Data Editing and Topology

Introduction

During the data creation, either using a tablet or on-screen digitizing can generate errors. The error can be due to human error, such as missing a point, line, polygon, or digitizing extra features. Errors can also be generated during scanning, tracing or during the georeferencing. An ArcGIS user can edit various types of data such as: feature data stored in shapefiles, geodatabases, and different tabular formats. The editing can include points, lines, polygons, and text.
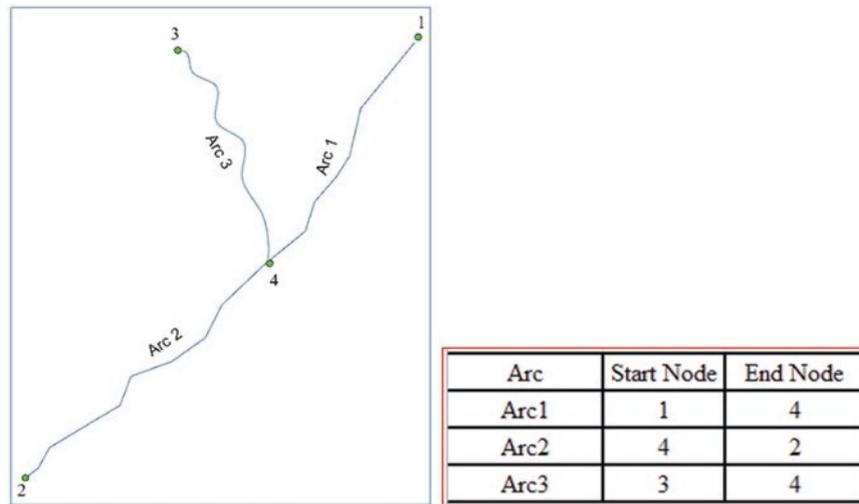
Editing occurs in an edit session where you can create or modify vector features or tabular attribute information. Start an edit session when you are ready to begin editing, but remember to end the edit session when you're done. If you have more than one data frame in your map, you can only edit the layers in one data frame at a time, even if all data is in the same workspace. The editing of the data can be done if they are either in the same or in different coordinate systems.

Topology is an advance way to edit the data and it is define as a data structure that creates connections and describes the spatial relationship between point, line, and polygon features. In other ways, the topology is simply the arrangement of how the 3-different features (point, line, and polygon) share geometry. All spatial elements in a GIS layer are connected in some fashion to each other which allows the layer to be categorized, queried, manipulated, and stored more efficiently. The topology is also a set of rules, behaviors, and models on how points, lines, and polygons share coincident geometry. For example, two adjacent catchment areas will have a common water divide between them which they share. The set of sub-catchment polygons within each watershed must completely cover the watershed polygon and share edges with the whole catchment boundary. The topology is a useful data structure concept in GIS which allows GIS users to know: the location of the feature, what is connected to it, what is surrounded by it, and how to identify spatial relationships with other features. It can also help to get around using the nodes and vertices to accomplish various spatial analysis tasks. In GIS, one can find, and trace, a route on a map between two cities, and measure the distance and time of arrival.

When topology is applied in GIS, a data structure table is built from _nodes_ and _chains_ of the features. The tables are used to determine various relationships such as: what is connected, what is adjacent (left and right), and what is the direction of the chains. Topology is applied after digitizing and editing. When data is digitized or created there is no connection, or relationship, to the feature that has recently been digitized. This means that no informational content associated with point, line, or polygon is available, except location. For example, if you digitize a river, and its tributaries, then run the topology, it will build the spatial information. It does this by recognizing the nodes at the end of each digitized stream and creating new nodes at intersections where the river crosses. The end result is that each segment of the river consists of three topological chains separated by a node (figure below). One stream segment consist of Arc 1, Arc2, and Arc 3 using start node and end node. Arc 1 has node 1 as its starting node and node 4 as its ending node.

Topology offers special information to the data structure, provides powerful functions for spatial analysis and presents a number of advantages to GIS. The topology allows users to calculate the spatial information and property of the features. The spatial property for the point is location (X, Y), the line is the length, and the polygon is the perimeter and area. Topology provides spatial relationships which allow users to query the data and provide spatial analysis when running the network analyst.

W. Bajjali, _ArcGIS for Environmental and Water Issues_, Springer Textbooks in Earth Sciences, Geography and Environment,
https://doi.org/10.1007/978-3-319-61158-7_8

Arc	Start Node	End Node
Arc1	1	4
Arc2	4	2
Arc3	3	4

In this chapter, you are going to be introduced to various types of editing, which range from simple, advance, and all the way to topological editing.

   I. Simple Editing
      a. Delete
      b. Move
      c. Split
      d. Reshape
      e. Modify
      f. Merge
  II. Advance Editing
      a. Overshoots and undershoots
      b. Generalize feature
      c. Smooth feature
 III. Topological Editing Using Geodatabase
      a. Fix Lines using topology
      b. Fix polygons using topology

I: Simple Editing

Simple Editing means a variety of basic editing that can be performed on a point, line, and polygon features. Editing allows you to use some commands to perform certain functions such as Delete and Move, or using the Editing Tool to perform several type of duties. The Editor toolbar includes several commands that help users to edit their data. It also allows you to start and stop an edit session, access a variety of tools, have commands that create new features or modify existing ones, and

can save your edits. To edit data, you need to add the Editor toolbar to ArcMap by clicking the Editor Toolbar button on the Standard toolbar or access it through the Customize menu/Toolbars/Editor.

The Editor toolbar executes quite a few commands such as trace, cut, reshape, split, rotate, and many more functions.
Scenario 1: You are giving a shapefile that was digitized from an aerial photograph and your boss asked you to modify it by deleting and moving some polygons.

Delete Function

In this step you are going to delete 2-polygons: H and G from the Farm layer

1. Start ArcMap and rename the Layers Data Frame "**Editing**"
2. Integrate the **Farm.shp** from \\Data\Q1 folder
3. Right-click **Farm.shp** and point to Label Features
4. Click Editor toolbar/Start Editing/highlight Farm/Continue
5. Click Edit Tool ▸ in the Editor Tool
6. Point to polygon H and click it, the H polygon will be selected
7. Click the Delete key on the keyboard
8. The H Polygon will be deleted
9. Repeat the previous steps to delete polygon G
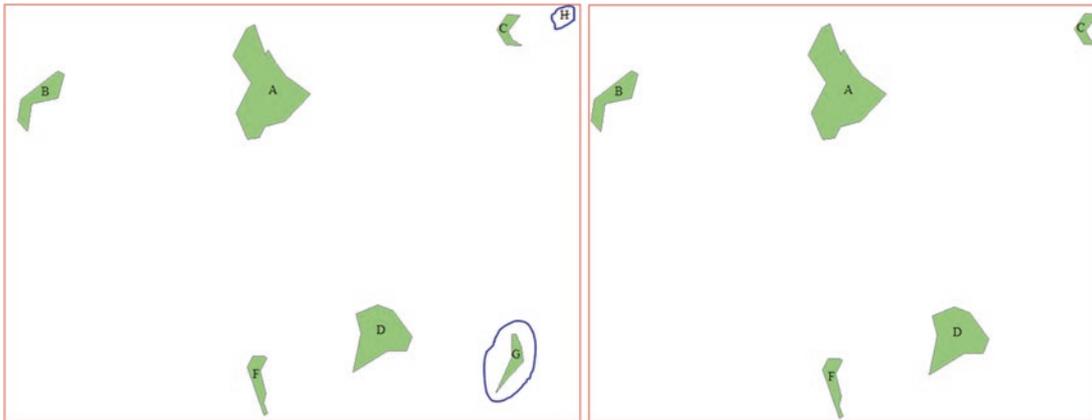
Move Function

In this step you are going to move 2-polygons: D and F.
   You have found that the actual location of the land D is between lands A and B. The location of land F is between lands A and C. So you have decided to move them into their correct locations.

10. Make sure you are in editing mode
11. Click Edit Tool in the Editor Tool
12. Point to polygon D and click it, the D polygon will selected
13. Click on it again and drag it between lands B and A
14. Repeat point 12 and 13 and drag polygon F between A and C then click on an empty place to deselect the F feature
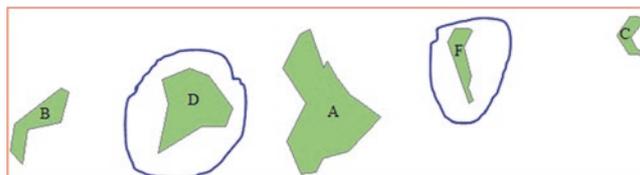
Split Function

The piece of land A is big and used for cultivating the potato crop. You have decided to split it into two parts and use it to cultivate two products: tomato and potato.

