

"SEARCH FOR BEST AREA TO BUY A NEW  
RESIDENTIAL PROPERTY IN RICHARDSON  
BASED ON MULTI CRITERIA ANALYSIS"

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# THE CHALLENGE?

- Most of the real estate websites provide much information about how to purchase your homes basing on the features of houses, pricing.
- Very less importance is given to user preference or choices. Like users want to live closer to a School, Work location, Hospitals, Grocery Stores is not satisfied.



# WHAT'S MY SOLUTION?

- To design a user friendly python application which will allow the potential users to buy houses based on their choices.
- This is done integrating the concepts of Webscrapping, API in Python with ArcGIS Pro for the purpose of mapping.
- The number of houses that are within the user search are displayed in ArcGIS Pro.



# SOME POPULAR REAL ESTATE SOURCES

Rank	Website	Total visits	Visits share
1	<a href="#">Zillow</a>	44.19 million	9.17%
2	<a href="#">Trulia</a>	33.70 million	7.00%
3	<a href="#">Realtor.com</a>	29.32 million	6.09%
4	<a href="#">Yahoo Homes</a>	26.48 million	5.50%
5	<a href="#">FrontDoor Real Estate</a>	26.14 million	5.43%
6	<a href="#">Homes.com</a>	17.98 million	3.73%
7	<a href="#">MSN Real Estate</a>	7.17 million	1.49%
8	<a href="#">Rent.com</a>	7.12 million	1.48%
9	<a href="#">AOL Real Estate</a>	6.56 million	1.36%
10	<a href="#">Apartment Guide</a>	5.89 million	1.22%

# WHAT'S MY PICK AND WHY?

The image shows a screenshot of the Zillow website homepage. At the top left is the Zillow logo. The navigation menu includes: Buy, Rent, Sell, Mortgages, Agent finder, Advice, Home design, and More. On the top right, there is a 'My Zillow' link with a help icon. The main content area features a large background image of a waterfront patio with the text 'Find your way home®'. Below this text are four buttons: 'Buy' (highlighted in blue), 'Rent', 'Sell', and 'Zestimate'. A search bar is positioned below these buttons, containing the placeholder text 'Enter an address, neighborhood, city or ZIP code' and a blue 'Search' button. At the bottom of the page, there is a dark blue banner with a house icon, the text 'Owner Dashboard Check your home value, get personalized tips and more.', and a blue 'Start now' button.

# RICHARDSON – MY STUDY AREA

Zillow Real Estate

Buy Rent Sell Mortgages Agent finder Advice Home design More

My Zillow

Zillow richardson TX

For Sale Any Price 0+ Beds Home Type (1) More

Save Search Saved Homes (0)

Click to see all homes

More Map

8 new homes

Richardson TX Single Family Homes 143 homes for sale.

