3D MODEL USING ANALYTICAL SHAPE

Team Members

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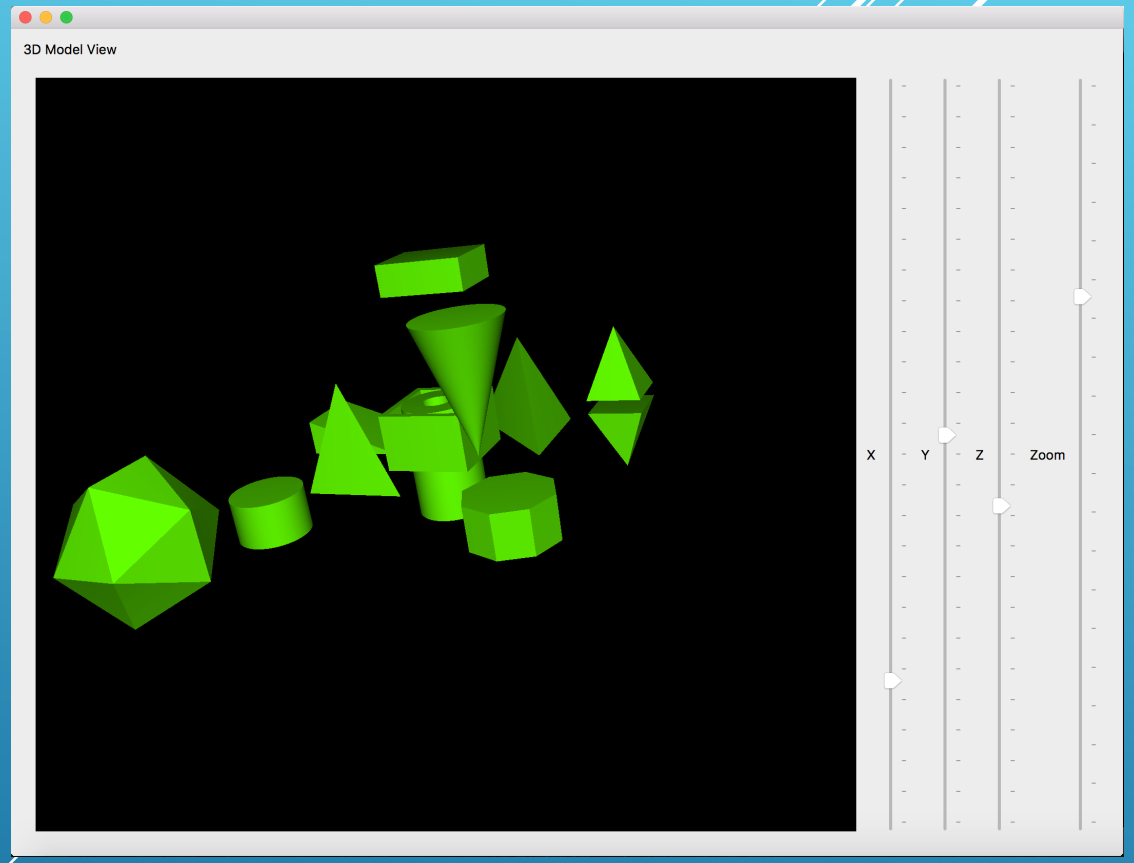
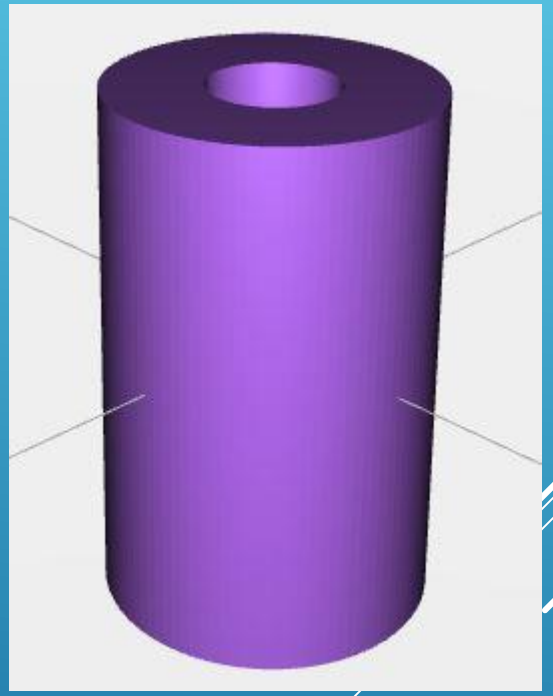


