

Assignment 1: Tangram Application

Answers to the Questions

1. The paradigm given in C.2a of the assignment document involves maintaining one transformation matrix for all primitives and applying the transformation matrix stored for all primitives. While in the approach given in C.2.b, several transformation matrices need to be stored for determining the last primitive transformation.
2. The canvas API for adding event listeners was critical in my implementation for any type of event be it keyboard or mouse events. I selected the element in the DOM tree by the ID and added event listeners for 'keydown' and 'mousedown' events.
3. Instead of using the keyboard as a way to change the position, the user should be able to do a translation of any primitive by drag or drop. We could also add a small input box on the page to increase the mode value, which would start at 0, go up to 3 and again go to 0. For rotation, as in [5], we could have the user click on the object multiple times for rotation. For scaling, we could have the user right-click on a primitive and then manipulate the size based on the input they provide.
4. To rotate any primitive we require a point about which it rotates. To rotate the object symmetrically about a line parallel to the z-axis, we need to use the centroid of the object. If we do not use centroid and use any other convenient point, say the origin, the primitive will as a whole rotate about the origin in the whole canvas. This could be inconvenient for the user. While, if we use centroid, we only need to translate the object to the origin in order to rotate it about the z-axis.

```
src
├── index.html
├── index.js
├── lib
│   ├── BufferManager.mjs
│   ├── gl-matrix.js
│   ├── Program
│   │   ├── ProgramManager.mjs
│   │   └── Shader
│   │       ├── FragmentShaderSrc.mjs
│   │       ├── ShaderManager.mjs
│   │       └── VertexShaderSrc.mjs
│   ├── Renderer.js
│   └── SceneElements
│       ├── Parallelogram.js
│       ├── Primitive.js
│       ├── Scene.js
│       └── Triangle.js
```

Some Implementation Notes:

- I haven't used matrices for any kind of transformation in this assignment. I did the translation by adding the step size to the current position.
- I have created a library in the lib folder in the src folder of the submission. This folder contains the different classes that I used for this assignment. The src folder tree is shown in the above image.
- For generating the exploded view of primitives, I have generated a random value to add to the initially only reflected through the y axis points of the fixed rectangle. This random value lies between -0.25 to 0.25.
- I intend to further clean my code and adopt matrices for transformations in the subsequent assignments.

References

[1] IndigoCode Youtube Playlist:

https://www.youtube.com/playlist?list=PLjcVFFANLS5zH_PeKC6l8p0Pt1hzph_rt

[2] David Parker model transformations:

<https://www.youtube.com/watch?v=CPybM7nN1xk>

[3] TA Amit Tomar's Repo: <https://github.com/Amit-Tomar/T2-21-CS-606>

[4] WebGL Documentation: <https://webglfundamentals.org/>

[5] Tangram Puzzles: https://www.mathplayground.com/tangram_puzzles.html