

# Digitální kartografie 9

- Ukázky vybraných nástrojů v ArcGIS

# Obsah cvičení:

- Ukázka projektu pro kartografickou vizualizaci ZABAGED®
- Ukázka generalizace polygonů
- Ukázka práce s liniovými prvky v rámci geodatabáze

# Kartografická vizualizace ZABAGED®

- ZABAGED® – Základní báze geografických dat
- Vytvořena na podkladu ZM ČR 1:10 000
- Poskytována ČÚZK (po mapových listech v kladu 1:10 000 nebo po čtvercích 2 x 2 km)
- ČÚZK poskytuje vizualizační nástroj s proměnlivou symbologií závisující na měřítku dostupný na **[www.cuzk.cz](http://www.cuzk.cz)** (formát .mxd)
- Stažený soubor je nutno uložit v adresáři s polohopisem a spustit pomocí ArcMap

The screenshot shows the ArcMap interface with the following elements:

- Table Of Contents:** Lists layers including BODY, Geodeticke body, Bod polohy, Přidružení, Trigonometrie, Zhušťování, Bod výšky, Bod tíhové, Site, Stozar elevace, Relief, Kotoviny, Osamělé body, Skupina bodů, Vstup do jímky, Komunikace, Uzlomy bodů, Krizovatka, Krizovatka urovnova UBU, heliport, and Průmyslové.
- Layers Panel:** The 'Bod polohy' layer is selected, and a context menu is open over it. The menu options are: Copy, Remove, Open Attribute Table, Joins and Relates, Zoom To Layer, Zoom To Make Visible, Visible Scale Range, Use Symbol Levels, Selection, Label Features, Edit Features, Convert Labels to Annotation..., Convert Features to Graphics..., Convert Symbology to Representation..., Data, Save As Layer File..., Create Layer Package..., and Properties... The 'Data' option is highlighted, and its sub-menu is visible.
- Data Source Dialog:** A dialog box titled 'Data Source' is open, showing the file path 'Home - DiKa\Zab3'. It lists several shapefiles, with 'BodPolohovehoPole.shp' selected. The 'Name' field contains 'BodPolohovehoPole.shp' and the 'Show of type' dropdown is set to 'Feature classes'. The 'Add' button is highlighted.
- Context Menu (Data):** The sub-menu for 'Data' includes: Repair Data Source..., Export Data..., Export to CAD..., Make Permanent, View Item Description..., and Review/Rematch Addresses... The 'Repair Data Source...' option is highlighted.



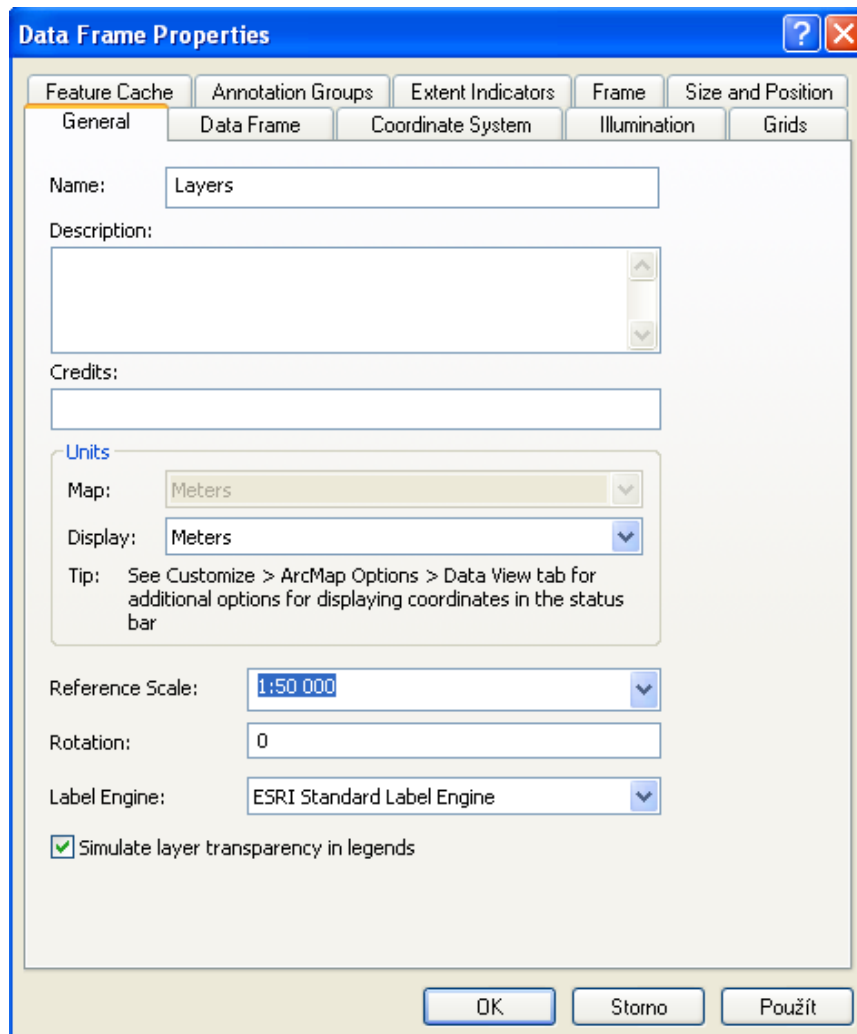
## Součásti ukázky:

