

Geodatabases: An Overview

Jennifer Kuntz

May 2008

Topics

- Geodatabase Format Options
 - File geodatabase
 - Scalable geodatabases
 - Personal
 - Workgroup
 - Enterprise
- Model the World Using
 - Subtypes
 - Domains
 - Behaviors
- Where to Learn More

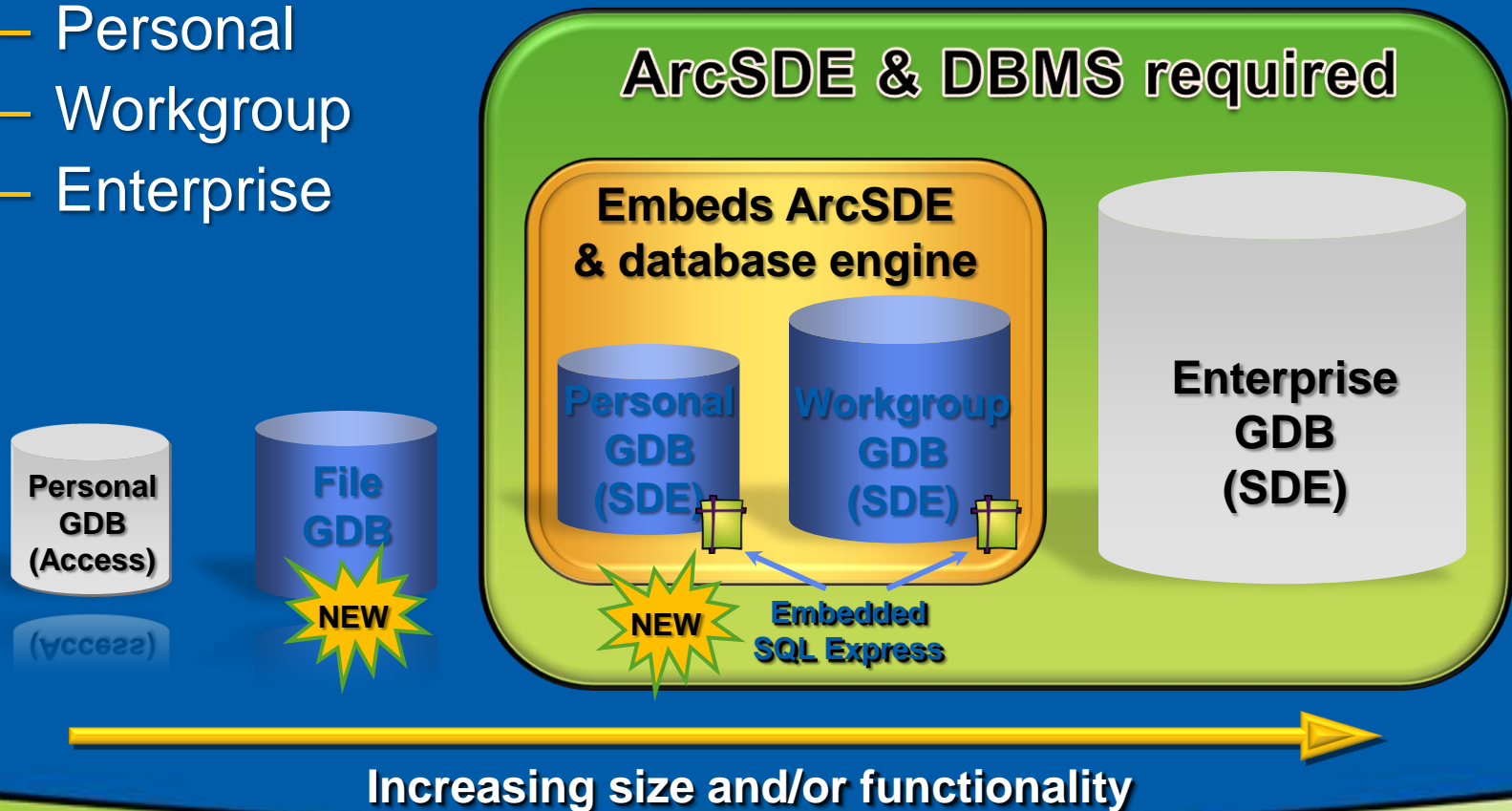
What is a geodatabase?

