CSCE 5320 Scientific Data Visualization
ICE-4

Introduction to Web Technologies

Introduction:

Firstly, Figma is a design tool that is used to create UI and other digital images. It provides options to export SVG (Scalable Vector Graphics) images. SVG images are widely used for web designing due to their scalable and lightweight nature. We shall be creating an SVG image and loading it into an HTML page. We shall be using HTML to create the structure and contents of the webpage and CSS to define the layout of the pages.

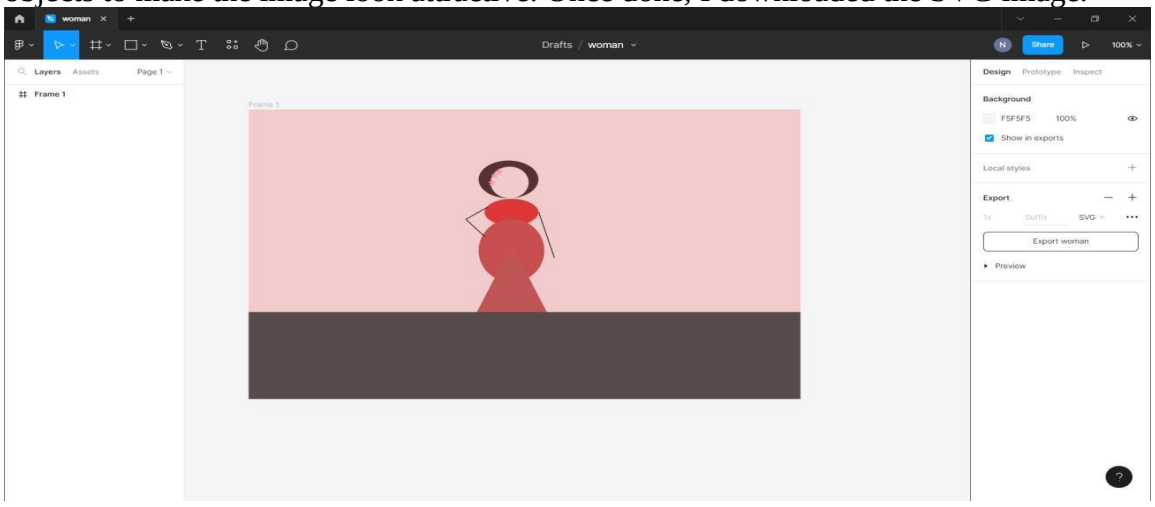
Secondly, We shall also be using JavaScript to dynamically interact with the webpage. A webpage is designed using HTML and CSS, with JavaScript popping alerts, with an SVG image loaded into the webpage. JavaScript is remarkably effective in creating interactive webpages and User-Friendly UI.

Finally, we are using VizHub to create customized images of high quality. It is an open-source platform to design and visualize using different technologies like D3.js, react, and GraphQL. In this Assignment, D3.js is used to design a face with multiple elements. These tools and technologies we are using are used for the visualization of data and information.