Homes for You Newest Cheapest More

Video walkthrough

HOUSE FOR SALE \$235,000 3 bds • 3 ba • 1,618 sqft

10 photos

HOUSE FOR SALE \$189,000 4 bds • 2 ba • 1,870 sqft

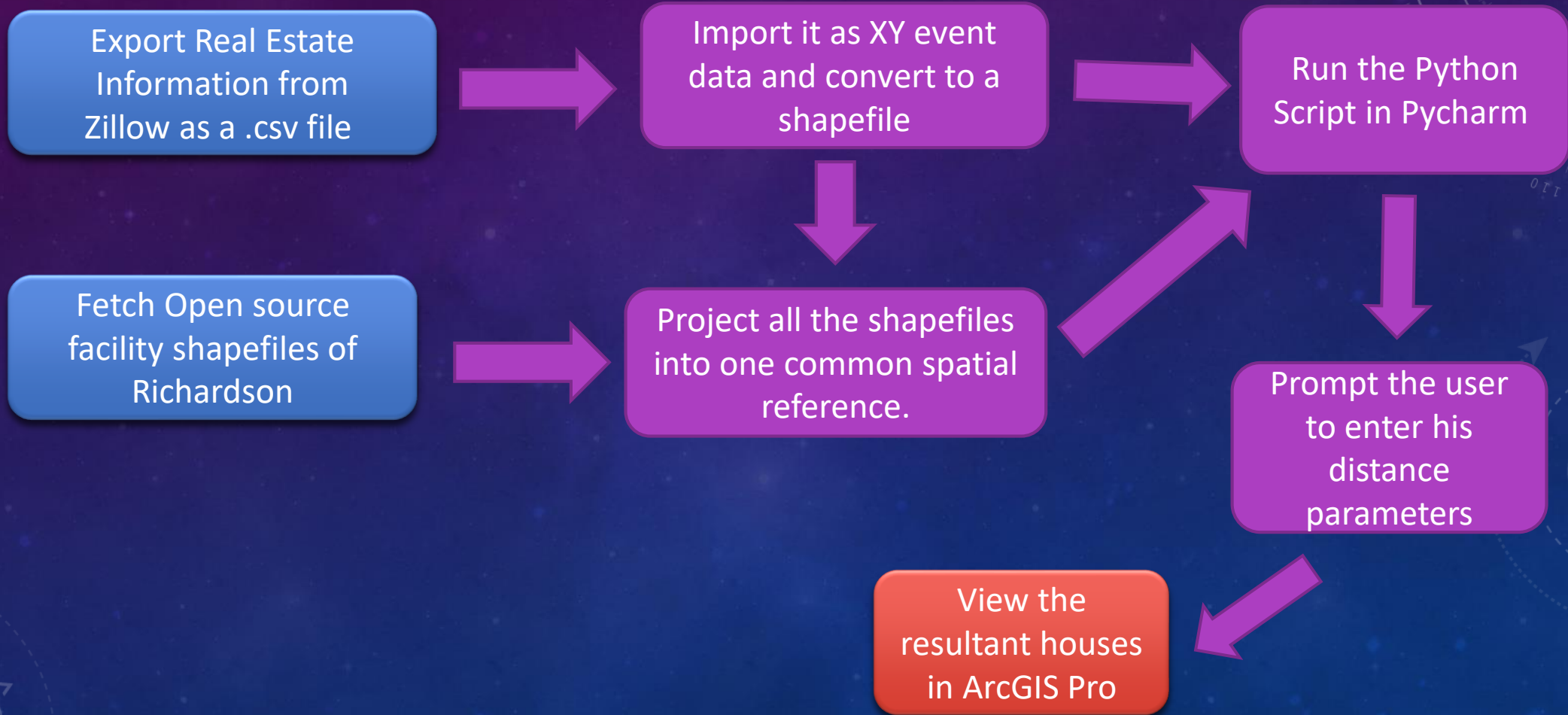
21 photos

36 photos

HOUSE FOR SALE

www.zillow.com

# WORKFLOW:



# HOW DO I EXPORT DATA FROM ZILLOW?

## Best Options:

- Through API - Real estate information can be obtained for a particular address.
- Web scrapping - Using HTML and Python all the data points can be extracted with their latitude and longitude values.



# API METHODOLOGY

- Package used : Pyzillow
- Allows us to convert directly an address and zipcode or zillow id into real estate information from the zillow database
- Two main API's used:
  - GetDeepSearchResults (address and Zipcode)
  - GetUpdatedPropertyDetails ( zillow id)

# WEB SCRAPPING USING PYTHON

## Urllib2:

- Helps in fetching URL's.
- Contains functions and classes to perform actions on URL's

