09. SVG Gradients.

A gradient is a smooth transition from one color to another. In addition, several color transitions can be applied to the same element.

There are two main types of gradients in SVG:

- **Linear**
- **Radial**

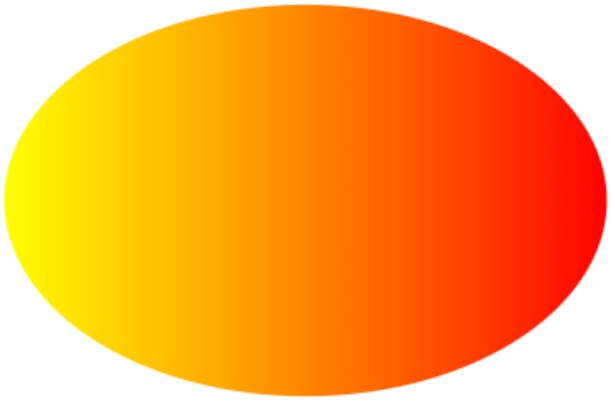
8.1. SVG Linear Gradient - <linearGradient>

The <linearGradient> element is used to define a linear gradient. The <linearGradient> element must be nested within a <defs> tag. The <defs> tag is short for definitions and contains definition of special elements (such as gradients).

Linear gradients can be defined as horizontal, vertical or angular gradients:

- **Horizontal gradients** are created when y1 and y2 are equal and x1 and x2 differ
- **Vertical gradients** are created when x1 and x2 are equal and y1 and y2 differ
- **Angular gradients** are created when x1 and x2 differ and y1 and y2 differ

Define an ellipse with a horizontal linear gradient from yellow to red:



Example: Here is the SVG code:

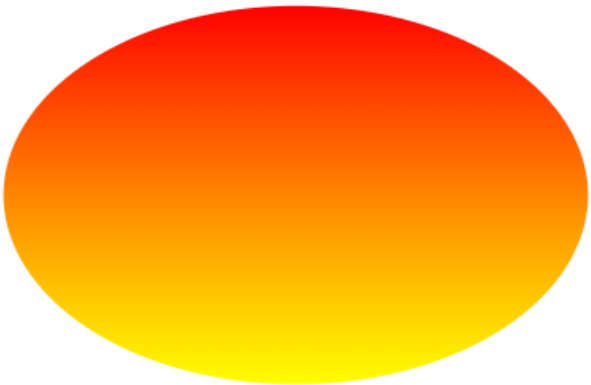
```
<svg height="150" width="400">
  <defs>
    <linearGradient id="grad1" x1="0%" y1="0%" x2="100%" y2="0%">
      <stop offset="0%" style="stop-color:rgb(255,255,0);stop-
opacity:1" />
      <stop offset="100%" style="stop-color:rgb(255,0,0);stop-
opacity:1" />
    </linearGradient>
  </defs>
  <ellipse cx="200" cy="70" rx="85" ry="55" fill="url(#grad1)" />
</svg>
```

Code explanation:

- The id attribute of the <linearGradient> tag defines a unique name for the gradient
- The x1, x2, y1,y2 attributes of the <linearGradient> tag define the start and end position of the gradient
- The color range for a gradient can be composed of two or more colors. Each color is specified with a <stop> tag. The offset attribute is used to define where the gradient color begin and end
- The fill attribute links the ellipse element to the gradient

9.2. SVG Vertical Gradient

Define an ellipse with a vertical linear gradient from yellow to red:



Example: Here is the SVG code:

```
<svg height="150" width="400">
  <defs>
    <linearGradient id="grad2" x1="0%" y1="0%" x2="0%" y2="100%">
      <stop offset="0%" style="stop-color:rgb(255,0,0);stop-
opacity:1" />
      <stop offset="100%" style="stop-color:rgb(255,255,0);stop-
opacity:1" />
    </linearGradient>
  </defs>
  <ellipse cx="200" cy="70" rx="85" ry="55" fill="url(#grad2)" />
</svg>
```

8.3. SVG Gradient and Text.

Define an ellipse with a horizontal linear gradient from yellow to red, and add a text inside the ellipse:

Example: Here is the SVG code:

```
<svg height="150" width="400">
  <defs>
    <linearGradient id="grad3" x1="0%" y1="0%" x2="100%" y2="0%">
      <stop offset="0%" style="stop-color:rgb(255,255,0);stop-
opacity:1" />
      <stop offset="100%" style="stop-color:rgb(255,0,0);stop-
opacity:1" />
```

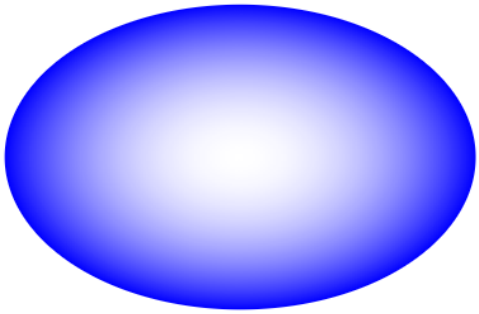
```
      </linearGradient>
    </defs>
    <ellipse cx="200" cy="70" rx="85" ry="55" fill="url(#grad3)" />
    <text fill="#ffffff" font-size="45" font-family="Verdana" x="150"
y="86">
    SVG</text>
</svg>
```

9.4. SVG Radial Gradient - <radialGradient>

The <radialGradient> element is used to define a radial gradient.

The <radialGradient> element must be nested within a <defs> tag. The <defs> tag is short for definitions and contains definition of special elements (such as gradients).

Define an ellipse with a radial gradient from white to blue:



Example: Here is the SVG code:

```
<svg height="150" width="500">
  <defs>
    <radialGradient id="grad1" cx="50%" cy="50%" r="50%" fx="50%"
fy="50%">
      <stop offset="0%" style="stop-color:rgb(255,255,255);
      stop-opacity:0" />
      <stop offset="100%" style="stop-color:rgb(0,0,255);stop-
```

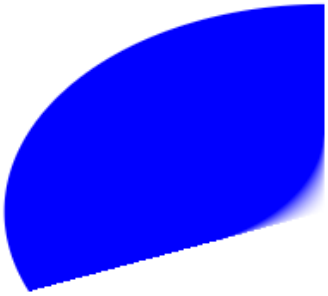
```
    opacity:1" />
        </radialGradient>
      </defs>
      <ellipse cx="200" cy="70" rx="85" ry="55" fill="url(#grad1)" />
    </svg>
```

Code explanation:

- The id attribute of the <radialGradient> tag defines a unique name for the gradient
- The cx, cy and r attributes define the outermost circle and the fx and fy define the innermost circle
- The color range for a gradient can be composed of two or more colors. Each color is specified with a <stop> tag. The offset attribute is used to define where the gradient color begin and end
- The fill attribute links the ellipse element to the gradient

9.5. SVG Radial Gradient Example

Define another ellipse with a radial gradient from white to blue:



Example: Here is the SVG code:

```
<svg height="150" width="500">
  <defs>
    <radialGradient id="grad2" cx="20%" cy="30%" r="30%" fx="50%"
```

```
fy="50%">
      <stop offset="0%" style="stop-color:rgb(255,255,255);
      stop-opacity:0" />
      <stop offset="100%" style="stop-color:rgb(0,0,255);stop-
opacity:1" />
    </radialGradient>
  </defs>
  <ellipse cx="200" cy="70" rx="85" ry="55" fill="url(#grad2)" />
</svg>
```