

# Data Integration Challenges for Non-spatial Data Systems

Presented by:

Jim Vanderweide

Trihydro Corporation

# Agenda

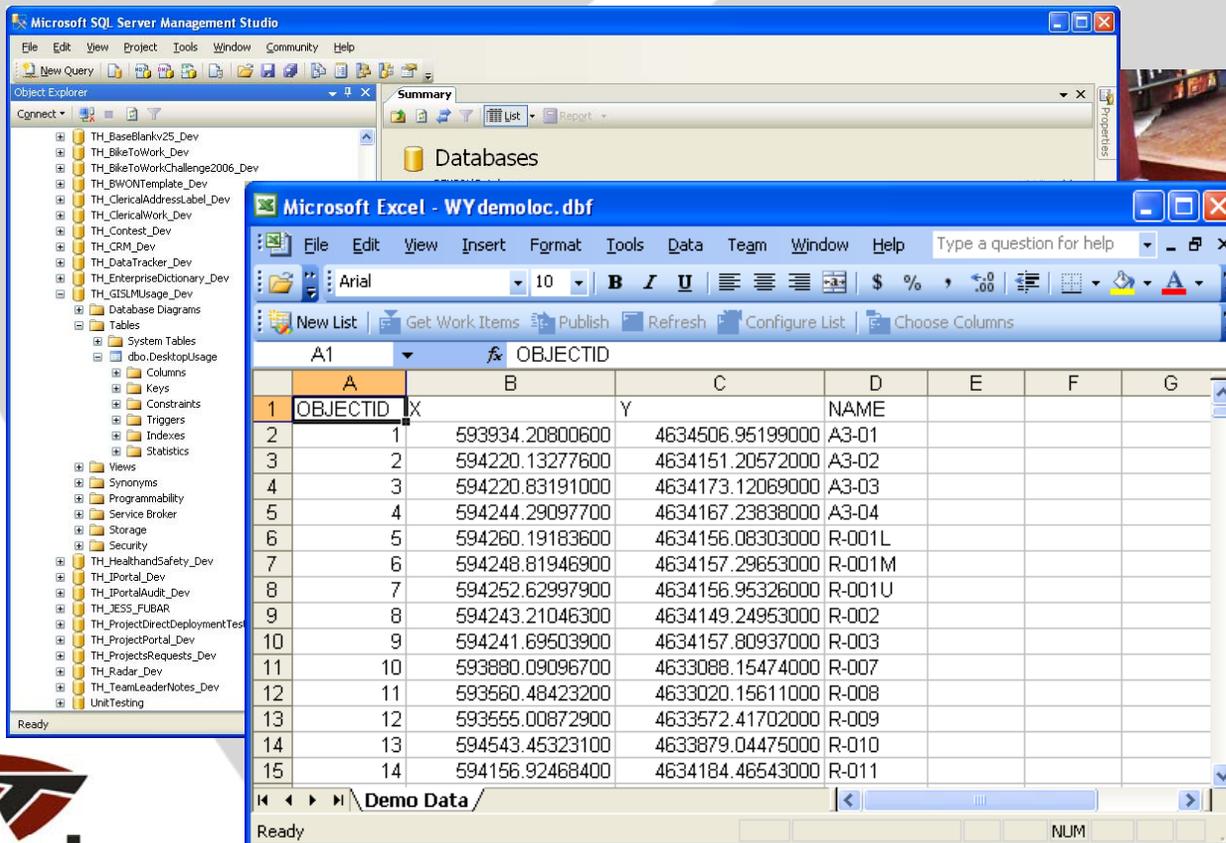
- ◆ Types of data
- ◆ Preparing the data for integration with GIS
- ◆ Linking the data to the GIS
- ◆ Demo
- ◆ Conclusion
- ◆ Questions

# Types of Data

- ◆ Attribute information
  - ❖ Additional information about spatial features
  - ❖ Scattered throughout organizations
    - ◆ Disparate remote database management systems (RDBMS)
    - ◆ Other software – other formats
    - ◆ Hard copy files
  - ❖ Difficult to track down all data sources

# Types of Data

## ◆ Where is your data



The image displays two overlapping software windows. The background window is Microsoft SQL Server Management Studio, showing a tree view of databases and tables. The foreground window is Microsoft Excel, displaying a table of data from a database. The table has columns labeled A through G, with the first column containing 'OBJECTID' and the last column containing 'NAME'. The data rows show numerical values in columns A, B, and C, and alphanumeric codes in column D.