## BeautifulSoup:

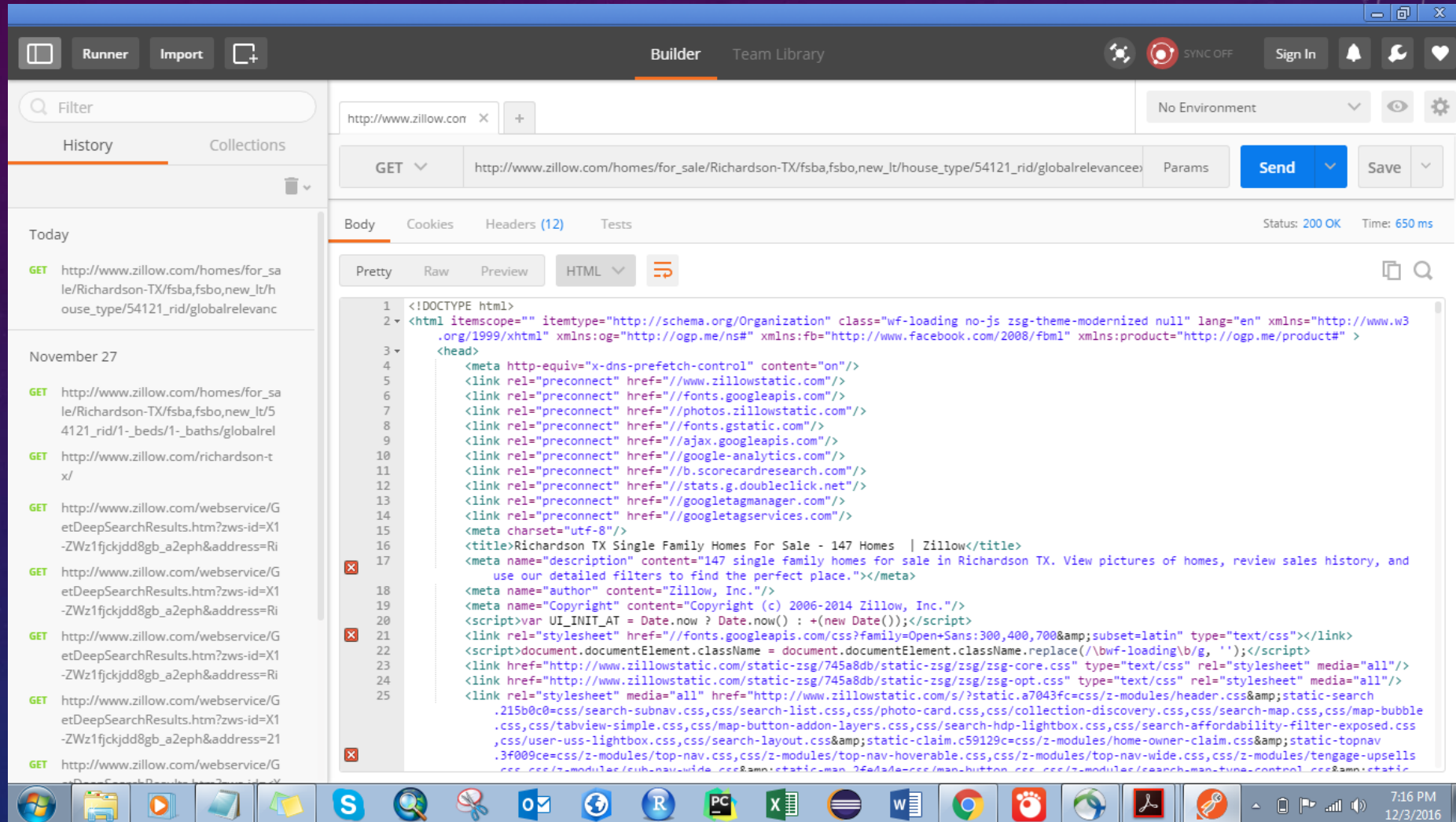
- Helps in extracting data from HTML and XML files.
- Saves hours and days of work of developers.
- Present as BeautifulSoup in Pycharm Packages. Latest version is bs4
- Need to use it in the below format.

```
from bs4 import BeautifulSoup
```

