GEOG 482/582: GIS Data Management

Lesson 3: Geodatabase Schema Development

Overview

Learning Objective Questions:

1. What are five methods for creating a geodatabase schema?
2. Why use schema productivity tools?
3. What are four schema productivity tools?
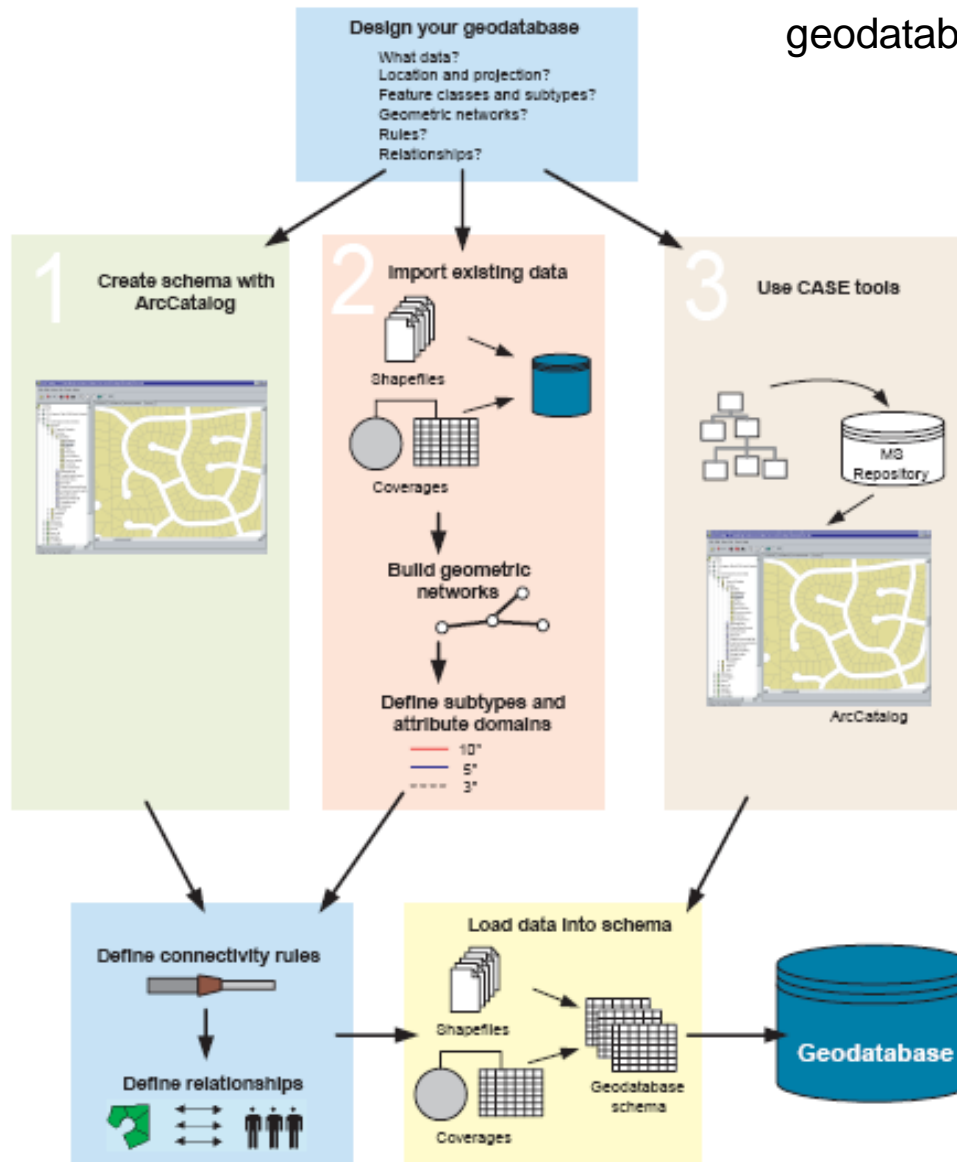4. How are the four schema productivity tools used?

Lesson Preview

Learning objective questions act as the lesson outline.

Questions beg answers.

1. What are five methods for creating a schema?

Three Methods to Create a Geodatabase of the five methods available for geodatabase data modeling

Design your geodatabase
- What data?
- Location and projection?
- Feature classes and subtypes?
- Geometric networks?
- Rules?
- Relationships?

