



# ArcGIS Pro: Scripting with Python

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# Target Audience

Experienced ArcGIS Desktop Users

Experienced with Python Scripting

Curious about ArcGIS Pro

# Python

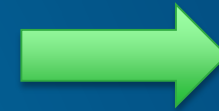
- Scripting language of choice introduced at ArcGIS 9.0 as the arcgisscripting module
- Since 10.0 – the ArcPy site-package
- Esri fully embraces it for:
  - Data Analysis
  - Data Conversion
  - Data Management
  - Map Automation



# Python Migration: ArcGIS for Desktop and ArcGIS Pro

- **Considerations**

- What is Pro?



- **Changes to Scripting**

- **Functionality and Appearance**
- **Arcpy Module names and content**
- **Supported Formats**
- **Licensing**



# ArcGIS Pro - Listening to user community



- **Changes to the Application – Faster**
  - Multiple Layouts
  - 64-bit Processing
  - Multi-threaded
  - Simpler and more Modern UI (Ribbon Interface)
  - Multiple Tasks
  
- **2D and 3D in one App**
  
- **Same Powerful Geoprocessing Framework - reorganized**

# The Next Generation of Desktop for all GIS Users

Not a replacement, but part of the Desktop App Suite

ArcMap and ArcGIS Pro run side by side

Fusion of the most used functionality in

ArcMap

ArcCatalog

ArcScene



# Considerations

How are you going to use Python?

Geoprocessing Window – Copy as Python snippets

Model Builder - Export as Python scripts

Python Window

Script tool

Stand-alone

- Do you want your script to run in ArcGIS Desktop 10.x, Pro...or Both?



# Installation

## Script Tools and Python Window

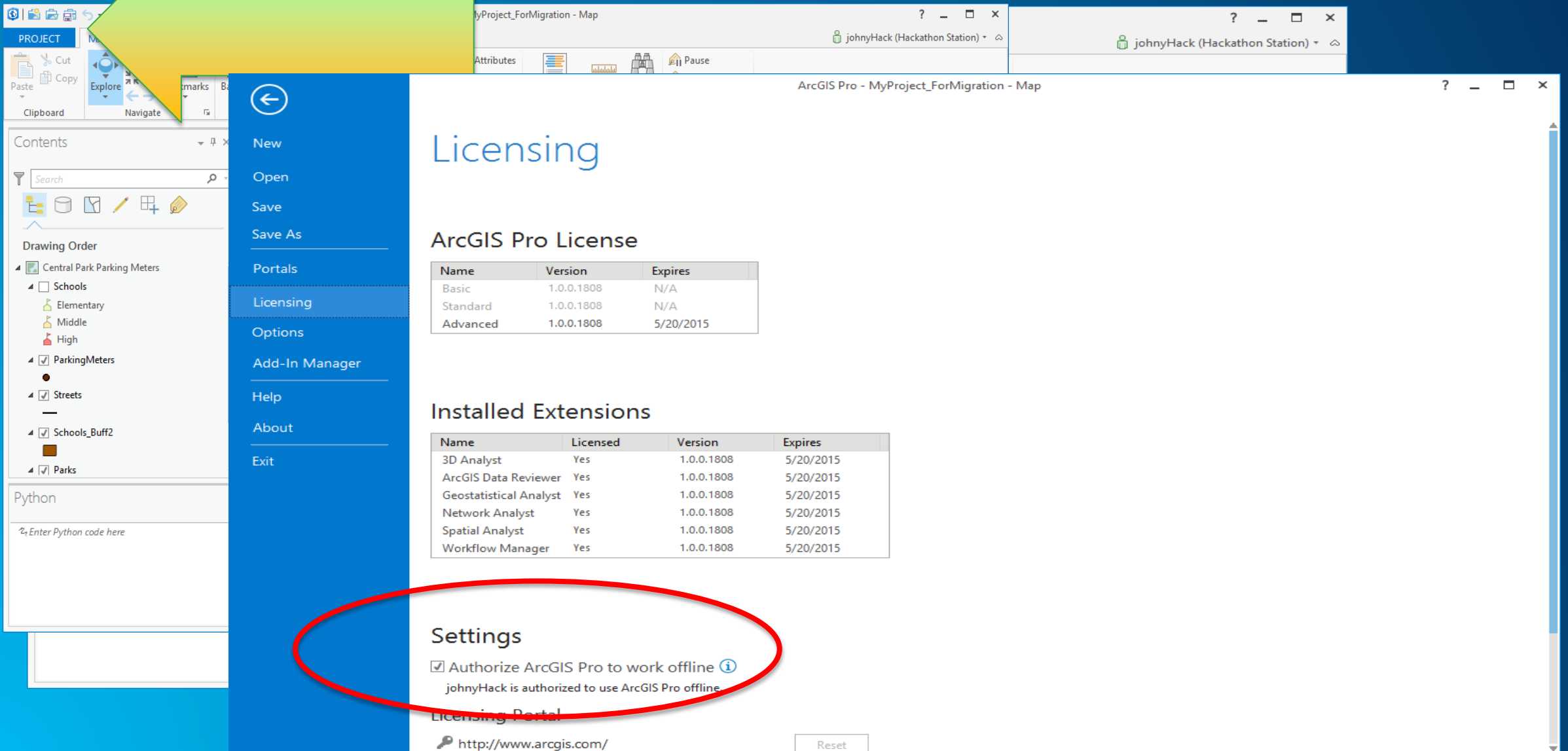
- Embedded Python installed with ArcGIS Pro

## Stand Alone Scripts

- Python for ArcGIS Pro Install: 64-bit Python 3.4.1
- All ArcGIS Pro Dependencies
- ArcGISPro.pth (Lib < site-packages)



# Stand-Alone Scripting: IDEs or Command Line



The screenshot shows the ArcGIS Pro interface with the Licensing dialog box open. A large green arrow points from the top left towards the dialog. The dialog is titled "Licensing" and displays the following information:

