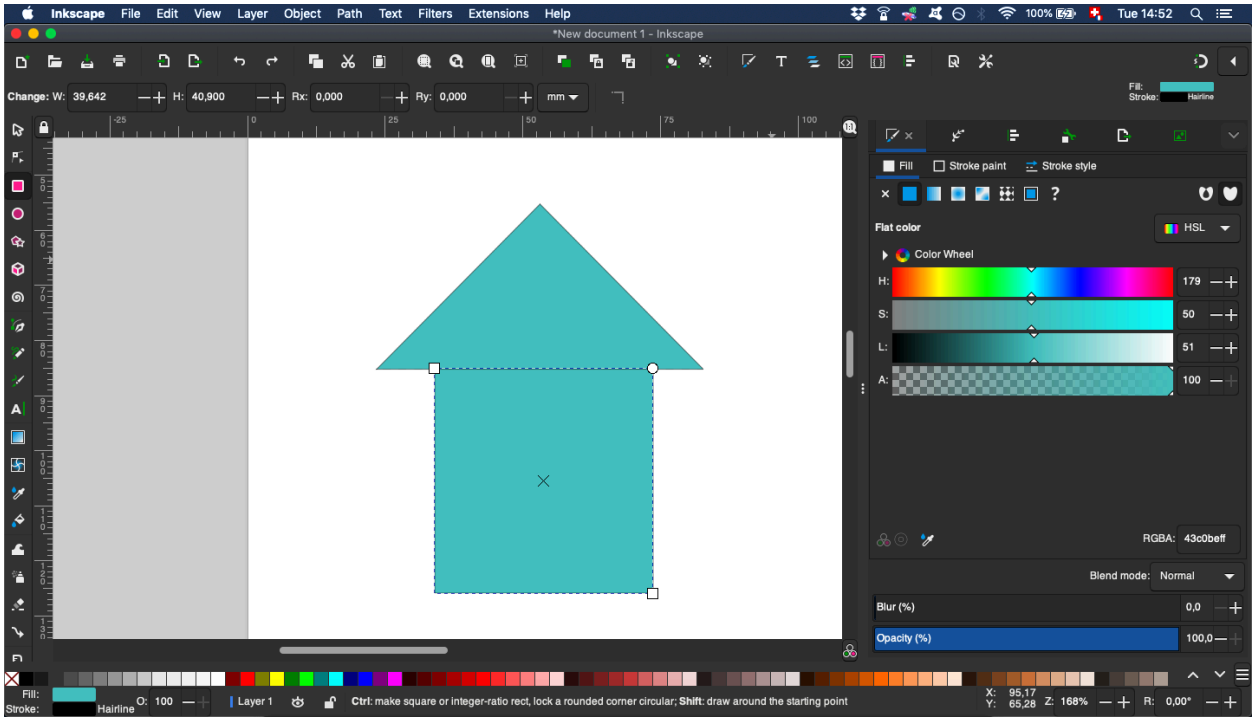
2D design concepts

Boolean operations

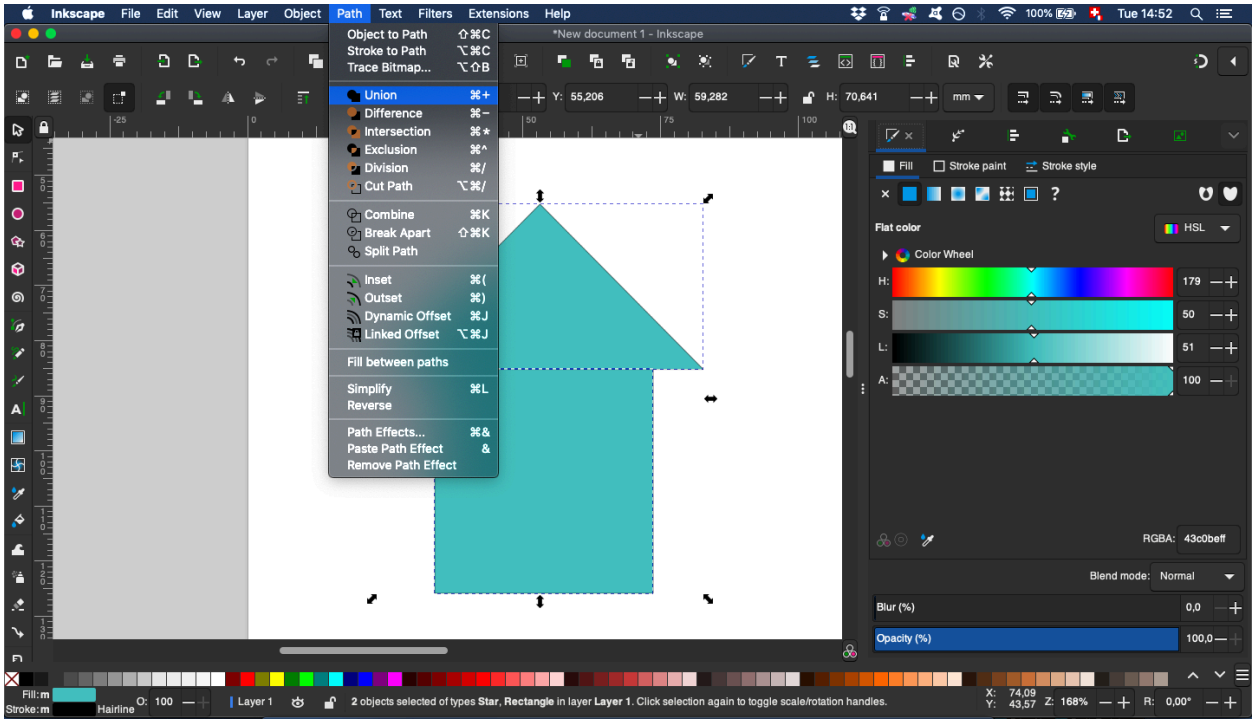
This tutorial was inspired by the Inkscape manual:
https://inkscape-manuals.readthedocs.io/en/latest/boolean-operations.html

Union

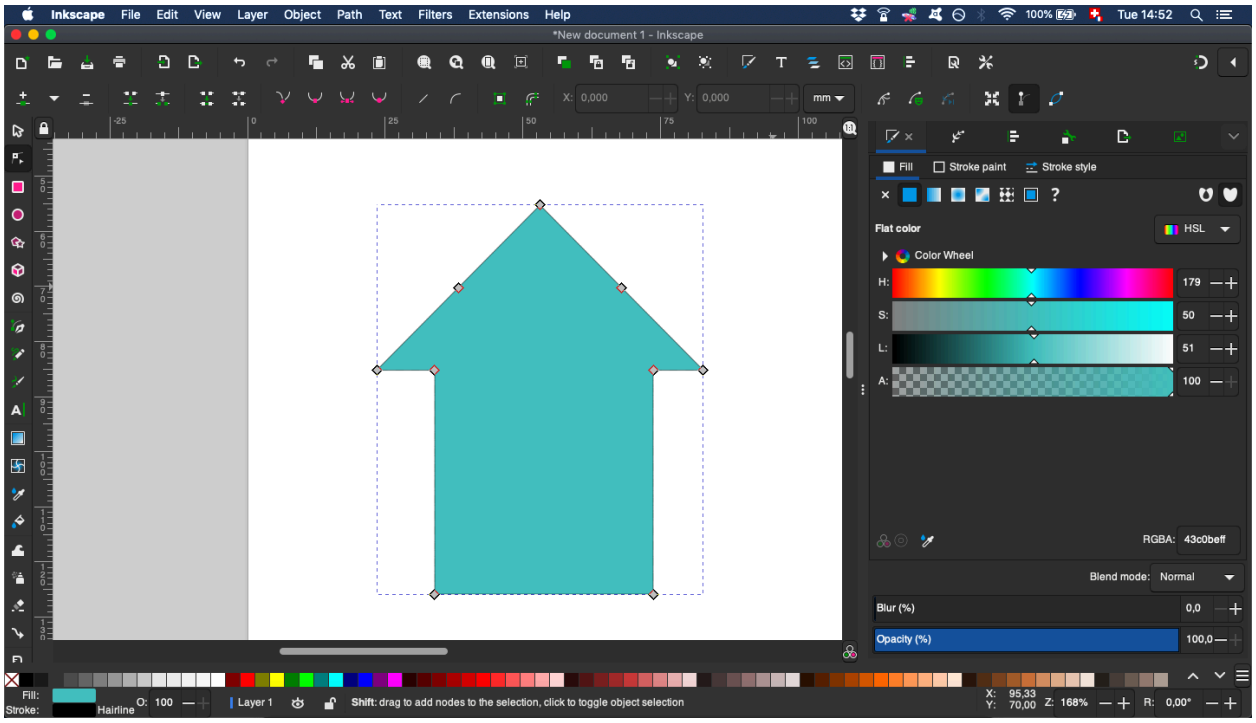
The union operation combines two or more selected shapes into a single shape, merging their paths. This is useful when you want to create complex shapes from simpler ones. In order to make a very simple house, we first create a square and a triangle.



