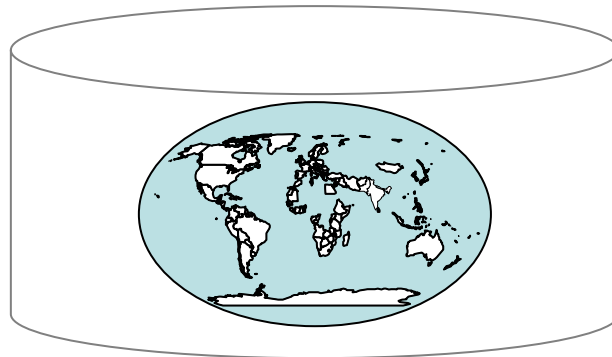
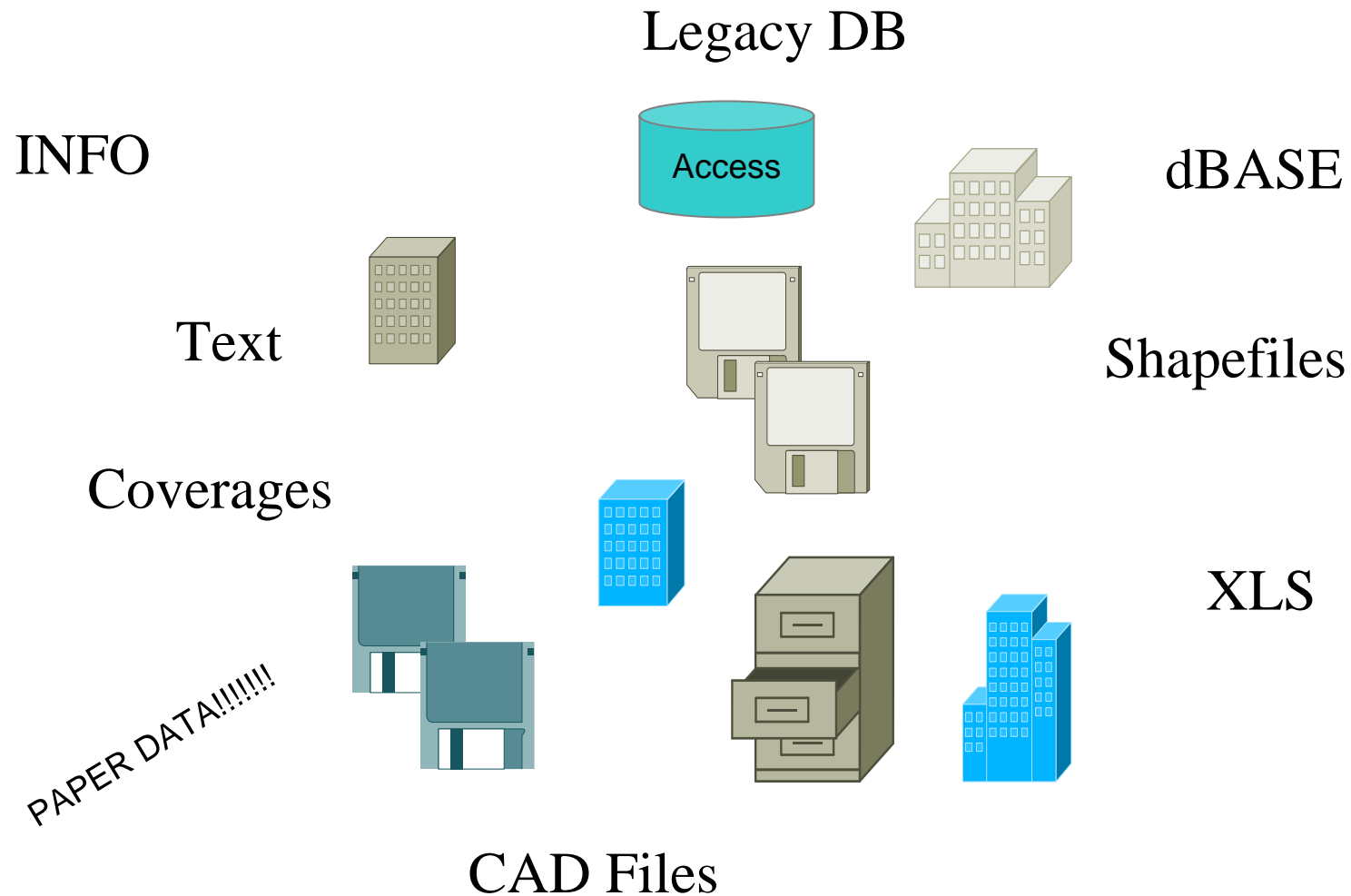




Geodatabases



So how do we get there when we are here?





