

## ArcMap - EXPLORING THE DATABASE

### Part I

## SPATIAL DATA FORMATS

### Part II

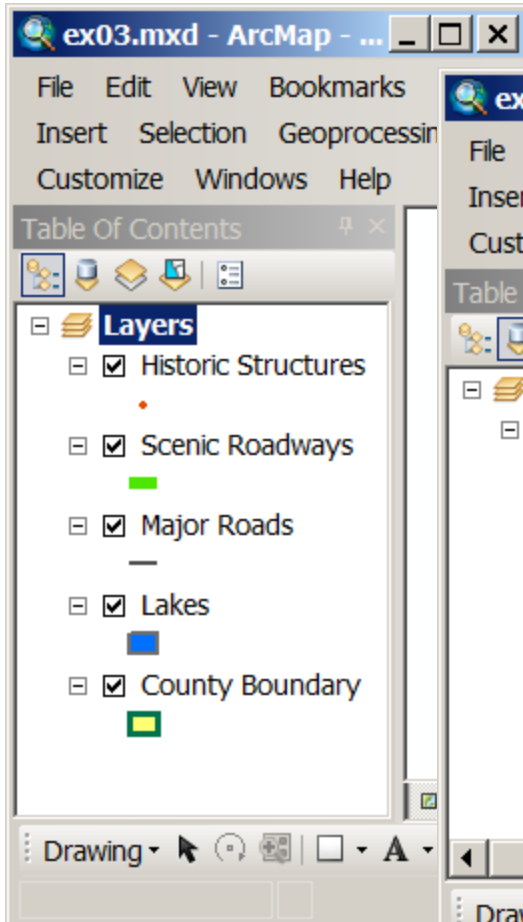
# topics of the week – Exploring the Database

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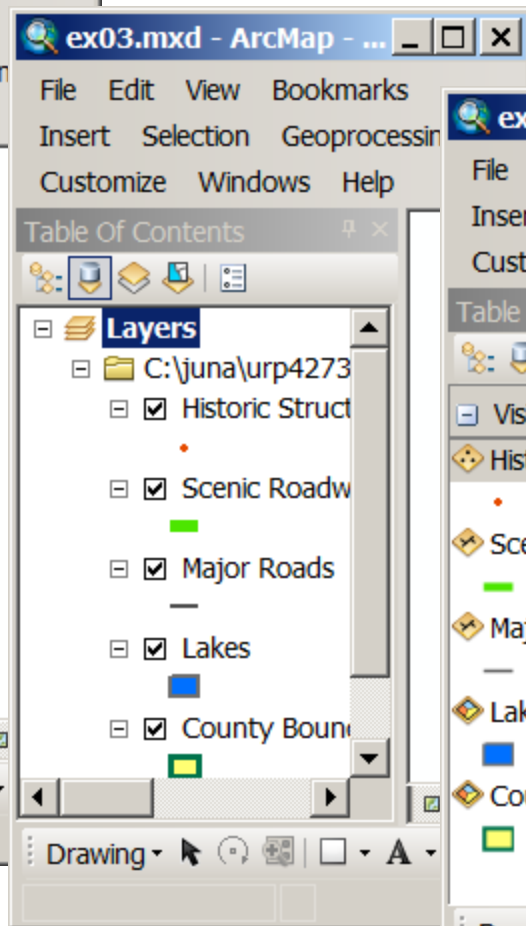
- ❑ **More on the Table of Contents**
- ❑ **Exploration tools**
  - ❑ Identify, Find, Measure, Map tips, Hyperlink, HTML popup
- ❑ **Selection methods**
  - ❑ Spatial selection
  - ❑ Attribute selection
- ❑ **Selection tools**
- ❑ **Statistics**