### ArcGIS Pro License

Name	Version	Expires
Basic	1.0.0.1808	N/A
Standard	1.0.0.1808	N/A
Advanced	1.0.0.1808	5/20/2015

### Installed Extensions

Name	Licensed	Version	Expires
3D Analyst	Yes	1.0.0.1808	5/20/2015
ArcGIS Data Reviewer	Yes	1.0.0.1808	5/20/2015
Geostatistical Analyst	Yes	1.0.0.1808	5/20/2015
Network Analyst	Yes	1.0.0.1808	5/20/2015
Spatial Analyst	Yes	1.0.0.1808	5/20/2015
Workflow Manager	Yes	1.0.0.1808	5/20/2015

### Settings

Authorize ArcGIS Pro to work offline ⓘ  
johnnyHack is authorized to use ArcGIS Pro offline

Licensing Portal  
<http://www.arcgis.com/> Reset

# Stand-Alone Scripting: IDEs or Command Line



- **If True:**

- **ArcGIS Pro is open**
- **Sign-In Automatically checked on sign in dialog**
- **ArcGIS Pro authorized to work offline**

# Analysis and Geoprocessing



- **Analysis tab: All things Analysis**

Analysis gallery, Find Tools, Network Analysis, Raster Functions, ModelBuilder, Python Window

- **Geoprocessing pane location to find and run tools**

<http://pro.arcgis.com/en/pro-app/help/analysis/geoprocessing/the-basics/what-is-geoprocessing-.htm>

- **Project/Geoprocessing History records all tools run on project**

- **Can customize the Analysis tab by adding tools to the analysis gallery**

- **Can customize the Geoprocessing pane by adding tools to favorites**

# Analysis and Geoprocessing



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# ArcGIS Pro: The Analysis Tab

The screenshot displays the ArcGIS Pro software interface. The top ribbon contains several tabs: PROJECT, MAP, INSERT, ANALYSIS, VIEW, EDIT, SHARE, APPEARANCE, LABELING, and DATA. The ANALYSIS tab is circled in red. Below the ribbon is a toolbar with various tools, including Calculate Field, Buffer, Near, Spatial Join, Intersect, Empirical Bayesian Kri..., Kernel Density, Optimized Hot Spot Analysis, Summary Statistics, Network Analysis, Raster Functions, and Function Editor. The main map area shows a 2D view of a geographic area with a heatmap overlay and several green circular markers. The left pane shows the Contents window with a search bar and a list of layers: Northridge2D (expanded to show Stations and Earthquakes), Roads, MajorFaults, Stations\_Buffer1500, BuildingDamage, Elevation (with a legend showing High: 7104 and Low: -18), and Basemap (World\_Topo\_Map). The right pane shows the Geoprocessing window with a search bar and a list of tools: Calculate Field (Data Management Tools), Buffer (Analysis Tools), Near (Analysis Tools), Spatial Join (Analysis Tools), and Intersect (Analysis Tools). The status bar at the bottom indicates a scale of 1:1,297,438, coordinates of 118.59W 34.33N, and 0 selected features.

# Analysis and Geoprocessing



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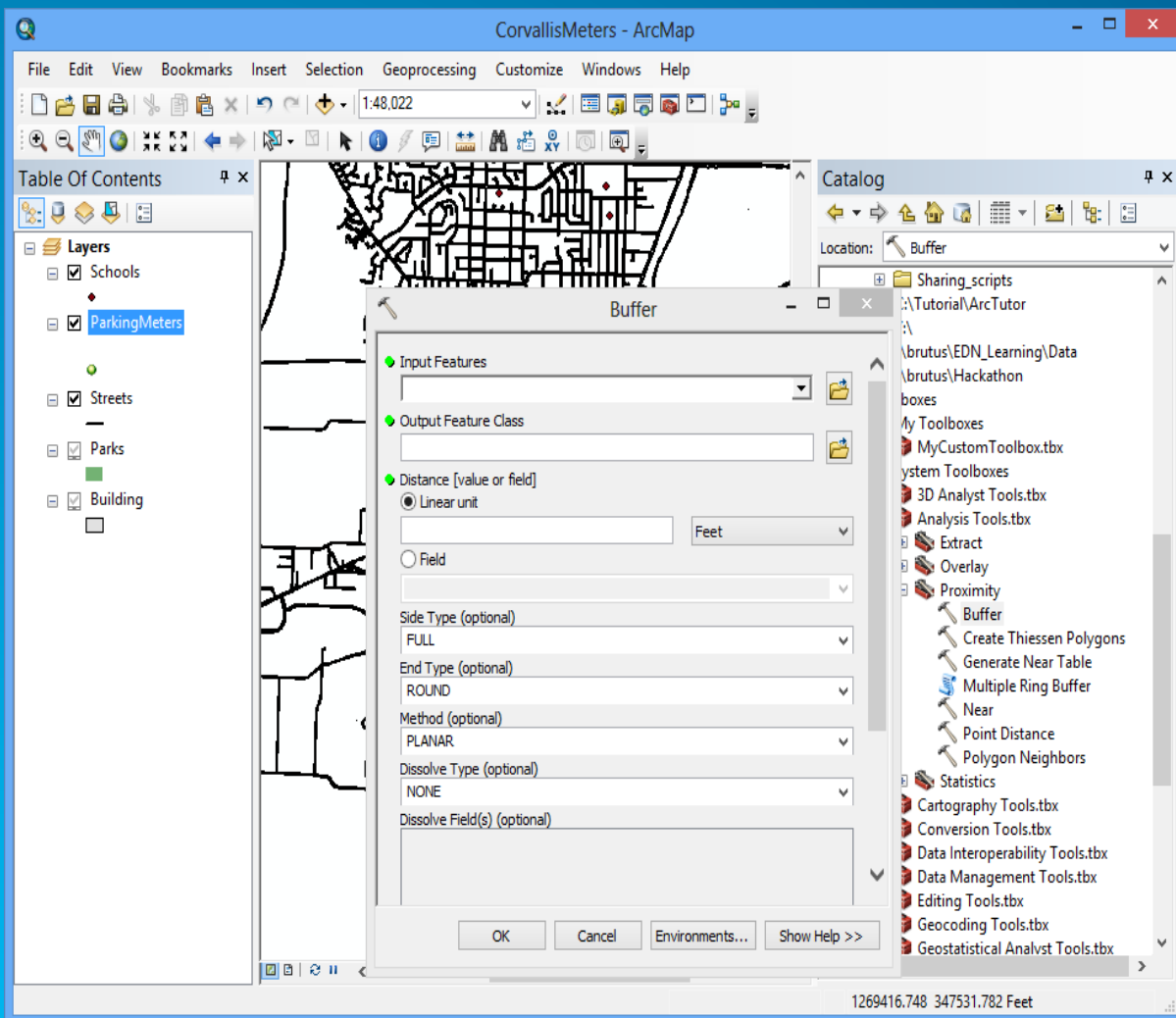
# Some Key Differences

