

# Grafika i animacija u HTML5

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# Uvod

- HTML (*HyperText Markup Language*) – prezentacijski jezik za izradu web stranica
- **HTML5** – novi standard HTML-a
- Uvodi nova pravila:
  - Nove grafičke osobine (HTML, CSS, DOM, JavaScript)
  - Bolje rukovanje pogreškama
  - Neovisnost o uređaju
  - Više označavanja, manje skriptiranja
  - Razvojni proces bi trebao biti vidljiv javnosti

# Nove grafičke osobine

- *Canvas* element
- WebGL
- SVG (*Scalable Vector Graphics*)
- CSS 3
- SMIL (*Synchronized Multimedia Integration Language*)

# *Canvas* element

- tag <canvas>
- predstavlja revolucionarnu mogućnost dinamičkog generiranja sofisticirane grafike na klijentskoj strani (web pregledniku)
- koristi JavaScript
- WebGL → API za 3D grafiku
- prvi put uveo *Apple* u preglednik *Safari 1.3*
- nije potreban *Flash*

# *Canvas* element

- potrebno je provjeriti da li naš web preglednik podržava *canvas* element
- potrebno je osigurati *fallback* sadržaj kako bi korisnici znali da nešto nije u redu
- Najjednostavniji način za provjeru da li browser podržava *canvas* je kreiranje  jednostavnog *canvas* elementa te provjera da li možemo izvršiti *getContext()* metodu

```
function isCanvasSupported(){
  return !!document.createElement('canvas').getContext;
}
```

# Jednostavan primjer

```
<!DOCTYPE HTML>
<html>
    <head>
        <script>
         window.onload = function(){
            var canvas = document.getElementById("myCanvas");
            var context = canvas.getContext("2d");
           // crtanje
          };
        </script>
    </head>
    <body>
        <canvas id="myCanvas" width="578" height="200">
         </canvas>
    </body>
</html>
```

# *Canvas* - Crtanje poligona

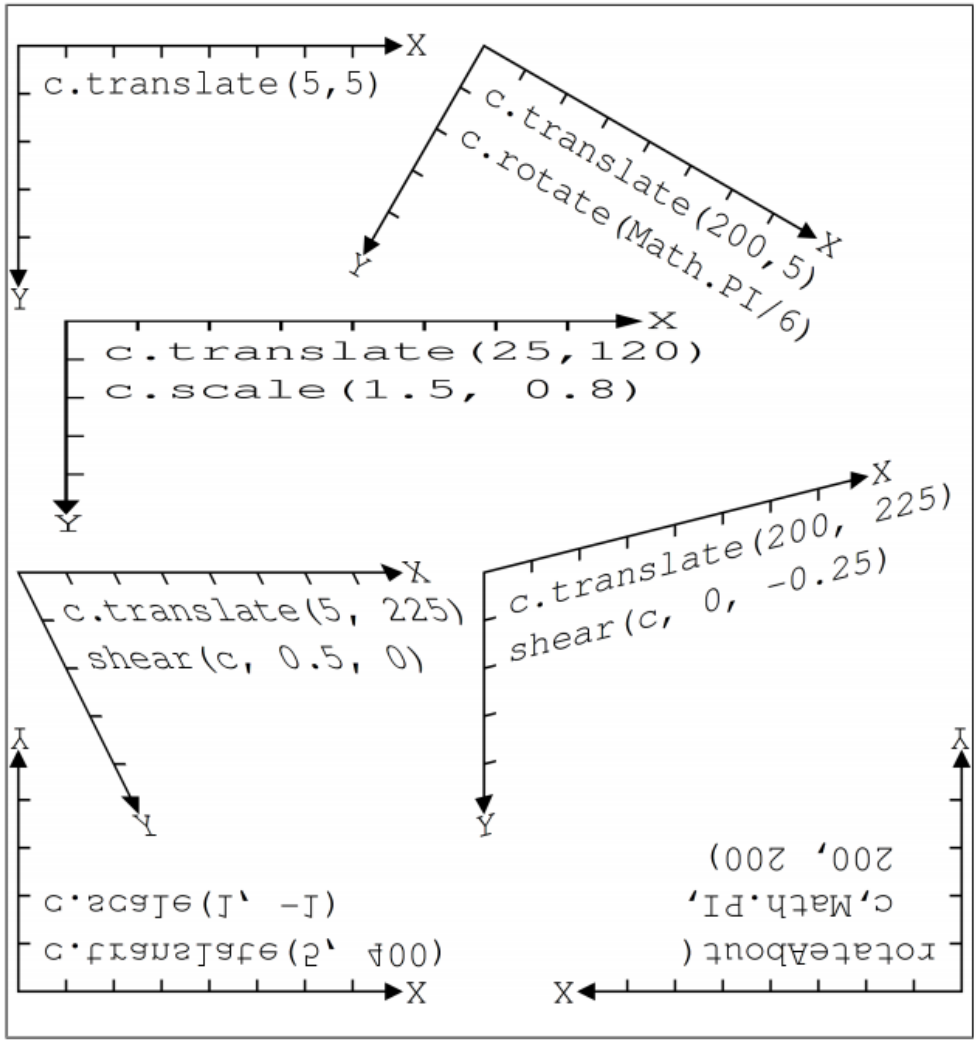
- primjer: crtanje pravokutnika

```
<script>
        window.onload = function(){
                var canvas = document.getElementById("myCanvas");
                 var context = canvas.getContext("2d");
                 context.rect(canvas.width / 2 - 100, canvas.height / 2 - 50, 200,100);
                 context.fillStyle = "#8ED6FF";
                 context.fill();
                 context.lineWidth = 5;
                 context.strokeStyle = "black";
                 context.stroke();
            };
 </script>
```