# Managing the Table of Contents

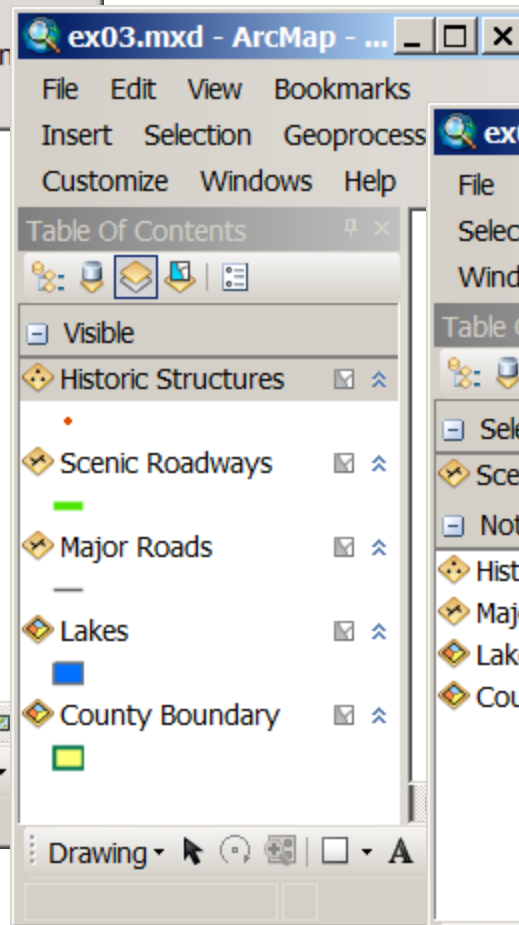
By drawing order



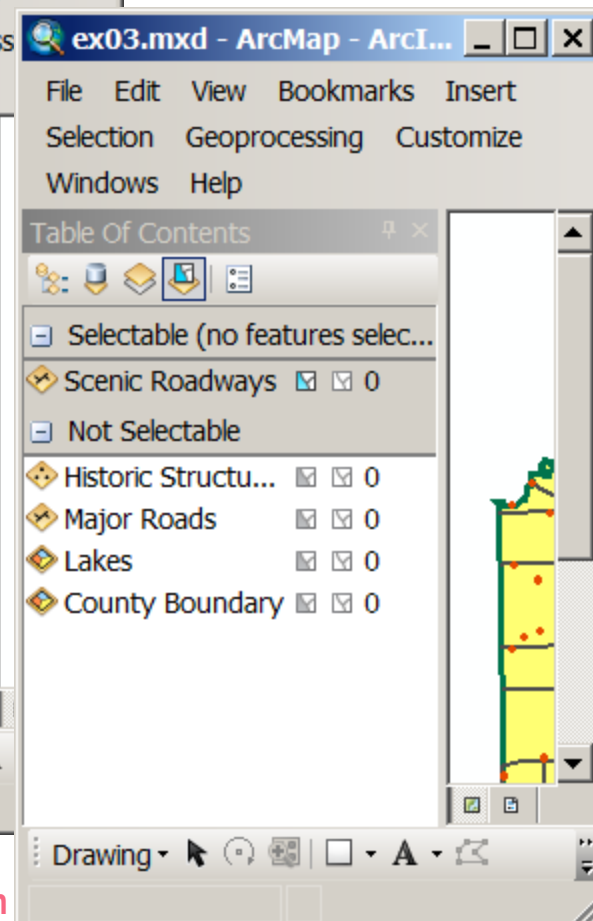
By path to the data source



By visibility



By selection



# Identify – *what is*

- Shows attributes for a feature = one record in the attribute table

The screenshot displays the ArcMap interface. At the top right, the **Tools** toolbar is visible, featuring icons for zooming, panning, and identifying features. A yellow arrow points from the Identify icon in the Tools toolbar down towards the Identify Results window.

The **Identify Results** window is open, showing the following information:

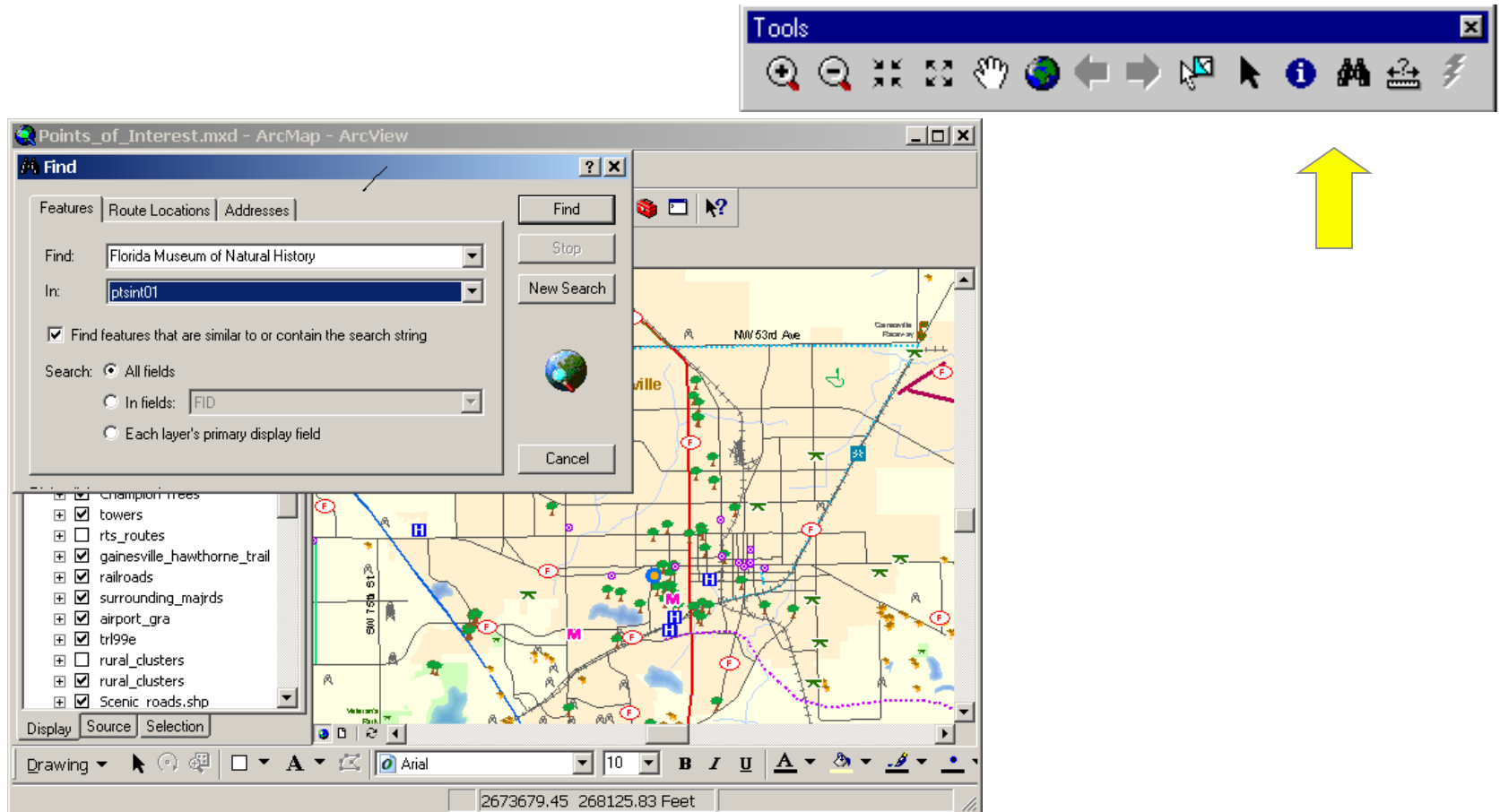
- Layers: <Top-most layer>
- ptsint01
- FLORIDA MUSEUM OF NATURAL HISTORY
- Location: (2653252.474015 241109.505102)

Field	Value
FID	37
Shape	Point
AREA	0
PERIMETER	0
PTSINT_	38
PTSINT_ID	1803
TYPE	MSM
NAME	FLORIDA MUSEUM OF NATURAL HISTORY
OWNERSHIP	PUBLIC
COUNTY	ALACHUA
SOURCE	3
UNIQUE_ID	40025

The main map area shows a street grid with various colored points and lines. The status bar at the bottom indicates coordinates: 2651385.49 242976.49 Feet.