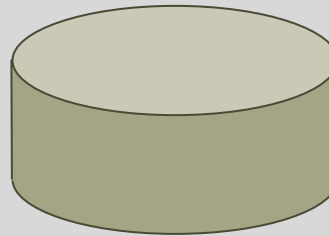
•Applications



- Collection data
- Biological
- Museum



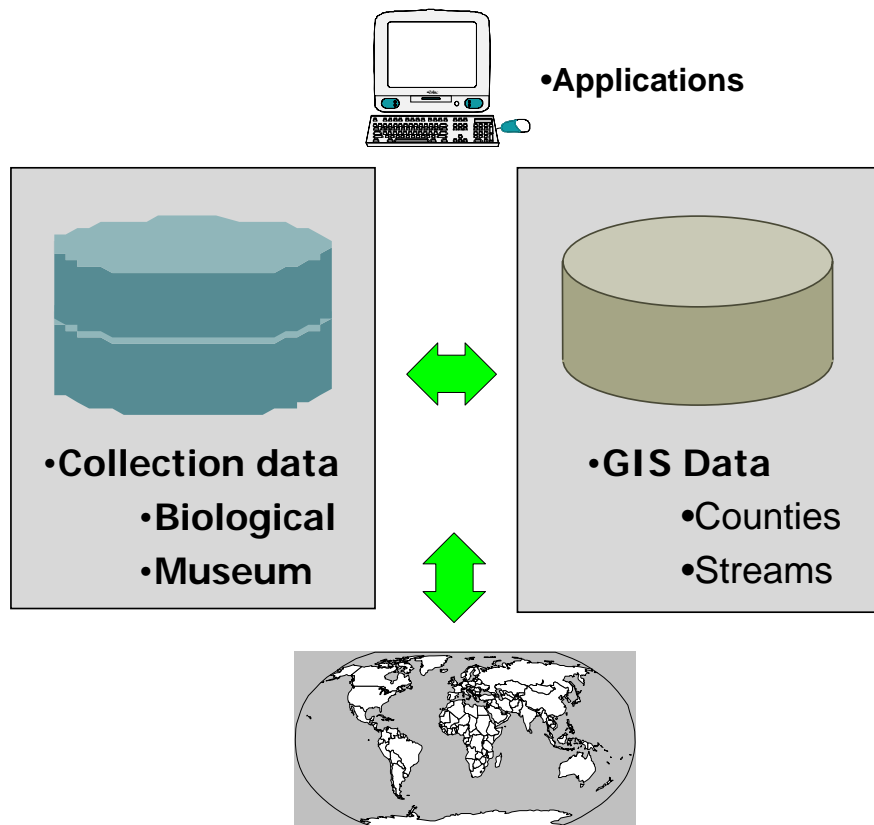
•Applications



- GIS Data
 - Counties
 - Streams

**No integrated way to
link client-tracking
to billing or
prospects to past
projects**

Integration Examples:

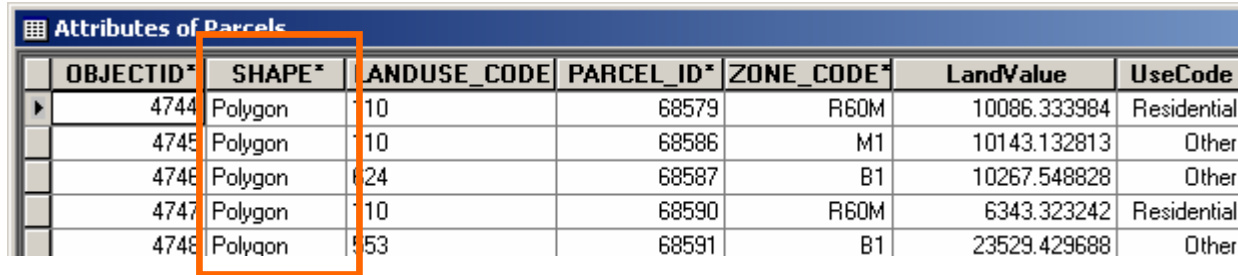


Once we integrate the GIS component we can begin to perform spatial analysis.

