapping.ConvertWebMapToMapDocument(Web Map as JSON, templateMxd)
web map
                                 mxd = result.mapDocument
                                df = arcpy.mapping.ListDataFrames(mxd, 'Webmap')[0]
                                 # Remove the service layer
                                 # This will just leave the vector layers from the template
Remove service layers
                                 for lyr in arcpy.mapping.ListLayers(mxd, data frame=df):
                                    if lyr.isServiceLayer:
                                         arcpy.mapping.RemoveLayer(df, lyr)
                                 # Export the web map to PDF
                                 output = 'WebMap {}.pdf'.format(str(uuid.uuid1()))
Export PDF
                                 Output File = os.path.join(arcpy.env.scratchFolder, output)
                                 arcpy.mapping.ExportToPDF(mxd, Output File, georef info=True)
                                 # Set the output parameter to be the output file of the server job
Output file of job
                                 arcpy.SetParameterAsText(3, Output File)
```

Web app to export vector PDF using arcpy.mapping

- Two tutorials in the help:
 - Basic vector web map printing: http://esriurl.com/4601
 - Advanced web map printing: http://esriurl.com/4602



Publishing map services with arcpy.mapping

- arcpy.mapping.CreateMapSDDraft(map_document, out_sddraft, service_name, {server_type}, {connection_file_path}, {copy_data_to_server}, {folder_name}, {summary}, {tags})
- Workflow to convert map document to map service.
- Use python scripts for:
 - Scheduled service updates. E.g. nightly.
 - Publishing automated analysis results.
 - Batch publishing.





Publishing map services with arcpy.mapping

Sample script: CreateMapSDDraft

import arcpy # define local variables Reference MXD wrkspc = 'C:/Project/' mapDoc = arcpy.mapping.MapDocument(wrkspc + 'counties.mxd') con = 'GIS Servers/arcgis on MyServer_6080 (publisher).ags' Server connection, service = 'Counties' service properties, sddraft = wrkspc + service + '.sddraft' sd = wrkspc + service + '.sd' etc. summary = 'Population Density by County' tags = 'county, counties, population, density, census' # create service definition draft **Create and analyze** arcpy.mapping.CreateMapSDDraft(mapDoc, sddraft, service, 'ARCGIS_SERVER', sddraft for errors. con, True, None, summary, tags) warnings, etc. # analyze the service definition draft analysis = arcpy.mapping.AnalyzeForSD(sddraft) # stage and upload the service if the sddraft analysis did not contain errors Stage and publish if analysis['errors'] == {}: **Map Service** # Execute StageService arcpy.StageService server(sddraft, sd) # Execute UploadServiceDefinition arcpy.UploadServiceDefinition server(sd, con) else: # if the sddraft analysis contained errors, display them print analysis['errors']

Online help and samples: http://esriurl.com/4598
Publish and overwrite a hosted feature service on ArcGIS.com blog post: http://esriurl.com/9754

Publishing other service types with python

- Create geoprocessing services
 - arcpy.CreateGPSDDraft()
- Create image services
 - arcpy.CreateImageSDDraft()
- Create geocoding services
 - arcpy.CreateGeocodeSDDraft()

Migrating to ArcGIS Pro

arcpy.mp

http://esriurl.com/9785

Function for importing 10.x documents into ArcGIS Pro Projects

ArcGISProject.importDocument(document_path, {include_layout})



```
Looping through MXDs in a folder.
```

2

Reference a template APRX. Import MXD into the APRX. Save the project.

Function for importing 10.x documents into ArcGIS Pro Projects

ArcGISProject.importDocument(document_path, {include_layout})



