In [1]:

```
import pandas,os
```

In [2]:

```
df1=pandas.read_csv("city.csv")
```

In [3]:

```
df1
```

Out[3]:

	ID	Adress	City	Country	Coordinate	Latitude	Longitude
0	1	Kuala Lumpur,Malaysia	Kuala Lumpur	Malaysia	KL,Malaysia	3.151664	101.694303
1	2	Hanoi,Vietnam	Hanoi	Vietnam	Hà Nội, Việt Nam	21.029450	105.854444
2	3	Taipei,Taiwan	Taipei	Taiwan	臺北市, 信義區, 臺北市, 11008, 臺灣	25.037520	121.563680
3	4	Seoul,Korea	Seoul	Korea	3서울, 110, 세종대로, 태평로1가, 소공동, 중구, 서울, 100-101, 대...	37.566679	126.978291
4	5	Tokyo,Japan	Tokyo	Japan	東京都, 関東地方, 日本	35.682839	139.759455
5	6	HK,Hong Kong	HK	Hong Kong	HK, 中国	22.350627	114.184916
6	7	Bangkok,Thailand	Bangkok	Thailand	NaN	NaN	NaN
7	8	Jakarta,Indonesia	Jakarta	Indonesia	NaN	NaN	NaN
8	9	Vancouver,Canada	Vancouver	Canada	Vancouver, Metro Vancouver, British Columbia,..	49.260872	-123.113953

In [4]:

```
import geopy
```

In [5]:

```
dir(geopy)
```

Out[5]:

```
['ArcGIS',
 'AzureMaps',
 'BANFrance',
 'Baidu',
 'Bing',
 'DataBC',
 'GeoNames',
 'GeocodeEarth',
 'GeocodeFarm',
 'Geolake',
 'GoogleV3',
 'Here',
 'IGNFrance',
 'LiveAddress',
 'Location',
 'MapBox',
 'Nominatim',
 'OpenCage',
 'OpenMapQuest',
 'Pelias',
 'Photon',
 'PickPoint',
 'Point',
 'Timezone',
 'TomTom',
 'What3Words',
 'Yandex',
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
 '__version__',
 'compat',
 'exc',
 'format',
 'geocoders',
 'get_geocoder_for_service',
 'location',
 'point',
 'timezone',
 'units',
 'util']
```

In [6]:

```
from geopy.geocoders import Nominatim
```

In [7]:

```
nom = Nominatim()
```

```
c:\users\lenovo\appdata\local\programs\python\python37\lib\site-packages\i
pykernel_launcher.py:1: DeprecationWarning: Using Nominatim with the defau
lt "geopy/1.19.0" `user_agent` is strongly discouraged, as it violates Nom
inatim's ToS https://operations.osmfoundation.org/policies/nominatim/ (htt
ps://operations.osmfoundation.org/policies/nominatim/) and may possibly ca
use 403 and 429 HTTP errors. Please specify a custom `user_agent` with `No
minatim(user_agent="my-application")` or by overriding the default `user_a
gent`: `geopy.geocoders.options.default_user_agent = "my-application"`. In
geopy 2.0 this will become an exception.
  """Entry point for launching an IPython kernel.
```

In [8]:

```
df1["Coordinate"]=df1["Adress"].apply(nom.geocode)
```

In [9]:

```
df1["Latitude"]=df1["Coordinate"].apply(lambda x: x.latitude if x !=None else None)
```

In [10]:

```
df1["Longitude"]=df1["Coordinate"].apply(lambda x: x.longitude if x !=None else None)
```

In [11]:

```
df1["Longitude"]=df1["Coordinate"].apply(lambda x: x.longitude if x !=None else None)
```

In [12]:

```
from geopy.distance import great_circle
```

In [13]:

```
df1
```

Out[13]:

	ID	Adress	City	Country	Coordinate	Latitude	Longitude
0	1	Kuala Lumpur,Malaysia	Kuala Lumpur	Malaysia	(KL, Malaysia, (3.1516636, 101.6943028))	3.151664	101.694303
1	2	Hanoi,Vietnam	Hanoi	Vietnam	(Hà Nội, Việt Nam, (21.0294498, 105.8544441))	21.029450	105.854444
2	3	Taipei,Taiwan	Taipei	Taiwan	(臺北市, 信義區, 臺北市, 11008, 臺灣, (25.0375198, 121.56...	25.037520	121.563680
3	4	Seoul,Korea	Seoul	Korea	(서울, 110, 세종대로, 태평로1가, 소공동, 중구, 서울, 100-101, 대...	37.566679	126.978291
4	5	Tokyo,Japan	Tokyo	Japan	(東京都, 関東地方, 日本, (35.6828387, 139.7594549))	35.682839	139.759455
5	6	HK,Hong Kong	HK	Hong Kong	(HK, 中国, (22.350627, 114.1849161))	22.350627	114.184916
6	7	Bangkok,Thailand	Bangkok	Thailand	(กรุงเทพมหานคร, ประเทศไทย, (13.7538929, 100.81...	13.753893	100.816080
7	8	Jakarta,Indonesia	Jakarta	Indonesia	(JKT, NKRI, (-6.1753942, 106.827183))	-6.175394	106.827183
8	9	Vancouver,Canada	Vancouver	Canada	(Vancouver, Metro Vancouver, British Columbia,...	49.260872	-123.113953

