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

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What is arcpy.mapping?

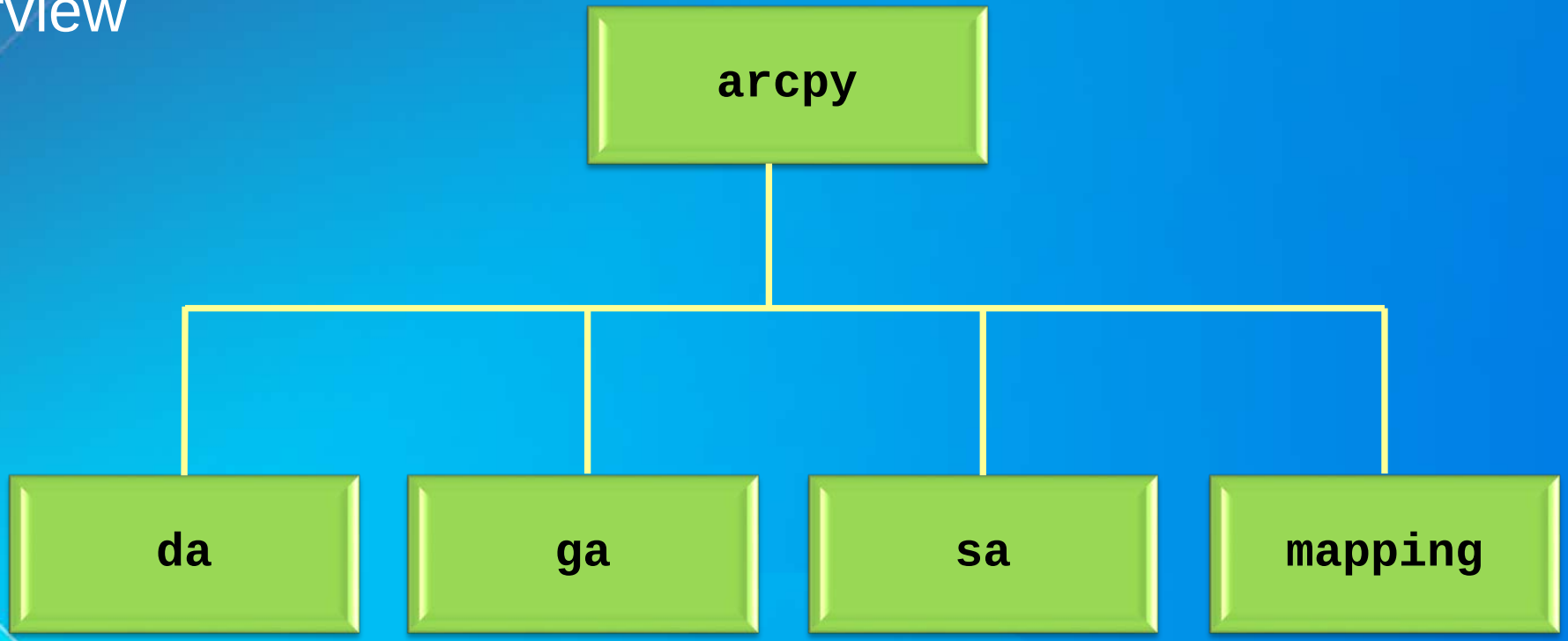
- Python mapping module that is part of the ArcPy site-package
- An API that allows users to:
  - manage map documents, layer files, and their contents
    - find a layer with data source X and replace with Y
    - update a layer's symbology in many MXDs
    - generate reports that lists document information
      - 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

