CSCI 165
Introduction to the Internet and the World Wide Web
Lecture 7: Graphics IV

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Overview

- Focus: Web Development
- Architecture: Internet
- Core Ideas:
  1. Paths
  2. Animation

Paths in Raphaël

Lines and Curves

Paths

- Sometimes in your SVG, you want custom shapes, like an apple logo
- Paths:
  - Straight lines
  - Curved lines
  - Hint: you will need use coordinates!

Concept

Paths: lines

- Step 1: create a canvas in your javascript, alongside the HTML file
    - `canvas = Raphael('shapes', 200, 200);`
- Step 2: draw a single line with path

```
p = canvas.path('M50,10 L50,150');
p.attr({
    'stroke-width': '4',
    'stroke': 'red'
})
```

- This draws a red line from coordinate (50, 10) to (50, 150)
- `M`: move to the given coordinate
- `L`: draw a straight line to the given coordinates

Technical

Paths: lines

- You can also draw shapes in a single path

```
rect = canvas.path('M50,10 L50,150 L75,150 L75,10 L50,10');
rect.attr({
     'stroke-width': '4',
     'stroke': 'red'
})
```

- This draws a red line from coordinate
  (50, 10) to (50, 150) to (75,150) to (75,10) to (50,10)

- You can also replace the last `L50,10` with `Z`, which will make it go back to the first coordinate:

```
rect = canvas.path('M50,10 L50,150 L75,150 L75,10 Z');
```

Curves

- Curves are a little bit different than straight lines
- Straight line uses `L`, curved lines uses `Q`

```
p = canvas.path('M50,10 Q50,150 100,150');
```

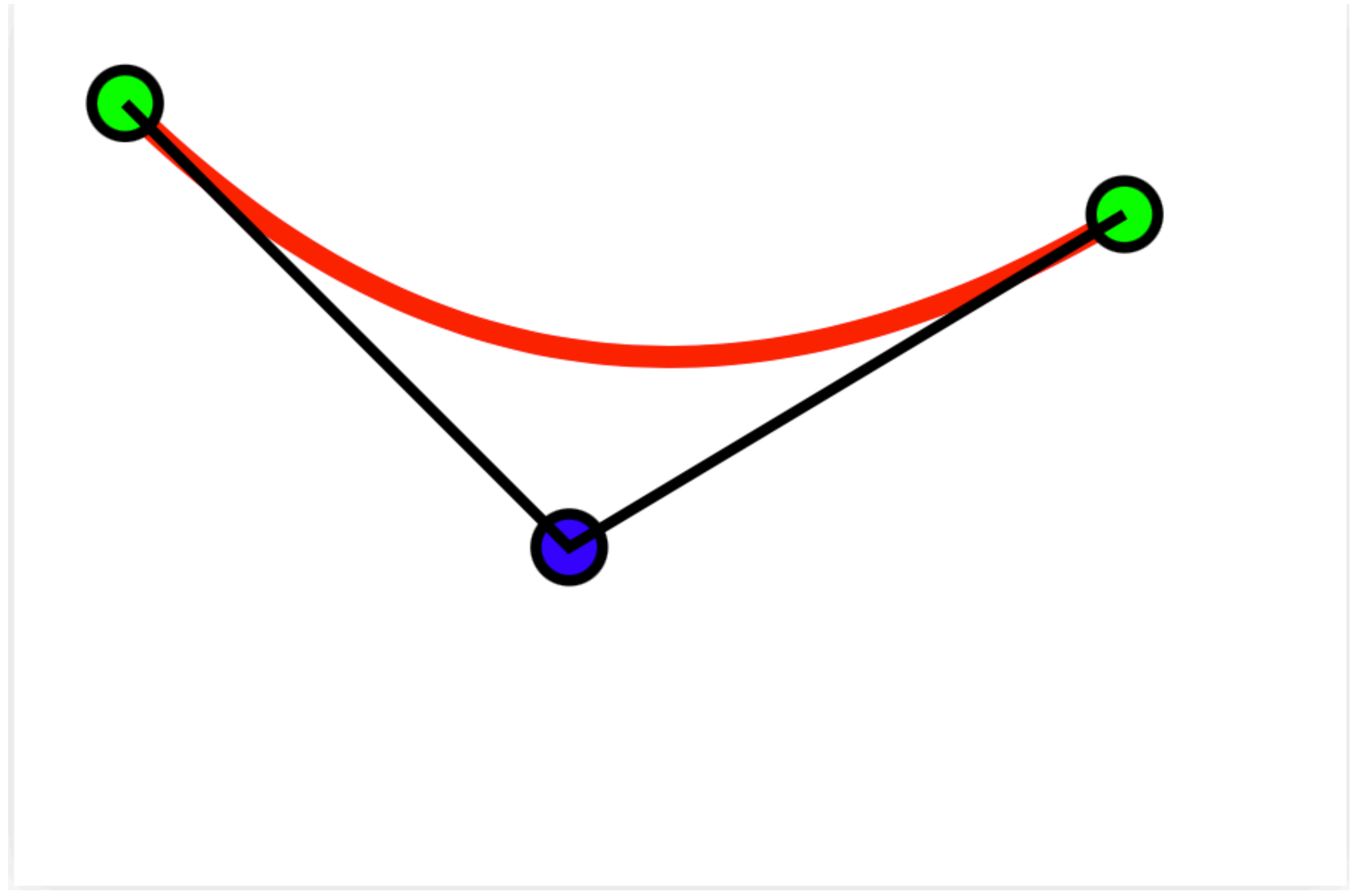
  - With `Q`, you need to specify 3 points
    - the starting coordinate (this case 50,10),
    - the middle point (a point that the curve must go through, here 50,150), and
    - the ending coordinate, in this case 100,150
    - You can keep drawing after this of course

