山东科技大学——测绘与空间信息学院

Python程序设计

地理信息科学系　刘洪强

J6-557　电话：86081170

2021年4月13日星期二

课程安排：

36个学时，其中授课24个学时，实验12个学时

成绩：

出勤5% + 实验报告25% + 考试70%

章节内容

第1章 认识Python

第2章 Python编程基础

第3章 函数、类、包和模块

第4章 文件操作

第5章 地图文档管理

第6章 数据链接查找与修复

第7章 地图制图与输出

第8章 地理处理工具的执行

第9章 地理处理工具的创建

第10章 数据查询与选择

第11章 数据访问模块

第12章 获取GIS数据的列表和描述

第11章 数据访问模块

游标

SearchCursor检索要素类中的要素

where子句筛选记录

几何令牌

InsertCursor插入行

UpdateCursor更新行

UpdateCursor删除行

编辑会话中插入和更新行

读取要素类中的几何信息

使用Walk()遍历目录

11.1 游标

游标是包括表格或要素类中的一行或多行数据的内存对象。每一行都包含数据源中每个字段的属性和每个要素的几何特征。游标可用于搜索、添加、插入、更新和删除表和要素类中的数据。

11.1 游标

Arcpy数据访问模块（arcpy.da）中有3种游标函数，每种函数都会返回一个与该函数同名的游标对象。

Function	Object created	Usage
SearchCursor()	SearchCursor	This is a read-only view of data from a table or feature class
InsertCursor()	InsertCursor	This adds rows to a table or feature class
UpdateCursor()	UpdateCursor	This edits or deletes rows in a table or feature class

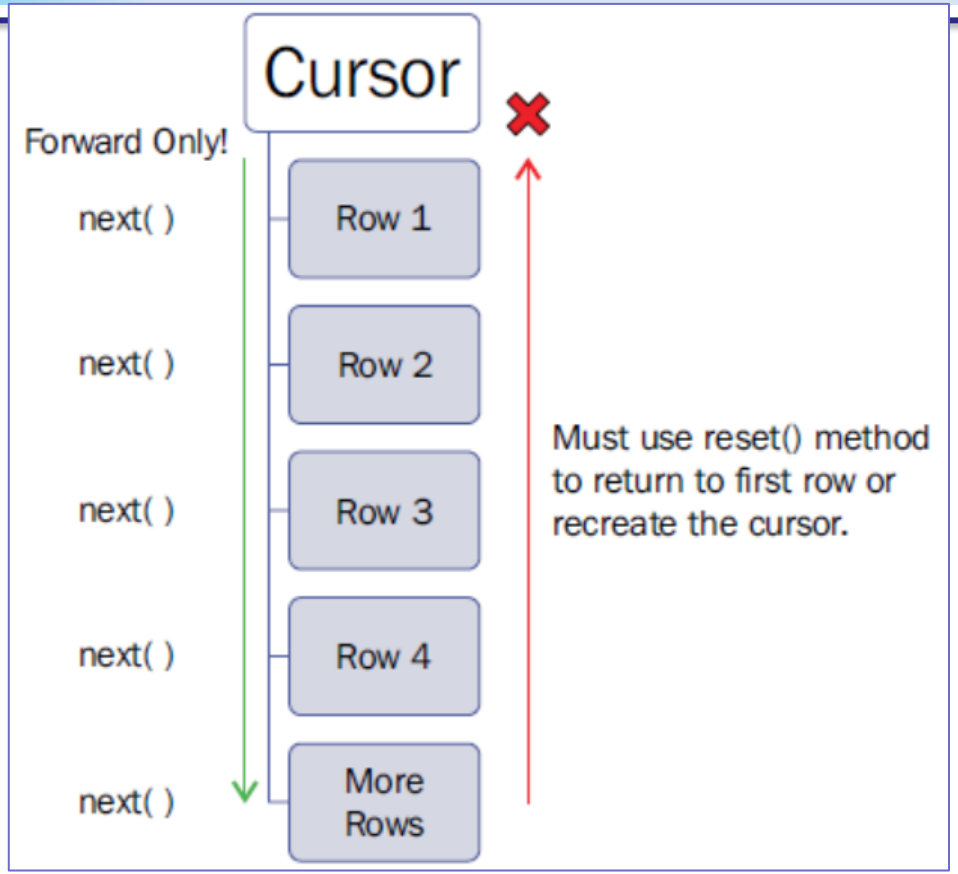
11.1 游标

当在游标中遍历记录时，**游标只能向前移动**。当创建一个游标时，游标位于第1行的上方。当第一次使用next()方法时，游标移动到第一行。对一行执行完需要处理的操作后，调用next()将指针移动到第2行。

也可以使用for循环来处理每条记录，而不需要调用next()方法。

当访问过一行后，就不能再返回到上一条记录。如果想重新访问第1行和第2行，需要调用**reset()**方法将游标对象重置回第1行或者**重新创建游标**。

11.1 游标


Cursor
Forward Only!
next( )
next( )
next( )
next( )
next( )
Row 1
Row 2
Row 3
Row 4
More Rows
Must use reset() method to return to first row or recreate the cursor.

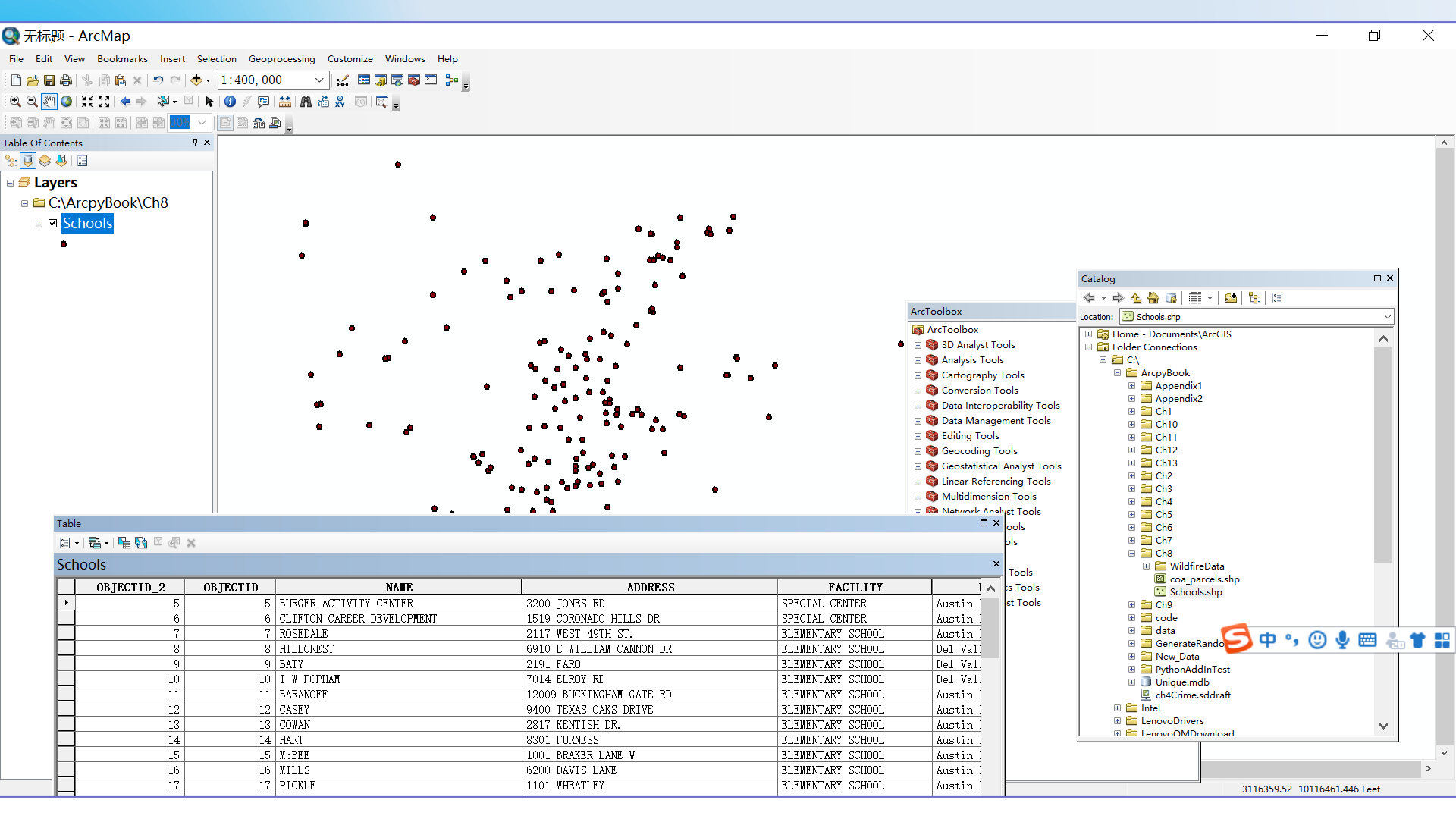
11.1 数据锁定

InsertCursor和UpdateCursor必须在引用的数据源上使用**排他锁**。排他锁意味着，其他应用程序不可以同时访问该数据源。锁定可以防止多个用户在同一时间改变数据。游标完成处理后必须明确释放锁定，以便其他应用程序（比如ArcMap或ArcCatalog）能否访问该数据。同样，ArcMap和ArcCatalog在更新或删除数据时也需要锁定数据。如果数据源已经被其他应用程序锁定，Python代码将不能访问该数据。

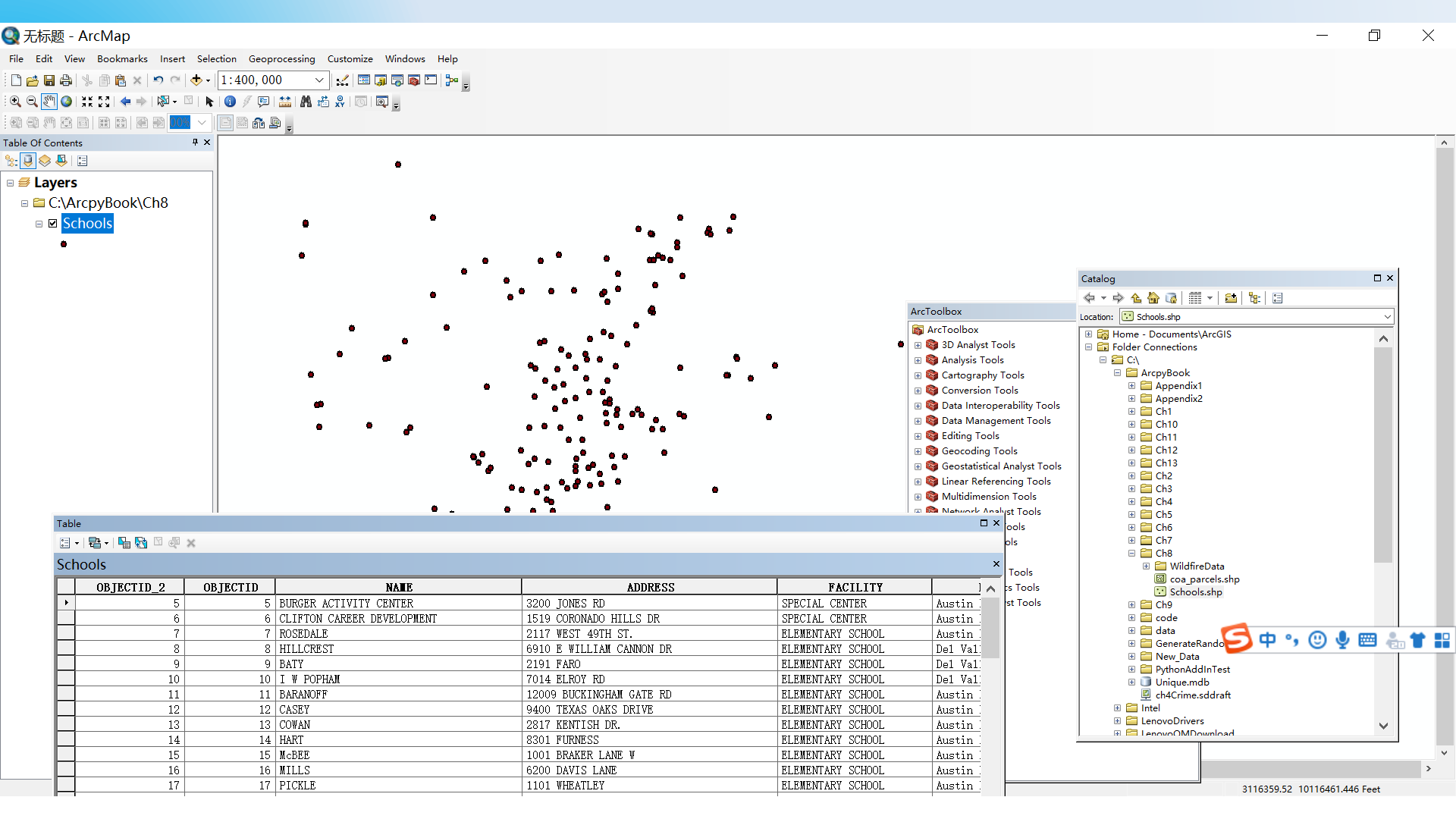
最好的做法是在使用包含InsertCursor和UpdateCursor的Python脚本之前，先关闭Arcmap和ArcCatalog。