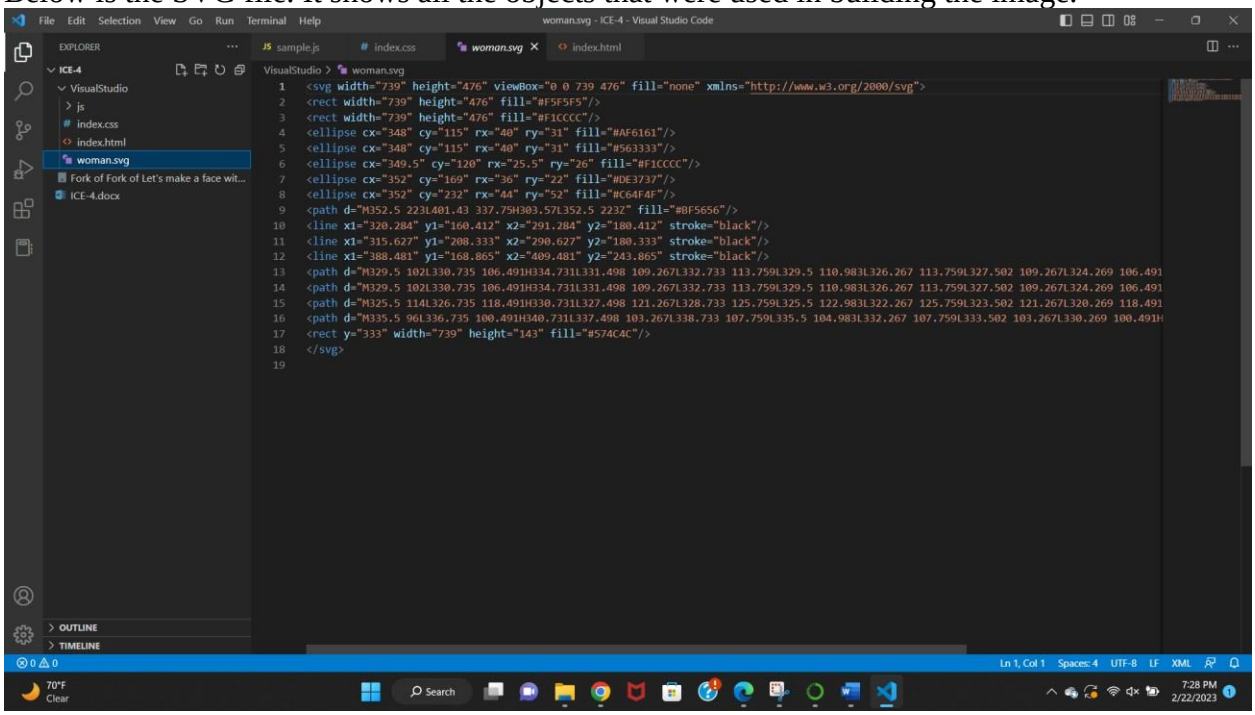
Introduction to SVG and CSS

Methodology:

1. Firstly, I have downloaded Figma App. Used the objects in the toolbar to create a new SVG image as shown below. I have also added background colors and used different objects to make the image look attractive. Once done, I downloaded the SVG image.



Below is the SVG file. It shows all the objects that were used in building the image.



2. Now I have created an HTML Page, with tags. Firstly, we start the page design by opening the <html> tag, for every opening tag, there must be a closing tag as well </html>. In HTML, we can use pre-defined tags or custom tags. I am using both to design a webpage.
   i. **Head Tag:** I am using the Head Tag to include all the basic headings of the page that I am designing and the links that I will be using in the webpage. Within Head Tag, I am using the below tags.
      a. **Title Tag:** Here it is given an ICE-4, title tag is used to define the title of the page that we are creating, it is displayed on the browser's tab page on top when the page is loaded.
      b. **Link Tag:** Links tag is used to access other documents of the project. The path to the documents is provided in the Link Tag. Here I am using the Link tag to access the CSS File.
   ii. **Body Tag:** The body tag includes the main webpage display logic, all the elements, and the functionality of different elements that appear on the webpage. I am dividing the Body of the Webpage into 3 main divisions using the 3 tags below.
      a. **Header Tag:** The header tag displays the topmost section of the webpage. I have used this custom tag to divide the top section of the webpage from the rest.
         - Heading Tag <h1>: I have used this tag to display the heading for this webpage, which is the subject name.

b. **Main Tag:** I have used this tag to display the main contents of the webpage. This is the middle part of the webpage.

- **Heading 2 Tag:** I Have used this tag to display the second heading of the page, here it is ICE-4.
- **Paragraph Tag:** I have used the paragraph tag to write down some information about the image.
- **Image Tag:** The image tag is used to display the SVG image that we have created using the Figma application. The src method is used to define the path, width, and height to determine the display size of the image.

c. **Footer:** The footer tag is used to mention the copywrites or contact information of the page using the paragraph tag. This is the bottommost section of the page.

index.html > html > body > main > h2

```
<!DOCTYPE html>
<html>
  <head>
    <title>ICE-4</title>
    <link href="index.css" rel="stylesheet" />
  </head>
  <body>
    <header>
      <h1>Scientific Data visualization</h1>
    </header>
    <main>
      <h2>ICE-4</h2>
      <p>Below is the SVG image:</p>
      <img src="woman.svg" alt="Girl in a jacket" width="620" height="400" />
    </main>
    <footer>
      <p>&copy; ScientificDataVisualization</p>
    <script src="js/sample.js"></script>
    </footer>
  </body>
</html>
```