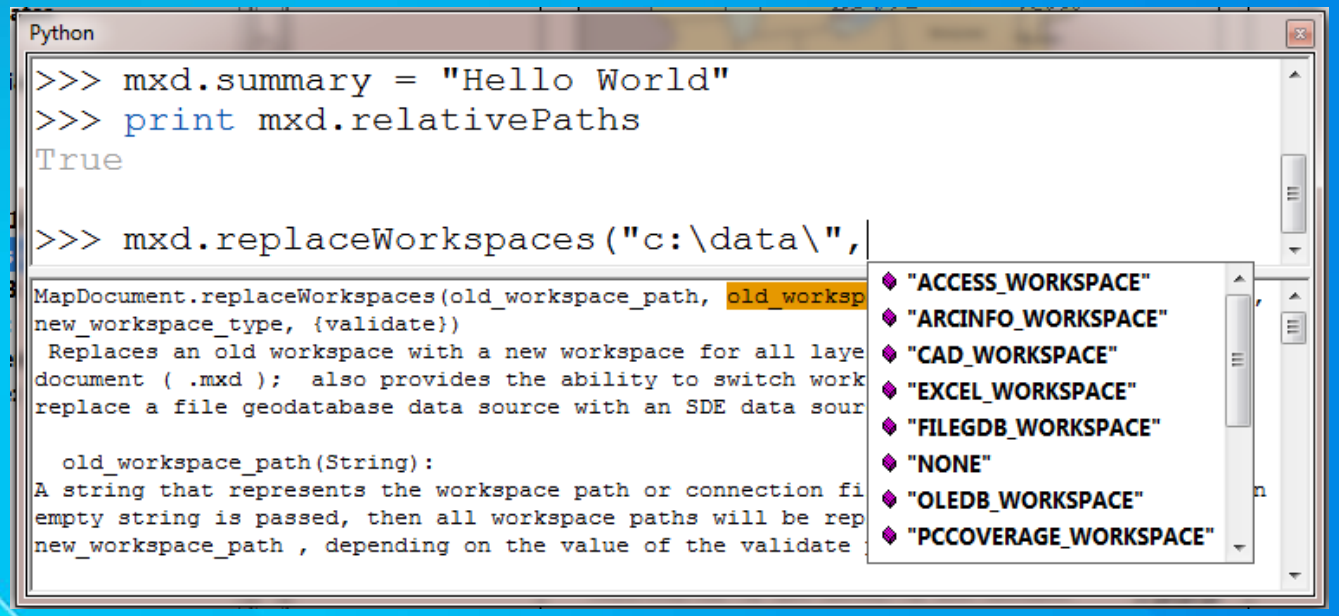
Tour of arcpy.mapping

Overview



Python window

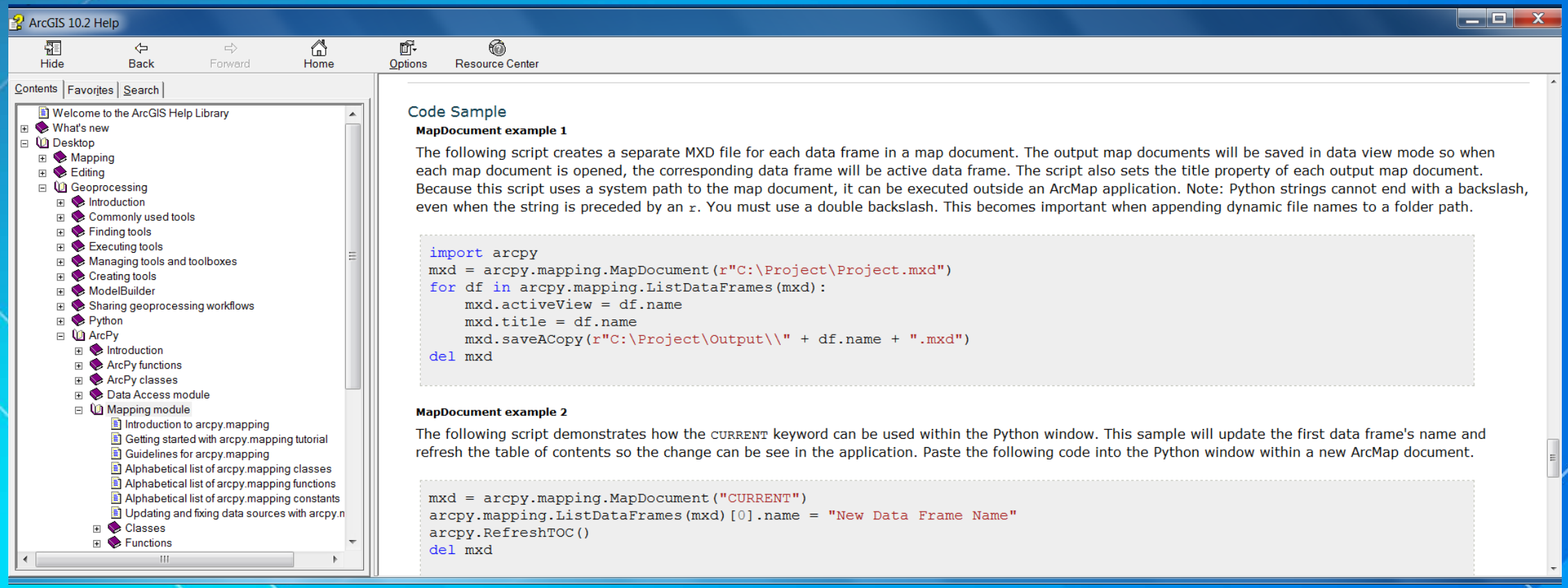
- Quick and easy access to Python and arcpy
  - Gateway for new users to learn Python
  - Intellisense for all tools, methods and properties & help window
  - Quickly and efficiently execute tools