- A particular collection of geographic data on disk
- Stored in geodatabase format
 - One of many geographic data formats
- Organized by geographic area, theme, or project
- May include vector data, raster data, tables, special data types
- Advanced capabilities for modeling feature and attribute relationships



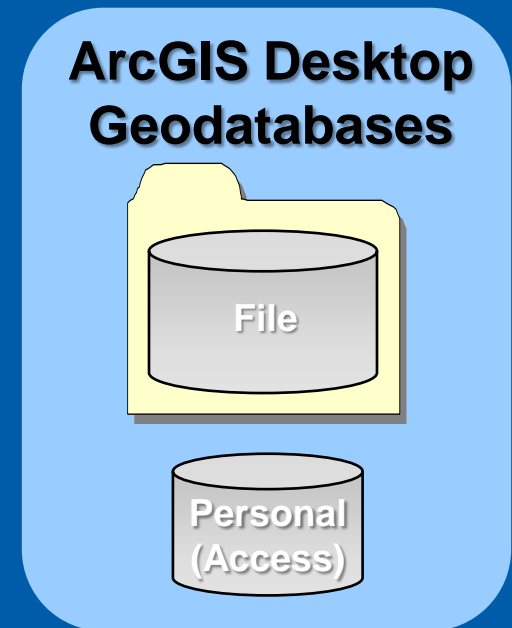
Geodatabase options at 9.2

- Personal geodatabase for Access
- File geodatabase
- Scalable geodatabases
 - Personal
 - Workgroup
 - Enterprise



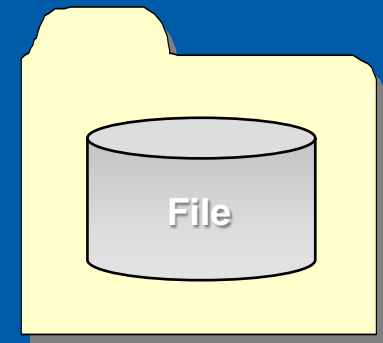
ArcGIS Desktop geodatabase formats



- File geodatabase
 - Upgraded geodatabase format
 - Stored in file system as a folder
 - Geodatabase elements stored as binary files
 - No size limit
- Personal for Microsoft Access
 - Legacy geodatabase format
 - Stored in Microsoft Access database
 - Geodatabase elements stored as tables
 - 2-GB size limit
- Both support all geodatabase elements



Advantages of the file geodatabase

- One terabyte size limit per table
- Efficient data storage
 - Stores same data as other formats using less disk space
- Ability to compress
 - Compression makes database even smaller
- Less restrictive editing locks
 - Locks on tables, not database
- Supported on Windows and UNIX

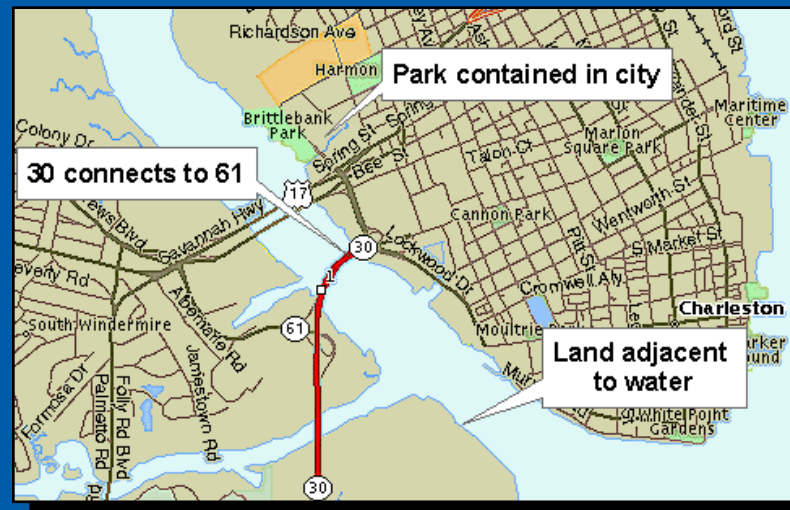


	Infrastructure.mdb	Personal Geodatabase	273.79 MB
	Infrastructure.gdb	File Geodatabase	20.73 KB

Storing same data

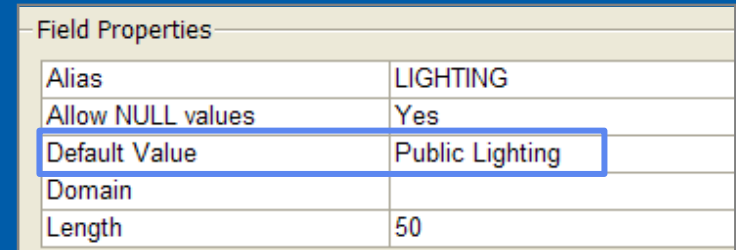
The nature of data relationships

- Geographic features do not exist independently
- Features have relationships
 - State and county boundaries are spatially coincident
 - County boundaries do not overlap each other
 - Roads are connected to other roads
- ArcGIS can model these types of data relationships