```
aprx = arcpy.mp.ArcGISProject("CURRENT")
aprx.importDocument(r"C:\Project\Demo\Mexico.mxd", include_layout=True)
aprx.importDocument(r"C:\Project\CentralColorado.mxd", include_layout=False)
aprx.importDocument(r"C:\Project\Yosemite.3dd")
aprx.importDocument(r"C:\Project\Structured.sxd")
```



Project/Map/Layer/Table/LayerFile.updateConnectionProperties (current_connection_info, new_connection_info, auto_update_joins_and_relates}...)

Find this path:

Replace it with this path:

Updating Data Sources advanced concepts – Layer.connectionProperties

- New at Pro
- The entire layer data source object model is exposed as a Python dictionary.
- Use if you need more fine grained control that what is available in Project/Map/Layer/Table/LayerFile.updateConnectionproperties()

```
import arcpy, pprint
p = arcpy.mp.ArcGISProject('current')
m = p.listMaps()[0]
l = p.listLayers()[0]
pprint.pprint (1.connectionProperties)

File Geodatabase layer
connection properties dictionary

import arcpy, pprint
p = arcpy.mp.ArcGISProject('current')
m = p.listMaps()[0]
l = p.listLayers()[0]
pprint.pprint (1.connectionProperties)

{'connection_info': {'database': 'C:\\Projects\\YosemiteNP\\Data\\Yosemite.gdb'},
    'dataset': 'RangerStations',
    'workspace_factory': 'File Geodatabase'}
```

DEMO

Two ways to use the connection properties dictionary – enterprise geodatabase examples

1. Write directly to the dictionary

```
# change the sde username and password
                                  2
                                        oldUser = 'Robbie'
                                        newUser = 'Slv'
                                  5
                                        password = 'Dunbar'
Get layer connection properties
                                        # get the layer's connection properties
                                        conProps = sdeLaver.connectionProperties
                                  8
                                        conProps['connection info']['user'] = newUser
Update dictionary
                                        conProps['connection_info']['password'] = password
                                  9
                                        conProps['dataset'] = sdeLayer.name.replace(oldUser, newUser)
                                 10
                                 11
                                        # apply the new connection properties
Set layer connection properties
                                12
                                        sdeLayer.connectionProperties = conProps
```

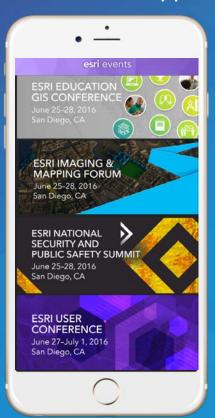
2. UpdateConnectionProperties will also do find and replace for full and partial dictionaries

```
# change the sde server
                                            # -----
                                            newDatabase = 'Shakespeare'
                                            # old database to search for
                                           old dict = {'connection info': {'db connection properties': 'esri4',
Old database info
                                                                            'instance': 'sde:sqlserver:esri4',
                                                                            'server': 'esri4',
                                     8
                                     9
                                                                            'version': 'sde.DEFAULT'}}
                                    10
                                            # new database to replace with
                                    11
                                           new dict = {'connection info': {'db connection properties': newDatabase,
                                    12
New database info
                                                                            'instance': 'sde:sqlserver:' + newDatabase,
                                                                            'server': newDatabase,
                                    14
                                                                            'version': 'dbo.DEFAULT'}}
                                    15
                                    16
                                    17
                                            # update the data sources by doing a find and replace on the project
Set layer connection properties
                                    18
                                            aprx.updateConnectionProperties(old dict, new dict, True, True)
```

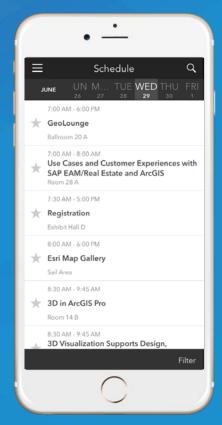
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Your feedback allows us to help maintain high standards and to help presenters

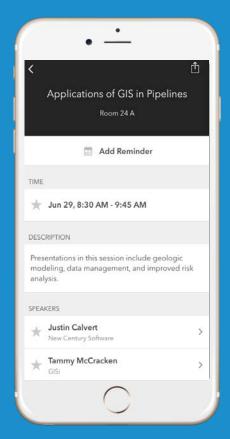
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