1 Create schema with ArcCatalog

2 Import existing data
- Shapefiles
- Coverages
- Build geometric networks
- Define subtypes and attribute domains
  - —— 10"
  - —— 5"
  - ---- 3"

3 Use CASE tools
- MS Repository
- ArcCatalog

Define connectivity rules

Define relationships

Load data into schema
- Shapefiles
- Coverages
- Geodatabase schema

Geodatabase

Five methods to schema creation:
1. Schema with ArcCatalog - manual
2. Import existing data from an external source
3. Computer Aided Software Engineering (CASE) schema productivity tools
4. Use a data model template – select from Esri Data(base) Model collection
5. Python program – write a script

2. Why use schema productivity tools?

Schema languages borrow from natural languages, but are more 'formalized', i.e., they are narrower and contain strict rules for types of data constructs and use of operations on them.   Thus, geodatabase data model (GDB) schemas can be rather large and complex

Six data construct of types within GDB data model are created, edited and documented: feature classes, data sets, relationship classes, domains, spatial relationships and rules, map layers

http://desktop.arcgis.com/en/arcmap/latest/manage-data/geodatabases/documenting-your-geodatabase-design.htm

Using a schema productivity tool can …
1) save time working with (creating and editing) schemas
2) increase the robustness (consistency) of the design
3) enhance transparency of the schema elements when sharing with stakeholders.

3. What are four schema productivity tools?

1. Esri X-Ray for ArcCatalog

http://www.arcgis.com/home/item.html?id=9ea218ff575f4a5195e01a2
cae03a0ae

2. Esri Geodatabase Diagrammer using MS Visio

http://www.arcgis.com/home/item.html?id=a378b48be11b45b5bb252
54643304cb7

3. ArcGIS Diagrammer

https://gdbgeek.wordpress.com/2015/04/09/arcgis-diagrammer-rip/

https://github.com/richiecarmichael/arcgis-diagrammer

4. Sparx Systems Enterprise Architect

https://en.wikipedia.org/wiki/Enterprise_Architect_(software)

http://www.sparxsystems.com/arcgis/

4. How are schema productivity tools used?

- Schema productivity tools work with schema designs considered to be database model descriptions

- Descriptions take the form of tables, diagrams, and narratives
- MS Excel contains a spreadsheet language to work with **tables**
- MS Visio provides diagramming languages to work with **diagrams**
- Open Management Group (OMG) offers a software design language called the unified modeling language (UML) to work with computer-oriented **diagrams**
- Designs are often translated into eXtensible Markup Language (XML) for computer-based processing, i.e, a **narrative** expressed in a computer-enabled language.

- X-Ray, Geodatabase Diagrammer (Visio), ArcGIS Diagrammer, and Enterprise Architect all work with XML Workspace documents
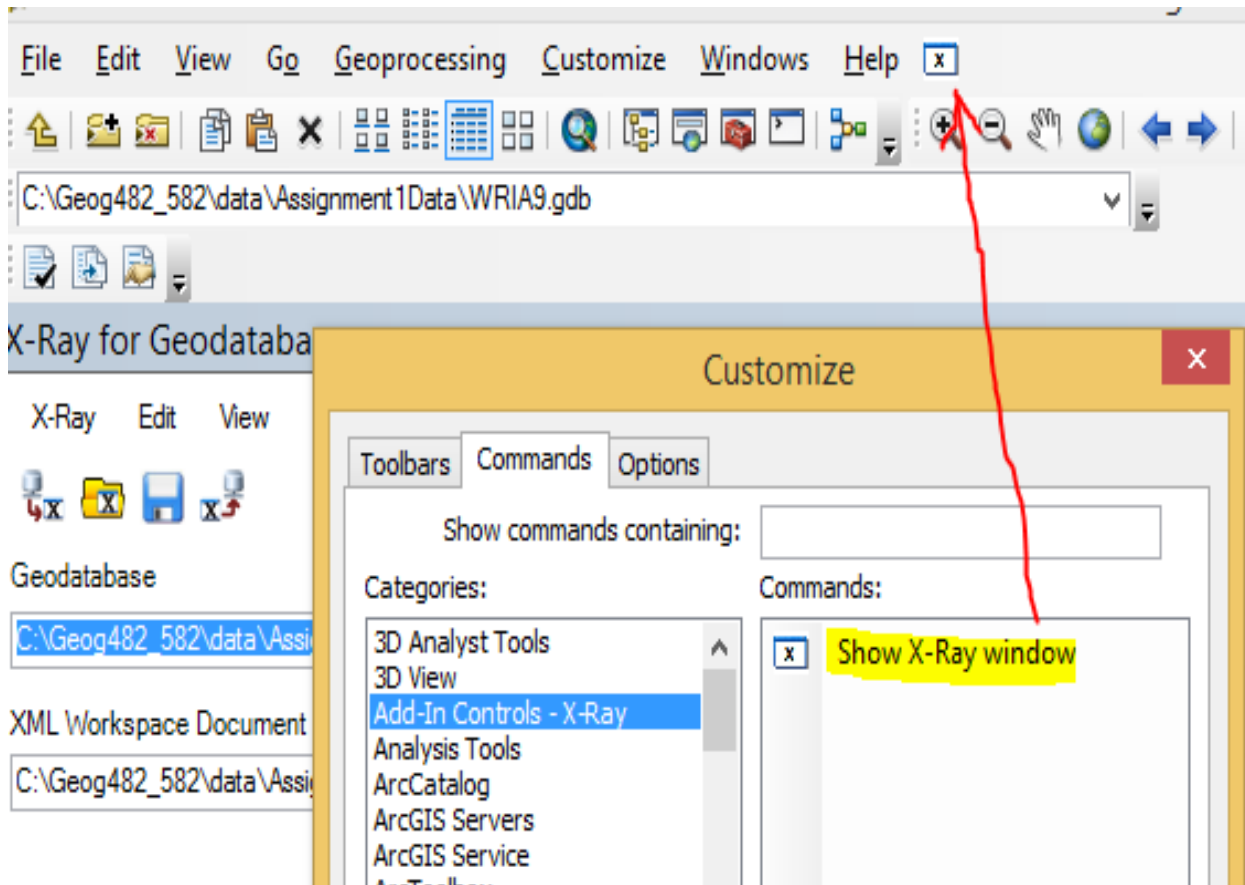
X-Ray as a schema productivity tool