After placing them on top of each other, go to **Path > Union.**

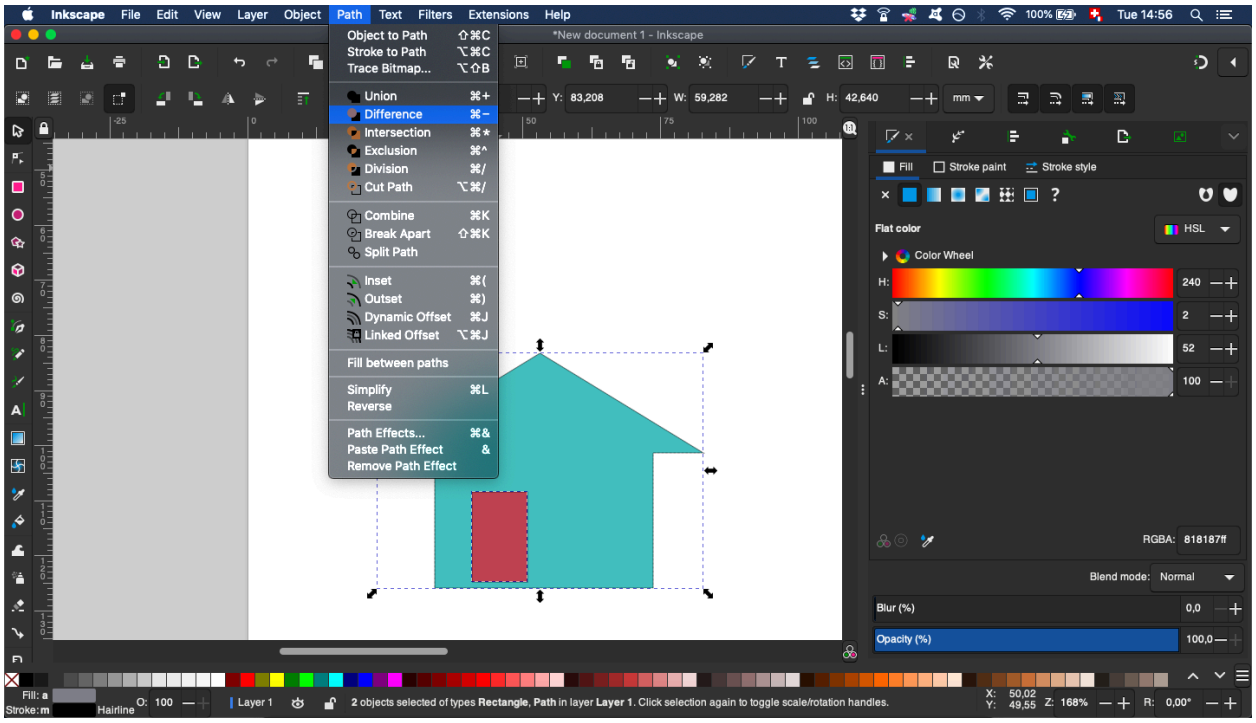


The 2 shapes have been merged into 1.

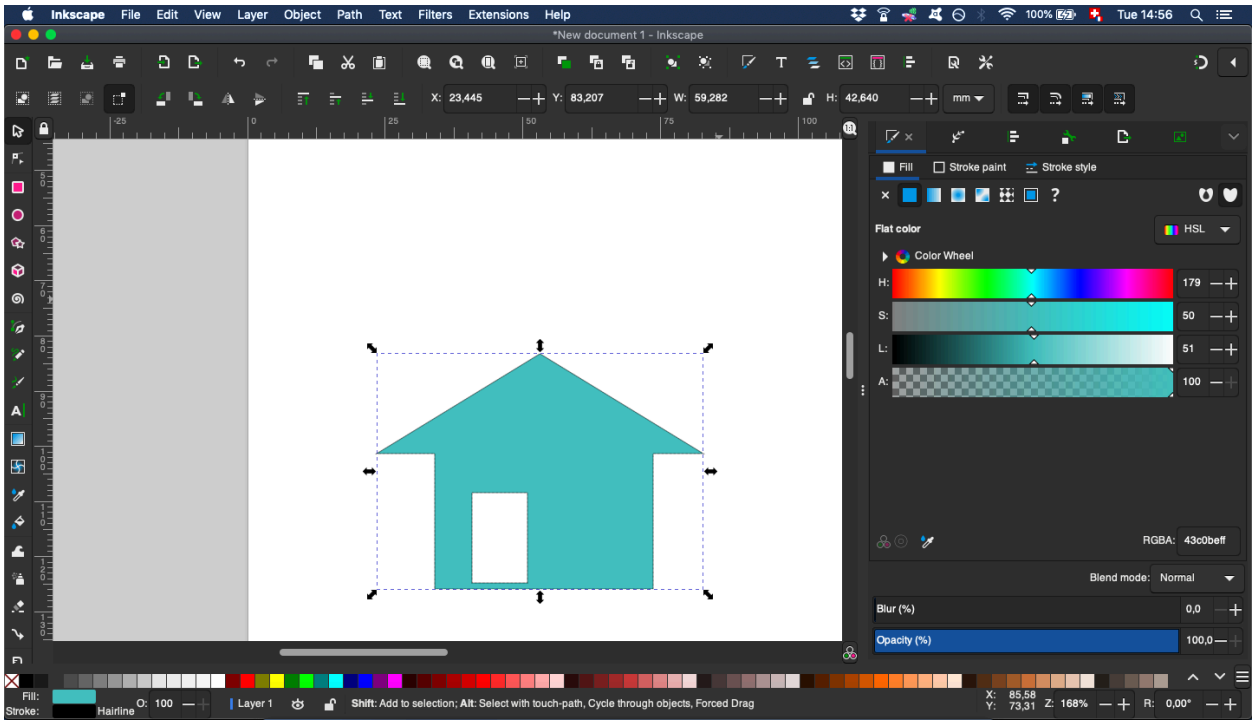


Difference

The difference operation enables you to subtract the top shape from the bottom shape, leaving behind a cutout. Use this to create negative space in your designs. Select the two shapes, making sure the shape to be subtracted is on top, then apply **Path > Difference.**