15. Make sure you are still in editing mode
16. Zoom to polygon A
17. You will split the polygon A between the points 1 and 2 as seen in the figure
18. Editor/Snapping/Snapping Toolbar
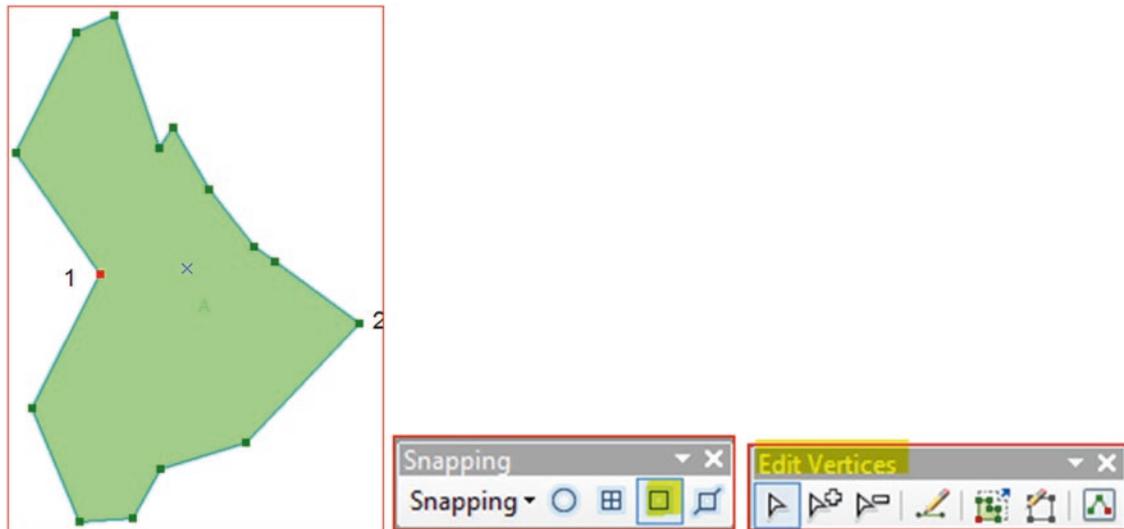
19. In the Snapping Toolbar/click the Snapping drop down menu
20. Make sure the "**Use Snapping**" icon is checked
21. Click Vertex Snapping (third icon on Snapping Toolbar)

22. Click Edit Tool in the Editor Tool
23. Point to polygon A and double click it, the A polygon will be selected

   Result: Polygon A will have one node (red) and 14-vertexes (greens).

24. Highlight the Farm in the Create Features Dialog Box
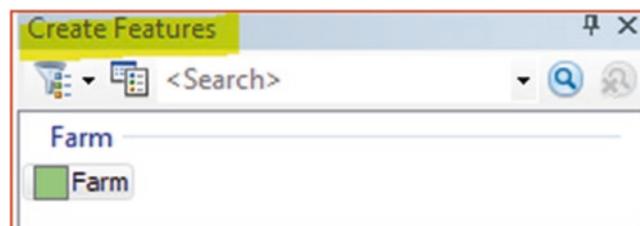
25. Click "**Cut Polygons Tool**" on the Editor Tool
26. Point you cursor toward point 2, it will snap
27. Then point your cursor toward point 1, it will snap, then double click it

28. The polygon A will split into two polygons and both have the label A
29. Open the attribute table of **Farm** layer
30. You will see two records selected and both of them labeled "A"
31. Highlight the Lower Label A, replace it by typing M
32. Then hit Enter/close the Farm Attribute Table
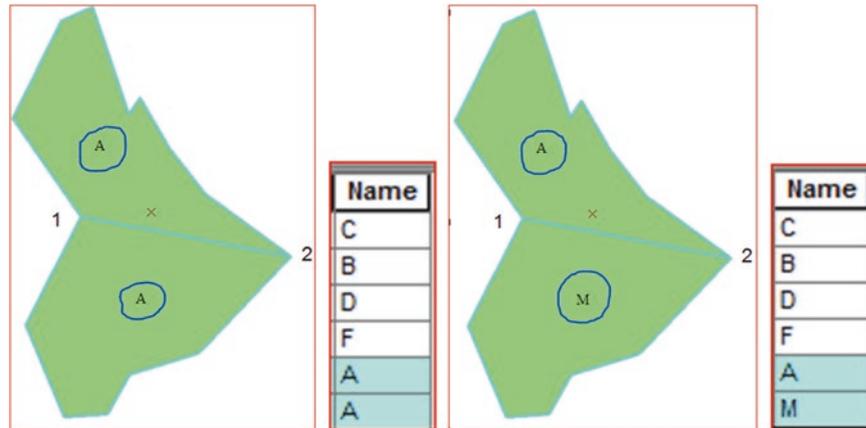
Result: The polygon A is now split into two polygons A and M.

Reshape Function

The piece of the **Farm** that has a label B, is now going to be improved and expanded to make more land available for agriculture. The Farm with the label B is going to be reshaped and modified to fit the size and shape of the **LandB;** which has a rectangular shape.

33. Add **LandB.shp** from \\Data\Q1 folder to the Editing Data Frame
34. Right click the LandB layer in the TOC/Zoom To Layer
35. In the TOC, click the symbol of the **LandB** layer, then click Hollow and make the Outline Width = 1 Click OK to exit the Symbol Selector dialog box
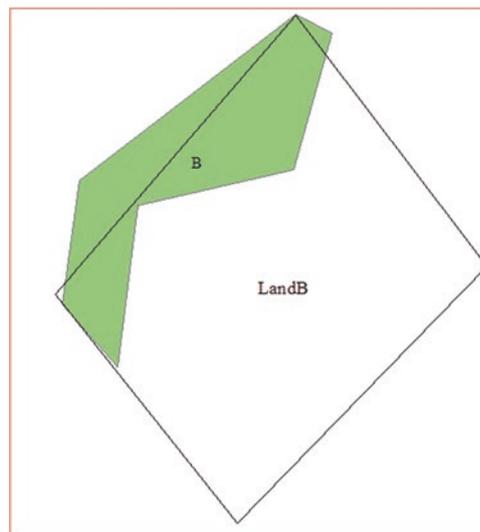

36. Right click **LandB** layer in the TOC/Edit Features/click the Organize Feature Templates
37. The Organize Feature Templates dialog box should be displayed
38. Click LandB and point to New Template

39. The Create New Template Wizard should be displayed
40. Highlight LandB and click Finish
41. Close the Create New Template Wizard dialog box display
42. The LandB is added into the Create Features Dialog

Result: The two layers **LandB** and Farm are now in the editing mode. However, you are going to reshape only the land B of the **Farm** layer.

43. In the Snapping Toolbar/click Snapping
44. Make sure "**Use Snapping**" is checked and the Vertex Snapping (third icon) is highlighted
45. Click Vertex Snapping (third icon on Snapping Toolbar)
46. Click Edit Tool in the Editor Tool
47. Double click land B of the **Farm layer**
48. The polygon will have one node (red) and all of the vertexes (greens)
49. Click Edit Tool in the Editor Tool and place it on vertex 1
50. Drag it and place it on the left upper corner of the **LandB** close to vertex 7 (as seen in the sketch)
51. Click vertex 6 and drag it to the lower left corner of the **LandB**
52. Click vertex 3 and drag it to lower right corner
53. Place your Edit Tool above vertex 4, right click and delete the vertex
54. Repeat the previous steps and delete vertex 5 and 7
55. Click Edit Tool somewhere outside the drawing
56. The farm with label B will be reshaped and will fit the rectangular shape of LandB
57. Go to Editor and click Stop Editing /click Yes
   In the TOC, r-click the Farm layer/Zoom to Layer
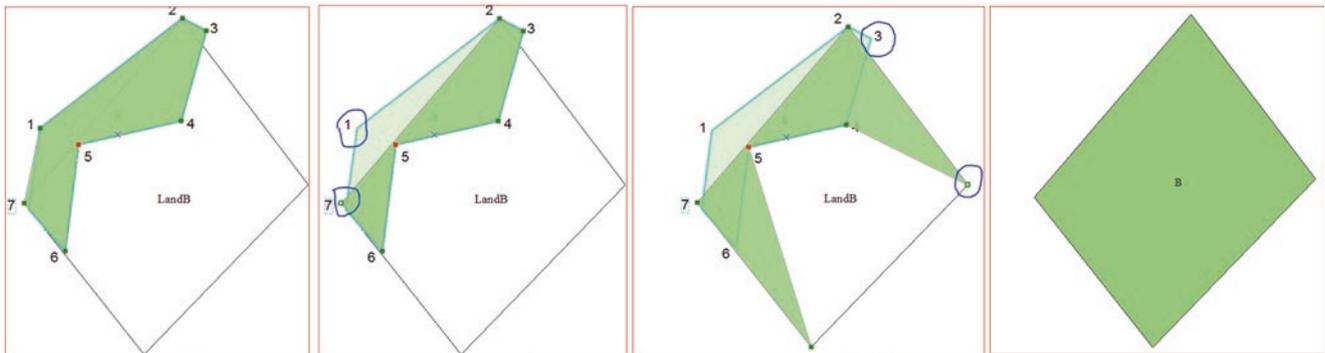
Modify Feature

One of the ways to modify a feature in ArcMap is to add features through digitizing and then update the attribute table.