X-Ray is an Add-in for ArcCatalog that uses MS Excel 2013 or 2016 to...

- Develop and refine geodatabase designs
- Analyze the differences between two geodatabase designs
- Merge two different designs into a new consolidated geodatabase design
- Check for reserved RDBMS field names in your design
- Replace and reorder fields in a current geodatabase (via GP Script)
- Import a design with geoprocessing
- Localize field aliases and descriptions in your geodatabase
- Populate workspace descriptions for your design
- Create a data dictionary and diagram for your design

As a table-based editor, X-Ray is best used to edit and/or update fields (work on content) rather than design relationships (work on structure) between/among feature classes.

X-Ray as a schema productivity tool

X-Ray is an Add-in for ArcCatalog (check out the video)

Geodatabase Diagrammer as a schema productivity tool

Geodatabase Diagrammer (GD) uses Visio...

- Designs depicted using "diagram language", e.g., All schema graphics in Designing Geodatabases text were created using GD

- GD Launches MS Visio to support creation of schema diagrams.

- Visio translates all diagrams into XML expressions.

- GD is useful for documenting schema diagrams, e.g. creating posters.

GD was designed as a 'report', as opposed to 'design' tool ...
- Change the schema description in ArcCatalog
- Initiate GD to portray it as a poster.

ArcGIS Digrammer as a schema productivity tool

ArcGIS Diagrammer…

- a 'stand-alone' tool for creating schema diagrams using an interactive data modeling design process

- translates diagram into XML workspace document.

- created after GD, meant to emphasize interactive development of schemas as a schema design, as opposed to reporting, process

- As such, it is considered easier to use because of the interactive graphical language

- The graphic programming library upon which it was developed is no longer (circa 2015) being maintained, and thus there was a call to the GIS community to see if people wanted to 'pitch in' for redevelopment.

