ArcGIS - Working with the Geodatabase

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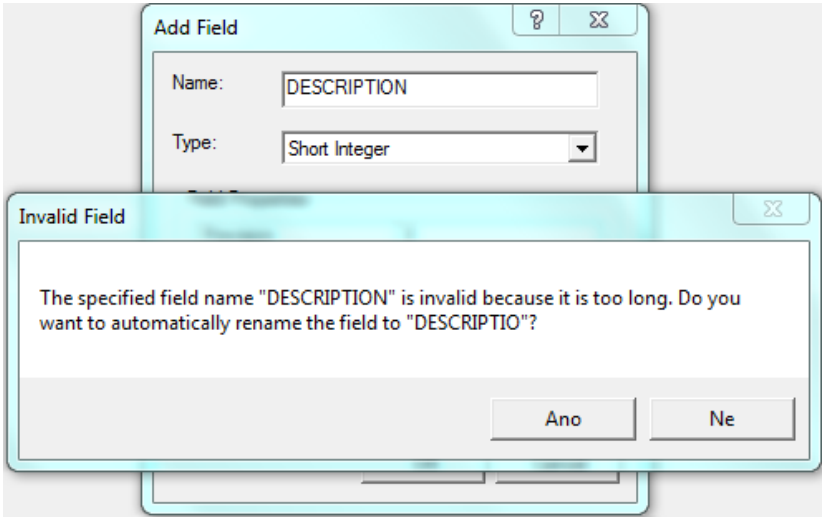
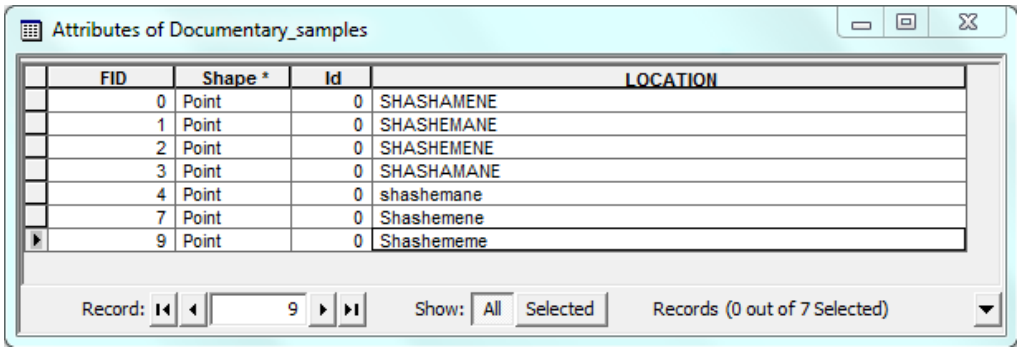
April 9, 2013

Introduction

Geodatabase is spatial database that is optimized to store and query data related to objects in space. [Wikipedia]

Shapefile limitations:





What can we store in the geodatabase?

- vector features (points, lines, polygons or 3D objects)
- raster data
- tables (standalone or related)
- relations
- topology
- annotations
- domains and subtypes
- ...

Vector features:

- similar to shapefile, in GDB it is called *Feature Class*

Name	Type
Annotation_Feature_Class	Personal Geodatabase Feature Class
Line_Feature_Class	Personal Geodatabase Feature Class
MultiPatch_Feature_Class	Personal Geodatabase Feature Class
Point_Feature_Class	Personal Geodatabase Feature Class
Polygon_Feature_Class	Personal Geodatabase Feature Class

Raster data:

- raster maps, photo documentations, raster analysis outputs, ...

Name	OBJECTID	photoID
P6092414.JPG	1	1
P6092411.JPG	2	1
P6092339.JPG	3	2
P6072175.JPG	4	3
P6072173.JPG	5	3
P6072170.JPG	6	3

Tables:

- attributes that have no geometry
- standalone / related

Relations:

