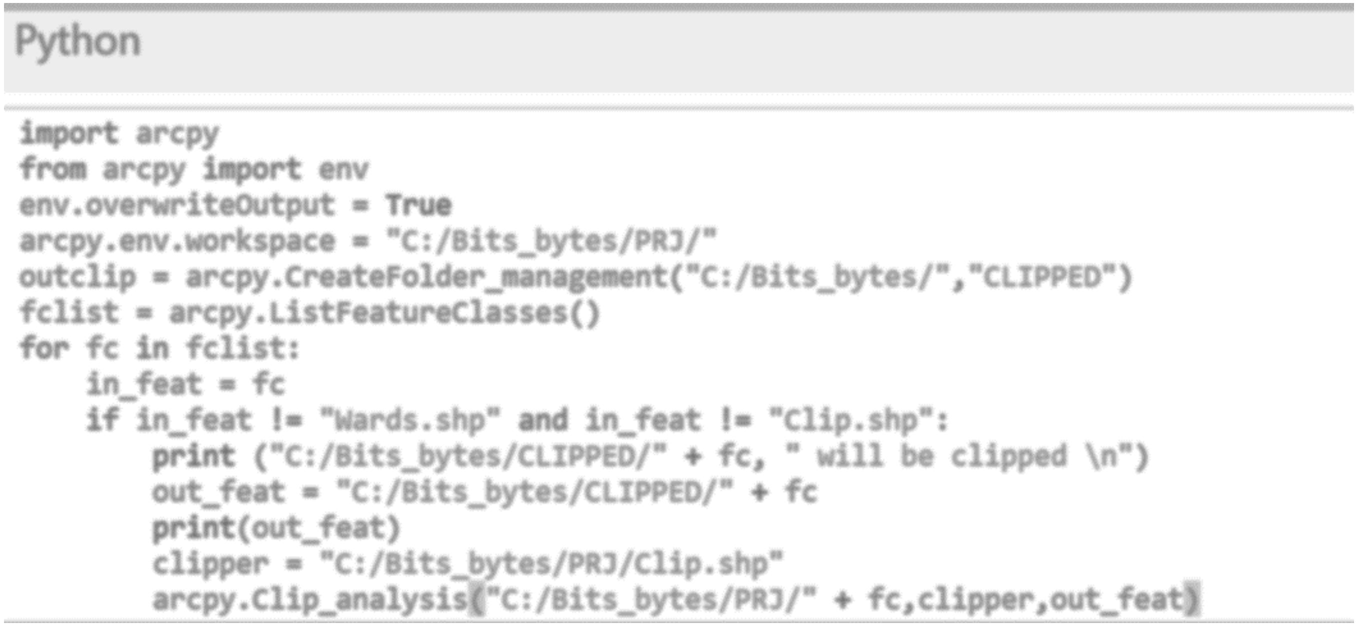
# Getting Started with Python in ArcGIS Pro

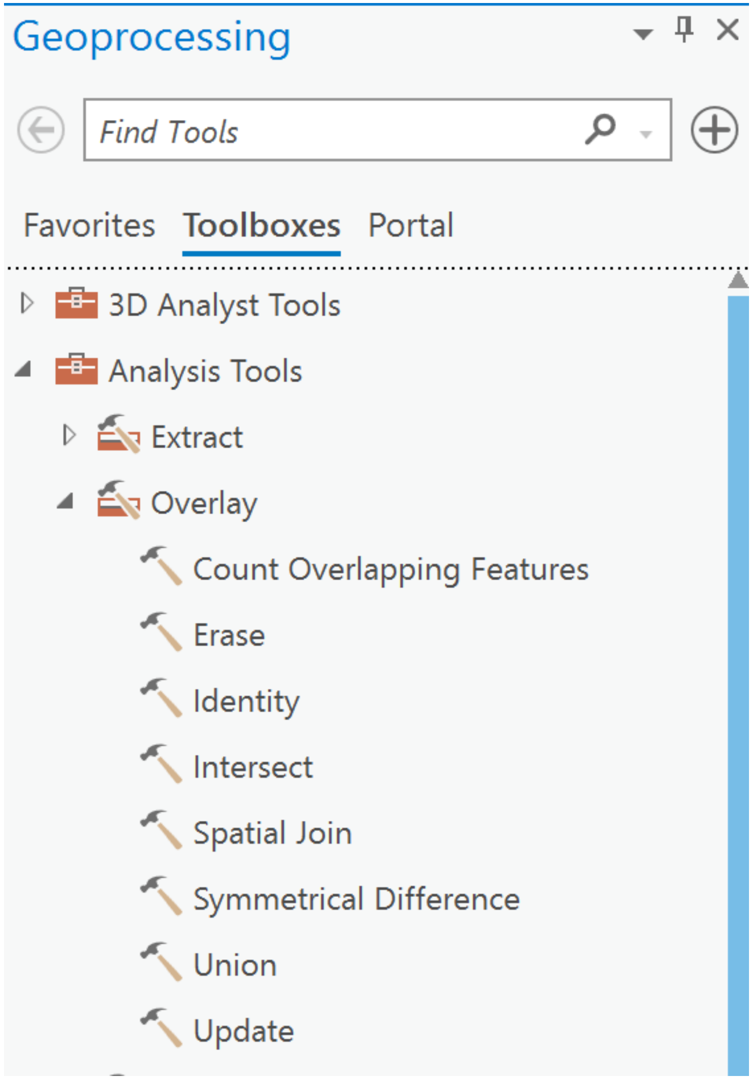


Python

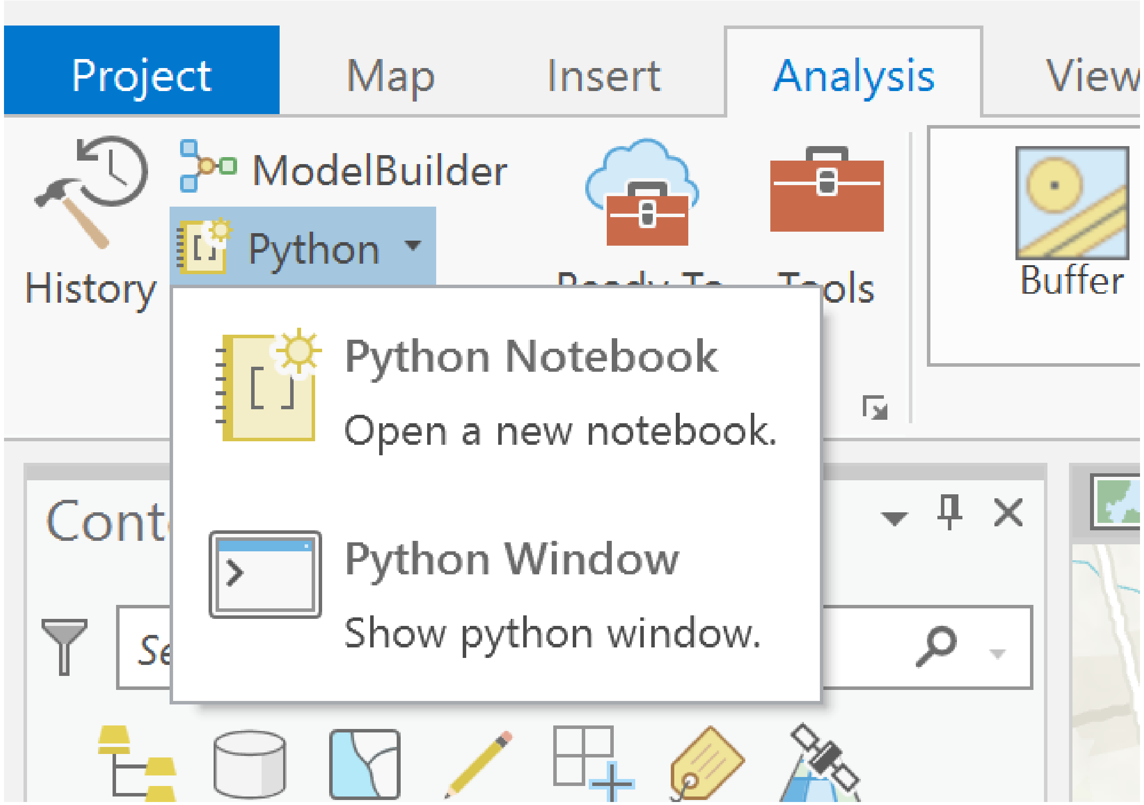
```
import arcpy
from arcpy import env
env.overwriteOutput = True
arcpy.env.workspace = "C:/Bits_bytes/PRJ/"
outclip = arcpy.CreateFolder_management("C:/Bits_bytes/","CLIPPED")
fclist = arcpy.ListFeatureClasses()
for fc in fclist:
    in_feat = fc
    if in_feat != "Wards.shp" and in_feat != "Clip.shp":
        print ("C:/Bits_bytes/CLIPPED/" + fc, " will be clipped \n")
        out_feat = "C:/Bits_bytes/CLIPPED/" + fc
        print(out_feat)
        clipper = "C:/Bits_bytes/PRJ/Clip.shp"
        arcpy.Clip_analysis("C:/Bits_bytes/PRJ/" + fc,clipper,out_feat)
```

# What is ArcPy?

ArcPy is a Python module that interacts with the tools in arctoolbox which are part of ArcGIS Pro and ArcGIS Desktop. This module allows the user to access the geoprocessing tools available in ArcGIS Pro and Desktop.