# Transformacije u koordinatnom sustavu

- *x* koordinata se povećava u desno, *y* koordinata se povećava prema dolje
- koristi se matrica transformacija
- naredbe:
  - *translate()*
  - *rotate()*
  - *scale()*

# Transformacije u koordinatnom sustavu – primjer 1



# Transformacije u koordinatnom sustavu – primjer 2

```
<!DOCTYPE HTML>
<html>
 <head>
   <style>
      body { margin: 0px;  padding: 0px; }
      #myCanvas { border: 1px solid #9C9898;  }
   </style>
 </head>

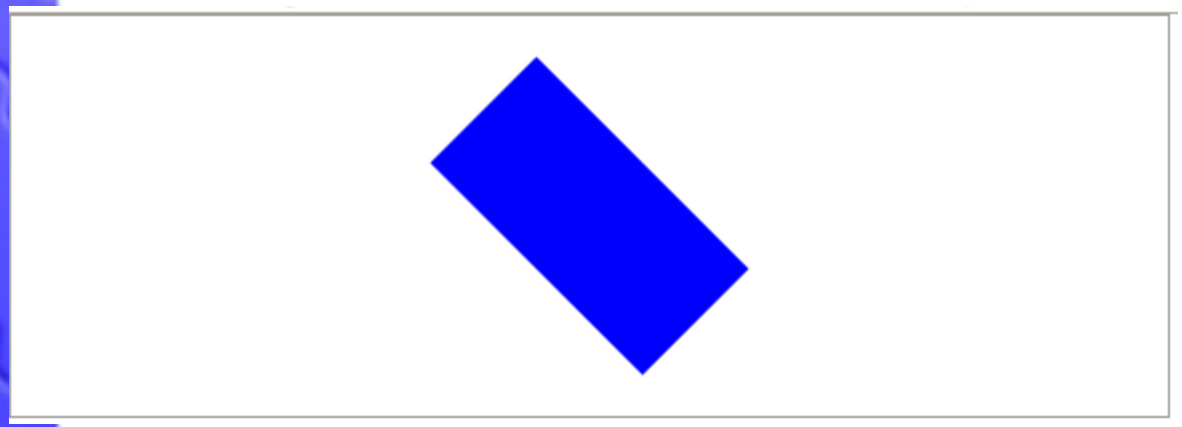
 <body>
    <canvas id="myCanvas" width="578" height="200"></canvas>
    <script>
      var canvas = document.getElementById('myCanvas');
      var context = canvas.getContext('2d');
      var rectWidth = 150;
      var rectHeight = 75;

      // translate context to center of canvas
      context.translate(canvas.width / 2, canvas.height / 2);

      // rotate 45 degrees clockwise
      context.rotate(Math.PI / 4);

      context.fillStyle = 'blue';
      context.fillRect(rectWidth / -2, rectHeight / -2, rectWidth, rectHeight);
    </script>
 </body>
</html>
```