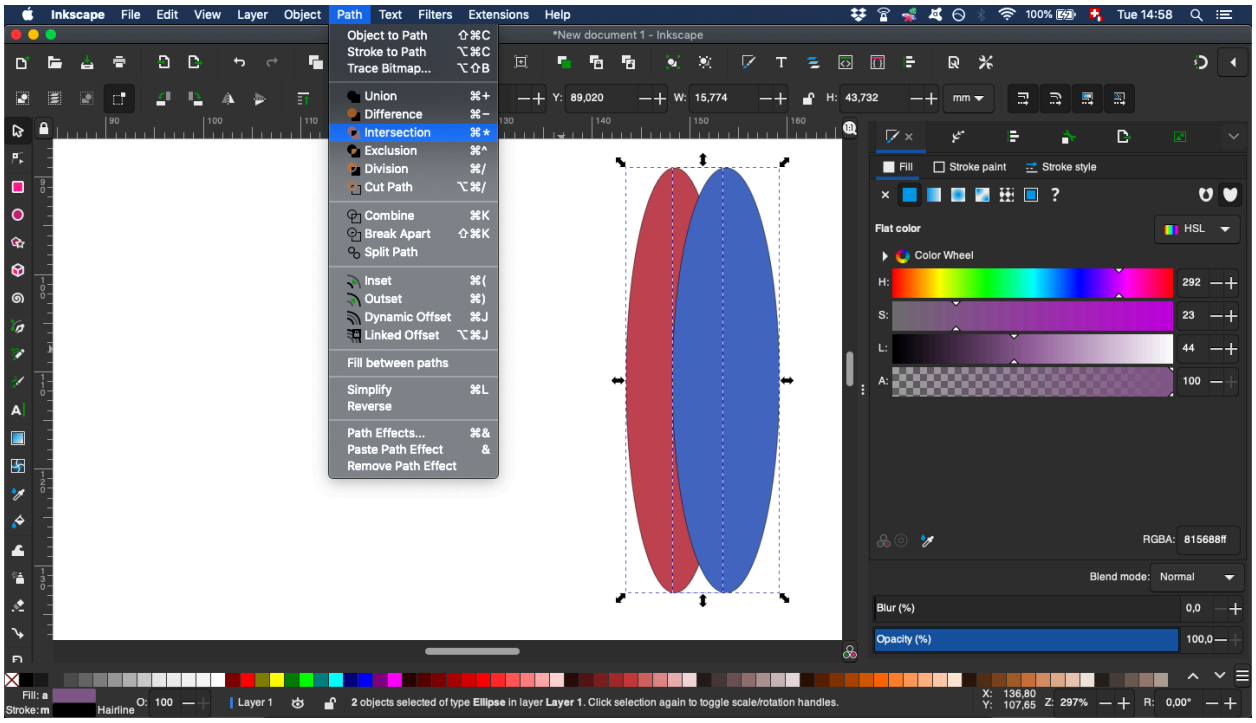


We now have a door inside our house.

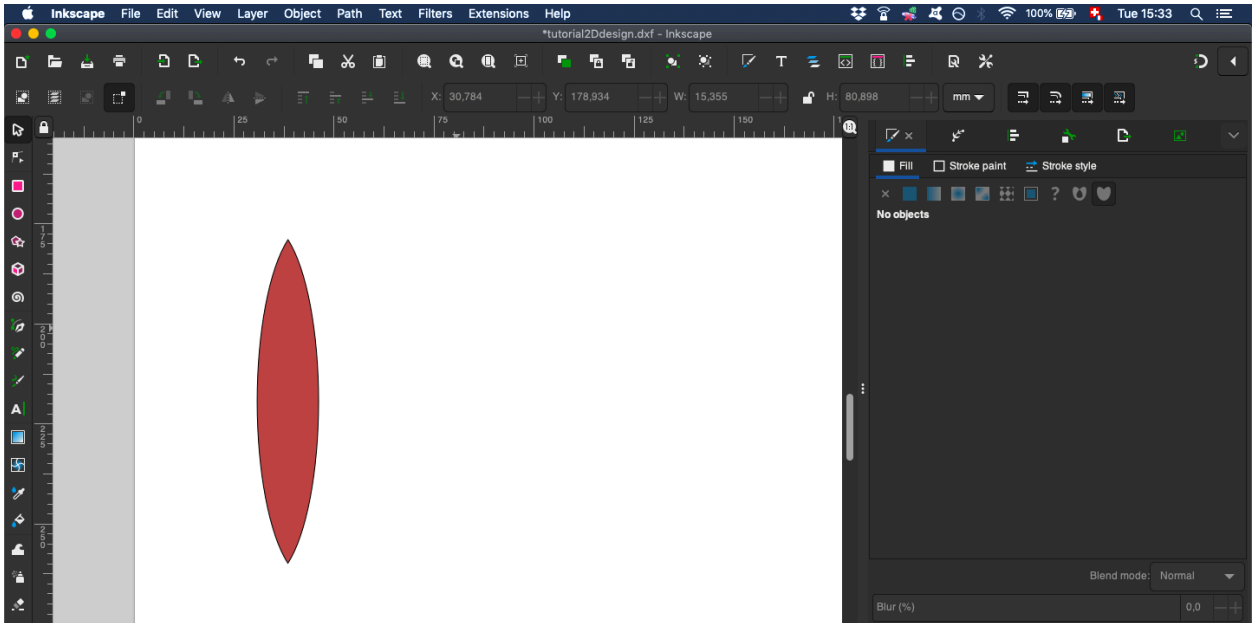


Intersection

An intersection creates a new shape from the overlapping area of the selected shapes. The result is only the area where all the shapes intersect. Select all overlapping shapes and apply the "Intersection" operation from the path menu:

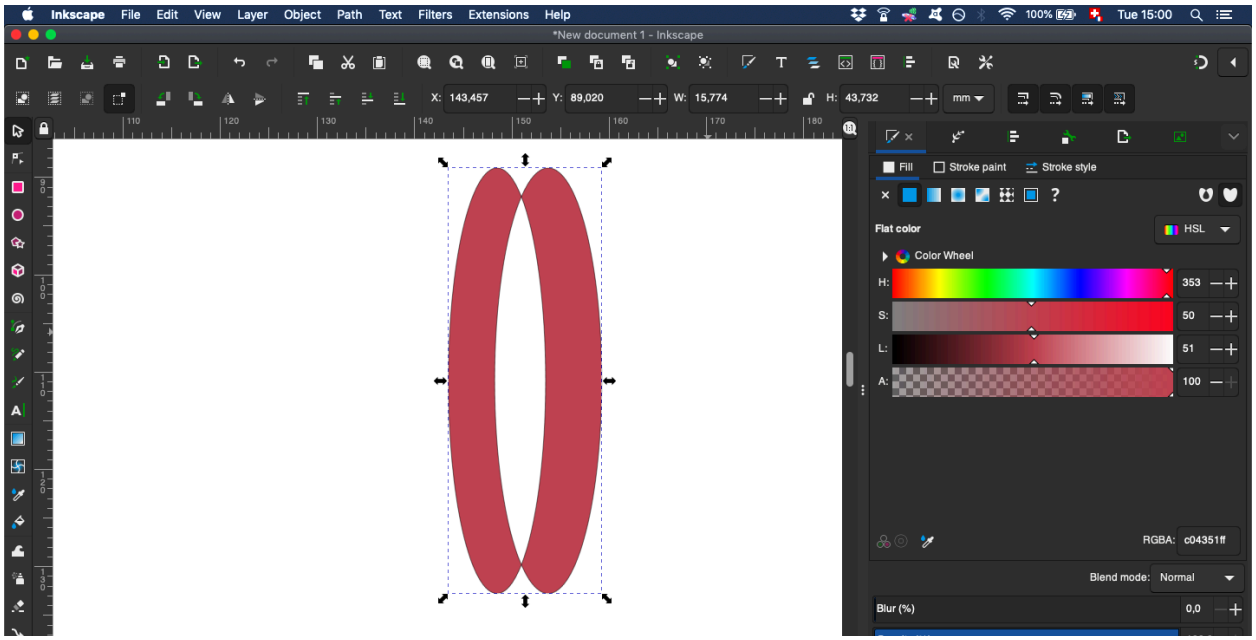


And here is the result:



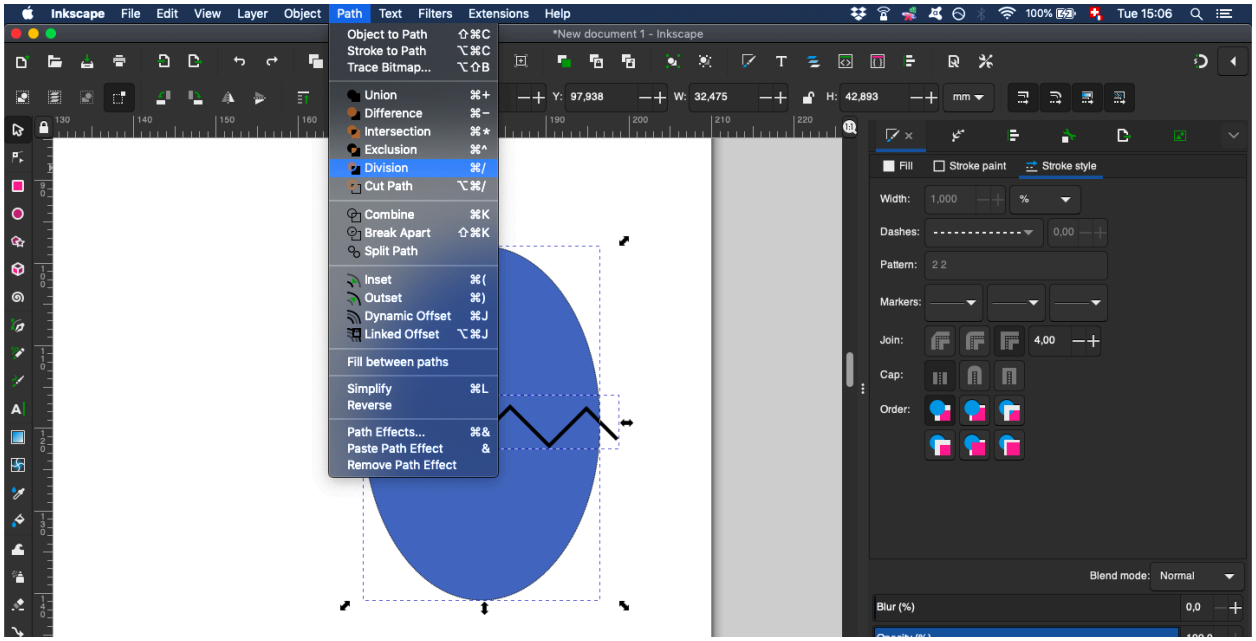
Exclusion

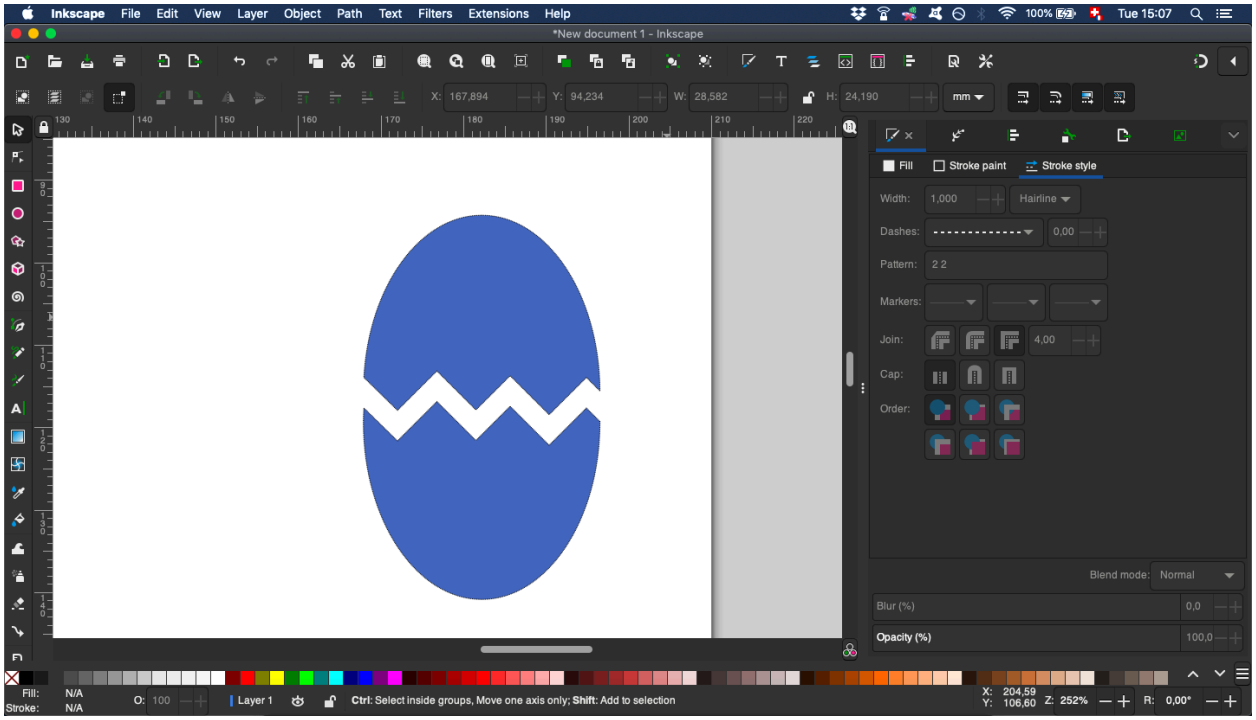
Exclusion removes the overlapping areas between selected shapes, leaving only the non-overlapping parts. Select the shapes that overlap and apply the "Exclusion" operation from the path menu.