11.2 SearchCursor检索要素类中的要素

SearchCursor() 返回一个SearchCursor对象。该对象只能通过遍历行来返回只读目标，没有插入、删除或更新的功能。可用where子句来限制返回的行。


无标题 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:400,000
Table Of Contents
Layers
C:\ArcpyBook\Ch8
Schools
ArcToolbox
ArcToolbox
3D Analyst Tools
Analysis Tools
Cartography Tools
Conversion Tools
Data Interoperability Tools
Data Management Tools
Editing Tools
Geocoding Tools
Geostatistical Analyst Tools
Linear Referencing Tools
Multidimension Tools
Catalog
Location: Schools.shp
Home - Documents\ArcGIS
Folder Connections
C:\
ArcpyBook
Appendix1
Appendix2
Ch1
Ch10
Ch11
Ch12
Ch13
Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8
WildfireData
coa_parcels.shp
Schools.shp
Ch9
code
data
GenerateRando
New_Data
PythonAddInTest
Unique.mdb
ch4Crime.sddraft
Intel
LenovoDrivers
Table
Schools
OBJECTID_2 OBJECTID NAME ADDRESS FACILITY
5 5 BURGER ACTIVITY CENTER 3200 JONES RD SPECIAL CENTER Austin
6 6 CLIFTON CAREER DEVELOPMENT 1519 CORONADO HILLS DR SPECIAL CENTER Austin
7 7 ROSEDALE 2117 WEST 49TH ST. ELEMENTARY SCHOOL Austin
8 8 HILLCREST 6910 E WILLIAM CANNON DR ELEMENTARY SCHOOL Del Val
9 9 BATY 2191 FARO ELEMENTARY SCHOOL Del Val
10 10 I W POPHAM 7014 ELROY RD ELEMENTARY SCHOOL Del Val
11 11 BARANOFF 12009 BUCKINGHAM GATE RD ELEMENTARY SCHOOL Austin
12 12 CASEY 9400 TEXAS OAKS DRIVE ELEMENTARY SCHOOL Austin
13 13 COWAN 2817 KENTISH DR. ELEMENTARY SCHOOL Austin
14 14 HART 8301 FURNESS ELEMENTARY SCHOOL Austin
15 15 McBEE 1001 BRAKER LANE W ELEMENTARY SCHOOL Austin
16 16 MILLS 6200 DAVIS LANE ELEMENTARY SCHOOL Austin
17 17 PICKLE 1101 WHEATLEY ELEMENTARY SCHOOL Austin
3116359.52 10116461.446 Feet

检索图层中学校的名称（NAME）？？？


无标题 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:400,000
Table Of Contents
Layers
C:\ArcpyBook\Ch8
Schools
ArcToolbox
ArcToolbox
3D Analyst Tools
Analysis Tools
Cartography Tools
Conversion Tools
Data Interoperability Tools
Data Management Tools
Editing Tools
Geocoding Tools
Geostatistical Analyst Tools
Linear Referencing Tools
Multidimension Tools
Catalog
Location: Schools.shp
Home - Documents\ArcGIS
Folder Connections
C:\
ArcpyBook
Appendix1
Appendix2
Ch1
Ch10
Ch11
Ch12
Ch13
Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8
WildfireData
coa_parcels.shp
Schools.shp
Ch9
code
data
GenerateRando
New_Data
PythonAddInTest
Unique.mdb
ch4Crime.sddraft
Intel
LenovoDrivers
Table
Schools
OBJECTID_2 OBJECTID NAME ADDRESS FACILITY
5 5 BURGER ACTIVITY CENTER 3200 JONES RD SPECIAL CENTER Austin
6 6 CLIFTON CAREER DEVELOPMENT 1519 CORONADO HILLS DR SPECIAL CENTER Austin
7 7 ROSEDALE 2117 WEST 49TH ST. ELEMENTARY SCHOOL Austin
8 8 HILLCREST 6910 E WILLIAM CANNON DR ELEMENTARY SCHOOL Del Val
9 9 BATY 2191 FARO ELEMENTARY SCHOOL Del Val
10 10 I W POPHAM 7014 ELROY RD ELEMENTARY SCHOOL Del Val
11 11 BARANOFF 12009 BUCKINGHAM GATE RD ELEMENTARY SCHOOL Austin
12 12 CASEY 9400 TEXAS OAKS DRIVE ELEMENTARY SCHOOL Austin
13 13 COWAN 2817 KENTISH DR. ELEMENTARY SCHOOL Austin
14 14 HART 8301 FURNESS ELEMENTARY SCHOOL Austin
15 15 McBEE 1001 BRAKER LANE W ELEMENTARY SCHOOL Austin
16 16 MILLS 6200 DAVIS LANE ELEMENTARY SCHOOL Austin
17 17 PICKLE 1101 WHEATLEY ELEMENTARY SCHOOL Austin
3116359.52 10116461.446 Feet

11.2 S

Python

```
>>> import arcpy.da as da
>>> arcpy.env.workspace = r'C:\ArcpyBook\Ch8'
>>> with da.SearchCursor('Schools.shp',('Facility','Name')) as cursor:
...     for row in sorted(cursor):
...         print('School name: ' + row[1])
...
School name: ALLAN
School name: ALLISON
School name: ANDREWS
School name: BARANOFF
School name: BARRINGTON
School name: BARTON CREEK
School name: BARTON HILLS
School name: BATY
School name: BECKER
School name: BEE CAVE
School name: BLACKSHEAR
School name: BLAKE MANOR
School name: BLANTON
School name: BLAZIER
School name: BLUEBONNET TRAIL
School name: BOONE
School name: BRENTWOOD
School name: BRIDGE POINT
School name: BROOKE
```

11.2 SearchCursor检索要素类中的要素

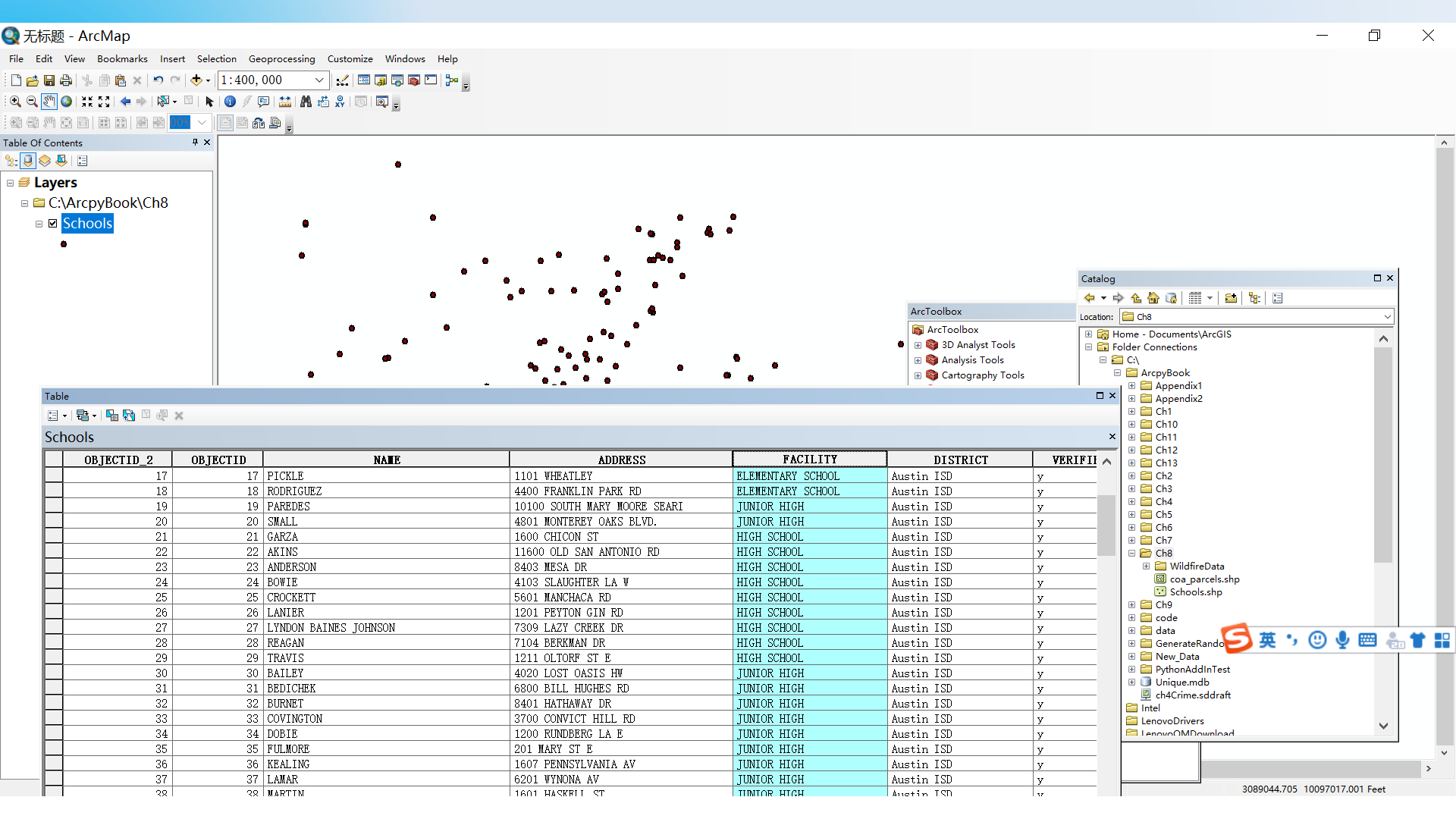
Syntax

SearchCursor (in_table, field_names, {where_clause}, {spatial_reference}, {explode_to_points}, {sql_clause})

Parameter	Explanation	Data Type
in_table	The feature class, layer, table, or table view.	String
field_names [field_names,...]	A list (or tuple) of field names. For a single field, you can use a string instead of a list of strings. Use an asterisk (*) instead of a list of fields if you want to access all fields from the input table (raster and BLOB fields are excluded). However, for faster performance and reliable field order, it is recommended that the list of fields be narrowed to only those that are actually needed. Raster fields are not supported.	String

11.3 where子句筛选记录

默认情况下，SearchCursor将返回一个表或要素类中的所有行。然而，在很多情况下，常常需要使用某些条件来限制返回的行数，一般通过在where子句中设置筛选条件来实现。



Table

Schools

OBJECTID_2	OBJECTID	NAME	ADDRESS	FACILITY	DISTRICT	VERIFI
17	17	PICKLE	1101 WHEATLEY	ELEMENTARY SCHOOL	Austin ISD	y
18	18	RODRIGUEZ	4400 FRANKLIN PARK RD	ELEMENTARY SCHOOL	Austin ISD	y
19	19	PAREDES	10100 SOUTH MARY MOORE SEARI	JUNIOR HIGH	Austin ISD	y
20	20	SMALL	4801 MONTEREY OAKS BLVD.	JUNIOR HIGH	Austin ISD	y
21	21	GARZA	1600 CHICON ST	HIGH SCHOOL	Austin ISD	y
22	22	AKINS	11600 OLD SAN ANTONIO RD	HIGH SCHOOL	Austin ISD	y
23	23	ANDERSON	8403 MESA DR	HIGH SCHOOL	Austin ISD	y
24	24	BOWIE	4103 SLAUGHTER LA W	HIGH SCHOOL	Austin ISD	y
25	25	CROCKETT	5601 MANCHACA RD	HIGH SCHOOL	Austin ISD	y
26	26	LANIER	1201 PEYTON GIN RD	HIGH SCHOOL	Austin ISD	y
27	27	LYNDON BAINES JOHNSON	7309 LAZY CREEK DR	HIGH SCHOOL	Austin ISD	y
28	28	REAGAN	7104 BERKMAN DR	HIGH SCHOOL	Austin ISD	y
29	29	TRAVIS	1211 OLTORF ST E	HIGH SCHOOL	Austin ISD	y
30	30	BAILEY	4020 LOST OASIS HW	JUNIOR HIGH	Austin ISD	y
31	31	BEDICHEK	6800 BILL HUGHES RD	JUNIOR HIGH	Austin ISD	y
32	32	BURNET	8401 HATHAWAY DR	JUNIOR HIGH	Austin ISD	y
33	33	COVINGTON	3700 CONVICT HILL RD	JUNIOR HIGH	Austin ISD	y
34	34	DOBIE	1200 RUNDBERG LA E	JUNIOR HIGH	Austin ISD	y
35	35	FULMORE	201 MARY ST E	JUNIOR HIGH	Austin ISD	y
36	36	KEALING	1607 PENNSYLVANIA AV	JUNIOR HIGH	Austin ISD	y
37	37	LAMAR	6201 WYNONA AV	JUNIOR HIGH	Austin ISD	y
38	38	MARTIN	1601 HASKELL ST	JUNIOR HIGH	Austin ISD	y

