

Basics on Python



Outline

- What is Python?
 - Why is it python?
- How is Python used in GIS
 - Python in ArcMap
 - Standalone Python Programs
- Some basics
- Model builder to python
 - For repeatable results

What is python?

- Python is a widely used high-level programming language for general-purpose programming, created by Guido van Rossum and first released in 1991. (from Wikipedia)
- Why is it called Python?
 - Guesses???

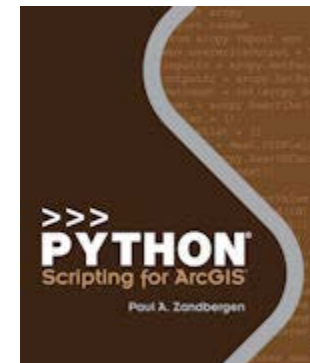
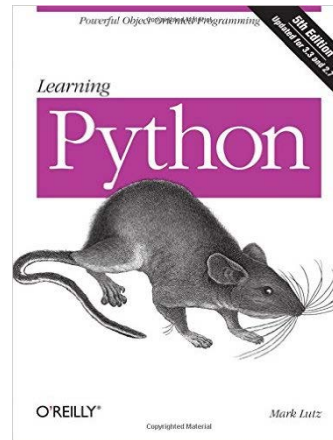


Python in GIS

- Almost any task in GIS can be completed using python.
- But that doesn't mean you should use it. Some tasks are *WAY* easier using the toolboxes
- Examples in a bit.....

Ways to Learn

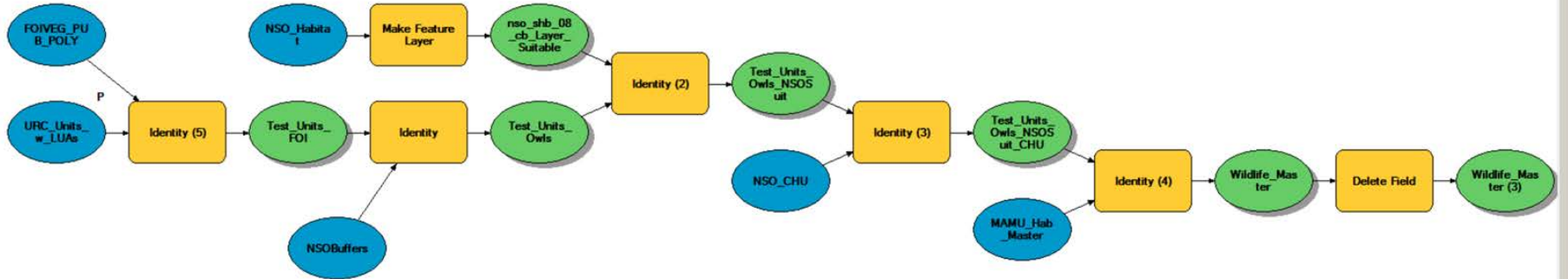
- Peers
- [StackExchange](#)
- [Python.org](#)
- [Code Academy](#)
- [ArcGIS Trainings](#)
- Books



Getting Started

- Decide if Python is the best option
- Which method?
 - ArcMap Python Window
 - Model Builder to Python
 - Stand alone python
- Each method has it own place in the toolbox