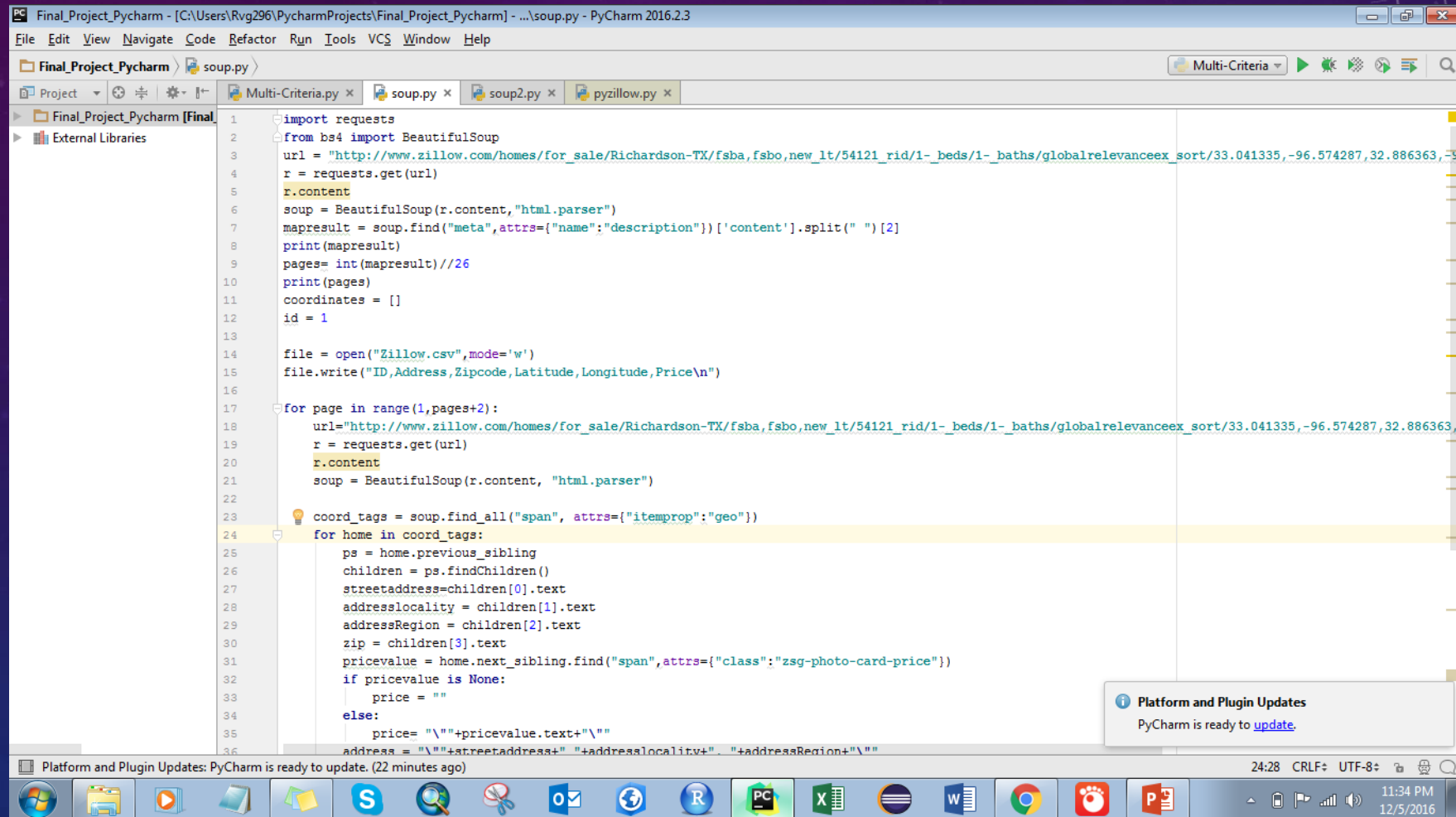
# POST MAN: (CHROME EXTENSION)

- Helps in energizing your API workflows by building, testing and documenting API's much faster.
- Main Features are :
  - To obtain History of sent requests
  - Create requests frequently
  - Customization with scripts
  - Robust Framework

# AN OVERVIEW OF POSTMAN



# PYTHON WEB SCRAPPING SCRIPT



```
Final_Project_Pycharm - [C:\Users\Rvg296\PycharmProjects\Final_Project_Pycharm] - ...\soup.py - PyCharm 2016.2.3
File Edit View Navigate Code Refactor Run Tools VCS Window Help
Final_Project_Pycharm > soup.py
Project Multi-Criteria.py x soup.py x soup2.py x pyzillow.py x
Final_Project_Pycharm [Final]
External Libraries
1 import requests
2 from bs4 import BeautifulSoup
3 url = "http://www.zillow.com/homes/for_sale/Richardson-TX/fsba,fsbo,new_lt/54121_rid/1-_beds/1-_baths/globalrelevanceex_sort/33.041335,-96.574287,32.886363,-96.574287,32.886363"
4 r = requests.get(url)
5 r.content
6 soup = BeautifulSoup(r.content, "html.parser")
7 mapresult = soup.find("meta", attrs={"name": "description"})['content'].split(" ") [2]
8 print(mapresult)
9 pages= int(mapresult)//26
10 print(pages)
11 coordinates = []
12 id = 1
13
14 file = open("Zillow.csv",mode='w')
15 file.write("ID,Address,Zipcode,Latitude,Longitude,Price\n")
16
17 for page in range(1,pages+2):
18 url="http://www.zillow.com/homes/for_sale/Richardson-TX/fsba,fsbo,new_lt/54121_rid/1-_beds/1-_baths/globalrelevanceex_sort/33.041335,-96.574287,32.886363,-96.574287,32.886363"
19 r = requests.get(url)
20 r.content
21 soup = BeautifulSoup(r.content, "html.parser")
22
23 coord_tags = soup.find_all("span", attrs={"itemprop": "geo"})
24 for home in coord_tags:
25     ps = home.previous_sibling
26     children = ps.findChildren()
27     streetaddress=children[0].text
28     addresslocality = children[1].text
29     addressRegion = children[2].text
30     zip = children[3].text
31     pricevalue = home.next_sibling.find("span", attrs={"class": "zsg-photo-card-price"})
32     if pricevalue is None:
33         price = ""
34     else:
35         price= "\"" +pricevalue.text+"\" "
36     address = "\"" +streetaddress+" "+addresslocality+" "+addressRegion+"\" "
```

