This is the third in a series of tips and tricks articles on editing in ArcMap. ArcGIS at the ArcEditor or ArcInfo license level is required for these operations. This article will help make editing sessions more productive by supplying information on dividing features, changing XY coordinates for features, and working with more complex features. The material is presented as a series of challenges and solutions. See the accompanying table for an overview of the content.

### Challenge 1—Splitting two lines where they intersect (interactively)

**Scenario:** While performing some quality control on street data, you notice that two street features that intersect at a traffic light were captured without creating an intersection. This will cause errors if network analysis is performed using these streets because the location where the streets are coincident would be represented as an overpass or underpass on the street network. Splitting the streets at their exact intersection will eliminate this problem.

**Solution:** Use the Intersection Sketch tool in a novel way to create the point where the lines intersect. Typically the Intersection Sketch tool is used to create a point or vertex at the implied intersection of two segments. In this case, this point will define the location for splitting two features.

1. In the Editor toolbar, choose Start Editing from the menu. Click the Tool Palette drop-down arrow and click the Intersection tool. The pointer turns into crosshairs.
2. Position the crosshairs over the first segment you want to create an intersection with, then click. A line extends from that segment across the map display so that you can see the first angle used to construct the point of intersection.
3. Position the crosshairs over the second segment and click. A construction point is added at the implied intersection of the two segments.
4. Use the construction point to split the lines at the intersection by defining a snapping agent to snap to the edit sketch vertex and then using the Split tool and snapping to the construction point.
5. To define the snapping agent, choose Snapping from the Editor menu. In the Snapping Environment window, check the Edit sketch vertices option. The Edit Sketch snapping options are located at the bottom of the Snapping Environment window. Note that snapping properties are effective as soon as they are checked or unchecked.
6. With the snapping agent defined, use the Split tool by selecting the line to split and clicking the Edit tool. Click on the construction point just created to select it. Click the Split tool on the Editor toolbar. Click the selected construction point, and the line is split into two features. Notice that snapping ensures the mouse pointer snaps to the construction point.
**Challenge 2—Splitting two or more lines where they intersect**

**Scenario:** While performing some quality control checks on street data, you notice several street features that cross without intersections. Because several of these intersections exist, you want to automate this process because splitting these streets interactively one at a time would be time consuming.

**Solution:** A quick and simple solution would be to use the Construct Features tool.

1. Select all intersecting line features.
2. On the Topology toolbar, click the Construct Features tool.
3. A cluster tolerance can be included. Check the box to consider existing features of the target layer in the current extent. Click OK. This will use existing lines as input geometry and split the features where the selected lines cross them.

**Challenge 3—Subdividing lines and generating coincident point features at line endpoints**

**Scenario:** You are creating a river management plan. As part of this plan, you need to subdivide the feature representing an environmentally important river into an equal number of parts. Water quality monitoring equipment will be installed at the endpoints of these segments. How will you subdivide the river into equal parts and create point features coincident to the endpoints of the parts?

**Solution:** Make the target feature class the same as the line that will be subdivided.

1. Select the line feature and choose the Divide command from the Editor menu.
2. In the Divide dialog box, choose Place 3 points along the line, spaced evenly, then click OK.
3. Three new line features are added to the map but the original feature remains. All are selected.
4. Unselect the features by clicking on the original line feature to select it and changing the target layer to point feature class.
5. Use the Divide command again and choose Place 2 points along the line, spaced evenly.
6. Click OK.

   Follow these steps to add four points—two where the line was subdivided by points and two at each end of the line. Select the original line feature again and delete it.

**Challenge 4—Subdividing a line into two lines using percentage of length**

**Scenario:** An existing street is being resurfaced. The contractor has only completed 60 percent of the resurfacing. You need to subdivide the street feature and update the attributes of the two resulting street parts to indicate their pavement conditions.

**Solution:** To subdivide the street by percentage of length, use the Split command. This command can use a specified distance value, a percentage of total length, or a measure value from either the start or end point of the feature.

1. Select the line using the Edit tool.
2. Choose the Split command from the Editor menu.
3. In the Split dialog box, choose Percentage of the line length.
4. In the text box, enter the percentage (in this example, 60). Click OK.

   The original line feature is divided into two new line features with the first feature being 60 percent of the original line feature’s length and the second feature 40 percent. Update the attributes.

   **Tip:** The Split tool works with all license levels but will only be enabled if a single line feature is selected.

**Challenge 5—Subdividing a line into three or more lines by specifying the length as a percentage of the original line length**

**Scenario:** You are editing data in a natural resources application. A river feature has to be divided into several management units that will

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be assigned to different field offices for monitoring. How can the river feature be subdivided into three or more new features that are created as a percentage of the original river’s length?

**Solution:** Using the Proportion command can split a selected line feature into a number of segments based on specified distance values. If there is a difference between the feature length and the entered values, this difference is proportioned between all of the new segments. Distance values are given in map units by default. The challenge is to proportion the river feature with segments that are a percentage of the total river length.