- Where are my top-billing clients?
- What areas in my territory are underserved?
- Traveling salesman analyses

Feature class

- ❑ Table that also stores shapes for features

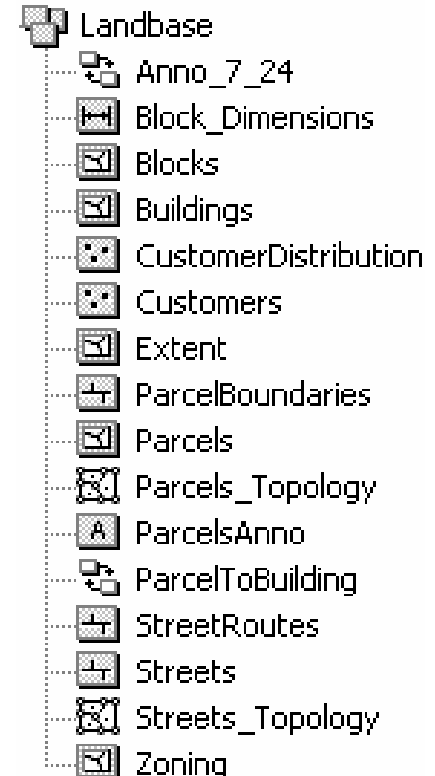


OBJECTID*	SHAPE*	LANDUSE_CODE	PARCEL_ID*	ZONE_CODE*	LandValue	UseCode
4744	Polygon	10	68579	R60M	10086.333984	Residential
4745	Polygon	10	68586	M1	10143.132813	Other
4746	Polygon	24	68587	B1	10267.548828	Other
4747	Polygon	10	68590	R60M	6343.323242	Residential
4748	Polygon	53	68591	B1	23529.429688	Other

- ❑ All features in a feature class have the same:
 - Geometry
 - Attribute fields
 - Spatial reference
 - Coordinate system
 - Behavior

Feature datasets

- ❑ **Contain feature classes**
 - All share the same spatial reference
 - Never tables and geometry
- ❑ **Required for geometric networks**
 - Manage network connectivity
- ❑ **Required for topologies**
 - Spatial relationship between feature classes



Databases

- ❑ Attribute data in many ways is tied to spatial location
- ❑ Traditional databases, e.g. Access can not store a 'point' as a field type.
- ❑ Most spatial data formats (Coverage, shapefile) can not be used inside a relational database
- ❑ Beneficial to store biological data along with spatial data inside a database.

Geodatabase

- ❑ **A container for spatial and attribute data**
 - GIS data stored in a relational database
 - Scalable solutions (personal and enterprise database)
 - Supports data integrity with rules
- ❑ **Tools to migrate existing GIS data**