Concept

Curves

- Demo:

```
curve2 = canvas.path('M10,10 Q50,50 100,20');
curve2.attr({'stroke-width': '2', 'stroke': '#f00'});
p1 = canvas.circle(10, 10, 3).attr({'fill': '#0f0'});
p2 = canvas.circle(50, 50, 3).attr({'fill': '#00f'});
p3 = canvas.circle(100, 20, 3).attr({'fill': '#0f0'});
l1 = canvas.path('M10,10 L50,50 L100,20');
```



Animation in Raphaël

P2
Raphaël Animate

Animation by changing attributes

- With Raphaël, we can set element appearance with `.attr()`
- We can set animation using `.animate()`, in the same format as jquery animation
- Here’s an example:

```
rect1 = canvas.rect(10, 10, 50, 80).attr(
    'stroke-width': '4', 'stroke': 'red')
new_size = {
    'width': '80',
    'height': '50'
}
rect1.animate(new_size, 1000)  // 1000 here is 1sec
```

Concept

Rotation

- Here's an example:

```
rect2 = canvas.rect(10, 10, 50, 80).attr(
     'stroke-width': '4', 'stroke': 'red')
original = {
     'transform': 'r0'
}
turned = {
     'transform': 'r360'
}
rect2.attr(original);
rect2.animate(turned, 2000);
```

- In `transform`, `r` is for rotation, `t` is for translation (move), `s` is for scaling.

Concept

Animation Options

- There are two more options we can give `.animate()`:
  - An “easing” type: should the movement be linear, accelerating, bouncy, etc. Default is `'linear'`.
  - A callback function: something to do when the animation is finished.

```
rect3 = canvas.rect(100, 20, 50, 80);
slide = {
    'transform': 't50,50'
}
rect3.animate(slide, 1000, 'linear', recolour);
recolour = function() {
    blush = {
        'fill': '#f99'
    }
    rect3.animate(blush, 1000);
}
```

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Raphaël Animate

Repeating Animations

```
setup = function() {
  canvas = Raphael('container', 200, 200);
  c = canvas.circle(100, 100, 40);
  grow();
}
$(document).ready(setup)

grow = function() {
  bigger = {
    'transform': 's2'
  }
  c.animate(bigger, 1000, 'linear', shrink); // Callback function shrink
}
shrink = function() {
  smaller = {
    'transform': 's1'
  }
  c.animate(smaller, 1000, 'linear', grow); // Callback function grow
}
```

Example