Introduction to Raphaël JS

Weiguang Guan

SHARCNet

What is Raphaël JS

Vector graphics library for web applications

- Open Source
- Written in JavaScript
- Lightweight
- 2D graphics
- Supports multiple browsers

Facts about Raphaël JS

- First release on August 8, 2008
- MIT License
- Using SVG (Scalar Vector Graphics) or VML
- Official web: http://dmitrybaranovskiy.github.io/raphael
- Hosted on https://github.com/DmitryBaranovskiy/raphael

Supported browsers

- IE 6.0+
- Firefox 3.0+
- Chrome 5.0+
- Safari 3.0+
- Opera 9.5+

A simple example

Drawing various shapes (simple.html and simple.js)

- Include RaphaelJS library
- Program in JavaScript
  - Embedded in HTML
  - A separate JS file
- Create a 2D Canvas using an HTML element as anchor
- Draw various objects on the 2D canvas

Overview

- Canvas
- Shapes, text, and grouping
- Attributes of shapes
- Visibility order (newer ones on top of older ones)
- Animation (changing attributes as time passes by)
- Transform (scaling, rotation, translation, or custom defined transformation matrix)
- Event handling

Raphael Canvas

- Create on an HTML element

```
var paper = Raphael(document.getElementById('paper1’), 500, 500);
…
<body>
…
<div id="paper1"></div>
…
</body>
```

- Create without referencing HTML element

```
var paper = Raphael(x, y, width, height);
Origin: top-left corner; x: horizontal, y: vertical
Example: var paper = Raphael(20,30,500,500);
```

- Origin: Top left corner

Shapes

- rect(x, y, width, height, radius);
- circle(x, y, radius);
- ellipse(x, y, h_radius, v_radius);
- image(src, x, y, width, height);
- path(pathString); e.g., path(“M20,30L40,50”)
  - M/m: move
  - L/l and l: Line to
  - Z: close the path
  - S/s, Q/q, T/t: smooth curve

Text and grouping

- text(x, y, text);
- print(x, y, text, font, size, origin, spacing); custom font
- set(): grouping shapes or non-shape objects or even other sets

Shape’s attributes

- Element.attr(name/value pairs) JSON
  - x, y
  - width, height
  - fill
  - stroke
  - stroke-width

Visibility order

- By default, newer ones on top of older ones
- toBack();
- toFront();

Animation

- element.animate(finalAttr, duration, easing, callback);

  Where "element" can be

  – shape

  – text

  – set

- element.animateWith(elem, anim, finalAttr, duration, easing, callback);

Transform

- Homogeneous coordinates

  $[x, y]^t$ ⇨ $[x, y, 1]^t$ or $[\mu x, \mu y, \mu]^t$
- Transformation
  - Affine transform: $[\mu x', \mu y', \mu]^t = M[x, y, 1]^t$; where

    $$\mathrm{M} = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$
  - Scale, rotate, translate: $\begin{bmatrix} s & 0 & 0 \\ 0 & s & 0 \\ 0 & 0 & 1 \end{bmatrix}$,

    $\begin{bmatrix} \cos(a) & -\sin(a) & 0 \\ \sin(a) & \cos(a) & 0 \\ 0 & 0 & 1 \end{bmatrix}$, and $\begin{bmatrix} 1 & 0 & tx \\ 0 & 1 & ty \\ 0 & 0 & 1 \end{bmatrix}$

Transform (cont.)

- element.transform(transformString)

  where transformString

  - S/s for scaling
  - R/r for rotation
  - T/t for translation
  - m for matrix
- element.scale(sx, sy, cx, cy);
- element.rotate(deg, cx, cy);
- element.translate(tx, ty);

Event handling

- Mouse events
  - click(clickHandler)
  - dblclick(dblClickHandler)
  - Up/Down, Drap-n-drop
  - Wheel
- Keyboard events
  - Raphael does not support keyboard event!
  - Suggest to use others, such as jquery.

Questions