# Transformacije u koordinatnom sustavu – primjer 2



- Primjer preuzet sa http://www.html5canvastutorials.com/advanced/html5-canvas-transform-rotate-tutorial/
- Još primjera: http://www.html5canvastutorials.com/advanced/html5-canvas-advanced-tutorials-introduction/

# *Canvas* - Tekst

Metode

- *fillText()* – crta tekst
- *fillStyle()* – definira stil teksta
- *strokeText()* – za specijalne efekte
- *measureText()* – mjeri širinu teksta

Svojstva

- *font*
- *textAlign*
- *textBaseline*

- *Za više informacija pogledati http://www.html5canvastutorials.com/tutorials/html5-canvas-text-font-size/*

# textBaseline, textAlign

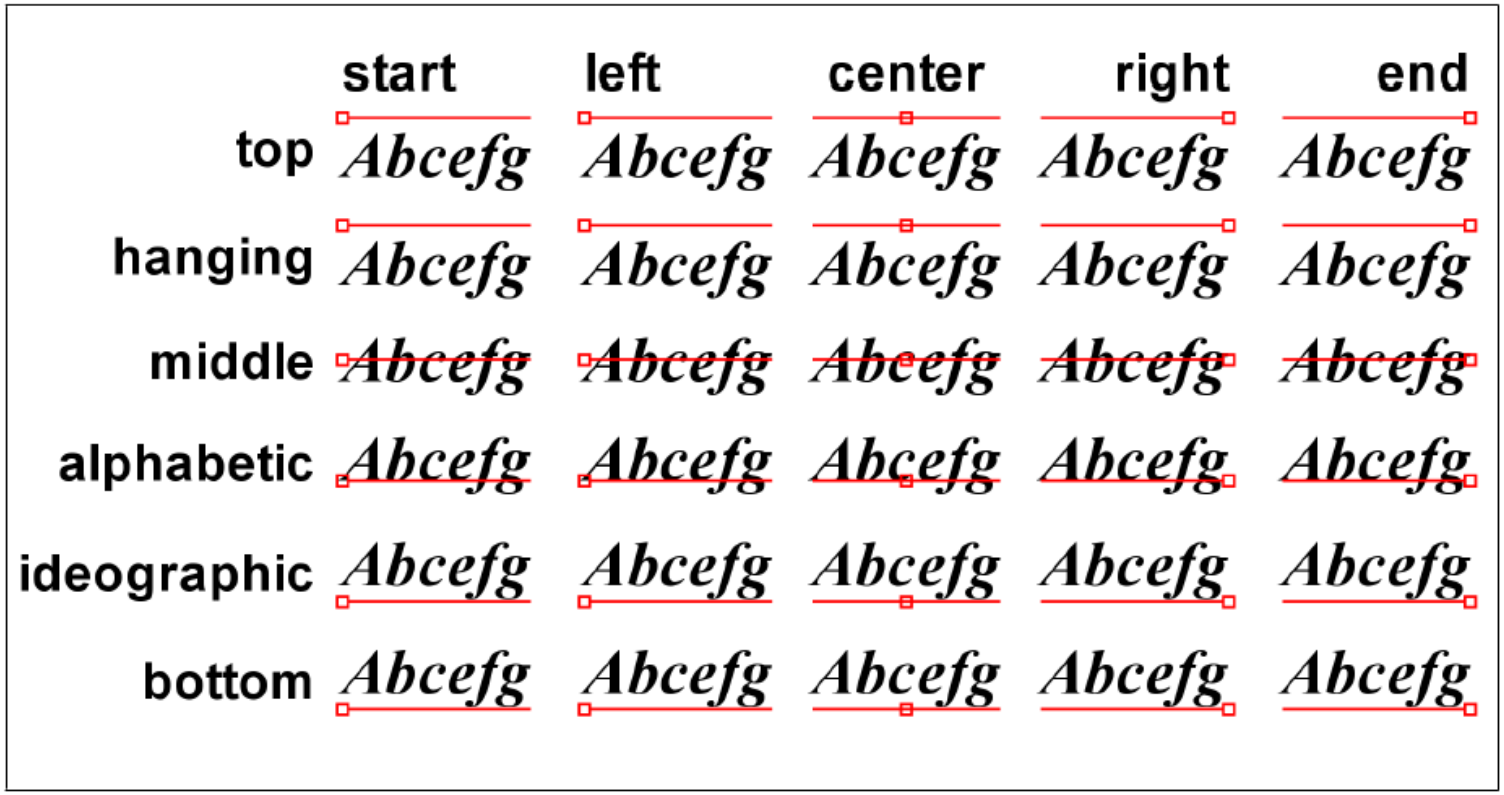



*Figure 1-9. The textAlign and textBaseline properties*

# Canvas – Tekst (primjer)

```
<!DOCTYPE HTML>
<html>
  <head>
    <style>
      body {
        margin: 0px;
        padding: 0px;
      }
      #myCanvas {
        border: 1px solid #9C9898;
      }
    </style>
  </head>
  <body>
    <canvas id="myCanvas" width="578" height="200"></canvas>
    <script>
      var canvas = document.getElementById('myCanvas');
      var context = canvas.getContext('2d');
      var x = 80;
      var y = 110;

      context.font = '60pt Calibri';
      context.lineWidth = 3;