Division

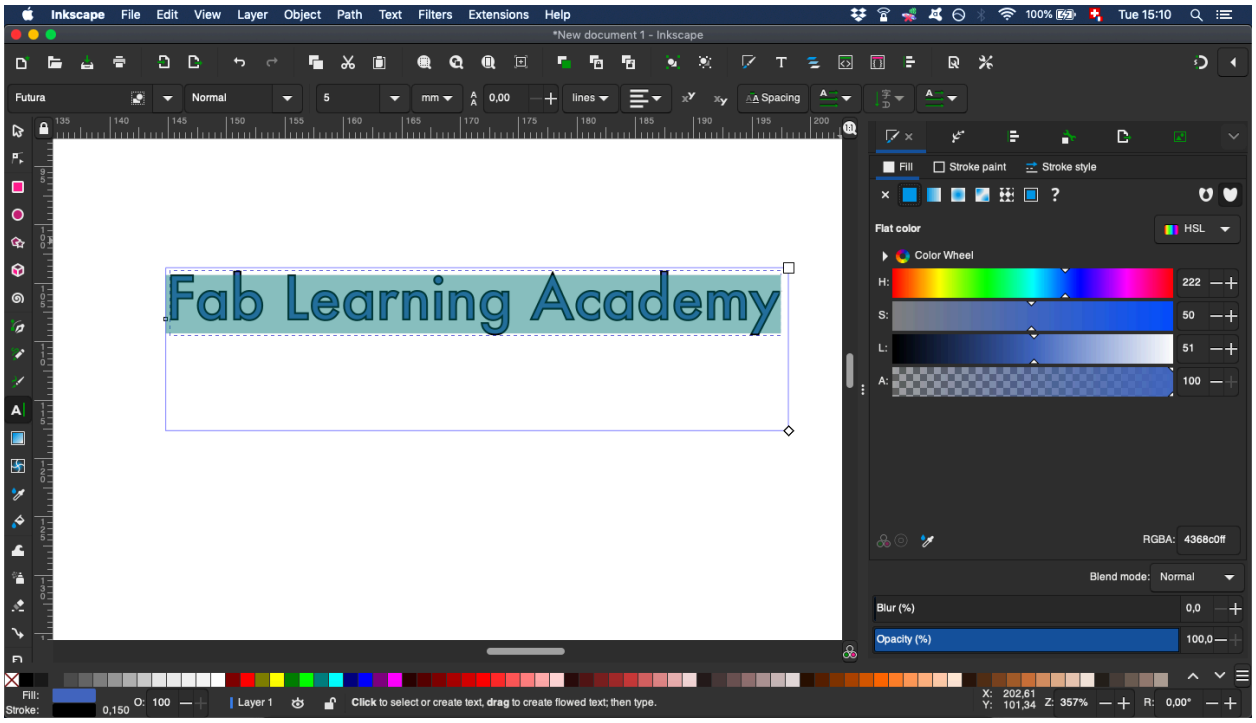
Division splits a shape into separate pieces based on where other shapes overlap with it. This operation is useful for dividing complex shapes into smaller parts. Select **Path > Division:**



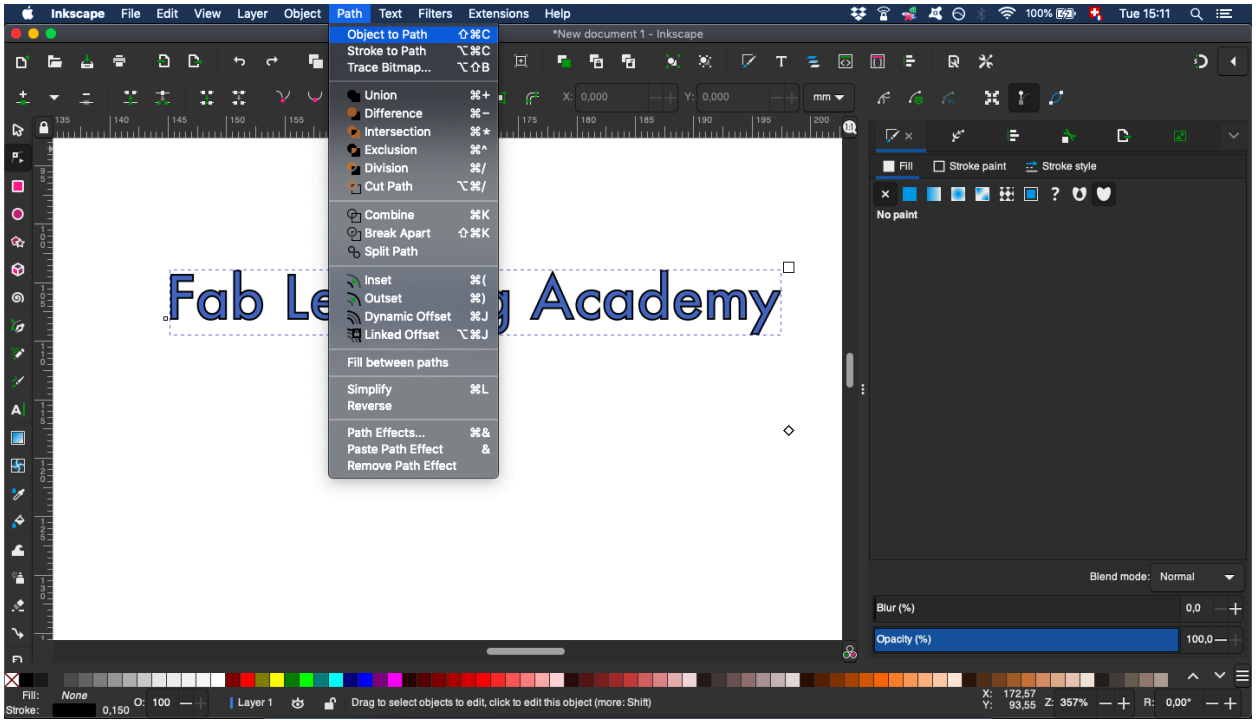


Converting Text to Path

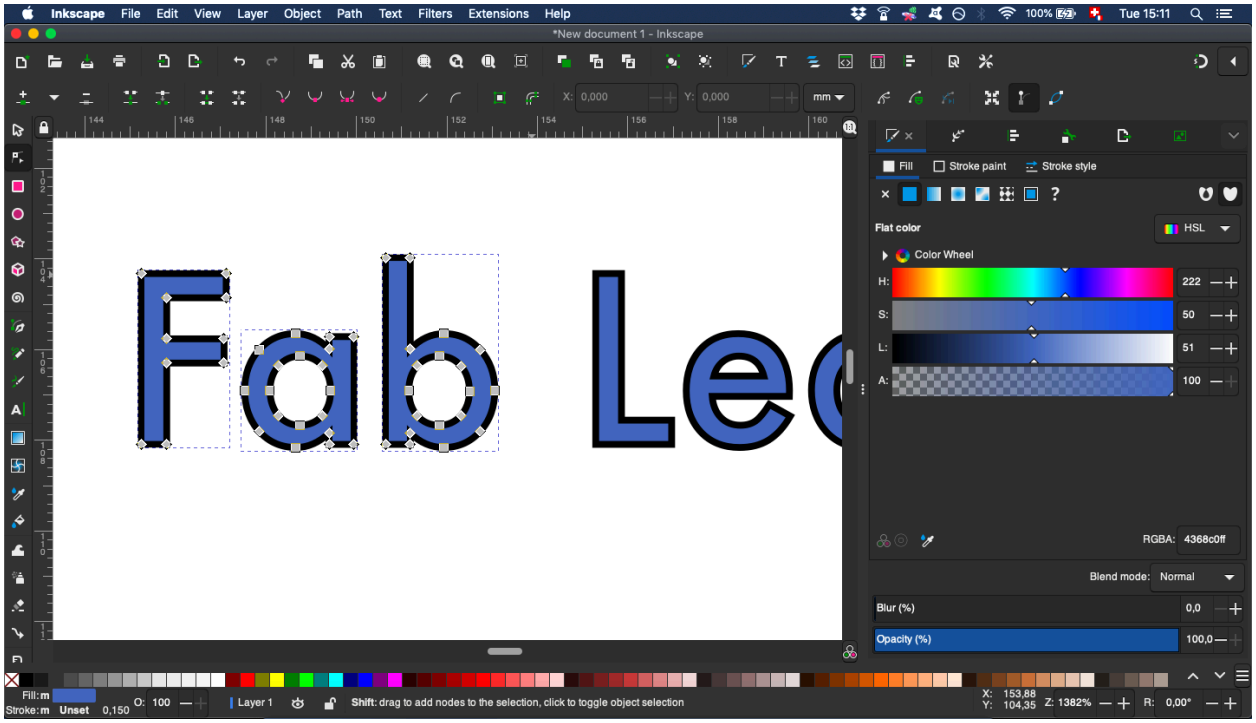
This converts text into vector outlines, allowing you to manipulate the text as a graphic element rather than editable text. This is useful for customizing text shapes or ensuring text remains consistent in different formats.