Now for the above HTML code, I have added CSS to style the webpage, to make it look better. In the CSS I have added dimensions, background colors, and font sizes for the tags that are being used in the HTML code. Whenever the HTML code is run, the tags use the styling criteria mentioned in the CSS and display the webpage accordingly. Below are the tags that I have defined the CSS for.

i. **Body Tag:** The CSS is defined for the body tag to select background color, font, and margins.

a. **Header Tag:** The CSS defines the background color, font color, padding, and alignment.

- **Heading 1 Tag <h1>:** The CSS defines the font size and margins.

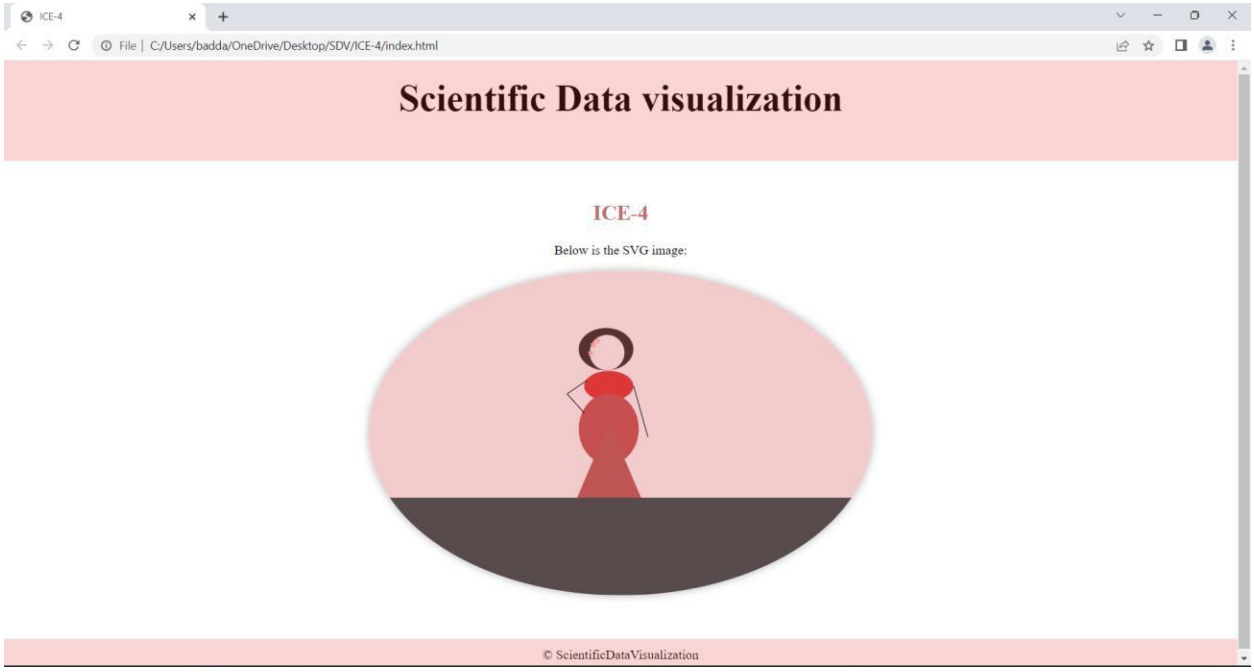
b. **Main Tag:** The CSS defines the margins and text alignment.