# Python in ArcGIS Pro



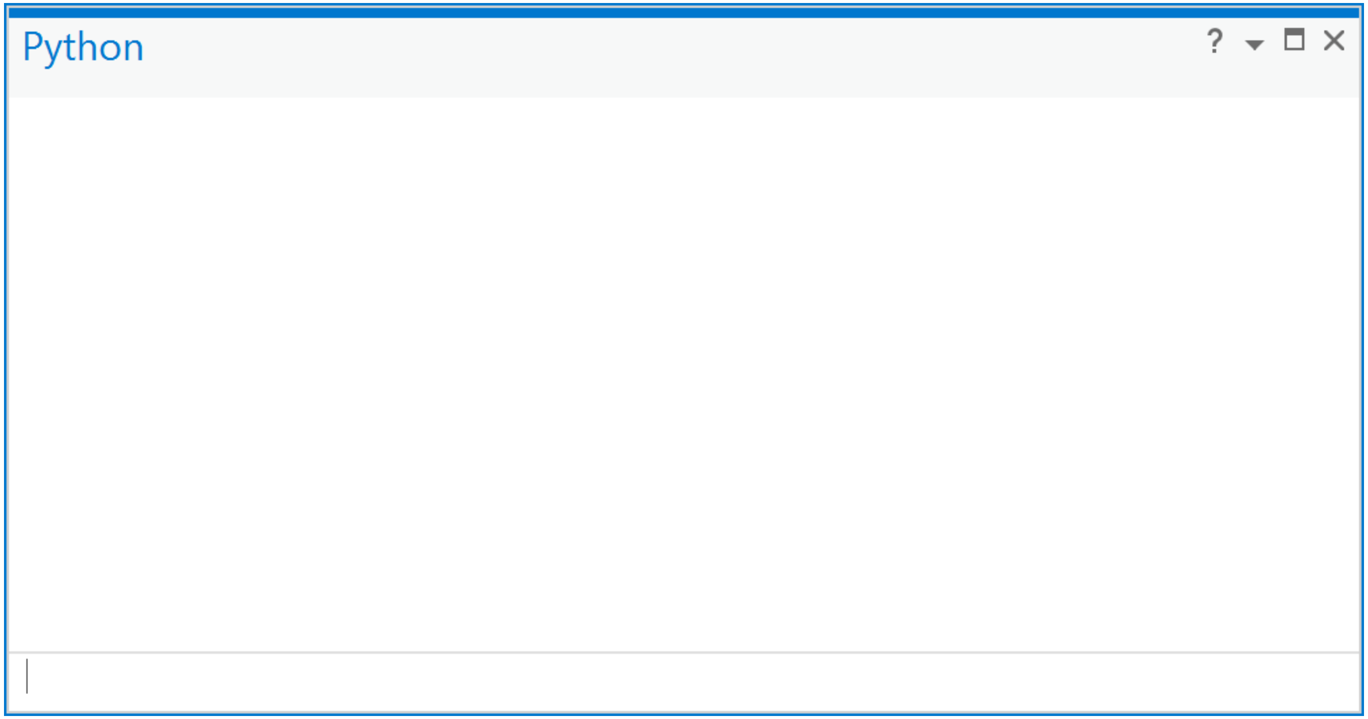
Python Notebook

Open a new notebook.

Python Window

Show python window.

# The Python window in ArcGIS Pro



# Printing text

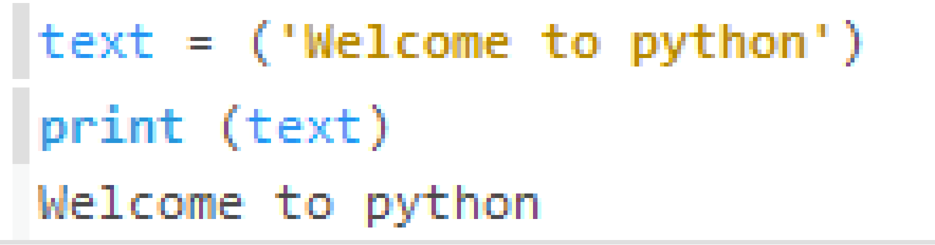
print('Welcome to python’)

*Using a variable*

Print text with a variable

text = ('Welcome to python')

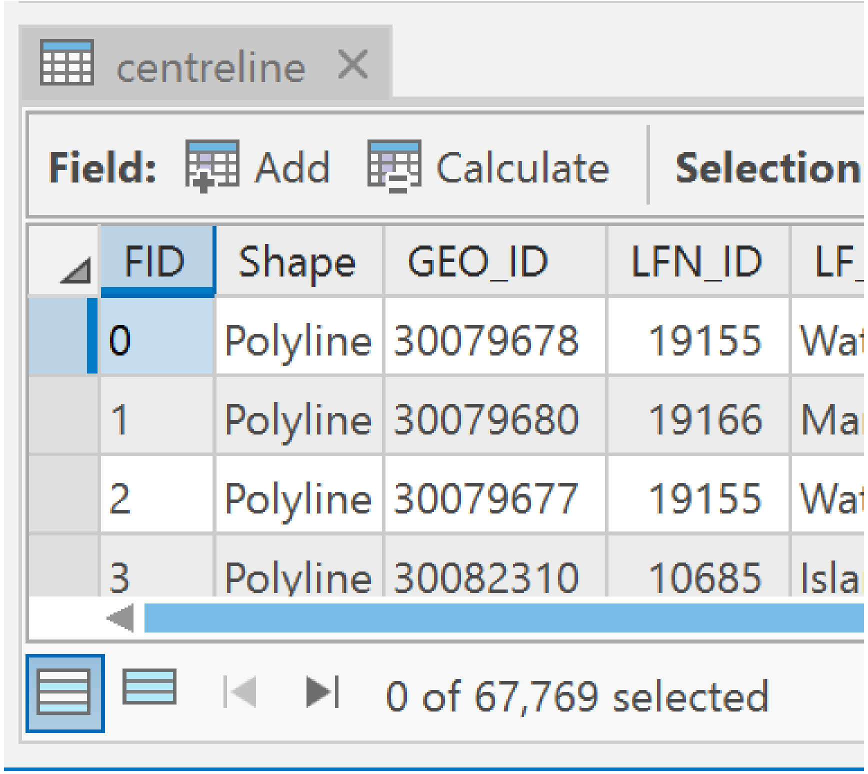
print(text)



```
text = ('Welcome to python')
print (text)
Welcome to python
```

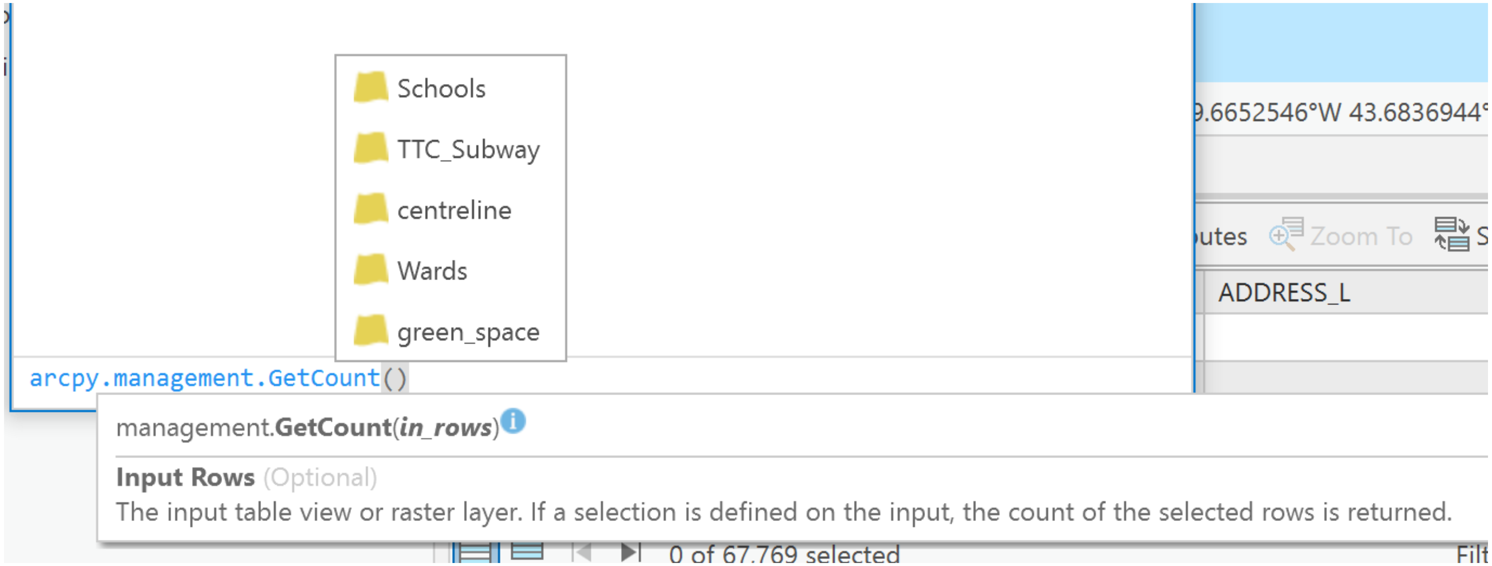
# Attributes

Open the attribute table to see how many records are in the roads



| FID | Shape | GEO_ID | LFN_ID | LF_ |
|---|---|---|---|---|
| 0 | Polyline | 30079678 | 19155 | Wat |
| 1 | Polyline | 30079680 | 19166 | Ma |
| 2 | Polyline | 30079677 | 19155 | Wat |
| 3 | Polyline | 30082310 | 10685 | Isla |

0 of 67,769 selected

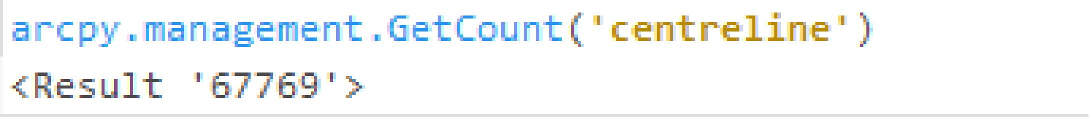


```
arcpy.management.GetCount()
```

management.**GetCount**(***in_rows***)

**Input Rows** (Optional)
The input table view or raster layer. If a selection is defined on the input, the count of the selected rows is returned.