查找FACILITY字段值为“HIGH SCHOOL” 的记录？

11.3 where子句筛选记录

Python

```
>>> import arcpy.da
... arcpy.env.workspace = "c:/ArcpyBook/Ch8"
... with arcpy.da.SearchCursor("Schools.shp",
 ("Facility","Name"), '"FACILITY" = \'HIGH SCHOOL\'') as
 cursor:
...         for row in sorted(cursor):
...                 print("School name: " + row[1])
```

11.3 where子句筛选记录

OBJECTID_1	OBJECTID_2	OBJECTID	NAME	ADDRESS
1285	22	22	AKINS	11600 OLD SAN ANTONIO RD
1377	114	114	ALTERNATIVE LEARNING CENTER	901 NEAL ST
1286	23	23	ANDERSON	8403 MESA DR
1373	110	110	AUSTIN	1715 1ST ST W
1287	24	24	BOWIE	4103 SLAUGHTER LA W
1288	25	25	CROCKETT	5601 MANCHACA RD
1508	146	146	DEL VALLE	5201 ROSS ROAD
1450	260	261	ELGIN	14000 County Line Rd
1284	21	21	GARZA	1600 CHICON ST
1402	200	201	HENDRICKSON	2905 FM 685
1534	177	177	JOHN B CONNALLY	13212 NORTH LAMAR BLVD
1378	115	115	JOHNSTON	1112 ARTHUR STILES
1397	195	196	LAGO VISTA	20801 F M 1431
1524	162	162	LAKE TRAVIS	3322 F M620 SOUTH
1289	26	26	LANIER	1201 PEYTON GIN RD
1290	27	27	LYNDON BAINES JOHNSON	7309 LAZY CREEK DR
1395	193	194	MANOR	12700 GREGG MANOR RD
1396	194	283	MANOR EXCEL	10334 Old Hwy 20
1559	192	193	MANOR NEW TECH	10323 US HWY 290 E
1500	138	138	MC NEIL	5720 MC NEIL RD
1376	113	113	McCALLUM	5600 SUNSHINE DR
1544	229	230	OPPORTUNITY CENTER	3311 FM 973
1573	0	0	OPPORTUNITY CENTER HS & MS	1401-A W Pecan Street
1533	176	176	PFLUGERVILLE	1301 WEST PECAN
1291	28	28	REAGAN	7104 BERKMAN DR
1419	221	222	ROBBINS	3908 AVENUE B
1461	271	272	TEXAS SCHOOL FOR THE DEAF	1102 SOUTH CONGRESS
1292	29	29	TRAVIS	1211 OLTORF ST E
1520	158	158	WESTLAKE	4100 WESTBANK DR

Python

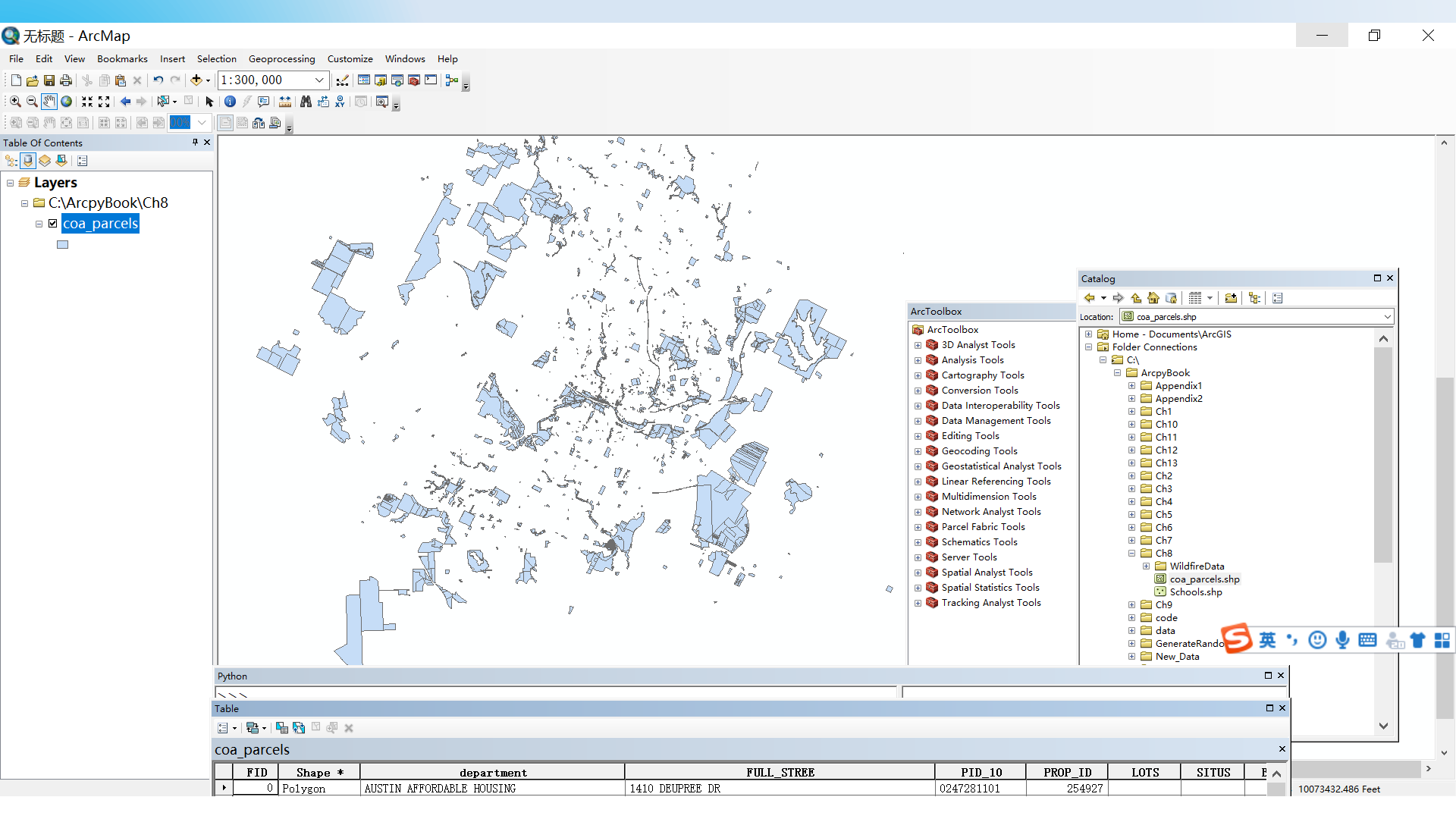
```
School name: AKINS
School name: ALTERNATIVE LEARNING CENTER
School name: ANDERSON
School name: AUSTIN
School name: BOWIE
School name: CROCKETT
School name: DEL VALLE
School name: ELGIN
School name: GARZA
School name: HENDRICKSON
School name: JOHN B CONNALLY
School name: JOHNSTON
School name: LAGO VISTA
School name: LAKE TRAVIS
School name: LANIER
School name: LYNDON BAINES JOHNSON
School name: MANOR
School name: MANOR EXCEL
School name: MANOR NEW TECH
School name: MC NEIL
School name: McCALLUM
School name: OPPORTUNITY CENTER
School name: OPPORTUNITY CENTER HS & MS
```

11.4 几何令牌

为了改进游标的性能，引入了Geometry tokens（几何令牌，象征性特征），使用几何令牌可以只返回几何的一部分信息，而不是返回游标中的全部要素的几何信息。返回整个要素的几何信息会导致游标性能下降，因为需要返回大量数据，而只返回需要的特定的几何部分明显提高了游标的速度。

11.4 几何令牌

SHAPE@XY	• Feature centroid x,y
SHAPE@X	• Feature X coordinate
SHAPE@TRUECENTROID	• Feature true centroid
SHAPE@Y	• Feature Y coordinate
SHAPE@Z	• Feature Z coordinate
SHAPE@M	• Feature M value
SHAPE@	• Geometry object; Entire feature
SHAPE@AREA	• Feature Area
SHAPE@LENGTH	• Feature Length
OID@	• Value of ObjectID field


无标题 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:300, 000
Table Of Contents
Layers
C:\ArcpyBook\Ch8
coa_parcels
ArcToolbox
ArcToolbox
3D Analyst Tools
Analysis Tools
Cartography Tools
Conversion Tools
Data Interoperability Tools
Data Management Tools
Editing Tools
Geocoding Tools
Geostatistical Analyst Tools
Linear Referencing Tools
Multidimension Tools
Network Analyst Tools
Parcel Fabric Tools
Schematics Tools
Server Tools
Spatial Analyst Tools
Spatial Statistics Tools
Tracking Analyst Tools
Catalog
Location: coa_parcels.shp
Home - Documents\ArcGIS
Folder Connections
C:\
ArcpyBook
Appendix1
Appendix2
Ch1
Ch10
Ch11
Ch12
Ch13
Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8
WildfireData
coa_parcels.shp
Schools.shp
Ch9
code
data
GenerateRando
New_Data
Python
Table
coa_parcels
FID Shape * department FULL_STREE PID_10 PROP_ID LOTS SITUS
0 Polygon AUSTIN AFFORDABLE HOUSING 1410 DEUPREE DR 0247281101 254927
10073432.486 Feet

如何获取地块质心的X、Y坐标和一些属性信息？？？

11.4 几何令牌

Python

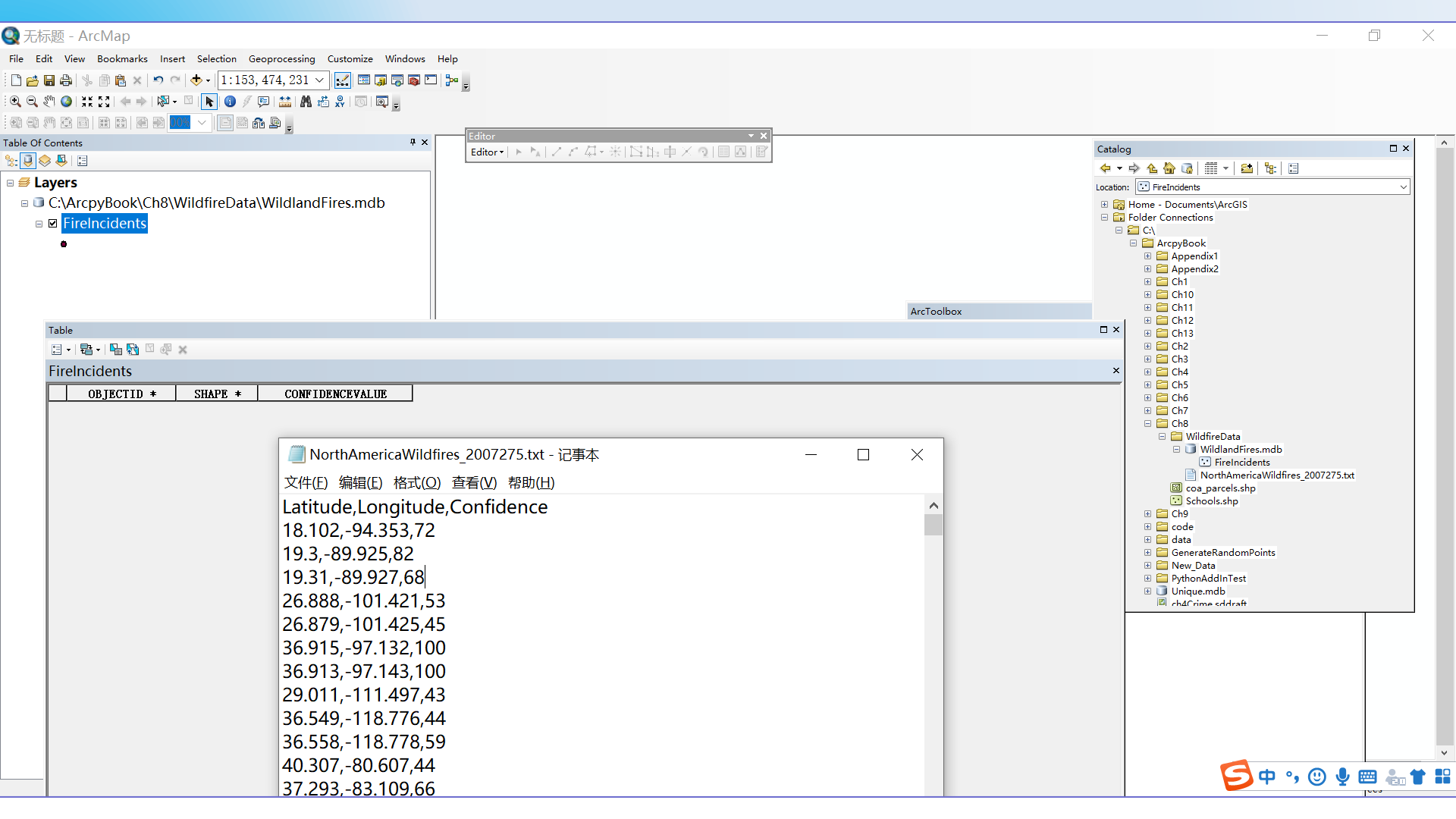
```
>>> import arcpy.da
... arcpy.env.workspace = "c:/ArcpyBook/Ch8"
... with arcpy.da.SearchCursor("coa_parcels.shp",
 ("PY_FULL_OW","SHAPE@XY")) as cursor:
...     for row in cursor:
...         print("Parcel owner: {0} has a location of:
 {1}".format(row[0], row[1]))
...
Parcel owner: AUSTIN AFFORDABLE HOUSING has a location of:
 (3139099.127188288, 10111192.98966641)
Parcel owner: AUSTIN HOUSING AUTHORITY has a location of:
 (3130795.453575606, 10125403.352832403)
Parcel owner: AUSTIN AFFORDABLE HOUSING COR has a location of:
 (3128315.315814862, 10072483.505782537)
Parcel owner: AUSTIN AFFORDABLE HOUSING COR has a location of:
 (3128315.315814862, 10072483.505782537)
Parcel owner: AUSTIN HOUSING AUTHORITY has a location of:
 (3113017.6493530977, 10133438.579810502)
```

