Python - Tips and Tricks for Working with Cursors

Brittney White

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

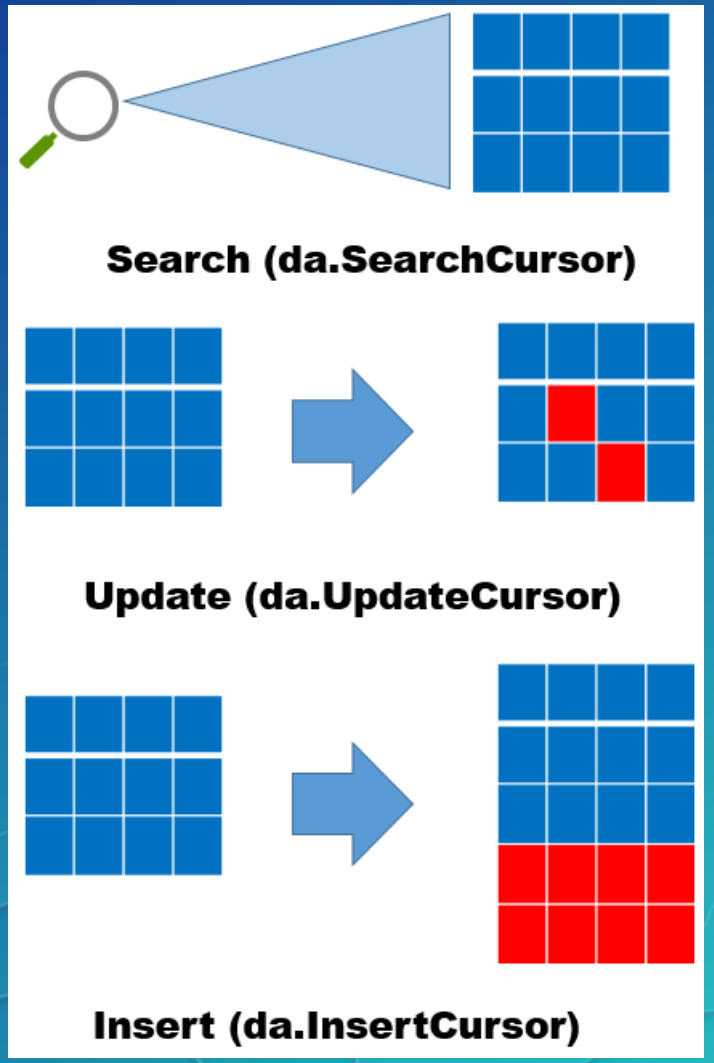
Two Types of Cursors

- arcpy.da cursors (10.1 onwards; significantly faster performance)
- “Classic” cursors (provided only for continuing backward compatibility)

> Legacy: The **arcpy.da** cursors (**arcpy.da.SearchCursor**, **arcpy.da.UpdateCursor**, and **arcpy.da.InsertCursor**) were introduced with ArcGIS 10.1 to provide significantly faster performance over the previously existing set of cursor functions (**arcpy.SearchCursor**, **arcpy.UpdateCursor**, and **arcpy.InsertCursor**). The original cursors are provided only for continuing backward compatibility.

