SQL and SSQl
and GIS Data Architecture

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Today's Road Map
• We will be making some connections and tying up some loose threads…
• This presentation/discussion focuses on Spatial SQL or SSQl
• In this week’s exercise you will revisit some GIS fundamentals
  – Data Structure (vector and raster)
  – Objects in a Geodatabase
  – Topology

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:
  
  ```sql
  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 in a Compound Expression

Combining Statements using Conditional Operator Expressions

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

• A Compound expression combining two or more simple 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
    • Oracle
    • 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…)
• `*.geometry` returns the geographic feature(s) as objects
• SSQL is used to select the geometry (geometry) of the TABLE of interest (residence) from a spatially-enabled object-relational database
GIS Layers are Tables?

Object Relational

Geometry Data Type

- We have talked a lot about the data types used to store traditional attributes (e.g., long integer, text, etc.)
- Recall, an ORDBMS can store OBJECTS natively
- What data type is used to store OBJECTS?
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…
  - Objects are stored in the table as LOB data
  - Along with other attributes

Professional Hints and Tips

- Work Smarter not Harder
  - Open DIR.txt in Excel and extract a list of file names

Questions?