

# Geol 552 - Lesson 14

## Midterm preparation + mini project 2 introduction

- copy follow\_along\midterm\_practice.mxd into your U:\ArcGIS folder

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## Midterm: Tuesday Oct. 18, 9:00-11:00

- Part 1 (15 min):
  - Multiple choice or True-false
  - 14 questions (13 or more will get you an A)
  - open book, open notes
- Part 2 (60 min):
  - Several exercises on the same data set (like in the book)
  - 3 parts (each 14 pts.)
  - Maximum points: 28 pts
  - Data set: shapefiles only (you may save)
  - Each part is self-contained and will not require results from any other part
  - Each part will involve several steps (3-5)
  - Open book, notes allowed
- Test this now: connect to \\delphi\exam\_drop\_folder and make a new folder

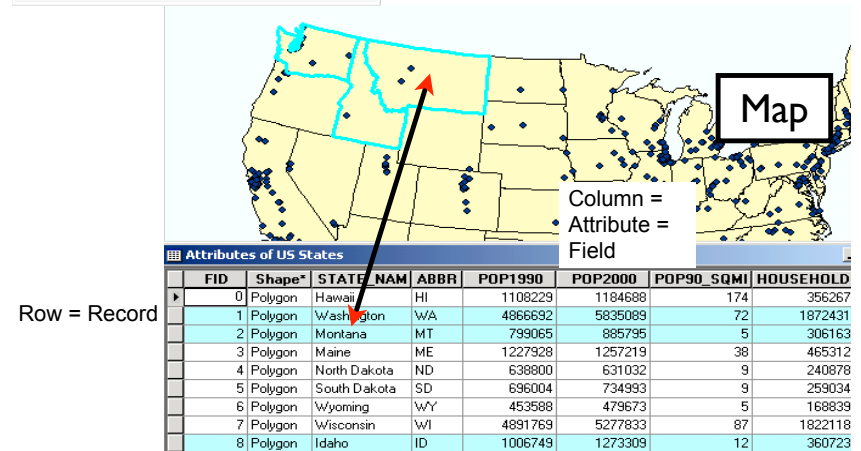
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## GIS data - coordinates, attributes, symbolization

- Data files: shapefiles, feature classes (geoDB)
  - layer: features of the same geometry type
  - features: coordinates + attribute(s)
  - coordinates => can be draw on a map
  - does NOT store any symbolization!
- Stand alone tables: only attributes (records)
  - does not store and coordinates\* or symbolization!
  - can be joined to features, if a key field exists
- mxd (ArcMap document), lyr (“layer file”)
  - store appearance (symbolization) only
  - no data, only references (links) to data
  - invalid links => red exclamation marks

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## layer of polygon features



Row = Record

Attribute Table

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## Data base joins

- can the tables be joined (key? rule of joining?)
- Which is destination (left) and source (right?)
- how many features do you expect to be in the joined table?
- the input layer with this number of features has to be the **destination** for the join!

**Destination**

**Source**

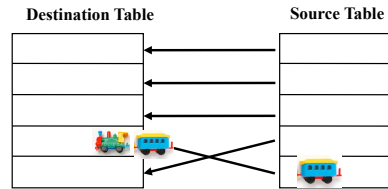
FID	Shape*	AREA	STATE_NAME	STATE_FIPS
0	Polygon	67290.061	Washington	53
1	Polygon	147244.653	Montana	30
2	Polygon	32161.925	Maine	23
3	Polygon	70812.056	North Dakota	38
4	Polygon	77195.055	South Dakota	46
5	Polygon	97803.199	Wyoming	56
6	Polygon	56088.178	Wisconsin	55

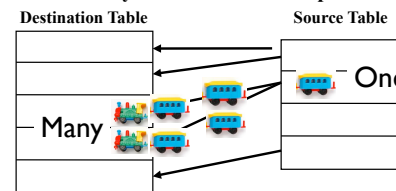
STATE_FIPS	POP1990	POP1999	POP90_SQMI	HOUSEHOLD
53	4866692	5773907	72	1872431
30	799065	884214	5	306163
23	1227928	1248908	38	465312
38	638000	637016	9	248878
46	86004	739508	9	259034
56	453588	482025	5	168839
55	4891769	5251093	87	1822118
16	1066749	1260247	12	360723

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### One-to-One Relationship



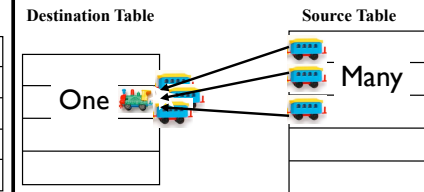
### Many-to-One Relationship



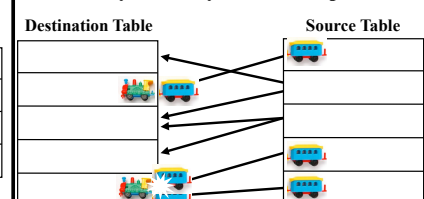
An engine gets only 1 car: can use **Join** operation (no arrow head collisions)

Correct way of joining

### One-to-Many Relationship



### Many-to-Many Relationship



An engine gets 2+ cars: can only use **Relate** operation (arrow head collisions)

