Python Map Automation: Introduction to arcpy.mapping / arcpy.mp

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What is arcpy.mapping?

• Python mapping module that is part of the ArcPy site-package

• An API that allows users to:
  - manage map documents, layer files, and their contents
    - find a layer with data source X and replace with Y
    - update a layer’s symbology in many MXDs
    - generate reports that lists document information
      - data sources, broken layers, spatial reference info, etc.
  - Automate the exporting and printing of map documents
  - Automate map production and create map books
  - extend Data Driven Pages capabilities
Who is arcpy.mapping for? Why was it built?

• An easy to use, productive scripting environment for the GIS Analyst
  - courser grained object model
  - not a complete replacement for ArcObjects

• An environment to use for basic map/layer management and map automation tasks

• A simple way to publish mapping tasks to the server environment
  - arcpy.mapping scripts can be easily published as geoprocessing tools
Tour of arcpy.mapping

Overview
Python window

• Quick and easy access to Python and arcpy
  - Gateway for new users to learn Python
  - Intellisense for all tools, methods and properties & help window
  - Quickly and efficiently execute tools
Desktop → Geoprocessing → ArcPy → Mapping module

arcpy.mapping help

http://esriurl.com/8148

UC2015 - Technical Workshop - Python Map Automation: Introduction to arcpy.mapping
Demonstration

- The Python Window and using the Desktop Help System
Referencing map documents

MapDocument function

MapDocument(mxd_path)

MapDocument class

Methods
replaceWorkspaces
save
saveAsCopy
...

Properties:
activeDataFrame
author
credits
relativePaths
...
Referencing map documents (MXDs)

- Opening Map Documents (MXD) with arcpy.mapping
  - Use the MapDocument function
    - Takes a path to MXD file on disk or special keyword "CURRENT"

- Reference map on disk
  ```python
  mxd = arcpy.mapping.MapDocument(r"C:\some.mxd")
  ```

- Get map from current ArcMap session
  ```python
  mxd = arcpy.mapping.MapDocument("CURRENT")
  ```
Referencing map documents (MXDs), cont.

• When using CURRENT
  - Always run in foreground (checkbox in script tool properties)
  - May need to refresh the application
    
    `arcpy.RefreshActiveView()`

• Limitations and pre-authoring
  - No "New Map" function, so keep an empty MXD available
  - Can’t create new objects (e.g., north arrow, data frame)
Demonstration

• Working with Map Documents (MXDs)

• Use Python Window to change map document property info
• Evaluate relative paths, last saved, etc.
• Change the active view
• Save changes out to a new file
Layers and data frames

• The “List” functions
  - ListLayers and ListDataFrames
  - Watch the list indexes (it is easy to forget to use [0])
    \[ \text{df} = \text{arcpy.mapping.ListDataFrames(MXD)}[0] \]

• Layer properties
  - Common properties are available (e.g., def query, visible)
  - All properties can be updated via layer (.lyr) files

• DataFrame properties and methods
  - Basic map navigation and settings
Layers and Data Frames

Layer functions

Layer
ListLayers
ListTableViews

AddLayer
AddLayerToGroup
InsertLayer
MoveLayer
RemoveLayer
UpdateLayer

Data Frame Class

Methods
panToExtent(extent)
zoomToSelectedFeatures()

Properties:
credits
description
displayUnits
elemHeight
elemPositionX
extent
scale

...
Demonstration

• Working with Layers and Data Frames

• Find a layer and turns it on or off
• Modify the scale/rotation of a data frame
• Zoom to selected features
Page Layout Elements

• Must pre-author most elements
  - Uniquely name your layout elements
  - Set the appropriate anchor
• Only graphics and text can be cloned
• Move elements off the page
Demonstration

- Working with layout elements

- Find a picture element and change its data source
Printing, exporting, server publishing, map books

**CLASSES**
- DataDrivenPages
- PDFDocument

**FUNCTIONS**
- ExportReport
- ExportToAI
- ExportToBMP
- ExportToEPS
- ExportToGIF
- ExportToJPEG
- ExportToPDF
- ExportToPNG
- ExportToSVG
- ExportToTIFF
- PDFDocumentCreate
- PDFDocumentOpen
- PrintMap
- CreateMapSDDraft

...
Demonstration

- Map output and map books

Map book that includes index pages using Python ReportLab
Sample: http://esriurl.com/4629
Updating data sources

• Use arcpy.mapping for migrating Map Documents and Layer files to new data sources
• Fancier scripts can help mitigate migration pain: SQL syntax changes, field name changes, etc
• A complete concept document is dedicated to this topic
  - “Updating and fixing data sources with arcpy.mapping”
  - http://esriurl.com/8149
Demonstration

- arcpy.mapping sample script tools

Sample: http://esriurl.com/4622
Resources available

- ArcGIS Resource Center (web help)  [http://esriurl.com/8148](http://esriurl.com/8148)
  - Alphabetical lists of classes and functions
  - Detailed discussions
  - Multiple sample scripts for each class and function topic

- ArcGIS Online – arcpy.mapping / Map Automation group
  - Download sample scripts  [http://esriurl.com/8899](http://esriurl.com/8899)
Migrating to ArcGIS Pro

- Help Topic: Migrating arcpy.mapping from ArcMap to ArcGIS Pro
  - Python 3.4
  - ArcGIS project file (.aprx)
  - Stand-alone functions have moved to appropriate classes
    - mapFrame.exportToPDF()
    - map.addLayer(), map.insertLayer(), etc
  - Layer files have changed
  - DataFrame replace by Map, MapFrame, and Camera
  - New Layout object
  - Application always refreshes when using CURRENT
Related Sessions

Desktop Mapping: Building Map Books
- Wednesday, 10:15am – 11:30am, Room 2
- Thursday, 8:30am - 9:45am, Room 05 B

Advanced Map Automation with Python
- Wednesday, 3:15pm – 4:30pm, Room 15 B
- Thursday, 1:30pm - 2:45pm, Room 07 A/B