Vector Data

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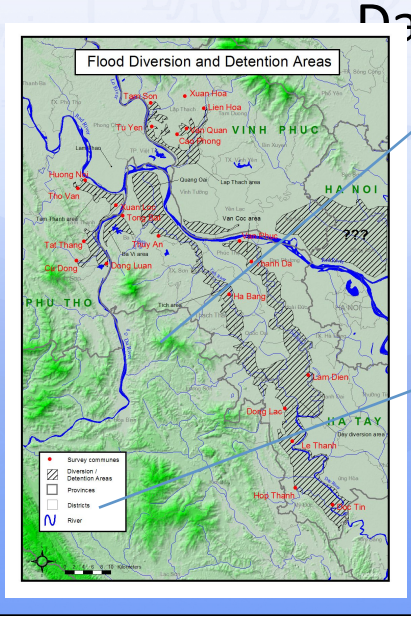
Recap: Raster Data and Vector Data



Continuous features (background elevation)

Raster Data Model

Discrete features:
- point
- line
- polygon

Vector Data Model

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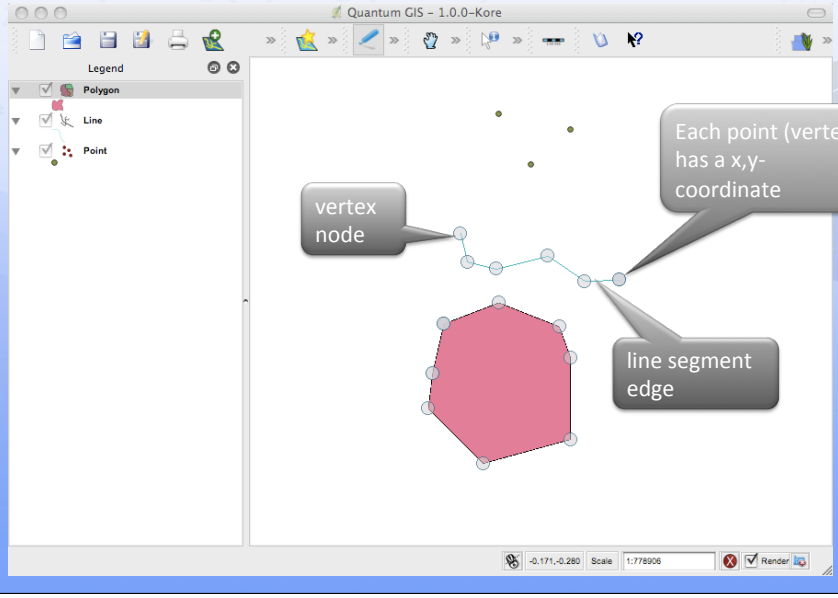
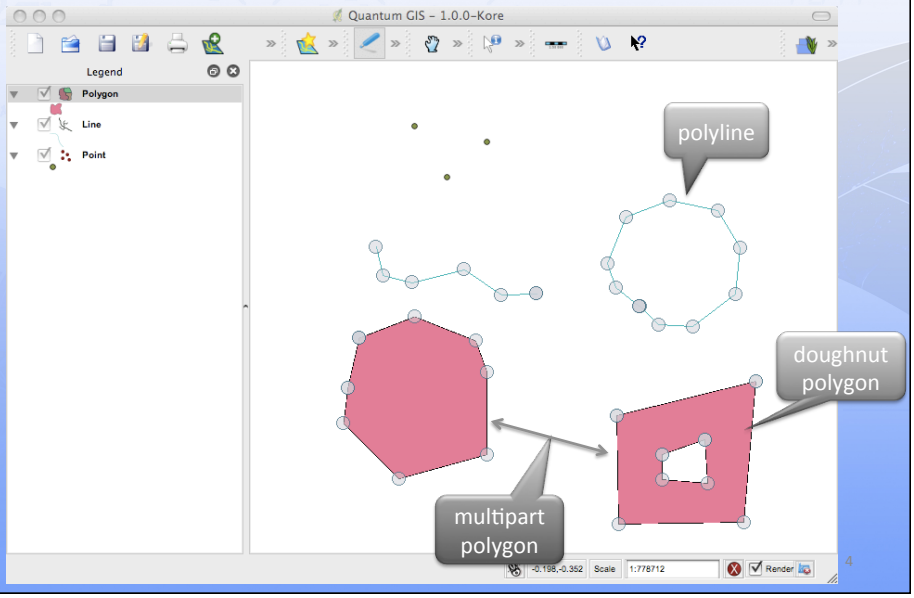
Vector Data Model (1)



