

Doing GIS With MS SQL Server

2013

AGIC

ARIZONA GEOGRAPHIC
INFORMATION COUNCIL

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Workshop Outline

- Spatial database concepts
- SQL Server Management Studio
- Building spatial layers
- Spatial data loading
- Presenting spatial data through ArcGIS
- Spatial data analysis

File-Based vs RDBMS-Based GIS

Item	File-Based	RDBMS
IT Integration		√
Performance – table-scan	√	
Performance – index search		√
Security & Reliability		√
Portability	√	
Scalability		√
Multi-User Access		√
Cost	√	

Geometry: SQL-Accessibility

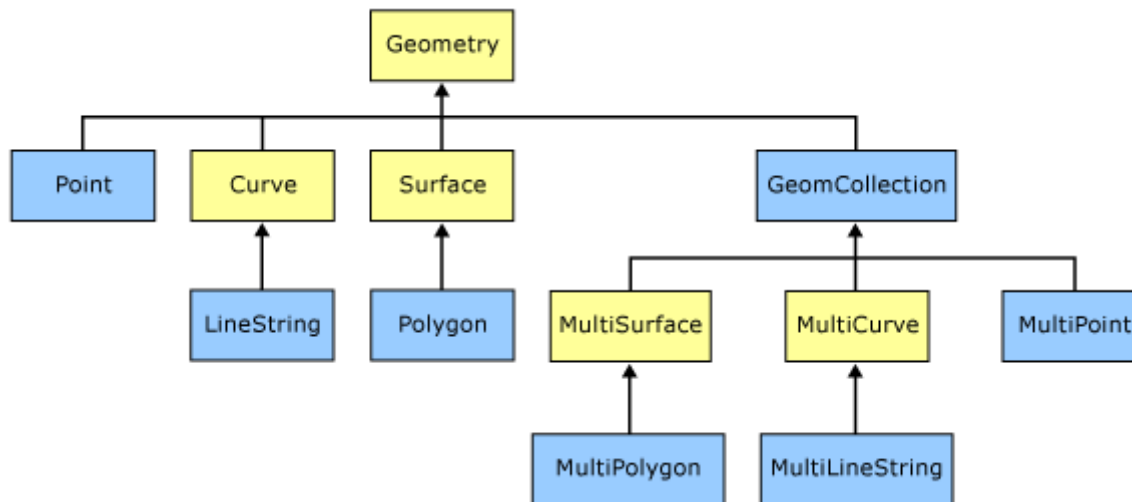
ESRI Accessible	Natively Accessible	Non-SQL Accessible
ST_Geometry	Oracle SDO	SDE Binary
	DB2 Spatial Extender	
	PostgreSQL PostGIS	
	MS SQL Spatial	
NA	MySQL Spatial	NA

GIS Functional Categories

- Storage (spatial index)
 - Geometry and geography
 - Vector and raster
 - Spatial Index
- CRUD
- Coordinate system support
 - Layer Level
 - Geometry Level
- Presentation
- Spatial analysis
 - Scalar functions
 - Aggregation functions

Spatial Data Types

- Geometry: planar, or Euclidean (flat-earth) data, such as OGC simple features
- Geography: ellipsoidal (round-earth) data, such as GPS latitude and longitude coordinates



Spatial References

- Every spatial object has Spatial Reference ID (SRID)
 - SRID defines coordinate system and datum
 - Each object can have different SRID, but usually doesn't (difficult to work with)
 - **Operation between objects requires them to have same SRID**
- List of supported SRIDs

```
SELECT * FROM SYS.SPATIAL_REFERENCE_SYSTEMS
```
- Default SRID for geometry is 0

Spatial References T-SQL Example

```
DECLARE @g geometry;
```

```
SET @g = geometry::STGeomFromText('POLYGON((0  
0, 3 0, 3 3, 0 3, 0 0))', 13);
```

```
SELECT @g.STSrid;
```

```
SET @g.STSrid = 23;
```

```
SELECT @g.STSrid;
```


SQL Server Management Studio

- Make connection
- Query tables and views
- Query spatial tables or views
- Creating spatial table through SQL
- Lab1

Ways to Import Spatial Data into SQL Server

- ArcGIS
 - With ArcSDE
- Shape2SQL
 - Free software from SharpGIS
- FME (Feature Manipulation Engine)
 - Software by Safe Software Inc.

Importing Spatial Data ArcSDE

- Lab2
 - Make database connection
 - Create new geodatabase
 - Import shapefile to geodatabase

Importing Spatial Data Shape2SQL

Database Configuration

Server name: localhost\SQLEXPRESS

Log on to the server

Use Windows Authentication

Use SQL Server Authentication

User name:

Password:

Save my password

Connect to a database

Select or enter a database name:

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Attach a database file:

Browse...

Logical name:

Cancel OK

Shapefile Uploader for SQL Server 2008

Shapefile C:\Users\student\Desktop\AGIC2013\Tutorial_Spatial_Data\World_Cou ...

253 Polygon features in shapefile.
Extent -179.9998,-89.9998 -> 180.83.6338

Database properties

Server AGIC2013 @ localhost\SQLEXPRESS Configure...

Geometry properties

Replace existing table

Planar Geometry

Geography (Spheric)

Set SRID 4326

Create Spatial Index

Table Name World_Countries

Attributes

Geometry Name geom

ID Column Name ID

ne_10m_adm

ScaleRank

LabelRank

FeatureCla

OID_

Upload to Database About

Present Spatial Layer in ArcGIS

- Query layers
 - New feature since v10.0
 - Why is this significant?
- Lab3

Spatial Functions

- Spatial Functions
 - STArea(), STBuffer(), STIntersection()...
- Spatial Aggregation Function (2012)
 - UnionAggregate(), ConvexHullAggregate()...
- Spatial Reference Transform Function (2012)
 - GeometryToGeometry(),
GeometryToGeography()...

Spatial Data Analysis

- Lab4
 - Find countries surrounding Syria
 - Create view
 - Add query layer in ArcGIS using view