17. D3JS Colors API.

Colors are displayed combining RED, GREEN and BLUE. Colors can be specified in the following different ways :

- **By color names**
- **As RGB values**
- **As hexadecimal values**
- **As HSL values**
- **As HWB values**

The d3-color API provides representations for various colors. You can perform conversion and manipulation operations in API. Let us understand these operations in detail.

17.1. Configuring API

You can configure the API directly using the script below.

Example:

```
<script src = "https://d3js.org/d3-color.v1.min.js"></script>
<body>
   <script>
   </script>
</body>
```

17.2. Basic Operations

D3.js supports different shapes. Let us go through the prominent shapes in detail.

Let us go through the basic color operations in D3.

Convert color value to HSL.

To convert color value to HSL, use the following:

Example:

```
var convert = d3.hsl("green");
```

You can rotate the hue by 45° as shown below.

Example:

```
convert.h + =  45;
```

Similarly, you can change the saturation level as well. To fade the color value, you can change the opacity value as shown below.

Example:

```
convert.opacity = 0.5;
```

17.3. Color API Methods.

Following are some of the most important Color API Methods.

- **d3.color(specifier)**
- **color.opacity**
- **color.rgb()**
- **color.toString()**
- **color.displayable()**

- **d3.rgb(color)**
- **d3.hsl(color)**
- **d3.lab(color)**
- **d3.hcl(color)**
- **d3.cubehelix(color)**

Let us understand each of these Color API Methods in detail.

d3.color(specifier)

It is used to parse the specified CSS color and return RGB or HSL color. If specifier is not given, then null is returned.

Example: Let us consider the following example.

```
<script>
   var color = d3.color("green");  // asign color name directly
   console.log(color);
</script>
```

We will see the following response on our screen

Example:

```
{r: 0, g: 128, b: 0, opacity: 1}
```

color.opacity

If we want to fade the color, we can change the opacity value. It is in the range of [0, 1].

Example: Let us consider the following example.

```
<script>
   var color = d3.color("green");
   console.log(color.opacity);
</script>
```

We will see the following response on our screen

Example:

```
1
```

color.rgb()

It returns the RGB value for the color. Let us consider the following example.

Example: Let us consider the following example.

```
<script>
   var color = d3.color("green");
   console.log(color.rgb());
</script>
```

We will see the following response on our screen

Example:

```
{r: 0, g: 128, b: 0, opacity: 1}
```

color.toString()

It returns a string representing the color according to the CSS Object Model specification. Let us consider the following example.

Example: Let us consider the following example.

```
<script>
   var color = d3.color("green");
   console.log(color.toString());
</script>
```

We will see the following response on our screen

Example:

```
rgb(0, 128, 0)
```

color.displayable()

Returns true, if the color is displayable. Returns false, if RGB color value is less than 0 or greater than 255, or if the opacity is not in the range [0, 1]. Let us consider the following example.

Example: Let us consider the following example.

```
<script>
   var color = d3.color("green");
   console.log(color.displayable());
</script>
```

We will see the following response on our screen

Example:

```
true
```

d3.rgb(color)

This method is used to construct a new RGB color. Let us consider the following example.

Example: Let us consider the following example.

```
<script>
   console.log(d3.rgb("yellow"));
   console.log(d3.rgb(200,100,0));
</script>
```

We will see the following response on our screen

Example:

```
{r: 255, g: 255, b: 0, opacity: 1}
{r: 200, g: 100, b: 0, opacity: 1}
```

d3.hsl(color)

It is used to construct a new HSL color. Values are exposed as h, s and l properties on the returned instance.

Example: Let us consider the following example.

```
<script>
   var hsl = d3.hsl("blue");
   console.log(hsl.h + =  90);
   console.log(hsl.opacity = 0.5);
</script>
```

We will see the following response on our screen

Example:

```
330
0.5
```

d3.lab(color)

It constructs a new Lab color. The channel values are exposed as 'l', 'a' and 'b' properties on the returned instance.

Example: Let us consider the following example.

```
<script>
   var lab = d3.lab("blue");
   console.log(lab);
</script>
```

We will see the following response on our screen

Example:

```
{l: 32.29701093285073, a: 79.18751984512221, b: -107.8601617541481,
opacity: 1}
```

d3.hcl(color)

Constructs a new HCL color. The channel values are exposed as h, c and l properties on the returned instance.

Example: Let us consider the following example.

```
<script>
   var hcl = d3.hcl("blue");
   console.log(hcl);
</script>
```

We will see the following response on our screen

Example:

```
{h: 306.2849380699878, c: 133.80761485376166, l: 32.29701093285073,
opacity: 1}
```

d3.cubehelix(color)

Constructs a new Cubehelix color. Values are exposed as h, s and l properties on the returned instance.

Example: Let us consider the following example.

```
<script>
   var hcl = d3.hcl("blue");
   console.log(hcl);
</script>
```

We will see the following response on our screen

Example:

```
{h: 236.94217167732103, s: 4.614386868039719, l: 0.10999954957200976,
opacity: 1}
```

17.4. Working Example.

Let us create a new webpage – color.html to perform all the color API methods. The complete code listing is defined below.