**Use in\_memory only for intermediate outputs in scripts and models**  
**If in Geoprocessing Pane output copied to project gdb**

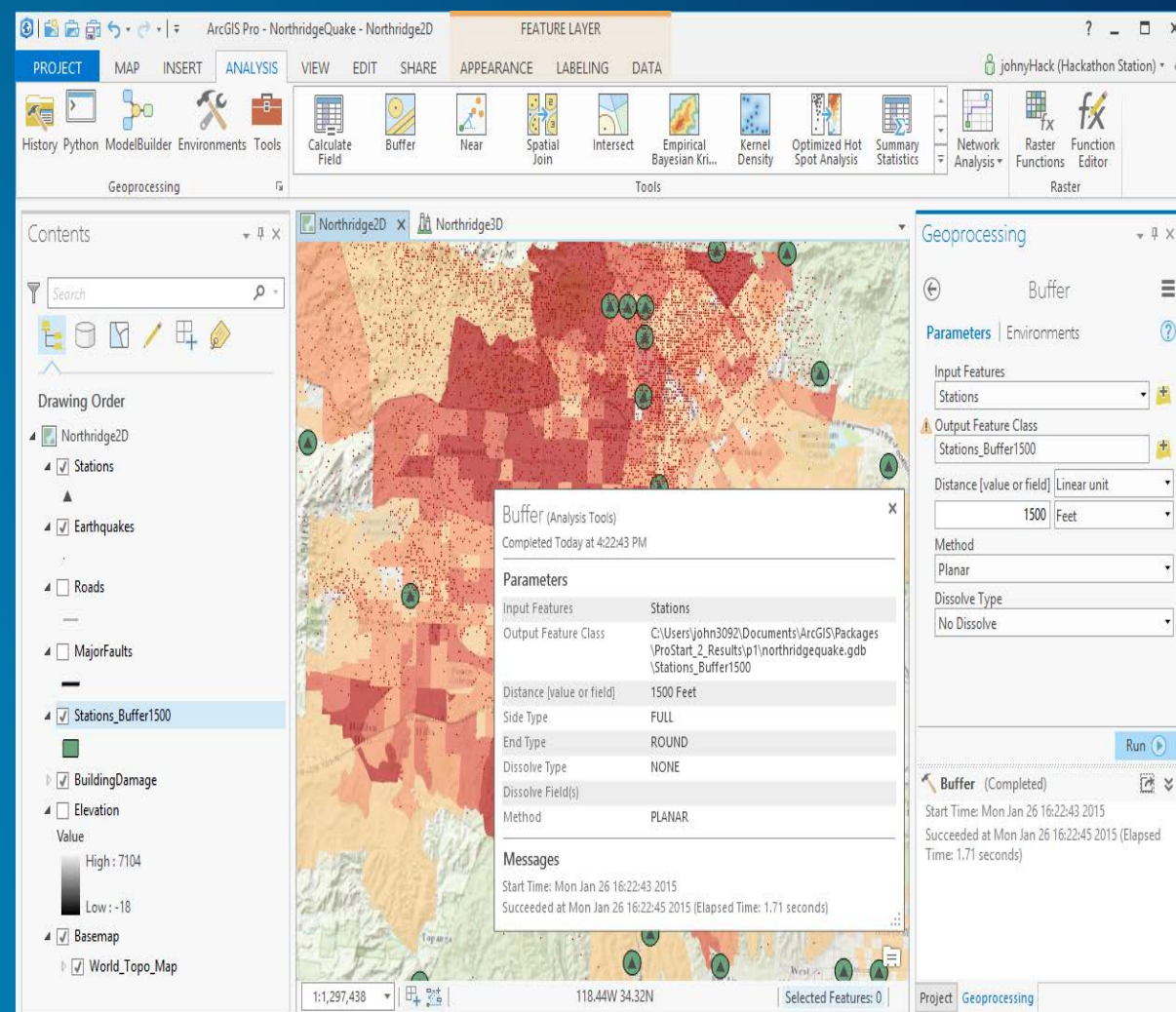
**Use Geoprocessing Pane menu to open and activate multiple tools**  
**Tools open side-by-side in ModelBuilder not Geoprocessing Pane**