Looking inside the Geodatabase

Feature dataset

spatial reference

Feature classes, subtypes

Polygon



Route

Line



Dimension



Point Annotation



Relationship class



Geometric Networks



Topology



Tables, subsets



Raster Datasets



Survey Datasets

Locators

Addresses

X,Y locations

Zip Codes

Route Events

Route Locations

Validation Rules

Attribute Defaults

Attribute Domains

Split/Merge Policies

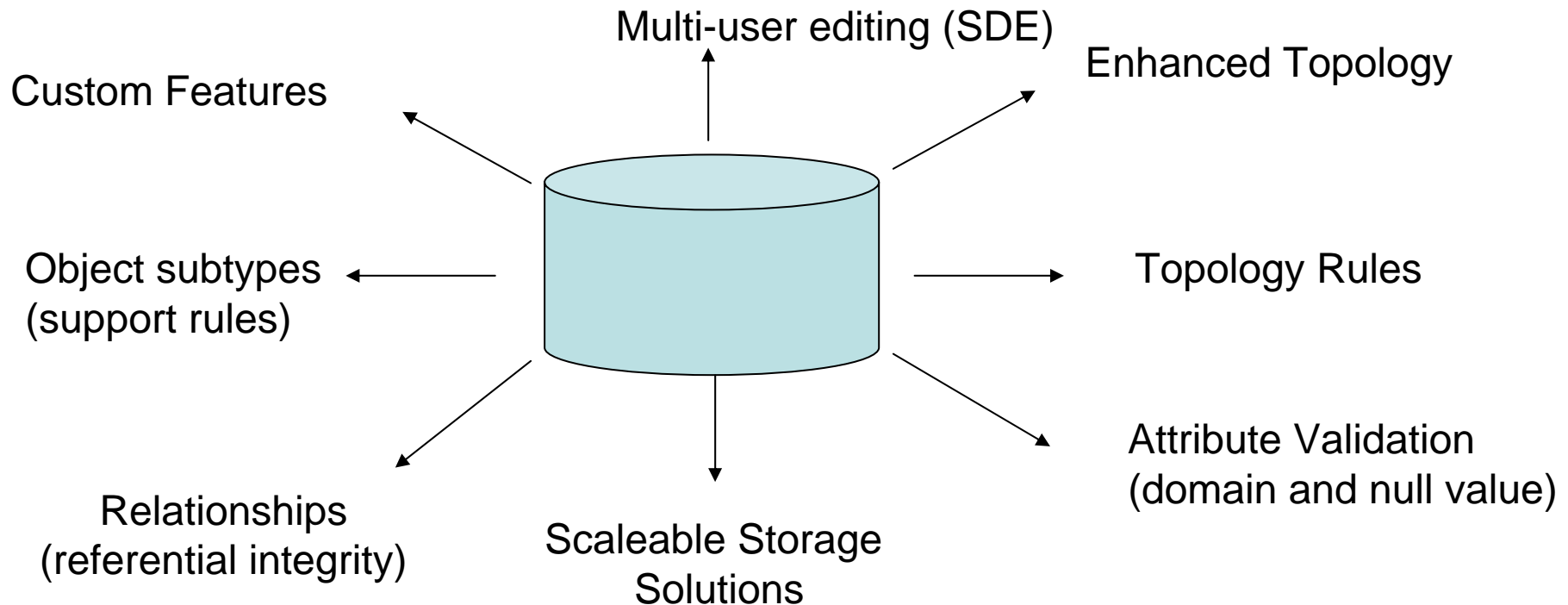
Connectivity Rules

Relationship Rules

Topology Rules

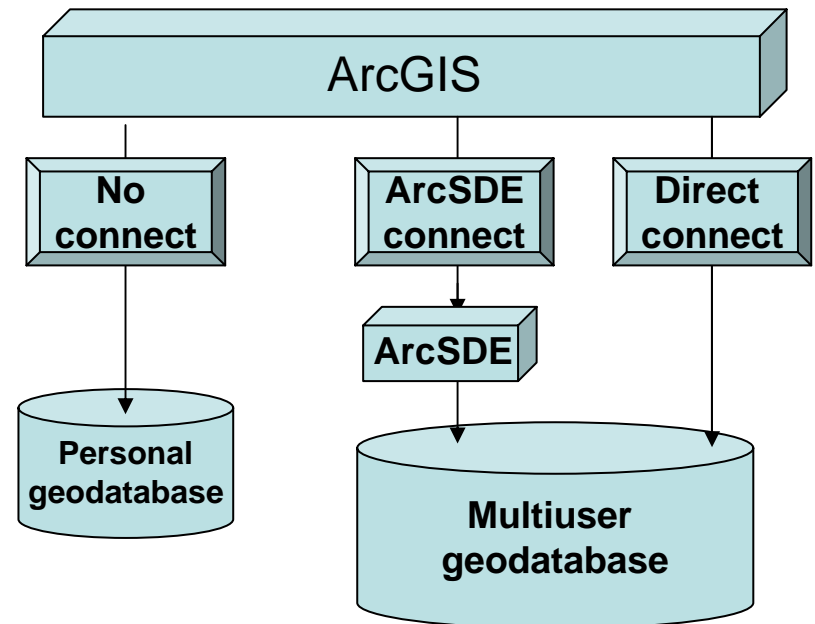
Advantages of the Geodatabase

- ❑ **An RDBMS for spatial and attribute data**
- ❑ **Other advantages**



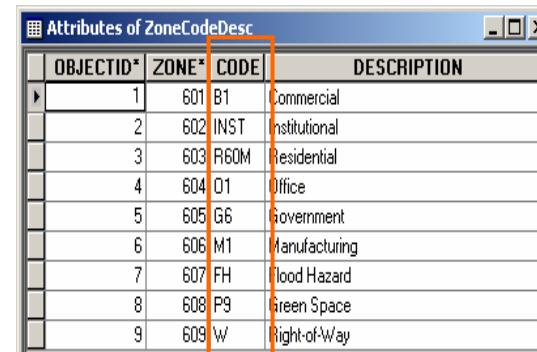
Storing the geodatabase

- ❑ **Personal geodatabase**
 - Microsoft Access
 - Provided out-of-the-box
- ❑ **ArcSDE geodatabase**
 - Enterprise RDBMS
 - Need ArcSDE License
- ❑ **The differences**
 - Data volume and speed
 - Multiuser with ArcSDE only
 - Raster with ArcSDE only
- ❑ **Use ArcCatalog to manage both**