Scenario 2: The geology of Dhuleil was subject to a detail study to update its outcropping formations. A group of geologists went to the field and, with the use of GPS, they delineated the outcropping formation that was missing from the old map. As a GIS technician, your duty is to use the new data to update the original geological map "**Geology.shp**".

1. Insert a new Data Frame and call it **Geology**
2. Integrate the **Geology.shp** and **Field_Geology.shp** from \\Data\Q2 folder
3. Right click **Geology.shp** and point to Properties/Symbology/Categories/Unique values
4. Go to the Value Field "GEOLOGY"/Click Add All Values/Uncheck all other values
5. Click OK
6. Right click the **Field_Geology.shp** point to Label Features
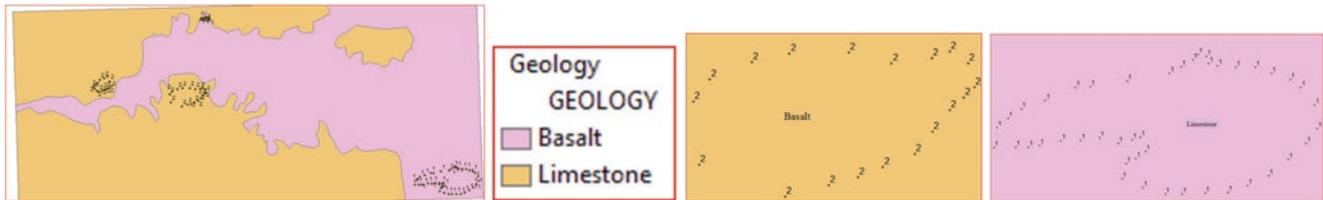
Result: The Geology layer will be displayed in 2 classes (**Basalt** & **Limestone**) and the Field_Geology layer is now labeled. **Note**: The next step is to digitize the basalt and limestone features using the Field_Geology layer as a reference. Labels 1 and 2 represent the limestone and the basalt formations respectively. The captured limestone is outcropping above the basalt, and the outcropping basalt is above the limestone.

7. Editor/Start Editing/Editor/Snapping/Snapping Toolbar
8. In the Snapping Toolbar/click Snapping and make sure the "**Use Snapping**" is checked
9. Click Point Snapping on the Snapping toolbar (first icon on Snapping Toolbar) to make it active
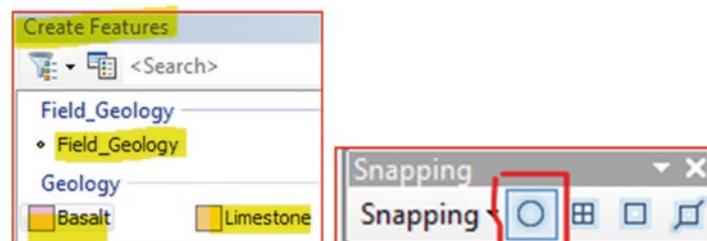

10. Zoom in around the Field_Geology layer in the lower right corner of the **Geology** layer
11. In the Create Features click the Limestone class under geology
12. In the Construction Tools click the Polygon Symbol
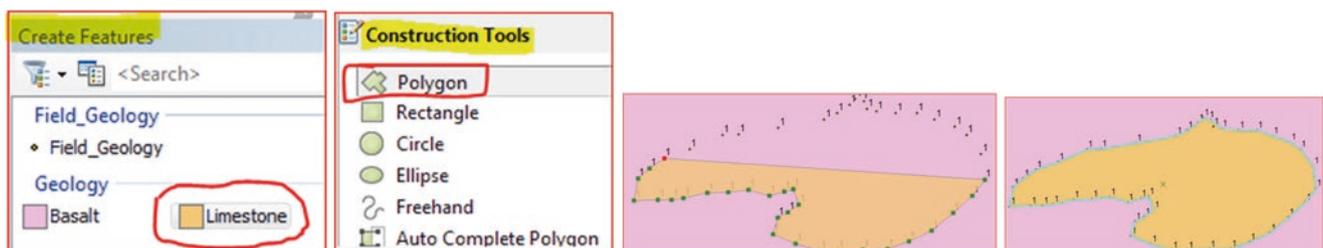
13. Click one point of the **Field_Geology.shp**
14. Then click a second point, and continue till you finish all the points
15. When you reach the last point double click to finish digitizing
16. Repeat the previous steps to finish digitizing the rest of the limestone formations

17. In the Create Features, click the Basalt class under geology
18. In the Construction Tools click the Polygon Symbol
19. Zoom in around the basalt points in the center of the **Geology.shp**
20. Click one point of the **Field_Geology.shp**
21. Then click a second point, and continue till you finish all the points
22. When you reach the last point double click to finish digitizing
23. Repeat the previous steps to finish digitizing the basalt formations
24. Open the attribute table of the **Geology.shp**
25. You will notice that all the limestone and basalt formations are added
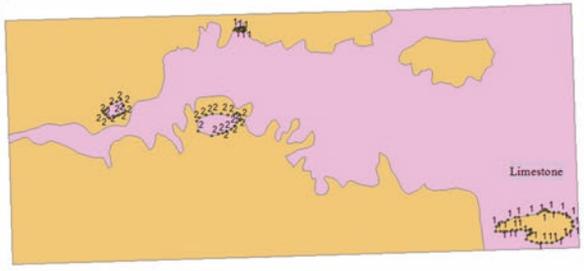
FID	Shape *	DHUL2_	DHUL2_ID	GEOLOGY	Area	Perimeter
0	Polygon	1	1	Basalt	230023000	147809
1	Polygon	2	2	Limestone	11807200	16254.3
2	Polygon	3	3	Limestone	82319400	66309.5
3	Polygon	4	4	Limestone	180966000	98912.6
4	Polygon	0	0	Limestone	0	0
5	Polygon	0	0	Limestone	0	0
6	Polygon	0	0	Basalt	0	0
7	Polygon	0	0	Basalt	0	0

Update the Area and Perimeter Field in the Geology Attribute Table

26. Go to Editor, Stop Editing/click yes to save your edits
27. Right click the Area field in the attribute table/Calculate Geometry/click Yes
28. The Calculate Geometry dialog box should be displayed
29. Make the Property: Area
30. For the Coordinate System: check the "Use Coordinate system of the data source" WGS1984 UTM Zone 36N
31. Make the Unit: Square Meters
32. Click OK/Yes

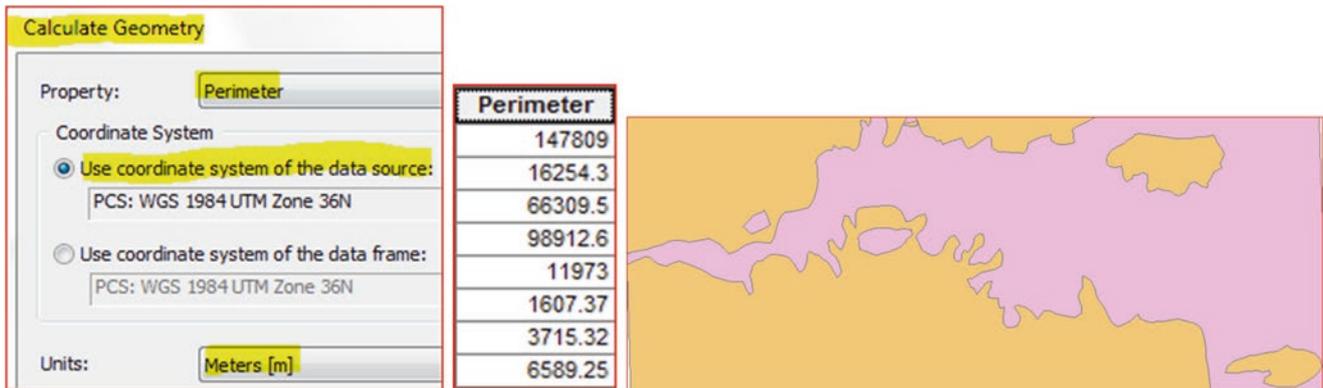**Result**: The Area of the new digitized area will be calculated.