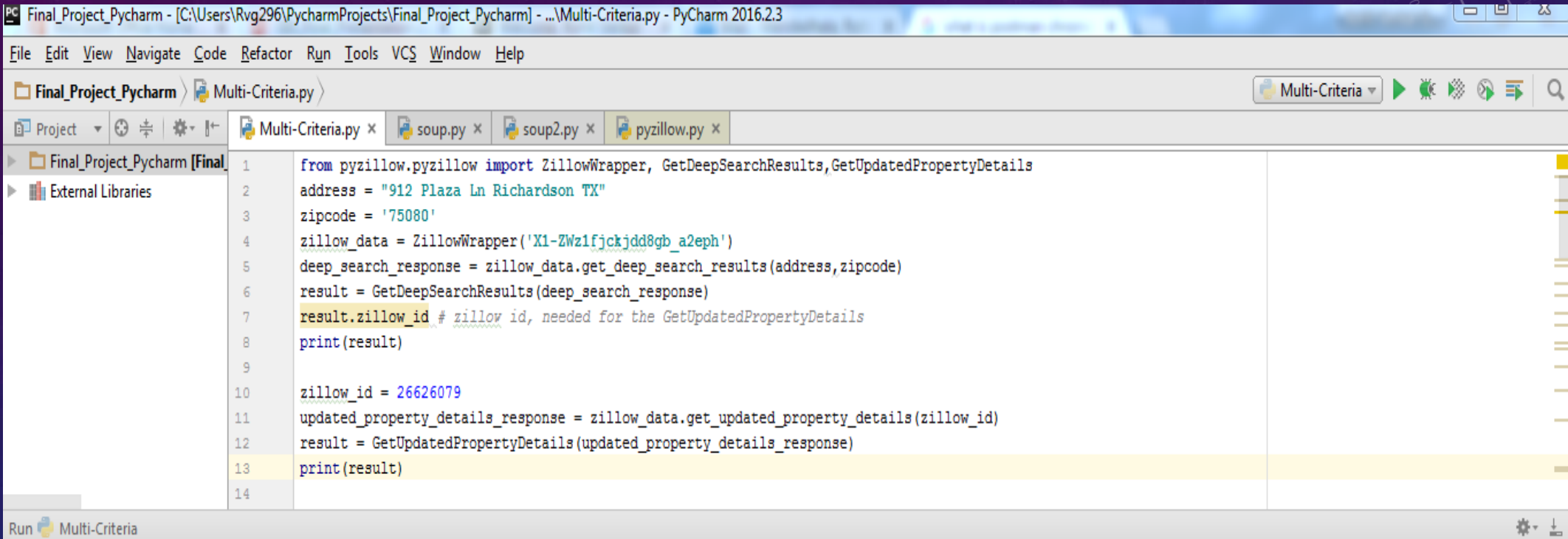
Platform and Plugin Updates  
PyCharm is ready to [update](#).

Platform and Plugin Updates: PyCharm is ready to update. (22 minutes ago)

24:28 CRLF UTF-8

11:34 PM  
12/5/2016

# PYTHON API SCRIPT FOR ADDRESS TO ZILLOW ID CONVERSION



The screenshot shows the PyCharm IDE interface. The title bar indicates the project is 'Final\_Project\_Pycharm' and the file being edited is 'Multi-Criteria.py'. The menu bar includes File, Edit, View, Navigate, Code, Refactor, Run, Tools, VCS, Window, and Help. The toolbar shows various icons for running and debugging. The main editor window displays the following Python code:

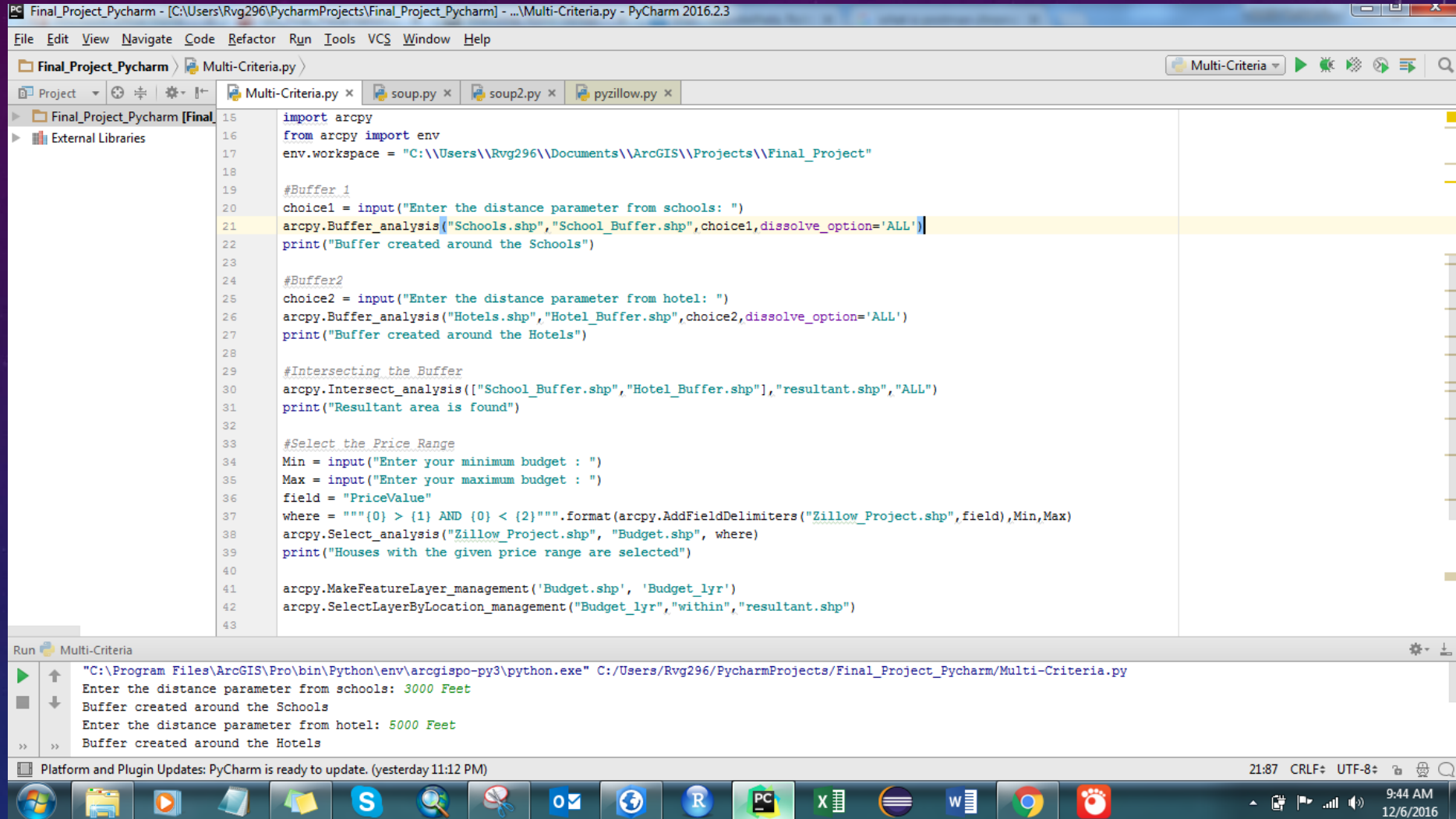
```
1 from pyzillow.pyzillow import ZillowWrapper, GetDeepSearchResults, GetUpdatedPropertyDetails
2 address = "912 Plaza Ln Richardson TX"
3 zipcode = '75080'
4 zillow_data = ZillowWrapper('X1-ZWz1fjckjdd8gb_a2eph')
5 deep_search_response = zillow_data.get_deep_search_results(address, zipcode)
6 result = GetDeepSearchResults(deep_search_response)
7 result.zillow_id # zillow id, needed for the GetUpdatedPropertyDetails
8 print(result)
9
10 zillow_id = 26626079
11 updated_property_details_response = zillow_data.get_updated_property_details(zillow_id)
12 result = GetUpdatedPropertyDetails(updated_property_details_response)
13 print(result)
14
```

The bottom status bar shows 'Run Multi-Criteria'.