11.4 几何令牌

几何令牌可作为一个字段名传入游标的构造函数中。使用令牌将**只返回几何的一部分**而不是全部，所以游标的性能得到了提升，尤其是对数据量比较大的折线或多边形数据进行操作时，执行时间将大大缩短。如果只需要特定的几何属性，也可以在游标中使用这些令牌。

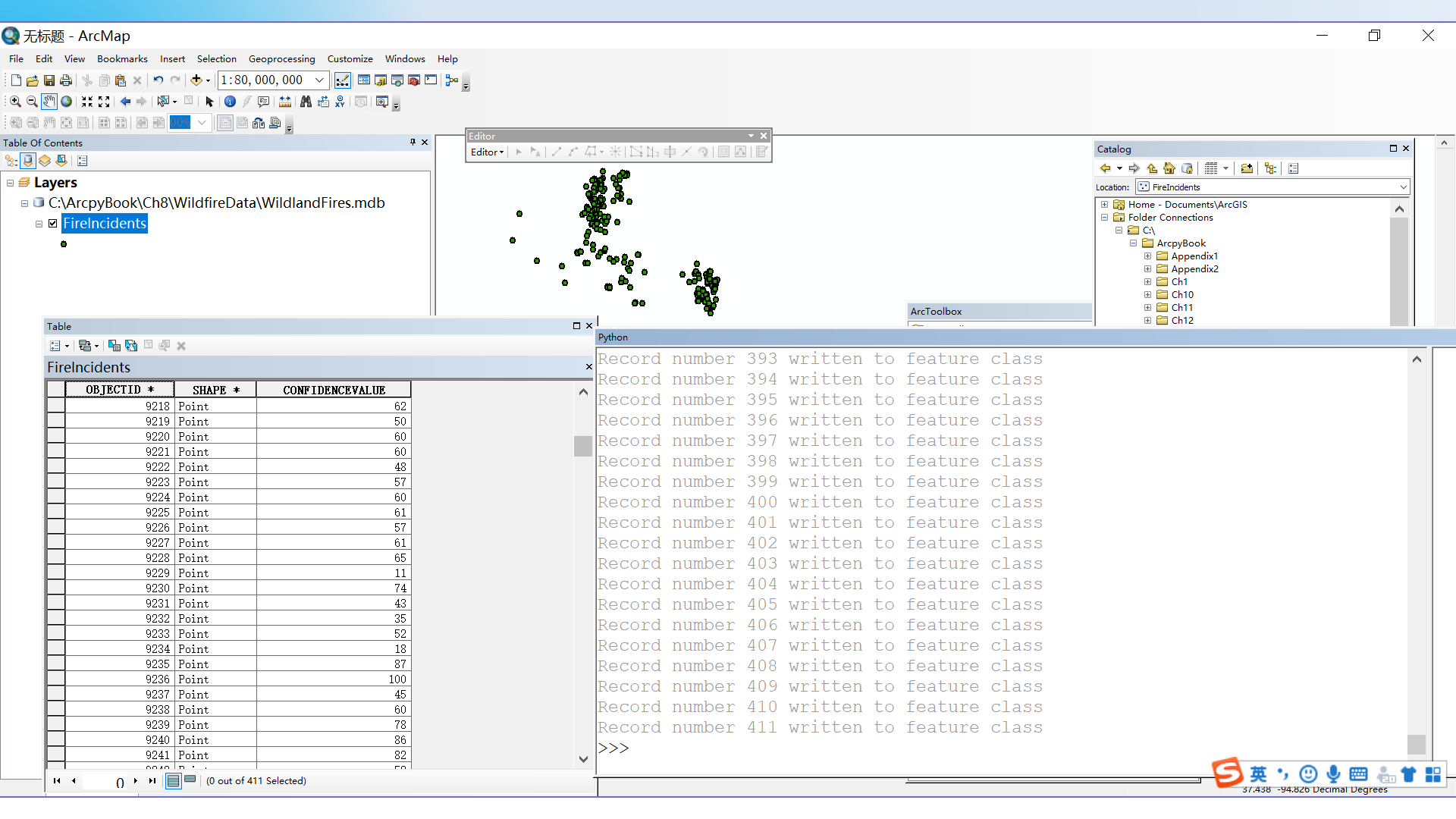
11.5 InsertCursor插入行

InsertCursor()函数创建了InsertCursor对象，它可以以编程的方式将新记录添加到要素类和表中。InsertCursor对象中的insertRow()方法用于添加新行，将列表或元组中的行作为参数传入insertRow()方法中。列表中的值必须与创建对象时定义的字段值相对应。与其他类型的游标类似，InsertCursor对象也可以通过构造函数的第2个参数来限制返回的字段名称，这个函数也支持几何令牌。


无标题 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:153, 474, 231
Table Of Contents
Layers
C:\ArcpyBook\Ch8\WildfireData\WildlandFires.mdb
FireIncidents
Editor
Editor
Catalog
Location: FireIncidents
Home - Documents\ArcGIS
Folder Connections
C:\
ArcpyBook
Appendix1
Appendix2
Ch1
Ch10
Ch11
Ch12
Ch13
Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8
WildfireData
WildlandFires.mdb
FireIncidents
NorthAmericaWildfires_2007275.txt
coa_parcels.shp
Schools.shp
Ch9
code
data
GenerateRandomPoints
New_Data
PythonAddInTest
Unique.mdb
ArcToolbox
Table
FireIncidents
OBJECTID *
SHAPE *
CONFIDENCEVALUE
NorthAmericaWildfires_2007275.txt - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)
Latitude,Longitude,Confidence
18.102,-94.353,72
19.3,-89.925,82
19.31,-89.927,68
26.888,-101.421,53
26.879,-101.425,45
36.915,-97.132,100
36.913,-97.143,100
29.011,-111.497,43
36.549,-118.776,44
36.558,-118.778,59
40.307,-80.607,44
37.293,-83.109,66

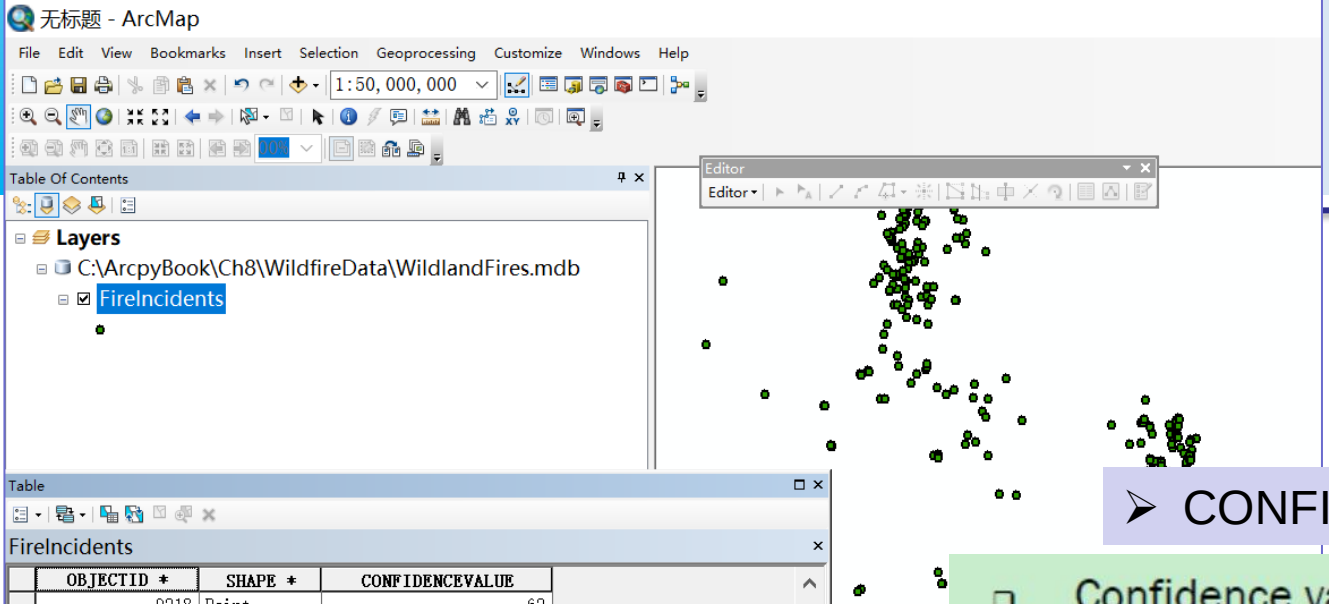
Python

```
>>> import arcpy
... import os
...
... arcpy.env.workspace = "C:/ArcpyBook/Ch8/WildfireData/WildlandFires.mdb"
... f = open("C:/ArcpyBook/Ch8/WildfireData/NorthAmericaWildfires_2007275.txt","r")
... lstFires = f.readlines()
... try:
...         with arcpy.da.InsertCursor("FireIncidents",("SHAPE@XY","CONFIDENCEVALUE")) as cur:
...                 cntr = 1
...                 for fire in lstFires:
...                         if 'Latitude' in fire:
...                                 continue
...                         vals = fire.split(",")
...                         latitude = float(vals[0])
...                         longitude = float(vals[1])
...                         confid = int(vals[2])
...                         rowValue = [(latitude,longitude),confid]
...                         cur.insertRow(rowValue)
...                         print("Record number " + str(cntr) + " written to feature class")
...                         cntr = cntr + 1
... except Exception as e:
...         print(e.message)
... finally:
...     f.close()
```


无标题 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:80, 000, 000
Table Of Contents
Layers
C:\ArcpyBook\Ch8\WildfireData\WildlandFires.mdb
FireIncidents
Editor
Editor
Catalog
Location: FireIncidents
Home - Documents\ArcGIS
Folder Connections
C:\
ArcpyBook
Appendix1
Appendix2
Ch1
Ch10
Ch11
Ch12
ArcToolbox
Table
FireIncidents
OBJECTID * SHAPE * CONFIDENCEVALUE
9218 Point 62
9219 Point 50
9220 Point 60
9221 Point 60
9222 Point 48
9223 Point 57
9224 Point 60
9225 Point 61
9226 Point 57
9227 Point 61
9228 Point 65
9229 Point 11
9230 Point 74
9231 Point 43
9232 Point 35
9233 Point 52
9234 Point 18
9235 Point 87
9236 Point 100
9237 Point 45
9238 Point 60
9239 Point 78
9240 Point 86
9241 Point 82
(0 out of 411 Selected)
Python
Record number 393 written to feature class
Record number 394 written to feature class
Record number 395 written to feature class
Record number 396 written to feature class
Record number 397 written to feature class
Record number 398 written to feature class
Record number 399 written to feature class
Record number 400 written to feature class
Record number 401 written to feature class
Record number 402 written to feature class
Record number 403 written to feature class
Record number 404 written to feature class
Record number 405 written to feature class
Record number 406 written to feature class
Record number 407 written to feature class
Record number 408 written to feature class
Record number 409 written to feature class
Record number 410 written to feature class
Record number 411 written to feature class
>>>
37.438 -94.826 Decimal Degrees

11.6 UndateCursor更新行

UpdateCursor()函数可用于更新或删除表或要素类中的行。返回的游标将会锁定数据，如果在with语句中使用游标，则会自动释放数据锁定。调用该函数将返回UpdateCursor对象。