arcpy.mapping help

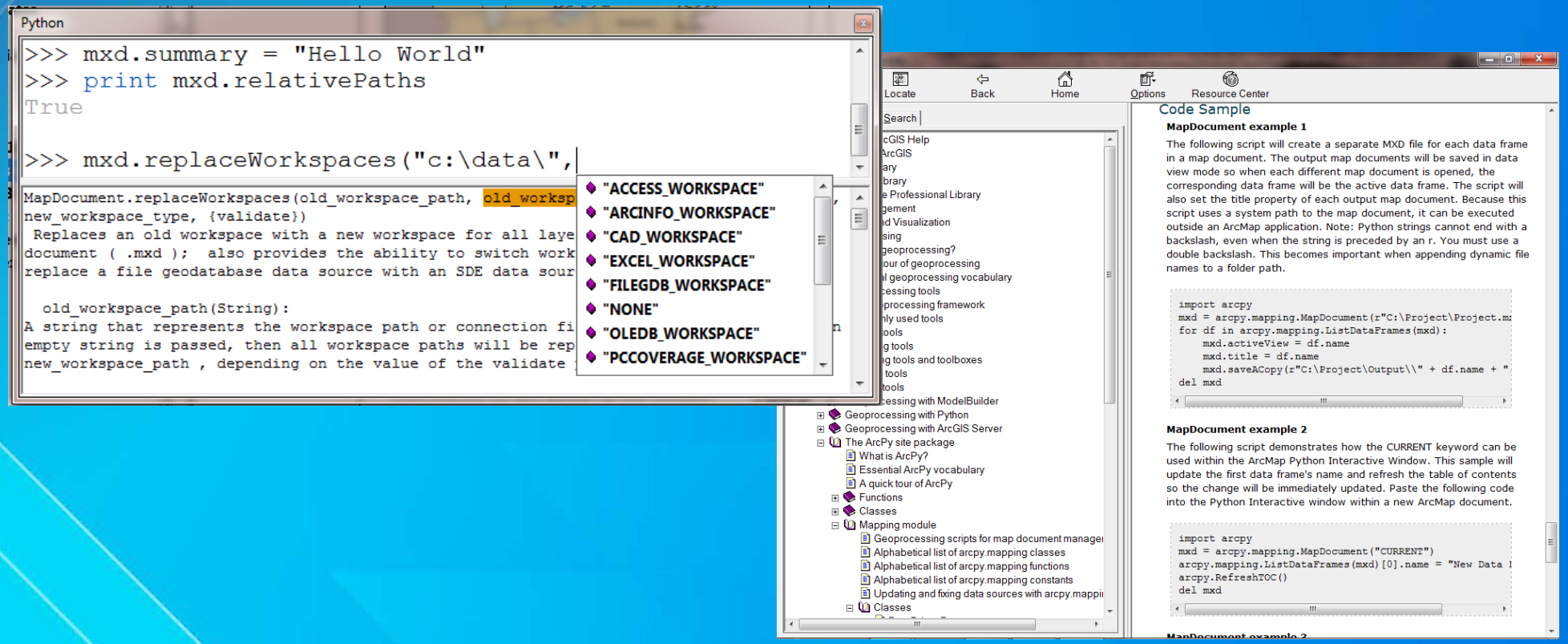
http://esriurl.com/8148

- Desktop → Geoprocessing → ArcPy → Mapping module



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

```
mxd = arcpy.mapping.MapDocument(r"C:\some.mxd")
```

- Get map from current ArcMap session

```
mxd = arcpy.mapping.MapDocument("CURRENT")
```

Referencing map documents (MXDs), cont.

