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Geographic Information Systems 1
Lab 2: Tables Operations, Select by Attribute

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- attribute table opening: right click on the layer → `Attribute Table` or from menu `Feature Layer - Data - Attribute Table`
- table rows - records (objects)
- table columns - attributes
- the maximum number of records is limited by the file type (e.g. shapefile 65 535)
- attributes can be of various data types (see programing)

- numerical data (Short Integer, Long Integer, Float, Double)
- String (Text)
- Date
- Geometry
- Object ID (FID) - obligatory attribute for spatial data

- designation (selection) of records in the table
  - click or drag in the record header (can be combined with SHIFT or CTRL)
  - right clik in the record header - `Select/Deselect`
- move through records - at the bottom left of the table (`Record`)
- toggle display of records - at the bottom of the table (`Show All/Selected`)
- right button in the record header - context menu:
  - `Flash` - the current object flashes on the map
  - `Zoom To, Pan To` - zoom in or out on current object
  - `Pop-up, Pinned Pop-up` - listing all attributes of the object in a separate window (Pop-up)
  - you can also work with selected records (`Zoom To, Select/Unselect, Delete Row`)

- you can move the columns (attributes) by dragging the mouse
- right button in the record header - context menu:
  - `Sort Ascending/Descending`
  - `Summarize` - creates a summary table according to unique values in the current column, you can work with statistical values of the summarized data (`First, Last, Average, Sum, Minimum, Maximum`, ...)
  - `Statistics` - calculates basic descriptive statistic of the chosen attribute (`Count, Sum, Minimum, Maximum, Average`)
  - `Hide field` - turns the dipsplay of the column on or off
  - `Delete` - canceles the attribute column
  - `Fields` - list of attributes with their parameters

- `Show Fields Aliases` - displays the so called alias names of attributes in the header of the table - set automatically
- `Fields View` - list of attributes with their parameters
- `Show domain and subtypes subscriptions`
- `Join and Relates`
- `Select related records`
- `Go to row number`
- `Export`

- **create a new attribute**: button `Add` in the attribute table (upper left) → a list of attributes will open, including a new one - fill in its properties → button `Save` in menu Feature Layer)
- **calculate values**: right click on the attribute header → `Calculate Field` - the dialog (pane) for calculation opens - set operation parameters:
  - `Expression Type` - choose the language of the calculation (SQL, Python 3, Arcade)
  - create a calculation expression ("formula")
  - `Helpers` - functions and quantifiers for the formula expression
  - start the calculation with the button `Run`
- in the column header - `Calculate Geometry`
  - you can calculte the area, perimeter or coordinates of a centroid of objects
  - either the coordinate system (CS) of the input data or CS of data frame (coordinates are then transformed).

- menu `Map` - set of tools `Selection` → `Select By Attributes`
- a dialog (pane) for constructing the query is displayed
- `Input Rows` - set the layer in which you make the selection
- `Selection type` - we set the type of selection (new selection, add to the current selecion, remove from the current selection)
- the selection is basically a query to the database. The basic scheme of the query is: "select all objects from the table, for which it applies ....". In the following condition it is possible to use appropriate attribute (column) values and various operators. It is possible of course use numeric constants as well.

operators are expressed verbally - when setting up SQL then using symbols:

- **relational** - $>, <, \geq, \leq, <>, =$
  - "AREA" $>$ 100000
  - "NAZEV" $=$ 'Praha' (attention: text strings must be in apostrophes!!!)
- **logical** - AND, OR, NOT
  - ("AREA" $>$ 1000000) AND ("NAZEVORP" $=$ 'Benešov') - conjunction
  - ("AREA" $>$ 1000000) OR ("NAZEVORP" $=$ 'Benešov') - disjunction
  - NOT("NAZORP" $=$ 'Benešov') - negation

- symbols _ a % - "joker" characters for text strings
  - underscore character - replaces just one character - eg. ('B_') finds Bor, Ber, Bar ...
  - percent - replaces any number of characters (and also no character) - eg. ('B%') finds Br, Bar, Boží Dar, ...
  - there is an operator for comparison - LIKE
  - "NAZEV" LIKE 'P%' finds everything, what begins with the letter P
  - `Reset Transformation` - cancels anything that is not stored
- the operator IS exists to compare NULL
- "NAZEV" IS NULL - finds everything that has no name.

- created queries can be saved and reused
- button Get Unique Values - returns a list of all unique values for the given attribute in the table
- selected data can be exported:
  - jako novou vrstvu (pouze dočasně)- pravé tlačítko nad názvem vrstvy - vybrat `Selection` → `Make Layer From Selected Features`
  - jako nová data (trvale) - pravé tlačítko nad názvem vrstvy a pak `Data` → `Export Features` → `Selected Features`