33. Right click the Perimeter field in the attribute table/Calculate Geometry/click Yes
34. The Calculate Geometry dialog box should be displayed
35. Make the Property: Perimeter
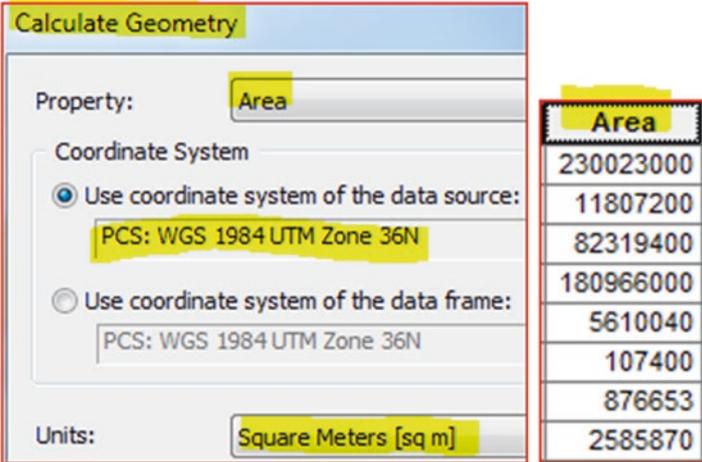
36. Coordinate System: (Use Coordinate system of the data source) WGS1984 UTM Zone 36N
37. Make the Unit: Meters
38. Click OK/Yes

Result: The Attribute Table of the **Geology** layer is updated and now contains eight records: three basalts and five limestones.

Merge Function

The merge function works with a single layer, and it can group selected records of a line or polygon features into one feature. In this scenario you are going to reduce the numbers of basalt and limestone records into one record each. So instead of having five records for the limestone in the attribute table, you will have only one record; same thing for the basalt features.

39. Insert Data Frame and call it **Merge**
40. Integrate **Geol_Dhul.shp** from the \\Ch08\Data\Q2 folder
41. Classify the **Geol_Dhul** layer based on the GEOLOGY field as shown in the previous section
42. Open the attribute table of the **Geol_Dhul** layer
43. The table consists of 8 records; **5 limestone records** and **3 basalt records**
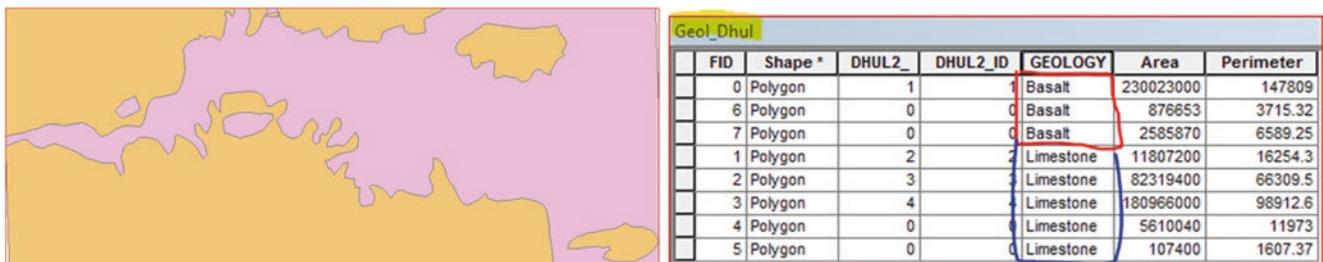

44. Right click **Geol_Dhul** layer/Edit Features/Start Editing
45. Open the Attribute Table of **Geol_Dhul** layer
46. Click Table Options and point to Select By Attributes
47. Write the following SQL statement: "**GEOLOGY**" **= 'Limestone'**
48. Click Apply then Close

Result: The 5-records of the limestone are selected.

49. Click Editor toolbar then select Merge
50. Select the first record "**Limestone (Geol_Dhul)**"
51. Click OK
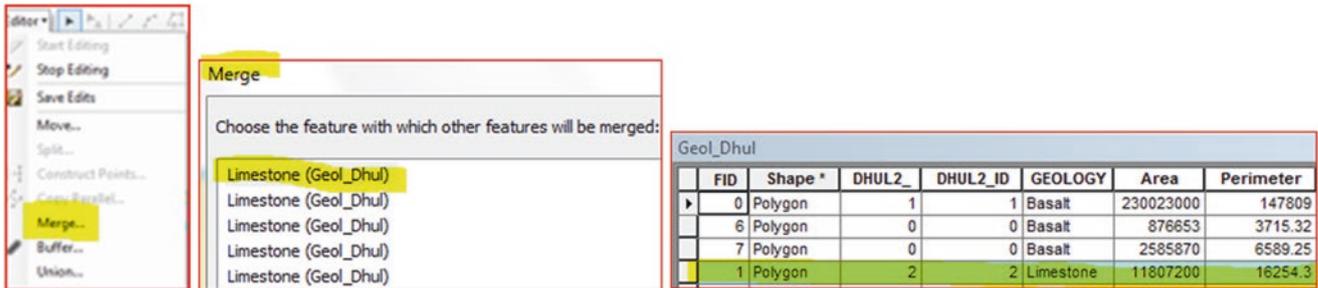
Result: The 5-limestone records have now become one record.

52. Open the Attribute Table of the **Geol_Dhul** layer
53. Click Table Options then click on Select By Attributes
54. Write the following SQL statement: "**GEOLOGY" = 'Basalt'**
55. Apply/Close
56. Go to the Editor/Merge
57. Select the first record "**Basalt (Geol_Dhul)**"
58. Click OK

    Result: The attribute table of the **Geol_Dhul** layer consists now of only two records.

59. Go to the Editor/Stop Editing and exit ArcMap

II: Advance Editing

In this section guide you will learn how to use the **Advanced Editing** tool in ArcMap to edit existing GIS features, how to fix some common digitizing errors, and how to update the spatial data using some of these advanced tools. The following topics will be covered:

Fixing Overshoots and Undershoots

Overshoots and undershoots are very common digitizing errors that affect the quality of the digitized data. Overshoots occur when a line that is supposed to terminate at the edge of another feature extends past the edge. An undershoot occurs when a line doesn't reach the edge where it is supposed to terminate.
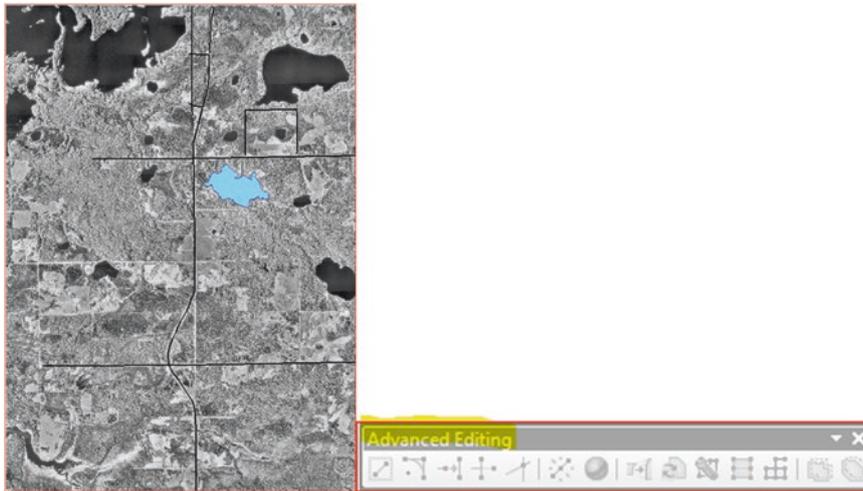
    The overshoot is fixed by trimming it to a selected edge, while the undershoot is fixed by extending it to a selected edge.

GIS Approach
1. Start ArcMap/File/Open and browse to \\Data\Q3 folder and Double click **Editing.mxd**

    Result: A map display showing the aerial photograph of St. Louis County, Streets, Rivers and Lakes layers.

2. Customize menu/Toolbars/Advanced Editing

Result: Advanced Editing toolbar is displayed, but none of the tools are active. The tools will become active once you've:

a) Started an edit session
b) Selected a feature to edit it

3. Bookmarks menu/point to Undershoot

    Result: The streets display and the ends of the square street are not connected to the main street.