Example:

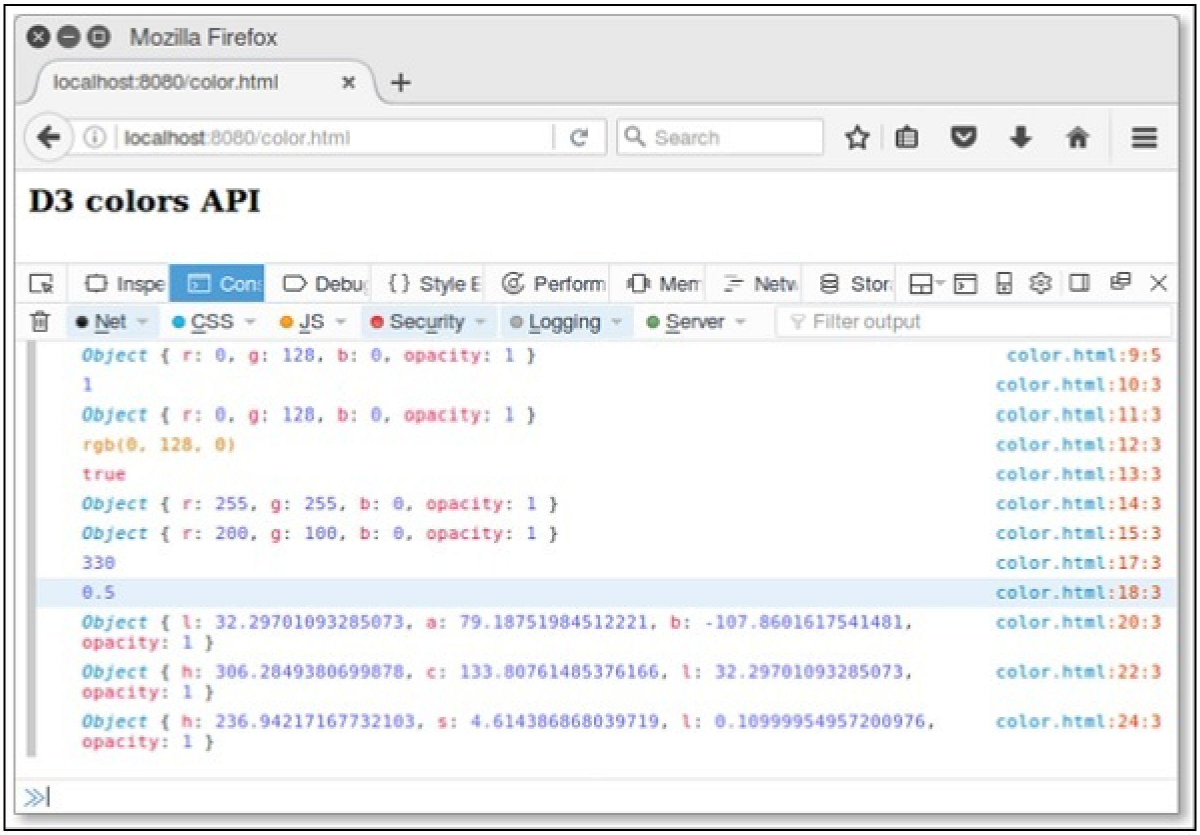
```
<html>
   <head>
      <script src = "https://d3js.org/d3.v4.min.js"></script>
   </head>

   <body>
      <h3>D3 colors API</h3>
      <script>
```

```
         var color = d3.color("green");
         console.log(color);
         console.log(color.opacity);
         console.log(color.rgb());
         console.log(color.toString());
         console.log(color.displayable());
         console.log(d3.rgb("yellow"));
         console.log(d3.rgb(200,100,0));
         var hsl = d3.hsl("blue");
         console.log(hsl.h + =  90);
         console.log(hsl.opacity = 0.5);
         var lab = d3.lab("blue");
         console.log(lab);
         var hcl = d3.hcl("blue");
         console.log(hcl);
         var cube = d3.cubehelix("blue");
         console.log(cube);
      </script>
   </body>
</html>
```

Now, request the browser and we will see the following response.

Output:



D3 colors API

```
Object { r: 0, g: 128, b: 0, opacity: 1 }                                   color.html:9:5
1                                                                           color.html:10:3
Object { r: 0, g: 128, b: 0, opacity: 1 }                                   color.html:11:3
rgb(0, 128, 0)                                                              color.html:12:3
true                                                                        color.html:13:3
Object { r: 255, g: 255, b: 0, opacity: 1 }                                 color.html:14:3
Object { r: 200, g: 100, b: 0, opacity: 1 }                                 color.html:15:3
330                                                                         color.html:17:3
0.5                                                                         color.html:18:3
Object { l: 32.29701093285073, a: 79.18751984512221, b: -107.8601617541481, color.html:20:3
opacity: 1 }
Object { h: 306.2849380699878, c: 133.80761485376166, l: 32.29701093285073, color.html:22:3
opacity: 1 }
Object { h: 236.94217167732103, s: 4.614386868039719, l: 0.10999954957200976, color.html:24:3
opacity: 1 }
```