COMP4021
Internet Computing

Images in Browsers

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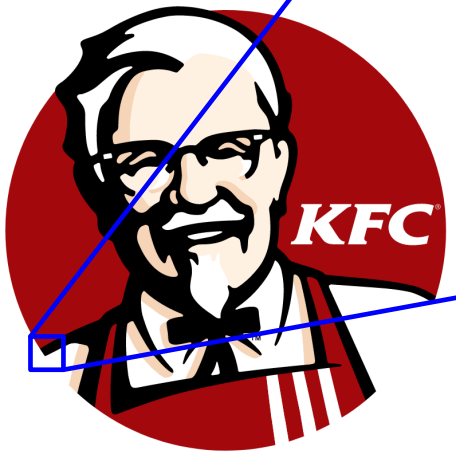
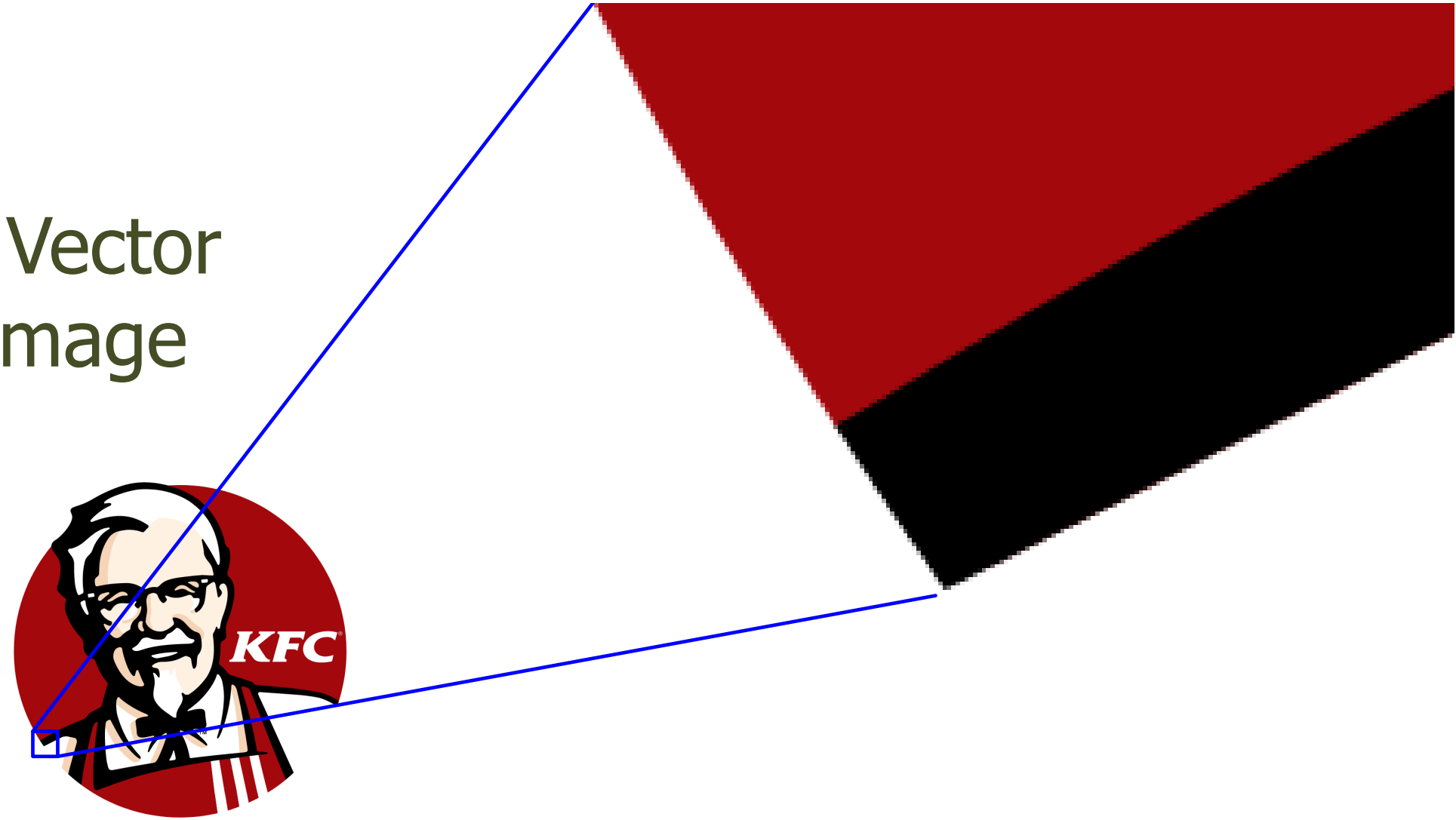
Basic Types of Image