2. Choose the right cursor for the task

Data Access Module Cursors



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

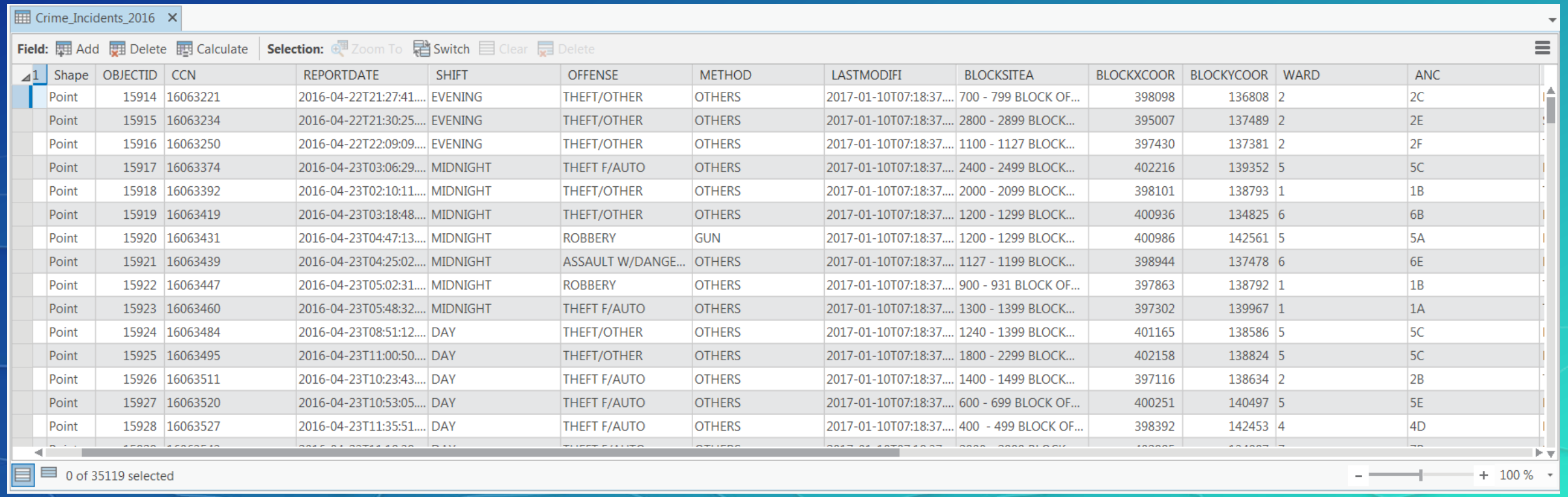
- OID@ —The value of the ObjectID field.
- SHAPE@ —A geometry object for the feature.
- SHAPE@XY —A tuple of the feature's centroid x,y coordinates.
- SHAPE@TRUECENTROID —A tuple of the feature's true centroid x,y coordinates.
- SHAPE@X —A double of the feature's x-coordinate.
- SHAPE@Y —A double of 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})
```

arcpy.da.SearchCursor


Crime_Incidents_2016

Field: Add Delete Calculate Selection: Zoom To Switch Clear Delete

1	Shape	OBJECTID	CCN	REPORTDATE	SHIFT	OFFENSE	METHOD	LASTMODIFI	BLOCKSITEA	BLOCKXCOOR	BLOCKYCOOR	WARD	ANC
	Point	15914	16063221	2016-04-22T21:27:41....	EVENING	THEFT/OTHER	OTHERS	2017-01-10T07:18:37....	700 - 799 BLOCK OF...	398098	136808	2	2C
	Point	15915	16063234	2016-04-22T21:30:25....	EVENING	THEFT/OTHER	OTHERS	2017-01-10T07:18:37....	2800 - 2899 BLOCK...	395007	137489	2	2E
	Point	15916	16063250	2016-04-22T22:09:09....	EVENING	THEFT/OTHER	OTHERS	2017-01-10T07:18:37....	1100 - 1127 BLOCK...	397430	137381	2	2F
	Point	15917	16063374	2016-04-23T03:06:29....	MIDNIGHT	THEFT F/AUTO	OTHERS	2017-01-10T07:18:37....	2400 - 2499 BLOCK...	402216	139352	5	5C
	Point	15918	16063392	2016-04-23T02:10:11....	MIDNIGHT	THEFT/OTHER	OTHERS	2017-01-10T07:18:37....	2000 - 2099 BLOCK...	398101	138793	1	1B
	Point	15919	16063419	2016-04-23T03:18:48....	MIDNIGHT	THEFT/OTHER	OTHERS	2017-01-10T07:18:37....	1200 - 1299 BLOCK...	400936	134825	6	6B
	Point	15920	16063431	2016-04-23T04:47:13....	MIDNIGHT	ROBBERY	GUN	2017-01-10T07:18:37....	1200 - 1299 BLOCK...	400986	142561	5	5A
	Point	15921	16063439	2016-04-23T04:25:02....	MIDNIGHT	ASSAULT W/DANGE...	OTHERS	2017-01-10T07:18:37....	1127 - 1199 BLOCK...	398944	137478	6	6E
	Point	15922	16063447	2016-04-23T05:02:31....	MIDNIGHT	ROBBERY	OTHERS	2017-01-10T07:18:37....	900 - 931 BLOCK OF...	397863	138792	1	1B
	Point	15923	16063460	2016-04-23T05:48:32....	MIDNIGHT	THEFT F/AUTO	OTHERS	2017-01-10T07:18:37....	1300 - 1399 BLOCK...	397302	139967	1	1A
	Point	15924	16063484	2016-04-23T08:51:12....	DAY	THEFT/OTHER	OTHERS	2017-01-10T07:18:37....	1240 - 1399 BLOCK...	401165	138586	5	5C
	Point	15925	16063495	2016-04-23T11:00:50....	DAY	THEFT/OTHER	OTHERS	2017-01-10T07:18:37....	1800 - 2299 BLOCK...	402158	138824	5	5C
	Point	15926	16063511	2016-04-23T10:23:43....	DAY	THEFT F/AUTO	OTHERS	2017-01-10T07:18:37....	1400 - 1499 BLOCK...	397116	138634	2	2B
	Point	15927	16063520	2016-04-23T10:53:05....	DAY	THEFT F/AUTO	OTHERS	2017-01-10T07:18:37....	600 - 699 BLOCK OF...	400251	140497	5	5E
	Point	15928	16063527	2016-04-23T11:35:51....	DAY	THEFT F/AUTO	OTHERS	2017-01-10T07:18:37....	400 - 499 BLOCK OF...	398392	142453	4	4D

0 of 35119 selected

100 %

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```
# 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]))
```