- **Heading 2 Tag:** The CSS defines margins, font size, text alignment, and font color.
- **Image Tag:** The CSS defines the image border radius and box shadow.

c. **Footer:** The CSS defines the background color, font color, padding, and alignment.

```css
body {
  margin: 0;
  padding: 0;
  font-family: 'Times New Roman', serif;
  background-color: rgb(255, 255, 255);
}

header {
  background-color: rgb(249, 214, 214);
  color: #360d0d;
  text-align: center;
  padding: 20px;
}

header h1 {
  margin-top: 0;
  font-size: 46px;
}

main {
  margin: 50px;
  text-align: center;
}

main h2 {
  margin-top: 0;
  font-size: 26px;
  color: #c46a6a;
  text-align: center;

}

footer {
  background-color: rgb(249, 214, 214);
  color: #360d0d;
  text-align: center;
  padding: 10px;
}

footer p {
  margin: 0;
}

img {
  border-radius: 80%;
  box-shadow: 0 0 10px rgba(0, 0, 0, 0.3);
}
```

Below is what the webpage looks like after adding the CSS to the HTML page.



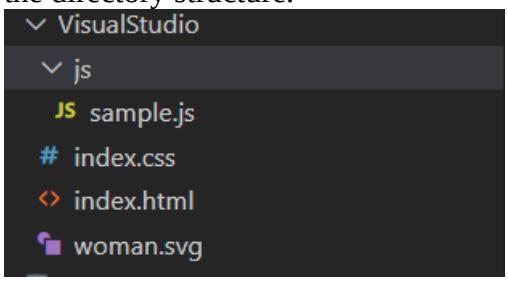
Explanation:

We have used Figma to create an image of women, I have used circles, triangles, lines, and rectangles to create this image. I have filled these objects with different colors to design a dress, accessories, and hair for the woman's image. I have exported this image as SVG and saved it to my project folder. Now I have created an HTML and CSS file in my document folder. I have used different tags to create a webpage and CSS is used to make the HTML page more presentable. The downloaded SVG image is loaded onto the webpage. The webpage displays different texts, images, and colors. We have created a UI to visually present the information that we have. SVG images are highly recommended in web applications because they can be used anywhere and consume less space and are easy to use. HTML and CSS make the interface where users can interact with the application.

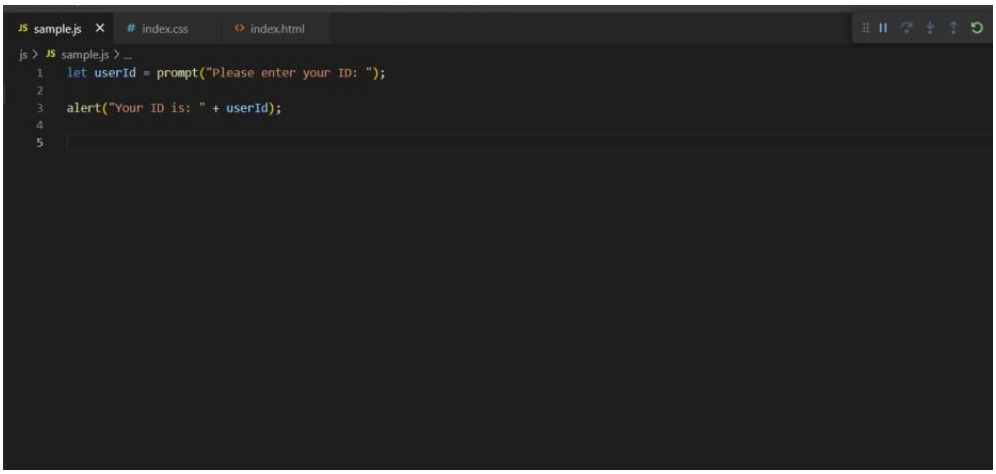
Introduction to JavaScript.

Methodology:

3. Now we shall be using JavaScript to interact with the created webpage. I have a visual studio for creating webpage, CSS, and JavaScript files. In the visual studio, in my project folder, I have created a new folder for java scrip code and named it "js" and saved it. In the "js" folder I have created a JavaScript code "sample.js" file. Below is the directory structure.