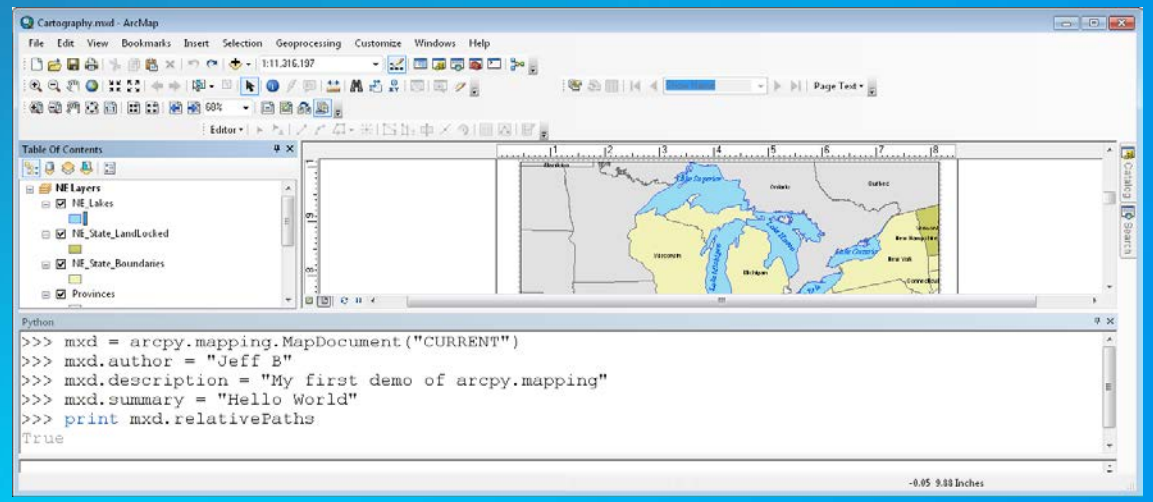
- When using CURRENT
  - Always run in foreground (checkbox in script tool properties)
  - May need to refresh the application

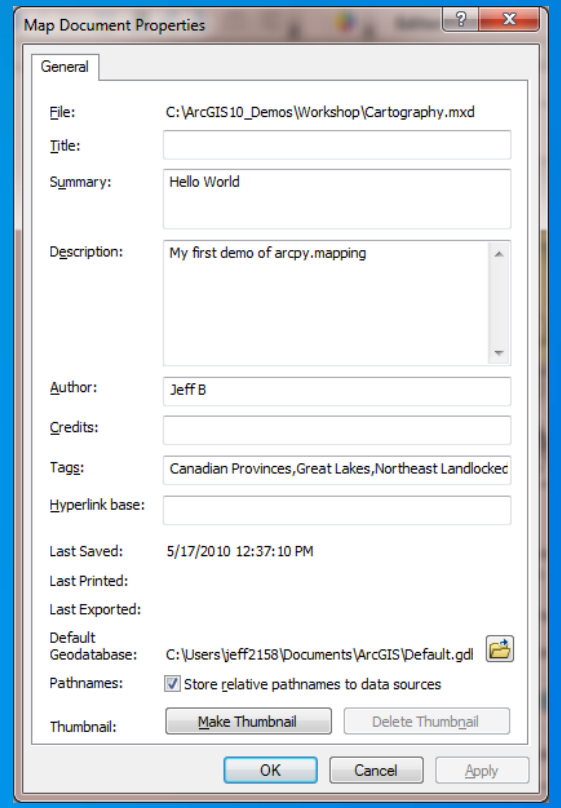
```
arcpy.RefreshActiveView()
```

- 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])

```
df = 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
      ...
```

