**Report**
**Programming Project**

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## Introduction

I spent huge amounts of time to complete the Programming Project. In addition, I added a lot of extra functionalities for extra credit. My program is run perfectly, and there are no bugs.

## Technical Problem

I faced critical technical problem. There is no simple way to do that, as the previous information of the pixels are lost after we draw anything. Using Canvas Web API, when drawing something, it draws to a buffer. And when we run stroke and the buffer is updated and all information that were in the underlying pixels are lost. Because canvas web API does not save any previous drawing data.

## Solution

I need to save drawing data. Because Canvas Web API never save any drawing data. To solve this problem, I added shape array to save drawing information. When user translate, scale, or rotate, canvas will be clear and re-draw using shape array data.

**script.js**

```
var shape = [];
shape.push({…});
```

## How to Run

Run index.html file on Google Chrome.

**Source**

|- images
|- **index.html**
|- script.js
|- jspdf.min.js

## Open Source API

I used open source API for certain aspects of the project.

| Function | API | URL |
|---|---|---|
| Save as PDF | jsPDF (Client-side JavaScript PDF generation) | https://github.com/MrRio/jsPDF |

## Tasks

I finished all requirements.

| Requirement | Status |
|---|---|
| Draw Line, Triangle, Square, Rectangle, Circle, Ellipse, Curve, Polyline, and Polygon | ✔**Completed** |
| New – to clear and start a new diagram [should provide Save option if “dirty”] | ✔**Completed** |
| Unlimited Undo – via Undo button and ctrl- | ✔**Completed** |
| Copy object(s) via Copy button and ctrl-c | ✔**Completed** |
| Paste object(s) via Paste button and ctrl-v | ✔**Completed** |
| Save diagram to file—JSON format | ✔**Completed** |
| Load diagram from file—JSON format | ✔**Completed** |
| Save as image—JPEG format | ✔**Completed** |

**8 Extra Credit Parts**

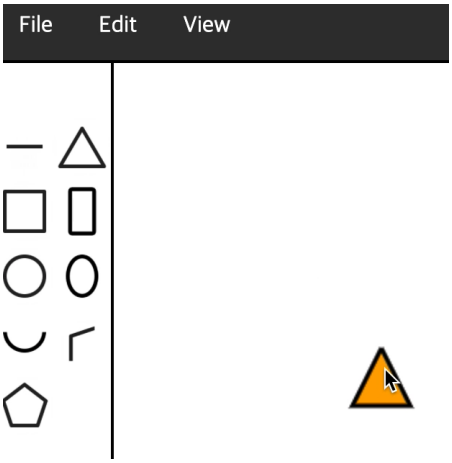
- Part 1 & Part 5: Splash Screen
- Part 2: Mouse Drag
- Part 3: View Grid
- Part 4: Save as PDF File
- Part 5: About Version
- Part 6: Warning when leaving
- Part 7: View Properties
- Part 8: View Shape Position
- Part 9: Turn on/off Shape Position Option

**Part 1 & Part 5: Splash Screen & About Version**

My program shows splash welcome screen for user friendly. User can see version information.

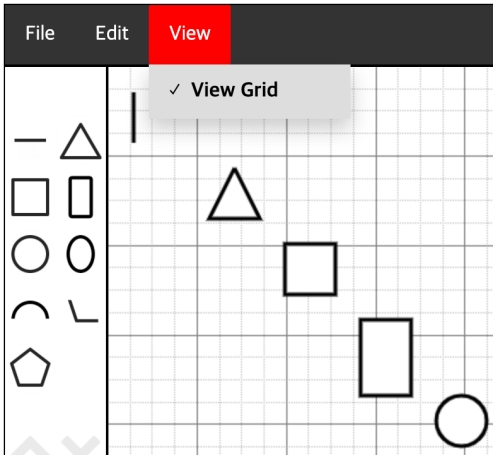

**Part 2: Mouse Moving**

Please see video: ***Demo_ExtraCredit.mp4***
User can move shapes when the mouse is dragged.