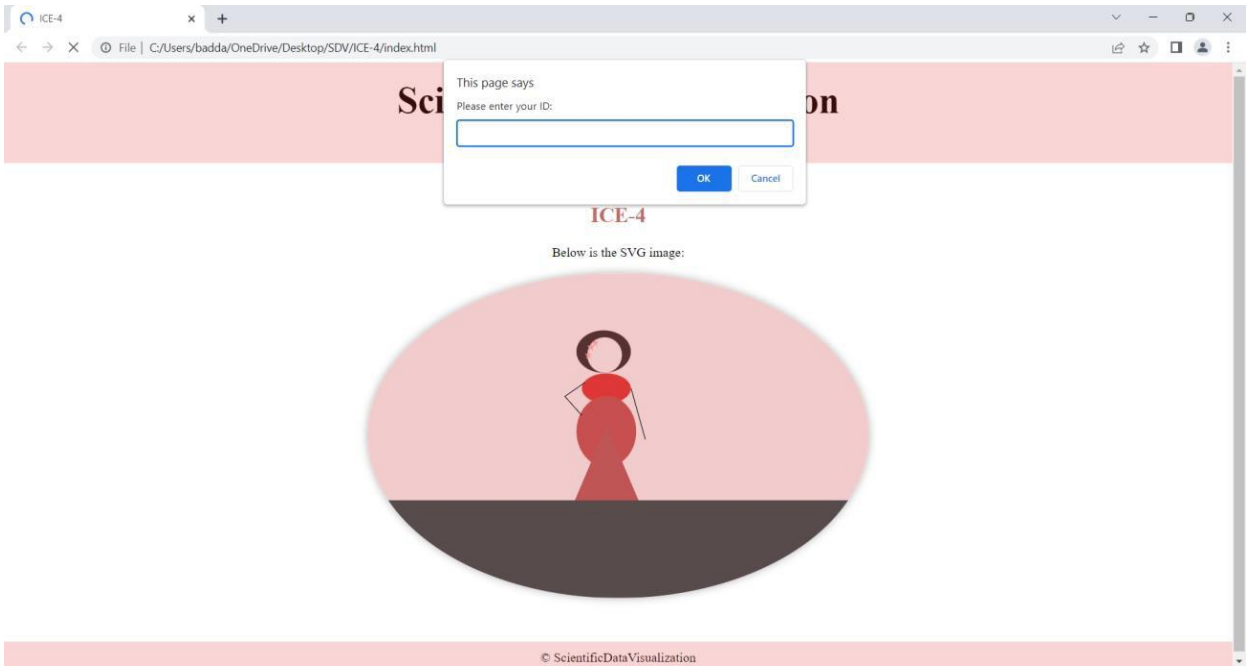
Now I have added a prompt and alert to the webpage. The prompt takes the user id as input and the alert displays the given user id.



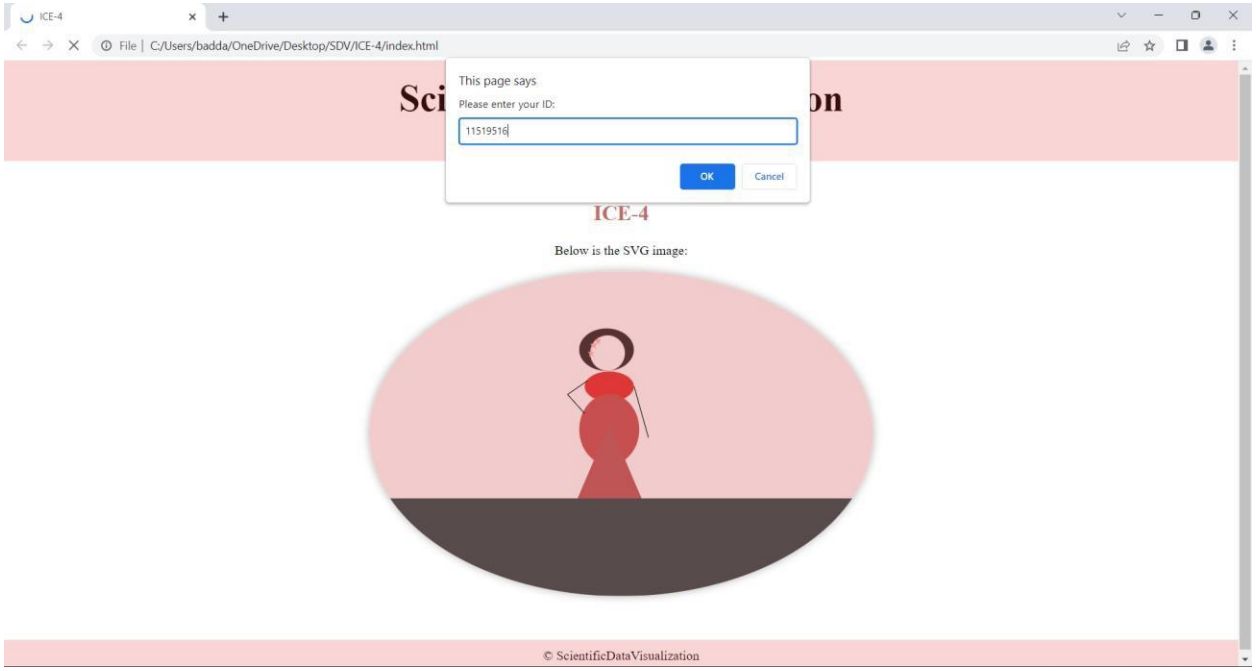
After saving the JavaScript file add the Script tag to HTML to link the above JavaScript code to the webpage.

```html
<!DOCTYPE html>
<html>
  <head>
    <title>ICE-4</title>
    <link href="index.css" rel="stylesheet" />
    <script src="js/sample.js"></script>
  </head>
  <body>
    <header>
      <h1>Scientific Data visualization</h1>
    </header>
    <main>
      <h2>ICE-4</h2>
      <p>Below is the SVG image:</p>
      <img src="woman.svg" alt="Girl in a jacket" width="620" height="400" />
    </main>
    <footer>
      <p>&copy; ScientificDataVisualization</p>
    </footer>
  </body>
</html>
```