# ArcGIS Diagrammer (AD) [user guide](#) contains two exercises

Example 1 : DESIGNING A GEODATABASE SCHEMA

- design a simple geodatabase
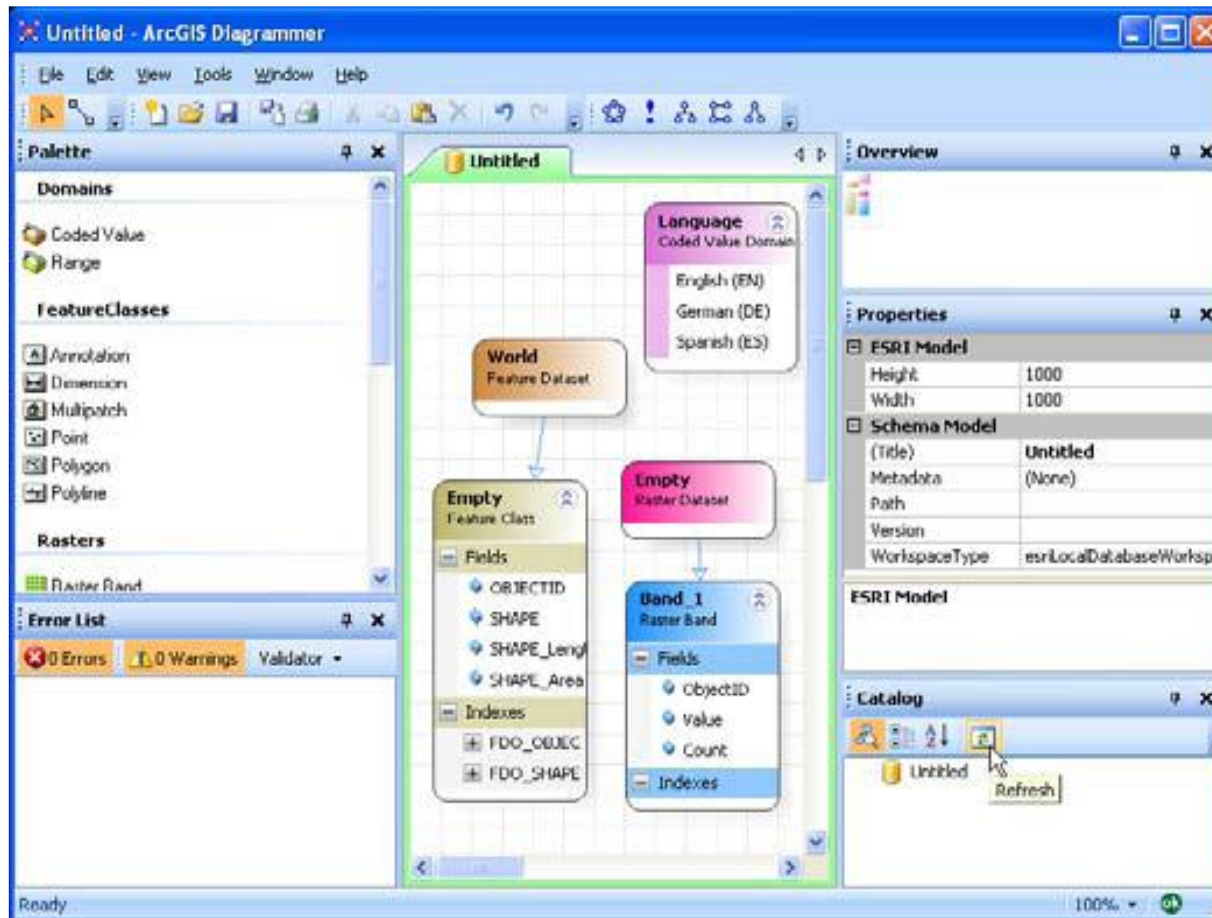
- work with class diagrams

Example 2 : MODIFY EXISTING GEODATABASE SCHEMA

- analyze schema of existing geodatabase, make modifications -
load edited schema to a new geodatabase

