• Today Chapter 4: Attribute Data
• Tables (general, import formats, field types),
• Selecting, SQL Query, Statistics, field calculator,
• Next lecture: Joins, Summarize, import x/y tables
• Follow along: copy data\follow along\ch4A_class_ex folder in you student folder. Open mxd file in ArcMap and open ArcCatalog
• installed: screen capture tool (printscreen)

• Plan: Midterm review oct. 11, midterm oct. 13
Managing multiple tables

Types of tables

**Attribute table**
- Stores attributes of map features
- Already associated with a spatial data layer (georef’ed)
- Has **special fields** for feature coordinates (called ?)

**Standalone table**
- Stores any tabular data (spreadsheet)
- **Not** associated with spatial data
- When imported into ArcGIS: OID instead of FID

**Fields**
- Fields have data types (numbers, words, ...)
- Type must be defined before use
- Once defined, a field’s type cannot be changed
- Naming rules for field (attribute) names:
  - Use only letters and numbers (no space!)
  - Must start with a letter
  - No more than 13 characters (hence the cryptic names!)
  - You can define longer (better) names as an **alias** (in: Layer properties - Fields, “Pop Density”)
Field types (data formats)

<table>
<thead>
<tr>
<th>Field Type</th>
<th>Description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>Small integers: -32,768 to 32,767</td>
<td>255</td>
</tr>
<tr>
<td>Long</td>
<td>Large integers: -2,147,483,648 to 2,147,483,647</td>
<td>15600</td>
</tr>
<tr>
<td>Float</td>
<td>Floating point decimal numbers (single precision = precise to about 7 decimal places)</td>
<td>1.23456</td>
</tr>
<tr>
<td>Double</td>
<td>Double-precision floating point (precise 15 decimals)</td>
<td>0.000000000123</td>
</tr>
<tr>
<td>Text</td>
<td>Alphanumeric strings (up to 255 letters, must be defined at creation)</td>
<td>Maple St</td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td>07/12/92</td>
</tr>
<tr>
<td>BLOB</td>
<td>Binary large object; any complex binary data including images, documents, etc. (uncommon!)</td>
<td></td>
</tr>
</tbody>
</table>

Field characteristics

- **Length**: The total characters a text field can store.
  - Length = 10: "Maple St."
  - Maple St."

- **Precision**: The total width of digits a numeric field can store (on both sides of .).
  - 156
  - 1985.128
  - -1922.5632

- **Scale**: The number of decimal (after .) places.
  - 0.001
  - 0.00001

- When creating a new attribute (column) YOU decide its “size”
- 0 precision, 0 scale means “let the computer decide”
- **For numbers usually 0 precision, 0 scale is OK**
- Exception: think about text length (are 50 letters long enough?)

What type would you use?
- Population of countries in the world?
  - very large number but you don’t need decimals.
- Average price for 1 gallon of gas?
  - need a few decimal places, number itself is not very large.
- Number of counties in a state?
  - small integer
- Highway name?
  - (how long?)
- Distances between cities, in meters
  - if high precision for these large numbers needed or if fractions of meters don’t matter.

Adding a new field to a table

- Let’s add a new decimal number field to table in States
- Right click - Open Attrib. Table - Table Options - Add Field
- Name: MlFmlRatio, Type: Float, leave “sizes” at 0

0 means: let the computer decide
Let's give our new attribute a longer name
Scroll to the LAST field on the right
R-click on precip (Column header)
Properties > change Alias for Precip to “Male to Female Ratio”
(Numeric... > round to 4 significant digits)
R-click also gives access to Summarize, Statistics, Field Calculator for this field
(Delete field - removes the field from table - but don’t do that now)

Calculate field values (Field calculator)

• Let’s calculate the ratio
• Expression: MlFmlRatio = MALES / FEMALES
• go through all cells of this row
• divide this row’s FEMALE value by MALE
• write it into the current row
• repeat until done

• freeze column, sort descending, scroll left
• which three states have more woman than men?

Per column Statistics

• Typical statistics on numeric column
• Use only the selected rows (if any)!
• Count: number of selected rows

Select by Attribute

• Uses Structured Query Language
• More on SQL in Chapter 5
• Query means:
  “give me only those records for which <statement> is true”
• Result: new selection (light blue)
• Examples of statements:
  “POP1990” > 1000000
  "MALES" >= "FEMALES"
  “STATE_NAME” = ‘Alabama’
  “MlFmlRatio” > 1.0
Elements of a SQL query (more detail in chapter 6)

• `<Field> <Relation> <Value>`

  “POP2000” > 1000000

• Field in **double quotes**: “POP2000”

• Relation: >, =, <=, <>, LIKE, AND, OR, ...

• Value:
  • Strings (words) : ‘Iowa’ (in **single quotes**)!
  • Floating point: 1.2353245 (no quotes)
  • Integer: 1984 (no quotes)

Lab

• Who’s going to GSA in Oct?
• Lecture feedback on Blackboard?

• Today: Finish HW3
• Tutorial ch 4: 1 - 18 & 37 - 46 (rest next lab, + HW4)
• Try printscreen - should have rectangle screen capture
• May ask you to create a folder U:\screenshots on star