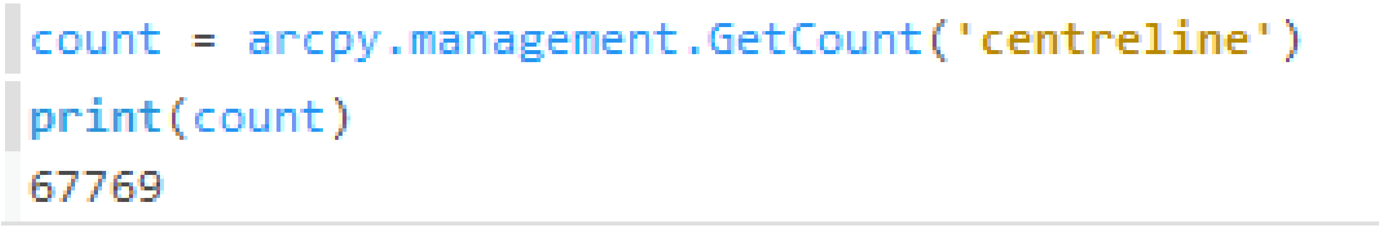
We get the same information by using the Get Count tool from arctoolbox into the python window



```
arcpy.management.GetCount('centreline')
<Result '67769'>
```

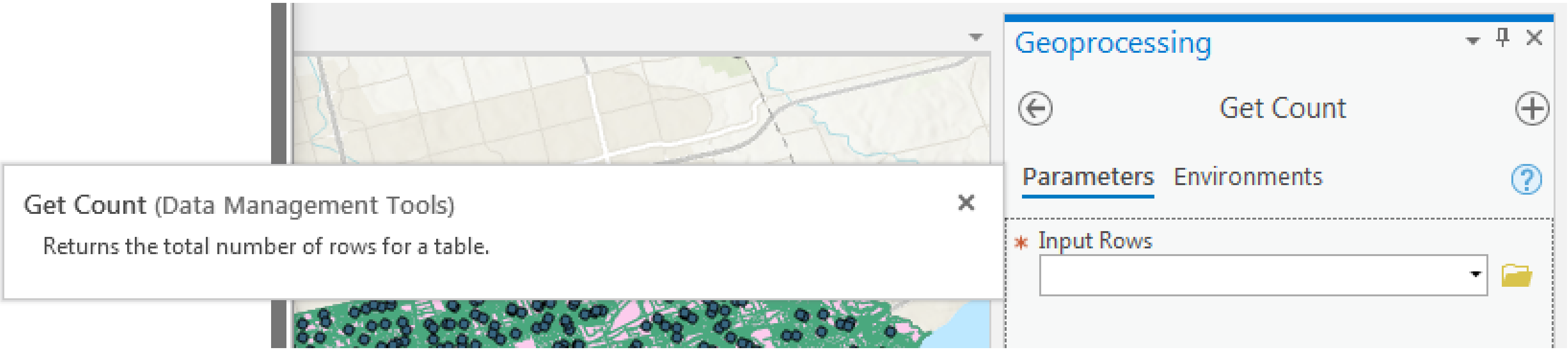
# Assign and Print a Variable

```
count = arcpy.management.GetCount('centreline')
print(count)
```



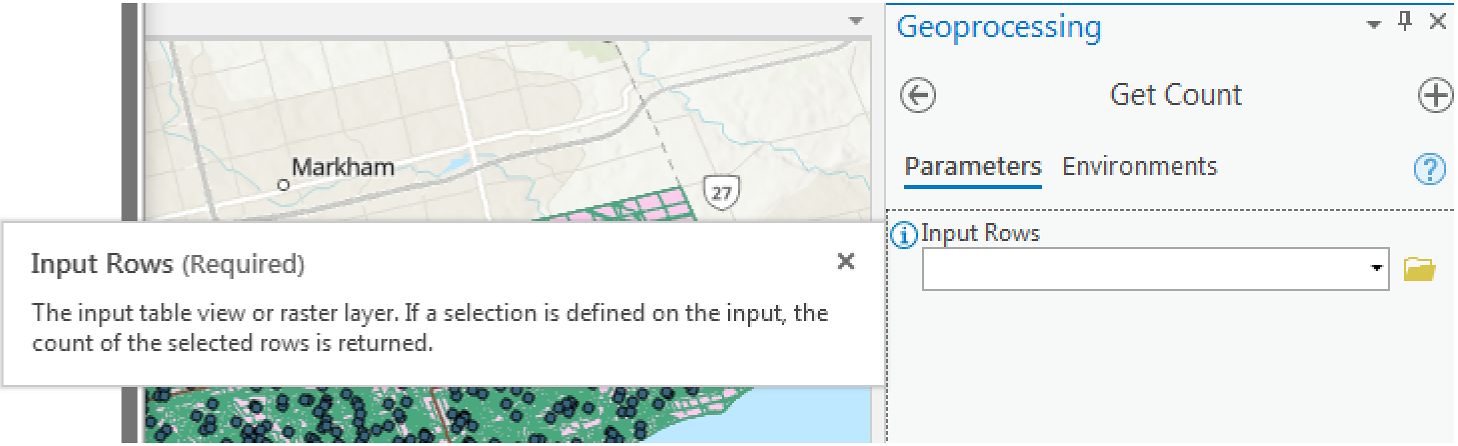
```
count = arcpy.management.GetCount('centreline')
print(count)
67769
```

# ArcGIS Toolbox Help



Get Count (Data Management Tools)

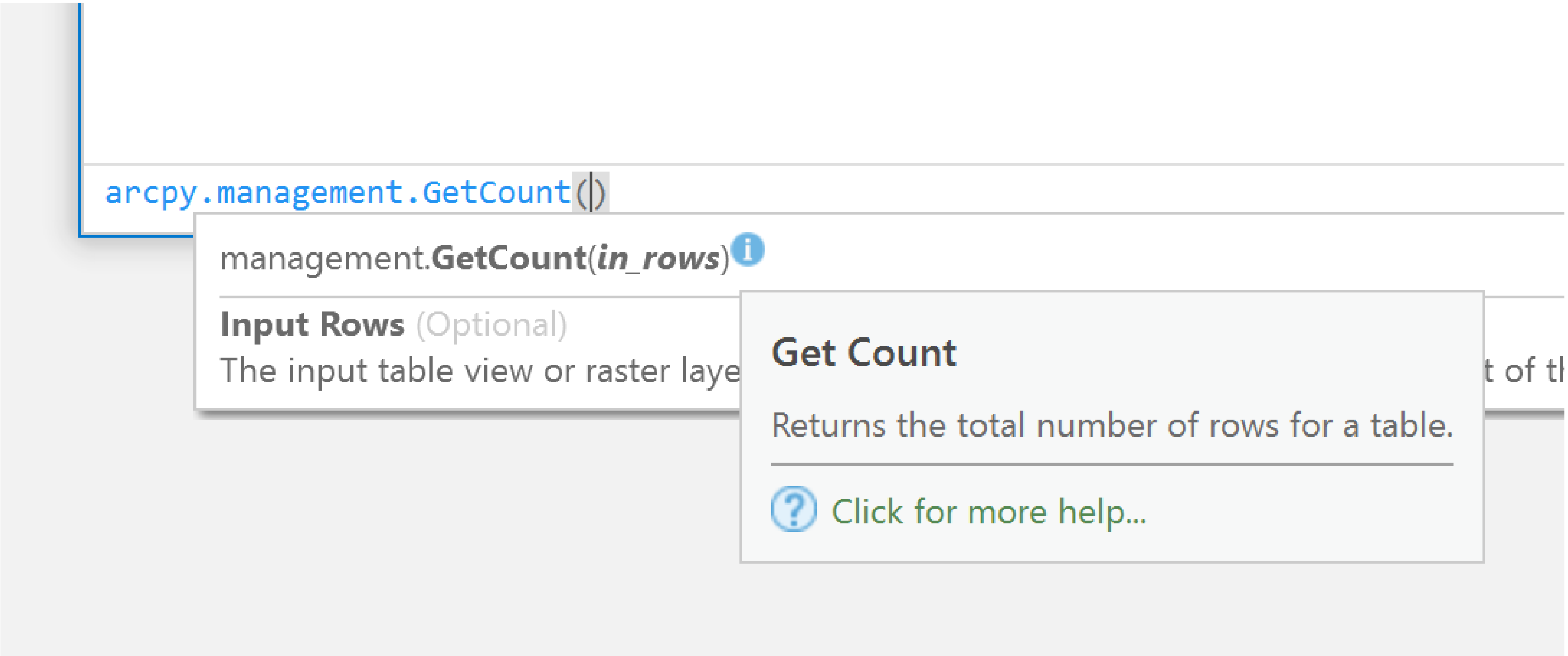
Returns the total number of rows for a table.