**Do not support COM tools (.NET, Java, c++)**  
**Custom tools developed with Python**

# Geoprocessing Dialog



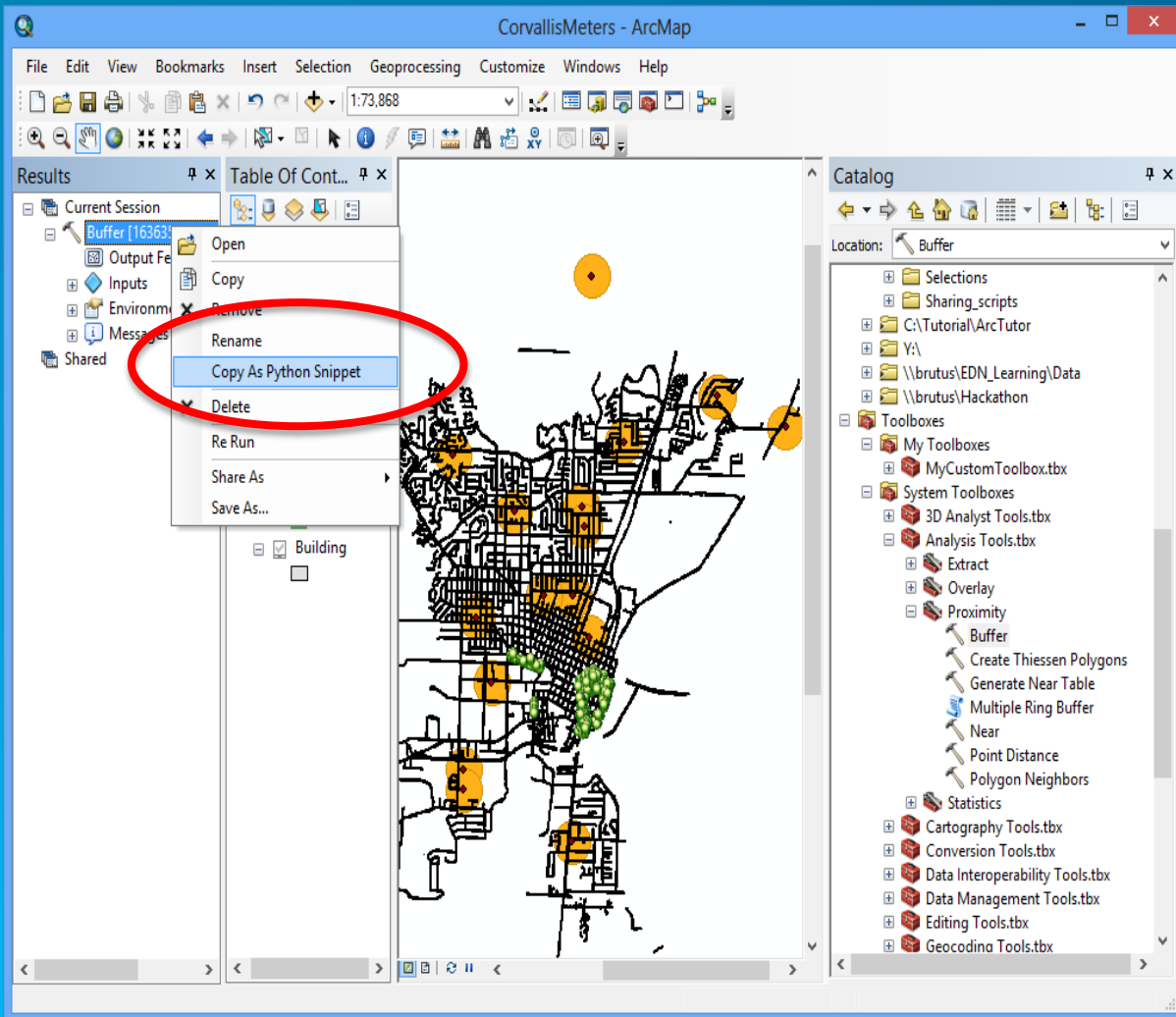
# Geoprocessing Pane



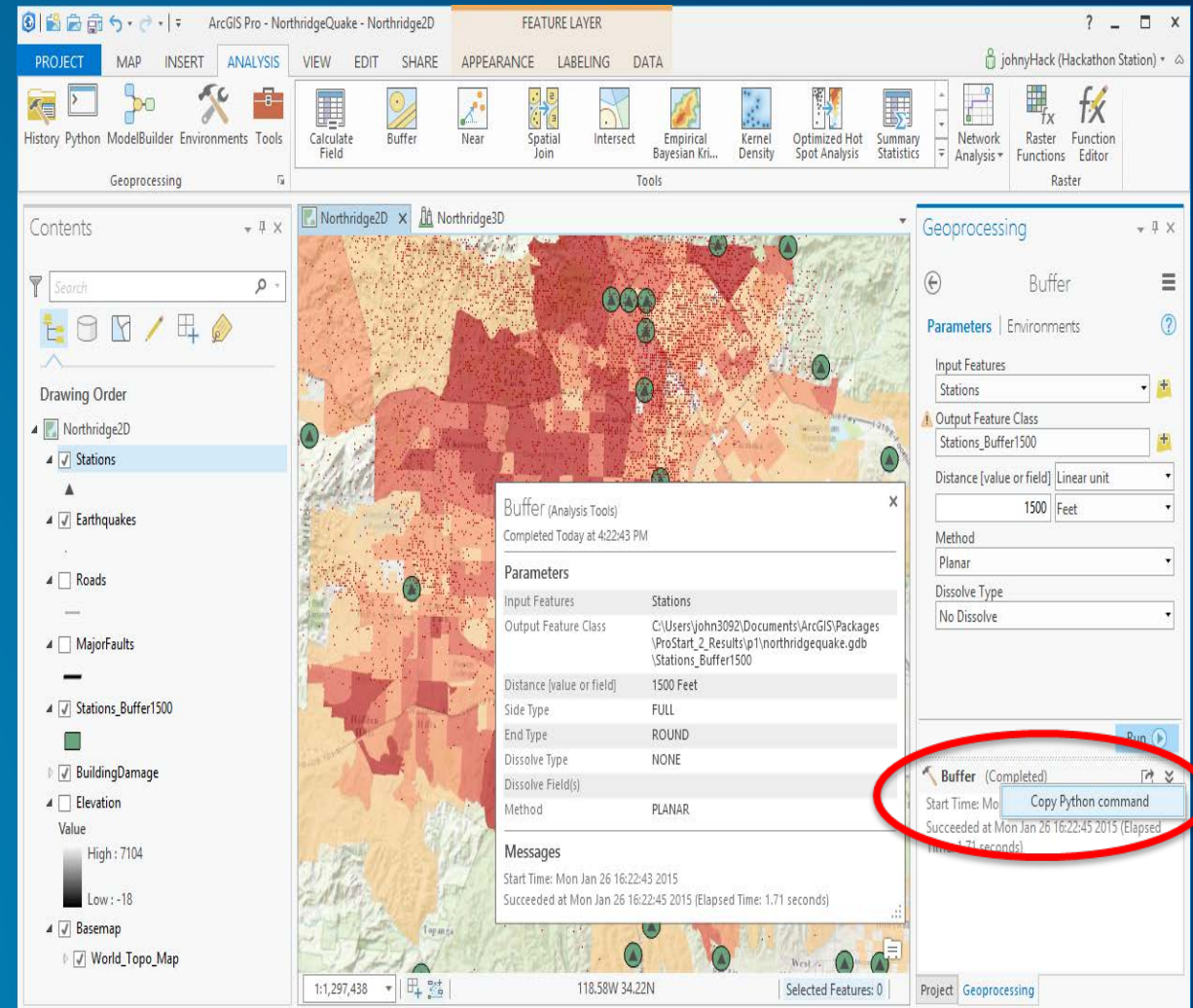