4. In the TOC, right click **Street_MN**/Edit Features/Start Editing

    Result: Some of the Advance Editing tool are now active.

5. Click Edit tool in the Editor Toolbar
6. Click the street that you want the undershoot street to connect to.

7. From the Advanced Editing toolbar, click the Extend tool (third icon from left)
8. Then click on one of the undershoot streets.

9. The undershoot street extended to the selected street centerline.
10. Next extend the other undershoots as well (as in the previous step).
11. Zoom out to the full extent and clear the selected features

Correct Overshoots of the Street

12. Bookmarks menu/point to Overshoot
13. Notice the overshoots where two small streets, inside the loop, extend beyond the straight street
14. Make sure you are still in editing mode
15. With Edit tool, select the straight street that you want the two overshoot streets to be connected to

16. Now click the Trim tool ![Trim tool icon] (4th icon from left).
17. Click the end of the overshoot on one street.
18. Both overshoots are trimmed off
19. Zoom out to the full extent and clear the selected features
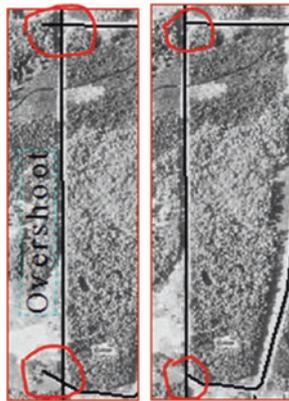
Generalize a Stream Feature

Generalizing reduces the number of vertices that describe a feature, so the feature's shape is somewhat less precise. The step will allow you to reduce the number of vertices that describe the **River_Mn.shp**.

1. Bookmarks menu/River
2. Make sure the River_MN.shp is selected in the "Create Features"

3. Click the Edit tool and then double click the River_MN layer to display its vertices.

4. On the Advanced Editing toolbar, click the Generalize tool (2nd icon ![Generalize tool icon] from right).
5. For the Maximum allowable offset, enter 5, then click OK
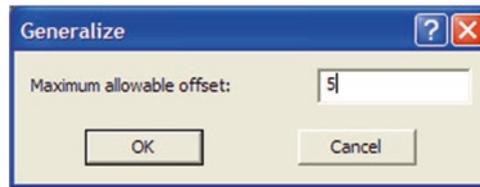
6. Double-click the River_MN layer again with the Edit tool to see its vertices.

Result: The number of vertices has been significantly reduced. If you zoom in closer at any part of the stream, you can see a slight effect on the shape of the stream.

7. Zoom out to the full extent and clear the selected features
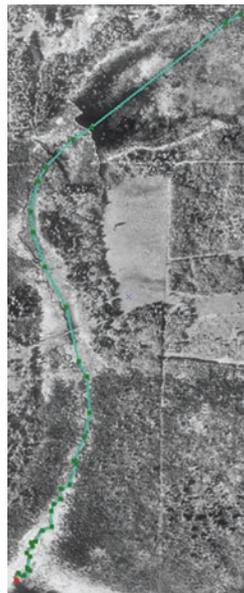

Smooth a Lake Feature

The outline of the lake next to the stream feature appears rough because it was digitized with too few vertices. To improve the appearance of the lake, you will use the Smooth tool.

8. Bookmark/Sunshine Lake
9. Make sure the **Lake_MN** layer is selected in the "Create Features".
10. Double-click the lake with the Edit tool to display its vertices.
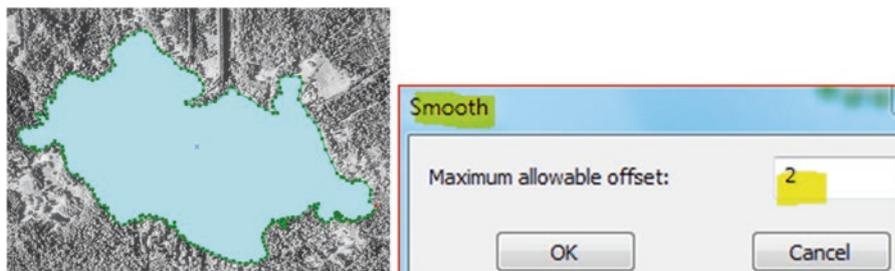
11. On the Advanced Editing toolbar, click the Smooth tool [icon] (last icon).
12. For the Maximum allowable offset, enter 2, then click OK.
13. Now the lake outline is much smoother.
14. Double-click the lake feature again to display the vertices.
15. The border of the lake looks smoother now.
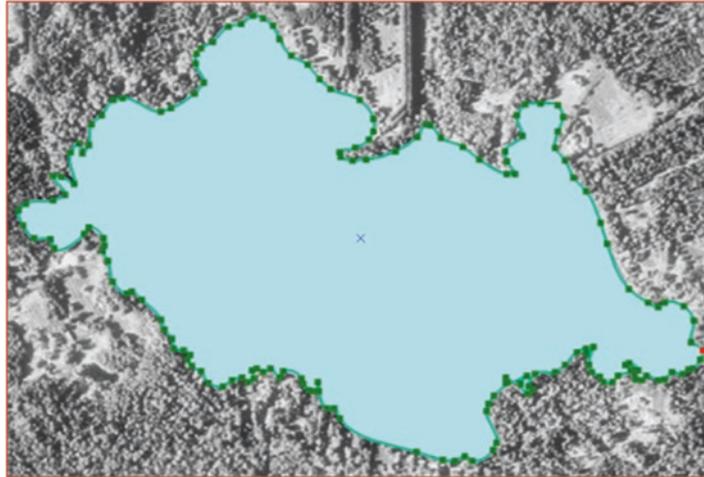
16. Zoom out to the full extent and clear the selected features
17. Stop Editing/click Yes (or NO, in case you want to practice)/Exit ArcMap

III: Topological Editing Using Geodatabase

Geodatabase topology is a set of rules that define how the features in one or more feature classes share geometry. The topology can be created in the Catalog window or ArcCatalog and can then be added to ArcMap as a layer to be edited. The topology rules allows a user to identify the topology errors that are present. For example a line (rivers, faults, and roads) might have a dangle, where one end of the line is not connected to another line, which are errors that you need to fix. The ArcGIS also allows you to validate the geodatabase topology to see if the edits has been following the topology's rules correctly.

Fix Fault System Using Topology

The catchment area of Wadi Andam-Halfyan in the Izki region in Oman has many wells. They are used mainly for domestic water supply and agriculture. The area has revealed a structural style that may have had a profound effect on the geomorphological and hydrological setting of the area. Two major fault trends have been observed; Fault A and Fault B are oriented north-east and north respectively, while Fault C oriented north-west. A detail field geological study of "**Fault A**" reveals that the fault actually consists of one section; not from different five segments. Therefore, Fault A should be corrected by joining the five segments into one fault system. You are going to use the Topology tool to carry out this job.
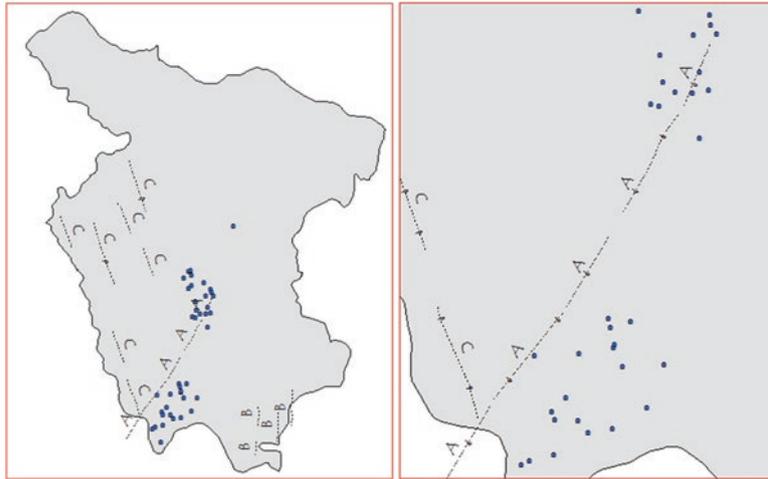
Note: The fault shapefile is projected onto UTM Zone 40N and the datum is WGS84 **(WGS_1984_UTM_Zone_40N)**.

The figure above shows that the Fault feature A contains gaps, and your duty is to fix them using the Topology technique in Geodatabase environment. To fix the errors there are various editing approaches using the topology, and your duty is to implement two topology techniques.