Input Rows (Required)

The input table view or raster layer. If a selection is defined on the input, the count of the selected rows is returned.

# When using tools help is available at the command line



```
arcpy.management.GetCount()
```

management.**GetCount**(***in_rows***)

**Input Rows** (Optional)

The input table view or raster laye

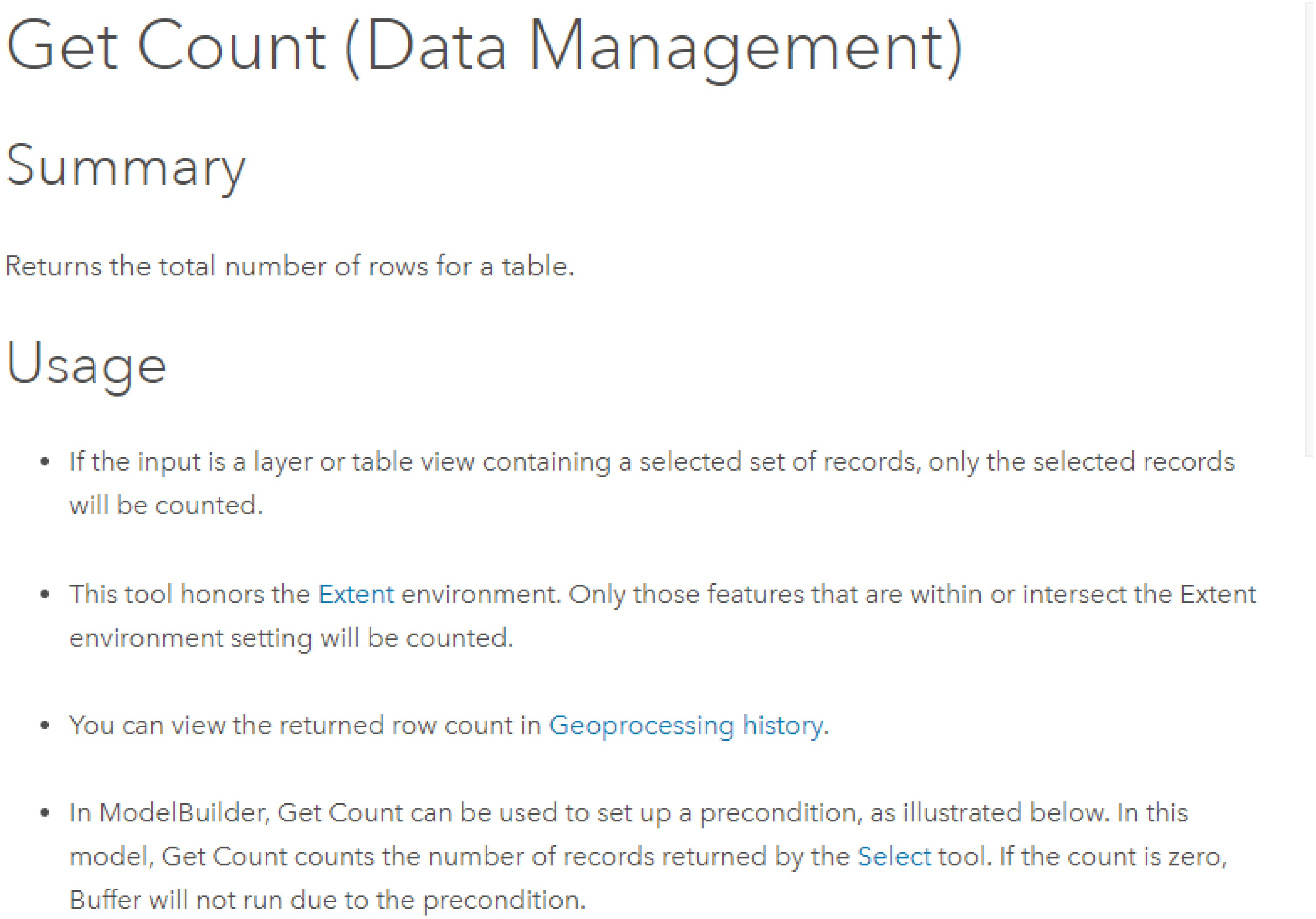
t of tl

**Get Count**

Returns the total number of rows for a table.

Click for more help...

# By clicking the Question mark it brings you to the online help of the tool



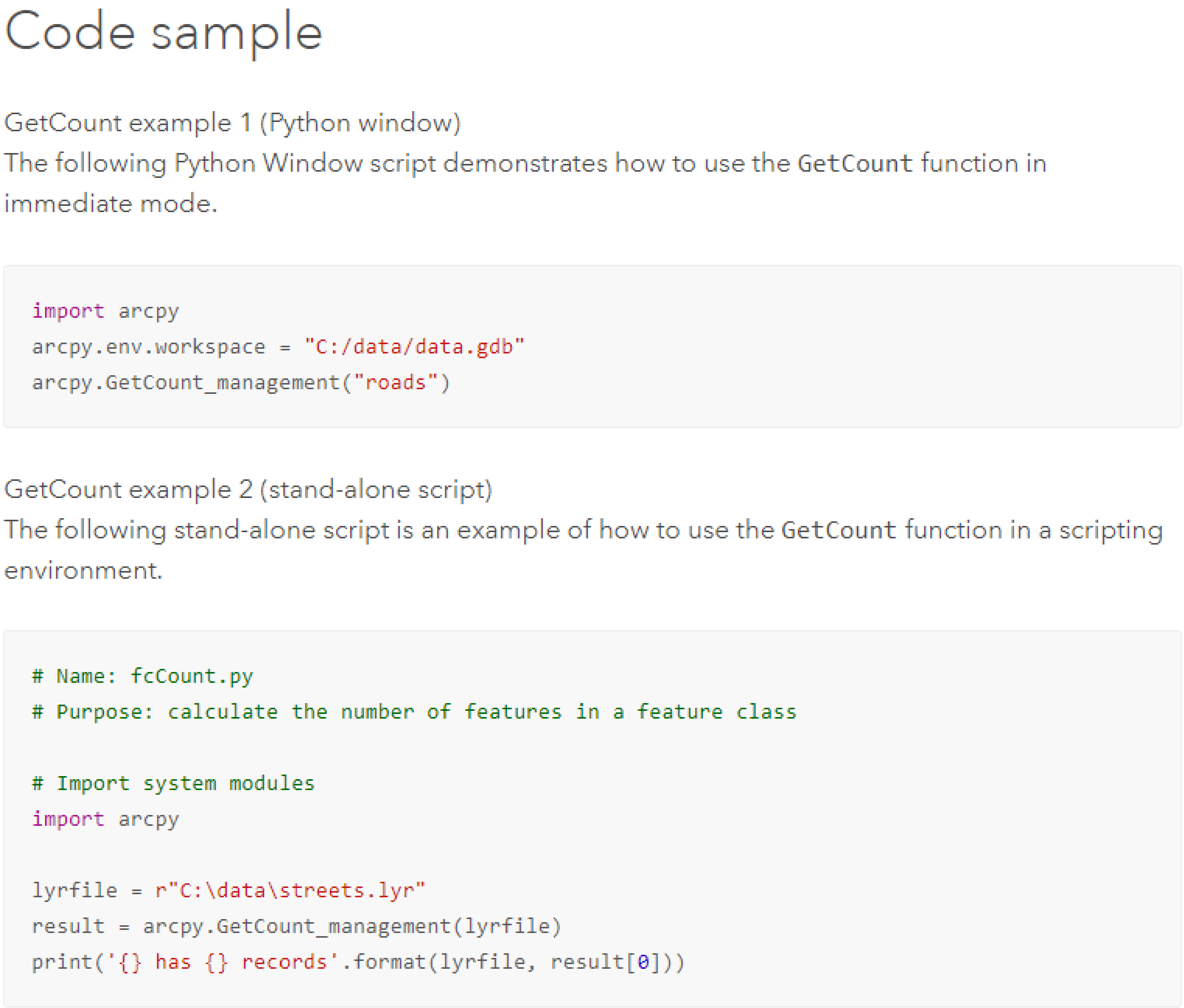
# Get Count (Data Management)

## Summary

Returns the total number of rows for a table.

## Usage

- If the input is a layer or table view containing a selected set of records, only the selected records will be counted.
- This tool honors the Extent environment. Only those features that are within or intersect the Extent environment setting will be counted.
- You can view the returned row count in Geoprocessing history.
- In ModelBuilder, Get Count can be used to set up a precondition, as illustrated below. In this model, Get Count counts the number of records returned by the Select tool. If the count is zero, Buffer will not run due to the precondition.