Model Builder



Python Version

```
• # Set the necessary product code
• # import arcinfo

• # Import arcpy module
• import arcpy

• # Script arguments
• URC_Units_w_LUAs = arcpy.GetParameterAsText(0)
• if URC_Units_w_LUAs == '#' or not URC_Units_w_LUAs:
•     URC_Units_w_LUAs = "URC_Units_w_LUAs" # provide a default value if unspecified

• # Local variables:
• FOIVEG_PUB_POLY = "G:\corp\BLMReplication\ORWA_rep_gdb\forest_MicroStorms_veg_pub.gdb\FOIVEG_PUB_POLY"
• Test_Units_FOI = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Scratch.gdb\Test_Units_FOI"
• NSOBuffers = "G:\cby\data\local\wildlife\NSO_Analysis.gdb\NSOBuffers"
• Test_Units_Owls = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Scratch.gdb\Test_Units_Owls"
• NSO_Habitat = "G:\cby\data\local\wildlife\wildlife.gdb\NSO_Habitat"
• nso_shb_08_cb_Layer_Suitable = "nso_shb_08_cb_Layer_Suitable"
• Test_Units_Owls_NSOSuit = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Scratch.gdb\Test_Units_Owls_NSOSuit"
• NSO_CHU = "G:\cby\data\local\wildlife\wildlife.gdb\NSO_CHU"
• Test_Units_Owls_NSOSuit_CHU = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Scratch.gdb\Test_Units_Owls_NSOSuit_CHU"
• MAMU_Hab_Master = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Final_Wildlife_Data.gdb\MAMU_Hab_Master"
• Wildlife_Master = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Final_Wildlife_Data.gdb\Wildlife_Master"
• Wildlife_Master_3 = Wildlife_Master

• # Set Geoprocessing environments
• arcpy.env.scratchWorkspace = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Scratch.gdb"
• arcpy.env.workspace = "Y:\tholland.BLM\ArcGis_Work\FY2016_Projects\44_0524_TSaleEA_WildlifeModel\Scratch.gdb"

• # Process: Identity (5)
• arcpy.Identity_analysis(URC_Units_w_LUAs, FOIVEG_PUB_POLY, Test_Units_FOI, "ALL", "", "NO_RELATIONSHIPS")

• # Process: Identity
• arcpy.Identity_analysis(Test_Units_FOI, NSOBuffers, Test_Units_Owls, "ALL", "", "NO_RELATIONSHIPS")

• # Process: Make Feature Layer
• arcpy.MakeFeatureLayer_management(NSO_Habitat, nso_shb_08_cb_Layer_Suitable, "SUBJ_SHB in ('1', '2')", "", "OBJECTID OBJECTID VISIBLE NONE;Shape Shape VISIBLE NONE;SUBJ_SHB SUBJ_SHB VISIBLE NONE;GISACU1083 GISACU1083 VISIBLE NONE;Habitat Habitat VISIBLE NONE;Comments Comments VISIBLE NONE;Update_Date Update_Date VISIBLE NONE;Shape_Length Shape_Length VISIBLE NONE;Shape_Area Shape_Area VISIBLE NONE")

• # Process: Identity (2)
• arcpy.Identity_analysis(Test_Units_Owls, nso_shb_08_cb_Layer_Suitable, Test_Units_Owls_NSOSuit, "ALL", "", "NO_RELATIONSHIPS")

• # Process: Identity (3)
• arcpy.Identity_analysis(Test_Units_Owls_NSOSuit, NSO_CHU, Test_Units_Owls_NSOSuit_CHU, "ALL", "", "NO_RELATIONSHIPS")

• # Process: Identity (4)
• arcpy.Identity_analysis(Test_Units_Owls_NSOSuit_CHU, MAMU_Hab_Master, Wildlife_Master, "ALL", "", "NO_RELATIONSHIPS")

• # Process: Delete Field
• arcpy.DeleteField_management(Wildlife_Master,
• "FID_Test_Units_Owls_NSOSuit_CHU;FID_Test_Units_Owls_NSOSuit;FID_Test_Units_Owls;FID_Test_Units_FOI;FID_URC_Units_w_LUAs;Acres;FID_FOIVEG_PUB_POLY;GIS_ACRES_1;FID_NSOBuffers;ORIG_FID;FID_NSO_Habitat;GISACU1083;FID_NSO_CHU;Shape_Leng;Acres_1;Hectares;FID_MAMU_Hab_Master;OCC_GIS_ACRES;GISACU1083_1;FID_Starting_Units_w_Name_Num")
```