- Generalizace polygonových vrstev (lesní plochy a budovy)
  - Agregace polygonů, zjednodušení a vyhlazení hranic
  - Zjednodušení polygonů budov
- Práce s liniovými prvky (železnice a vodní toky)
  - Začlenění liniových prvků do geodatabáze
  - Ukázka zobrazení mostu
  - Vyhodnocení grafického konfliktu

# Generalizace

- Mapa je sama o sobě generalizovaným obrazem zemského povrchu
- Při přechodu k menším měřítkům je třeba pro zachování přehlednosti zjednodušovat a vypouštět prvky zobrazované ve vyšších měřítcích
- Mezi používané nástroje patří např. selekce, geometrická generalizace, agregace, generalizace popisků, ...

# Nastavení referenčního měřítka



Referenční  
měřítko definuje  
pevnou velikost  
mapových  
značek

Zvolená hodnota:  
**1:50 000**



Generalizace - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:67 468

Table Of Contents

Layers

- BudovaBlokBudov
- LesniPudaSeStromy

Aggregate Polygons

Input Features: LesniPudaSeStromy

Output Feature Class: D:\DIKa\LesAgg.shp

Aggregation Distance: 100 Meters

Minimum Area (optional): 1 Hectares

Minimum Hole Size (optional): 1 Hectares

Preserve orthogonal shape (optional)

**Agregace polygonů**

OK Cancel Environments... Show Help >>

ArcToolbox

- 3D Analyst Tools
- Analysis Tools
- Cartography Tools
  - Annotation
  - Cartographic Refinement
  - Data Driven Pages
  - Generalization
    - Aggregate Points
    - Aggregate Polygons**
    - Collapse Dual Lines To Centerline
    - Merge Divided Roads
    - Simplify Building
    - Simplify Line
    - Simplify Polygon
    - Smooth Line
    - Smooth Polygon
    - Thin Road Network
  - Graphic Conflicts
  - Grids and Graticules
  - Masking Tools
  - Representation Management
- Conversion Tools
- Data Interoperability Tools
- Data Management Tools
- Editing Tools
- Geocoding Tools
- Geostatistical Analyst Tools
- Linear Referencing Tools
- Multidimension Tools
- Network Analyst Tools
- Parcel Fabric Tools
- Schematics Tools
- Server Tools
- Spatial Analyst Tools
- Spatial Statistics Tools
- Tracking Analyst Tools

Georeferencing Layer: -605347,772 -1136844,482 Meters



**Zjednodušení polygonů**

**Simplify Polygon**

Input Features: LesAgg

Output Feature Class: D:\Dika\LesSim.shp

Simplification Algorithm: BEND\_SIMPLIFY

Simplification Tolerance: 200 Meters

Minimum Area (optional): 2 Hectares

Handling Topological Errors (optional): RESOLVE\_ERRORS

Keep collapsed points (optional)

OK Cancel Environments... Show Help >>

ArcToolbox

- ArcToolbox
  - 3D Analyst Tools
  - Analysis Tools
  - Cartography Tools
    - Annotation
    - Cartographic Refinement
    - Data Driven Pages
    - Generalization
      - Aggregate Points
      - Aggregate Polygons
      - Collapse Dual Lines To Centerline
      - Merge Divided Roads
      - Simplify Building
      - Simplify Line
      - Simplify Polygon**
      - Smooth Line
      - Smooth Polygon
      - Thin Road Network
    - Graphic Conflicts
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  - Data Interoperability Tools
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  - Geostatistical Analyst Tools
  - Linear Referencing Tools
  - Multidimension Tools
  - Network Analyst Tools
  - Parcel Fabric Tools
  - Schematics Tools
  - Server Tools
  - Spatial Analyst Tools
  - Spatial Statistics Tools
  - Tracking Analyst Tools