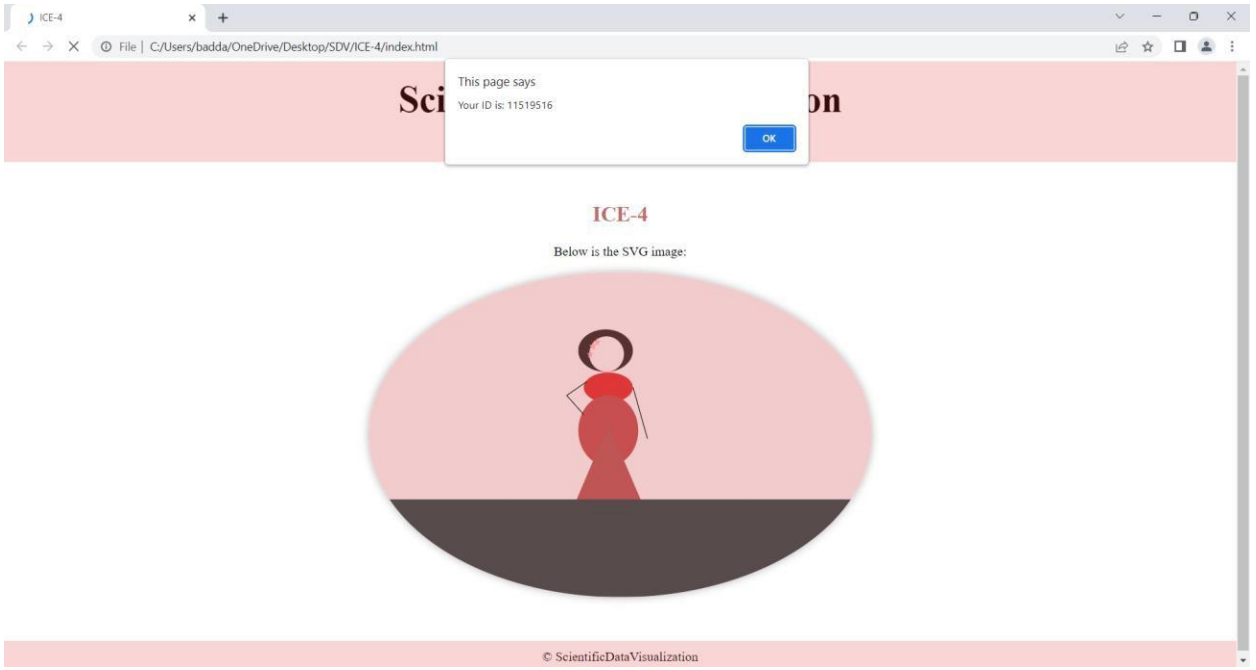
Once the HTML, CSS, and JavaScript code are saved, run the code. Html Page is displayed as shown below.