Crime_Incidents_2016

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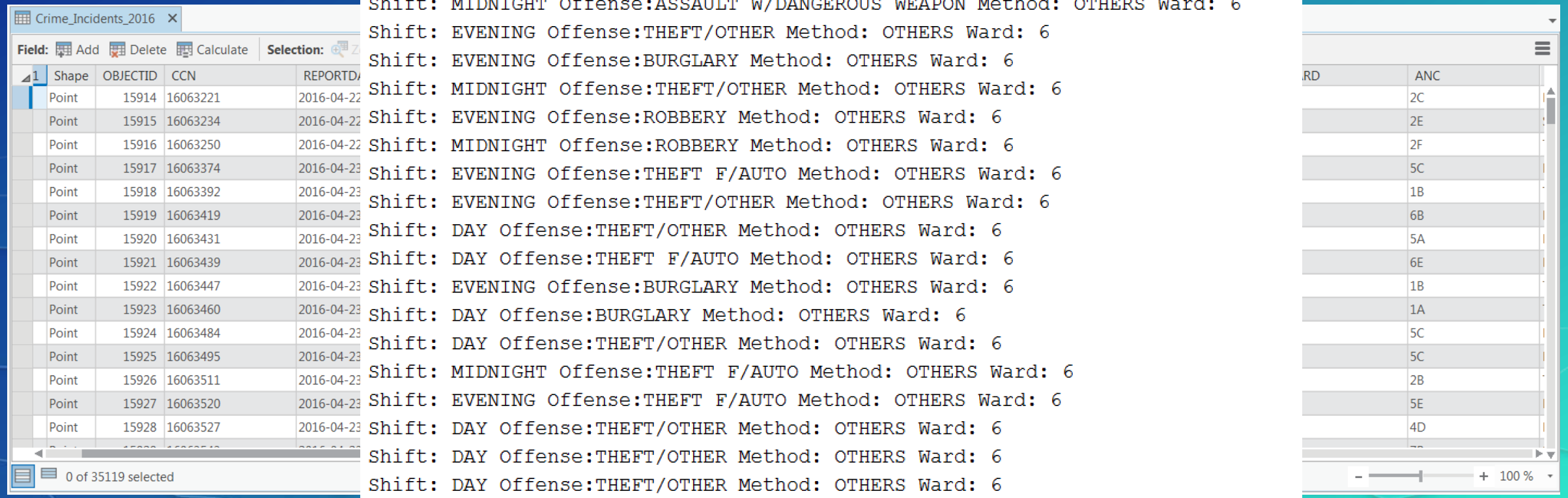
```

```
Shift: MIDNIGHT Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: MIDNIGHT Offense:ASSAULT W/DANGEROUS WEAPON Method: OTHERS Ward: 6
Shift: EVENING Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: EVENING Offense:BURGLARY Method: OTHERS Ward: 6
Shift: MIDNIGHT Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: EVENING Offense:ROBBERY Method: OTHERS Ward: 6
Shift: MIDNIGHT Offense:ROBBERY Method: OTHERS Ward: 6
Shift: EVENING Offense:THEFT F/AUTO Method: OTHERS Ward: 6
Shift: EVENING Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: DAY Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: DAY Offense:THEFT F/AUTO Method: OTHERS Ward: 6
Shift: EVENING Offense:BURGLARY Method: OTHERS Ward: 6
Shift: DAY Offense:BURGLARY Method: OTHERS Ward: 6
Shift: DAY Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: MIDNIGHT Offense:THEFT F/AUTO Method: OTHERS Ward: 6
Shift: EVENING Offense:THEFT F/AUTO Method: OTHERS Ward: 6
Shift: DAY Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: DAY Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: DAY Offense:THEFT/OTHER Method: OTHERS Ward: 6
Shift: DAY Offense:THEFT F/AUTO Method: OTHERS Ward: 6
```



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]))
```

```python
# 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
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        print("Offense:{} Coordinates: {}".format(row[0], row[1]))
```

```
Offense:ROBBERY Coordinates: (1308231.6409734625, 451799.8333681458)
Offense:THEFT F/AUTO Coordinates: (1312467.197828326, 440789.35427620757)
Offense:THEFT F/AUTO Coordinates: (1315108.2692477861, 443617.4334204988)
Offense:THEFT F/AUTO Coordinates: (1313418.6396913962, 443062.97236885206)
Offense:THEFT/OTHER Coordinates: (1316751.9669016926, 449053.7753106581)
Offense:SEX ABUSE Coordinates: (1313602.366157454, 450996.0289629688)
Offense:THEFT/OTHER Coordinates: (1312772.315310747, 447859.55179770023)
Offense:THEFT/OTHER Coordinates: (1316781.4944870411, 441826.09797414625)
Offense:THEFT F/AUTO Coordinates: (1305656.1861242952, 453459.935325456)
Offense:BURGLARY Coordinates: (1310990.8224155093, 443309.03488714236)
Offense:THEFT F/AUTO Coordinates: (1311322.1865406574, 449207.97437929467)
Offense:THEFT F/AUTO Coordinates: (1306384.5313509994, 450343.14282557205)
```