      // stroke color
      context.strokeStyle = 'blue';
      context.strokeText('Hello World!', x, y);
    </script>
  </body>
</html>
```

# Canvas – Tekst (primjer)



# Canvas – Text

- Malo motivacije ☺




- Još motivacije na stranici http://www.html5rocks.com/en/tutorials/canvas/texteffects/

# Glazba i video

- Moguće dodati na canvas, ali malo nezgodno, mnogo linija koda
- Jednostavnije ubaciti izvan canvasa

# Glazba

## Audio Formats and Browser Support

Currently, there are 3 supported file formats for the <audio> element: MP3, Wav, and Ogg:

| Browser | MP3 | Wav | Ogg |
|---|---|---|---|
| Internet Explorer 9+ | YES | NO | NO |
| Chrome 6+ | YES | YES | YES |
| Firefox 3.6+ | NO | YES | YES |
| Safari 5+ | YES | YES | NO |
| Opera 10+ | NO | YES | YES |

# Glazba - primjer

```
1  <!DOCTYPE HTML>
2  <html>
3      <head>
4          <title>Christmas card</title>
5          <meta charset="utf-8">
6          <link href="pahulje.css" rel="stylesheet" type="text/css"/>
7          <script src="pahulje.js">
8          </script>
9      </head>
10     <body>
11     <canvas id="scene" width="1600"  height="800" >
12     </canvas>
13     <audio class="center" src="pjesmaS.ogg" controls loop autoplay></audio>
14     </body>
15 </html>
16
```