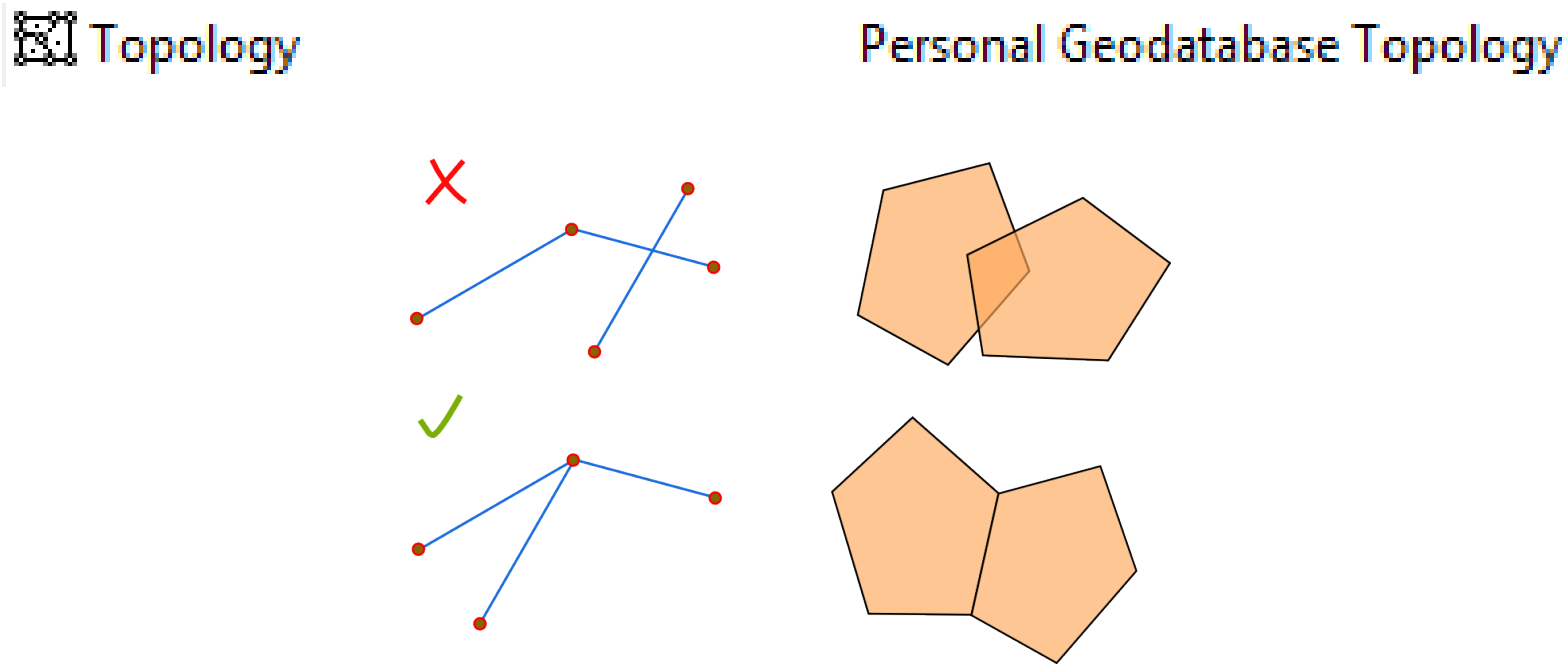
- relations between tables, feature classes, raster catalogues
- 1:1, 1:M, N:M
- primary key, foreign key


Relationship_Class

Personal Geodatabase Relationship Class

Topology:

- Describes spatial relations.
- checking overlaps, gaps, dangles, ...



Annotations:

- labels stored in GDB
- each annotation feature can be edited as a feature in the shapefile or feature class


Annotation_Feature_Class

Personal Geodatabase Feature Class

Domains and subtypes:

- domains define possible attribute values
- by range or coded values
- subtype divides class into main categories
- domains can be assigned to each category

ALLOWED ATTRIBUTE VALUES

coded value domain example:

1	lava dome
2	scorrea
3	pumis
4	pyroclastic flow
5	lava flow

range domain example:

from 3 to 8

SUBTYPES

1	endodynamic
2	exodynamic

For each subtype the different domain can be set:

endodynamic domain

1	tectonic processes
2	volcanic processes

exodynamic domain

1	denudational processes
2	accumulational processes
3	erosional processes
4	gravitational processes

Subtypes define symbology categories:

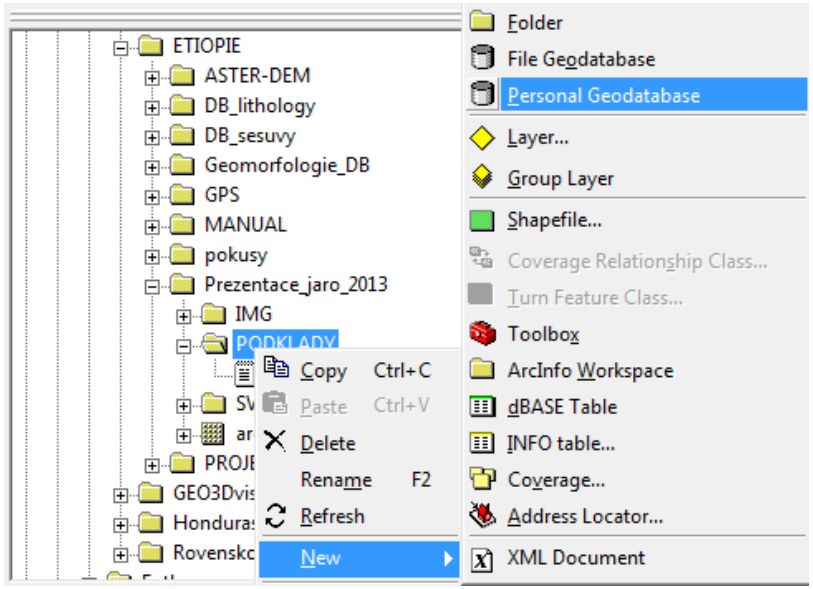
1
2

Attribute table example:

GENESIS	PROCESS
exodynamic	accumulational processes
endodynamic	volcanic processes
exodynamic	~~tectonic processes~~
exodynamic	gravitational processes
endodynamic	~~gravitational processes~~

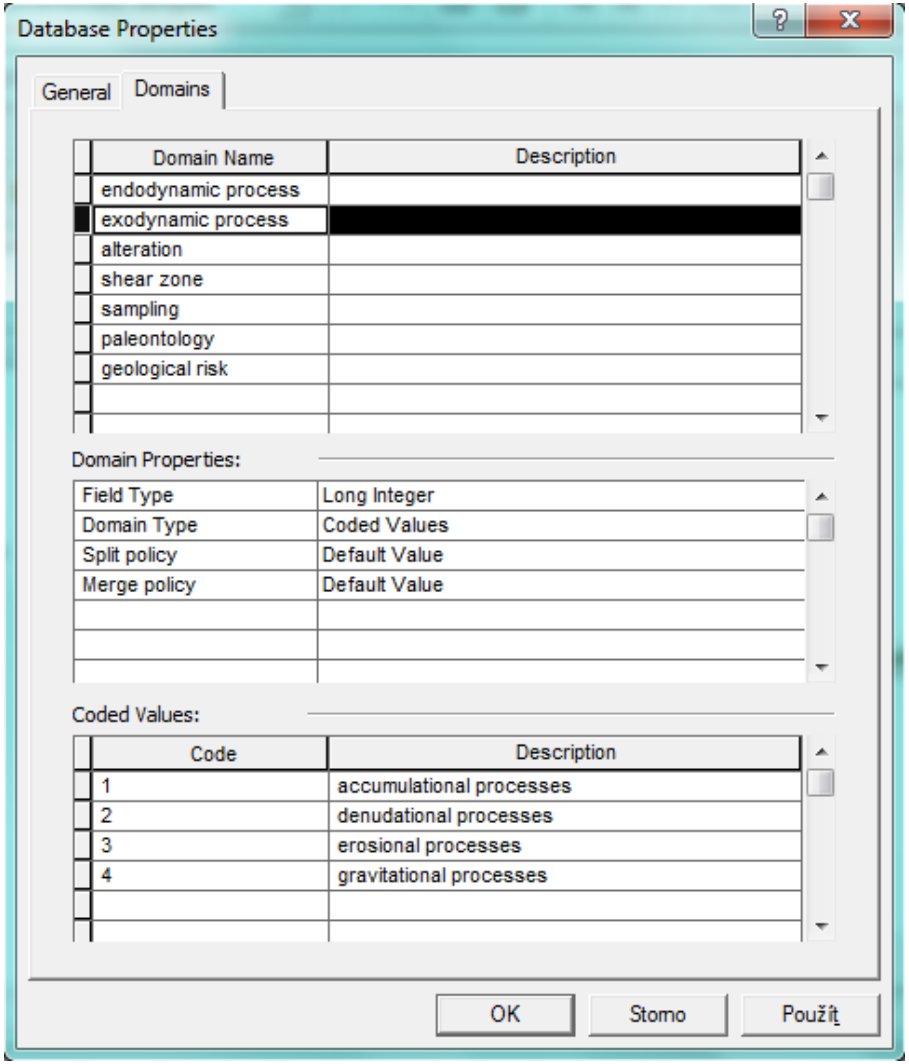
Creating a new geodatabase

- In ArcCatalog browse the folder where you want to create the new geodatabase.
- Right-click it, point to *New* and select Personal Geodatabase.
- Type a new name for this GDB.



