HTML5 SVG (Scalable Vector Graphics)

What is SVG?

SVG is a language for describing 2D graphics in XML. SVG allows for three types of graphic objects: vector graphic shapes (such as paths and basic shapes), images, and text. SVG drawings can be interactive and styleable using CSS. They can also be dynamic and animated.

Benefits of SVG

1. Scalability: SVG images can be scaled to any size without losing quality.
2. Performance: SVGs are typically smaller in file size compared to bitmap images like PNG or JPEG, especially for images with simple graphics.
3. Interactivity and Animation: SVG supports interactivity and animation, which can be added via CSS or JavaScript.
4. Accessibility: SVG content is accessible, and text within SVG is searchable and selectable.

Basic Structure of an SVG File

An SVG file is essentially an XML file. Here is a basic example:

```
<svg width="100" height="100" xmlns="http://www.w3.org/2000/svg">
 <circle cx="50" cy="50" r="40" stroke="black" stroke-width="3" fill="red" />
</svg>
```

In this example:
- <svg>: The root element of an SVG document.
- width and height: Define the dimensions of the SVG canvas.
- xmlns: Defines the XML namespace for the SVG content.
- <circle>: Defines a circle with attributes for position (cx, cy), radius (r), and style (stroke, stroke-width, fill).

Using SVG in HTML

There are several ways to include SVG in an HTML document:
1. Inline SVG:

```
<!DOCTYPE html>
<html>
<body>
 <svg width="100" height="100">
  <circle cx="50" cy="50" r="40" stroke="black" stroke-width="3" fill="red" />
 </svg>
</body>
</html>
```

2. SVG File:

```
<!DOCTYPE html>
<html>
<body>
 <img src="image.svg" alt="SVG Image">
</body>
</html>
```

3. Object Tag:

```
<!DOCTYPE html>
<html>
<body>
 <object data="image.svg" type="image/svg+xml"></object>
</body>
</html>
```

4. Background Image:

```
<!DOCTYPE html>
<html>
<head>
<style>
 .svg-background {
   width: 100px;
   height: 100px;
   background: url('image.svg');
 }
</style>
</head>
<body>
 <div class="svg-background"></div>
</body>
</html>
```

Styling SVG with CSS

SVG elements can be styled using CSS, either inline or via external stylesheets. For example:

```
<!DOCTYPE html>
<html>
<head>
<style>
 circle {
   fill: blue;
```

```
  stroke: green;
  stroke-width: 4;
 }
</style>
</head>
<body>
 <svg width="100" height="100">
  <circle cx="50" cy="50" r="40" />
 </svg>
</body>
</html>
```

Animating SVG

SVG supports animations defined either through SMIL (Synchronized Multimedia Integration Language) or CSS animations. Here's an example using CSS animations:

```
<!DOCTYPE html>
<html>
<head>
<style>
 @keyframes example {
  0% { transform: scale(1); }
  50% { transform: scale(1.5); }
  100% { transform: scale(1); }
 }
 circle {
  animation: example 4s infinite;
 }
</style>
</head>
<body>
 <svg width="100" height="100">
  <circle cx="50" cy="50" r="40" fill="red" />
 </svg>
</body>
</html>
```

Conclusion

SVG is a versatile and powerful tool in web development that allows for creating high-quality graphics that are scalable, interactive, and stylable. Integrating SVG in HTML5 can enhance the visual appeal and functionality of web applications.