SQL and SSQl

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Definitions to get started

• SQL = Structured Query Language
• SSQl = Spatial SQL
• GPL = Graphical Presentation Language

SQL- A Review

• SQL is a simple language used to query (question) an ODBC-compliant database and retrieve data.
  – SQL is *not* simple or standard
  – S = structured
Structure

• The most basic SQL statement is:
  – `SELECT * from database.table`
• Let’s dissect this statement
  – `SELECT` is the command
  – `*` is a wildcard = i.e., everything and anything
  – `Database.table` is the target of the query

A Little More…

• The previous SQL statement selected everything from a table
• But, how do we select only a portion of a table?
  – The `WHERE` CLAUSE

WHERE CLAUSE

• `WHERE` conditional operator
• For example:
  – `SELECT * from database.table WHERE CITY_NAME = 'Pocatello'`
Types of Conditional Ops

- **Simple** (as in the previous example)
- **Compound**
  - Let's say we want to select and work with all records describing Pocatello and Blackfoot
  - We could select and work with them individually using two discrete Simple statements or use Conditional operators

Combining Statements using Conditional Operator Expressions

- Instead of:
  - `SELECT * from database.table WHERE CITY_NAME = 'Pocatello'`
  - …do some work, and then
  - `SELECT * from database.table WHERE CITY_NAME = 'Blackfoot'`
  - …do some more work

We Can Use…

- A **Compound** expression combining two or more single expressions using either:
  - AND
  - OR
- In our example, which shall we use?
**OR**

- SELECT * from database.table WHERE
  CITY_NAME = ‘Pocatello’
- OR
  CITY_NAME = ‘Blackfoot’

**Why OR?**

- Before a record (entity) is returned as a result of a query, the record must satisfy EACH WHERE clause if **AND** is used.
- When **OR** is used, a record must satisfy only one of the WHERE clauses.

**This is SQL**

- What is SSQL?
  - **Spatial** Structured Query Language
  - Or SQL for Spatially-enabled relational databases (i.e., object-relational databases)
    - Informix
    - IBM DB2
    - MS SQL Server
    - PostGreSQL
An Example

- SELECT `residence.geometry` FROM `residence` WHERE `Type` = ‘single family’

What is different about this expression?
`residence.geometry`

Why is `.geometry` important?

- Until now, we have been returning all fields – `(SELECT * FROM...)`
- Now, we only want to see the geographic feature(s) returned by the query
- To do that, we instruct SSQL to select the geometry (`.geometry`) of the TABLE of interest (`residence`)

GIS Layers are Tables?

- Data type for Geometry
- Spatial Grid Extent
Object Relational

- OBJECTID inherited from Object class
- SHAPE inherited from a class called Feature

This could be “Boundary”

Geometry Data Type

- Earlier we talked a lot about data types for more traditional attributes (e.g., long integer, text, etc.)
- Recall, RDBMS can store OBJECTS natively
- What data type is used to store OBJECTS?

SSQL with Topology

- Similar to intersect and union
- These are conditional operators that are written into the WHERE clause
Key Concepts

- SQL is highly structured
- **Spatial SQL** builds upon SQL but remains within the same general framework
- SSQL requires an object relational, spatially-enabled database
- The * geometry table is queried to return features...
  - Stored in the table as LOB data
  - Along with other attributes

Questions?

- Your assignment is:
  - Read Egenhofer’s early (1994) manuscript on Spatial SQL theory
  - Review basic SQL (as necessary)
  - Review the ArcGIS SSQL Help (use the link)
  - Complete the IBM DB2 SSQL exercise