	A	B	C	D	E	F	G
1	OBJECTID	X	Y	NAME			
2	1	593934.20800600	4634506.95199000	A3-01			
3	2	594220.13277600	4634151.20572000	A3-02			
4	3	594220.83191000	4634173.12069000	A3-03			
5	4	594244.29097700	4634167.23838000	A3-04			
6	5	594260.19183600	4634156.08303000	R-001L			
7	6	594248.81946900	4634157.29653000	R-001M			
8	7	594252.62997900	4634156.95326000	R-001U			
9	8	594243.21046300	4634149.24953000	R-002			
10	9	594241.69503900	4634157.80937000	R-003			
11	10	593880.09096700	4633088.15474000	R-007			
12	11	593560.48423200	4633020.15611000	R-008			
13	12	593555.00872900	4633572.41702000	R-009			
14	13	594543.45323100	4633879.04475000	R-010			
15	14	594156.92468400	4634184.46543000	R-011			

# Types of Data

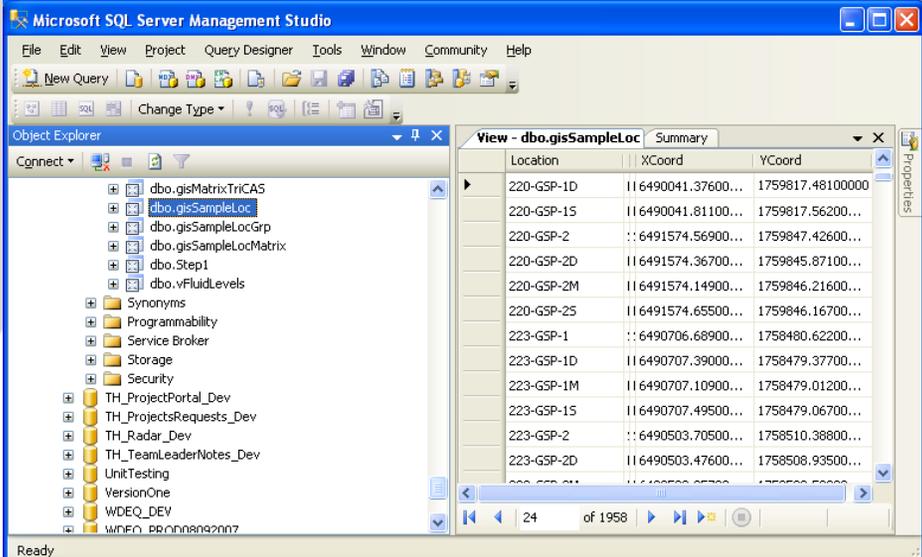
- ◆ Spatial information
  - ❖ Spatially referenced data to the real world
    - ◆ The data we dream about
  - ❖ Stored in databases that are not spatially aware
    - ◆ The missing link
    - ◆ Time consuming to visualize
    - ◆ Here's our challenge...

# Preparing the Data

- ◆ Attribute information
  - ❖ How to link the data together
  - ❖ Add an item to the database to create the link
    - ◆ ObjectID, Location ID, etc...
    - ◆ Simply done with a SQL editor
  - ❖ Edit the information to link the attributes to GIS features
  - ❖ Tough and time consuming

# Preparing the Data

- ◆ Spatial information (x,y stored in database)
  - ❖ Know the projection (i.e. local, WGS 84, ...)
  - ❖ Use event layers to verify the data
  - ❖ Very little prep
  - ❖ 9.2 projection issues!



The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left displays a tree view of the database structure, with 'dbo.gisSampleLoc' selected. The main window shows a 'View - dbo.gisSampleLoc' window with a table of data. The table has three columns: 'Location', 'XCoord', and 'YCoord'. The data rows include various GSP identifiers and their corresponding coordinates.

Location	XCoord	YCoord
220-GSP-1D	116490041.37600...	1759817.48100000
220-GSP-1S	116490041.81100...	1759817.56200...
220-GSP-2	116491574.56900...	1759847.42600...
220-GSP-2D	116491574.36700...	1759845.87100...
220-GSP-2M	116491574.14900...	1759846.21600...
220-GSP-2S	116491574.65500...	1759846.16700...
223-GSP-1	116490706.68900...	1758480.62200...
223-GSP-1D	116490707.39000...	1758479.37700...
223-GSP-1M	116490707.10900...	1758479.01200...
223-GSP-1S	116490707.49500...	1758479.06700...
223-GSP-2	116490503.70500...	1758510.38800...
223-GSP-2D	116490503.47600...	1758508.93500...