DB schema design: drag and drop data construct types into center window…
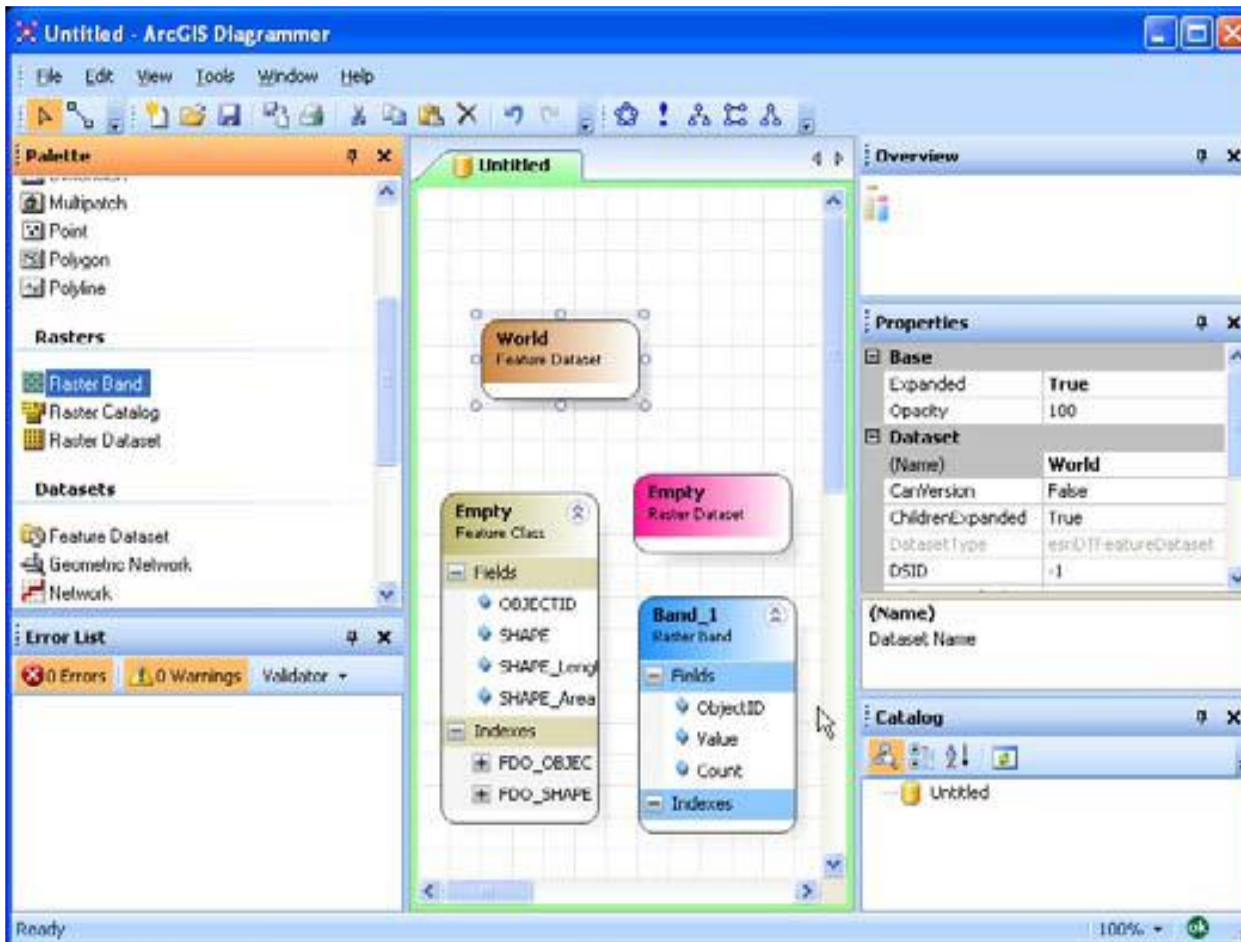
View > Catalog when window not visible

Click **Refresh**

button shown at left

Three catalog window view types?

Directory tree view

← Directory tree view
Group by storage hierarchy.

Categorized view

← Categorized view
Group like data construct types
for easier comparison by type.

Catalog window

Alphabetical view

← Alphabetic view
Group by alphabetized order of construct.

Contrast the views...How do these view types differ?

...by information structure, i.e. the structure of the information is different to expose different relationships...although it is basically the same content the display structure (relationships) are different to provide quicker insight.

Right click on any geodatabase object in any view to display context menu then *Scroll* and *Flash*.

Enterprise Architect (EA) as a schema productivity tool

Supports computer systems modeling using Unified Modeling Language (UML), providing a foundation for designing and implementing new systems or changing existing systems, and one of those is ArcGIS Desktop.

Sparx Systems initially released Enterprise Architect in 2000. Originally designed as a UML modeling tool for modeling UML 1.1, the product has evolved to include other OMG UML specifications 1.3, 2.0, 2.1, 2.3, 2.4.1 and 2.5.

Modeling ranges from laying out organizational or systems architectures, business process re-engineering, business analysis, and service-oriented architectures and web modeling, plus application and database design and re-engineering, and development of embedded systems.

Commonly compatible with the 2nd most recent version of ArcGIS Desktop, as it takes time to upgrade EA to maintain software stability

Summary

In this lesson, you learned about...

1. What are five methods for creating a geodatabase schema?
2. Why use schema productivity tools?
3. What are four (CASE-oriented) schema productivity tools?
4. How are the four schema productivity tools used?

Contact me at
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have questions or
comments about this
lesson.

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END Lesson 3: Geodatabase Schema
Development