Python - Tips and Tricks for Working with Cursors

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Cursors

• Used to:
  - Iterate over the set of rows in a table
  - Insert new rows into a table
1. Use the data access (da) module cursors
Two Types of Cursors

- **arcpy.da cursors** (10.1 onwards; significantly faster performance)
- “Classic” cursors (provided only for continuing backward compatibility)
2. Choose the right cursor for the task
Data Access Module Cursors

Search (da.SearchCursor)

Update (da.UpdateCursor)

Insert (da.InsertCursor)
Required Arguments

• Table
  - The feature class, layer, table, or table view

• Fields
  - Single field or list of field names
  - Index position in fields parameter defines value access

```
#           0        1       2
fields = ["Name", "Year", "Count"]
```
3. Use tokens as shortcuts
Tokens

Used as shortcuts in place of field names

- **OID@** — The value of the ObjectId field.
- **SHAPE@** — A geometry object for the feature.

- **SHAPE@XY** — A tuple of the feature’s centroid x,y coordinates.
- **SHAPE@TRUECENTROID** — A tuple of the feature’s true centroid x,y coordinates.
- **SHAPE@X** — A double of the feature’s x-coordinate.
- **SHAPE@Y** — A double of the feature’s y-coordinate.
- **SHAPE@Z** — A double of the feature’s z-coordinate.
- **SHAPE@M** — A double of the feature’s m-value.

- **SHAPE@JSON** — The esri JSON string representing the geometry.
- **SHAPE@WKB** — The well-known binary (WKB) representation for OGC geometry. It provides a portable representation of a geometry value as a contiguous stream of bytes.
- **SHAPE@WKT** — The well-known text (WKT) representation for OGC geometry. It provides a portable representation of a geometry value as a text string.
- **SHAPE@AREA** — A double of the feature’s area.
- **SHAPE@LENGTH** — A double of the feature’s length.
4. Need to limit results? Use the where clause parameter.
arcpy.da.SearchCursor