Stand Alone Script

```
# -----
# CreateExhibitAData.py
# Created on: Mon Jan 26 2009 10:31:57 AM
# (generated by ArcGIS/ModelBuilder then modified by John Guetterman)
# Modified 13 May 09 by Guetterman to work with Citrix data sources, eliminate dissolve of reserve area, and add error trap if Scratch.gdb already exists
# Modified 005 Oct 09 by Flora so as to buffer the clip cover by 15 meters before creating
# the contours (to not have gaps at the edges of the clip cover). The contours are
# then clipped back to the original clip cover.
# Modified 1 Oct 12 by Guetterman to create only 100 ft contours and to clip landings, convert to arcpy
# Modified on 14 Oct 14 by Flora to also keep the 20 ft contours. Also updated Owl Site theme.
# Modified on 22 Jan 16 by Holland to work with the new Microstorms Dataset and New Owl Database data
# Modified on 07 Mar 16 by Holland to 110 yards for MMH buffer and sites, rather than the original 100 yard buffer
# Modified on 20 Sept 16 by Holland to update the new locaion and name of the wildlife files

# variables for testing: Y:\jguetter.BLM\Temp\ExhibitA_test\Test_ExA_data.gdb Y:\jguetter.BLM\Temp\ExhibitA_test\Test_ExA_data.gdb\Reserve
Y:\jguetter.BLM\Temp\ExhibitA_test\Test_ExA_data.gdb\Unit # Y:\jguetter.BLM\Temp\ExhibitA_test\Test_ExA_data.gdb\Streams ###
# -----

# Setup stuff
import sys, string, os, arcpy
##gp = arcgisscripting.create()
ARCGISHOME = os.environ.get("ARCGISHOME")
##arcpy.CheckOutExtension("spatial")
##arcpy.AddToolbox(ARCGISHOME + "\\ArcToolbox\\Toolboxes\\Spatial Analyst Tools.tbx")
##arcpy.AddToolbox(ARCGISHOME + "\\ArcToolbox\\Toolboxes\\Data Management Tools.tbx")
##arcpy.AddToolbox(ARCGISHOME + "\\ArcToolbox\\Toolboxes\\Analysis Tools.tbx")
arcpy.env.overwriteOutput = True
arcpy.env.outputCoordinateSystem =
"PROJCS['NAD_1983_UTM_Zone_10N',GEOGCS['GCS_North_American_1983',DATUM['D_North_American_1983',SPHEROID['GRS_1980',6378137.0,298.257222101]],PRIMEM['Greenwich',0.0],UN
IT['Degree',0.0174532925199433]],PROJECTION['Transverse_Mercator'],PARAMETER['False_Easting',500000.0],PARAMETER['False_Northing',0.0],PARAMETER['Central_Meridian',-
123.0],PARAMETER['Scale_Factor',0.9996],PARAMETER['Latitude_Of_Origin',0.0],UNIT['Meter',1.0]]"
#arcpy.env.OutputCoordinateSystem = ARCGISHOME + "\\Coordinate Systems\\Projected Coordinate Systems\\Utm\\Nad 1983\\NAD 1983 UTM Zone 10N.prj"
arcpy.CheckOutExtension("spatial")
from arcpy import sa

# Script arguments
output_gdb = sys.argv[1]
reserve = sys.argv[2]
units = sys.argv[3]
landings = sys.argv[4]
streams = sys.argv[5]
mmh = sys.argv[6]
mmocc = sys.argv[7]
nso_hab = sys.argv[8]
nso_sites = sys.argv[9]
```

MetaData

- Everyone's Favorite

```
~*- coding: utf-8 ~*-  
#-----  
# Name: module1  
# Version:  
# Purpose:  
#  
# Usage: module1  
#  
# Example:  
#  
# Author:      tholland  
#-----  
# History:  
# tholland - 09/03/2017 - Created.  
#-----  
# Issues or future enhancemnets:  
# tholland - 09/03/2017 - None.  
#-----
```

Things to watch

- Each Integrated Development Environment (IDLE) is a little different
- Hash Tags are your friend, #####!
- Try and try and try again

Demo and Q and A

- ????????????????