Table

FireIncidents

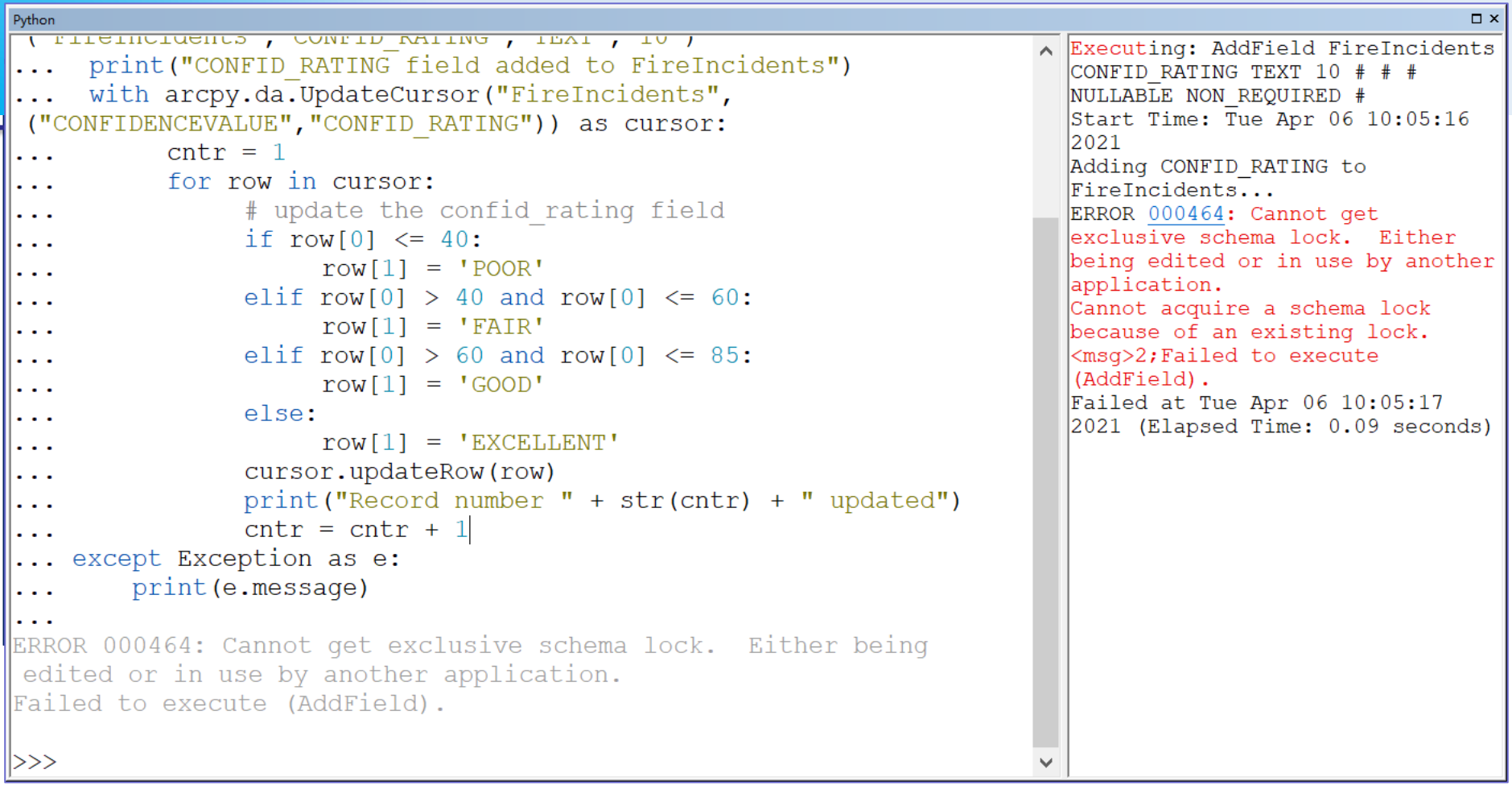
OBJECTID *	SHAPE *	CONFIDENCEVALUE
9218	Point	62
9219	Point	50
9220	Point	60
9221	Point	60
9222	Point	48
9223	Point	57
9224	Point	60
9225	Point	61
9226	Point	57
9227	Point	61
9228	Point	65
9229	Point	11
9230	Point	74
9231	Point	43
9232	Point	35
9233	Point	52
9234	Point	18
9235	Point	87
9236	Point	100
9237	Point	45
9238	Point	60

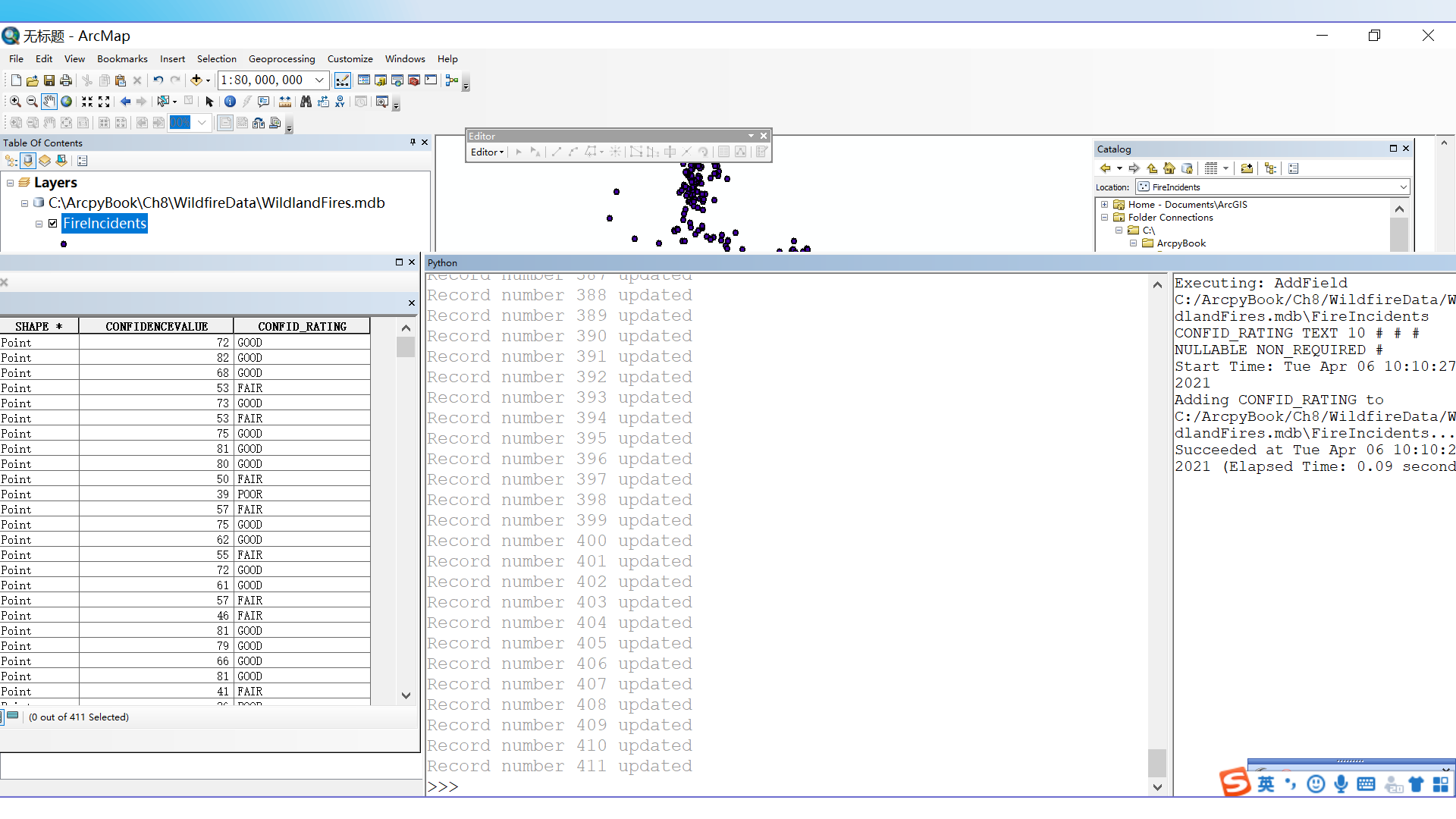
- CONFID_RATGING字段

- Confidence value 0 to 40 = POOR
- Confidence value 41 to 60 = FAIR
- Confidence value 61 to 85 = GOOD
- Confidence value 86 to 100 = EXCELLENT

Python

```
>>> import arcpy
...
... arcpy.env.workspace = "C:/ArcpyBook/Ch8/WildfireData/WildlandFires.mdb"
... try:
...  #create a new field to hold the values
...  arcpy.AddField_management("FireIncidents","CONFID_RATING","TEXT","10")
...  print("CONFID_RATING field added to FireIncidents")
...  with arcpy.da.UpdateCursor("FireIncidents",
 ("CONFIDENCEVALUE","CONFID_RATING")) as cursor:
...       cntr = 1
...       for row in cursor:
...            # update the confid_rating field
...            if row[0] <= 40:
...                 row[1] = 'POOR'
...            elif row[0] > 40 and row[0] <= 60:
...                 row[1] = 'FAIR'
...            elif row[0] > 60 and row[0] <= 85:
...                 row[1] = 'GOOD'
...            else:
...                 row[1] = 'EXCELLENT'
...            cursor.updateRow(row)
...            print("Record number " + str(cntr) + " updated")
...            cntr = cntr + 1
... except Exception as e:
...     print(e.message)
...
```


Python
("FireIncidents", "CONFID_RATING", "TEXT", 10)
... print("CONFID_RATING field added to FireIncidents")
... with arcpy.da.UpdateCursor("FireIncidents",
("CONFIDENCEVALUE","CONFID_RATING")) as cursor:
... cntr = 1
... for row in cursor:
... # update the confid_rating field
... if row[0] <= 40:
... row[1] = 'POOR'
... elif row[0] > 40 and row[0] <= 60:
... row[1] = 'FAIR'
... elif row[0] > 60 and row[0] <= 85:
... row[1] = 'GOOD'
... else:
... row[1] = 'EXCELLENT'
... cursor.updateRow(row)
... print("Record number " + str(cntr) + " updated")
... cntr = cntr + 1
... except Exception as e:
... print(e.message)
...
ERROR 000464: Cannot get exclusive schema lock. Either being edited or in use by another application.
Failed to execute (AddField).
>>>
Executing: AddField FireIncidents CONFID_RATING TEXT 10 # # # NULLABLE NON_REQUIRED #
Start Time: Tue Apr 06 10:05:16 2021
Adding CONFID_RATING to FireIncidents...
ERROR 000464: Cannot get exclusive schema lock. Either being edited or in use by another application.
Cannot acquire a schema lock because of an existing lock.
<msg>2;Failed to execute (AddField).
Failed at Tue Apr 06 10:05:17 2021 (Elapsed Time: 0.09 seconds)



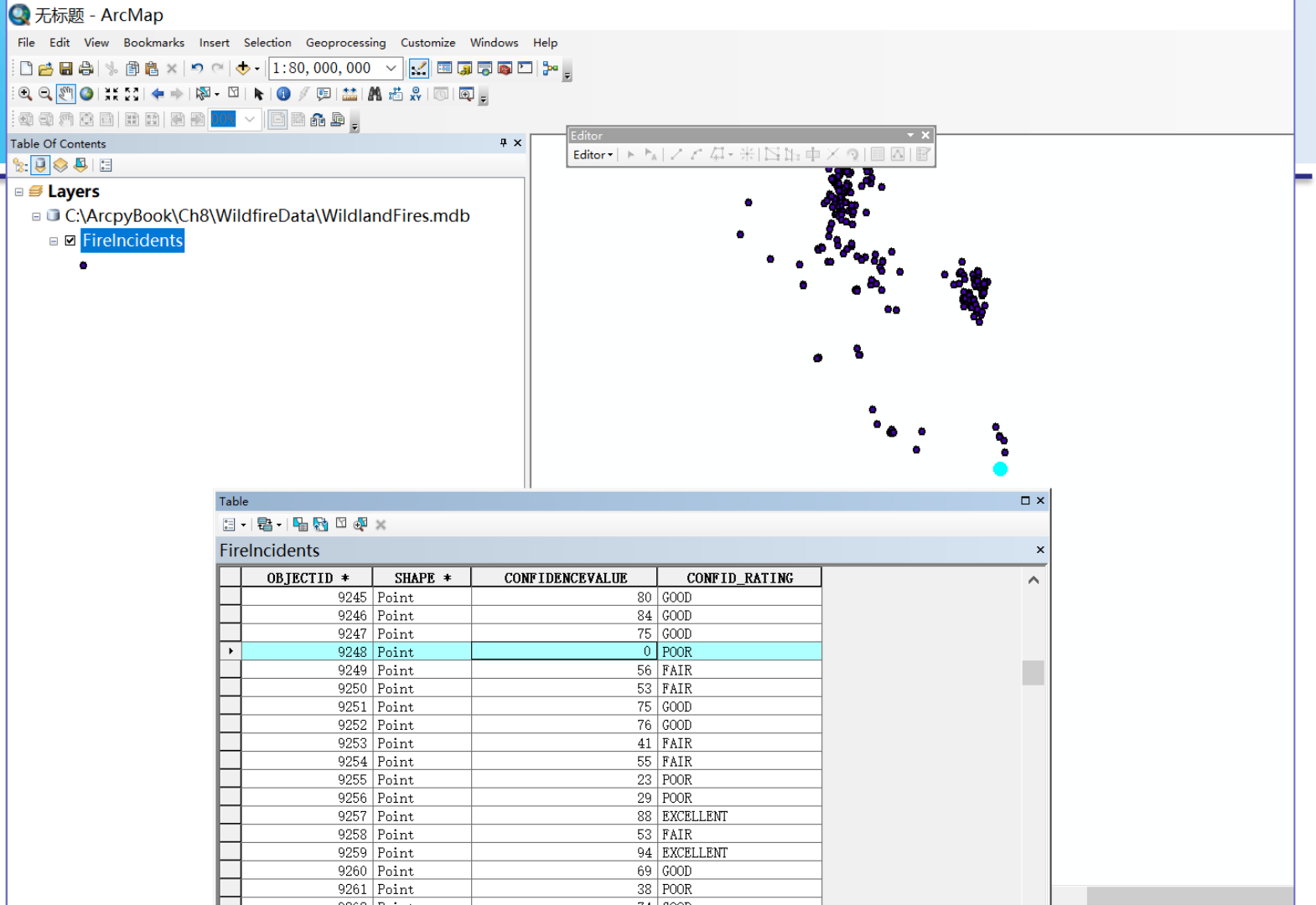
SHAPE *	CONFIDENCEVALUE	CONFID_RATING
Point	72	GOOD
Point	82	GOOD
Point	68	GOOD
Point	53	FAIR
Point	73	GOOD
Point	53	FAIR
Point	75	GOOD
Point	81	GOOD
Point	80	GOOD
Point	50	FAIR
Point	39	POOR
Point	57	FAIR
Point	75	GOOD
Point	62	GOOD
Point	55	FAIR
Point	72	GOOD
Point	61	GOOD
Point	57	FAIR
Point	46	FAIR
Point	81	GOOD
Point	79	GOOD
Point	66	GOOD
Point	81	GOOD
Point	41	FAIR