Georeferencing Layer: -609960,183 -1136066,771 Meters



Generalizace - ArcMap - ArcInfo

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Table Of Contents

Layers

- D:\Dika
  - LesSim
  - LesAgg
  - LesAgg\_Tbl
- D:\Dika\Data
  - BudovaBlokBudov
  - LesniPudaSeStromy

Smooth Polygon

Input Features: LesSim

Output Feature Class: D:\Dika\LesSmo.shp

Smoothing Algorithm: BEZIER\_INTERPOLATION

Smoothing Tolerance: 0 Meters

Preserve endpoint for rings (optional)

Handling Topological Errors (optional): FLAG\_ERRORS

OK Cancel Environments... Show Help >>

ArcToolbox

- ArcToolbox
  - 3D Analyst Tools
  - Analysis Tools
  - Cartography Tools
    - Annotation
    - Cartographic Refinement
    - Data Driven Pages
    - Generalization
      - Aggregate Points
      - Aggregate Polygons
      - Collapse Dual Lines To Centerline
      - Merge Divided Roads
      - Simplify Building
      - Simplify Line
      - Simplify Polygon
      - Smooth Line
      - Smooth Polygon
      - Thin Road Network
  - Graphic Conflicts
  - Grids and Graticules
  - Masking Tools
  - Representation Management
- Conversion Tools
- Data Interoperability Tools
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- Geocoding Tools
- Geostatistical Analyst Tools
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- Multidimension Tools
- Network Analyst Tools
- Parcel Fabric Tools
- Schematics Tools
- Server Tools
- Spatial Analyst Tools
- Spatial Statistics Tools
- Tracking Analyst Tools

Georeferencing Layer:

Smooths a polygon to improve visual quality.

-609100,285 -1135052,621 Meters





The screenshot displays the ArcGIS interface with the 'Simplify Building' dialog box open. The dialog box contains the following fields and options:

- Input Features:** BudovaBlokBudov
- Output Feature Class:** D:\Dika\BudSim.shp
- Simplification Tolerance:** 20 Meters
- Minimum Area (optional):** 4 Ares
- Check for spatial conflicts (optional)

The ArcToolbox on the right side of the screen shows the 'Simplify Building' tool selected under the 'Generalization' category. The main map area shows a building footprint with the text 'Zjednodušení budov' overlaid.

Generalizace - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

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Table Of Contents

Layers

- LesSmo
- LesSim
- LesAgg
- BudovaBlokBudov
- LesniPudaSeStromy

ArcToolbox

- ArcToolbox
- 3D Analyst Tools
- Analysis Tools
- Cartography Tools
  - Annotation
  - Cartographic Refinement
  - Data Driven Pages
  - Generalization
    - Aggregate Points
    - Aggregate Polygons
    - Collapse Dual Lines To Centerline
    - Merge Divided Roads
    - Simplify Building**
    - Simplify Line
    - Simplify Polygon
    - Smooth Line
    - Smooth Polygon
    - Thin Road Network
- Graphic Conflicts
- Grids and Graticules
- Masking Tools
- Representation Management
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- Parcel Fabric Tools
- Schematics Tools
- Server Tools
- Spatial Analyst Tools
- Spatial Statistics Tools
- Tracking Analyst Tools

Zjednodušení budov

Simplify Building

Input Features  
BudovaBlokBudov

Output Feature Class  
D:\Dika\BudSim.shp

Simplification Tolerance  
20 Meters

Minimum Area (optional)  
4 Ares

Check for spatial conflicts (optional)

OK Cancel Environments... Show Help >>

Georeferencing Layer:

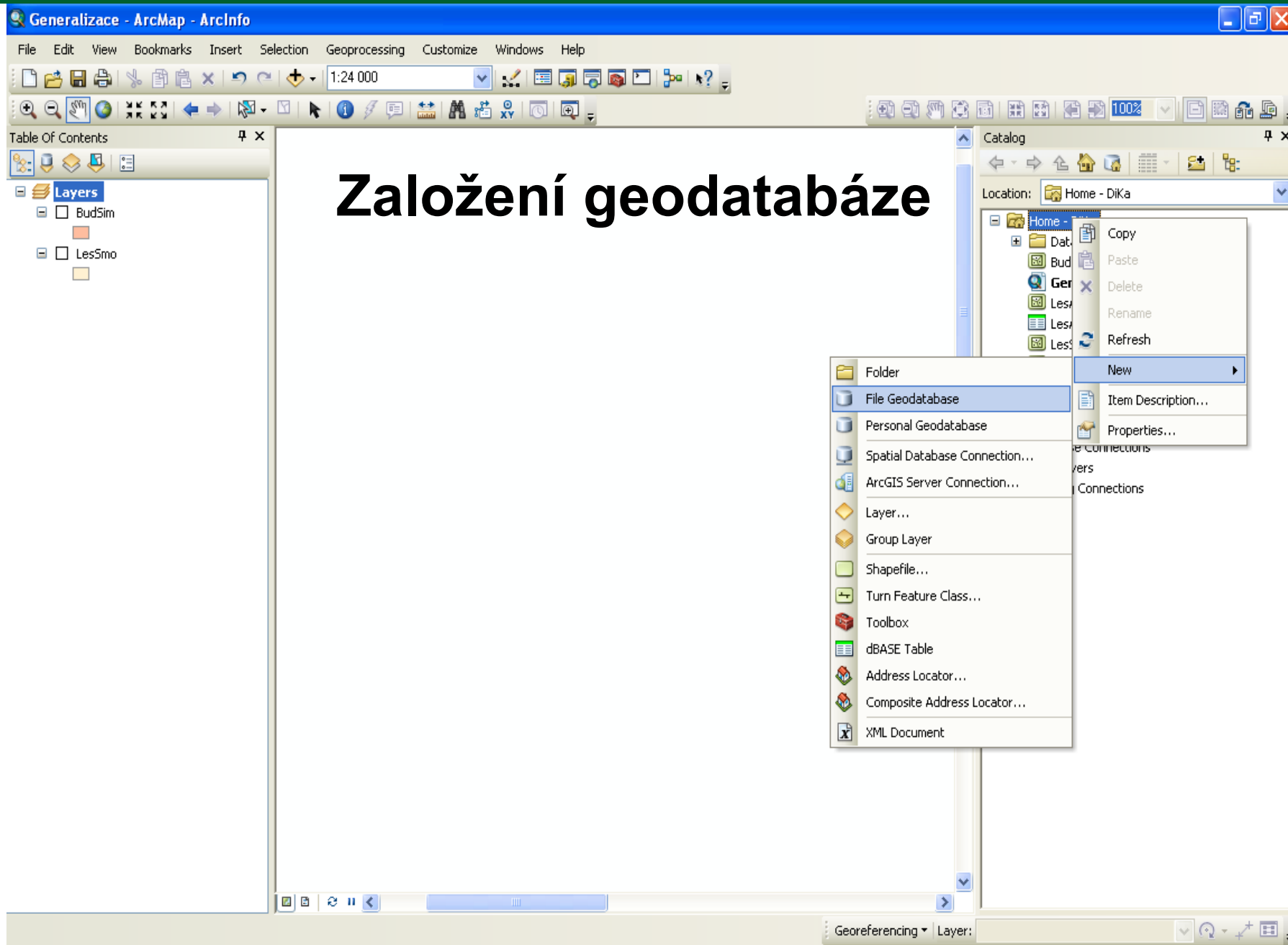
-613614,244 -1133602,067 Meters





# Práce s liniovými prvky

- Pro práci s liniovými prvky je nutno vytvořit geodatabázi
- Pro zobrazení liniových prvků budeme využívat kartografickou reprezentaci, která stanovuje pravidla pro zobrazení jednotlivých prvků
- Kartografická reprezentace umožňuje využití efektů jako je redukce mezer v místech napojování a zalamování dělených linií, vytváření značek mostů v místech křížení linií a nabízí možnosti odstraňování grafického konfliktu



The screenshot displays the ArcGIS interface with the following elements:

- Generalizace - ArcMap - ArcInfo** window title bar.
- Menu bar: File, Edit, View, Bookmarks, Insert, Selection, Geoprocessing, Customize, Windows, Help.
- Table of Contents: Shows a 'Layers' list with 'BudSim' and 'LesSmo'.
- Feature Class to Geodatabase (multiple)** dialog box:
  - Input Features list:
    - D:\DiKa\Data\Cesta.shp
    - D:\DiKa\Data\VodniTok.shp
    - D:\DiKa\Data\SilniceDalnice.shp
    - D:\DiKa\Data\ZeleznicniTrat.shp
  - Buttons: OK, Cancel, Environments..., Show Help >>
- Catalog** window:
  - Location: KartoGDB.gdb
  - Tree view showing 'Home - DiKa' > 'Data'.
  - Context menu open over 'Data' with 'Import' selected.
- Status bar: Georeferencing, Layer: -612015,707 -1133032,735 Meters.