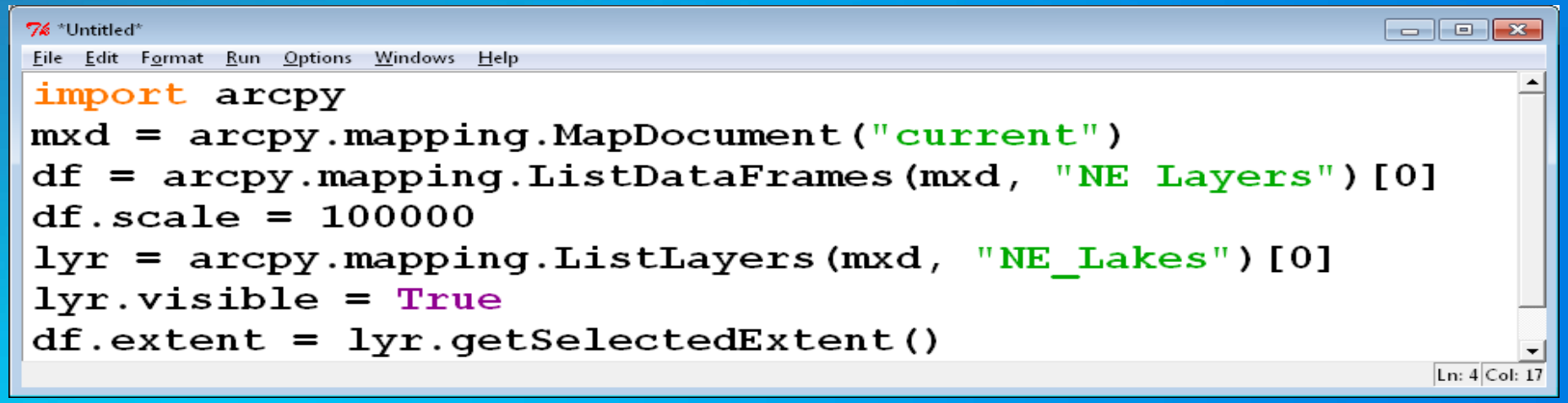
Data Frame Class

```
Methods
 panToExtent(extent)
 zoomToSelectedFeatures()

Properties:
 credits
 description
 displayUnits
 elementHeight
 elementPositionX
 extent
 scale
           ...
```