(0 out of 411 Selected)

11.7 UpdateCursor删除行

UpdateCursor除了可以更新记录，还可以删除表或要素类的记录。在更新或删除记录时，UpdateCursor对象的创建方式是相同的，但删除记录调用的是**deleteRow()**而不是updateRow()。也可以使用where子句来限制返回的记录。

11.7



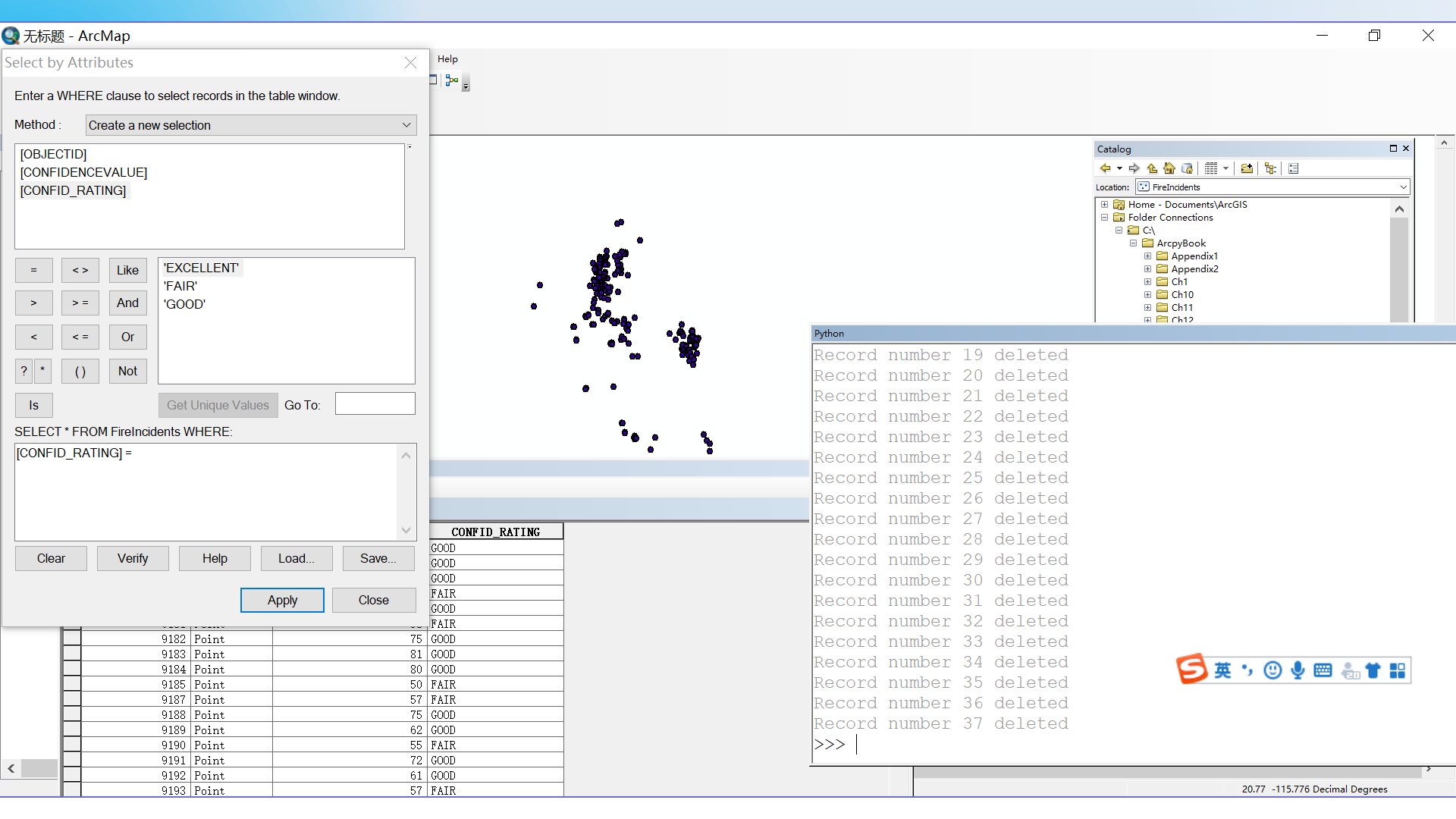
OBJECTID *	SHAPE *	CONFIDENCEVALUE	CONFID_RATING
9245	Point	80	GOOD
9246	Point	84	GOOD
9247	Point	75	GOOD
9248	Point	0	POOR
9249	Point	56	FAIR
9250	Point	53	FAIR
9251	Point	75	GOOD
9252	Point	76	GOOD
9253	Point	41	FAIR
9254	Point	55	FAIR
9255	Point	23	POOR
9256	Point	29	POOR
9257	Point	88	EXCELLENT
9258	Point	53	FAIR
9259	Point	94	EXCELLENT
9260	Point	69	GOOD
9261	Point	38	POOR

如何删除CONFID_RATING字段值为“POOR”的记录？？？

11.7 UpdateCursor删除行

Python

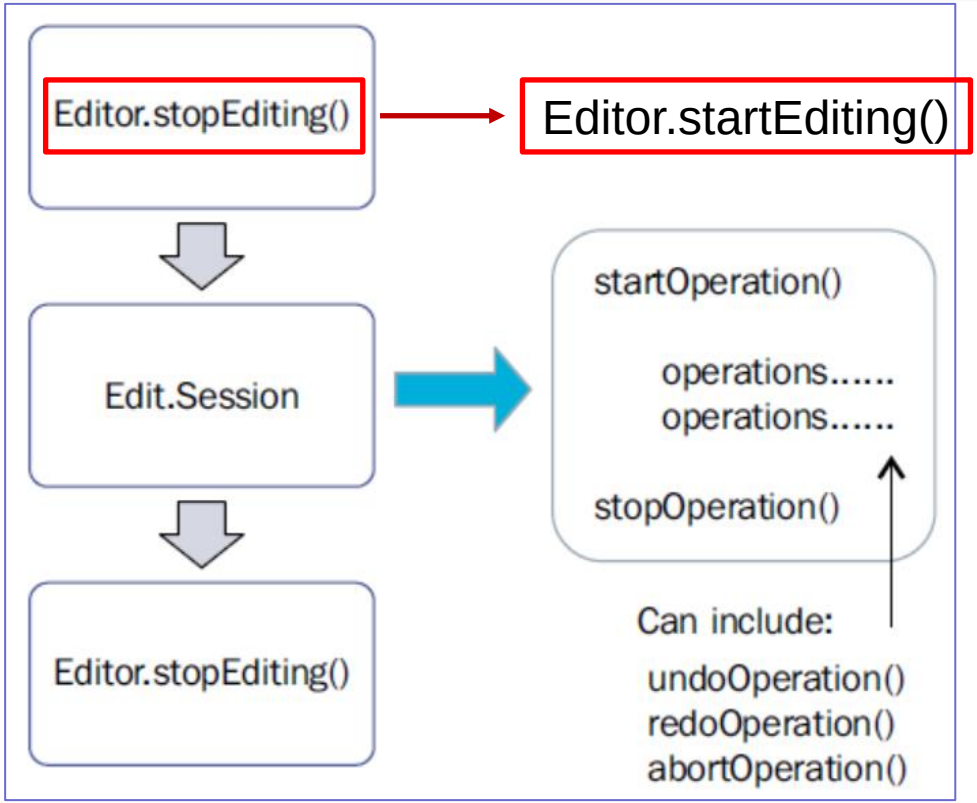
```
>>> import arcpy
... import os
...
... arcpy.env.workspace =
 "C:/ArcpyBook/Ch8/WildfireData/WildlandFires.mdb"
... try:
...  with arcpy.da.UpdateCursor("FireIncidents",
 ("CONFID_RATING"),'[CONFID_RATING] = \'POOR\'') as cursor:
...       cntr = 1
...       for row in cursor:
...            cursor.deleteRow()
...            print("Record number " + str(cntr) + " deleted")
...            cntr = cntr + 1
... except Exception as e:
...     print(e.message)
```


无标题 - ArcMap
Select by Attributes
Enter a WHERE clause to select records in the table window.
Method :
Create a new selection
[OBJECTID]
[CONFIDENCEVALUE]
[CONFID_RATING]
= < > Like
> > = And
< < = Or
? * ( ) Not
'EXCELLENT'
'FAIR'
'GOOD'
Is
Get Unique Values
Go To:
SELECT * FROM FireIncidents WHERE:
[CONFID_RATING] =
Clear Verify Help Load... Save...
Apply Close
Help
Catalog
Location: FireIncidents
Home - Documents\ArcGIS
Folder Connections
C:\
ArcpyBook
Appendix1
Appendix2
Ch1
Ch10
Ch11
Ch12
Python
Record number 19 deleted
Record number 20 deleted
Record number 21 deleted
Record number 22 deleted
Record number 23 deleted
Record number 24 deleted
Record number 25 deleted
Record number 26 deleted
Record number 27 deleted
Record number 28 deleted
Record number 29 deleted
Record number 30 deleted
Record number 31 deleted
Record number 32 deleted
Record number 33 deleted
Record number 34 deleted
Record number 35 deleted
Record number 36 deleted
Record number 37 deleted
>>>
CONFID_RATING
9182 Point 75 GOOD
9183 Point 81 GOOD
9184 Point 80 GOOD
9185 Point 50 FAIR
9187 Point 57 FAIR
9188 Point 75 GOOD
9189 Point 62 GOOD
9190 Point 55 FAIR
9191 Point 72 GOOD
9192 Point 61 GOOD
9193 Point 57 FAIR
20.77 -115.776 Decimal Degrees

