12D: Advanced MapBasic

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Who am I?

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12D Hands-On: Advanced MapBasic

- As a developer, you can leverage the power of MapBasic to create custom-tailored applications that help the user perform tasks quickly and easily.
- By automating processes for the user, you can get your users to be productive with minimal training and spare end-users the tedium of doing time-consuming manual work.
12D Hands-On: Advanced MapBasic

- This session will touch on capabilities in MapBasic application development such as:
  - Customizing the MapInfo user-interface
  - Computing Weighted Average Location
  - Automating routine and repetitive tasks, such as, search-at-point processing, thematic mapping, generating layout windows, workspaces
  - Programming advanced SQL Queries.
MapBasic Applications

- **Turn-key systems** - Application designed as a complete solution for a specific job. ie. Crime analysis

- **Extensions** - Applications that add new operations to the basic functionality of MapInfo. ie. Locate nearest point

- **Utilities** - Applications that are designed to automate routine or repetitive tasks. ie. Weekly reports
Data tables used in this session

- **Workspaces**
  - 12D_Part1.WOR
  - 12D_Part2.WOR

- **Region Data**
  - STATES.TAB
  - SALES_REGIONS.TAB
  - US_COUNTIES.TAB
  - US_ZIPS

- **Point Data**
  - CUSTOMERS.TAB
  - CITY_125.TAB

- **Line Data**
  - SOMEHIWAYS.TAB
Agenda

- Application 1
  - Update Table
  - Find points not within bounds
  - Update with “point-in-poly”
  - Menus
  - Find the Best Location or Weighted Average Location using SQL queries with aggregates
  - Proportion Overlap
  - Menus
  - Toolpads (Buttons)
Agenda

• Application 2
  • Menus
  • Themes
  • External Applications
  • SelectionChangedHandler

• MB to launch external applications
• External compiler for MB code (such as : EditPlus)
• Built In Tools (such as : COGO Line)
Menu Statements to Know

- Create Menu Bar
- Alter Menu Bar
- Create Menu
- Menu Bar
- Context Menus
Toolbar Statements to Know

- Alter Button
- Alter ButtonPad
- Create ButtonPad
- Create ButtonPads As Default
Weighted Average
Find the Weighted Average Location

- The WtAvg aggregate function provides an easy way to calculate a weighted centroid.

- To calculate a weighted centroid, use SQL Select, choose the table containing points and weighting data, and use the following formula in the 'Select' statement:
  \[
  \text{WtAvg} (\text{CentroidX(obj), \{weight column\}), WtAvg(\text{CentroidY(obj), \{weight column\})}
  \]
Example for Find the Weighted Average Location

- **Example:** Create a weighted centroid point, based on a table of point data that includes a weight column

- **Calculate the longitude and latitude of the weighted centroid point and output the results into a temporary table**
  cmdstring = "Select wtavg(CentroidX(obj), "+columnName+"),
  wtavg(CentroidY(obj), "+columnName+") from PointsTable into WeightedCentroid"
  run command cmdstring

- **Save the results into a TAB file**
  Commit Table WeightedCentroid As PathAppDat+"WeightedCentroid"

- **Close the temporary table**
  Close Table WeightedCentroid

- **Open the saved TAB file**
  Open Table PathAppDat+"WeightedCentroid" As WeightedCentroid Interactive

- **Make the table mappable, so that it can be displayed in a Map window**
  Create Map For WeightedCentroid CoordSys Earth Projection 1, 74

- **Create a point object for the Weighted Centroid**
  cmdstring = "Update WeightedCentroid Set Obj = CreatePoint(_COL1, _COL2)"
  run command cmdstring
Update Columns

• Update WeightedCentroid Set Obj = CreatePoint(_COL1, _COL2)
• Update CUSTOMERS Set County = "", SalesREgion="", SalesRep=""
• update sales_region set revenue=0
• Add Column "CUSTOMERS" (County) From US_county Set To County Where contains
• Add Column "CUSTOMERS" (SalesRegion) From Sales_REGION Set To REGION_ID Where contains
• Add Column "CUSTOMERS" (SalesRep) From SALES_REGION Set To SalesRep Where COL9 = COL1
SQL
Useful SQL Functions

- Filter Information from a table
  - Select by tabular data (text, numbers, etc)
  - Select by geographic data length, color, size
  - Like statement
- SubSelects
  - Select Points Inside a Region
  - Select Bordering Boundaries
- Join Tables
  - Understand the Geographic Operators
- Derive Information from a Table
  - Proportion Overlap, AreaOverlap, ObjectLen, Weighted Average
  - Extract Latitude and Longitude From a Table of Points
  - CentroidX, CentroidY, ObjectLen, Round
  - Create Buffers and Find Distance
- Aggregate and Summarize Data
  - Count, Min, Max, Avg
Geographic relationships

Geographic relationships two objects may have

- Within, Entirely Within, Contains, Contains Entire, and Intersects.
  - The circle is **within** New York, since the circle's centroid is inside the borders of New York.
  - The square **contains** the circle, since circle's centroid is inside the square.
  - The triangle is **entirely within** New York since 100% of the triangle is inside of New York.