# Video

## Video Formats and Browser Support

Currently, there are 3 supported video formats for the <video> element: MP4, WebM, and Ogg:

| Browser | MP4 | WebM | Ogg |
|---|---|---|---|
| Internet Explorer 9+ | YES | NO | NO |
| Chrome 6+ | YES | YES | YES |
| Firefox 3.6+ | NO | YES | YES |
| Safari 5+ | YES | NO | NO |
| Opera 10.6+ | NO | YES | YES |

- MP4 = MPEG 4 files with H264 video codec and AAC audio codec
- WebM = WebM files with VP8 video codec and Vorbis audio codec
- Ogg = Ogg files with Theora video codec and Vorbis audio codec

# Video – primjer 1

```
<!DOCTYPE HTML>
<html>
    <head>
        <title>Christmas card</title>
        <meta charset="utf-8">
        <link href="pahulje.css" rel="stylesheet" type="text/css"/>
        <script src="crta_math_fraktal.js">
        </script>
    </head>
    <body>
    <canvas id="canvas" width="1600" height="420">
    </canvas>
    <video class='center'  src="funny.ogv" type="video/ogg" autoplay="true" controls="true">
    </video>
    </body>
</html>

```

# Video – primjer 2

- Dodavanje videa na canvas u 4 koraka
- Primjer preuzet iz knjige:
  - Eric Rowell: HTML5 Canvas Cookbook

# Video – primjer 2

1. Create a cross-browser method that requests an animation frame:

```
window.requestAnimFrame = (function(callback){
    return window.requestAnimationFrame ||
    window.webkitRequestAnimationFrame ||
    window.mozRequestAnimationFrame ||
    window.oRequestAnimationFrame ||
    window.msRequestAnimationFrame ||
    function(callback){
        window.setTimeout(callback, 1000 / 60);
    };
})();
```

# Video – primjer 2

2. Define the `drawFrame()` function which copies the current video frame, pastes it onto the canvas using the `drawImage()` method, and then requests a new animation frame to draw the next frame:

```
function drawFrame(context, video){
    context.drawImage(video, 0, 0);
    requestAnimFrame(function(){
        drawFrame(context, video);
    });
}
```

# Video – primjer 2

3. Define the canvas context, get the video tag, and draw the first video frame:

```
window.onload = function(){
    var canvas = document.getElementById("myCanvas");
    var context = canvas.getContext("2d");
    var video = document.getElementById("myVideo");
    drawFrame(context, video);
};
```

# Video – primjer 2

4. Embed the canvas and the video tag inside the body of the HTML document:

```
<video id="myVideo" autoplay="true" loop="true"
style="display:none;">
    <source src="BigBuckBunny_640x360.ogv" type="video/ogg"/
><source src="BigBuckBunny_640x360.mp4" type="video/mp4"/>
</video>
<canvas id="myCanvas" width="600" height="360" style="border:1px
solid black;">
</canvas>
```

# SVG grafika




- ***S**calable **V**ector **G**raphics*
- jezik za opisivanje 2D-grafike u XML-u
- ugrađivanje  u HTML5 kod:

```
<svg xmlns="http://www.w3.org/2000/svg">
</svg>
```

# Canvas vs. SVG

**Canvas**

- rasterska grafika
- nema DOM elemenata
- nema API za animaciju
- slabije mogućnosti renderiranja teksta
- visoke performanse crtanja 2D grafike

**SVG**

- raniji standard za crtanje u pregledniku
- vektorska grafika
- slike reprezentirane u XML-u
- rukovatelji događajima povezani sa objektima
- s povećanjem kompleksnosti smanjuju se performanse renderiranja

# Zaključak

- Početak rada sa HTML5: „Uuuuu.. Zanimljivo!”
- Nakon par sati uz HTML5: „Užas! Nepotrebne komplikacije, tko je ovo smislio?! >.< ”
- Nakon par dana uz HTML5: „Hmmm.. A možda i nije tak loše.. Ima zanimljivih stvari…samo treba više prakse.”

# Literatura


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- http://www.w3schools.com/html/html5_intro.asp
- http://www.html5tutorial.info/html5-canvas-text.php