# Python Code Snippets after Geoprocessing

## ArcGIS Desktop



## ArcGIS Pro



# Analysis and Geoprocessing

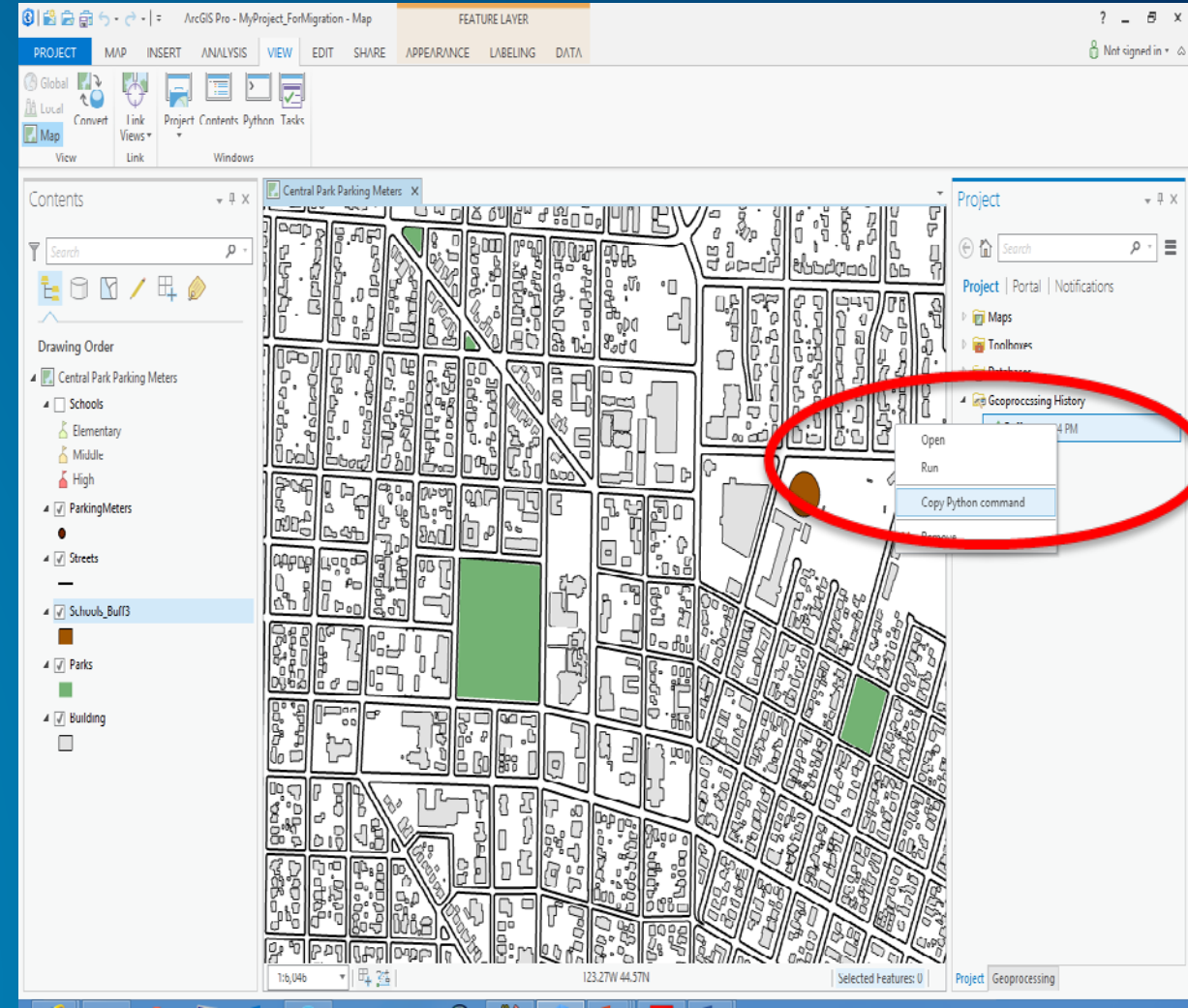
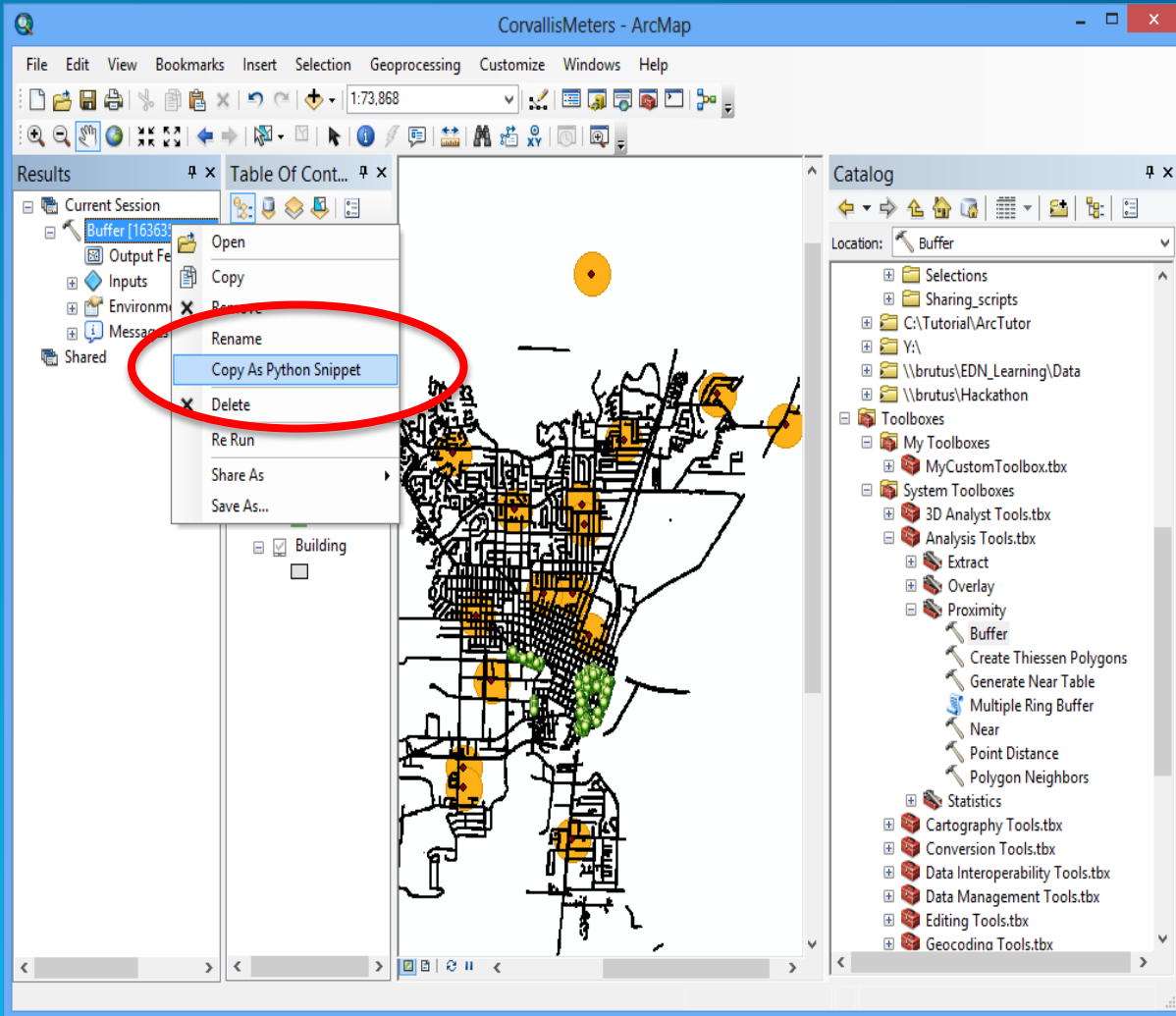