# Code sample

GetCount example 1 (Python window)

The following Python Window script demonstrates how to use the `GetCount` function in immediate mode.

```
import arcpy
arcpy.env.workspace = "C:/data/data.gdb"
arcpy.GetCount_management("roads")
```

GetCount example 2 (stand-alone script)

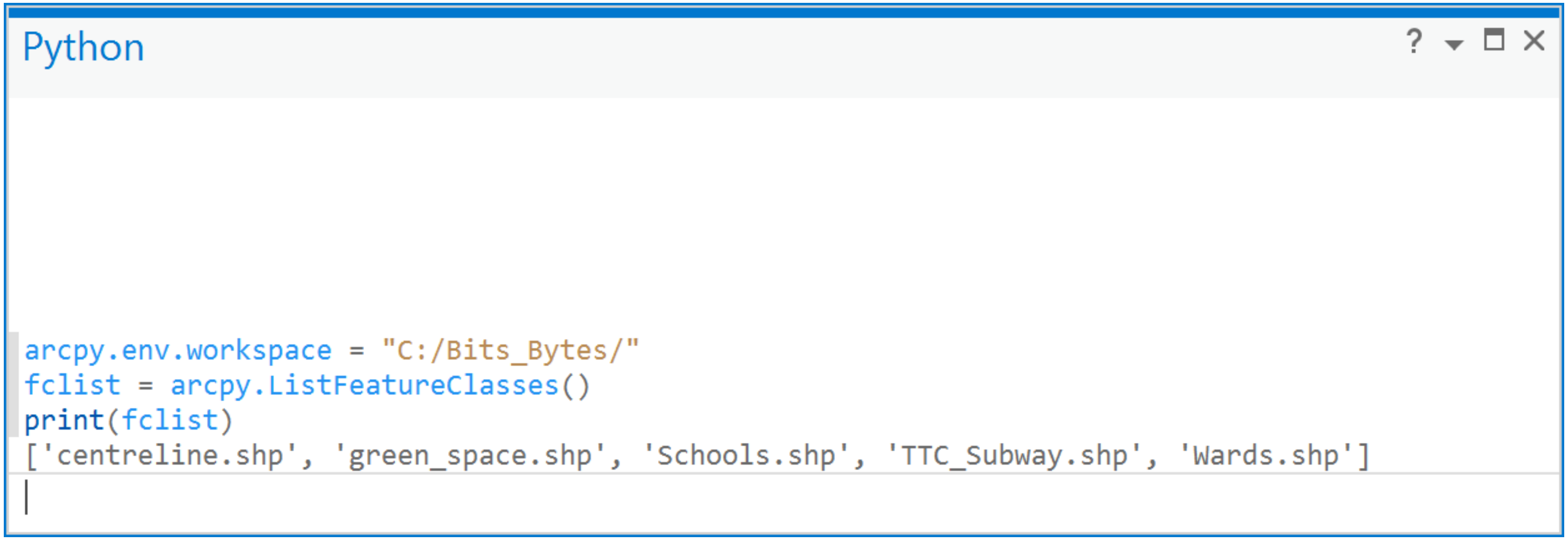
The following stand-alone script is an example of how to use the `GetCount` function in a scripting environment.

```
# Name: fcCount.py
# Purpose: calculate the number of features in a feature class

# Import system modules
import arcpy

lyrfile = r"C:\data\streets.lyr"
result = arcpy.GetCount_management(lyrfile)
print('{} has {} records'.format(lyrfile, result[0]))
```

# List feature classes in a Directory

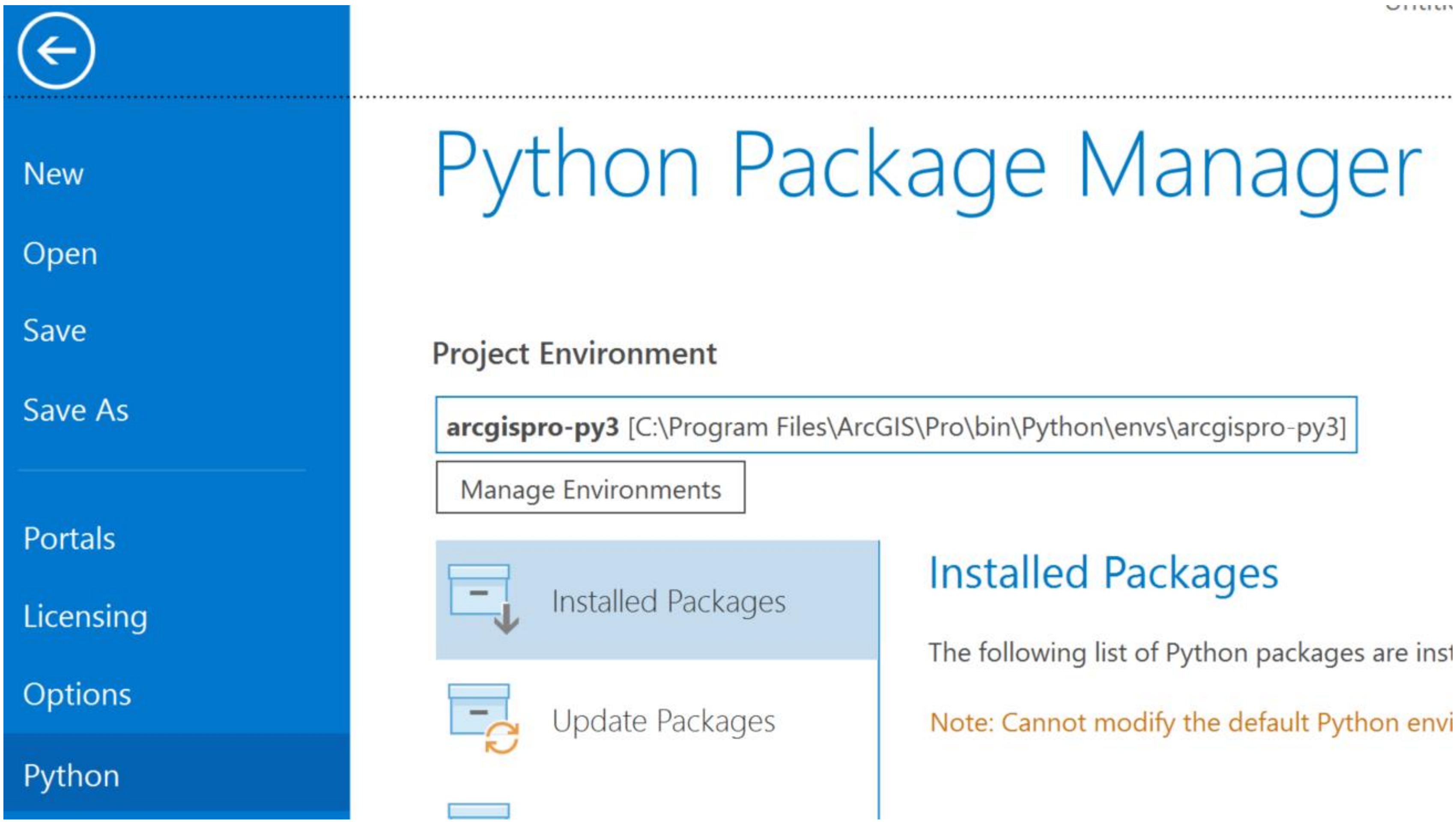
```
arcpy.env.workspace = "C:/Bits_Bytes/"
fclist = arcpy.ListFeatureClasses()
print(fclist)
```

Python window code and output



```
arcpy.env.workspace = "C:/Bits_Bytes/"
fclist = arcpy.ListFeatureClasses()
print(fclist)
['centreline.shp', 'green_space.shp', 'Schools.shp', 'TTC_Subway.shp', 'Wards.shp']
```

# Python directory for stand alone programs



Python Package Manager

Project Environment

arcgispro-py3 [C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3]