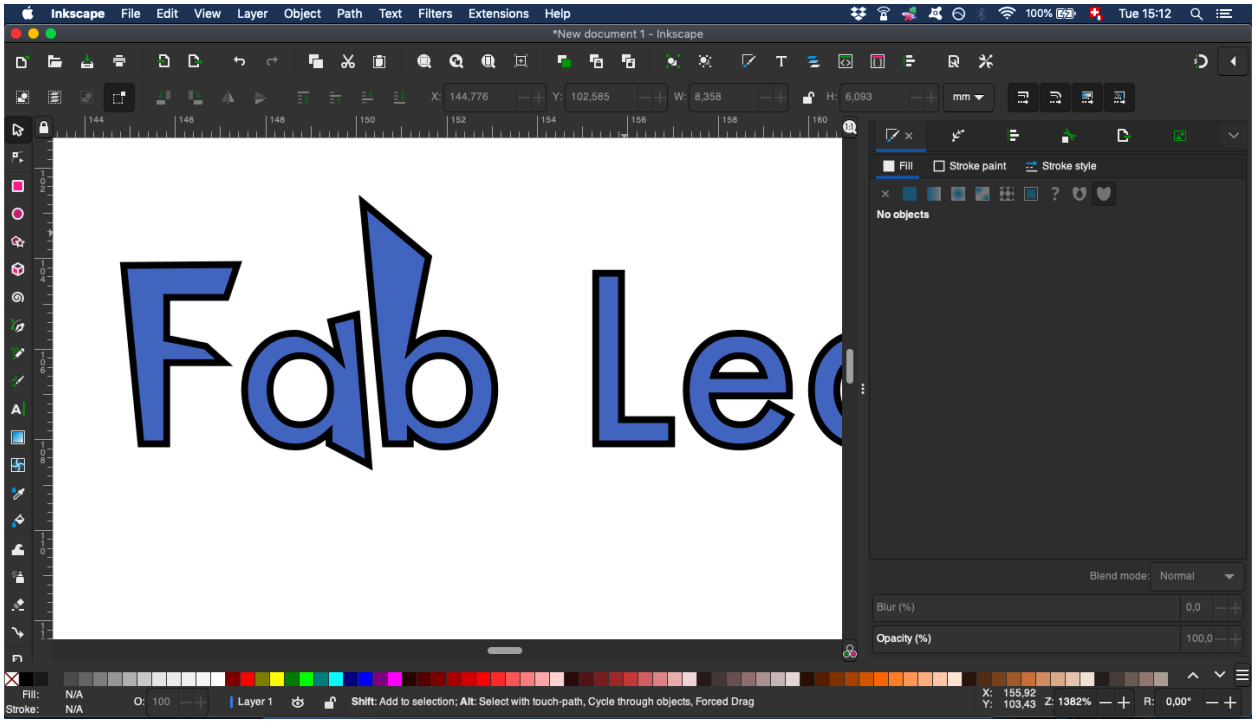
Select the text, then choose "Convert to Path" from the path menu.



The text is now vectorized.



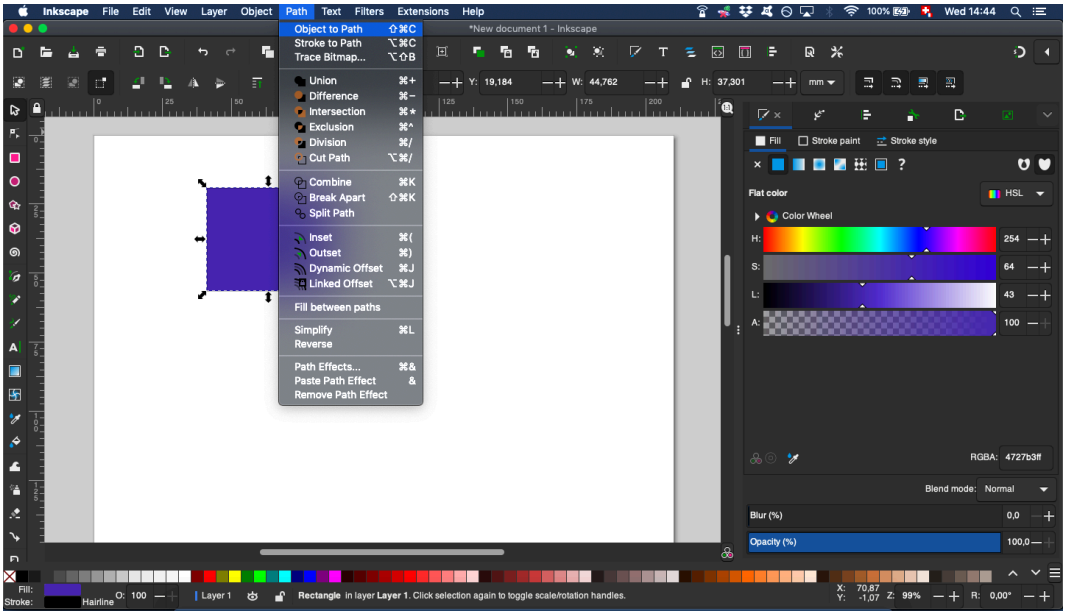
It is therefore possible to modify the shape of each letter.



Path effect

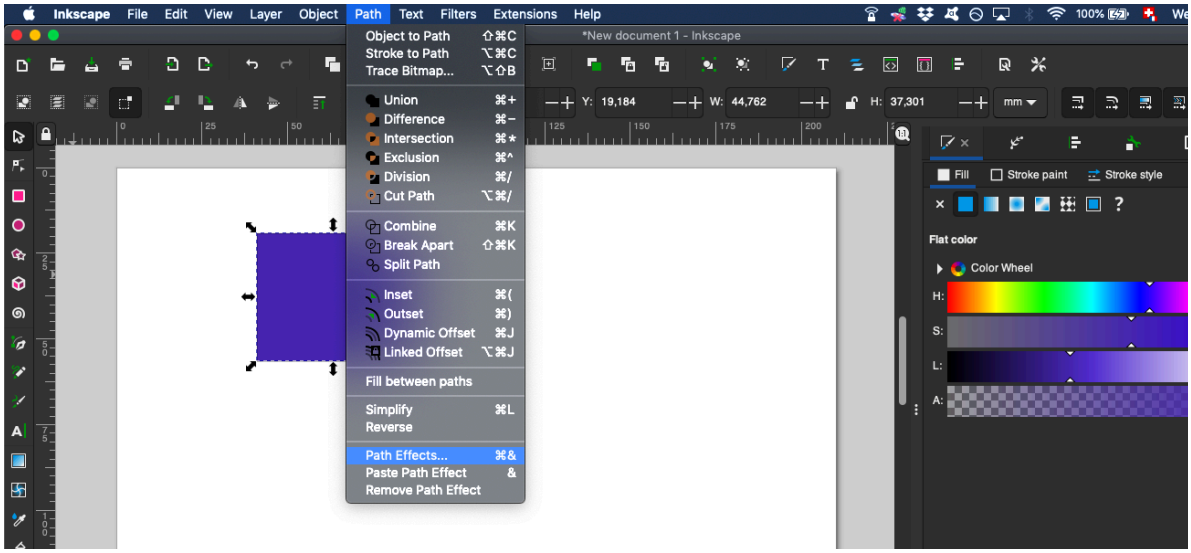
If you're working with shapes (like rectangles or circles), you'll need to convert them into a path:

- Select the object.
- Go to **Path > Object to Path**.