Geodatabase tables

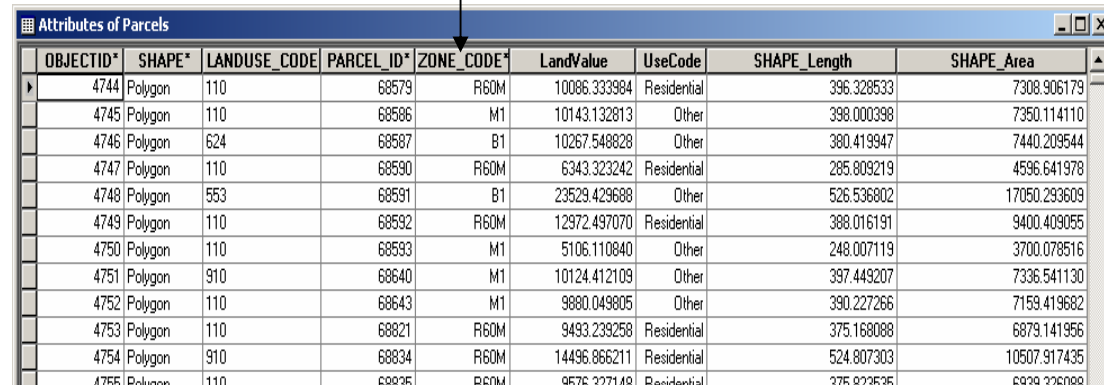
- ❑ Collections of rows and columns
 - Non-spatial
- ❑ May have behavior
 - Subtypes
 - Default values
 - Domains
- ❑ May participate in relationships



OBJECTID*	ZONE*	CODE	DESCRIPTION
1	601	B1	Commercial
2	602	INST	Institutional
3	603	R60M	Residential
4	604	O1	Office
5	605	G6	Government
6	606	M1	Manufacturing
7	607	FH	Flood Hazard
8	608	P9	Green Space
9	609	W	Right-of-Way

Origin table
(look up table)

Destination table
(feature class)



OBJECTID*	SHAPE*	LANDUSE_CODE	PARCEL_ID*	ZONE_CODE*	LandValue	UseCode	SHAPE_Length	SHAPE_Area
4744	Polygon	110	68579	R60M	10086.333984	Residential	396.328533	7308.906179
4745	Polygon	110	68586	M1	10143.132813	Other	398.000398	7350.114110
4746	Polygon	624	68587	B1	10267.548828	Other	380.419947	7440.209544
4747	Polygon	110	68590	R60M	6343.323242	Residential	285.809219	4596.641978
4748	Polygon	553	68591	B1	23529.429688	Other	526.536802	17050.293609
4749	Polygon	110	68592	R60M	12972.497070	Residential	388.016191	9400.409055
4750	Polygon	110	68593	M1	5106.110840	Other	248.007119	3700.078516
4751	Polygon	910	68640	M1	10124.412109	Other	397.449207	7336.541130
4752	Polygon	110	68643	M1	9880.049805	Other	390.227266	7153.419682
4753	Polygon	110	68821	R60M	9493.239258	Residential	375.168088	6879.141956
4754	Polygon	910	68834	R60M	14496.866211	Residential	524.807303	10507.917435
4755	Polygon	110	68835	R60M	9576.277148	Residential	375.273535	6939.276088

Subtypes

- ❑ Groups of objects within a feature class or table
 - Assign different rules to each subtype
 - Attribute domains, topology rules, network rules, etc.
 - Grouped by an integer attribute

	OBJECTID*	SHAPE*	LANDUSE_CODE	PARCEL_ID*	ZONE_CODE*	La
▶	4744	Polygon	110	68579	R60M	
	4745	Polygon	110	68586	M1	
	4746	Polygon	624	68587	B1	
	4747	Polygon	110	68590	R60M	
	4748	Polygon	553	68591	B1	
	4749	Polygon	110	68592	R60M	
	4750	Polygon	110	68593	M1	
	4751	Polygon	910	68640	M1	