Create Domains

- domains are common to the entire database.
- Right-click the new geodatabase and point to *Properties*
- Select the Domains tab and create a new domain by typing the domain name.
- For each domain you can choose the type (range or coded values).
- Specify the range for the range domain type or codes for the coded values domain type.
- Range domains do not have built-in validation! You have to manually validate in ArcMap! In the edit session, select features you want to validate and use *Validate Features* on the Editor menu.


Database Properties
General
Domains
Domain Name
Description
endodynamic process
exodynamic process
alteration
shear zone
sampling
paleontology
geological risk
Domain Properties:
Field Type
Long Integer
Domain Type
Coded Values
Split policy
Default Value
Merge policy
Default Value
Coded Values:
Code
Description
1
accumulational processes
2
denudational processes
3
erosional processes
4
gravitational processes
OK
Storno
Použít

Arrange Your Data

Vector Data

Organizing vector data in feature datasets

grouping data with the same

- coordinate system
- thematic content
- spatial location

Organizing raster data in raster catalogues

grouping raster data (photos, raster maps)


Feature_Dataset
Personal Geodatabase Feature Dataset


Raster_Catalog
Personal Geodatabase Raster Catalog

Create a New Feature Dataset

- Right-click the geodatabase, point to *New* and select *Feature Dataset*.
- Type name and specify coordinate system.

Create a New Feature Class Within the Feature Dataset

- Right-click the feature dataset, point to *New* and select *Feature Class*.
- Type name and create new fields (can be created later).
- Coordinate system is taken from the feature dataset.

Add Domains to Feature Class

- Create a new feature class in the same manner as described on the previous slide.
- Create field with data type *long integer* and select domain you want to add (on field properties).

Create the Subtype

- Create a new field with data type *long integer*
- (in ArcCatalog click the feature class, select *Preview* tab, on drop-down menu select *table*, click the *Options* button and point to *Add Field...*)
- Name the field and select *Long Integer* type. Let the Domain property empty.
- Now on the feature class properties dialog open *Subtypes* tab and find your subtype field.
- Only one subtype can be defined to the feature class.
- Fill in subtypes (codes and description) in the same manner you define domains.

Subtype and related domains

- On the Subtype tab of the feature class properties dialog, click a code value you want and set domains for this code in the *Default Valeus and Domains* table. Click another code and assign different domains to it.
- open ArcMap, start editing and see what happens on domains fields when you change the subtype value.

Raster Data

- Raster data can be included to the GDB using *Raster Catalog*.
- Right-click your GBD in ArcCatalog, point to *New* and select *Raster Catalog...*
- Type name of the Raster Catalog and select *Raster Management Type*.
- *Managed* type means that rasters will be stored within GDB.
- *Unmanaged* type creates only links to existing photos.

Load Rasters

- To load rasters right-click the raster catalog, point to *Load* and select *Load Data*.

Add ID to rasters

- In ArcMap open the raster catalog. Open attribute table and add a new field with photo id information.
- This field will serve as the primary key for relating your tables to rasters.
- Typically you can relate the documentary points feature class to the photo documentation.

Relate a table

- Create a new feature class *Documentary_samples* with the field called *Photo_id*.
- Digitize few points and assign them an existing photo id from raster catalog.
- In ArcCatalog right-click the feature dataset that contains feature class Documentary_samples, select *New* and *Relationship Class*.
- On the wizard dialog relate documentary samples to the raster catalog, choose simple relationship, check *no messages propagated*, select cardinality *one to many* and choose the primary and the foreign key (photo_id).

Now add documentary samples and raster catalog to ArcMap and select a documentary point by *Identify* tool. You can see that photos are related to the point.