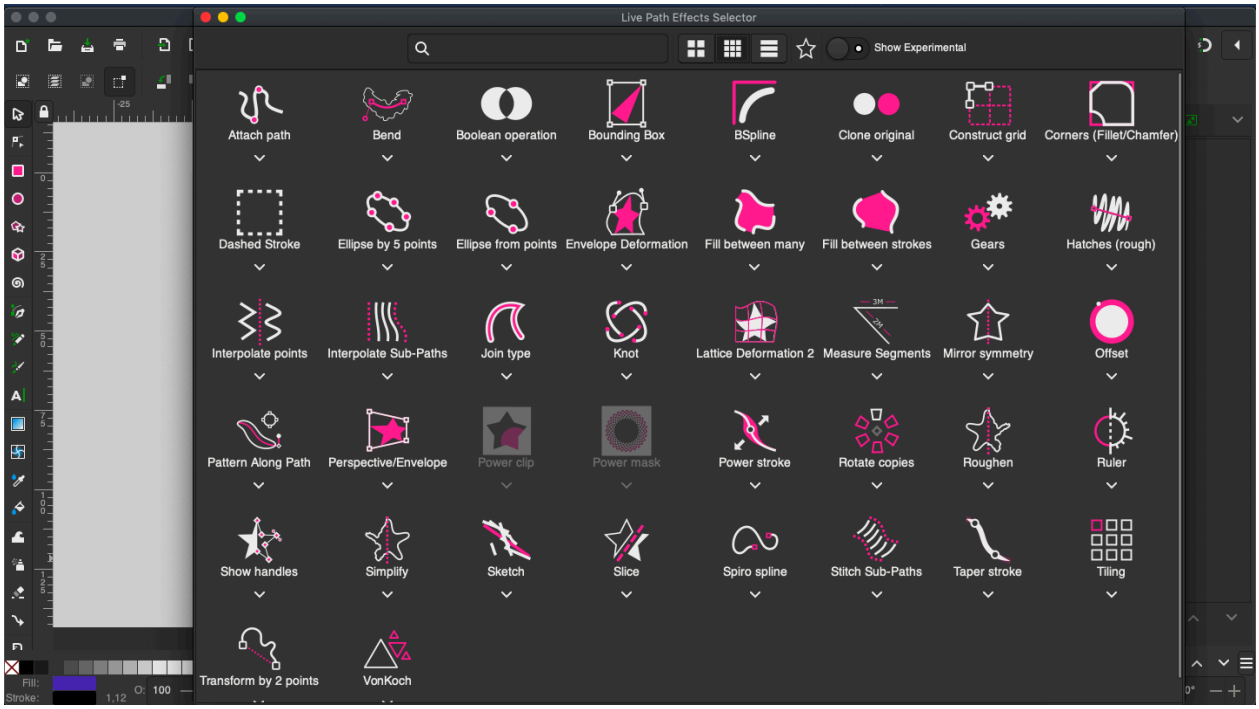
Access Path Effects

- Open the **Path Effects** panel: Go to **Path > Path Effects**.
- In the Path Effects panel, click the **+** button to add an effect.