Demonstration

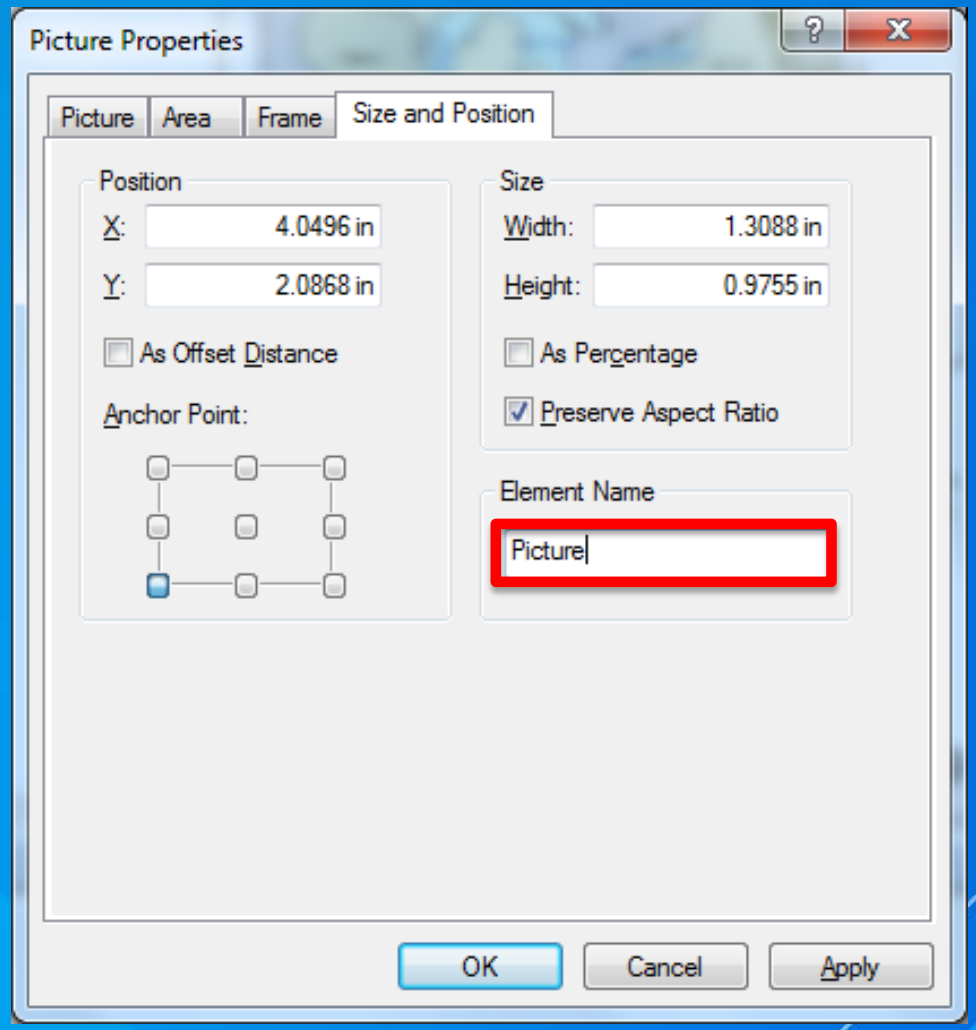
- Working with Layers and Data Frames



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

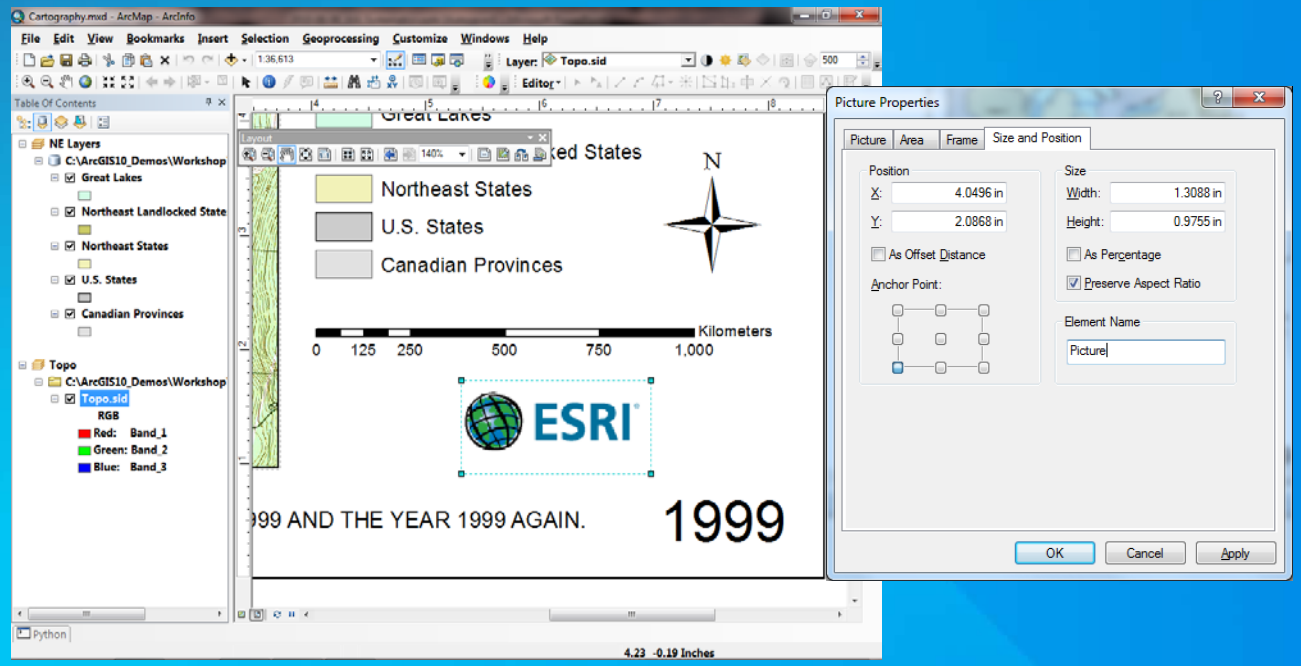