Feature Class Properties

General | Fields | Indexes | Subtypes | Relationships

Subtype Field: ZONE_CODE

Default Subtype: B1

Subtypes:

Code	Description
601	B1
602	INST
603	R60M
604	O1
605	O6
606	M1

Domains

☐ Rules for attributes

- Range
 - Well depth range : 25-400 feet
- Coded Values
 - Type: Bored or Artesian

☐ Property of the geodatabase

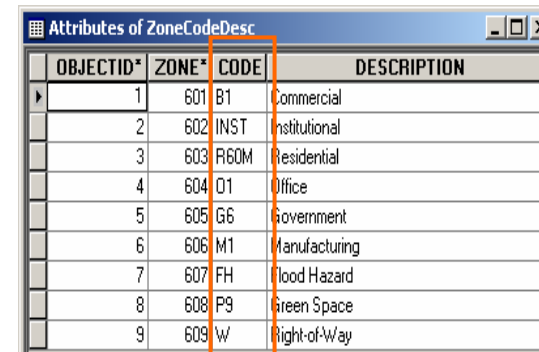
- Can apply a domain for many fields
- Apply to all records or by subtype

☐ Create them in ArcCatalog, use them in ArcMap

- Prevents errors, can label features, find errors

Relationship classes

- ❑ Links objects in origin and destination table
 - Key fields establish relationship
- ❑ Provides:
 - Read/write access
 - Referential integrity
 - Relationship rules
 - Support for versioning

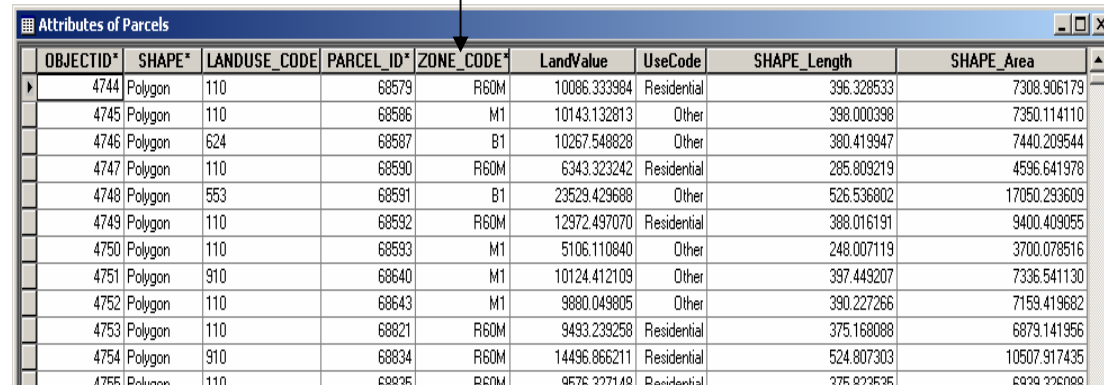


Attributes of ZoneCodeDesc

OBJECTID*	ZONE*	CODE	DESCRIPTION
1	601	B1	Commercial
2	602	INST	Institutional
3	603	R60M	Residential
4	604	O1	Office
5	605	G6	Government
6	606	M1	Manufacturing
7	607	FH	Flood Hazard
8	608	P9	Green Space
9	609	W	Right-of-Way

Origin table
(look up table)

Destination table
(feature class)