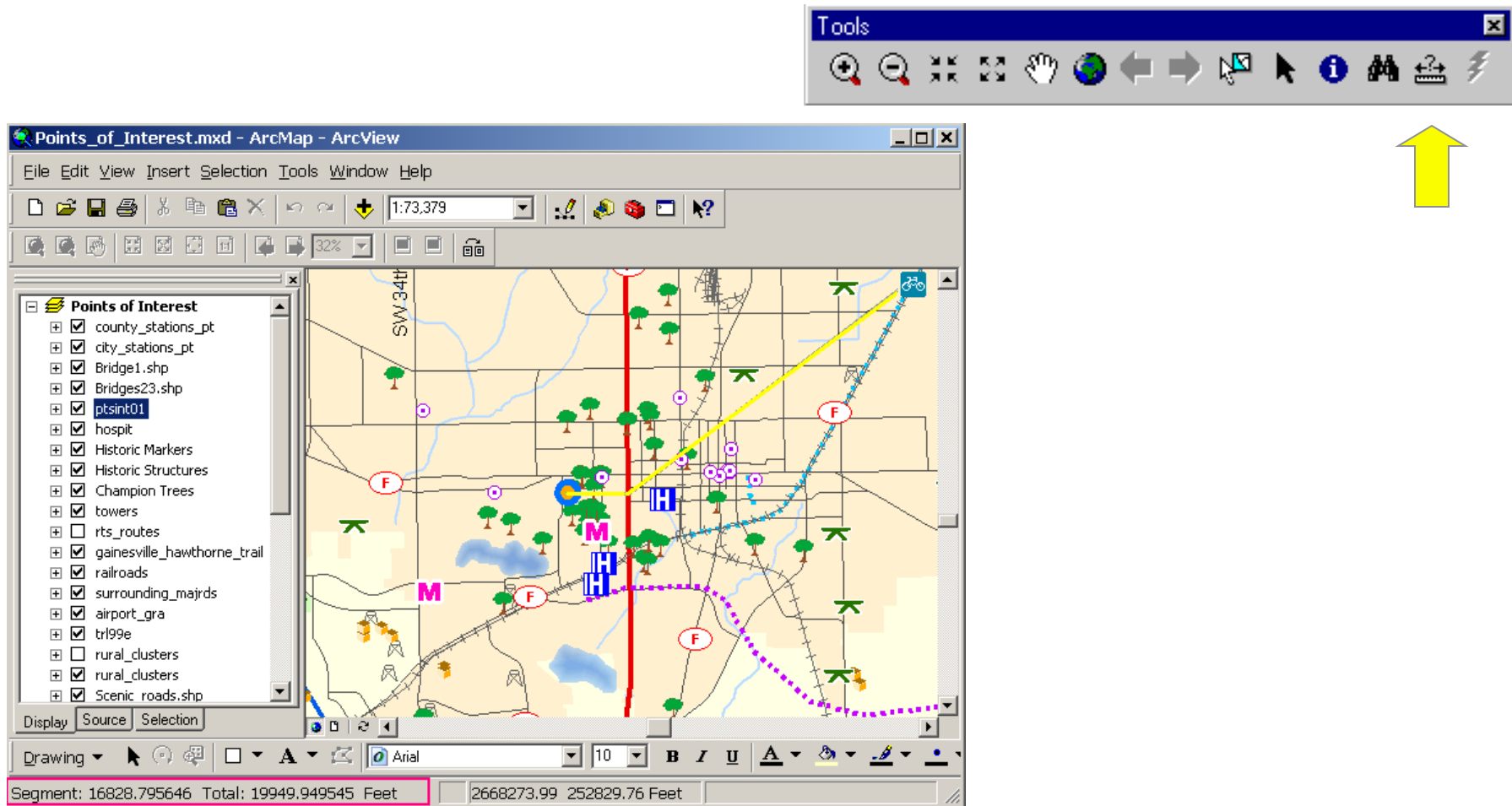
# Find – where is

- Locate a specific feature or when you know or quasi know the attribute



# Measure

- Measure linear distances in map or display units



# Map tips and hyperlinks

- ❑ Other utilities to display layer attributes
- ❑ Map tips (one field only)
- ❑ HTML popups - click (all fields)
- ❑ Hyperlinks
  - ❑ Document
  - ❑ URL
  - ❑ Macro



**Layer Properties**

General | Source | Selection | Display | Symbology | Fields | Definition Query | Labels | Joins & Relates | Time | HTML Popup

Scale symbols when a reference scale is set

Transparent: 0 %

Display Expression

Field: FIPSSTCO Expression...

Show MapTips using the display expression

Hyperlinks

Support Hyperlinks using field:

COUNTY

Document  URL  Script Edit...

Feature Exclusion

The following features are excluded from drawing:

Feature ID: FIPSSTCO Restore Drawing

**ex03.mxd - ArcMap - ArcInfo**

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:740,484

Table Of Contents

**Layers**

- Historic Structures
- Scenic Roadways
- Major Roads
- Lakes
- County Boundary

**NEWNANS LAKE**

NEWNANS LAKE	
FID	7
ID	8
AREA	267205103.214
PERIMETER	68156.344206
ACRES	6134.185
NAME	NEWNANS LAKE

# What is a selection and how to use it?

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- ❑ A selection is a highlighted subset of the data source
- ❑ The subset can be by area or by attributes
- ❑ There are various reasons why we use a selection
  - ❑ Narrow down your analysis
  - ❑ Work more effectively
  - ❑ Create a new layer
  - ❑ Create a new data source
  - ❑ Use as a study area to select features from other layers
  - ❑ Convert to graphics
  - ❑ Run a report
  - ❑ Run statistics
  - ❑ Edit only parts of the data source