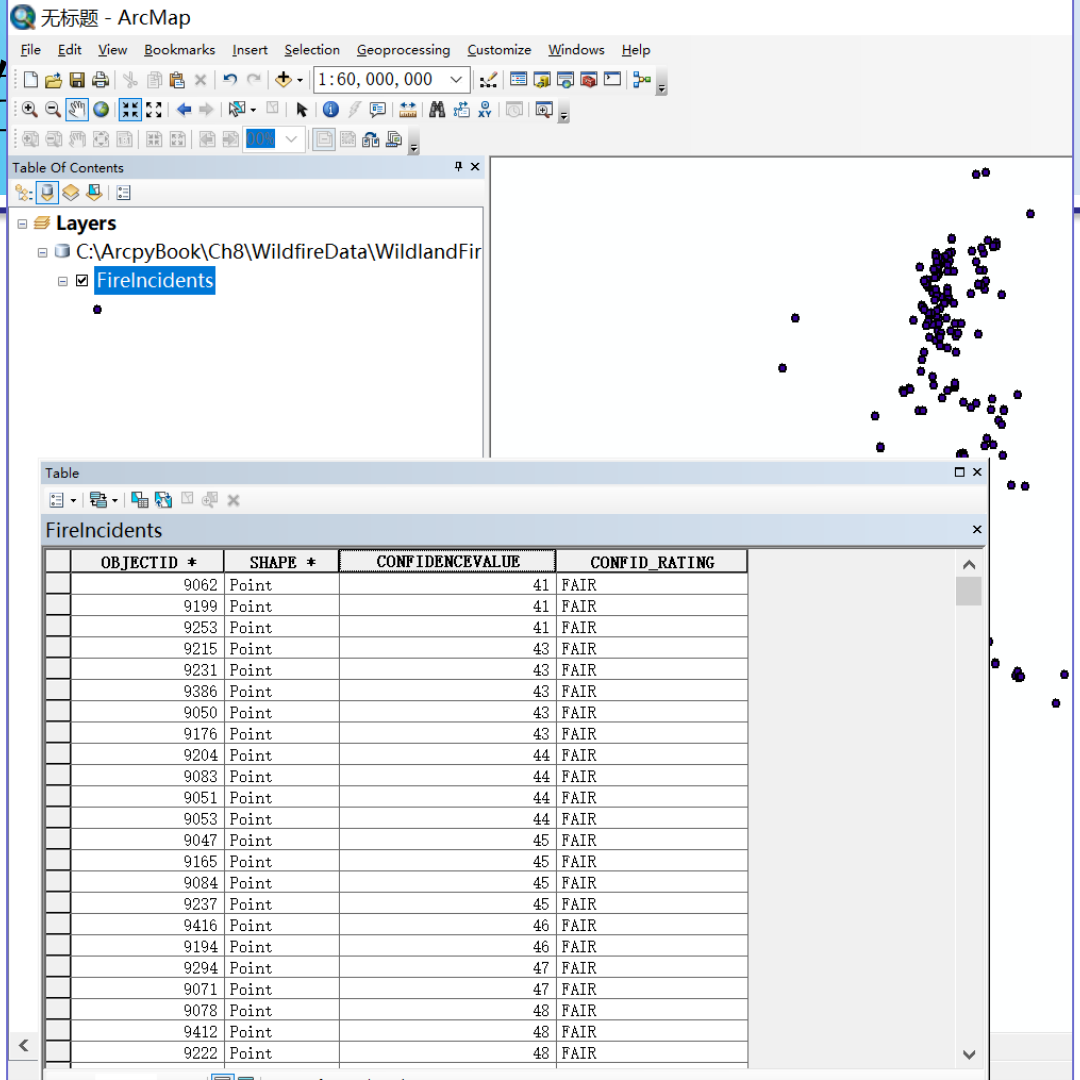
11.8 在编辑会话中插入和更新行

数据访问模块中新的Editor类支持创建编辑会话和编辑操作功能。调用Editor.startEditing()启动编辑会话。在会话中，使用Editor.startOperation()方法开始一个操作，在这个操作中可以对数据执行各种编辑操作。这些编辑可以被撤销、重做、回滚、中止等。完成这些操作后，先调用Editor.stopOperation()方法停止编辑操作，再调用Editor.stopEditing()方法停止编辑会话。会话结束时可以不保存，在这种情况下，更改将不会生效。

11.8 在编辑会话中插入和更新行



11.8 在



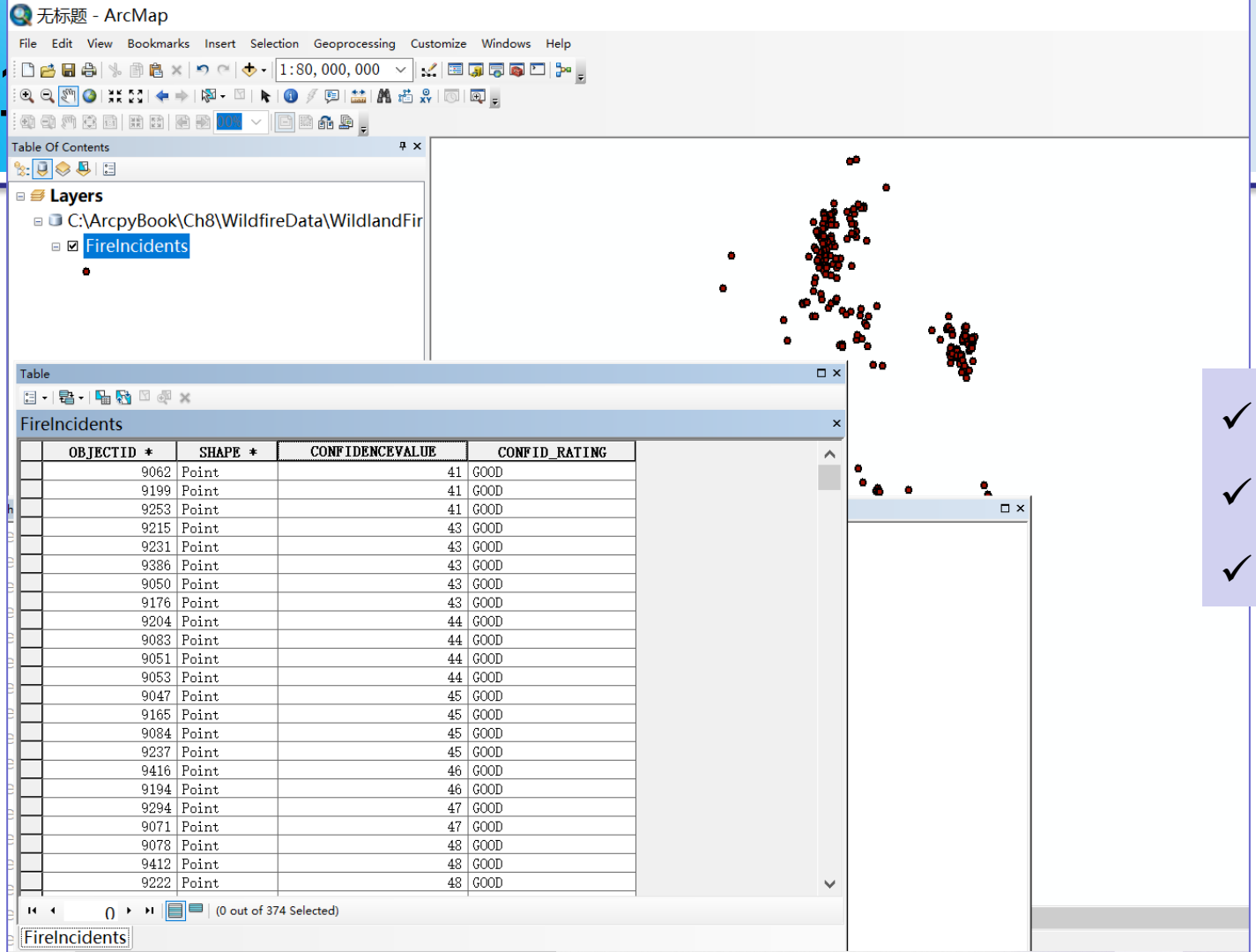
OBJECTID *	SHAPE *	CONFIDENCEVALUE	CONFID_RATING
9062	Point	41	FAIR
9199	Point	41	FAIR
9253	Point	41	FAIR
9215	Point	43	FAIR
9231	Point	43	FAIR
9386	Point	43	FAIR
9050	Point	43	FAIR
9176	Point	43	FAIR
9204	Point	44	FAIR
9083	Point	44	FAIR
9051	Point	44	FAIR
9053	Point	44	FAIR
9047	Point	45	FAIR
9165	Point	45	FAIR
9084	Point	45	FAIR
9237	Point	45	FAIR
9416	Point	46	FAIR
9194	Point	46	FAIR
9294	Point	47	FAIR
9071	Point	47	FAIR
9078	Point	48	FAIR
9412	Point	48	FAIR
9222	Point	48	FAIR

- ✓ 40~60: GOOD
- ✓ 61~85: BETTER
- ✓ 86及以上: Best

11.8

Python

```
>>> import arcpy
... import os
...
... arcpy.env.workspace =
"C:/ArcpyBook/Ch8/WildfireData/WildlandFires.mdb"
... try:
...  edit = arcpy.da.Editor
('C:/ArcpyBook/Ch8/WildfireData/WildlandFires.mdb')
...  edit.startEditing(True)
...  with arcpy.da.UpdateCursor("FireIncidents",
("CONFIDENCEVALUE","CONFID_RATING")) as cursor:
...       cntr = 1
...       for row in cursor:
...            # update the confid_rating field
...            if row[0] > 40 and row[0] <= 60:
...                 row[1] = 'GOOD'
...            elif row[0] > 60 and row[0] <= 85:
...                 row[1] = 'BETTER'
...            else:
...                 row[1] = 'BEST'
...            cursor.updateRow(row)
...            print("Record number " + str(cntr) + "
updated")
...            cntr = cntr + 1
...  edit.stopEditing(True)
... except Exception as e:
...     print(e.message)
...
```

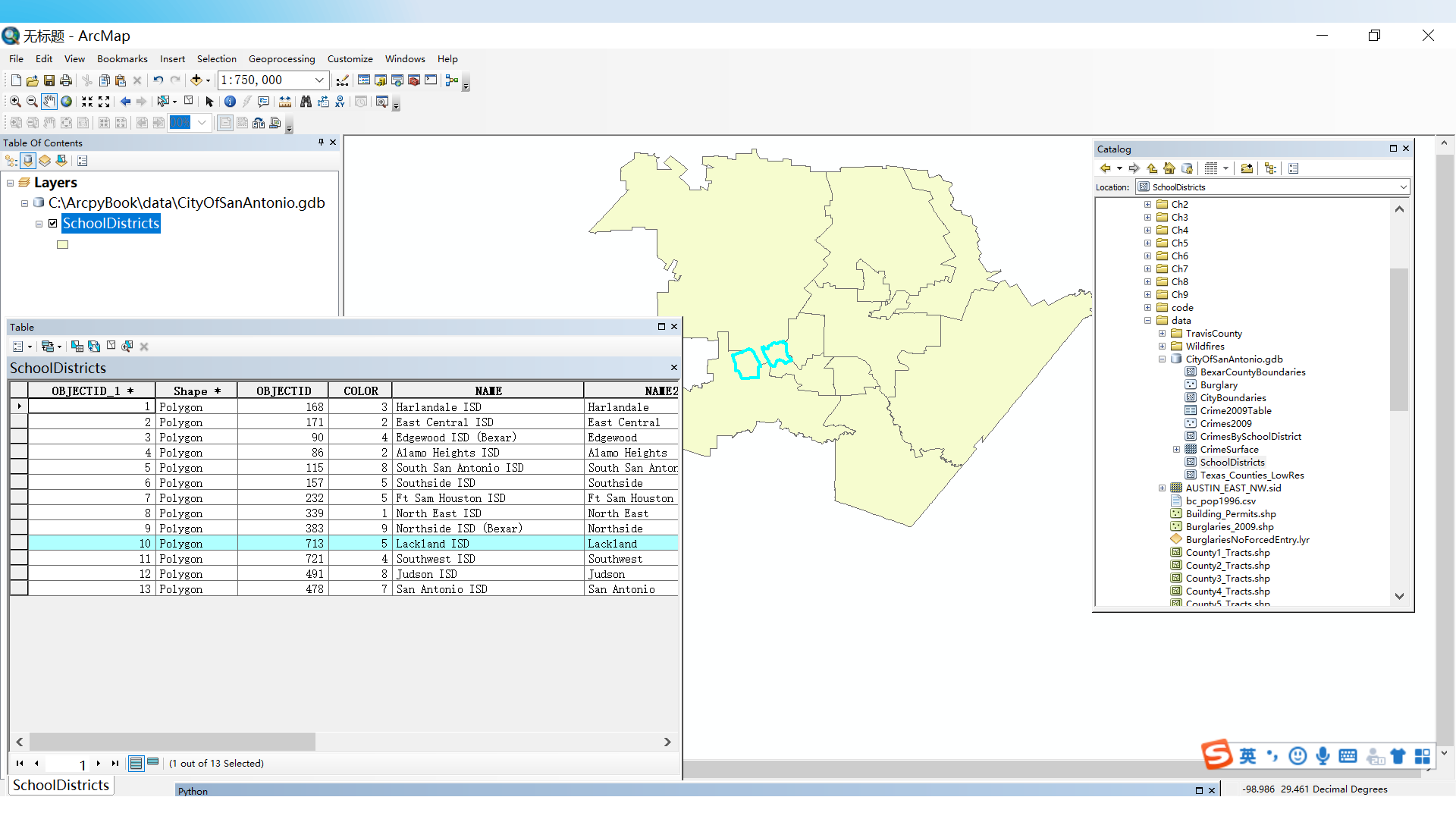


- ✓ 40~60: GOOD
- ✓ 61~85: BETTER
- ✓ 86及以上: Best

11.9 读取要素类中的几何信息

每个要素类都有相关的几何对象，如Polygon，Polyline，PointGeometry或MultiPoint等，都可以在游标中访问。这些几何对象存储在要素类属性表中的shape字段中，可以通过shape字段来读取每个要素的几何特征。

Polyline和Polygon要素类的要素是由多个部分组成的。首先使用partCount属性返回每个要素组成部分的数量，然后使用getPart()遍历要素每个部分的每个点，提取坐标信息。点要素类由PointGeometry对象组成，每个要素都包含了每个点的坐标信息。