# Import vrstev

The screenshot displays the ArcMap interface with the title bar 'Generalizace - ArcMap - ArcInfo'. The main map area shows a network of colored lines representing a river system. A context menu is open over the map, listing various actions such as 'Copy', 'Remove', 'Open Attribute Table', and 'Convert Symbology to Representation...'. The 'Convert Symbology to Representation...' option is highlighted. On the right, the Catalog window shows a folder structure under 'Data', including 'KartoGDB' and 'Generalizace'. The status bar at the bottom indicates 'Georeferencing' and 'Layer:'.

# Založení reprezentací

The screenshot displays the ArcMap interface with a map showing various road types. The 'Table of Contents' on the left lists several layers, including 'Cesta', 'SilniceDalnice', 'VodniTok', and 'ZelezniciTrat'. The 'Cesta' layer is expanded, showing its representation 'Cesta\_Rep1' and sub-categories: 'Cesta neudržovaná' (dashed line), 'Cesta parková a hřbitovní' (solid blue line), and 'Cesta udržovaná' (dashed red line). The 'Layer Properties' dialog box is open for the 'Cesta' layer, with the 'Symbology' tab selected. It shows the 'Draw using representation stored in the layer's data source' option. The 'Dashes' section is expanded, showing a pattern of 2 solid and 2 dashed segments, with 'Endings' set to 'With half pattern', 'Position' at '-1 pt', and 'Offset at end' at '0 pt'. The 'Add control points' section shows an 'Angle tolerance' of 120. The map background shows a road network with these different styles, and a scale of 1:5,000 is visible in the top toolbar.

# Práce s grafickou reprezentací prvků

Generalizace - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

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Table Of Contents

- Layers
  - Cesta
    - Representation: Cesta\_Rep1
      - Cesta neudržovaná
      - Cesta parková a hřbitovní
      - Cesta udržovaná
  - SilniceDalnice
    - Representation: SilniceDalnice\_
      - silnice 2. třídy
      - silnice 3. třídy
  - VodniTok
    - Representation: VodniTok\_Rep
      - Rule\_1
  - ZelezniciTrat
    - Representation: ZelezniciTrat\_
      - Rule\_1
  - BudSim
  - LesSmo

Layer Properties

Hatches Joins & Relates Time HTML Popup

General Source Selection Display Symbology Fields Definition Query Labels Routes

Show: Draw using representation stored in the layer's data source. Import...

Features

Categories

Quantities

Charts

Multiple Attributes

Representations

- Cesta\_Rep
  - Cesta\_Rep1

[1] Cesta neudržovaná

[2] Cesta parková a hřbitovní

[3] Cesta udržovaná

Dashes

Pattern: 2 2

Endings: With half pattern

Position: -1 pt

Offset at end: 0 pt

Add control points

Angle tolerance: 120

789 Meters

**Generalizace - ArcMap - ArcInfo**

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

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# Vykreslení mostu

**Layers**

- VodniToky  
Representation: VodniToky\_Rej
- Rule\_1
- Cesta  
Representation: Cesta\_Rep1
  - Cesta neudržovaná
  - Cesta parková a hřbitovní
  - Cesta udržovaná
- SilniceDalnice  
Representation: SilniceDalnice\_
  - silnice 2. třídy
  - silnice 3. třídy
- ZelezniciTrat  
Representation: ZelezniciTrat\_
  - Rule\_1
- Disp
- Detect
- BudSim
- LesSmo

**ArcToolbox**

- ArcToolbox
- 3D Analyst Tools
- Analysis Tools
- Cartography Tools
  - Annotation
  - Cartographic Refinement
    - Align Marker To Stroke Or Fill
    - Calculate Line Caps
    - Calculate Polygon Main Angle
    - Create Overpass**
    - Create Underpass
    - Disperse Markers
    - Set Representation Control P
    - Set Representation Control P

**Create Overpass**

Input Above Features With Representations  
ZelezniciTrat

Input Below Features With Representations  
VodniToky

Margin Along 0,2 Points

Margin Across 0,2 Points

Output Overpass Feature Class  
D:\DiKa\Ovr.shp

Output Mask Relationship Class  
C:\Documents and Settings\skoupy\Dokumenty\ArcGIS\Default.gdb\Msk