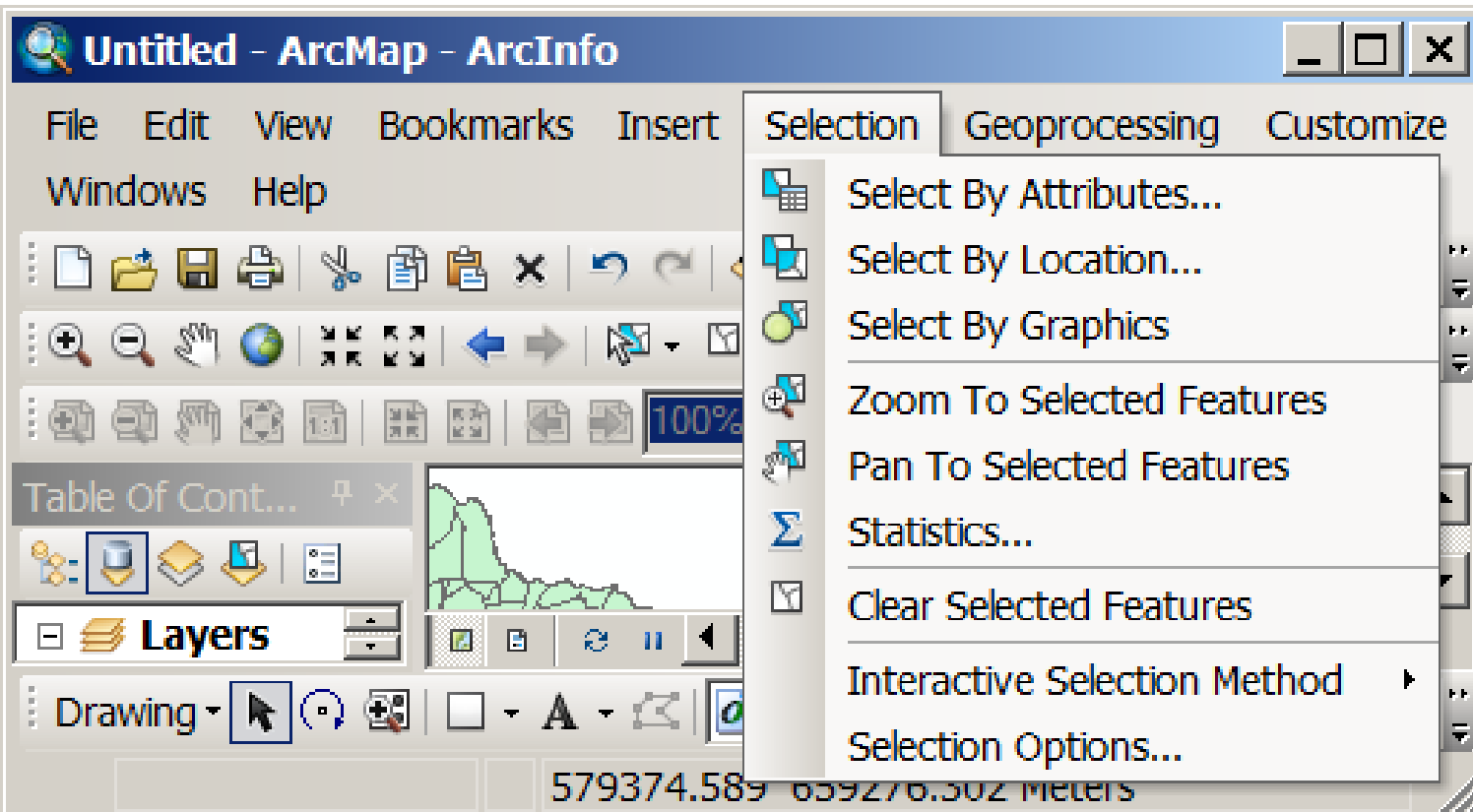


# Four ways to create a selection

- Interactive, by attributes, by location, by graphics



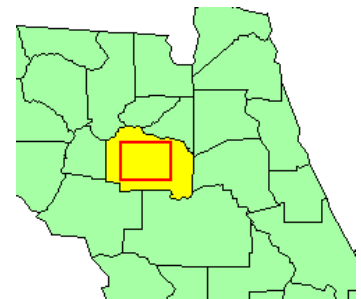
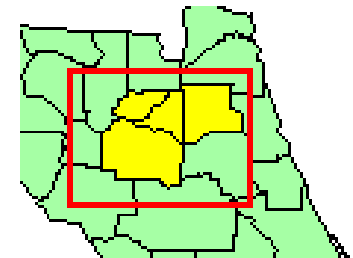
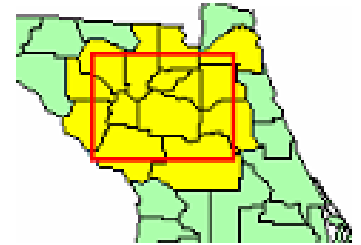
Interactive  
Selection