6. Need information about every vertex? Use the explode to points parameter.

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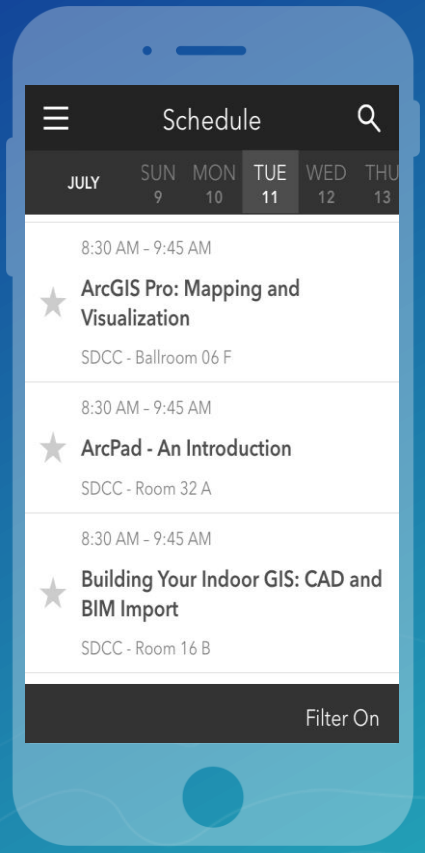
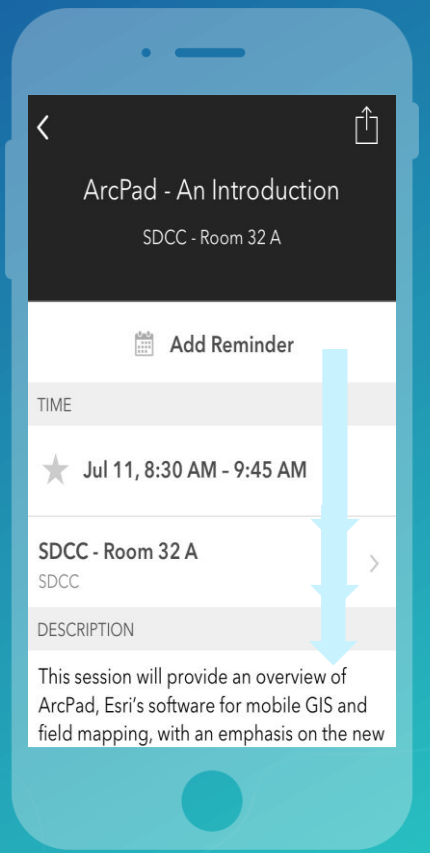
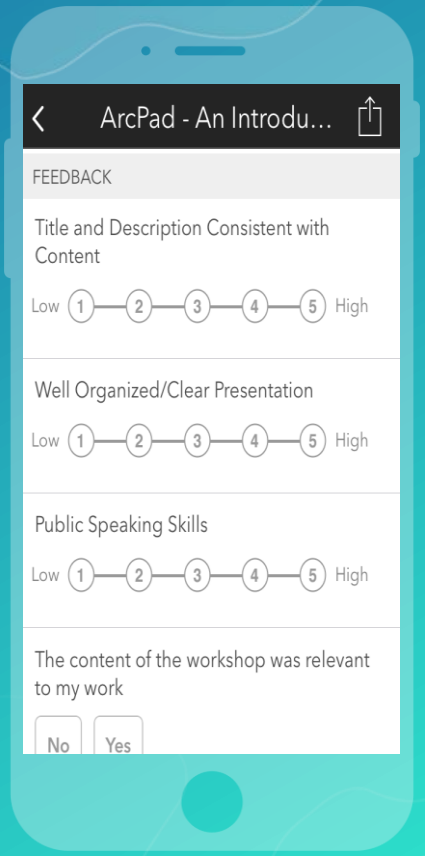


Scroll down to find the survey



Complete Answers and Select "Submit"

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