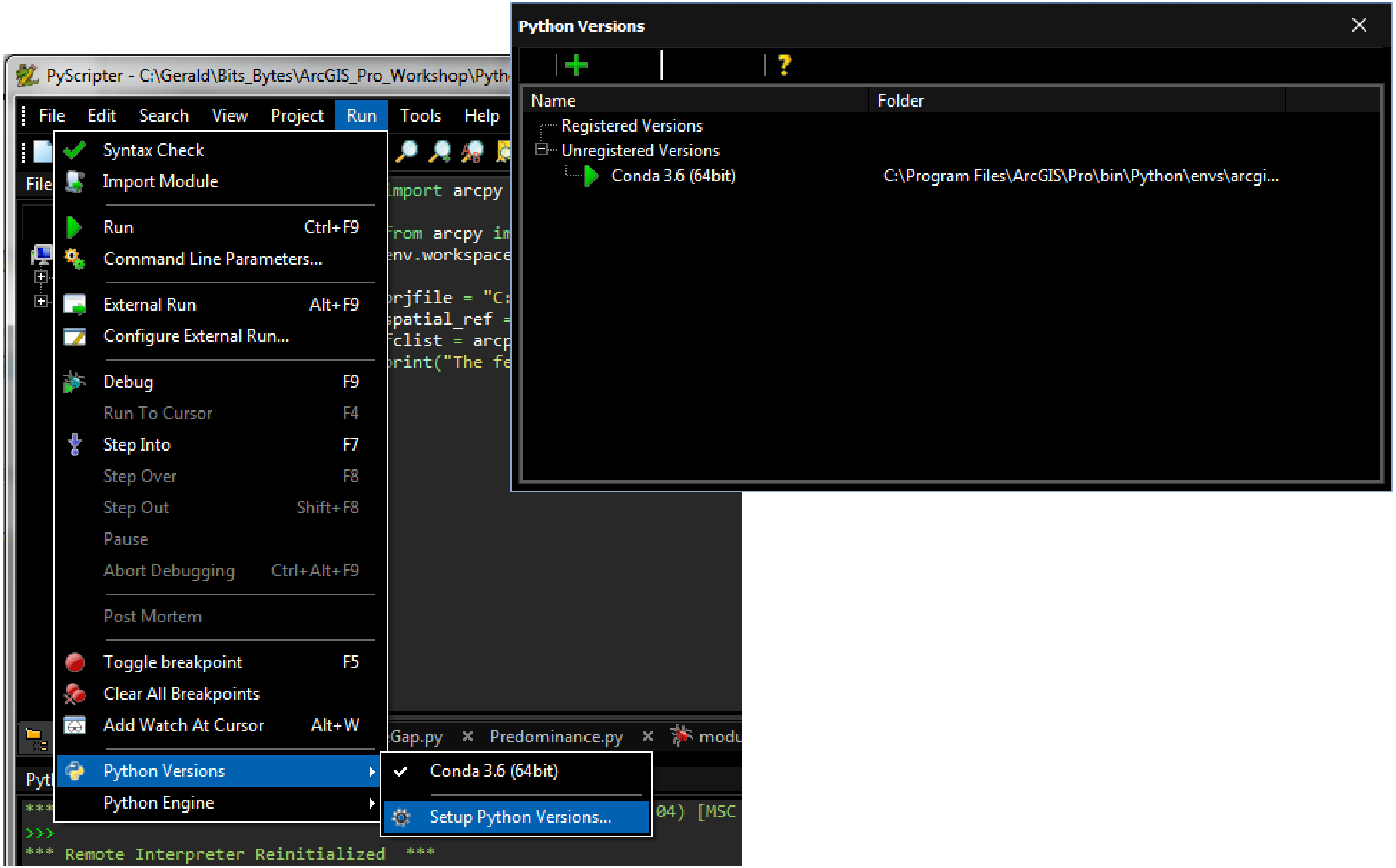
Installed Packages

The following list of Python packages are inst

Note: Cannot modify the default Python envi

# Setup Python version in PyScripter

C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3



```
mport arcpy

from arcpy im
nv.workspace

rjfile = "C:
patial_ref =
clist = arcp
rint("The fe
```

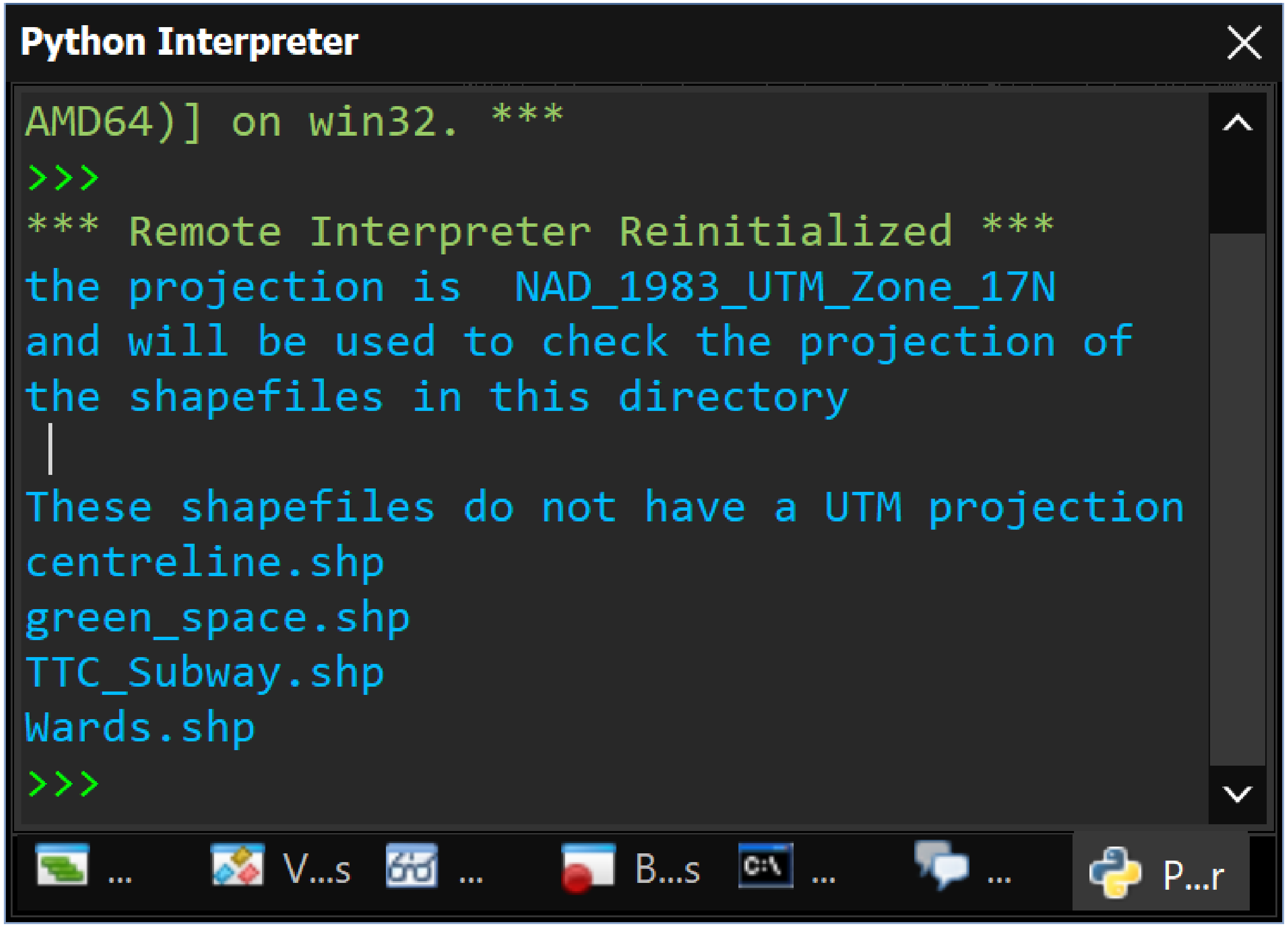
```
***                                    04) [MSC
>>>
*** Remote Interpreter Reinitialized  ***
```

| Name | Folder |
|---|---|
| Conda 3.6 (64bit) | C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgi... |

# Projection Test

*To be run in PyScripter*

```
import arcpy
from arcpy import env
env.workspace = "C:/Bits_Bytes/"
prjfile = "C:/Bits_Bytes/Python/Schools.prj"
spatial_ref = arcpy.SpatialReference(prjfile)
print  ("the projection is ", spatial_ref.name, " and will be used to check the projection of the shapefiles in this directory \n ")
fclass = arcpy.ListFeatureClasses()
print ("These shapefiles do not have a UTM projection")
for fc in fclass:
    spatial_ref = arcpy.Describe(fc).spatialReference
    if spatial_ref.name != "NAD_1983_UTM_Zone_17N":
        print (fc)
```



```
AMD64)] on win32. ***
>>>
*** Remote Interpreter Reinitialized ***
the projection is  NAD_1983_UTM_Zone_17N
and will be used to check the projection of
the shapefiles in this directory

These shapefiles do not have a UTM projection
centreline.shp
green_space.shp
TTC_Subway.shp
Wards.shp
>>>
```

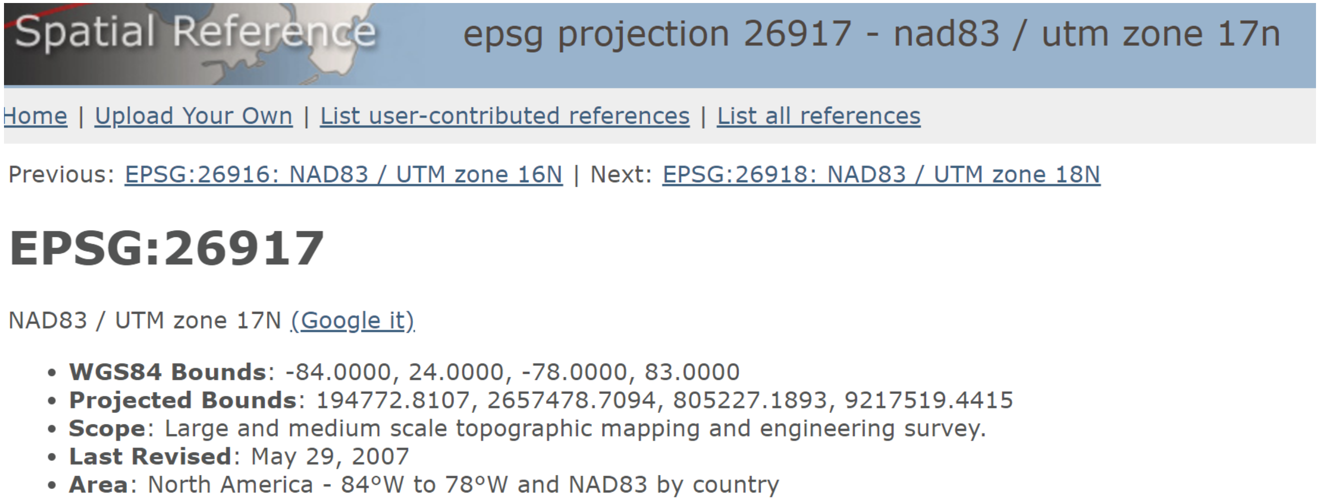
# Project Shapefiles

*Project_management (in_dataset, out_dataset, out_coor_system, {transform_method}, {in_coor_system})*

- *in_dataset* in_feat this is the input shapefile which will be projected
- *out_dataset* out_feat this is the output shapefile which will be the projected shapefile
- *out_coord_system* out_coord is the projection that will be assigned to the new shapefile. This is defined by using the SpatialReference function where the new projection will be Nad 1983 UTM Zone 17