# Select Interactively – three options

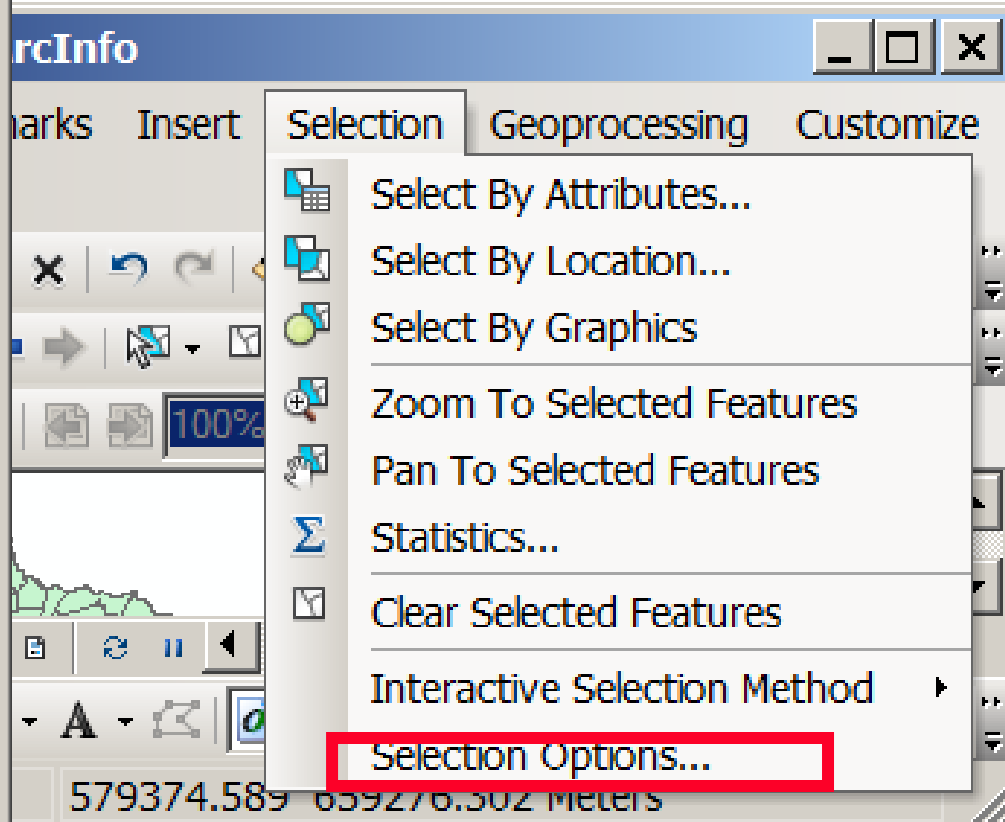
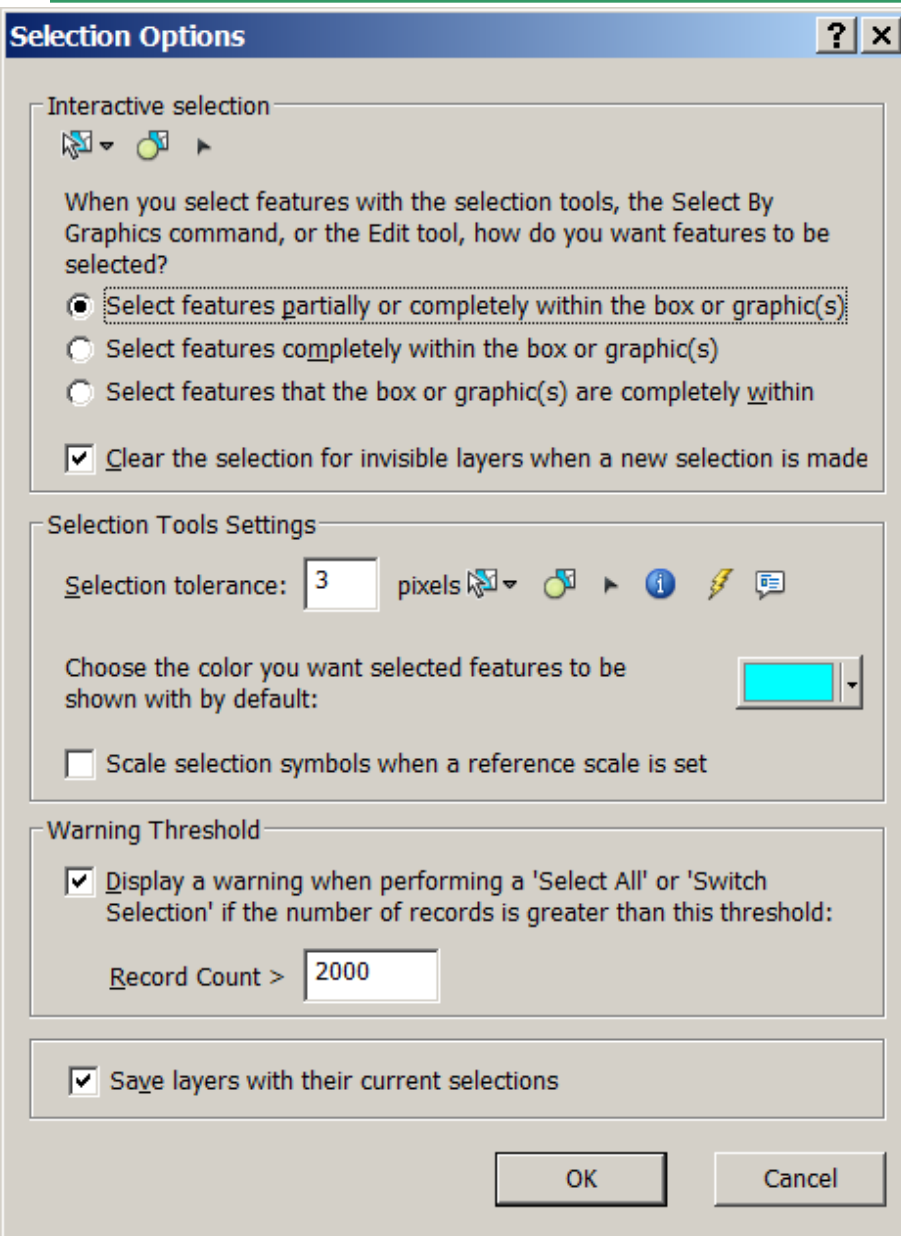
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- ❑ **Select features partially or completely within the box or graphic(s)**
- ❑ **Select features completely within the box or graphic(s)**
- ❑ **Select features that the box or graphic are completely within**



# Selection options

- ❑ Three selection options
- ❑ Selection color
- ❑ Selection radius resolution



# Select by attributes

- ❑ Must use an SQL statement to select features
- ❑ Can verify SQL statement
- ❑ Can save and reload selection expressions
- ❑ Field + operator + value
- ❑ *and vs. or*

**Select By Attributes**

Query Wizard...

Layer: county\_stations\_pt  
 Only show selectable layers in this list

Method: Create a new selection

Fields:

- "FID"
- "ID"
- "ADDR1"
- "NAME"
- "CNTY\_CTY"
- "X"
- "Y"
- "TYPE"

> >= And  
< <= Or  
\_ % ( ) Not  
Is

Go To:

Get Unique Values

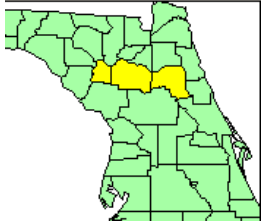
SELECT \* FROM county\_stations\_pt WHERE:  
"NAME" = 'Alachua'