- If you want to display an image in a browser, there are two general approaches:
  1. Bitmap images
  2. Vector graphics

A Bitmap Image



A Vector Image

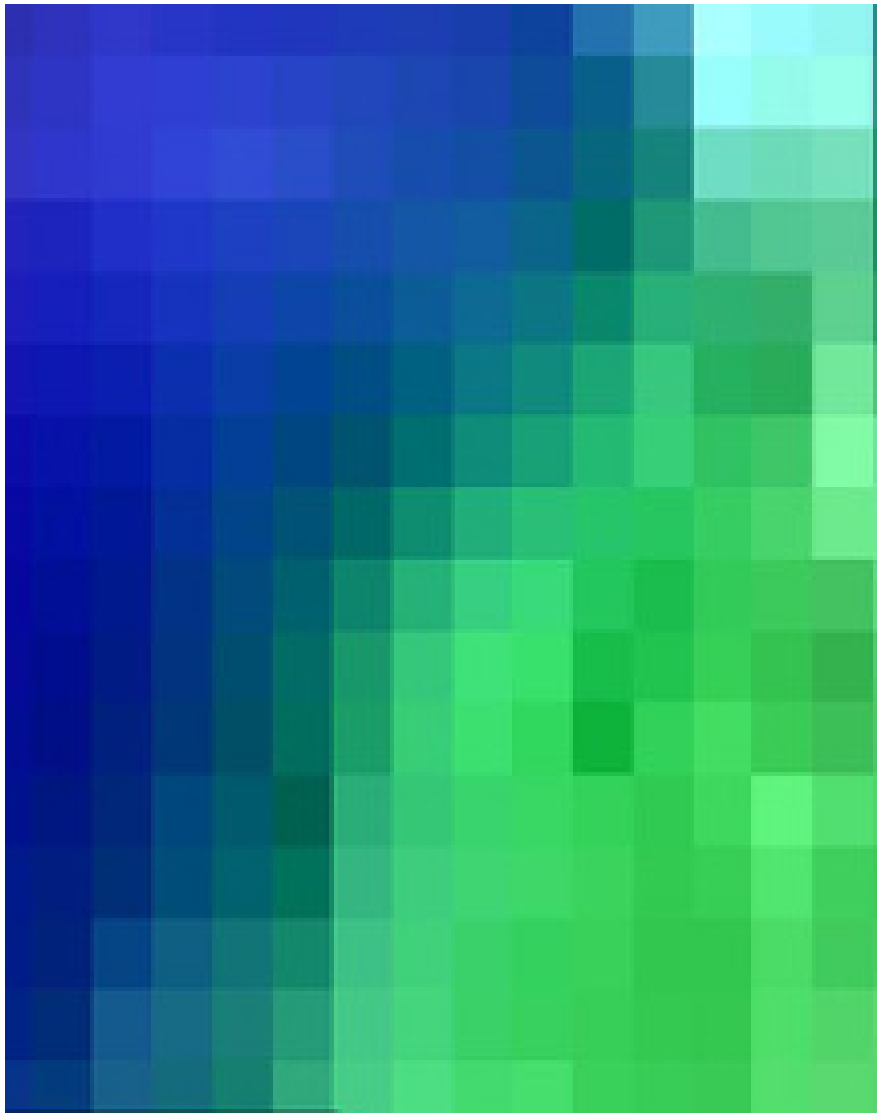


Bitmap Image Formats

- Some common bitmap image formats for the web are:
  - GIF – old format for images with <=256 colours
  - JPEG – best for images of 'natural' things (such as photographs of people, places)
  - PNG – high compression file format which does not change the pixels; this is the main web format for bitmap images
- These are all pixel based systems (=bitmap formats)