Expression (optional)

Output Decoration Feature Class (optional)  
D:\DiKa\Decor.shp

Wing Type (optional)  
ANGLED

Wing Tick Length (optional)  
0,5 Points

Generalizace - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:5 000

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Table Of Contents

- Layers
  - Cesta
    - Representation: Cesta\_Rep1
    - Cesta neudržovaná
    - Cesta parková a hřbitovní
    - Cesta udržovaná
  - SilniceDalnice
    - Representation: SilniceDalnice\_
    - silnice 2. třídy
    - silnice 3. třídy
  - VodniTok
    - Representation: VodniTok\_Rep
    - Rule\_1
  - ZelezniciTrat
    - Representation: ZelezniciTrat\_
    - Rule\_1
  - BudSim
  - LesSmo

ArcToolbox

- ArcToolbox
  - 3D Analyst Tools
  - Analysis Tools
  - Cartography Tools
    - Annotation
    - Cartographic Refinement
    - Data Driven Pages
    - Generalization
    - Graphic Conflicts
      - Detect Graphic Conflict
      - Propagate Displacement
      - Resolve Building Conflicts
      - Resolve Road Conflicts
    - Grids and Graticules
    - Masking Tools
    - Representation Management
  - Conversion Tools
  - Data Interoperability Tools
  - Data Management Tools
  - Editing Tools
  - Geocoding Tools
  - Geostatistical Analyst Tools
  - Linear Referencing Tools
  - Multidimension Tools
  - Network Analyst Tools
  - Parcel Fabric Tools
  - Schematics Tools
  - Server Tools
  - Spatial Analyst Tools
  - Spatial Statistics Tools
  - Tracking Analyst Tools

Detect Graphic Conflict

Input Layer: ZelezniciTrat

Conflict Layer: VodniTok

Output Feature Class: D:\Dika\Detect.shp

Conflict Distance (optional): 1,5 Points

Line Connection Allowance (optional): 0 Points

OK Cancel Environments... Show Help >>

Georeferencing Layer: -613229,628 -1133381,817 Meters

## Detekce a vyřešení grafického konfliktu



Generalizace - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:5 000

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Table Of Contents

**Layers**

- Cesta  
Representation: Cesta\_Rep1
  - Cesta neudržovaná
  - Cesta parková a hřbitovní
  - Cesta udržovaná
- SilniceDalnice  
Representation: SilniceDalnice\_
  - silnice 2. třídy
  - silnice 3. třídy
- VodniTok  
Representation: VodniTok\_Rep
  - Rule\_1
- ZeleznicniTrat  
Representation: ZeleznicniTrat\_
  - Rule\_1
- Detect
- BudSim
- LesSmo

**Resolve Road Conflicts**

- VodniTok
- ZeleznicniTrat

Hierarchy Field  
Hierarchie

Output Displacement Feature Class (optional)  
D:\Dika\Disp.shp

OK Cancel Environments... Show Help >>

Georeferencing Layer: -613207,139 -1133450,608 Meters

The screenshot displays the ArcGIS interface with the 'Propagate Displacement' dialog box open. The dialog box is titled 'Propagate Displacement' and contains the following fields:

- Input Features:** VodniTok
- Displacement Features:** Disp
- Adjustment Style:** AUTO

The background map shows a network of roads and water features. The 'Layers' panel on the left lists the following layers:

- Cesta  
Representation: Cesta\_Rep1  
---- Cesta neudržovaná  
— Cesta parková a hřbitovní  
- - - Cesta udržovaná
- SilniceDalnice  
Representation: SilniceDalnice\_  
— silnice 2. třídy  
— silnice 3. třídy
- VodniTok  
Representation: VodniTok\_Rep  
— Rule\_1
- ZelezniciTrat  
Representation: ZelezniciTrat\_  
— Rule\_1
- Disp
- Detect
- BudSim
- LesSmo

The 'ArcToolbox' panel on the right shows the 'Generalization' folder expanded, with 'Propagate Displacement' selected. The status bar at the bottom indicates the current layer is 'Georeferencing' and the coordinates are -613215,076 -1133491,619 Meters.

# Děkuji za Vaši pozornost !



Lesnická  
a dřevařská  
fakulta

Mendelova  
univerzita  
v Brně



## **Kontakt:**

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