1. **Make the Advanced Editing toolbar active.** Select the line feature and click on the Proportion tool on the Advanced Editing toolbar.
2. **In the Proportion dialog box,** the length of the selected feature is provided. Because the Proportion tool automatically redistributes leftover lengths (even negative lengths), you can subdivide line features into percentages as long as the percentages add up to 100 percent. **a.** The trick is to choose a factor of 10 to represent 100 percent depending on the length of the feature. **b.** If the feature length is less than 100 units (e.g., meters), enter lengths that add up to 100. **c.** If the feature length is less than 1,000 units, enter lengths that add up to 1,000, and so on. **d.** For example, if the line feature is 1,459.094 meters long, enter lengths that add up to 10,000 (3,500 + 500 + 4,500 + 500 + 1,000 = 10,000). The proportion tool divides the line into new lines of the appropriate percentage of the original line.

**Challenge 6—Changing XY coordinates of an existing feature**

**Scenario:** You are working with forestry management data. Forest compartment polygons, a subunit of forestry management units, are the base mapping unit. The coordinates for several of these polygons must be updated. New environmental legislation will require that forest compartments bordering sensitive areas around streams be reduced in size. Trees within these sensitive areas will be felled. The vertices of some forest compartment boundaries must be updated and others removed. You would like to avoid recapturing the compartment polygons and, fortunately, you have a list of GPS coordinates for the new boundary positions.

**Solution:** Modifying coordinates for an existing feature can easily be done using the Edit Sketch Properties dialog box. This dialog box allows you to insert and delete vertices, remove parts from a multipart feature, and change the z- and m-values of vertices. This scenario requires deleting several vertices and inserting new ones to modify the boundaries.

1. Verify that the Task is set to Modify Feature and that editing is enabled. Double-click the feature with the Edit tool.
2. Click Edit Sketch Properties.
3. In the Edit Sketch Properties dialog box, click to highlight a vertex for editing.
4. Right-click and choose Options > Insert vertices.
5. Zoom to the vertex and delete it.

**Challenge 7—Creating and working with multipart features**

**Scenario:** Forest compartments are often planted with a specific plant species, but many compartments also contain pockets of natural forest and lakes. These pockets need to be managed as part of the forest compartment, not as separate features. How can this be done effectively and efficiently?

**Solution:** Geodatabase feature classes support multipart features. Multipart features are composed of more than one physical part that references only one set of attributes in the database. Even though a single multipart feature can consist of several points, polygons, or lines, it only has one associated attribute record in the database. Multipart polygons have multiple rings, and one ring inside another creates a hole.

There are several ways to create and edit multipart features: Use the Merge command to combine features of the same layer into one feature. Merging nonadjacent features will create a multipart feature. When finished creating the first part of a multipart feature, right-click anywhere on the map and choose Finish Part from the context menu. Create the second part of the multipart feature, right-click, and choose Finish Sketch. Alternatively, create parts with the Sketch context menu and insert vertex coordinates.
Challenge 8—Creating or removing an empty hole in an existing polygon feature

Scenario: While managing forestry compartments, you must create and remove holes associated with multipart features.

Solution: Two methods for creating holes in polygons and one method for removing a hole from a polygon are given.

Creating an empty hole in an existing polygon feature
1. Double-click the polygon feature with the Edit tool to expose the vertices and automatically change the Task to Modify Feature.
2. Click the Sketch tool. In the map, right-click and select Finish Part from the context menu.
3. Digitize a polygon inside the selected polygon.
4. Right-click and click Finish Sketch to create a multipart feature.

Digitizing the empty hole in the same feature class in a new polygon
1. Create a new polygon and select it.
2. From the Editor menu, select Clip.
3. In the Clip dialog box, choose Discard the area that intersects. Click OK.
4. Press the delete key. This will create a donut hole in the coincident polygon below the digitized feature.

Removing donut holes in polygons
1. Double-click on the feature to modify its shape.
2. Open the Sketch Properties dialog box.
3. Right-click on the donut hole part and choose Delete.

Conclusion
ArcGIS has many tools and commands for editing and manipulating data. These tips will help you be more productive when performing daily editing tasks. For more editing tips, see the previous two ArcUser articles in this series, “ArcMap Editing Tips and Tricks” in the July–September 2005 issue and “More ArcMap Editing Tips and Tricks” in the April–June 2006 issue. Another resource is Editing in ArcMap, a manual that is part of documentation for ArcGIS 9. The ESRI Virtual Campus (campus.esri.com) also offers several courses such as Creating and Editing Geodatabase Features with ArcGIS 9, Creating and Editing Linearly Referenced Features with ArcGIS 9, and Creating and Editing Geodatabase Topology with ArcGIS 9. Visit www.esri.com/training to learn about instructor-led training courses that include information on editing such as Introduction to ArcGIS II, Building Geodatabases I, and Creating and Editing Parcels with ArcGIS.

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Free Companion Training Seminar
The authors of “Divide and Conquer” have also created an online training seminar that is available from the ESRI Virtual Campus. The second in a series on using the wide variety of tools for editing and manipulating data in ArcGIS Desktop, it covers
- Using sketch constraints
- Creating cul-de-sacs and generating street centerlines
- Editing with offsets
- Splitting and subdividing lines

The presenter will explain and demonstrate solutions to common editing challenges in this hour-long seminar. Visit campus.esri.com, click the Support tab, and look under Seminars and Training.