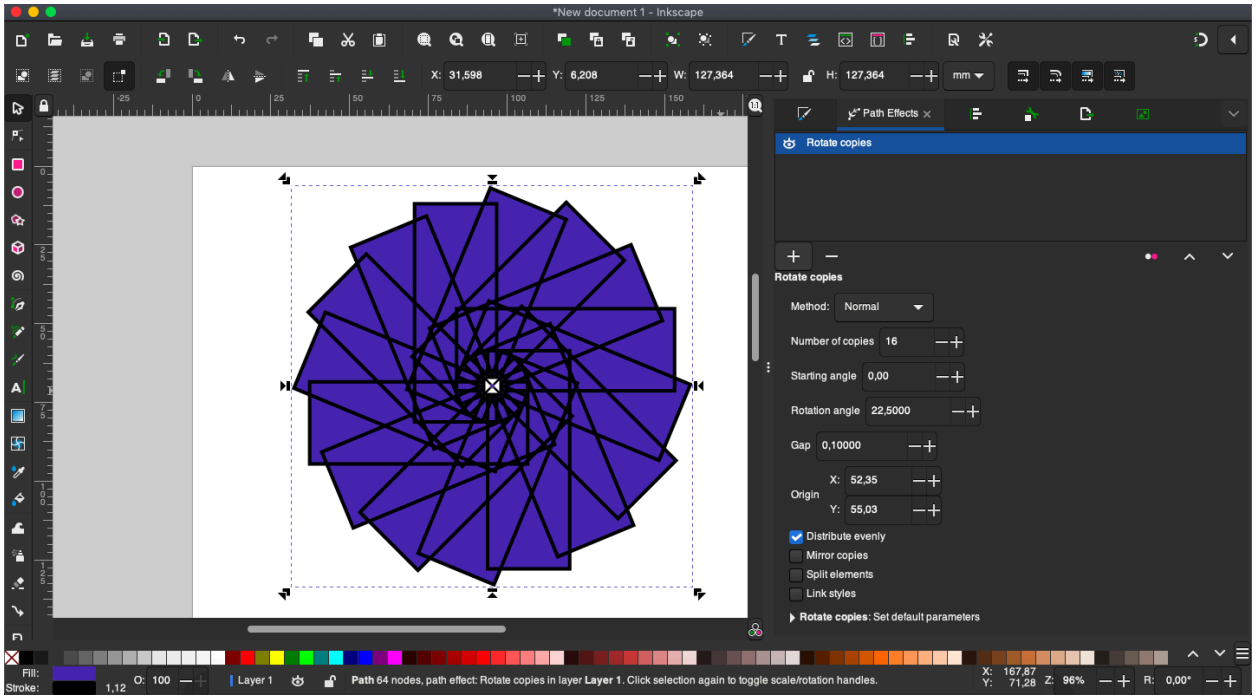


Rotational symmetry

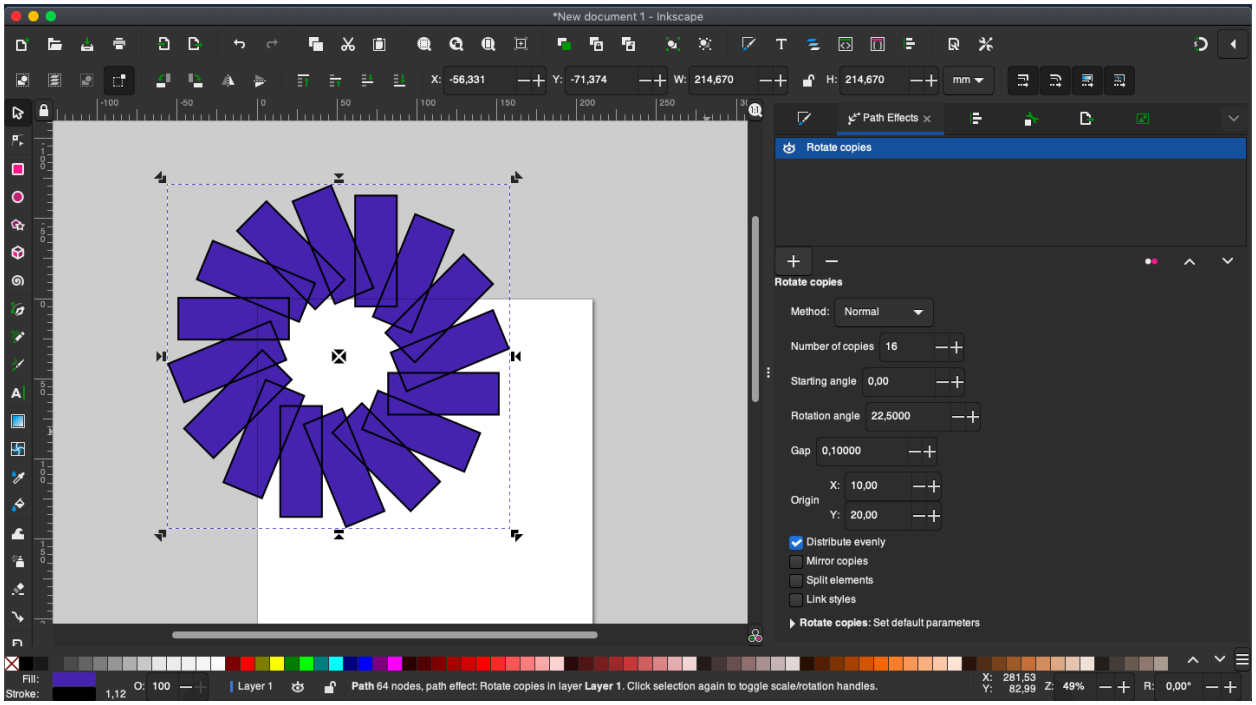
You have now access to a variety of different effects. For this tutorial, let's choose the **Rotate copies** effect.



Below is the result after applying the effect.

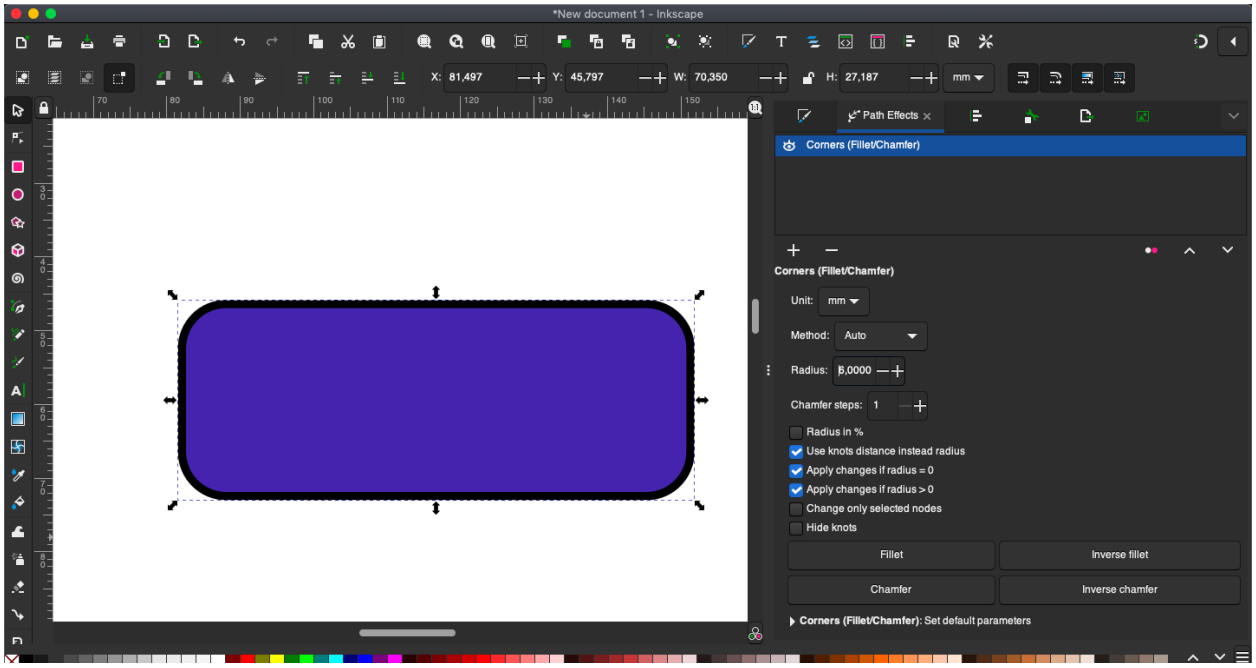


You can adjust the different parameters to achieve your desired result. Below is the result after modifying the origin.



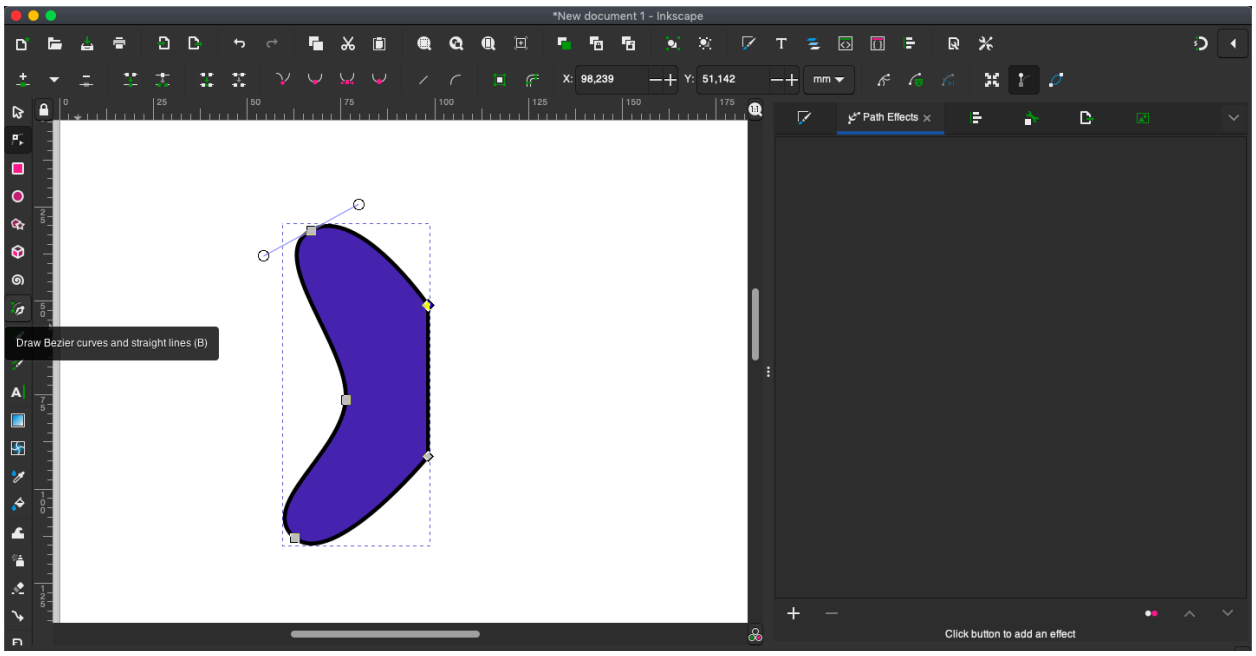
Fillets and chamfers

An effect that may be useful in digital fabrication is the **Corners (Fillet/Chamfer)** effect. For example, this can be used to round the sharp corners of a rectangle.



Mirror Symmetry

For the next effect, let's first draw a shape using the *Draw Bezier curves and straight lines* tool.



We can then apply the **Mirror Symmetry** Path effect to create a mirrored image of our shape (in this example, the *Fuse paths* option is selected).