Clear Verify Help Load... Save...  
Apply Close

# Four selection methods

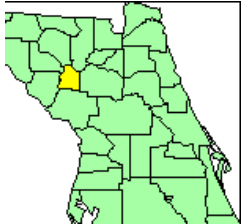
Create new selection

*Gilchrist, Alachua, Putnam*



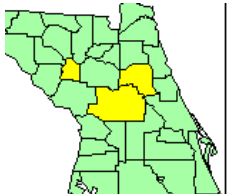
Select from selection

*Gilchrist*



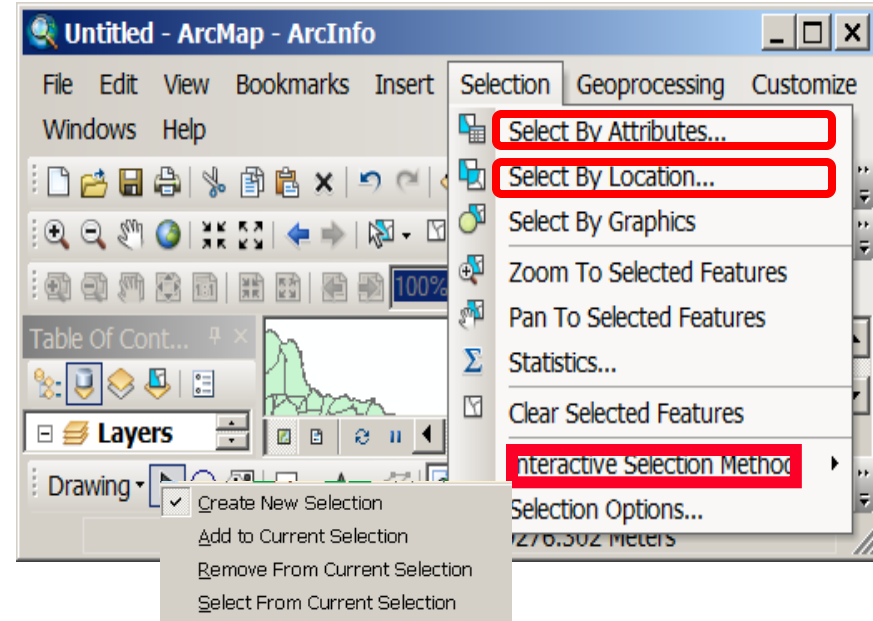
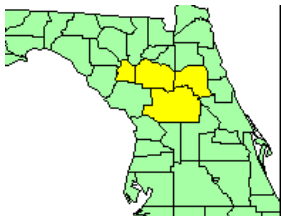
Remove from selection

*Gilchrist, Marion, Putnam*



Add to selection

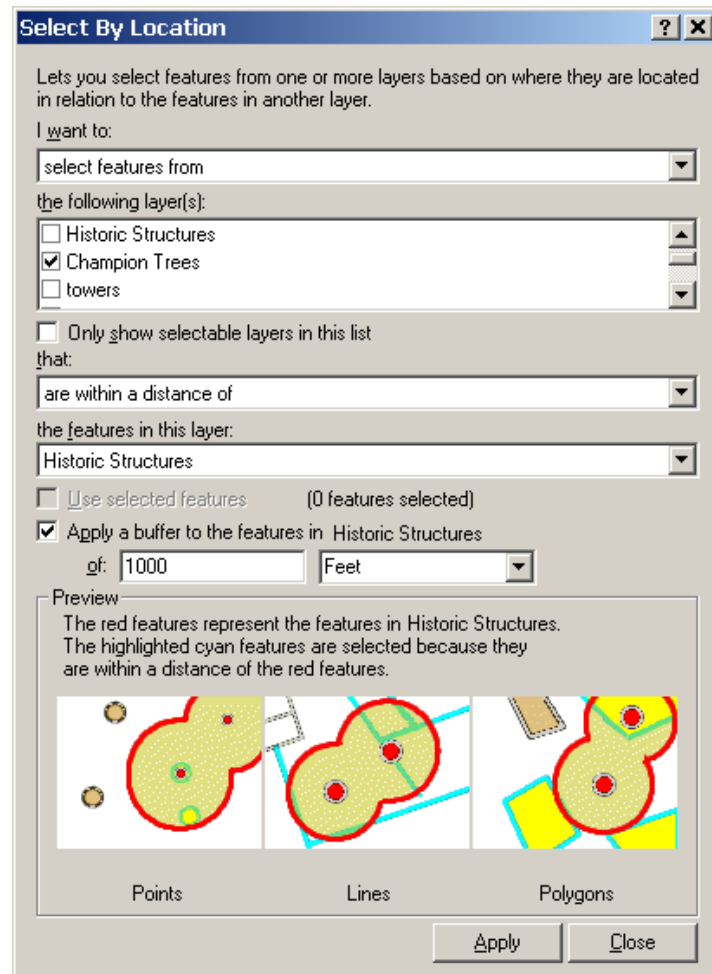
*Alachua, Gilchrist, Putnam, Marion*



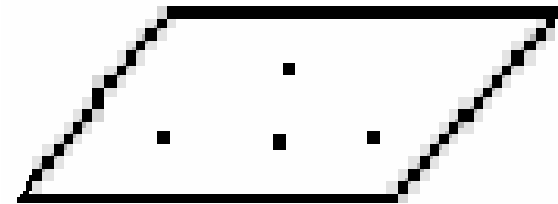
*From the Selection menu*

# Select by location (spatial query)

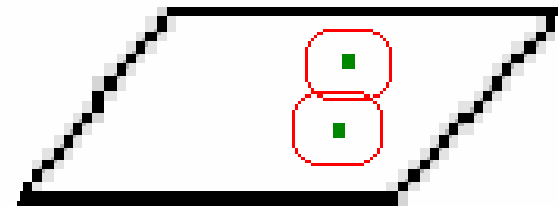
- Use features in one layer to select features in another



Historic Structures



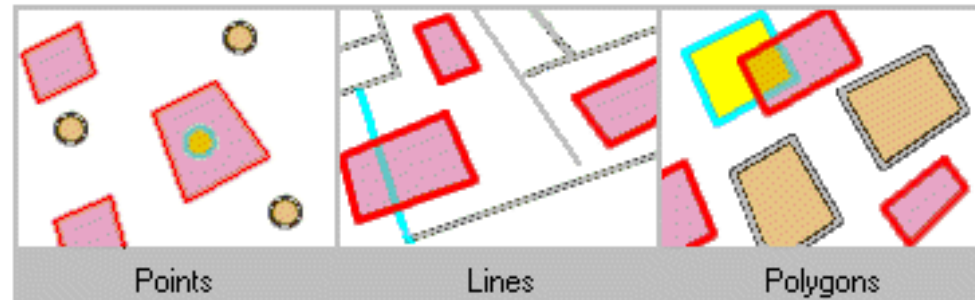
Champion Trees



# Many selection methods

- **Select by Location offers many selection methods**

- **Intersects**
- **Contain**
- **Are completely within**
- **Shares a line segment**
- **Have their centroid**
- **Within a distance**
- **Are identical**
- **Others...**