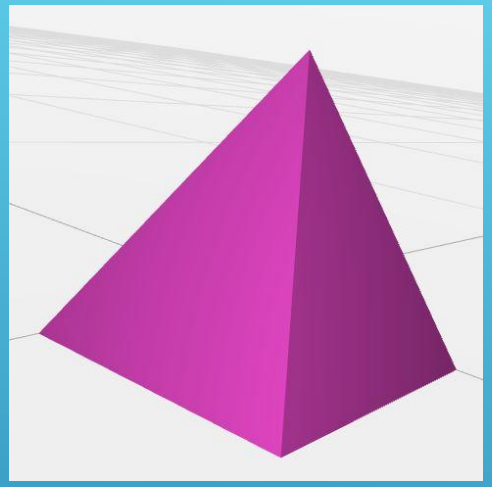
OVERVIEW

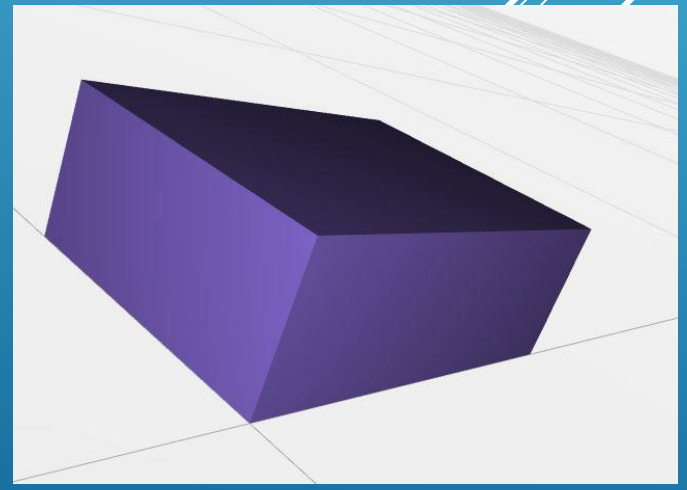
- Purpose of our Project
- Basic 3D Modeling with Facets
- Structure of STL files
- Project Architecture
- Code Overview
- Demo



PURPOSE OF OUR PROJECT

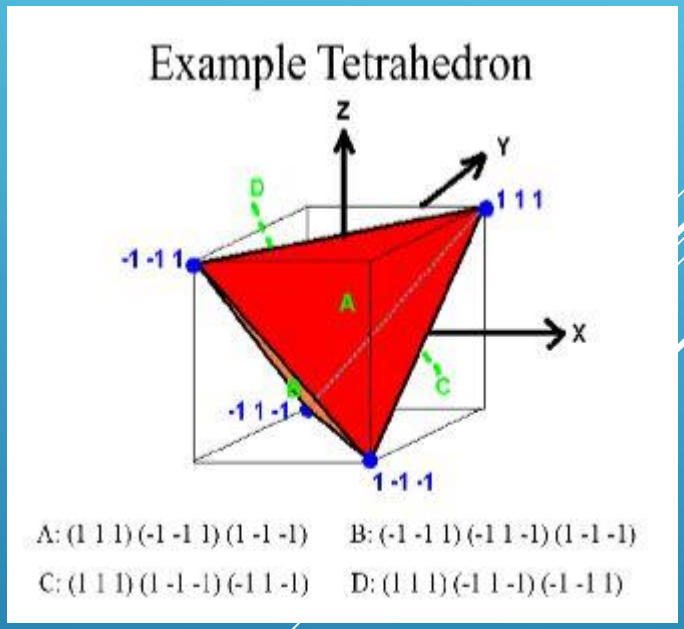
- Using QT's OpenGL to generate and view 3D Models
- Generate a Library of configurable shape objects
- View generated 3D model
- Output the Model data to an STL file