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# Python Code Snippets

GP Results  
ArcGIS Desktop

GP History  
ArcGIS Pro

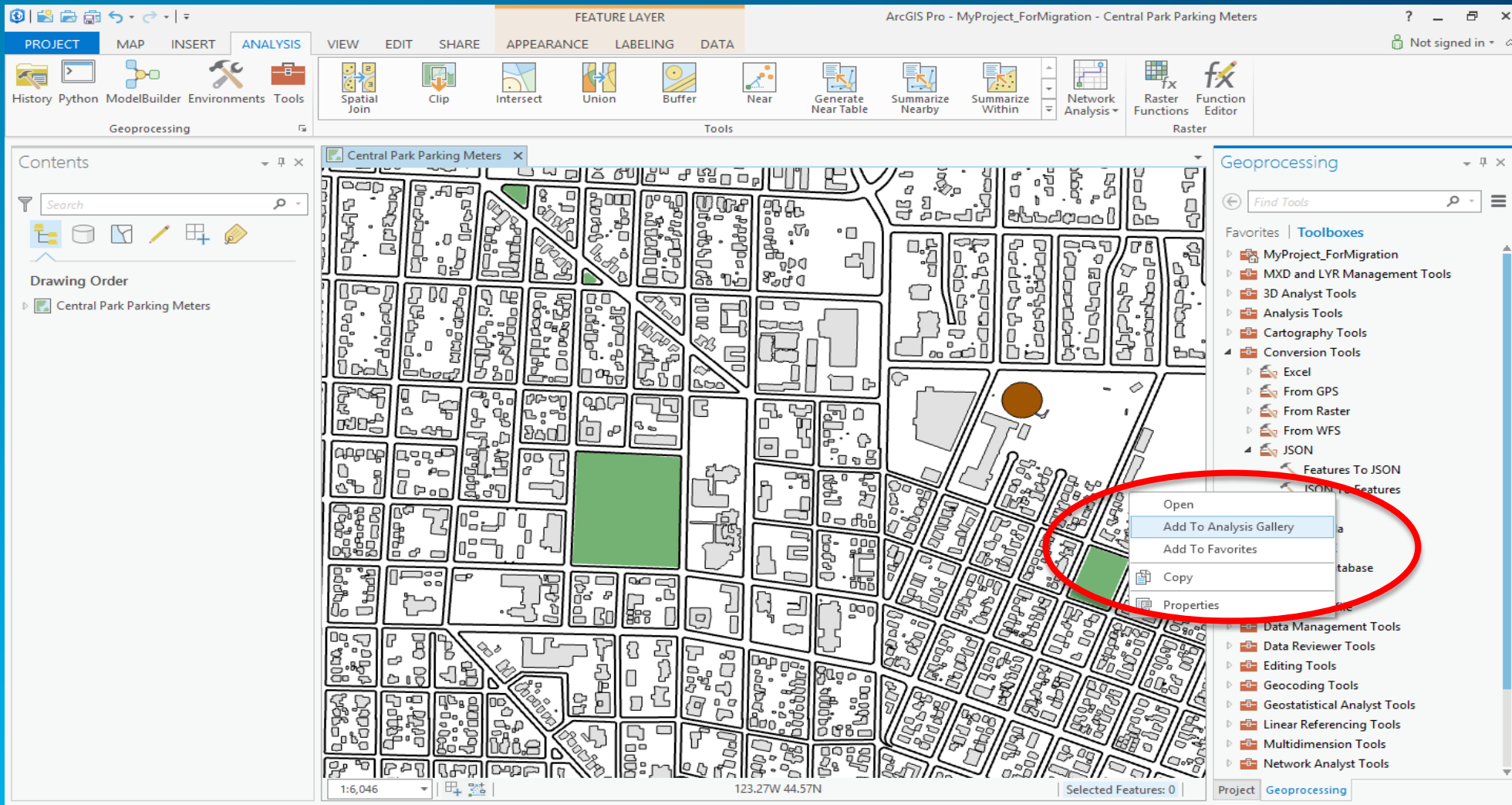


# Analysis and Geoprocessing

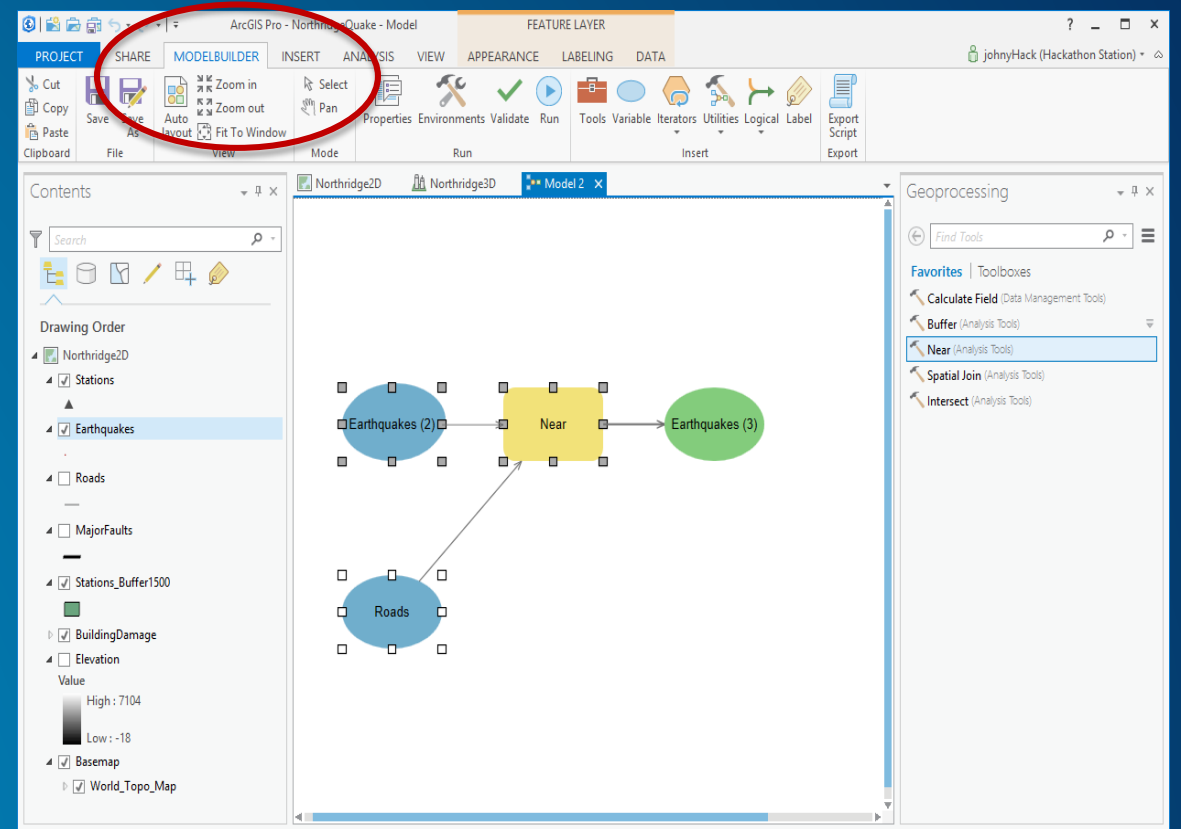
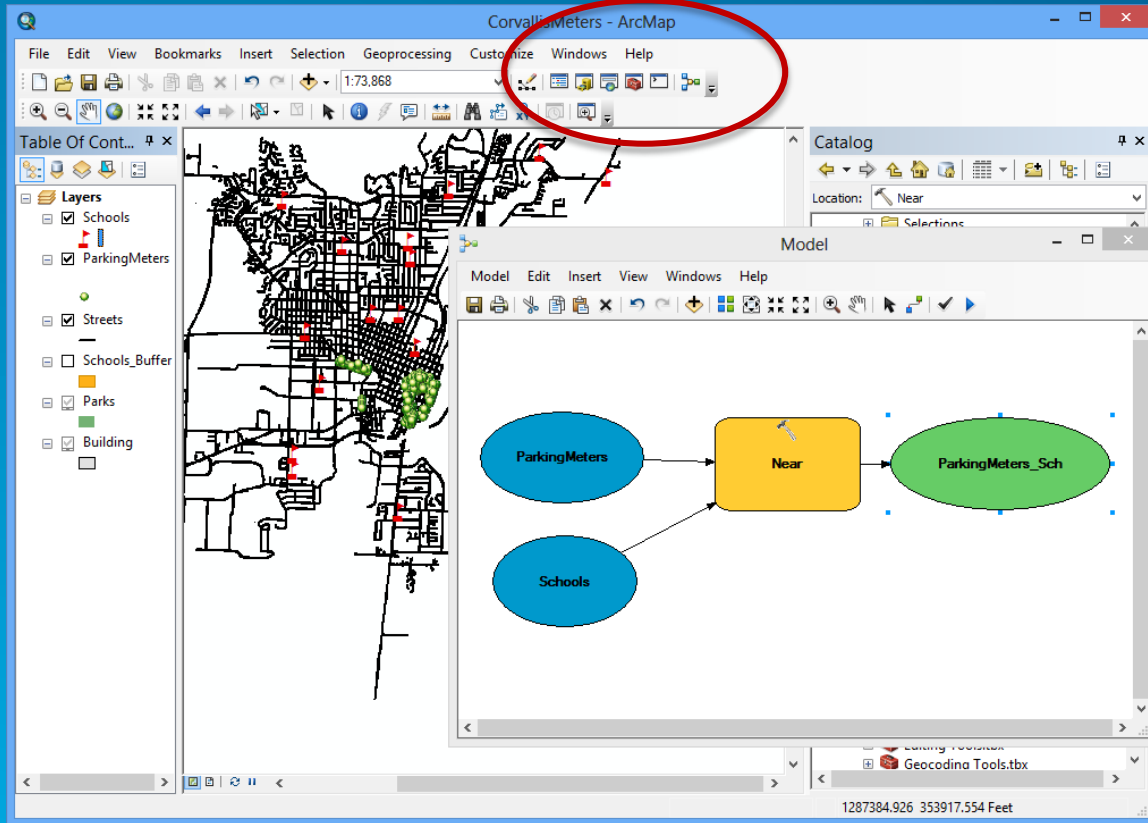