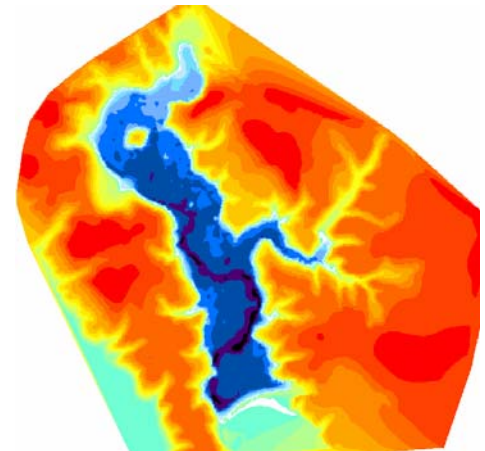


Attributes of Parcels

OBJECTID*	SHAPE*	LANDUSE_CODE	PARCEL_ID*	ZONE_CODE*	LandValue	UseCode	SHAPE_Length	SHAPE_Area
4744	Polygon	110	68579	R60M	10086.333984	Residential	396.328533	7308.906179
4745	Polygon	110	68586	M1	10143.132813	Other	398.000398	7350.114110
4746	Polygon	624	68587	B1	10267.548828	Other	380.419947	7440.209544
4747	Polygon	110	68590	R60M	6343.323242	Residential	285.809219	4596.641978
4748	Polygon	553	68591	B1	23529.429688	Other	526.536802	17050.293609
4749	Polygon	110	68592	R60M	12972.497070	Residential	388.016191	9400.409055
4750	Polygon	110	68593	M1	5106.110840	Other	248.007119	3700.078516
4751	Polygon	910	68640	M1	10124.412109	Other	397.449207	7336.541130
4752	Polygon	110	68643	M1	9880.049805	Other	390.227266	7153.419682
4753	Polygon	110	68821	R60M	9493.239258	Residential	375.168088	6879.141956
4754	Polygon	910	68834	R60M	14496.866211	Residential	524.807303	10507.917435
4755	Polygon	110	68835	R60M	9576.277118	Residential	375.273535	6939.276088

Rasters in the geodatabase

- ❑ Images and grids
 - Image formats: TIFF, BMP, SID, etc.
 - Grids (Native ESRI raster)
- ❑ ArcSDE geodatabases stores as
 - Separate rasters
 - May mosaic during loading
 - Raster catalogs
 - Internal or referenced to file-based data



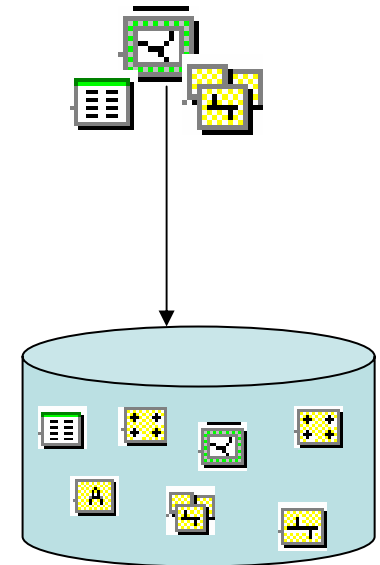
Not available in the personal geodatabase

Geodatabase rules

- ❑ **Attribute defaults**
- ❑ **Attribute domains**
 - Legal values
 - Split/merge policies
- ❑ **Connectivity rules**
- ❑ **Relationship rules**
- ❑ **Topology rules**

Data Loading

- ❑ **Import / Export with ArcCatalog or ArcToolbox**
 - Creates a new feature class
 - Fast and easy but less control
- ❑ **Export with ArcMap**
 - Creates a new class
 - Can export selected features
- ❑ **Load data with ArcCatalog**
 - Simple data loader
 - Into an existing class, or empty
 - No networks or topology allowed
- ❑ **Load data with ArcMap**
 - Object Loader
 - Into an existing class
 - Networks and topology allowed