无标题 - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:750,000
Table Of Contents
Layers
C:\ArcpyBook\data\CityOfSanAntonio.gdb
SchoolDistricts
Table
SchoolDistricts
OBJECTID_1 * | Shape * | OBJECTID | COLOR | NAME | NAME2
1 | Polygon | 168 | 3 | Harlandale ISD | Harlandale
2 | Polygon | 171 | 2 | East Central ISD | East Central
3 | Polygon | 90 | 4 | Edgewood ISD (Bexar) | Edgewood
4 | Polygon | 86 | 2 | Alamo Heights ISD | Alamo Heights
5 | Polygon | 115 | 8 | South San Antonio ISD | South San Antor
6 | Polygon | 157 | 5 | Southside ISD | Southside
7 | Polygon | 232 | 5 | Ft Sam Houston ISD | Ft Sam Houston
8 | Polygon | 339 | 1 | North East ISD | North East
9 | Polygon | 383 | 9 | Northside ISD (Bexar) | Northside
10 | Polygon | 713 | 5 | Lackland ISD | Lackland
11 | Polygon | 721 | 4 | Southwest ISD | Southwest
12 | Polygon | 491 | 8 | Judson ISD | Judson
13 | Polygon | 478 | 7 | San Antonio ISD | San Antonio
(1 out of 13 Selected)
Catalog
Location: SchoolDistricts
Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8
Ch9
code
data
TravisCounty
Wildfires
CityOfSanAntonio.gdb
BexarCountyBoundaries
Burglary
CityBoundaries
Crime2009Table
Crimes2009
CrimesBySchoolDistrict
CrimeSurface
SchoolDistricts
Texas_Counties_LowRes
AUSTIN_EAST_NW.sid
bc_pop1996.csv
Building_Permits.shp
Burglaries_2009.shp
BurglariesNoForcedEntry.lyr
County1_Tracts.shp
County2_Tracts.shp
County3_Tracts.shp
County4_Tracts.shp
SchoolDistricts
Python
-98.986 29.461 Decimal Degrees

```
>>> import arcpy
... infc = "c:/ArcpyBook/data/CityOfSanAntonio.gdb/SchoolDistricts"
... # Enter for loop for each feature
... for row in arcpy.da.SearchCursor(infc, ["OID@", "SHAPE@"],'"NAME" = \'Lackland ISD\''):
...     # Print the current multipoint's ID
...     print("Feature {0}:".format(row[0]))
...     partnum = 0
...
...     # Step through each part of the feature
...     #
...     for part in row[1]:
...         # Print the part number
...         #
...         print("Part {0}:".format(partnum))
...
...         # Step through each vertex in the feature
...         #
...         for pnt in part:
...             if pnt:
...                 # Print x,y coordinates of current point
...                 #
...                 print("{0}, {1}".format(pnt.X, pnt.Y))
...             else:
...                 # If pnt is None, this represents an interior ring
...                 #
...                 print("Interior Ring:")
...         partnum += 1
...
```

11.9 读取要素类中的几何信息

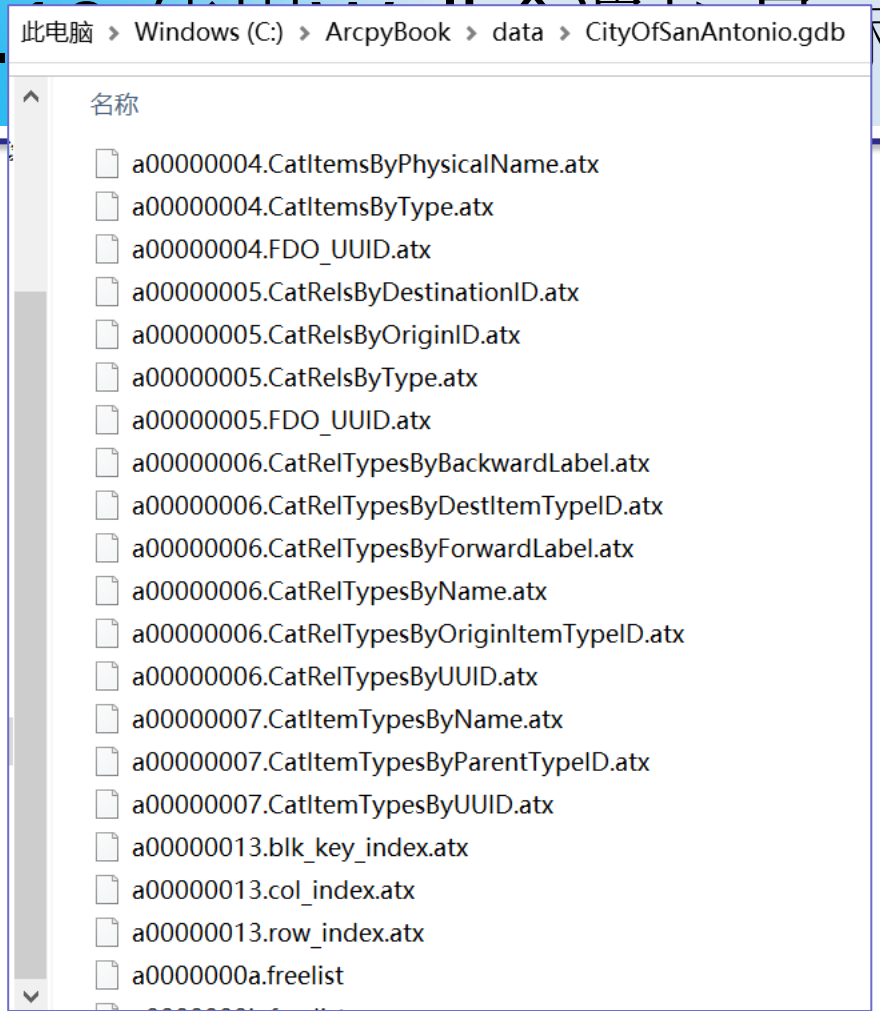
```
Feature 10:
Part 0:
-98.660787011, 29.392755991
-98.659319964, 29.392306981
-98.657978966, 29.392642979
-98.656901005, 29.392623979
-98.656297999, 29.391234009
-98.65536998, 29.389604049
-98.652797926, 29.385134011
-98.652297938, 29.384234014
-98.651897965, 29.383533988
-98.651497957, 29.38273398
-98.648797879, 29.377733987
-98.647598023, 29.375733974
-98.646998026, 29.374334045
-98.645597963, 29.371934043
-98.645197969, 29.371233993
-98.644897997, 29.370533975
-98.644497981, 29.369733947
-98.643997908, 29.369033925
-98.643497953, 29.368234032
-98.64319797, 29.367434024
-98.643297947, 29.366634022
-98.643297986, 29.365734022
-98.646608956, 29.365852022
-98.646569959, 29.360961003
```

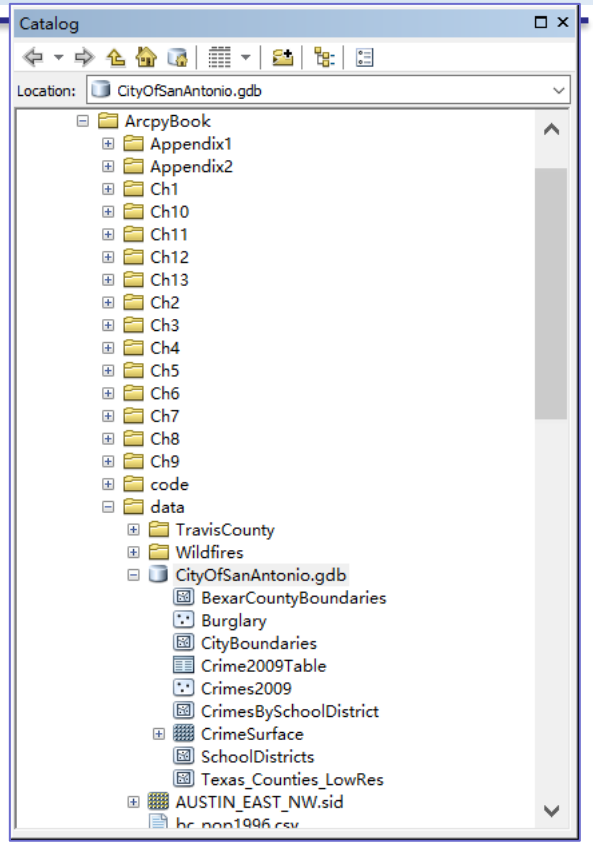
```
Part 1:
-98.607796983, 29.405232971
-98.60799699, 29.403332951
-98.607092233, 29.402978945
-98.606508907, 29.402750699
-98.605697064, 29.402433035
-98.602996966, 29.401432967
-98.602897024, 29.393433961
-98.603096948, 29.392234017
-98.602996941, 29.389534011
-98.60279701, 29.387133986
-98.60179699, 29.387034053
-98.601729044, 29.386907961
-98.601097062, 29.385734018
-98.601397003, 29.384833972
-98.601189766, 29.384681242
-98.601431994, 29.384051529
-98.601765017, 29.383167018
-98.594366232, 29.376630893
-98.594163508, 29.376451788
-98.596194791, 29.373943013
-98.597716434, 29.374833571
-98.599030298, 29.374176111
-98.600214999, 29.373606806
-98.601397746, 29.373171881
-98.603264564, 29.370961743
```

11.10 使用Walk()遍历目录

Walk()函数是arcpy.da的一部分，通过自上而下或自下而上的方式遍历目录树，生成目录树中的文件名。每个目录或工作空间生成一个包含目录路径、目录名称和文件名的元组。这个函数类似于Python的os.**walk()**函数，但是它具有识别地理数据库结构的优点。os.walk()函数是基于文件的，所以不能够提供有关地理数据库结构的信息，但是arcpy.da.Walk()可以。

11.


此电脑 › Windows (C:) › ArcpyBook › data › CityOfSanAntonio.gdb
名称
a00000004.CatItemsByPhysicalName.atx
a00000004.CatItemsByType.atx
a00000004.FDO_UUID.atx
a00000005.CatRelsByDestinationID.atx
a00000005.CatRelsByOriginID.atx
a00000005.CatRelsByType.atx
a00000005.FDO_UUID.atx
a00000006.CatRelTypesByBackwardLabel.atx
a00000006.CatRelTypesByDestItemTypeID.atx
a00000006.CatRelTypesByForwardLabel.atx
a00000006.CatRelTypesByName.atx
a00000006.CatRelTypesByOriginItemTypeID.atx
a00000006.CatRelTypesByUUID.atx
a00000007.CatItemTypesByName.atx
a00000007.CatItemTypesByParentTypeID.atx
a00000007.CatItemTypesByUUID.atx
a00000013.blk_key_index.atx
a00000013.col_index.atx
a00000013.row_index.atx
a0000000a.freelist


Catalog
Location: CityOfSanAntonio.gdb
ArcpyBook
Appendix1
Appendix2
Ch1
Ch10
Ch11
Ch12
Ch13
Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8
Ch9
code
data
TravisCounty
Wildfires
CityOfSanAntonio.gdb
BexarCountyBoundaries
Burglary
CityBoundaries
Crime2009Table
Crimes2009
CrimesBySchoolDistrict
CrimeSurface
SchoolDistricts
Texas_Counties_LowRes
AUSTIN_EAST_NW.sid

11.10 使用Walk()遍历目录

Python

```
>>> import arcpy.da as da
... import os
... os.chdir(r'C:\ArcpyBook\data\CityOfSanAntonio.gdb')
... print("os walk")
...
... for dirpath, dirnames, filenames in os.walk(os.getcwd()):
...     for filename in filenames:
...         print(filename)
...
... print("arcpy da walk")
...
... for dirpath, dirnames, filenames in da.Walk(os.getcwd
 (),datatype="FeatureClass"):
...     for filename in filenames:
...         print(os.path.join(dirpath, filename))
```

11.10 使用Walk()遍历目录

```
os walk
a00000001.gdbindexes
a00000001.gdbtable
a00000001.gdbtablx
a00000002.gdbtable
a00000002.gdbtablx
a00000003.gdbindexes
a00000003.gdbtable
a00000003.gdbtablx
a00000004.CatItemsByPhysicalName.atx
a00000004.CatItemsByType.atx
a00000004.FDO_UUID.atx
a00000004.freelist
a00000004.gdbindexes
a00000004.gdbtable
a00000004.gdbtablx
a00000004.spx
a00000005.CatRelsByDestinationID.atx
a00000005.CatRelsByOriginID.atx
a00000005.CatRelsByType.atx
a00000005.FDO_UUID.atx
a00000005.gdbindexes
a00000005.gdbtable
a00000005.gdbtablx
```

```
arcpy da walk
C:\ArcpyBook\data\CityOfSanAntonio.gdb\Crimes2009
C:\ArcpyBook\data\CityOfSanAntonio.gdb\CityBoundaries
C:\ArcpyBook\data\CityOfSanAntonio.gdb\CrimesBySchoolDistrict
C:\ArcpyBook\data\CityOfSanAntonio.gdb\SchoolDistricts
C:\ArcpyBook\data\CityOfSanAntonio.gdb\BexarCountyBoundaries
C:\ArcpyBook\data\CityOfSanAntonio.gdb\Texas_Counties_LowRes
C:\ArcpyBook\data\CityOfSanAntonio.gdb\Burglary
>>>
```

- ✓ 地理数据库中要素类的实际名称
- ✓ 物理文件名

The End