Page Layout Elements

- 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

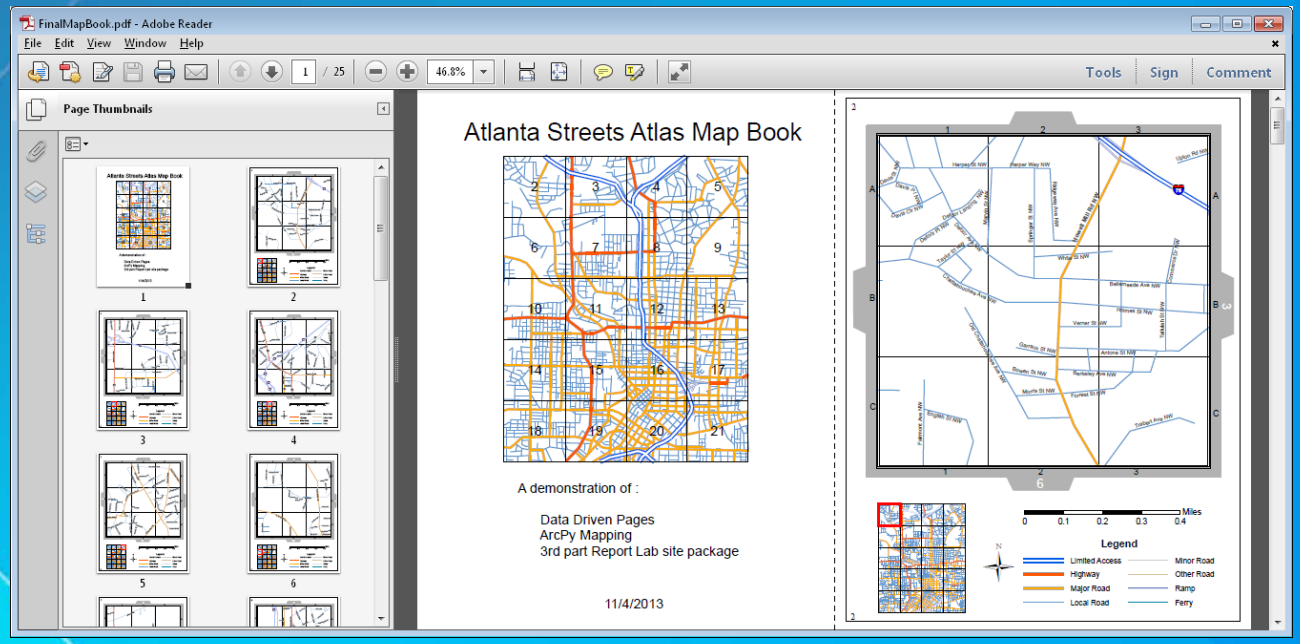
Printing, exporting, server publishing, map books

