Python Scripting for Map Automation in ArcGIS 10

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What is map scripting (aka arcpy.mapping)?

- A new mapping module that is part of the geoprocessing ArcPy site-package
- A python scripting API that allows our users to:
  - Manage map documents, layer files, and the data within them
    - 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 PDF map books
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
Demonstration #1
Brief introduction to an arcpy.mapping script

Find and replace text in an ArcMap layout
Running arcpy.mapping scripts

- arcpy.mapping is part of the Geoprocessing (GP) framework
- Run in wide variety of places
  - Script tool in ArcMap or ArcCatalog
  - Python Window in ArcMap
  - Standalone python - from IDE, from the command line, or as a scheduled task
  - Run as a GP Service in ArcGIS Server
Tour of arcpy.mapping

Overview
Tour of arcpy.mapping

Managing Documents and Layers

CLASSES
- MapDocument
- Layer
- TableView
- LabelClass
- DataFrame
- DataFrameTime
- GraphicElement
- LegendElement
- PictureElement
- TextElement
- MapSurroundElement
- PictureElement

FUNCTIONS
- MapDocument
- Layer
- ListBrokenDataSources
- ListDataFrames
- ListLayers
- ListLayoutElements
- ListPrinterNames
- ListTableViews
- AddLayer
- AddLayerToGroup
- InsertLayer
- MoveLayer
- RemoveLayer
- UpdateLayer
Tour of arcpy.mapping

Printing, Exporting, Server Publishing, Map Books

CLASSES
DataDrivenPages
PDFDocument

FUNCTIONS
ExportToAI
ExportToBMP
ExportToEMF
ExportToEPS
ExportToGIF
ExportToJPEG
ExportToPDF
ExportToPNG
ExportToSVG
ExportToTIFF
PDFDocumentCreate
PDFDocumentOpen
PrintMap
PublishMSDToServer
AnalyzeForMSD
ConvertToMSD
arcpy.mapping for Map Documents (MXDs)

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

- The CURRENT keyword versus MXDs on disk

- Get map from disk
  ```python
  mapDoc = arcpy.mapping.MapDocument(r"C:\Maps\LocalGovernmentInfrastructure.mxd")
  ```

- Get map from current ArcMap session
  ```python
  mapDoc = arcpy.mapping.MapDocument("CURRENT")
  ```

- When using CURRENT
  - Always run in foreground (checkbox in script tool props)
  - Be wary of open conflicts, file contention

- Limitations and pre-authoring
  - No "New Map" function, so keep an empty MXD available
Demonstration #2
Working with Map Documents (MXDs)

- A standalone script that creates a new MXD for each data frame
- Use the Python Window to update a data frame name
arcpy.mapping for Map Layers and Data Frames

• The “List” functions
  – ListLayers
  – ListDataFrames
  – Watch the list indexes (you may often forget to use [0])
    • df = arcpy.mapping.ListDataFrames(MXD)[0]

• DataFrame properties and methods
  – Map Navigation
  – DataFrameTime
arcpy.mapping for Map Layers and Data Frames

• Layer functions

FUNCTIONS

Layer
ListLayers
ListTableViews

AddLayer
AddLayerToGroup
InsertLayer
MoveLayer
RemoveLayer
UpdateLayer
arcpy.mapping for Map Layers and Data Frames

• When and what to pre-author for Map Document scenarios
  – Layer Symbology (aka Renderer) properties are not accessible
  – Pre-Author Layer files and use UpdateLayer or data source methods to connect it to data

• Scenarios for updating layers
  – changing layer symbology
  – changing layer type
    • eg. batch replace a traditional featureclass "basemap" layer with a basemap layer from a server
arcpy.mapping for Map Layers and Data Frames

• Updating Data Sources
  – use arcpy.mapping for migrating Map Documents and Layer files to new data sources. Batch migration.
  – Fancier scripts can help mitigate migration pain: SQL syntax changes, etc.
Demonstration #3
Working with Map Layers and Data Frames

- A script that finds a layer and turns it on
- A script that updates layer data sources
- A script that replaces a layer
arcpy.mapping for the Page Layout

• When and what to pre-author for layout manipulation scenarios
  – Name your layout elements
  – Cannot add new elements, so pre-author and hide off page if necessary
Demonstration #4
Working with layout elements

- A script tool to find a picture element and change its data source
arcpy.mapping for Printing and Exporting

- Export functions
- Print Functions
- Map Server Publishing
- Map Books
- The PDFDocument class

FUNCTIONS
- ExportToAI
- ExportToBMP
- ExportToEMF
- ExportToEPS
- ExportToGIF
- ExportToJPEG
- ExportToPDF
- ExportToPNG
- ExportToSVG
- ExportToTIFF
- PDFDocumentCreate
- PDFDocumentOpen
- PrintMap
- PublishMSDToServer
- AnalyzeForMSD
- ConvertToMSD

CLASSES
- DataDrivenPages
- PDFDocument
Demonstration #5
Map output and map books

- A script tool to export data driven pages to multipage PDF
- A script tool to create a temporal map book
- A full custom application ported from VBA
Resources available

• Desktop help
  – Geoprocessing → The ArcPy site package → Mapping module
    • Alphabetical lists of classes and functions
    • Detailed discussions
    • Multiple sample scripts for each class and function topic

• ArcGIS Resource Center
  – Download sample script tools
    • see the Geoprocessing Resource Center Gallery
  – Watch video demonstrations
  – Monitor the user forums/discussions
We want your feedback

- Get access to ArcGIS 10 Pre-release
- Try using it for your day to day tasks
- Help us identify future requirements
Thank you for your attention.

Questions?