BASIC 3D MODELING WITH FACETS

- Represent 3D objects by defining a series of triangles or facets
- Triangles are defined in 3D space with Normal
- Utilization of the right hand rule
- Triangle data can then be output to a STL file

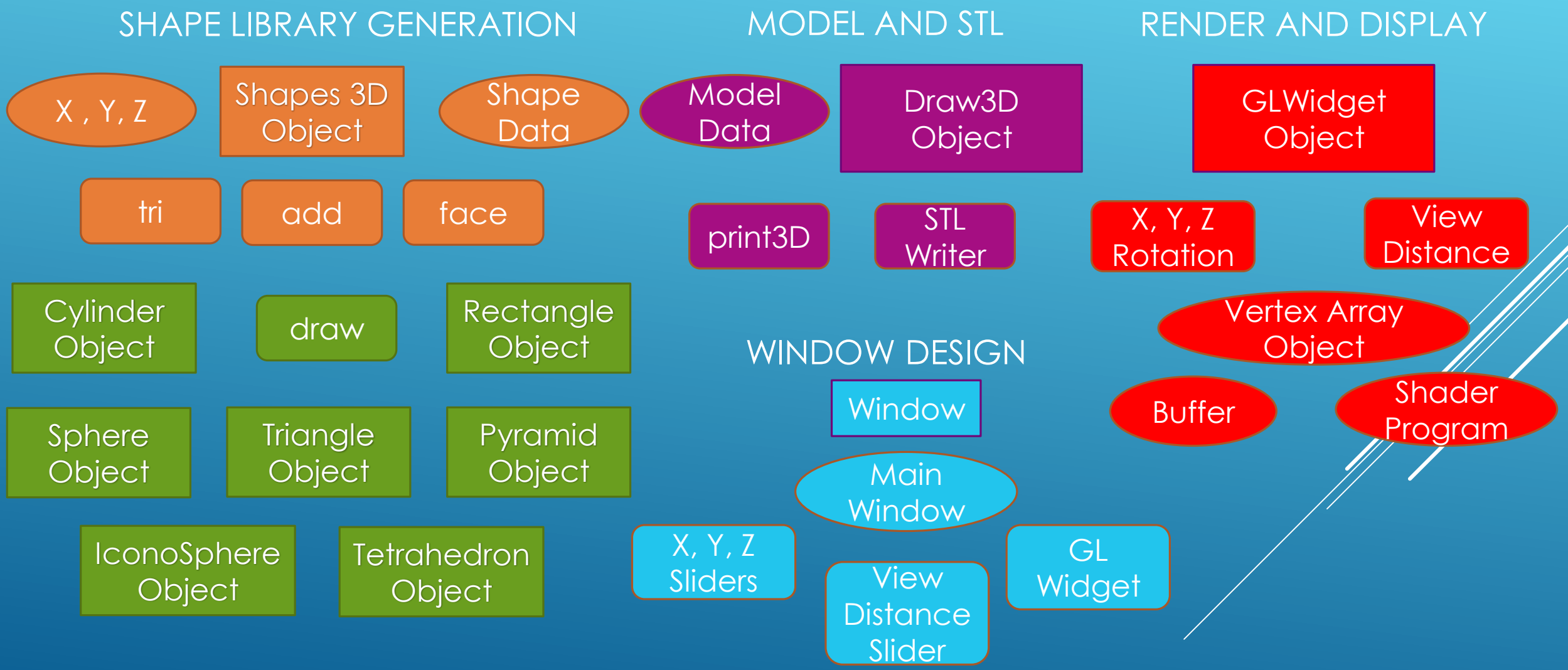


STRUCTURE OF STL FILES

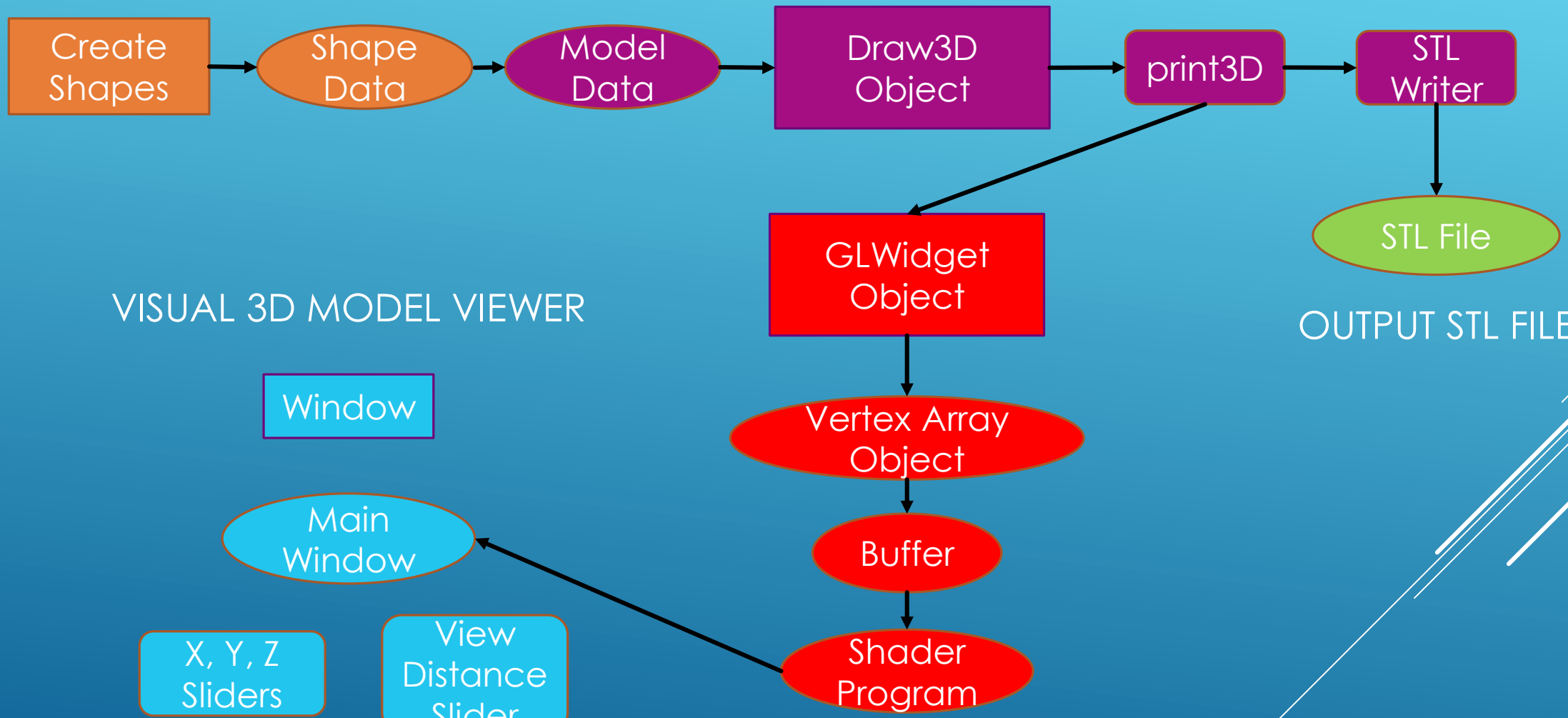
- STL format: An STL "StereoLithography" file is a triangular representation of a 3 dimensional surface geometry
- The surface broken down logically into a series of small triangles (facets).
- Each facet is described by a perpendicular direction and three points representing the vertices (corners) of the triangle.

```
solid model
facet normal 0 0 -1
outer loop
      vertex 7 0 0
      vertex 0 0 0
      vertex 0 5 0
endloop
endfacet
facet normal 0 0 -1
outer loop
      vertex 0 5 0
      vertex 7 5 0
      vertex 7 0 0
endloop
endfacet

......MORE FACETS

facet normal 0 0 1
outer loop
      vertex 0 5 2.5
      vertex 0 0 2.5
      vertex 7 0 2.5
endloop
endfacet
facet normal 0 0 1
outer loop
      vertex 7 0 2.5
      vertex 7 5 2.5
      vertex 0 5 2.5
endloop
endfacet
endsolid model
```