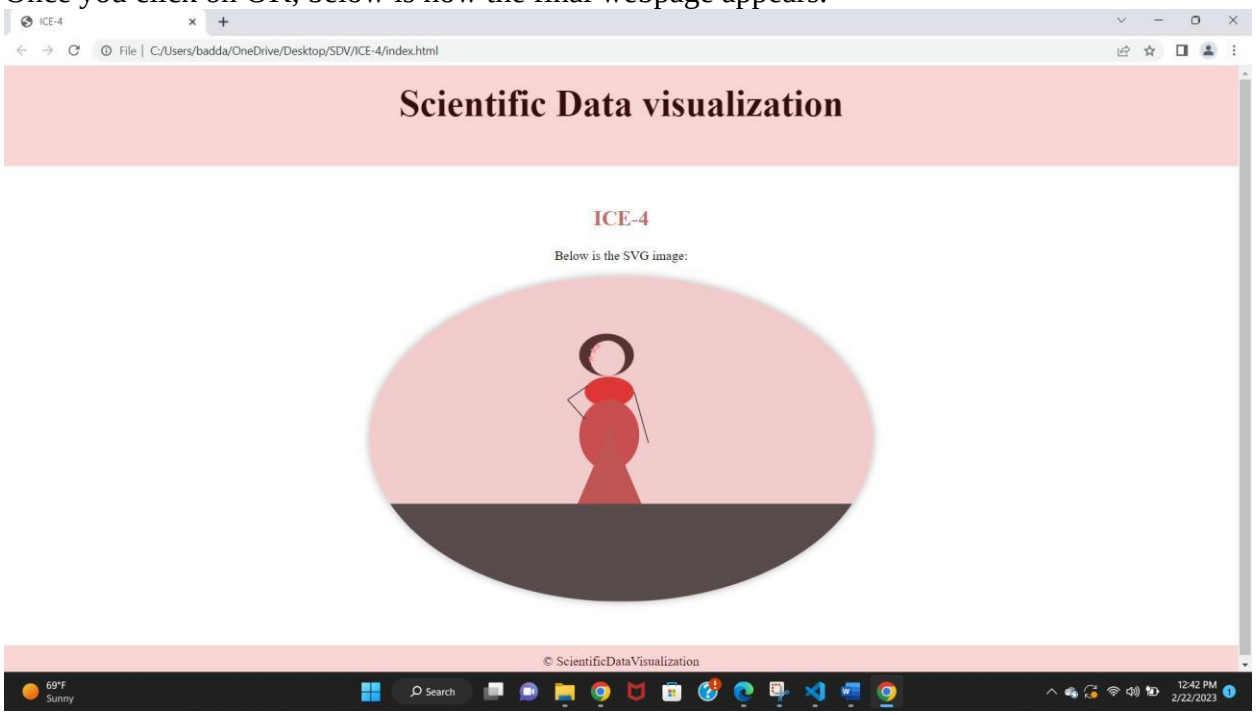
I entered my ID in the prompt and clicked on the OK button.



Now an alert is popped displaying my ID.



Once you click on OK, below is how the final webpage appears.