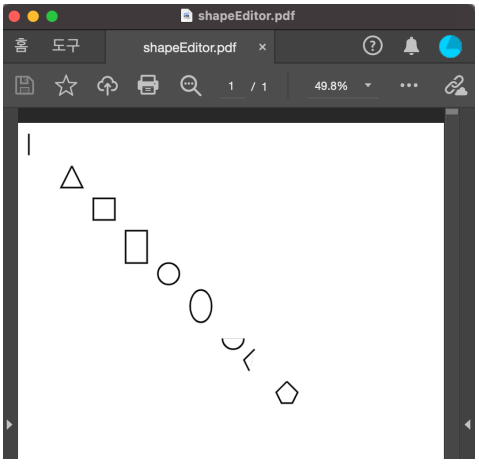

**Part 3: View Grid**

My program can draw grid on canvas. User can turn on/off to view grid.



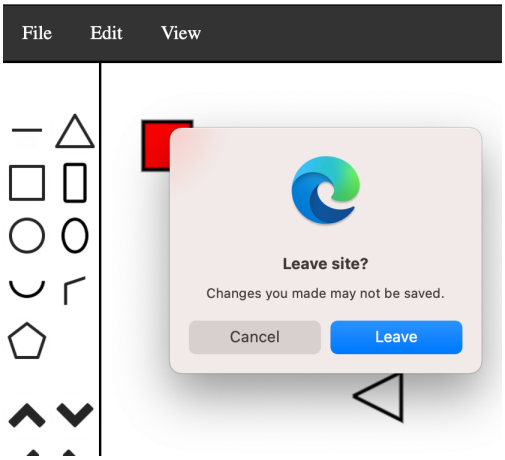

**Part 4: Save as PDF File**

My program can save current canvas into PDF file. User can export it as PDF.



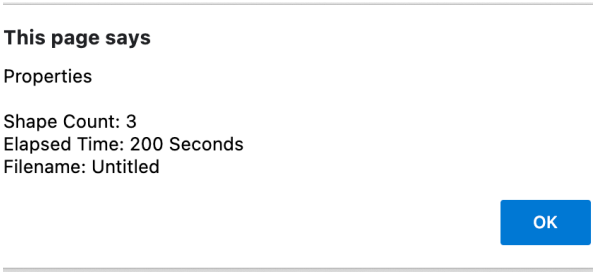
**Part 6: Warning when leaving**

My program can protect unsaved canvas when the user leaves Shape Editor.



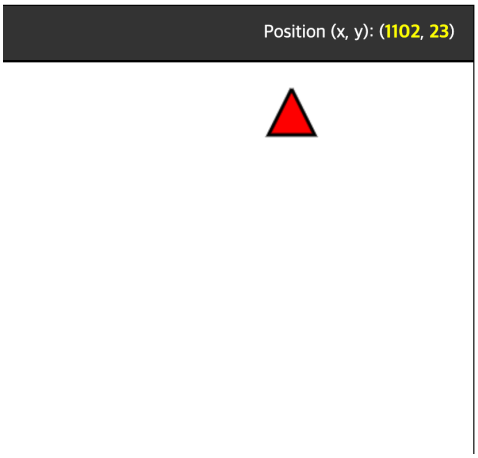

**Part 7: View Properties**

My program can protect unsaved jobs when the user leaves Shape Editor.



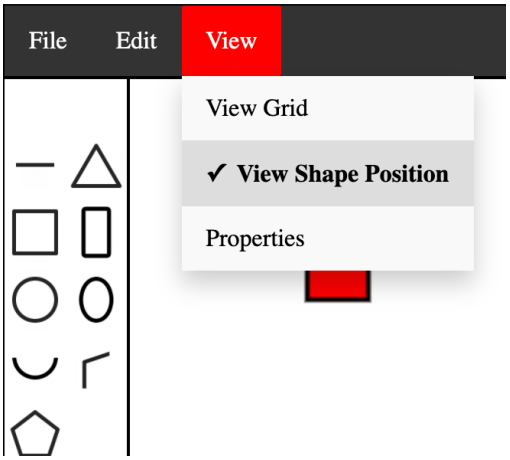

**Part 8: View Shape Position**

My program can show real-time shape position even shape is moving.




**Part 9: Turn on/off Shape Position Option**

As Part 7, my program shows shape position. User can turn on or off to view this section.




**Output Files**

- ***Demo.mp4***: Show all requirements
- ***Demo_ExtraCredit.mp4***: Show 8 extra parts for extra credit
- ***shapeEditor.json***: Sample saved file
- ***shapeEditor.pdf***: Sample exported as PDF file
- ***shapeEditor.png***: Sample exported as PNG file