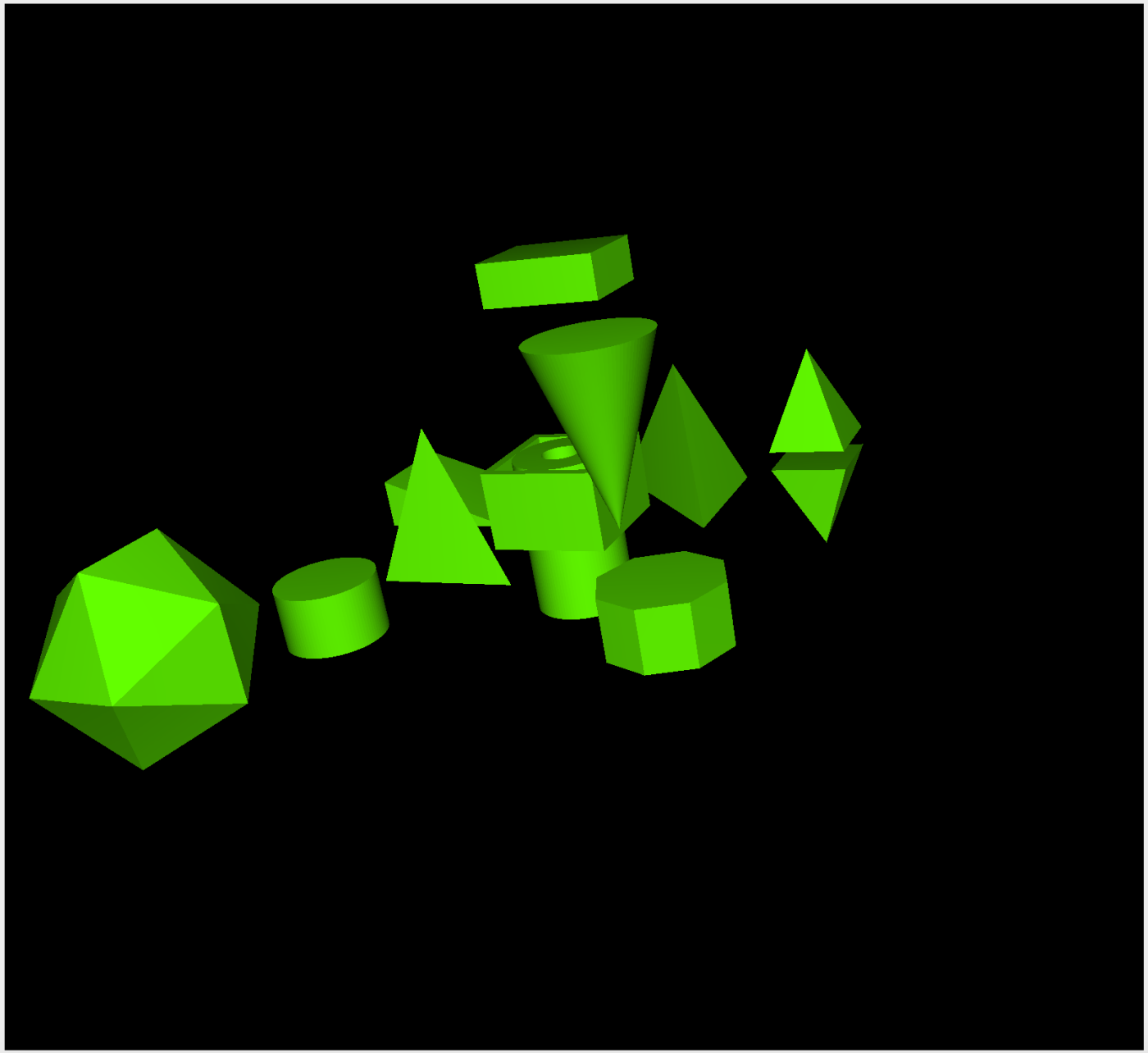
PROJECT ARCHITECTURE



PROJECT ARCHITECTURE



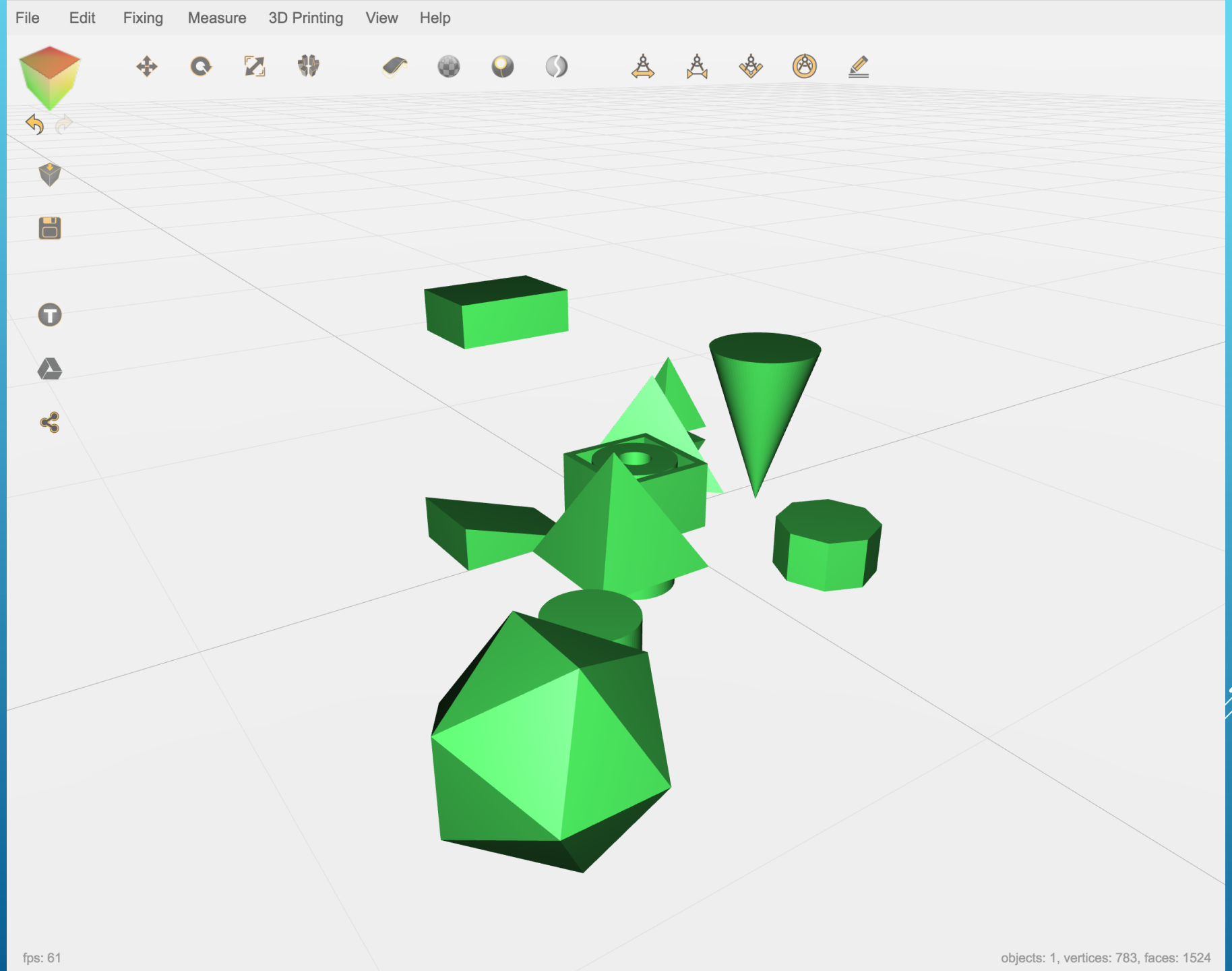
3D Model View



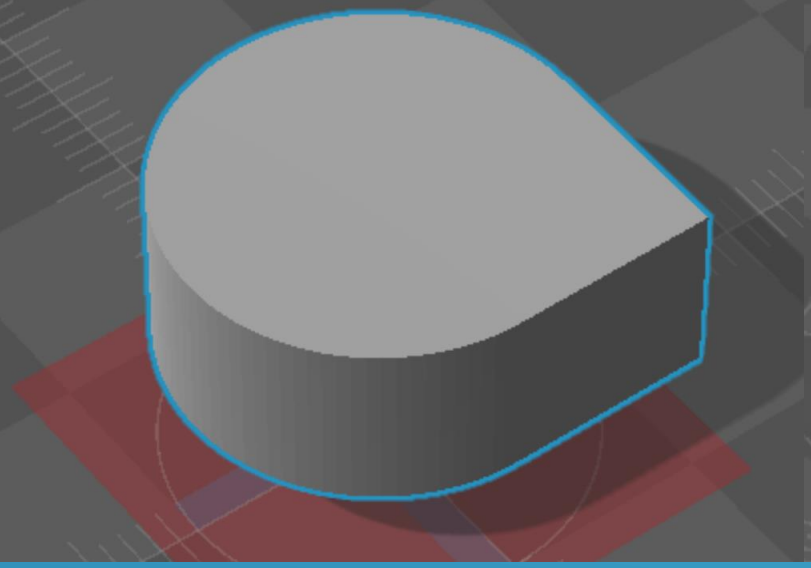
X Y Z Zoom

model3D.stl

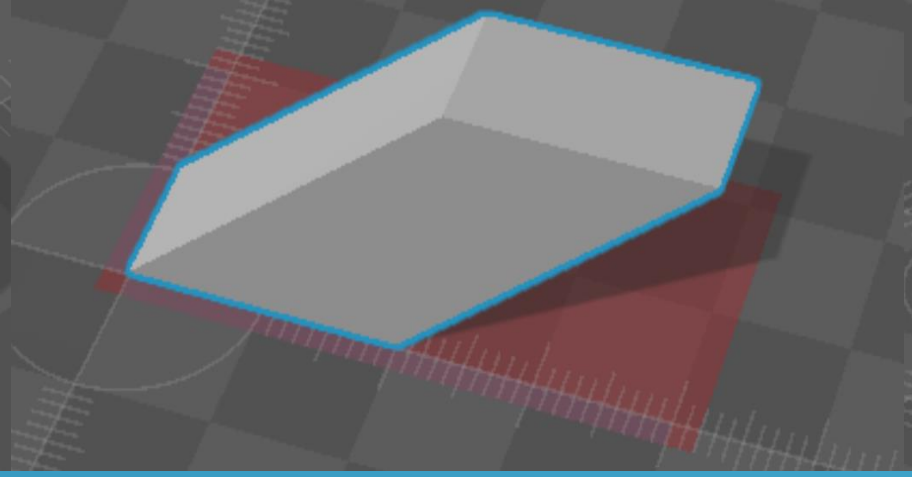
```
solid model
facet normal 0 0 -1
outer loop
vertex 0 7 10
vertex -7 7 10
vertex -7 12 10
endloop
endfacet
facet normal 0 0 -1
outer loop
vertex -7 12 10
vertex 0 12 10
vertex 0 7 10
endloop
endfacet
facet normal 0 0 1
outer loop
vertex -7 12 12.5
vertex -7 7 12.5
vertex 0 7 12.5
endloop
endfacet
facet normal 0 0 1
outer loop
vertex 0 7 12.5
vertex 0 12 12.5
vertex -7 12 12.5
endloop
endfacet
facet normal -1 0 0
outer loop
vertex -7 12 10
vertex -7 7 10
vertex -7 7 12.5
endloop
endfacet
facet normal -1 0 0
outer loop
vertex -7 7 12.5
vertex -7 12 12.5
vertex -7 12 10
endloop
endfacet
facet normal 1 0 0
outer loop
vertex 0 7 12.5
vertex 0 7 10
vertex 0 12 10
endloop
endfacet
facet normal 1 0 0
outer loop
vertex 0 12 10
vertex 0 12 12.5
vertex 0 7 12.5
endloop
endfacet
```