# Linking the Data

- ◆ This is the fun part
  - ❖ We created functionality for desktop and web
    - ◆ ESRI ArcGIS Desktop
    - ◆ ESRI ArcGIS Server
  - ❖ Used Visual Studio 2005 and .NET 2.0 to create custom data sources
  - ❖ Alternative - VBA customization

# Linking the Data

- ◆ Application initialization
  - ❖ Get the data
  - ❖ Render the data
  - ❖ Data acts just like feature class/shapefile
- ◆ Hashing technique to sort into the correct layers
- ◆ Configuration string to connect to any database
- ◆ We used ADO.NET

# Linking the Data

- ◆ IQueryFunctionality
  - ❖ Spatial query algorithms to select and return data
    - ◆ Point
    - ◆ Shape (polygon/area)
    - ◆ Line
- ◆ Our query tool uses point query functionality
- ◆ We utilized the Even/Odd Rule

# Demo

- <http://projectdirectdemo.trihydro.com/Secure>

# Conclusion

- ◆ Centralizing your data sources is one of the most time consuming tasks
- ◆ Preparing your data takes some effort
- ◆ The integrating with the GIS is the bulk of the work
  - ❖ Understand the integration technologies

# Questions and Contact Information

Questions?

Jim Vanderweide

Trihydro Corporation

307-745-7474

[jvanderweide@trihydro.com](mailto:jvanderweide@trihydro.com)



# Code Examples

See the following for more information

Overview:

[http://edndoc.esri.com/arcobjects/9.2/NET\\_Server\\_Doc/developer/ADF/creating\\_custom\\_data\\_source.htm](http://edndoc.esri.com/arcobjects/9.2/NET_Server_Doc/developer/ADF/creating_custom_data_source.htm)

Examples:

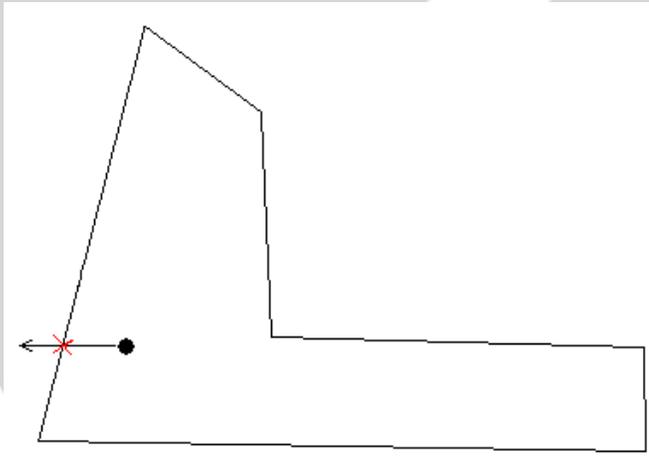
[http://edndoc.esri.com/arcobjects/9.2/NET\\_Server\\_Doc/developer/samples/Web\\_Applications/Common\\_CustomDataSource/e45f36a3-4b96-470a-bbcf-63922b9cbe7e.htm](http://edndoc.esri.com/arcobjects/9.2/NET_Server_Doc/developer/samples/Web_Applications/Common_CustomDataSource/e45f36a3-4b96-470a-bbcf-63922b9cbe7e.htm)

Details:

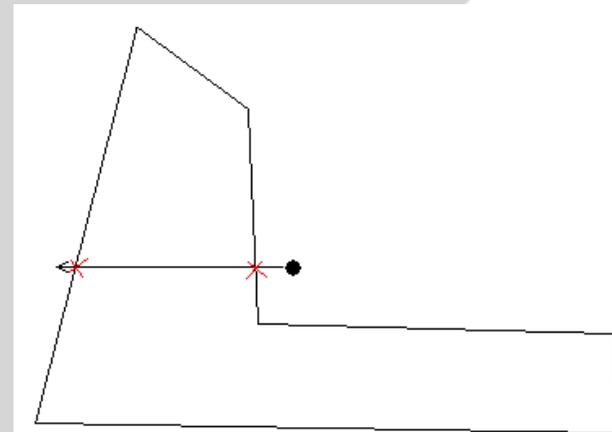
[http://edndoc.esri.com/arcobjects/9.2/NET\\_Server\\_Doc/developer/ADF/common\\_api.htm](http://edndoc.esri.com/arcobjects/9.2/NET_Server_Doc/developer/ADF/common_api.htm)

# Odd/Even Rule

- ◆ The Even/Odd Rule
  - ❖ The Even/Odd rule is a fast way to determine if a point is inside a shape.



Inside the shape the cross count is always odd



Outside shape the cross count is always even

Exception: the ray being investigated is tangent to the shape.