# Spatial Reference

There are many way to define projections in arcgis. The spatial reference can be defined by using the prj file from a shapefile, from typing out the actual projection such as 'NAD 1983 UTM Zone 17N' or by specifying an EPSG number such as 26917.



epsg projection 26917 - nad83 / utm zone 17n

Home | Upload Your Own | List user-contributed references | List all references

Previous: EPSG:26916: NAD83 / UTM zone 16N | Next: EPSG:26918: NAD83 / UTM zone 18N

## EPSG:26917

NAD83 / UTM zone 17N (Google it)

- **WGS84 Bounds**: -84.0000, 24.0000, -78.0000, 83.0000
- **Projected Bounds**: 194772.8107, 2657478.7094, 805227.1893, 9217519.4415
- **Scope**: Large and medium scale topographic mapping and engineering survey.
- **Last Revised**: May 29, 2007
- **Area**: North America - 84°W to 78°W and NAD83 by country

# Project Shapefile

In ArcGIS Pro type the code below in the python window. This will project the shapefile by assigning the SpatialReference command a projection definition and then using project_management to project the shapefile.

```
import arcpy
from arcpy import env
env.overwriteOutput = True
in_feat = "C:/Bits_Bytes/Wards.shp"
out_feat = "C:/Bits_Bytes/PRJ/Wards.shp"
out_coord = arcpy.SpatialReference('Nad 1983 UTM Zone 17N')
arcpy.Project_management(in_feat, out_feat,out_coord)
```

# Project Shapefiles in a Directory

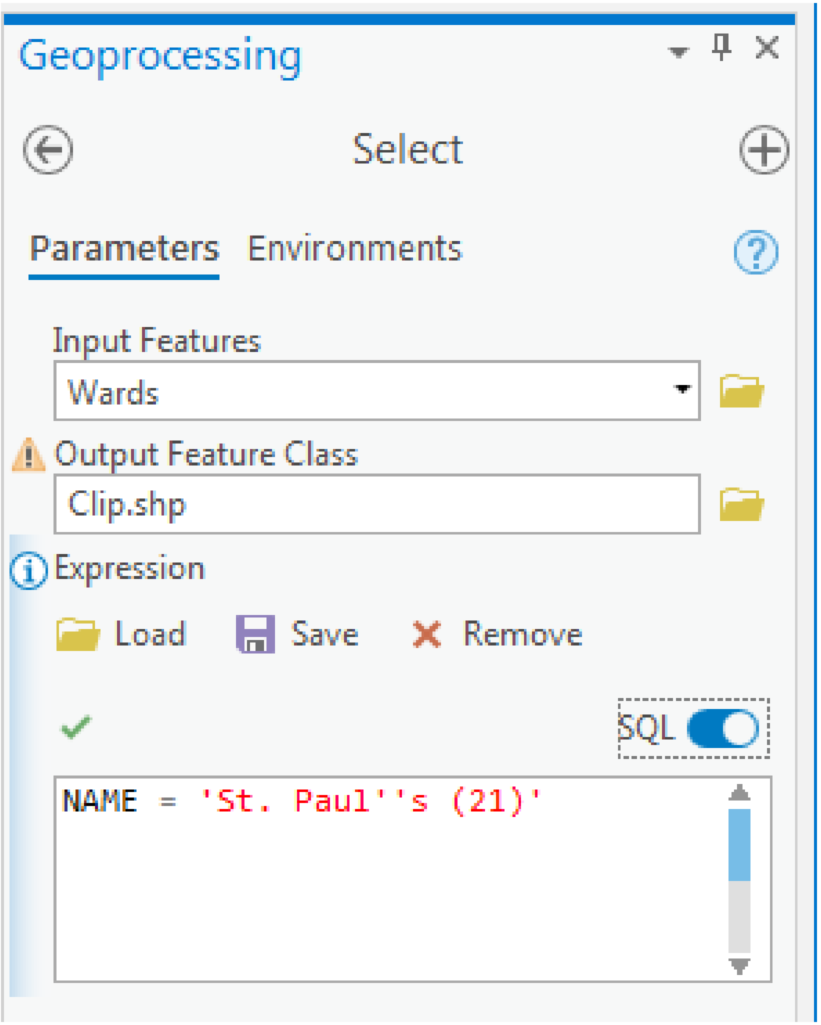
*This will be run from pyScripter*

```
import arcpy
from arcpy import env
env.overwriteOutput = True
env.workspace = "C:/Bits_Bytes/"
prjfile = "C:/Bits_Bytes/Schools.prj"
spatial_ref = arcpy.SpatialReference(prjfile)
print ("the projection for schools.shp is ", spatial_ref.name)
fclass = arcpy.ListFeatureClasses()
for fc in fclass:
    spatial_ref = arcpy.Describe(fc).spatialReference
    print (spatial_ref.name, " is the projection for ", fc)
    if spatial_ref.name == "NAD_1983_UTM_Zone_17N":
        print (fc, "... will not be projected \n")
    else:
        print (fc, "...is being projected")
        out_dir = "C:/Bits_Bytes/PRJ/"
        out_coord = arcpy.SpatialReference('NAD 1983 UTM Zone 17N')
        in_feat = fc
        out_feat = out_dir + fc
        arcpy.Project_management(in_feat,out_feat,out_coord)
```

# Select data for clipping

Using the select tool we can see this sql code

This will not work in python!

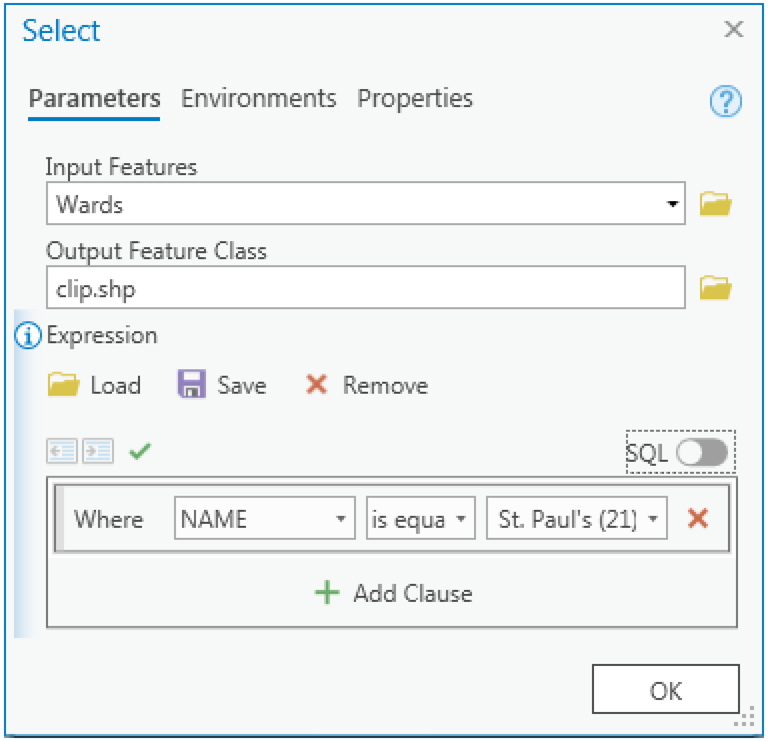


Input Features: Wards

Output Feature Class: Clip.shp

Expression

```
NAME = 'St. Paul''s (21)'
```



Select

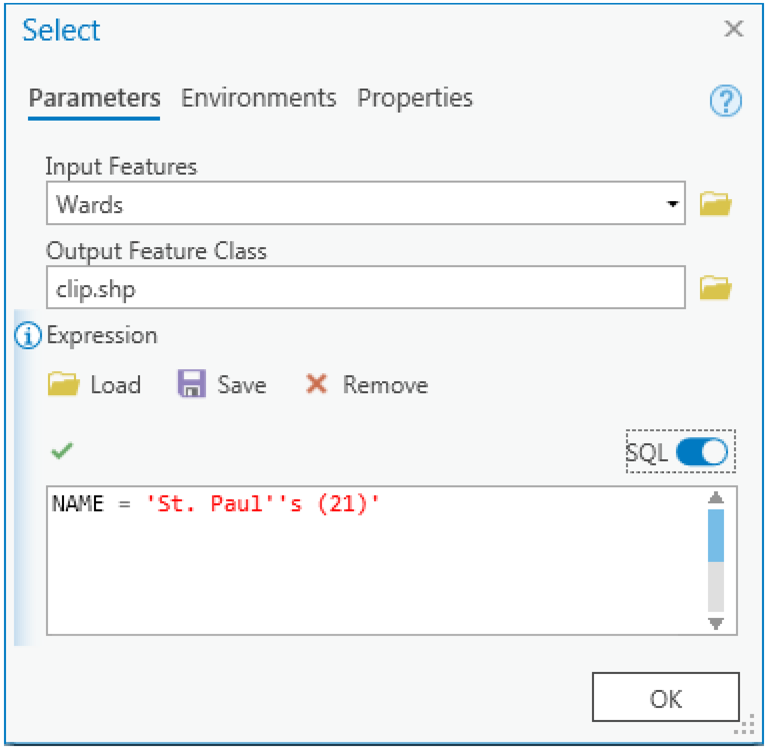
Input Features: Wards

Output Feature Class: clip.shp

Expression

SQL: off

Where NAME is equa St. Paul's (21)