File
Edit
Fixing
Measure
3D Printing
View
Help
fps: 61
objects: 1, vertices: 783, faces: 1524

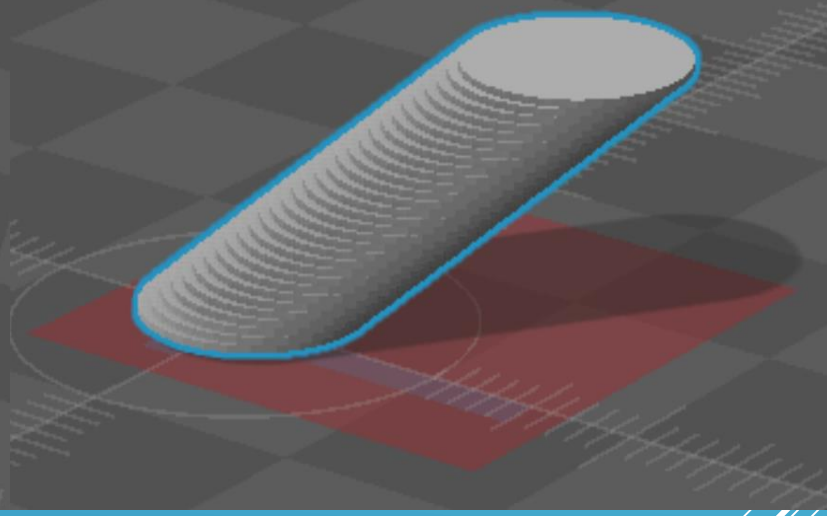
Union of Cylinder and Rectangle



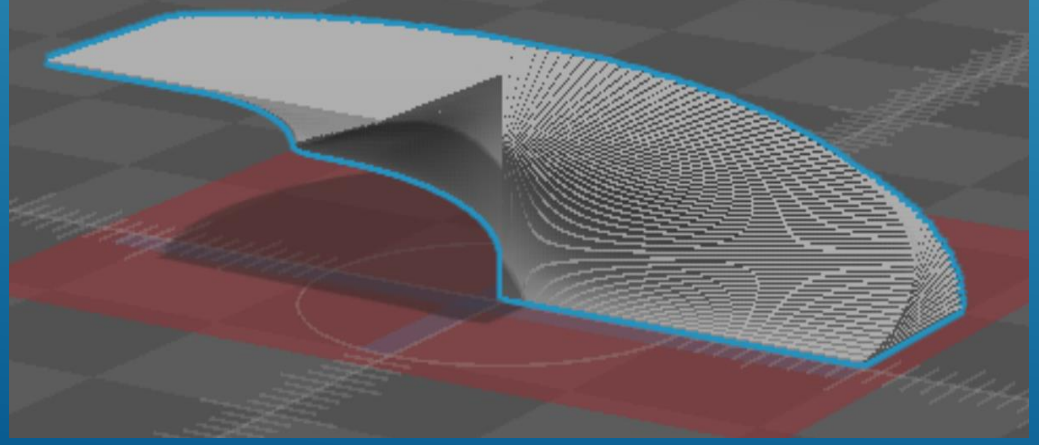
Inclined Rectangle



Inclined Cylinder



Rotated Rectangle



Rotated Cylinder