New York **contains** the square, circle and the triangle.
New York **contains entire** for the triangle.
Objects **intersect** if they touch at any point.
Some Sample SQL statements

- select "<option value=""" + fips_code + """">" + county + "</option>"from US_county where State="NV" order by county into NV_HTML_TO_PASTE
  - browse * from NV_HTML_TO_PASTE

- Select * from CUSTOMERS where not obj into CUSTOMER_NO_MAP_OBJECT
  - Browse * From CUSTOMER_NO_MAP_OBJECT
Some Sample SQL statements

- Select Name, Company, City + ", " + state , CentroidX(obj) "X", CentroidY(obj) "Y" from customers where Sales2006 < 2500 into CustXY order by state, city
  - Browse * From CustXY

- Select * from CUSTOMERS where rowid\2 = rowid/2 into CUSTOMER_SUBSET
  - Browse * From CUSTOMER_SUBSET
Some Sample SQL statements

- Select * from states where state not in ( select customers.state from states, customers where states.obj contains customers.obj group by 1 ) into States_Without_Customers
- browse * from States_Without_Customers
Launching External Applications

- Run Program "notepad.exe /p c:\test.txt"
  - Prints C:\text.txt in notepad
- Run Program "C:\Program Files\Internet Explorer\iexplore.exe www.mapinfo.com"
  - Runs Explorer and navigates to www.mapinfo.com
- Run Program "C:\Program Files\Microsoft Office\OFFICE11\EXCEL.EXE /p c:\temp" <folder>
  - Forces Excel to use the path that you specify as the active path instead of the default path. Example: /p "C:\Windows"
- Run Program "C:\Program Files\Microsoft Office\OFFICE11\EXCEL.EXE c:\test.txt"
  - Starts Excel and loads C:\text.txt
Using IDE’s other than MapBasic’s ID“e”

- You can use other code editors instead of the MapBasic editor.
  - Any code/text editor will do. Some will let you compile the MapBasic code from within the editor.
    - Codewright
    - EditPlus
    - UltraEdit
    - Notepad
    - Etc.
Using IDE’s other than MapBasic’s ID“e”

- Command switches for MB
  - Compile
    - C:\Program Files\MapInfo\MapBasic\mapbasic.exe –D MapBasicApp.MB
  - Link
    - C:\Program Files\MapInfo\MapBasic\mapbasic.exe –L MapBasicApp.MB

- Codewright support
Example: EditPlus3
Tools In MapInfo Professional
Built In MapInfo Tools

- A groups of tools found under the “Tools” menu of MapInfo Professional

**Tool Manager**

<table>
<thead>
<tr>
<th>Tools</th>
<th>Loaded</th>
<th>Autoload</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcLink</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autolabeler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentric Ring Buffers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordinate Extractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoordSys Bounds Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Line By Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBMS Catalog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBMS Count Rows in Table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree Converter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description:**

ArcLink translates MapInfo files to and from ArcInfo’s export file format.

**About COGOLine (Ver. 4)**

This MapBasic application lets you create a line at a specified starting point of a specific length, at a specific angle.

To create a line, click the Create Line button on the Tools pad, click in the editor to type the desired length and angle in the Properties box that displays. The line is created in editable layers. If there is no editable layer, a Cosmetic layer is used [and is made visible] and the line is created there.

The default settings in the Advanced Options section of COGOLine to interpret input angles. Angles are standard trigonometric angles, where 0 degrees is East, with angles increasing counterclockwise.

However, any angle can be set as desired. The default settings can be changed in the Advanced Options section. An entry of 0 degrees is North, with angles [0 degrees is North, with angles increasing counterclockwise.]

The advance options section can be customized to interpret angle values.

**Properties of New Line**

- **Starting X:** 0.0 [degrees]
- **Starting Y:** 0.0 [degrees]
- **Angle:** 44 [degrees]
- **Length:** 799 [miles]

**Advanced Options:**

- Customize interpretation of angle values
  - An entry of 0 degrees denotes a trigonometric angle of:
    - 90 [degrees]
- From 0 degrees, angles should increase:
  - Clockwise
  - Counterclockwise

- Create Line
- Create Polyline
- After drawing, move starting point to end of new line
- Close dialog after drawing line

[Draw Line] [Close]
How to get my MapBasic application to display in the tool manager?

Source code provided for the samples

- C:\Program Files\MapInfo\MapBasic\Samples\MAPBASIC\COGOLINE
  - COGOLINE.DEF
  - COGOLINE.MB
  - COGOLINE.STR
  - COGOLINE.MBP
Where Do I Find More Information on MapBasic

- MapBasic Sample Applications
  - Source code for over 35 MapBasic extensions available for use under the Tool Manager in MapInfo Professional.
  - Many good examples on how to accomplish specific tasks using MapBasic
- MapBasic Knowledgebase
  - Search the knowledgebase for examples on how to accomplish specific tasks using MapBasic.
  - http://testdrive.mapinfo.com
- MapInfo Training Classes
  - http://www.mapinfo.com/training
- MapInfo Professional Services
- MapInfo User Groups