Select

Input Features: Wards

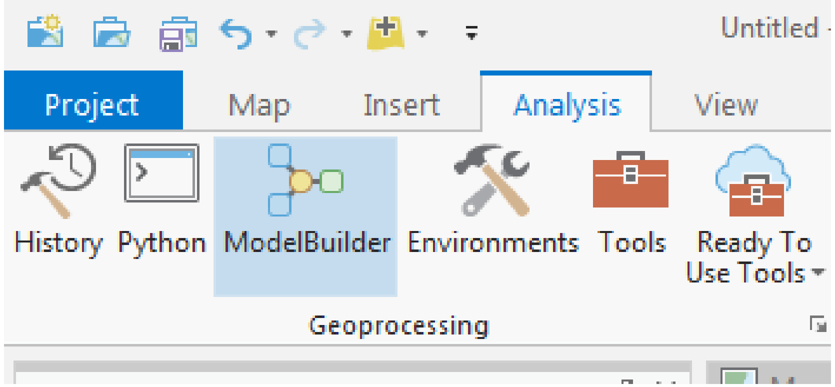
Output Feature Class: clip.shp

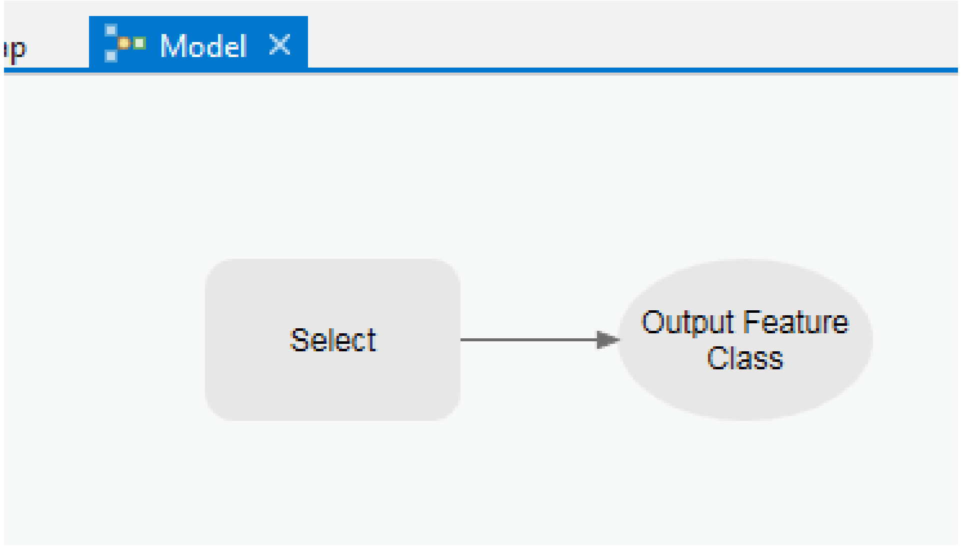
Expression

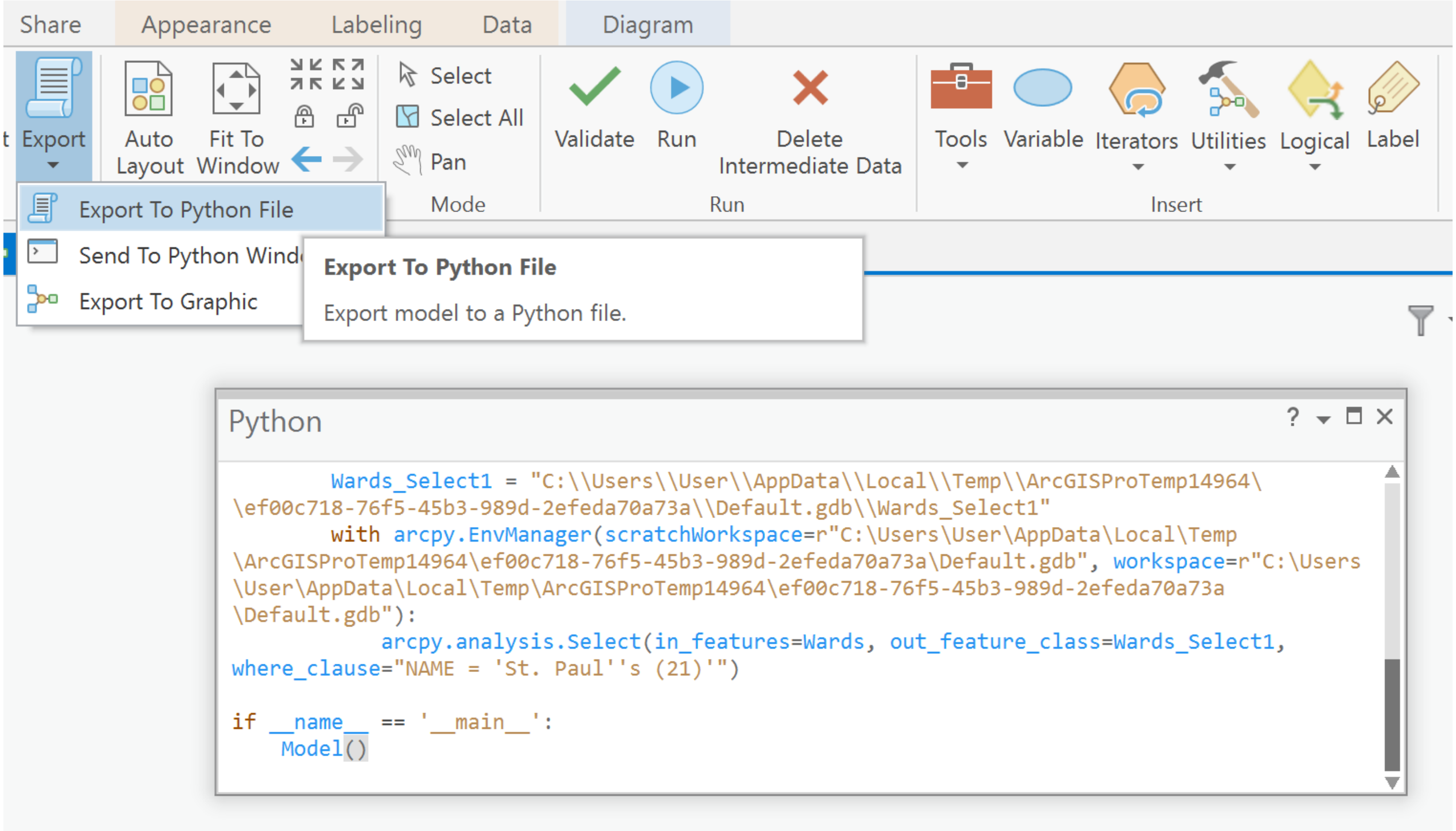
SQL: on

```
NAME = 'St. Paul''s (21)'
```

# Use Model Builder to get python Code







**Export To Python File**

Export model to a Python file.

```
        Wards_Select1 = "C:\\Users\\User\\AppData\\Local\\Temp\\ArcGISProTemp14964\
\ef00c718-76f5-45b3-989d-2efeda70a73a\\Default.gdb\\Wards_Select1"
        with arcpy.EnvManager(scratchWorkspace=r"C:\Users\User\AppData\Local\Temp
\ArcGISProTemp14964\ef00c718-76f5-45b3-989d-2efeda70a73a\Default.gdb", workspace=r"C:\Users
\User\AppData\Local\Temp\ArcGISProTemp14964\ef00c718-76f5-45b3-989d-2efeda70a73a
\Default.gdb"):
            arcpy.analysis.Select(in_features=Wards, out_feature_class=Wards_Select1,
where_clause="NAME = 'St. Paul''s (21)'")

if __name__ == '__main__':
    Model()
```

From select tool

```
NAME = 'St. Paul''s (21)’
```

From Model builder

```
"NAME = 'St. Paul''s (21)'"
```

# SQL Syntax from Model Builder

```
arcpy.analysis.Select(in_features=Wards,
out_feature_class=clip_shp, where_clause="NAME =
'St. Paul''s (21)'")
```

Select_analysis extracts features from an input feature class or input feature layer, typically using a select or Structured Query Language (SQL) expression and stores them in an output feature class

Select_analysis (in_features, out_feature_class, {where_clause})

| | |
|---|---|
| Inf_features | Wards.shp |
| Out_feature_class | Clip.shp |
| Where clause | "NAME = 'St. Paul''s (21)'" |

*This will be done in ArcGIS Pro*

```
import arcpy
from arcpy import env
env.overwriteOutput = True
env.workspace = "C:/Bits_bytes/PRJ"
arcpy.Select_analysis('Wards',"C:/Bits_bytes/PRJ/Clip.shp","NAME = 'St. Paul''s(22)'")
```

# Clip data

*To be run in PyScripter*

```
import arcpy
from arcpy import env
env.overwriteOutput = True
arcpy.env.workspace = "C:/Bits_bytes/PRJ/"
outclip = arcpy.CreateFolder_management("C:/Bits_bytes/","CLIPPED")
fclist = arcpy.ListFeatureClasses()
for fc in fclist:
    in_feat = fc
    if in_feat != "Wards.shp" and in_feat != "Clip.shp":
        print ("C:/Bits_bytes/CLIPPED/" + fc, " will be clipped \n")
        out_feat = "C:/Bits_bytes/CLIPPED/" + fc
        print(out_feat)
        clipper = "C:/Bits_bytes/PRJ/Clip.shp"
        arcpy.Clip_analysis("C:/Bits_bytes/PRJ/" + fc,clipper,out_feat)
```