arcpy.da.SearchCursor(in_table, field_names, {where_clause}, {spatial_reference}, {explode_to_points}, {sql_clause})
<table>
<thead>
<tr>
<th>Shape</th>
<th>OBJECTID</th>
<th>CON</th>
<th>REPORTDATE</th>
<th>SHIFT</th>
<th>OFFENSE</th>
<th>METHOD</th>
<th>LASTMODIFIED</th>
<th>BLOCKSITEA</th>
<th>BLOCKXCOORD</th>
<th>BLOCKYCOORD</th>
<th>WARD</th>
<th>ANC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>15915</td>
<td>16063234</td>
<td>2016-04-22T21:30:25</td>
<td>EVENING</td>
<td>THEFT/OTHER</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>2800 - 2899 BLOCK OF...</td>
<td>395007</td>
<td>137489</td>
<td>2</td>
<td>2E</td>
</tr>
<tr>
<td>Point</td>
<td>15916</td>
<td>16063250</td>
<td>2016-04-22T22:00:09</td>
<td>EVENING</td>
<td>THEFT/OTHER</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>1100 - 1127 BLOCK OF...</td>
<td>397450</td>
<td>137381</td>
<td>2</td>
<td>2F</td>
</tr>
<tr>
<td>Point</td>
<td>15917</td>
<td>16063374</td>
<td>2016-04-23T03:06:29</td>
<td>MIDNIGHT</td>
<td>THEFT/F/AUTO</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>2400 - 2499 BLOCK OF...</td>
<td>402216</td>
<td>139352</td>
<td>5</td>
<td>5C</td>
</tr>
<tr>
<td>Point</td>
<td>15918</td>
<td>16063392</td>
<td>2016-04-23T02:10:11</td>
<td>MIDNIGHT</td>
<td>THEFT/OTHER</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>2000 - 2099 BLOCK OF...</td>
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<td>138793</td>
<td>1</td>
<td>1B</td>
</tr>
<tr>
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<td>16063419</td>
<td>2016-04-23T03:18:48</td>
<td>MIDNIGHT</td>
<td>ROBBERY</td>
<td>GUN</td>
<td>2017-01-10T07:18:37</td>
<td>1200 - 1299 BLOCK OF...</td>
<td>400938</td>
<td>134825</td>
<td>6</td>
<td>6B</td>
</tr>
<tr>
<td>Point</td>
<td>15920</td>
<td>16063431</td>
<td>2016-04-23T04:47:13</td>
<td>MIDNIGHT</td>
<td>ROBBERY</td>
<td>GUN</td>
<td>2017-01-10T07:18:37</td>
<td>1200 - 1299 BLOCK OF...</td>
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<td>142561</td>
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<td>5B</td>
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<td>ASSAULT W/DANGE</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>1127 - 1199 BLOCK OF...</td>
<td>398944</td>
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<td>6E</td>
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<tr>
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<td>16063447</td>
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<td>MIDNIGHT</td>
<td>ROBBERY</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>900 - 931 BLOCK OF...</td>
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<td>138792</td>
<td>1</td>
<td>1B</td>
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<td>MIDNIGHT</td>
<td>THEFT/F/AUTO</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>1300 - 1399 BLOCK OF...</td>
<td>397302</td>
<td>139967</td>
<td>1</td>
<td>1A</td>
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<tr>
<td>Point</td>
<td>15924</td>
<td>16063484</td>
<td>2016-04-23T08:51:12</td>
<td>DAY</td>
<td>THEFT/OTHER</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>1240 - 1399 BLOCK OF...</td>
<td>401165</td>
<td>138586</td>
<td>5</td>
<td>5C</td>
</tr>
<tr>
<td>Point</td>
<td>15925</td>
<td>16063495</td>
<td>2016-04-23T11:00:50</td>
<td>DAY</td>
<td>THEFT/OTHER</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>1800 - 2299 BLOCK OF...</td>
<td>402158</td>
<td>138824</td>
<td>5</td>
<td>5C</td>
</tr>
<tr>
<td>Point</td>
<td>15926</td>
<td>16063511</td>
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<td>DAY</td>
<td>THEFT/OTHER</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>1400 - 1499 BLOCK OF...</td>
<td>397136</td>
<td>138634</td>
<td>2</td>
<td>2B</td>
</tr>
<tr>
<td>Point</td>
<td>15927</td>
<td>16063520</td>
<td>2016-04-23T10:53:05</td>
<td>DAY</td>
<td>THEFT/OTHER</td>
<td>OTHERS</td>
<td>2017-01-10T07:18:37</td>
<td>600 - 689 BLOCK OF...</td>
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<td>140497</td>
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<td>5E</td>
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<tr>
<td>Point</td>
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<td>16063527</td>
<td>2016-04-23T11:35:51</td>
<td>DAY</td>
<td>THEFT/OTHER</td>
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<td>2017-01-10T07:18:37</td>
<td>400 - 499 BLOCK OF...</td>
<td>398392</td>
<td>142453</td>
<td>4</td>
<td>4D</td>
</tr>
</tbody>
</table>
```python
# Open a Search Cursor, print results

table = "Crime_Incidents_2016"
fields = ["Shift", "Offense", "Method", "Ward"]
qry = " Ward = '6' "

with arcpy.da.SearchCursor(table, fields, qry) as cursor:
    for row in cursor:
        print("Shift: {} Offense:{} Method: {} Ward: {}".format(row[0], row[1], row[2], row[3]))
```
# Open a Search Cursor, print results

table = "Crime_Incidents_2016"
fields = ["Shift", "Offense", "Method", "Ward"]
qry = " Ward = '6' "

with arcpy.da.SearchCursor(table, fields, qry) as cursor:
    for row in cursor:
        print("Shift: {} Offense: {} Method: {} Ward: {}".format(row[0], row[1], row[2], row[3]))
5. Need the geometry reported in a different coordinate system? Use the spatial reference parameter.
# Open a Search Cursor with a where clause, print results

table = "Crime_Incidents_2016"
fields = ["Offense", "SHAPE@XY"]
qry = " Ward = '6' "
# WKID: 2248 for NAD_1983_StatePlane_Maryland_FIPS_1900_Feet
sro = arcpy.SpatialReference(2248)
with arcpy.da.SearchCursor(table, fields, qry, sro) as cursor:
    for row in cursor:
        print("Offense:{} Coordinates: {}".format(row[0], row[1]))
# Open a Search Cursor with a where clause, print results

table = "Crime_Incidents_2016"
fields = ["Offense", "SHAPE@XY"]
qry = " Ward = '6' "
# WKID: 2248 for NAD_1983_StatePlane_Maryland_FIPS_1900_Feet
sro = arcpy.SpatialReference(2248)

with arcpy.da.SearchCursor(table, fields, qry, sro) as cursor:
    for row in cursor:
        print("Offense:{} Coordinates: {}".format(row[0], row[1]))
6. Need information about every vertex? Use the explode to points parameter.
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