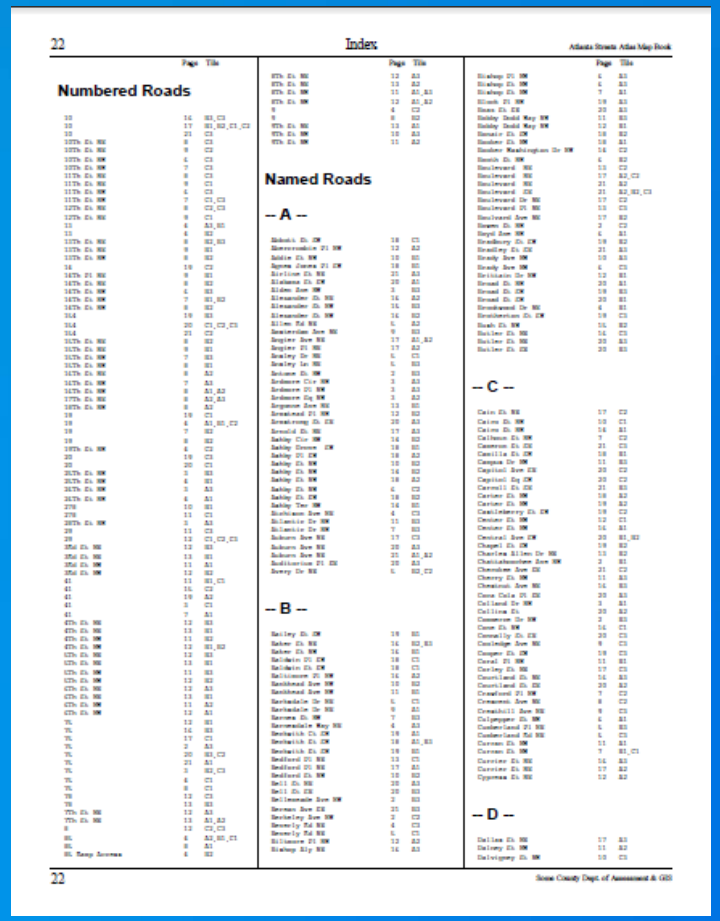
CLASSES
DataDrivenPages
PDFDocument

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

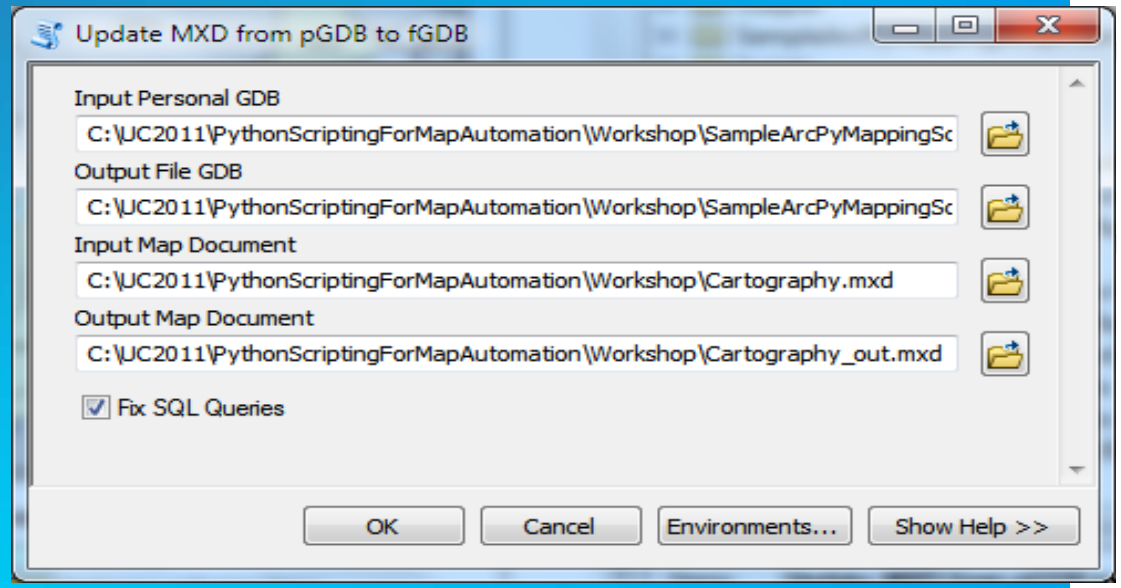
Sample: http://esriurl.com/4629

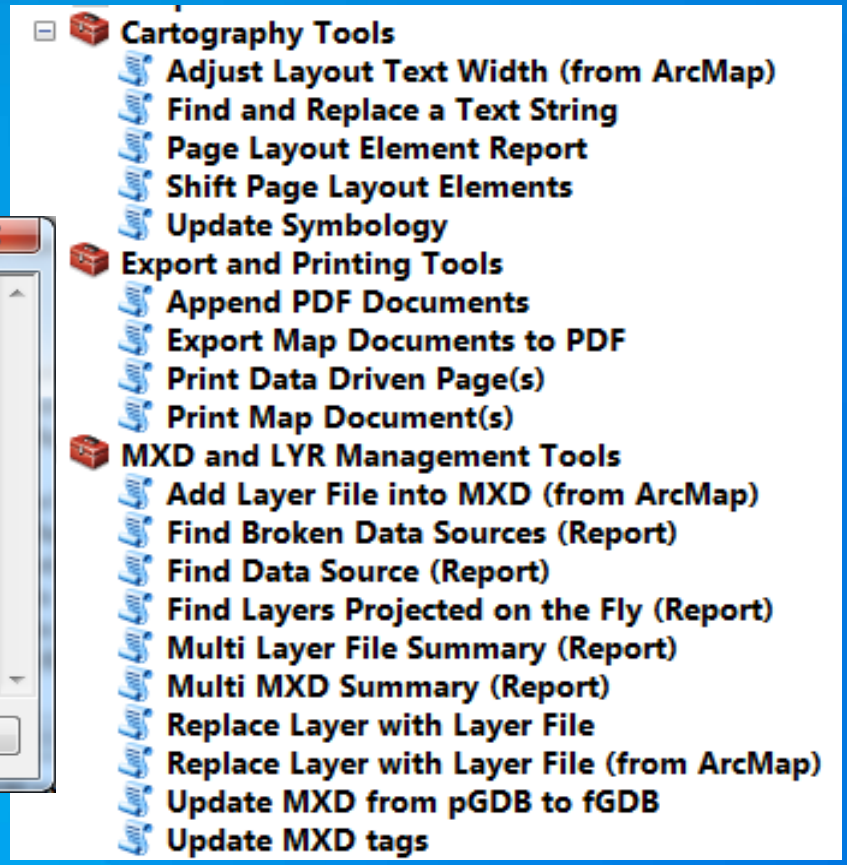
Updating data sources

- 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
  - 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

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**

Understanding our world.