## MULTI FUNCTIONAL CRITERIA USED

- Buffer (arcpy.Buffer\_Analysis) - Create the buffers
- Intersect (arcpy.Intersect\_Analysis) - Intersect the buffers
- Select (arcpy.Select\_Analysis) - Select the houses based on Prices
- Select (arcpy.SelectLayerByLocation\_management) - Within the resultant area.
- Copy (arcpy.Copy\_management) -- Used for showing the houses as a separate layer which the user can finalize upon purchasing.

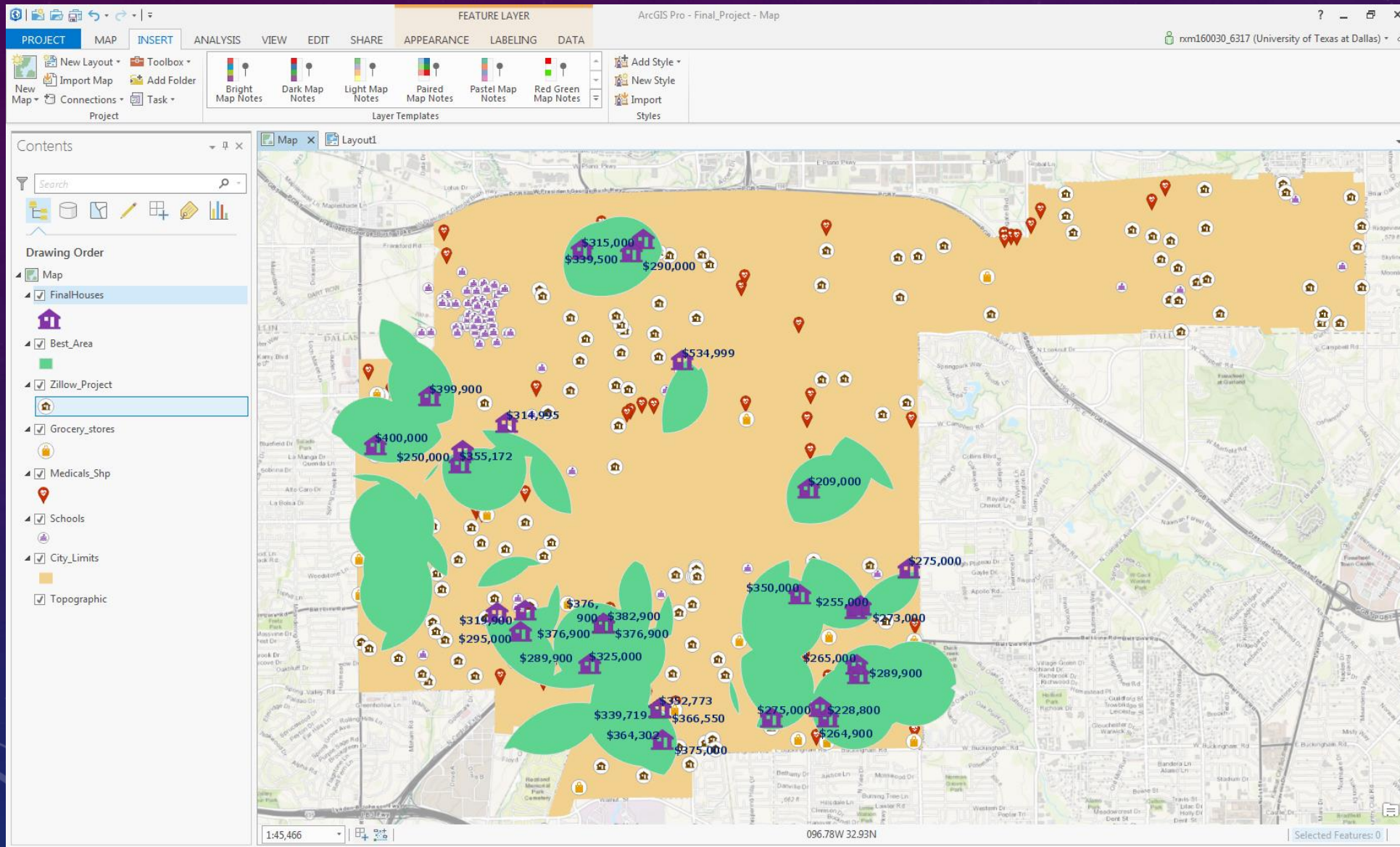
# SAMPLE SCRIPT FOR MULTI-CRITERIA



```
Final_Project_Pycharm - [C:\Users\Rvg296\PycharmProjects\Final_Project_Pycharm] - ...Multi-Criteria.py - PyCharm 2016.2.3
File Edit View Navigate Code Refactor Run Tools VCS Window Help
Final_Project_Pycharm > Multi-Criteria.py >
Project > Multi-Criteria.py x soup.py x soup2.py x pyzillow.py x
Final_Project_Pycharm [Final
External Libraries
15 import arcpy
16 from arcpy import env
17 env.workspace = "C:\\Users\\Rvg296\\Documents\\ArcGIS\\Projects\\Final_Project"
18
19 #Buffer 1
20 choice1 = input("Enter the distance parameter from schools: ")
21 arcpy.Buffer_analysis("Schools.shp", "School_Buffer.shp", choice1, dissolve_option='ALL')
22 print("Buffer created around the Schools")
23
24 #Buffer2
25 choice2 = input("Enter the distance parameter from hotel: ")
26 arcpy.Buffer_analysis("Hotels.shp", "Hotel_Buffer.shp", choice2, dissolve_option='ALL')
27 print("Buffer created around the Hotels")
28
29 #Intersecting the Buffer
30 arcpy.Intersect_analysis(["School_Buffer.shp", "Hotel_Buffer.shp"], "resultant.shp", "ALL")
31 print("Resultant area is found")
32
33 #Select the Price Range
34 Min = input("Enter your minimum budget : ")
35 Max = input("Enter your maximum budget : ")
36 field = "PriceValue"
37 where = ""{0} > {1} AND {0} < {2}"".format(arcpy.AddFieldDelimiters("Zillow_Project.shp", field), Min, Max)
38 arcpy.Select_analysis("Zillow_Project.shp", "Budget.shp", where)
39 print("Houses with the given price range are selected")