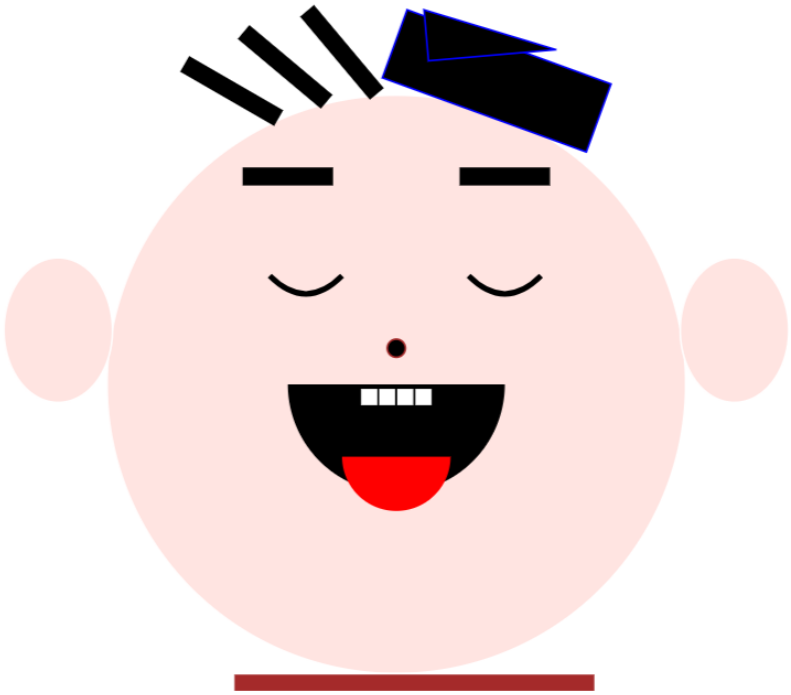
Explanation:

JavaScript is a web designing language used to develop dynamic and interactive web pages. For the above project, now a new folder is added for JavaScript files, which helps in making the webpage interactive by taking the User Id as Input from the prompt and later displaying an alert with the ID. Now when we run the code prompt is popped and an alert is displayed.

Introduction to VizHub and Making a Face with D3.js

Methodology

4. I have logged into the VizHub and forked one of the most popular faces. I have opened the editor and started to make changes to the face using D3.js. Below is the final image. I have added the following elements.
    i. Face element: I initially created a circle element, added color, and set dimensions.
    ii. Ears: I have added two ellipses on either side of the face to look like ears.
    iii. Eyes: I have added the right and left eyes that look alike in the form of an arc, which appears as closing eyes.
    iv. Eyebrows: I have added eyebrows that can move up and down, right above the eyes.
    v. Nose: I have added a tiny nose, in between the eyes, right above the mouth.
    vi. Mouth: The mouth is a semi-circle that is right below the nose in black color.
    vii. Teeth: I have added 4 teeth inside the mouth.
    viii. Tongue: I have added the red tongue in the mouth which is another semicircle.
    ix. Hair: I have added 3 stands of hair on the head.
    x. Hat: Finally, I used a rectangle and pentagon to make it look like a hat on the head.
    xi. Collar: A red rectangle collar is added to the neck



Please find the image in the below link.

VizHub:

https://vizhub.com/nehabaddam/422dded2ee5d49149bbf0a356f3e08bc?edit=files&file=index.js

VizHub ID: nehabaddam

Explanation:

VizHub is used for web designing, we can create projects and interactive web pages using JavaScript, HTML, and CSS. For now, I have used JavaScript language and used D3.j packages to design a face of a boy. I have written JavaScript code snippets separately for each element in the face and consolidated them later. We have added a face, ears, eyes, eyebrows, nose, mouth, teeth, tongue, hair, collar, and hat elements.

Conclusion:

Firstly, I used Figma to create an image of a woman and exported it as an SVG image, I created a webpage using HTML with multiple tags and used CSS to define the layout of the webpage. The webpage is divided into three main sections, the header, main, and footer. The header consists of the Webpage headings, the main page has the SVG image that has been created using Figma, and the footer has the copyright path.

Secondly, JavaScript is used to pop a prompt and alert message. The prompt takes an ID as input and the alert displays the given ID. Once, the alert is closed, we can see the webpage with the header and footer. The SVG image is loaded in the center of the webpage. This helps in interacting with the application at run-time making it visually pleasing to the users.

Next, we use VizHub to create a face using JavaScript. The JavaScript code consists of different elements that add up to form a face. We have added a face, ears, eyes, eyebrows, nose, mouth, teeth, tongue, hair, collar, and hat. The link to the VizHub of the created face is provided in this document. To conclude, we have created a face out of basic objects using JavaScript and made it look more presentable and attractive.

Finally, we have used the above tools to create images and web pages, to present information to the users in a visual format.