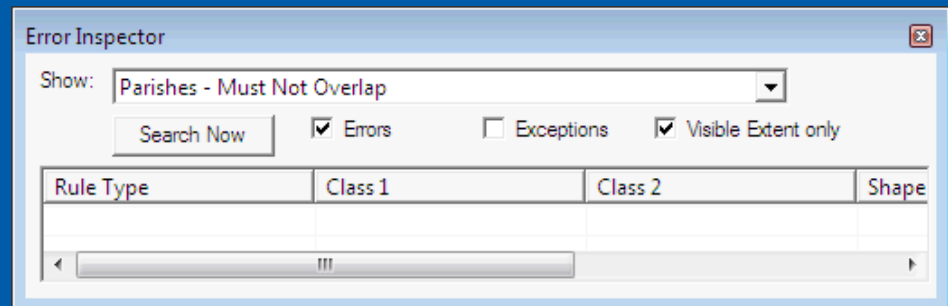


Creating a more efficient GIS

- Set default attribute field values
 - Set to a typical value
 - New features get default
- Attribute Domains: Restrict possible values to known valid values
 - User chooses from list of valid values
 - Standardizes attribute tables
- Data Subtypes: Treat features in same feature class according to different rules
 - Less manual attribution
- Locate and fix invalid data



Field Properties	
Alias	LIGHTING
Allow NULL values	Yes
Default Value	Public Lighting
Domain	
Length	50



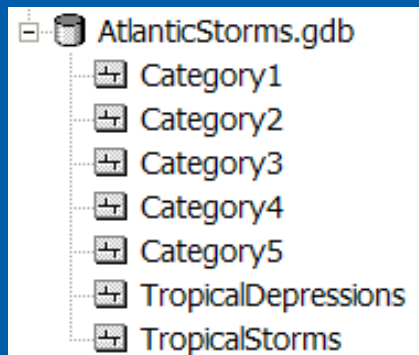
Error Inspector			
Show:	Parishes - Must Not Overlap		
<input type="button" value="Search Now"/>	<input checked="" type="checkbox"/> Errors	<input type="checkbox"/> Exceptions	<input checked="" type="checkbox"/> Visible Extent only
Rule Type	Class 1	Class 2	Shape

Subtypes

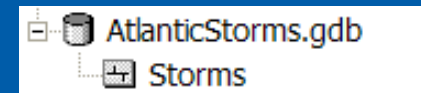
- Behavior that categorizes features into groups
 - Storms feature class grouped by severity
- Determine default values
- Apply domains to subtypes
- Less manual attribution
- Easier data management

Subtypes:	
Code	Description
1	Category 1 Hurricane
2	Category 2 Hurricane
3	Category 3 Hurricane
4	Category 4 Hurricane
5	Category 5 Hurricane
6	Tropical Depression

Feature classes without subtypes



Feature class with subtypes



Domains

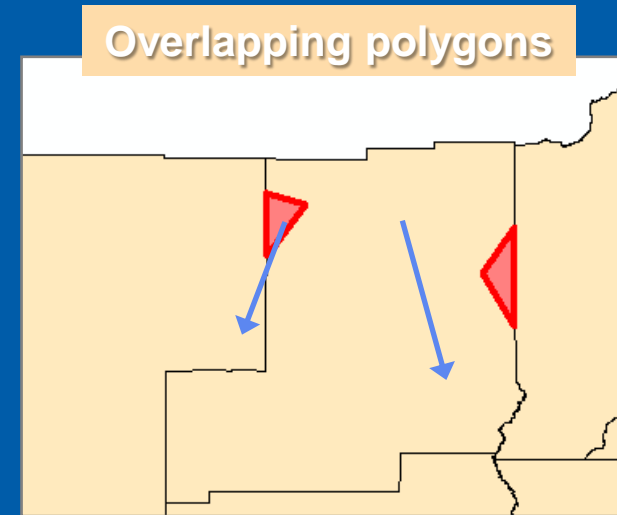
- Behavior that prevents and locates attribute errors
- Coded values
 - User chooses from list when editing field
- Range
 - User can enter any value
 - Validation locates errors
 - Example: Wind_Speed field for category 1 hurricane = 74–95 mph

STATE	ZIP	Animal
LA	70094	Dog
		Bird
		Cat
		Dog
		Reptile
		Other

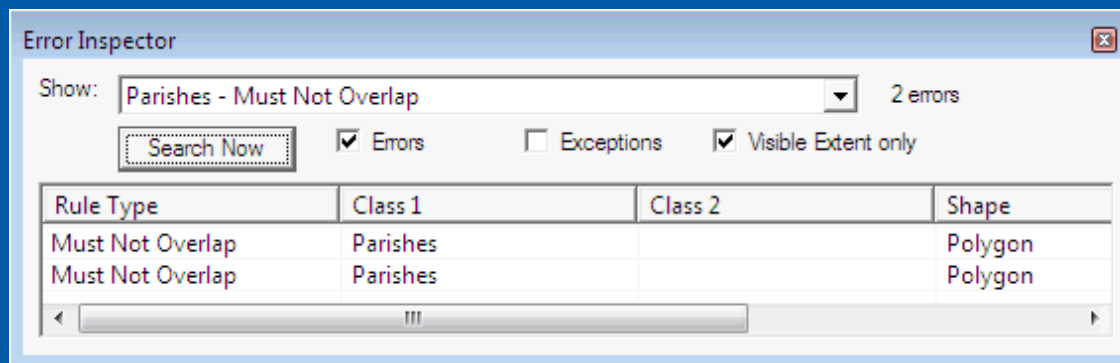
Cat1Winds	Wind speed range for Category 1 Hurricanes
Domain Properties:	
Field Type	Short Integer
Domain Type	Range
Minimum value	74
Maximum value	95