Editing Data

Creating Polygons

- The simplest way to create polygons is to use the *Editor* tool in ArcMap.
- But this manner brings lot of inaccuracies - overlap or gaps!
- To avoid these errors it is better to use *Polygon Feature Class From Lines* tool.
- In ArcMap you simply create lines (borders of areas) within the line feature class.
- Furthermore, using point feature class there is possibility to add attribute to polygons.

Polygon Feature Class From Lines

- Open ArcCatalog, right-click the feature dataset, select *New* and *Polygon Feature Class From Lines*.
- On the tool dialog type name of a new polygon feature class and select the input line and the point feature class.

Creating Annotations

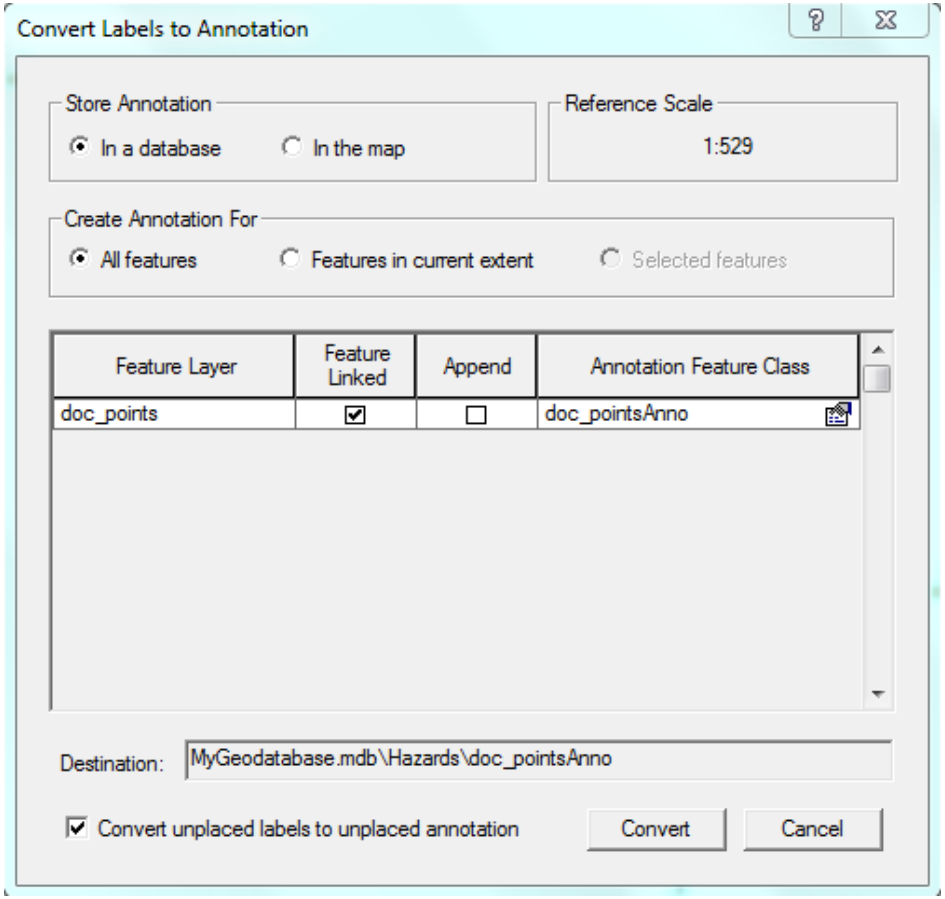
Labels

- automatically generated text
- Label parameters are defined for layers.
- unable to define parameters separately for each text element

Annotations

- generated from labels
- stored in geodatabase as features
- Label parameters are defined for each feature.
- can be edited as feature classes (attribute table, geometry)

- In ArcMap label the layer you want to create annotations from
- Right-click the layer on the *Table Of Contents* and select *Convert Labels To Annotations*.
- Check *In a database* and *All features* and select the destination geodatabase.
- *Feature linked* means that annotations will be linked to features that are labelled. So when you change the position of the feature, the linked annotation position will be automatically changed
- By *Append* tool you can append new annotations to existing annotations.


Convert Labels to Annotation
Store Annotation
In a database
In the map
Reference Scale
1:529
Create Annotation For
All features
Features in current extent
Selected features
Feature Layer
Feature Linked
Append
Annotation Feature Class
doc_points
doc_pointsAnno
Destination:
MyGeodatabase.mdb\Hazards\doc_pointsAnno
Convert unplaced labels to unplaced annotation
Convert
Cancel