Editing Using Topology

In order to use the topology to fix the errors in the database you must do the following:

1. Create a Geodatabase and a Feature Dataset
2. Integrate the Fault into the Feature Dataset as a feature class
3. Build a Topology and set the Topology Rules

Create Geodatabase

1. Launch ArcMap and rename the Layers data frame "**Fault**"
2. Open Catalog window and browse onto \\Ch08\Result folder, R-click Result/New/choose File Geodatabase
3. Enter "**Resources**" as the name of the New File Geodatabase.gdb
4. Right click **Resources.gdb**/New/Feature Dataset
5. Make the Name: Water
6. Click Next and open the "Projected Coordinate Systems"/UTM/WGS1984/
7. Select Northern Hemisphere then select "WGS 1984 UTM Zone 40 N"
8. Click Next/Next/Finish
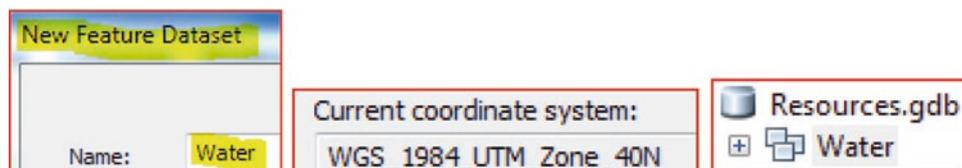
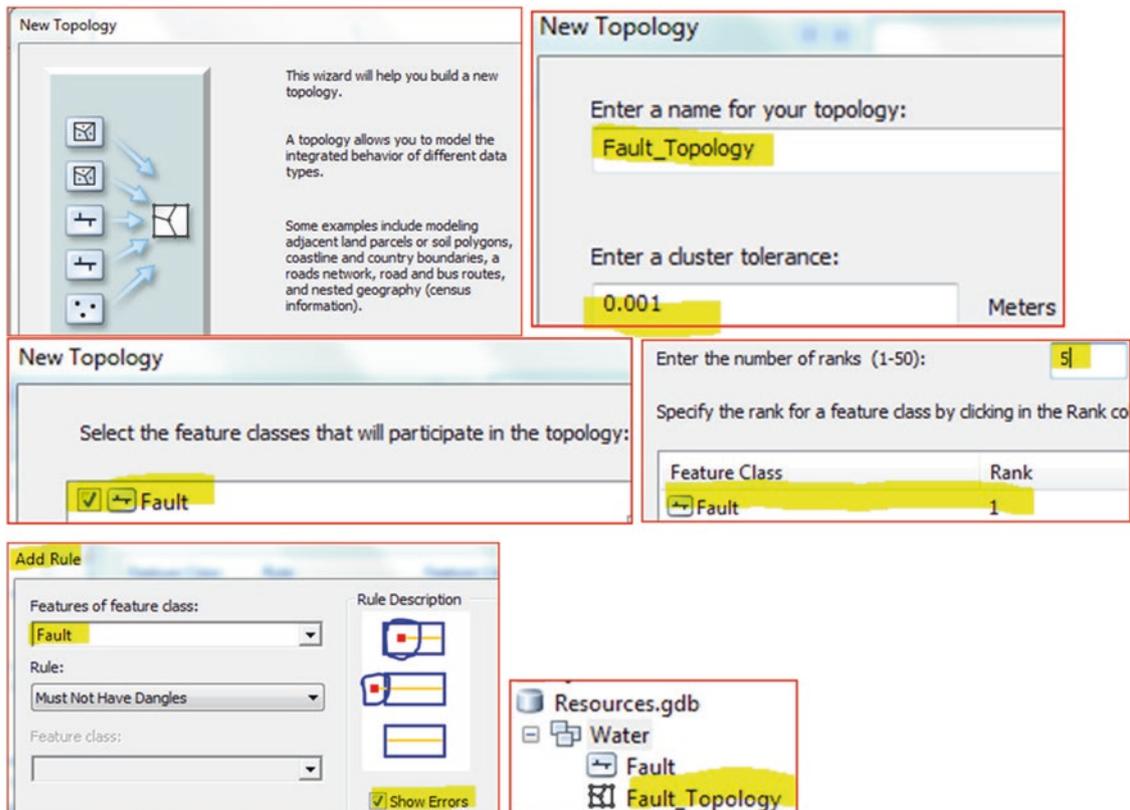**Result**: The Water feature dataset is created.

9. Right click on the Water feature dataset/Import/Feature Class (single)
10. Input Features: \\Data\Q4\Fault.shp
11. Output Location: \\Data\Resources.gdb\Water
12. Output Feature Class: Fault

13. Click OK (The Fault feature class displays in the TOC)
14. Right click Fault in the TOC/Remove
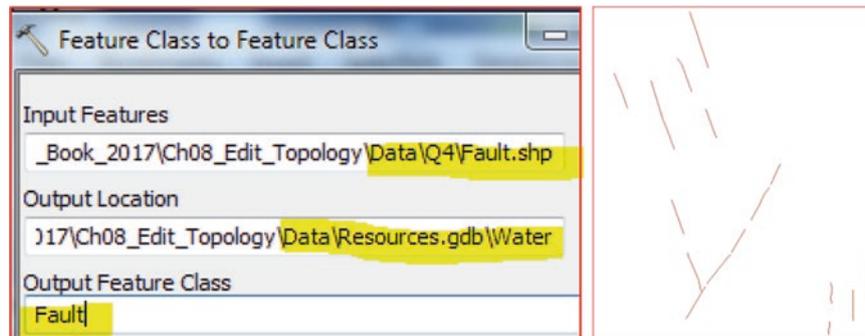
Building Topology and Set the Rules

15. Right click the Water Feature Dataset/New/Topology/Click Next
16. Call it Fault_Topology and accept the cluster tolerance (0.01 m)
17. Click Next/Select Fault/Next and accept the default/Next
18. Click Add Rule
19. Make the features of the feature class: Fault
20. Rule: Must Not Have Dangle
21. Click OK/Next/Finish
22. Click Yes to validate the topology

Result: The Fault_Topology is created in the Water Feature dataset.

23. Right click Fault_Topology/Properties/Click the Errors Tab
24. Click Generate Summary
25. You will see 32 Dangles
26. Click OK

Fixing Dangles in ArcMap Using First Topology Approach

27. Drag the Water Feature Dataset into ArcMap from the Catalog window
28. The Fault_Topology and the Fault feature class will be added to the TOC.
29. In TOC, r-click Fault layer/Label Features

Comment: The 32 dangling nodes at the perimeter of the three fault systems (A, B, and C) is displayed. The goal is to fix the dangle in Fault A.
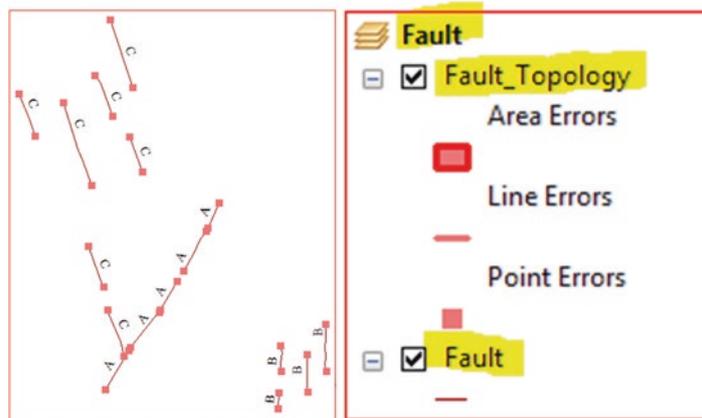
Topology Tool

30. Click the customize menu/Toolbars/click Topology tool
31. The Topology Toolbar will be displayed (none of the tools are active)
32. Click the Editor toolbar and click Start Editing
33. Some of the tools in the Topology toolbar will be active

34. On the Topology toolbar, choose "Select Topology" (first icon)
35. Select "Geodatabase Topology"
36. Click OK
37. Zoom in between the two fault segments at the upper part of Fault A
38. Measure the distance between the two vertexes in meters in the upper two segments (round up)

Note: Here is the distance: 150.3 m.

39. On the Topology toolbar, select the "Fix Topology Error Tool" (second icon from last)
40. Click on a node, it will turn black/then right click on it and choose "snap"
41. Use the measured value from earlier as the snap tolerance value (here, 151 m)/Enter
42. The node from the upper fault segment will snap to the node of the lower segment

43. Click Validate Topology on Current Extent
44. The node will disappear
45. Zoom to Full Extent

   Result: The two sections of the A fault become one line segment.