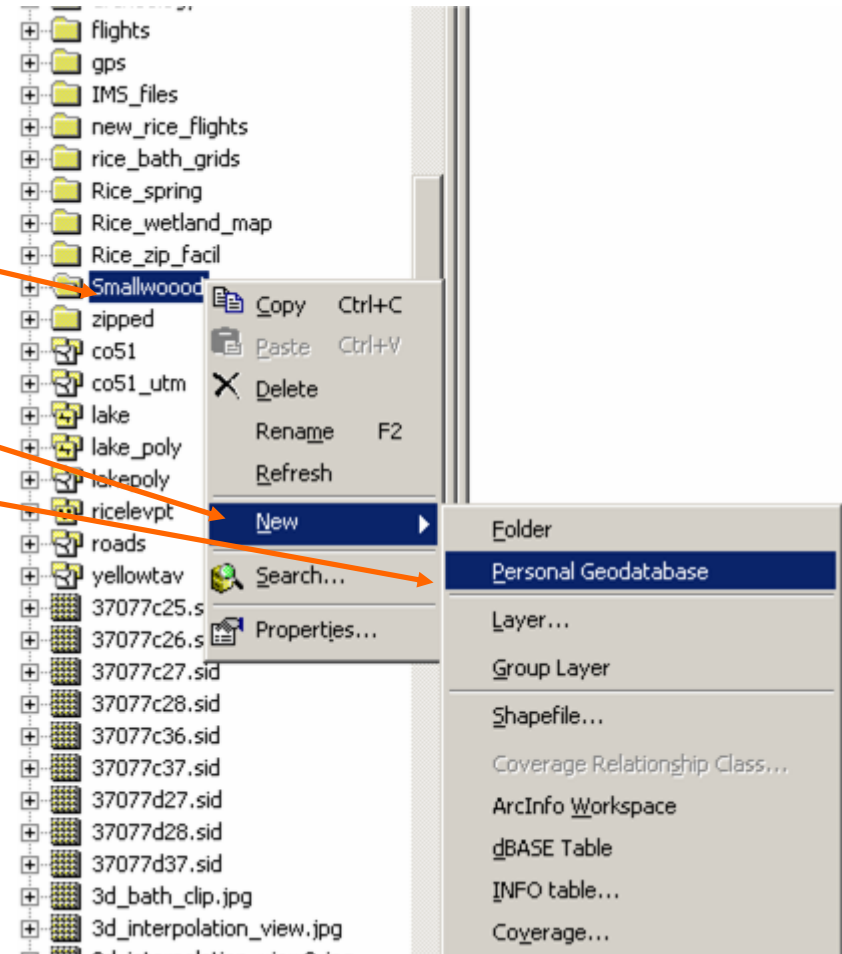
Create your own

❑ Use ArcCatalog

- Step 1: right-click
- Step 2: new
- Step 3: Select

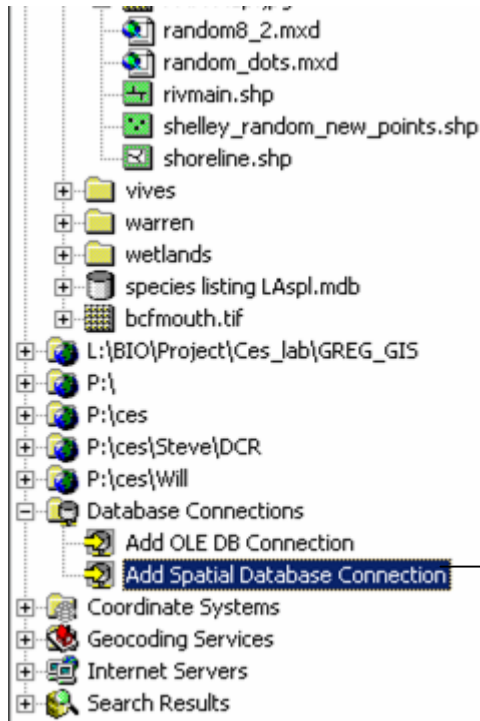
❑ User input:

- Name
- Relationships
- Field names
- Spatial reference



ArcSDE Database

❑ Use ArcCatalog



Spatial Database Connection [?] [X]

Server:

Service:

Database:
(If supported by your DBMS)

Account

User Name:

Password:

☒ Save Name/Password

Version

☒ Save Version

sde.DEFAULT

Customization

☐ Application customization

- VBA code
- Catch interesting editor events (OnNew, OnChanged,
- Code will be included in the *.mxd

☐ Database customization

- Custom class extensions
- Custom object (VB, C++)

Existing data models

- ❑ **Data models are schema templates**
- ❑ **Many types**
 - Provides UML models and personal geodatabases
- ❑ **Saves development time**
 - Modify template to serve your needs
- ❑ **Test, update, test, update**

ESRI Data Models



ArcGIS Data Models

Download

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[ESRI Lays Foundation
for the International
Cadastre Data Model](#)

[Arc Hydro Data Model](#)

ArcNews, 2003

[Status Report on
ArcGIS Data Models](#)

ArcNews, 2002

[ArcGIS main page](#)

.....
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About ESRI software

The goal for each [ArcGIS data model](#) is to provide practical templates for implementing GIS projects for specific industries and applications. Designed by a consortium of users and business partners, these models provide ready-to-use frameworks, built on accepted standards, for modeling and capturing the behavior of real-world objects in a geodatabase. ArcGIS data models are available for

- [Address](#)
- [Basemap](#)
- [Biodiversity](#)
- [Census-Administrative
Boundaries](#)
- [Defense-Intel](#)
- [Energy Utilities](#)
- [Energy Utilities - MultiSpeak
TM](#)
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Facilities](#)
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- [Hydro](#)
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Biodiversity Conservation Data Model

July 2, 2001