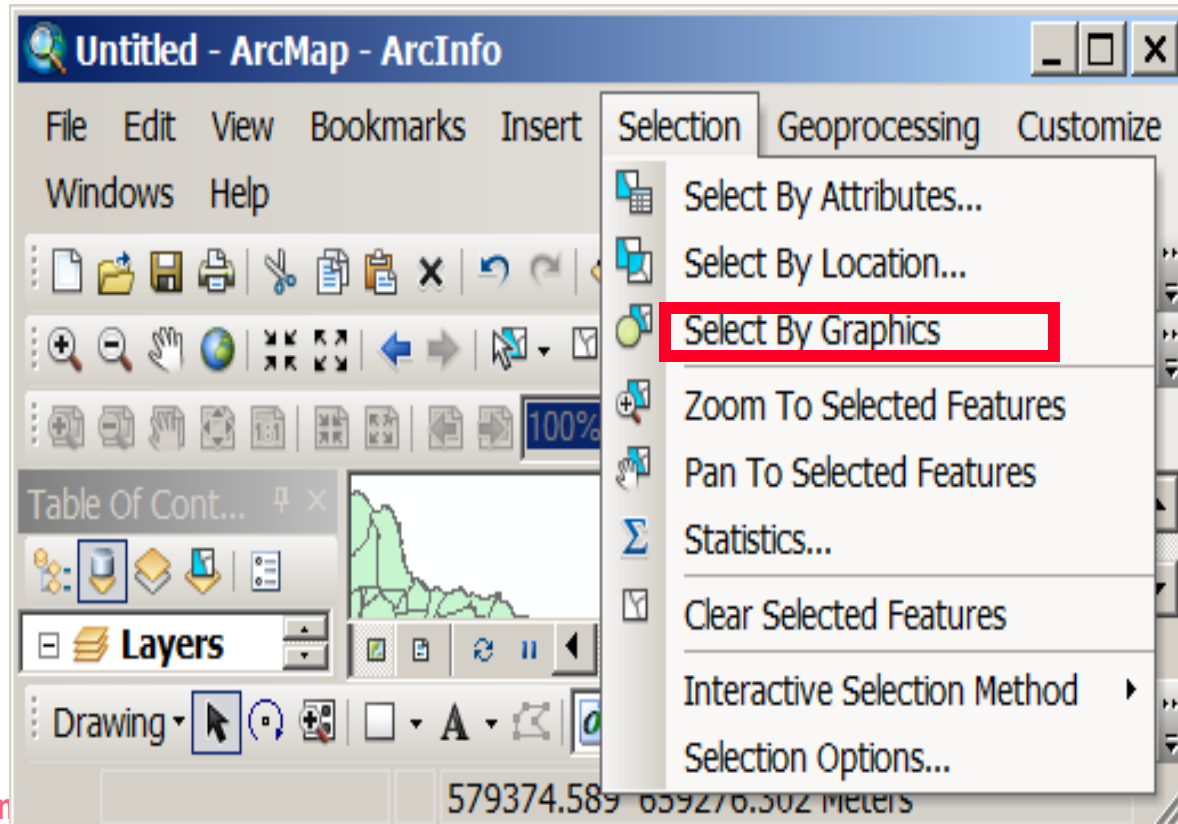
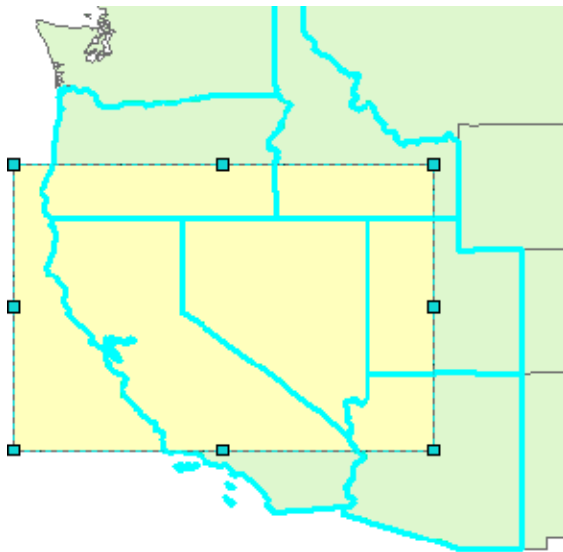
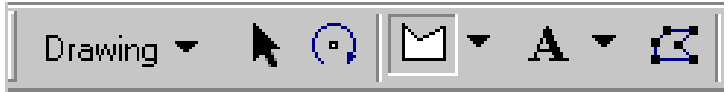
The highlighted cyan features are selected because they **intersect** the red features.



The highlighted cyan features are selected because they **are completely contained** by a red feature.

# Select by graphics

- Select features that intersect a graphic element from selectable layers
- Create new graphic with drawing tools
- Or, select existing graphic with *Select Element* tool
- *Select by Graphics* menu will enable
- Click the menu to select





# Statistics by Field for selected features

- ❑ Select features in a layer
- ❑ Selection menu > Statistics
- ❑ Choose layer
- ❑ Choose field

The screenshot displays the ArcMap interface with the Selection menu open, highlighting the Statistics option. The Selection Statistics dialog box is open, showing the following information:

- 6 features selected from 1 layers
- Layer: Countries
- Field: AGE0T014
- Statistics:
  - Count: 3
  - Minimum: 45.91
  - Maximum: 50.86
  - Sum: 144.16
  - Mean: 48.053333
  - Standard Deviation: 2.074549

To the right of the dialog box is a 3D bar chart titled "Frequency Distribution" showing the distribution of the selected features. The x-axis represents the field values (45.9 and 49.1), and the y-axis represents the count (1). The bars are blue and 3D.

The background shows the ArcMap interface with the Table of Contents on the left, displaying the Major Cities layer with Cities and Countries sub-layers. The map shows a map of Africa with a cyan selection boundary around a region in the northeast. The status bar at the bottom indicates the current drawing tool and coordinates: 4°16'37.07"W 30°27'59.22"N.

# SPATIAL DATA FORMATS

## Part II

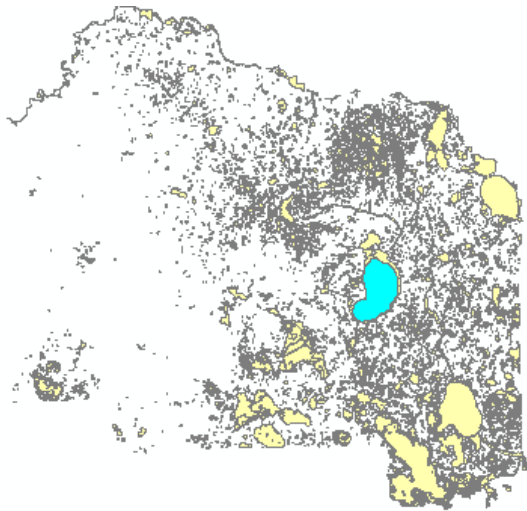
# Spatial data

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- ❑ **Spatial data – Formats**
- ❑ **Feature classes**
- ❑ **Linking features and attributes**
- ❑ **Metadata**