46. Zoom into the next upper dangle error and measure the distance
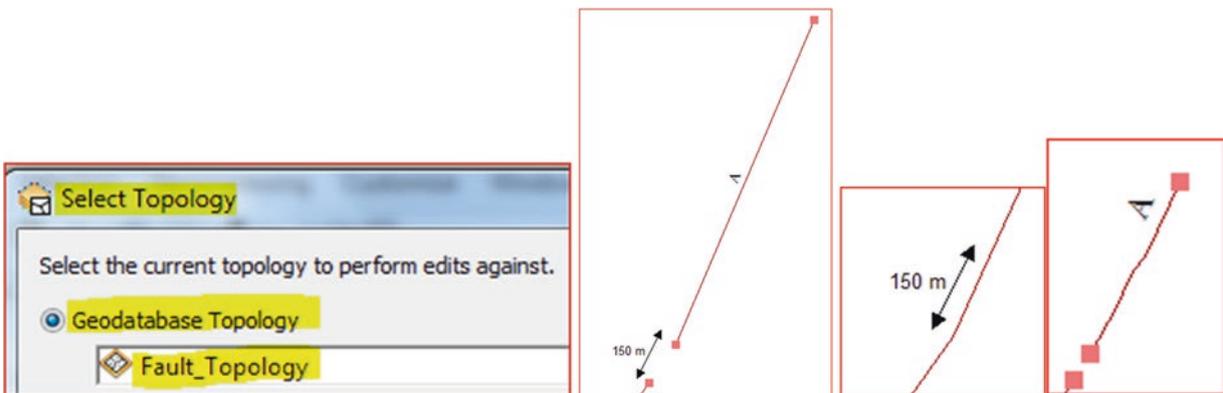
**Result**: The distance is 509.12 m.

47. Repeat the above steps in the same order to snap the two-nodes together
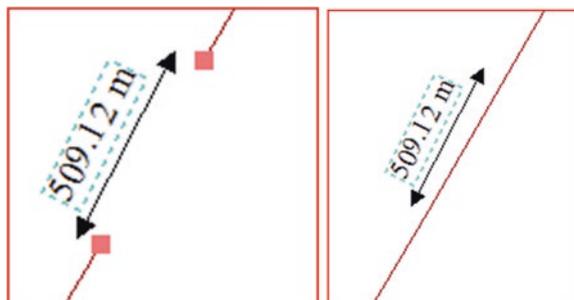
## Fixing Dangles in ArcMap Using Second Topology Approach

This is a second approach to remove the gaps between the nodes along the fault segments based on the topology approach. To proceed, you need to make sure that you are in editing mode.

48. Zoom into the lower Fault A and measure the distance between the two nodes.
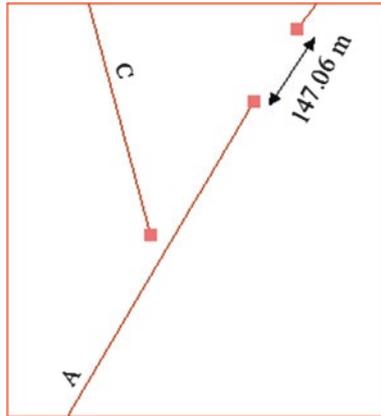
Comment: The distance is 147.06 m

49. Click Editor in the Editor toolbar
50. Click Snapping/Snapping Toolbar
51. Make sure the Point Snapping is highlighted
52. Click Create Feature on the right tab
53. Highlight Fault in the Create Feature dialog box
54. Click Line under Construction Tools
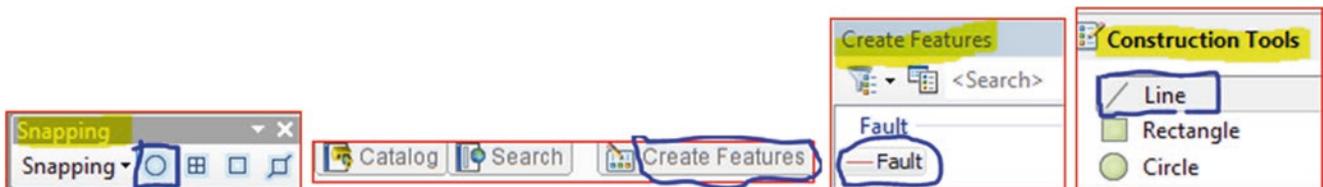
55. Click the Straight Segment [icon] Tool in the Editor toolbar
56. Right click the upper node/Snap To Feature/Endpoint
57. Move your cursor to the node you want to connect the line
58. Right click on the node/Snap To Feature/Endpoint/
59. Right click on the node once again/click Finish Sketch

**Result**: A cyan line is created and connects the two nodes.
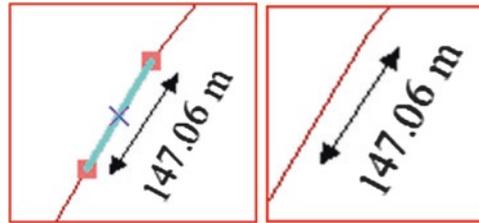
In order to connect the cyan line between the two nodes to the original fault, you should validate the topology.

60. On the Topology toolbar click the Validate Topology In Current Extent

Result: The cyan line and the two-nodes will disappear.
Continue correcting the gaps along Fault A

61. Click Stop Editing under the Editor dropdown menu when you finish
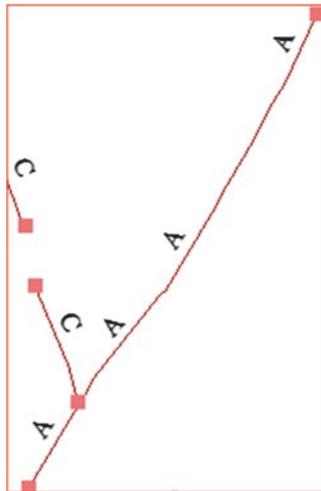
Fix Watershed Using Topology

Two catchment areas were created using the Hydrology tool in the Spatial Analyst. Two different thresholds were used and the result two catchment areas were created. The two catchments don't cover each other and in this exercise, you will use the Topology Tool to make them identical to each other.

62. Insert New Data Frame and call it Watershed
63. In the Catalog window right click \\Result\Resources.gdb\New\Feature Dataset
64. Make the Name: **Shed**
65. Click Next/then in the New Feature Dataset dialog box

66. Click the drop down arrow of the Add Coordinate System and click Import
67. Import the coordinate from **Watershed_1.shp** from \\Ch08\Data\Q5 folder

The coordinate System of the **Watershed_1.shp** is "NAD_1983_UTM_Zone_15N"

68. Click Next/Next/Accept the Default/and click Finish
69. Right click on Shed/Import/Feature Class (multiple)

70. Add **Watershed_1.shp** & **Watershed_2.shp** from \\Data\Q5 folder/
71. Click OK

   **Result**: **Watershed_1.shp** and **Watershed_2.shp** will be displayed in ArcMap.
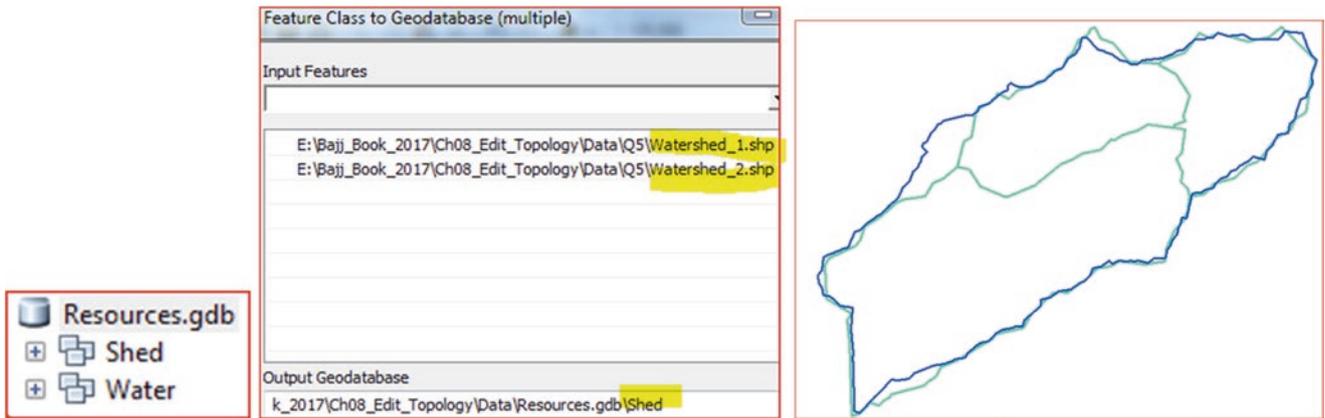
72. Remove the **Watershed_1** and **Watershed_2 layers** from TOC of Watershed in ArcMap

