Python: Introduction to Map Automation

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What is arcpy.mapping or arcpy.mp?

• Python mapping module that is part of the ArcPy site-package
• An API that allows users to:
  - manage MXDs/Projects, layer files, and their contents
    - find a layer with data source X and replace with Y
    - update a layer’s symbology in many documents/projects
    - generate reports that lists document information
      - data sources, broken layers, spatial reference info, etc.
  - Automate the exporting and printing of layouts
  - Automate map production and create map books
    - extend Data Driven Pages / Map Series capabilities
Tour of arcpy.mapping / arcpy.mp

• Overview
Help

Code sample

ArcGISProject example 1

The following script demonstrates how to import documents into an existing ArcGIS Pro project. It also sets up some of the default project settings and saves the result to a new file.

```python
import arcpy
aprx = arcpy.mp.ArcGISProject(r"C:\Projects\Yosemite\Documents\Yosemite.aprx")
aprx.ImportDocument(r"C:\Projects\Yosemite\Documents\Yosemite_Project.aprx")
aprx.ImportDocument(r"C:\Projects\Yosemite\Documents\Yosemite_ScenicViews.aprx")
aprx.defaultToolbox = r"C:\Projects\Yosemite\Data\Vector\YosemiteData.gdb"
aprx.defaultCopy = r"C:\Projects\Yosemite\Analysis\AnalysisTools.mxd"
aprx.saveAsCopy(r"C:\Projects\Yosemite\Analysis\AnalysisTools.mxd")
```

ArcGISProject example 2

The following script uses the keyword current, so it should be run from the Python window. The script prints the name of each map in a project and its layers, as well as the name of each layout and its page size.

```python
aprx = arcpy.mp.ArcGISProject("CURRENT")
for m in aprx.listMaps():
    print("Map: "+m.name)
    for lyr in m.listLayers():
        print("  "+lyr.name)
    print("Layouts:")
    for lyr in m.listLayouts():
        print("  {0} ([{1}] x [{2}])".format(lyr.name, lyr.pageHeight, lyr.pageWidth, lyr.pageUnits))
```
• Quick and easy access to Python and arcpy
  - Great way for new users to learn Python
  - Intellisense for all tools (methods and properties), parameter syntax
  - Quickly and efficiently test and execute tools
  - ArcPy module is already imported and fully accessible
You can get there from here

- The starting points are:
  - ArcGISProject
  - LayerFile

- The end result might be:
  - A modified, saved project
  - An exported PDF
Referencing projects

**ArcGISProject function**

```python
ArcGISProject(aprx_path)
```

**ArcGISProject class**

- Methods
  - `importDocument`
  - `listBrokenDataSources`
  - `save`
  - `updateConnectionProperties`
  - ...

- Properties:
  - `defaultGeodatabase`
  - `filePath`
  - `homeFolder`
  - ...

Referencing projects

- Use the `ArcGISProject` function
  - Takes a path to an aprx file on disk or special keyword "CURRENT"

- Reference project on disk (stand-alone script)
  `aprx = arcpy.mp.ArcGISProject(r"C:\path\some.aprx")`

- Reference project in current application session (in process)
  `aprx = arcpy.mp.ArcGISProject("CURRENT")`
Where to run your scripts

- Python window or script tool (in process)
- IDE (e.g., IDLE), command line (out of process)
ArcGISProject
Maps and Layers

• Use “List” functions on appropriate objects
  
  \[
  mp = aprx.listMaps("parc*")[0]
  \]
  
  \[
  lyr = mp.listLayers()[0]
  \]
  - Warning - it is easy to forget to use [0]

• Common properties are available
  - Layers:
    - definitionQuery, saveACopy, visible
  - Map:
    - AddLayer, ClearSelection, defaultCamera
Layouts and layout elements

• Support zero to many
  - `lyt = aprx.listLayouts(“Landscape”) [0]`

• Find elements on a layout
  - `txtElm = lyt.listElements(“text_element”, “title”) [0]`
  - `txtElm.text = “Some new title”`

• Each element has a unique name
Map Frame and Camera

- **Reference map frame on a layout**
  
  \[-mf = lyt.listElements(“mapframe_element”)\][0]\]

- **Zoom to Bookmark / Layer**
  
  \[-bkmk = mp.listBookmarks(“bookmark”)\][0]\]
  \[-mf.zoomToBookmark(bkmk)\]
  \[-lyrExt = mf.getLayerExtent(lyr, True)\]
  \[-mf.camera.setExtent(lyrExt)\]

- **Modify camera**
  
  \[-cam = mf.camera\]
  \[-cam.X = x; cam.Y = y; cam.scale = sc\]
  \[-mf.camera = cam\]
Managing PDF documents

• Can create or open existing PDFs
  - `myPDF = arcpy.mp.PDFDocumentCreate(r"C:\Temp\new.pdf")`
  - `myPDF.appendPages(r"C:\Temp\someOther.pdf")`
  - `myPDF.saveAndClose()`
PDF Export

Diagram showing the process of PDF export, including PictureElement, TextElement, Layout, PDFDocument, and PDF File.
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