# Features

- **Features** represent an element in the reality (ex. a school, a lake)
- **Features** can be points, lines, or areas
- Each feature is related to a record in the attribute table and vice versa
- They are tied together by the unique identifier in the table



**Feature**

	OBJECTID*	Shape*	AREA
▶	1	Polygon	53233.35302
	2	Polygon	2246.91016
	3	Polygon	140.42082
	4	Polygon	383.77933
	5	Polygon	2424.9155
	6	Polygon	2744.96696
	7	Polygon	2910.46316
	8	Polygon	9585.07983
	9	Polygon	5258.15586
	10	Polygon	3709.66528
	11	Polygon	1157554.52887

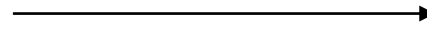
# Feature classes

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- ❑ Feature classes are collections of **features** with the same geometry
- ❑ Features classes can be point, line, or area types
- ❑ Feature classes can be stored in many data file formats



*Roads as lines*



*Housing as points*



*Land parcels as areas*

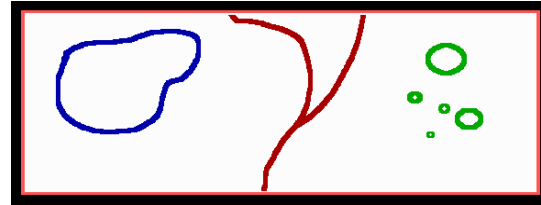
**Represented**

**Reality**

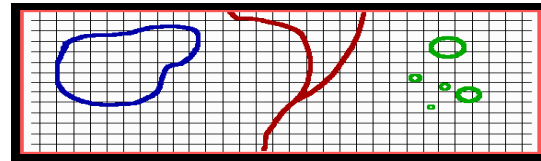
# Models by which we represent Feature Classes

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- Vector data



- Raster data



- Both have

*Geometry*

*Attributes*

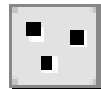
*Behavior*

# Spatial data formats

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- Feature classes can be stored in many data formats (spatial formats)
- ArcGIS works with a variety of spatial data formats
- There is an associated icon for each format

**Geodatabase**



Tables



Shapefile



CAD



Raster Dataset



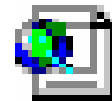
Internet Map Service



Coverage



ArcGIS Project *.mxd*



ArcGIS Layer *.lyr*



# Data format: Geodatabase

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- ❑ **Stores spatial features and their attributes in the same database (RDBMS)**
- ❑ **Feature classes can be stand-alone or grouped in a feature dataset**
- ❑ **Feature datasets model spatial relationships**
- ❑ **Native format of ArcGIS and not readable from other GIS packages**
- ❑ **Not an inter-operable format**



# Data format: Shapefile

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- ❑ **Single feature class**
- ❑ **Native of ArcView 3.\***
- ❑ **Attributes are stored in dBASE tables**
- ❑ **A shapefile is composed of at least three files:**
  - ❑ **.shp – stores the feature geometry (*required*)**
  - ❑ **.dbf – stores the feature attribute information (*required*)**
  - ❑ **.shx – stores the index of the feature geometry (*required*)**
  - ❑ **.prj – stores the coordinate system information (*optional but important*)**
- ❑ **It is an inter - operable format**

# Data format: Rasters

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- ❑ Raster format are composed of rows and columns of equal-sized cells
  - ❑ Each cell stores a value
  - ❑ Detail depends on cell size
- ❑ Grids (the ESRI native raster format)



- ❑ Images (tiff, bmp, sid, jpeg, ERDAS)



# Data format: Coverage

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- ❑ A folder containing multiple feature classes
- ❑ Can store point, line, polygon feature classes, and more
- ❑ Attributes are stored in a separate INFO table
- ❑ Coverages must be stored in an ArcGIS workspace
  - ❑ Workspaces contain an info folder
  - ❑ The info folder stores information about the attribute tables
- ❑ Manage coverages/workspaces with ArcGIS tools *only*
  - ❑ Operating system commands do not honor the coverage–info link

# Tabular locations

Tables that store geographic location for point feature classes

Table with coordinates

X_COORD	Y_COORD
480585.5	3769234
483194.094	3768432
485285.813	3768391



Point feature class

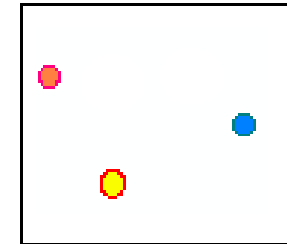
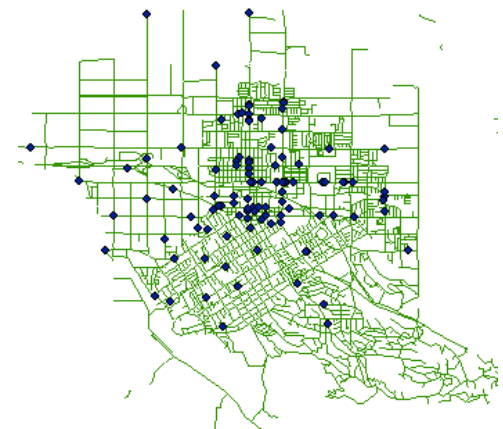


Table with addresses

OID	OBJECTID	CASE_NUM	TYPE	LOCATION
0	6	990302216	6	316 E CLARK ST
1	7	990301762	6	1535 GARDEN ST
2	27	990201031	3	1725 N CHURCH ST
3	29	990201340	3	1721 N CHURCH ST
4	33	990302252	7	145 S CHURCH ST
5	36	990100032	3	1711 N ORANGE ST
6	38	990302093	3	1702 N ORANGE ST



Point feature class



# Data format: CAD drawings, CAD files

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- ❑ **Computer Aided Design files (DXF, DWG, DGN)**
- ❑ **Access one or all feature class(es) at a time**
- ❑ **Can work with them as they are, display, query**
- ❑ **Can convert to coverage, shapefile, or geodatabase**
- ❑ **Must edit after conversion to feature class**

# Metadata /Data Documentation /Item Description

- ❑ What is metadata?
- ❑ Metadata main components
  - ❑ Description
  - ❑ Spatial
  - ❑ Attributes
- ❑ Create and edit metadata
- ❑ Display metadata using different stylesheets
  - ❑ ArcGIS Metadata
  - ❑ FGDC Metadata
  - ❑ Create your own