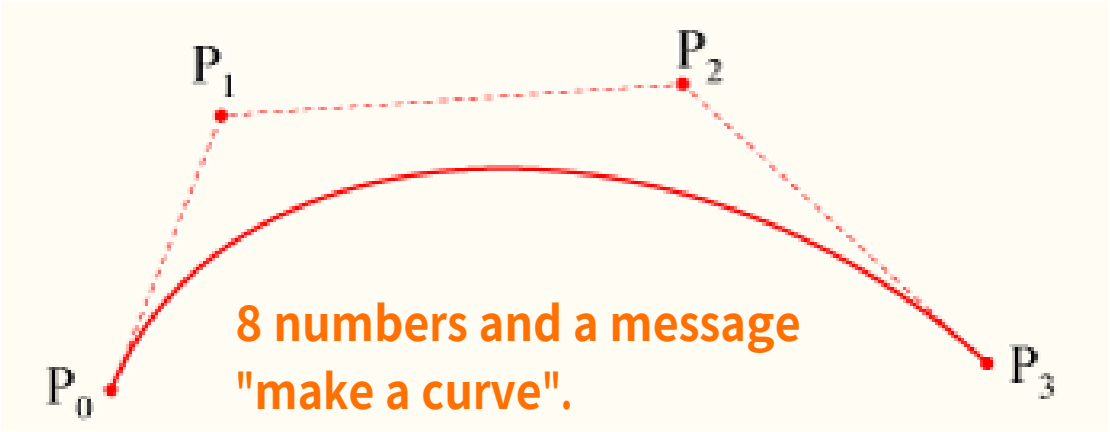
Bitmap Images

- With bitmap images
  - Looks poor when you zoom in/print it (if not enough pixels)
  - They are static (=non-moving), or sometimes can do simple animation by looping (such as animated GIF files)
  - File size can be large



very hard to move just a part of a bitmap image.

Vector Graphics



- With vector systems
  - Everything is mathematically represented
  - Get perfect quality, looks great even when you zoom in/print
  - Everything in the image is ‘separate’
  - This means e.g. dynamic change can be easily applied to some specific things in the image (=animation)
  - Often much smaller file size than bitmap images, so less disk space & less time needed for download

Vector Graphics on the Web

- There are two main ways to display vector graphics in a browser:
  - Canvas `<canvas> … </canvas>`
    - This is a bitmap system which has some vector graphics commands
  - SVG `<svg> … </svg>` svg: scalable vector graphics
    - This is mainly for vector graphics

Possible Uses of Canvas

1. An image where nothing moves
2. An image which is controlled by JavaScript
   – JavaScript can react to user input
     and change anything at any time

Open this HTML in the browser, you can right click and save the image, because it is handled as a bitmap image.
In svg, you cannot save the image. Because svg is a vector system and it does not handle specific pixels.

```
<!DOCTYPE html>
<html>
<body>
<canvas id="myCanvas" width="300" height="200"
    style="border:1px solid grey">
</canvas>

<script>
var c = document.getElementById("myCanvas");
var ctx = c.getContext("2d");
ctx.moveTo(0, 0);
ctx.lineTo(300, 200);
ctx.stroke();
</script>
</body>
</html>
```

stoke = line

Canvas Example

Possible Uses of SVG

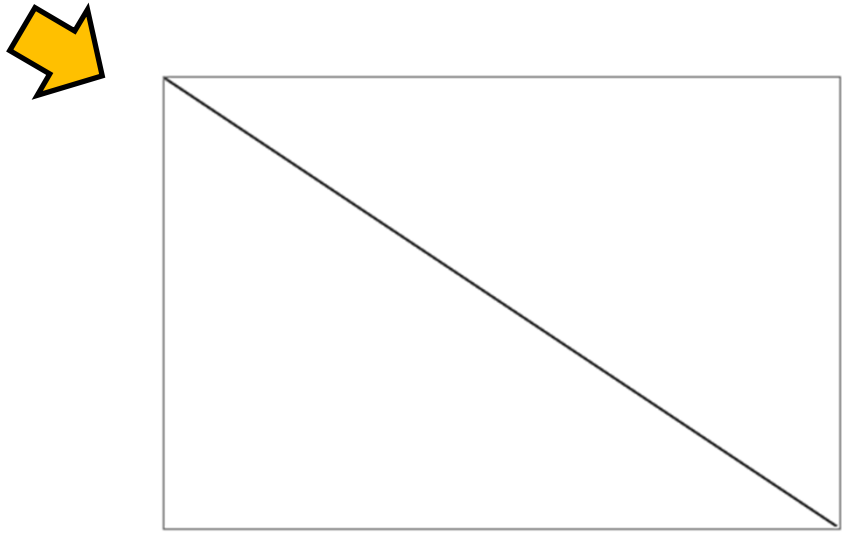
1. An image where nothing moves
2. An image where some things move (animation)
   – Animation commands are included in SVG
3. An image which is controlled by JavaScript
   – JavaScript can react to user input
     and change anything at any time

We can do some clever animations without using javascript.

```
<!DOCTYPE html>
<html>
<body>

<svg width="300" height="200" style="border:1px solid grey">
  <line x1="0" y1="0" x2="300" y2="200" style="stroke:black" />
</svg>

</body>
</html>
```



SVG Example