INCORRECT way of joining

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## statistics vs. summarize

- Field statistics:
  - all types of stats
  - just for one field
  - E.g. ALL records (avg. city population?)
- Summarize:
  - Use one field to make groups (R-click on it!)
  - Does some form of stats from all records belonging to each group
  - E.g. Per county name (group) average POP

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USA county data  
(per county: NAME,  
POP and STATE)

ID	Shape *	NAME	STATE_NAME	POP
1	Polygon	Lake of the	Minnesota	4651
2	Polygon	Ferry	Washington	7199
3	Polygon	Stevens	Washington	4065
4	Polygon	Okanogan	Washington	3864
5	Polygon	Pend Oreille	Washington	1175
6	Polygon	Boundary	Idaho	1006
7	Polygon	Lincoln	Montana	1885
8	Polygon	Flathead	Montana	7343

- would you use query, "statistics" or "summarize" for:

- **Find all counties with > 7000 people?**
  - SQL query ("POP" > 20000)
- **Find total number of people in each state?**
  - summarize : Group field? Stats field? Type of stat?
  - Group field: STATE ; stats field: POP ; type of stat: SUM
  - What would COUNT\_ contain here?
- **Total number of people in US?**
  - statistics for POP

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## Selections (select-by, queries)

- By Attribute (SQL) - based on table only
- By Location - based on spatial concept only
- Save selection - Right click on layer in TOC - "Selection" - "Create layer from Selected features"
- **Definition query** (not a "light blue" selection, think filter, only the "selection" is shown, rest is hidden)

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## Spatial Joining Destination/Source

+city1	
+city2	+city3
poly2	poly1

city1	10
city2	20
city3	15

poly1	A
poly2	B

Q: In which poly is each city? Dest? Simple or Summarized?  
 How many people in each poly?  
 How many cities in each poly?

For Dest: cities Source Polygons

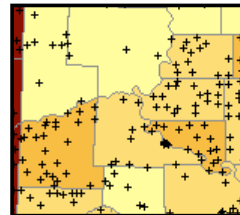
		Inside of
city1	10	B
city2	20	B
city3	15	A

For Dest: polygon Source: cities

		Sum	Count
poly1	A	15	1
poly2	B	30	2

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Which county has the most cities (and how many)?  
 Which is the right strategy?  
 (look at the table on p. 158)



D: Cities, S: Counties  
 Summarized Inside Join

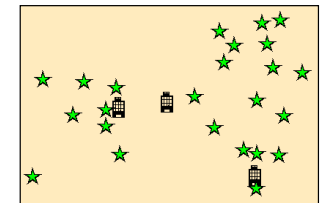
D: Cities, S: Counties  
 Simple Distance Join

D: Counties, S: Cities  
 Summarized Inside Join

D: Counties, S: Cities  
 Simple Inside Join

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Looking at each hotel, which star is the closest to any hotel?  
 Which is the right strategy?



D: Hotels, S: Stars  
 Simple Inside Join

D: Hotels, S: Stars  
 Simple Distance Join

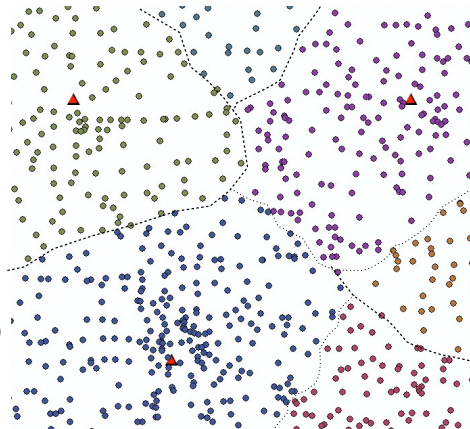
D: Stars, S: Hotels  
 Summarized Inside Join

D: Stars, S: Hotels  
 Simple Distance Join

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Color each dot according to the closest red triangle (each dot has to know: which is my closest Triangle!)

(I added the partition lines manually...)



D: dots, S: Triangles  
Summarized Distance Join

D: dots, S: Triangles  
Summarized Inside Join

D: Triangles, S: dots  
Summarized Inside Join

D: Triangles, S: dots  
Simple Distance Join

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## Student requests

- Calculating percentages (HW5)
- \*2000 features trick (Attribute Table)
- Join Dating table to counties
  - Why FIPS as key?
  - Destination? Number of feature pre and post join?
  - SQL for lost POP from 1990 to 2000?

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## Miniproject 2 (Iowa data)

- Assemble data (3 - 5 layers) + base map for a theme
- Think of chains of operations from operations: Join, spatial join, summarize, attribute or spatial query, statistics
- Use at least 2 chains
- Possible themes:
  - Tourists/Travellers
  - Geology & environmental issues
  - Transportation
  - Water
  - Population (census)
  - Marketing study (who/where to sell a product)
- Sample Iowa Data: data\Miniproj 2 data
- More: \\pub\pub\IowaDNR\IA\_state (see categories)

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- Iowa data set: (Dep. of Nat. Res. Data collection)
- Only copy layers you find interesting to your student folder
  - P-drive: IowaDNR\IA\_State (also \\pub.gis.iastate.edu\pub)
  - ftp://pub.gis.iastate.edu/IowaDNR/IA\_State (use zipped files!)
- May use online layers from ESRI
- Hillshade and other background data should be semi-transparent
- for “cropping” with Iowa boundary: Data frame - Data frame - Clip to shape
- miniproj 2 due: Oct 25

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