



Creating Attribute Queries

One of the major advantages of GIS technology is that the linking of tabular data to geographic features not only leads to easy symbolization, but also allows powerful attribute queries that zero in events of interest.

Structured Query Language (SQL) is the standard query language for attribute queries in ArcGIS. The ArcMap implementation of SQL requires that an attribute name, such as Crime, be placed in double quotation marks in the query syntax. Text values need to be put in single quotation marks. For example, if we want to find all types of crime that are robberies, our syntax is:

```
"crime" = 'robbery'
```

After executing a query with the above criterion, ArcMap highlights all the records in the table and all the crime point features in the map where the type of crime was a robbery.

Logical Operators

There are several logical operators available: =, >, <, >=, <=. You can include these operators when your query includes numerical features.

For example, if we want to find all the counties with population less than 250,000, our query is:

```
"population" < 250000
```

Compound Criteria

Compound criteria are made up of two or more simple criteria connected with either an AND or and OR connector.

AND means that both criteria must be true for corresponding features (and records) to be selected.

For example, if we want to find all the counties that belong to the State of California with a total population below 250,000:

```
"state" = 'CA' AND "population" < 250000
```

OR means that either criteria is true for corresponding features to be selected.

For example, we want to select all the crimes that are robbery and assault:

“crime” = ‘robbery’ OR “crime = ‘assault’

- **Exercise: Querying crime data**

You are working with the police department and want to analyze crime in your area. You will create attribute queries to find what types of crimes and when they happen as a starting point of your analysis.

Open the ArcMap document titled *Querying_data_crime.mxd*. The resulting map has four map layers: Offenses2008 (crime data), police sectors, rivers, and streets. All these layers are essential to your analysis. Rivers are often considered key geographic features and natural barriers to social and criminal interactions.

- **Selection by Attributes**

A typical crime analysis query starts with a date range criteria. In this case, we want to *identify the crimes committed during the month of July of 2008*.

A selection by attributes identifies the subset of features in a map layer that meet the query criteria. Once you execute this tool, the selected features will appear colored both on the map and in the corresponding attribute table.

Once the features are selected, you can export them to a new map layer.

From the **Menu** bar, click **Selection/Select by Attributes**. Make sure Offenses2008 is the map layer selected.

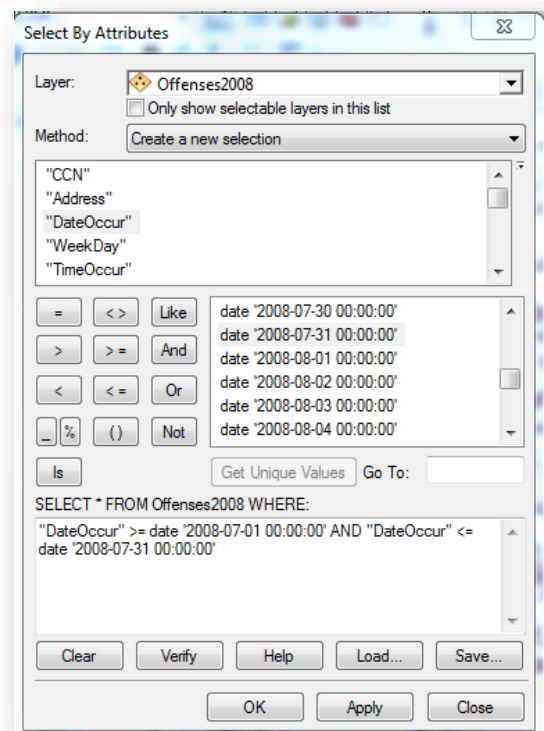
In the list of attributes, double-click *DateOccur*.

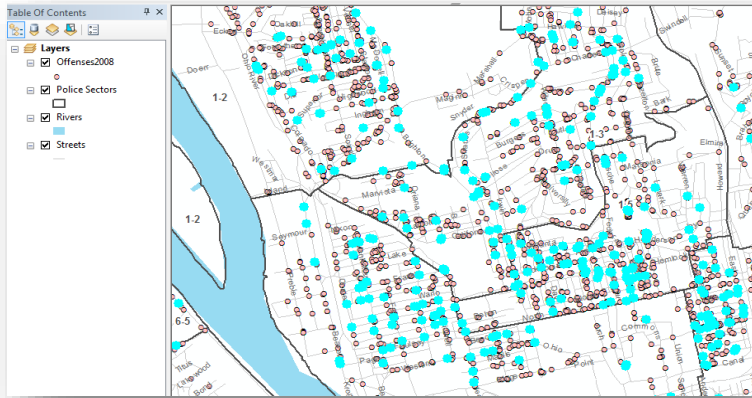
Click once the **>=** button, and click **Get Unique Values**. Scroll down in the resulting values panel and double-click date ‘2008-07-1 00:00:00’.

Click the **And** button. Then double-click *DateOccur* and click the **<=** button. Scroll down in the values panel and double-click date ‘2008-07-31 00:00:00’.

Click **Verify** and fix any errors. You can type directly in the criteria panel after the WHERE statement to fix any error.

Click **OK** twice. All the points for the Offenses2008 layer remain on the map, but the crimes for the





month of July are now displayed in the selection color.

Right-click *Offenses2008* and select **Open Attribute Table**. At the bottom of the table, a register shows that 4,085 out of 42,108 crimes were committed in July 2008.