40
41 arcpy.MakeFeatureLayer_management('Budget.shp', 'Budget_lyr')
42 arcpy.SelectLayerByLocation_management("Budget_lyr", "within", "resultant.shp")
43
Run Multi-Criteria
"C:\Program Files\ArcGIS\Pro\bin\Python\env\arcgispro-py3\python.exe" C:/Users/Rvg296/PycharmProjects/Final_Project_Pycharm/Multi-Criteria.py
Enter the distance parameter from schools: 3000 Feet
Buffer created around the Schools
Enter the distance parameter from hotel: 5000 Feet
Buffer created around the Hotels
Platform and Plugin Updates: PyCharm is ready to update. (yesterday 11:12 PM)
21:87 CRLF+ UTF-8+
9:44 AM
12/6/2016
```



# HOUSES THAT SATISFY USER CRITERIA



## APPLICATION USAGE:

- Helps in getting a brief overview of the houses that are present in the neighborhood within the user search criteria.
- Most useful for the working staff at UTD if they are interested in purchasing a new house within the vicinity of Richardson, so that they can commute much faster to the university.
- Potential users will be getting a clear cut picture about making house and property search

## SOME LIMITATIONS:

- The user should enter a broader search parameters ( >1000 Feet) for the distance and the budget range. (Min – Max Value)
- The Python script for web scrapping should be slightly modified as per the number of houses for sale mentioned in the Zillow website. Only the URL and the looping methodology for iterating needs to be modified, the logic for extracting the desired values will be same.
- All the data types of the fields should be checked before running the python script and appropriate type casting or conversions need to be done.

## REFERENCES & SOURCES:

- <http://www.zillow.com/>
- <https://www.getpostman.com/>
- <https://pypi.python.org/pypi/pyzillow/0.5.1>
- <https://www.crummy.com/software/BeautifulSoup/bs4/doc/>
- <http://opendata.richardson.opendata.arcgis.com/>
- <http://www.inman.com/2013/02/13/top-10-real-estate-websites-get-nearly-half-traffic/>

