Making features “smart”

GEOG 419/519: Advanced GIS

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Qualities of features (p. 76)

- **Features have shapes**
  - **Geometry feature class**
    - **Points and multipoints**
    - **Polylines (line segments that may or may not be connected)**
    - **Polygons (set of either disjoint or embedded rings)**
      - **Ring: set of connected, closed, nonintersecting line segments**
    - **Line segments can be straight, circular arcs, Bézier curves, and elliptical arcs**

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Qualities of features II (p. 76)

- **Features have spatial reference**
  - **Specifies how the x,y coordinates of a set of features are mapped onto the earth's surface**
- **Features have attributes**
  - **Fields in a feature class table**
  - **Standard or custom properties of features**
  - **Numeric, textual, descriptive**
- **Features have subtypes**
  - **Feature class is homogenous set of features**
    - **May be considerable variation among features**
  - **Buildings → Residential, Commercial, Industrial**
  - **Subtypes give more control over qualities of features**
    - **No longer all or nothing…**

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Qualities of features III (p. 77)

- **Features have relationships**
  - **Among geographic features**
  - **Between geographic features and nonspatial objects**
- **Features can be constrained**
  - **Attribute domain: numeric range or list of valid values**
    - **All or nothing…**
- **Features have rule validation**
  - **Pipe connections**
- **Features have topology**
  - **Precise spatial relationships**
  - **Planar topology**
  - **Geometric network**
- **Features have complex behavior**
  - **Custom editing interaction, intrinsic analytical capabilities, sophisticated cartographic rendering**

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Steps to making features smart (p. 78)

- Progressively adding intelligence
- Select feature type and topology
  - Inventory all of the types of objects you need to model
  - Establish feature datasets to group feature classes that are bound by spatial reference, topology, and thematic content (Chambers article)
    - Nonspatial: create object classes
    - Spatial: create simple feature classes (point, line polygon)
    - Topological: create a graph with topological feature classes in a common feature dataset

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Steps to making features smart II

- Set attribution and subtypes (p. 89)
  - Subtype – special attribute
    - Major groupings of objects
    - Can express diversity among similar objects/features without creating lots of classes (the more classes, the slower the geodatabase)
    - Improve data integrity with attribute domains, default values, connectivity rules, relationship rules
- Define attribute domains and validation rules
- Establish object relationships
  - Relationship classes, relationship rules
- Create custom objects
  - VisualBasic programming

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Geodb design considerations (Chambers article)

- Keep features/objects in same geodb if (p. 195):
  - Objects/features have relationships
  - Features that have topological associations
  - In order to concurrently edit features
    - Can only edit one geodb at a time
- Separate features/objects in separate geodb if:
  - Different departments have responsibility for different datasets
  - Use of different commercial RDBMS
  - Personal geodb have practical size limits

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Geodb design considerations II (p. 195)

- Classes (object, feature, relationship) can either stand alone or reside in a feature dataset
- Group classes in a feature dataset if:
  - If feature classes are topologically related
  - If you wish to enforce a common spatial reference for a set of feature classes
  - Logical organization

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Geodb design considerations III

- Should a group of related features be separate feature classes or subtypes of the same feature class?
- The more feature classes, the worse the geodb performance
- Why split into feature classes?
  - Each group of features requires distinct custom behavior
  - When feature attributes are different
  - If you need different access privileges for different classes
  - Some features are to use versioning and some not

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Storing data in tables

- All objects, features, and relationships are stored in tables
- Predefined fields
  - For identifying objects and storing feature shapes
  - Managed by ArcInfo and should NEVER be modified via another RDBMS
- Custom fields
  - All others

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Adding simple behavior with subtypes (p. 89)

- Primarily used to verify the integrity of objects
- Subtypes (lightweight subdivision)
  - Can name them
  - Can define distinct attribute domains
    - Constraints on data values
    - Split and merge policies
  - Can define distinct default values
  - Can define distinct validation rules
    - Attribute rules , connectivity rules, relationship rules
  - Can prescribe relationship types
  - With programming, you can add custom rules

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Relationships among objects

- Topological
  - Connectivity, adjacency
- Spatial
  - Touches, coincides with, overlaps, is inside of, is outside of
- General
  - Persistent tie between objects/features

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