Vector Data Model (2)



Topology

- Expresses explicitly spatial relationships
- Topology: study of properties of geometric objects that remain invariant under certain transformations (for instance: a rubber band)
- Defines for instance:
  - direction
  - connectivity
- Relevant for data integrity and some types of analysis (e.g. route planning)

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Attribute Data

- Spatial and attribute data are stored separately and are linked with a unique ID
- Four types of relationships:
  1. one-to-one
  2. one-to-many
  3. many-to-one
  4. many-to-many
- Type of relations has impact on how data is displayed in a map

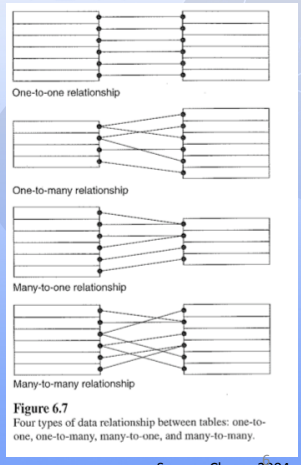


Figure 6.7
Four types of data relationship between tables: one-to-one, one-to-many, many-to-one, and many-to-many.

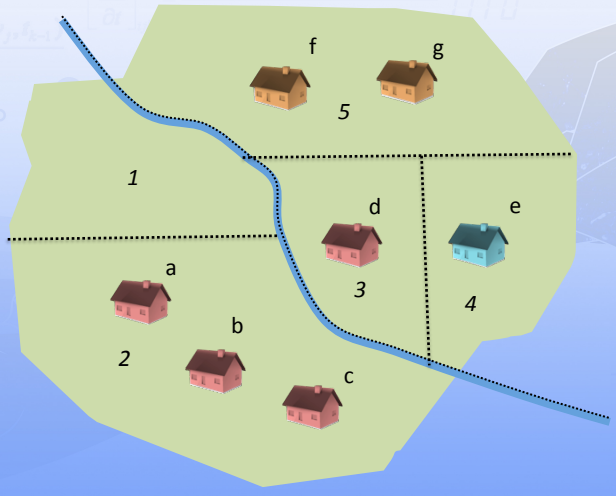
Source: Chang, 2004

Example Attribute Data

House	Plot
a	2
b	2
c	2
d	3
e	4
f	5
g	5
Lee	f
Lee	g

Many-to-one

One-to-many



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Attribute Data

- GIS software usually handles database storage and querying through menus and actions on maps
- Some GIS provide direct querying of database using SQL or similar language

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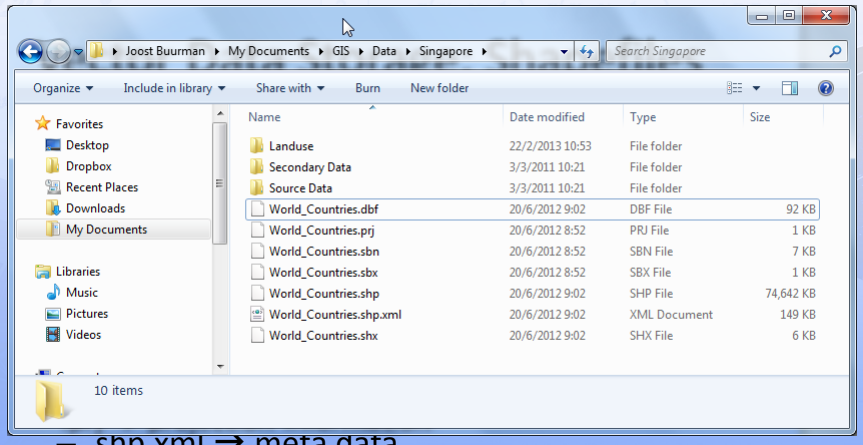
Vector Data Storage: Shapefiles



  - .shp.xml → meta data
- Attribute table can contain anything, just like in database

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(Vector) Data Storage: Geodatabases

- GIS data is stored in many files, can create data management problem, especially in multi-user environment
- Use databases to store spatial and attribute data together
- Use SQL and all database tools and techniques to store and query data
- However, requires special database and SQL that can handle spatial data and queries
- ArcGIS supports several types of databases:
  - File Geodatabase: organised directory
  - Personal Geodatabase: Microsoft Access
  - ArcSDE Geodatabase: network
  - Database connections, spatial databases (e.g. Oracle Spatial, DB2, Informix, PostgreSQL)

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Metadata

- Metadata: description of the data
- Important, otherwise other users will not be able to understand the contents of the data files
- In particular coordinate system and projection is important for geographical data

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