Geography 38/42:376
GIS II

Topic 2: Managing Geospatial Tables

Chapter 8: Chang
(Ch 4, p. 79-85 & Chapter 6: DeMers)

Attribute Data Storage

- What is a database?
- Functions of DBMS include:
  1.
  2.
  3.
  4.

Attribute Tables

- Types of geospatial tables
  1. _____ tables
     - all vector data layers come with tables
     - but only thematic rasters
  2. _____ tables
     - must be joined or related by key item
     - join vs. relate determined by _____
       - determines what you can do with aspatial data
       - VERY IMPORTANT DIFFENCES

Data Relations

- Primary difference between database models
  - how and what type of relations formed
- Also called <u>cardinality</u>, types include:
  -
  -
  -
  -

Origin of the Relational Database

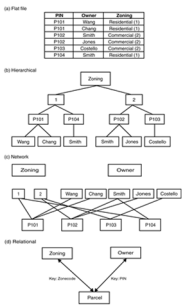

Figure 9.6
Four types of database design: (a) flat file, (b) hierarchical, (c) network, and (d) relational.

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Building a Relational Databases

- Multistage process
  - Determine attributes → organize into tables
- Normalization of data tables
  - Decomposition
  - Objective is to:
    - Reduce complexity
    - Avoid data redundancy
    - Ensure linkages

Uneven Records

Redundant Data Entries

PIN	Owner	Owner address	Sale date	Acres	Zone code	Zoning
P101	Wang	101 Oak St	1-10-98	1.0	1	residential
	Chang	200 Maple St				
P102	Smith	300 Spruce Rd	10-6-68	3.0	2	commercial
	Jones	105 Ash St				
P103	Costello	206 Elm St	3-7-97	2.5	2	commercial
P104	Smith	300 Spruce Rd	7-30-78	1.0	1	residential

TABLE 9.1 An Unnormalized Table

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No Uneven Records

BUT More Redundancy

PIN	Owner	Owner address	Sale date	Acres	Zone code	Zoning
P101	Wang	101 Oak St	1-10-98	1.0	1	residential
P101	Chang	200 Maple St	1-10-98	1.0	1	residential
P102	Smith	300 Spruce Rd	10-6-68	3.0	2	commercial
P102	Jones	105 Ash St	10-6-68	3.0	2	commercial
P103	Costello	206 Elm St	3-7-97	2.5	2	commercial
P104	Smith	300 Spruce Rd	7-30-78	1.0	1	residential

TABLE 9.2 First Step in Normalization

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Parcel table

PIN	Sale date	Acres	Zone code	Zoning
P101	1-10-98	1.0	1	Residential
P102	10-6-68	3.0	2	Commercial
P103	3-7-97	2.5	2	Commercial
P104	7-30-78	1.0	1	Residential

Owner table

PIN	Owner name
P101	Wang
P101	Chang
P102	Smith
P102	Jones
P103	Costello
P104	Smith

Address table

Owner name	Owner address
Wang	101 Oak St
Chang	200 Maple St
Jones	105 Ash St
Smith	300 Spruce Rd
Costello	206 Elm St

Remaining Redundancy

Figure 9.7
Separate tables from the second step in normalization.
The keys relating the tables are highlighted.

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Parcel table

PIN	Sale date	Acres	Zone code
P101	1-10-98	1.0	1
P102	10-6-68	3.0	2
P103	3-7-97	2.5	2
P104	7-30-78	1.0	1

Address table

Owner name	Owner address
Wang	101 Oak St
Chang	200 Maple St
Jones	105 Ash St
Smith	300 Spruce Rd
Costello	206 Elm St

Owner table

PIN	Owner name
P101	Wang
P101	Chang
P102	Smith
P102	Jones
P103	Costello
P104	Smith

Zone table

Zone code	Zoning
1	Residential
2	Commercial

Figure 9.8
Separate tables after normalization. The keys relating the tables are highlighted.

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Relate vs. Join

- Depends on cardinality
- Must identify tables which table is:
  - "Base table" = _____ table
  - "Table to be joined" = _____ table
- Cardinality is described as if the feature attribute table is joined **TO** the aspatial table, but in reality it's the other way around

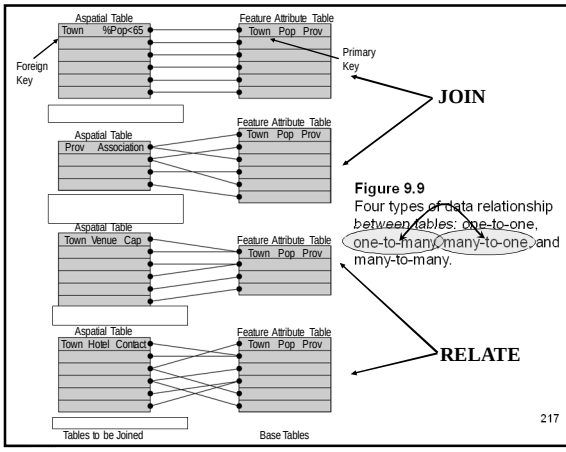

Figure 9.9
Four types of data relationship *between tables:* one-to-one, one-to-many, many-to-one, and many-to-many.

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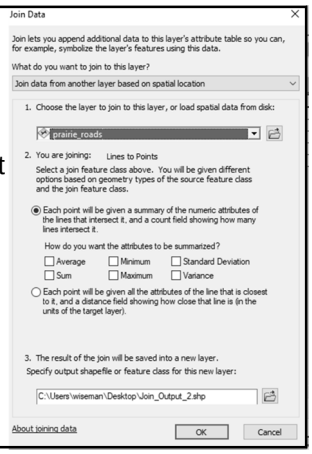
Spatial Joins

- When you want to join tables but NO key item exists
- Uses spatial proximity or topological relationship instead



Attribute-based Operations

- Results in:
  - creation of _____
  - creation of _____
- Predominantly mathematical operations
  - E.g. reclassifying, ranking, calculating rates
- Utilizes functionality of RDBMS

Attribute-based Operations

- Single attribute – info reducing
  - Group or Reclassify
  - Rescale
- Single attribute – info increasing
  - Evaluate
  - Calculate
- Multiple attributes
  - Mathematical operations
  - Cross Tabulation