Spatial data behavior

- Real-world features have spatial relationships
 - Cities are contained within states
 - Parishes do not overlap
- Enforce topological relationships
 - Between features in one feature class
 - Between features in two feature classes
- ArcMap contains specific editing tools
 - Locate and fix spatial errors

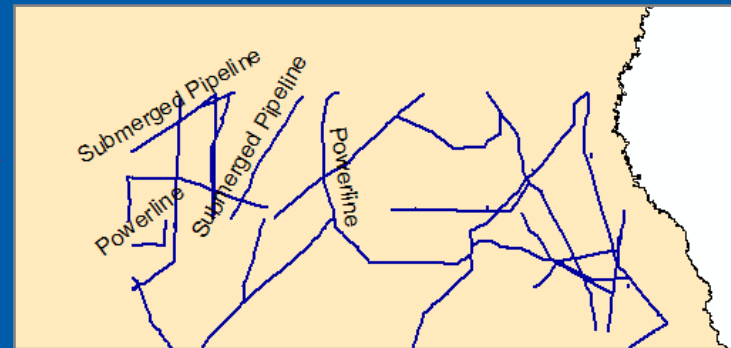
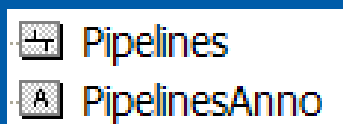


Create
Geodatabase
Topology with
ArcEditor or
ArcInfo, Map
Topology with
Any License
Level



Feature-linked annotation

- Create with ArcEditor or ArcInfo, can be viewed by ArcView
- Map text stored in feature class in geodatabase
- Text is linked to features in a feature class
 - If feature is moved or deleted, so is text
 - If label attribute is modified, then annotation on map changes



- ArcGIS creates relationship class
 - Geodatabase behavior element that associates tables

Other Geodatabase Behaviors

Available with ArcEditor or ArcInfo

- Relationship classes
 - Create persistent association between tables
 - Required by feature-linked annotation
 - Can set rules to determine proper associations
 - ◆ Example: commercial parcel can have 1–3 commercial buildings
- Geometric networks
 - Used to model behavior of utility networks (electric, gas, water)
 - Connectivity rules determine valid spatial relationships
 - ◆ Example: 4" lateral connects to 6" main via 4 x 6 tee
- Both use validation to locate invalid features

Scalable Geodatabases

(require ArcEditor or ArcInfo)



	ArcSDE Personal	ArcSDE Workgroup	ArcSDE Enterprise
Supported DBMS	SQL Server Express	SQL Server Express	IBM DB2, IBM Informix, SQL Server, Oracle
Management interface	ArcCatalog	ArcCatalog	ArcCatalog, commands, & RDBMS
Storage capacity	4 GB/geodatabase	4 GB/geodatabase	Depends on server
Licensing availability	ArcGIS Desktop ArcEditor/ArcInfo	ArcGIS Server Workgroup	ArcGIS Server Enterprise
Supported O/S platform	Windows	Windows	Multiple platforms
Number of users	3 concurrent; 1 editor/gdb	10 editors & readers concurrent	Unlimited editors & readers concurrent
Network application	Desktop applications only	Intranet & internet	Intranet & internet

Personal and Workgroup Geodatabase Servers

- Bundled geodatabase servers support full geodatabase model
 - Complex geodatabase objects
 - Topology, geometric networks...
 - Versioning
 - Long transactions and multiple editors
 - Archiving
 - Keep historical record of edits
 - Replication
 - Synchronizing multiple geodatabases over a network
- All administration done from ArcCatalog

Additional Resources

- ESRI Virtual Campus
 - What's New in the Geodatabase at ArcGIS 9.2 (Free!)
 - Working with Geodatabase Topology (Free!)
 - Working with Geodatabase Subtypes and Domains
 - Creating and Editing Geodatabase Topology with ArcGIS Desktop
- Instructional Podcasts (choose Geodatabase as Category)
- ESRI Instructor-Led Training
 - Introduction to ArcGIS Desktop III
 - Building Geodatabases
- [Support.esri.com](http://support.esri.com)

Questions?