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# Customizing Analysis Gallery and Favorites



# Model Builder



**Not Backwards Compatible: Use Save As**

# The Python Window

ArcPy Café – The New Python Window in ArcGIS Pro  
<https://arcpy.wordpress.com/Arc>



```
Python
```

```
arcpy.GetCount_management('rivers')
```

```
<Result '135'>
```

```
arcpy.Describe('rivers').FIDSet
```

Transcript

Python prompt

# Demo - ArcGIS Pro Interface, Geoprocessing and Python

- **Landing Page** → <http://pro.arcgis.com/en/pro-app/>
- **Terminology and User Interface Reference Guide** → <http://pro.arcgis.com/en/pro-app/get-started/arcgis-pro-terminology.htm>
- **Overview** → <http://pro.arcgis.com/en/pro-app/get-started/overview-of-arcgis-pro.htm>
- **User Interface** → <http://pro.arcgis.com/en/pro-app/get-started/arcgis-pro-user-interface.htm>
- **ArcPy Reference** → <http://pro.arcgis.com/en/pro-app/arcpy/main/arcgis-pro-arcpy-reference.htm>
- **Free and Cost Courses** → <http://training.esri.com/gateway/index.cfm?fa=search.results&searchterm=arcgispro>
- **Video** <http://geochannel.esri.com/index.cfm?event=video.view&channelId=38&videoId=4940>



**Demo**

**Python scripts outside the Mapping Module will most likely just run**

### **Demonstration:**

**Showed a script deleting feature classes from a File System folder in Desktop, referencing ArcPy functions.**

**Discussed how this script would work the same in ArcGIS Pro since all functions are located on the same classes.**

# Migrating Scripts using Mapping module

**ArcPy mapping – renamed:**

Module in Pro:     mp

**Fundamental Difference:**

Data Frame object branched into Map, MapFrame, Camera

\*

# Demonstration of Mapping Code in Desktop and Modifying it to work in Pro

## Desktop

```
File Edit Search View Project Run Tools Help
nontemp.py x AddLayerFile_CURRENT_LessV.py x AddLayerFile_CURRENT.py x

26 import arcpy
27
28 try:
29     #Read parameters from dialog
30     folderLocation = arcpy.GetParameterAsText(0)
31     layerFile = arcpy.GetParameterAsText(1)
32     dfName = arcpy.GetParameterAsText(2)
33     position = arcpy.GetParameterAsText(3)
34
35     #Reference map document from within ArcMap
36     mxd = arcpy.mapping.MapDocument("CURRENT")
37
38     #Reference the layer file on disk and data frame
39     addLayer = arcpy.mapping.Layer(layerFile)
40     df = arcpy.mapping.ListDataFrames(mxd, dfName)[0]
41     #Add layer file
42     arcpy.mapping.AddLayer(df, addLayer, position)
43
44     #Refresh TOC and ActiveView
45     arcpy.RefreshActiveView()
46     arcpy.RefreshTOC()
47
48     del mxd, addLayer
49
50 except Exception, e:
51     import traceback
52     arcpy.AddError(traceback.format_exc().split("\n"))
53     arcpy.AddError(str(e))
54
```

Python Interpreter

```
*** Python 2.7.8 (default, Jun 30 2014, 16:03:49) [MSC v.1500 32 bit (Intel)] on win32. ***
*** Remote Python engine is active ***
>>>
*** Remote Interpreter Reinitialized ***
>>>
Command Line: see height weight
```

Variables | Watches | Output | Messages | Python Interpreter

1: 1 | Insert

## Pro

```
File Edit Search View Project Run Tools Help
nontemp.py x AddLayerFile_CURRENT_LessV.py x AddLayerFile_CURRENT.py x

24 # via the customize dialog box [Geoprocessing Tools].
25
26 import arcpy
27
28
29 try:
30     #Read parameters from dialog
31     folderLocation = arcpy.GetParameterAsText(0)
32     layerFile = arcpy.GetParameterAsText(1)
33
34     #Reference current project
35     aprx = arcpy.mp.ArcGISProject("CURRENT")
36     #Reference a map from available maps
37     map = aprx.listMaps()[0]
38
39     #Assign layer file from dialog to variable
40     addLayer = arcpy.mp.LayerFile(layerFile)
41
42     #Add layer file from the Map instance
43     map.addLayer(addLayer)
44
45
46     del map, addLayer
47
48 except Exception as e:
49     import traceback
50     list(map(arcpy.AddError, traceback.format_exc().split("\n")))
51     arcpy.AddError(str(e))
52
```

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39: 12 | Insert