In [14]:

```
print("KL,INDONESIA :",great_circle(KL, IN).kilometers)
print("KL,TAIPEI :",great_circle(KL, TP).kilometers)
print("KL,HONG KONG :",great_circle(KL,HK ).kilometers)
print("KL,THAI :",great_circle(KL, TH).kilometers)

print("THAI,HANOI :",great_circle(TH, HN).kilometers)
print("INDONESIA,HANOI :",great_circle(IN, HN).kilometers)

print("HANOI,SEOUL :",great_circle(HN, SL).kilometers)
print("HANOI,TAIPEI :",great_circle(HN, TP).kilometers)

print("HONG KONG,VANCOUVER :",great_circle(HK, VN).kilometers)
print("HONG KONG,TOKYO :",great_circle(HK, TK).kilometers)

print("TAIPEI,HONG KONG :",great_circle(TP, HK).kilometers)
print("TAIPEI,SEOUL :",great_circle(TP, SL).kilometers)

print("SEOUL,TOKYO :",great_circle(SL, TK).kilometers)
print("TOKYO, VANCOUVER:",great_circle(TK, VN).kilometers)
```

```
---------------------------------------------------------------------------
-
NameError                                 Traceback (most recent call las
t)
<ipython-input-14-b2b5d6c8509a> in <module>
----> 1 print("KL,INDONESIA :",great_circle(KL, IN).kilometers)
      2 print("KL,TAIPEI :",great_circle(KL, TP).kilometers)
      3 print("KL,HONG KONG :",great_circle(KL,HK ).kilometers)
      4 print("KL,THAI :",great_circle(KL, TH).kilometers)
      5

NameError: name 'KL' is not defined
```

In [15]:

```
KL=(3.1516636, 101.6943028)
HN=(21.0294498, 105.8544441)
TP=(25.0375198, 121.563680)
SL=(37.566679, 126.978291)
TK=(35.6828387, 139.7594549)
HK=(22.350627, 114.1849161)
IN=(13.753893, 100.816080)
TH=(-6.175394, 106.827183)
VN=(49.260872, -123.113953)
```

In [16]:

```
print("KL,INDONESIA :",great_circle(KL, IN).kilometers)
print("KL,TAIPEI :",great_circle(KL, TP).kilometers)
print("KL,HONG KONG :",great_circle(KL,HK ).kilometers)
print("KL,THAI :",great_circle(KL, TH).kilometers)

print("THAI,HANOI :",great_circle(TH, HN).kilometers)
print("INDONESIA,HANOI :",great_circle(IN, HN).kilometers)

print("HANOI,SEOUL :",great_circle(HN, SL).kilometers)
print("HANOI,TAIPEI :",great_circle(HN, TP).kilometers)

print("HONG KONG,VANCOUVER :",great_circle(HK, VN).kilometers)
print("HONG KONG,TOKYO :",great_circle(HK, TK).kilometers)

print("TAIPEI,HONG KONG :",great_circle(TP, HK).kilometers)
print("TAIPEI,SEOUL :",great_circle(TP, SL).kilometers)

print("SEOUL,TOKYO :",great_circle(SL, TK).kilometers)
print("TOKYO, VANCOUVER:",great_circle(TK, VN).kilometers)
```

```
KL,INDONESIA : 1182.854293401512
KL,TAIPEI : 3231.8242631574694
KL,HONG KONG : 2524.3444234808403
KL,THAI : 1183.3989427180807
THAI,HANOI : 3026.9080409795506
INDONESIA,HANOI : 969.4356186447203
HANOI,SEOUL : 2740.2380294860536
HANOI,TAIPEI : 1666.9306385691227
HONG KONG,VANCOUVER : 10249.480684105873
HONG KONG,TOKYO : 2881.5743863405123
TAIPEI,HONG KONG : 808.364970767223
TAIPEI,SEOUL : 1484.357658719539
SEOUL,TOKYO : 1158.7109083879723
TOKYO, VANCOUVER: 7550.354524613018
```

In [ ]: