

**SQL and SSQL**

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**Definitions to get started**

- SQL = Structured Query Language
- SSQL = Spatial SQL
- GPL = Graphical Presentation Language

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**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

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## 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

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## 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

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## WHERE CLAUSE



- **WHERE** *conditional operator*
- For example:
  - **SELECT** \* from database.table **WHERE**  
CITY\_NAME = 'Pocatello'



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## 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

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## 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

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## We Can Use...

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

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## OR

- **SELECT** \* from database.table **WHERE**  
CITY\_NAME = 'Pocatello'
- OR**
- CITY\_NAME = 'Blackfoot'

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## 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.

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## This is SQL

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

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### An Example

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• SELECT residence.geometry
FROM residence
WHERE Type = 'single family'

```

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

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### 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)

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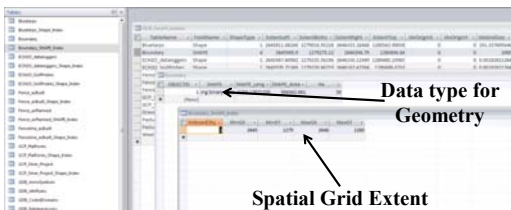
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### GIS Layers are Tables?




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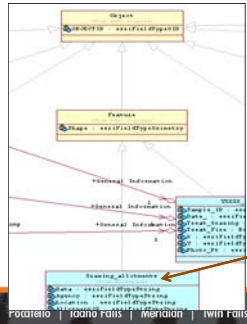
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### Object Relational



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

This could be "Boundary"



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### 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?



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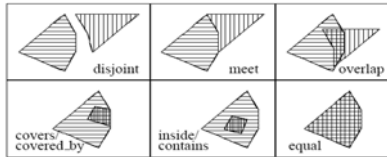
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### SSQL with Topology



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



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IEEE Transactions on Knowledge and Data Engineering 6(1): 66-95, 1994.

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## 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

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## 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

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