Build Topology Rule to Make Two Watershed Layers Cover Each Other

73. In Catalog window, right click on Shed feature Dataset/New/Topology
74. Click Next
75. Enter a name for your topology: Shed_Topology
76. Accept the default of the cluster tolerance/Next
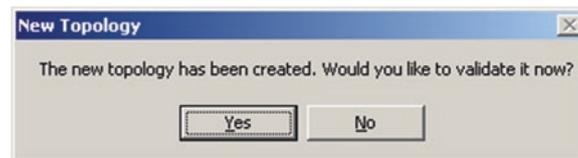77. Check Watershed_1 & Watershed_2
78. Click Next
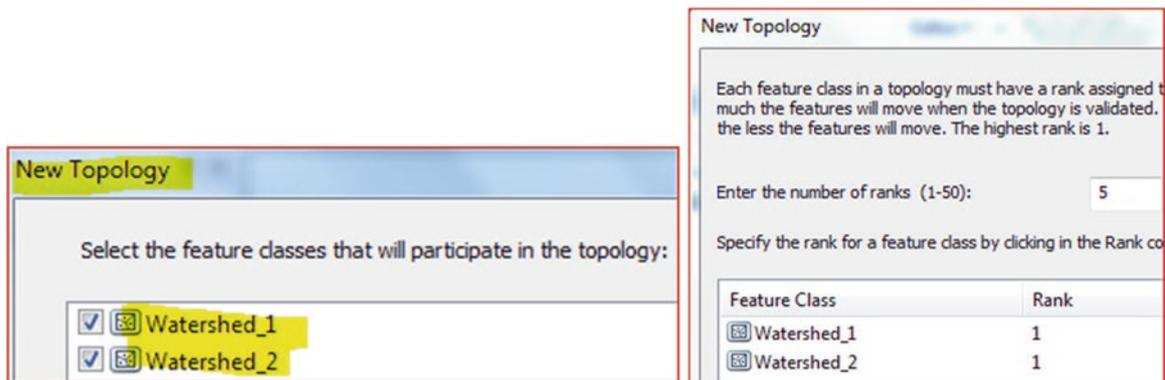
79. Accept the default/Next
80. Click Add Rules
81. Select Watershed_2.shp
82. Select "Must Cover Each Other"
83. Feature Class: Watershed_1.shp
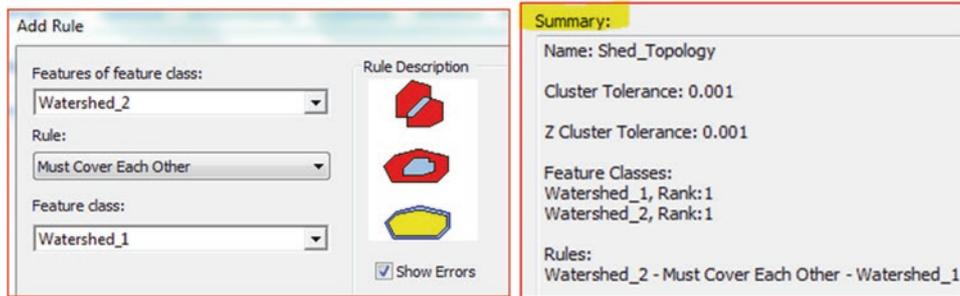
84. OK/click Next/Finish
85. Click Yes to validate the topology

Result: The Shed_Topology is established and, you can see the detail of the topology rule in the Catalog window. The summary shows that the area is not covered by the red area.

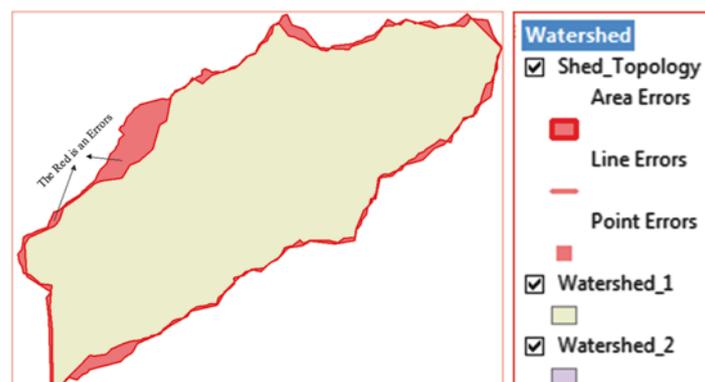86. In Catalog window/Right click Shed_Topology/Properties/click Error tab
87. Click Generate Summary
88. Click OK

Result: There are 44 errors.

89. Drag the Shed Feature Dataset from the Catalog window into ArcMap

Result: The Shed_Topology, the Watershed_1 and Watershed_2 feature classes are added to the TOC.

90. Click Editor toolbar/Start Editing

Note: Make sure that the Topology toolbar is available in ArcMap.

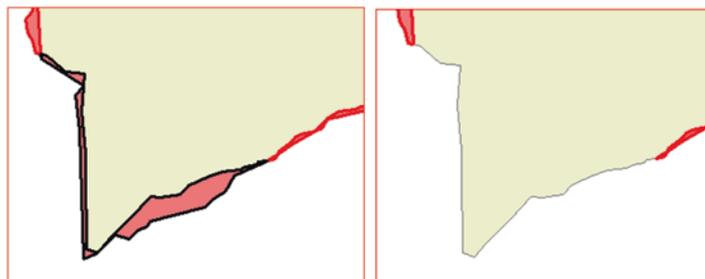91. Click the Select Topology tool [icon] on the Topology toolbar
92. Click the circle next to Geodatabase Topology
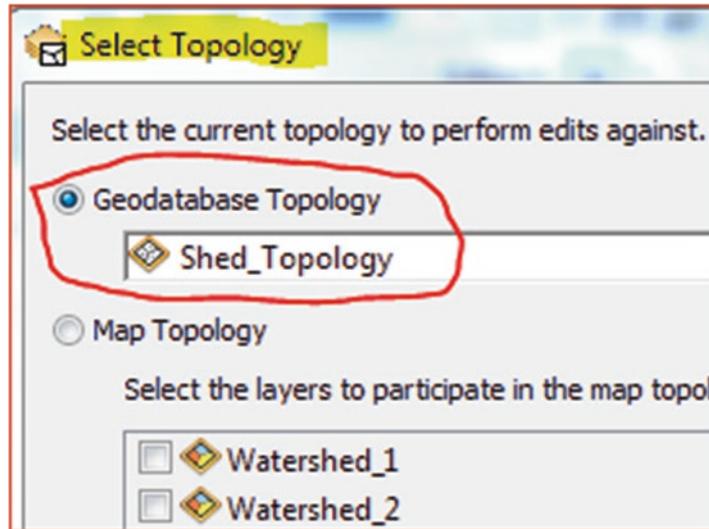
93. Click OK

94. Click the Fix Topology Error tool [icon] on the Topology Toolbar
95. Use the Fix Topology Error tool by dragging a box around the error in the lower-left corner
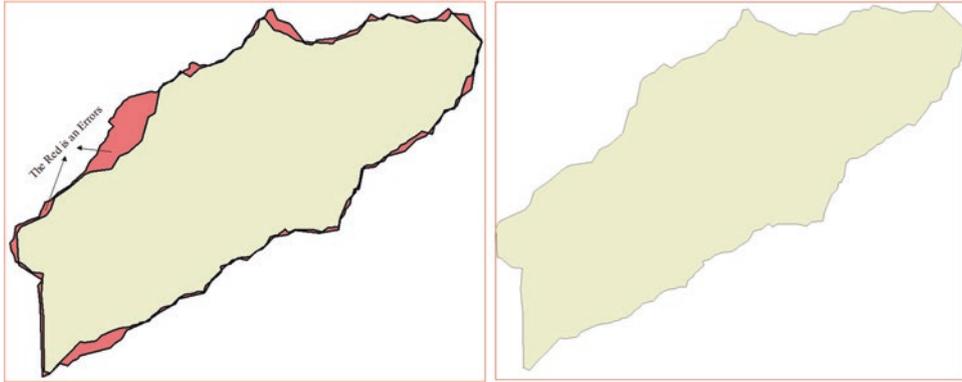

Result: The area that is selected should turn the error black.

96. Right click in the error and click Subtract
97. Repeat the above steps to fix the rest of the errors OR
98. Click the Fix Topology Error tool/drag box around Watershed_1 and Watershed_2
99. Right click in the error and click Subtract

The Red is an Errors

Result: The two watersheds become identical.

100. Click Editor and Stop Editing
101. Click Yes to save edits