Click the **Show selected records** button at the bottom of the table. Now the table displays only the 4,085 selected crimes.

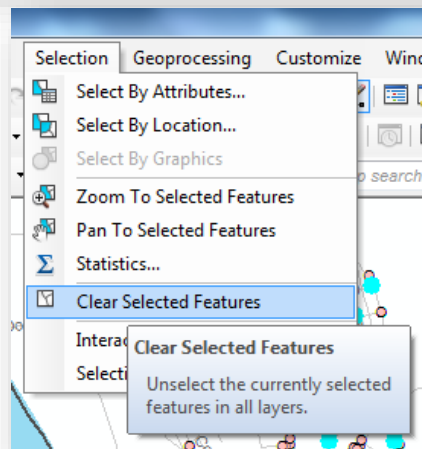
Click the **Show all records** button and close the table.

2008000089	2102 ELMORE SQ	1/1/2008	
2008000097	1317 PAULSON AV	1/1/2008	
2008000142	BANKSVILLE AV & CRANE AV	1/1/2008	
2008000001	6112 PENN	1/1/2008	
2008000003	344 RENOVA ST	1/1/2008	

< > 1 >> >>> (4085 out of 42108 Selected)

Offenses2008

On the **Menu bar**, click **Selection/Clear Selected Features**.

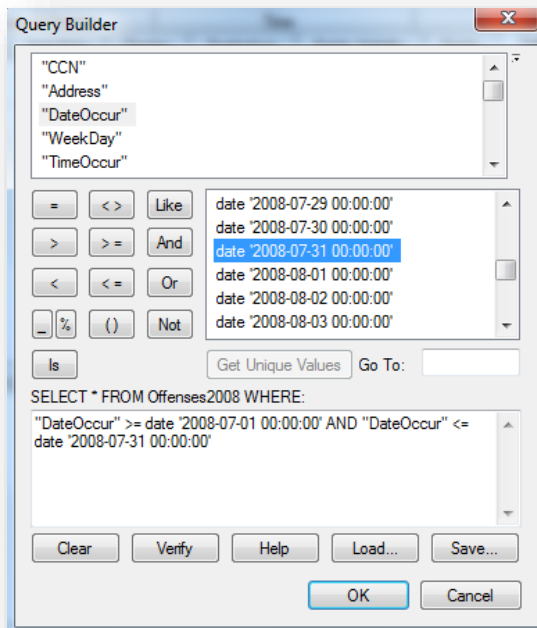


- **Definition Query**

A definition query limits the display of a map layer to only those features that satisfy the query criteria.

The same query builder can be used to build definition queries as well as to select by attributes. Therefore, you can use the same logic for both.

Right-click *Offenses2008* and select **Properties**.



Click the **Definition Query** tab, and then click the **Query Builder** button.

Enter the same SQL query that you entered for selection by attribute (crimes committed during the month of July in 2008).

Click **OK** twice.

Right-click *Offenses2008*, click **Open Attribute Table**, and select any record to get an accurate count of records at the bottom of the table. You should find that there are 4,085 records in the table.

Right-click the *DateOccur* heading in the table, select **Sort Ascending**, and scroll down to see that you have records just for the month of July. When you are finished, close the table.

Right-click *Offenses2008* in the table of contents and select **Properties**. Click the **Definition Query** tab, and then click **Query Builder**.

Click **Save**, go to your folder exercise and change File Name to *OffensesDateRange.exp*. Click **Save**.

In the **Query Builder** window, select the query criterion text in the bottom panel and press **DELETE**. Now your query is gone and all your data is back.

You can reload your query from the stored file. Click **Load** and double-click *OffenseDateRange.exp*. Your query is back.

Click **OK** twice.

- **Using logical connectors**

Crime types are codes, often entered by using lists in the code tables. In our case, the hierarchy field tells us the severity of the crime, from 1 being the most severe violent crimes. We want to query the *most violent crimes (hierarchy 1 to 4) that happened during the month of July*.

Open the **Query Builder** for *Offenses2008*.

Your query should read:

"DateOccur" >= date '2008-07-01 00:00:00' AND

"DateOccur" <= date '2008-07-31 00:00:00' AND

"Hierarchy" >= 1 AND

"Hierarchy" <= 4

Click **OK** twice.

You can also use parentheses to force certain parts of your query to run first.

For example, if we want to query all the robberies, vagrancies and vandalisms that occurred in the month of July, our query should be:

"DateOccur" >= date '2008-07-01 00:00:00' AND

"DateOccur" <= date '2008-07-31 00:00:00' AND

("Crime" = 'Robbery' OR

"Crime" = 'Vagrancy' OR

"Crime" = 'Vandalisms')

The parentheses force the three OR conditions to execute first, and then limit selections to the date range.

- **Wild-card characters**

The **LIKE** operator allows you to use a wild-character, %, in text values to represent zero, one, or more characters.

For example:

"ArrResid" LIKE '%WOOD%' finds records with the corresponding values of Woodland, Pinewood, and Oakwoodland.

Note that text query values are sensitive, so "wood" needs to be in all caps (WOOD) because attribute values for ArrResid are in all caps.

- **Practice exercise: Using several criteria.**

Find the crimes in your map that fit the following criteria:

Males under 18 years old whose residence of arrest starts with WOOD and were arrested between the 1st of July and the 30th of August.