

HTML5 Canvas

Cvičení 6

Z8144 Počítačová grafika v kartografii

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UKÁZKY HTML CANVAS

- <http://www.effectgames.com/demos/canvascycle/>
- <http://www.sinuousgame.com/>
- <https://lab.hakim.se/trail/03/>
- <http://kennethjorgensen.com/blog/2014/canvas-trees> –
zmáčkněte F5
- <https://mario5.florian-rappl.de/#menu>

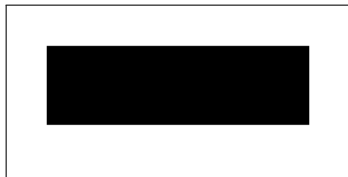
DEFINICE CANVAS

```
<canvas width="250" height="120" id="draw"></canvas>
```

```
const DRAW_CANVAS = document.getElementById("draw");
```

KRESLENÍ CANVAS

```
const DRAW_CANVAS = document.getElementById("draw");  
const DRAW_CONTEXT = DRAW_CANVAS.getContext("2d");  
DRAW_CONTEXT.fillRect(25, 25, 200, 60);
```



`.getContext("2d")`? A co **3d**?

`.getContext("2d")`? A co **3d**? → **WebGL**

.getContext("2d")? A co **3d**? → **WebGL**
Trochu jiný vesmír ...

OBDELNÍKY

```
DRAW_CONTEXT.rect(x, y, width, height)  
DRAW_CONTEXT.fillRect(x, y, width, height)  
DRAW_CONTEXT.strokeRect(x, y, width, height)  
DRAW_CONTEXT.clearRect(x, y, width, height)
```


BARVY – FILL, STROKE

```
DRAW_CONTEXT.fillStyle = "#rrggbb";  
DRAW_CONTEXT.strokeStyle = "#rrggbb";
```

Nastaví barvy pro další kreslení.

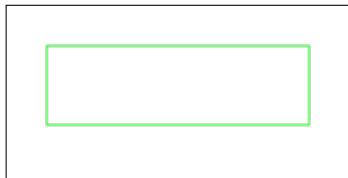
FILL – PŘÍKLAD

```
const DRAW_CANVAS = document.getElementById("draw");  
const DRAW_CONTEXT = DRAW_CANVAS.getContext("2d");  
DRAW_CONTEXT.fillStyle = "#ff0000";  
DRAW_CONTEXT.fillRect(25, 25, 200, 60);
```



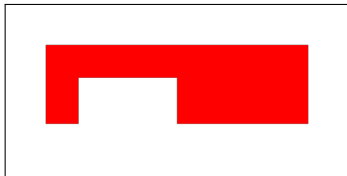
STROKE – PŘÍKLAD

```
const DRAW_CANVAS = document.getElementById("draw");  
const DRAW_CONTEXT = DRAW_CANVAS.getContext("2d");  
DRAW_CONTEXT.strokeStyle = "#00ff00";  
DRAW_CONTEXT.strokeRect(25, 25, 200, 60);
```



CLEAR

```
const DRAW_CANVAS = document.getElementById("draw");  
const DRAW_CONTEXT = DRAW_CANVAS.getContext("2d");  
DRAW_CONTEXT.fillStyle = "#ff0000";  
DRAW_CONTEXT.fillRect(25, 25, 200, 60);  
DRAW_CONTEXT.clearRect(50, 50, 75, 75);
```



REFERENCE

- http://www.w3schools.com/tags/ref_canvas.asp
- <http://diveintohtml5.info/canvas.html>

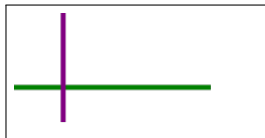
CANVAS PATH

```
fill()  
stroke()  
beginPath()  
moveTo()  
closePath()  
lineTo()  
clip()  
quadraticCurveTo()  
bezierCurveTo()  
arc()  
arcTo()  
isPointInPath()
```

BEGINPATH

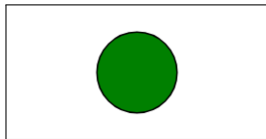
https://www.w3schools.com/tags/canvas_beginpath.asp

```
const DRAW_CANVAS = document.getElementById("draw");  
const DRAW_CONTEXT = DRAW_CANVAS.getContext("2d");  
  
DRAW_CONTEXT.beginPath();  
DRAW_CONTEXT.lineWidth="5";  
DRAW_CONTEXT.strokeStyle="green";  
DRAW_CONTEXT.moveTo(0,75);  
DRAW_CONTEXT.lineTo(200,75);  
DRAW_CONTEXT.stroke();  
  
DRAW_CONTEXT.beginPath();  
DRAW_CONTEXT.strokeStyle="purple";  
DRAW_CONTEXT.moveTo(50,0);  
DRAW_CONTEXT.lineTo(50,110);  
DRAW_CONTEXT.stroke();
```



KRUH

```
const DRAW_CANVAS = document.getElementById("draw");  
const DRAW_CONTEXT = DRAW_CANVAS.getContext("2d");  
  
const CX = DRAW_CANVAS.width / 2;  
const CY = DRAW_CANVAS.height / 2;  
const R = 70;  
DRAW_CONTEXT.beginPath();  
DRAW_CONTEXT.arc(CX, CY, R, 0, 2 * Math.PI, false);  
DRAW_CONTEXT.lineWidth = 3;  
DRAW_CONTEXT.strokeStyle = '#000000';  
DRAW_CONTEXT.stroke();  
DRAW_CONTEXT.fillStyle = 'green';  
DRAW_CONTEXT.fill();
```



1. ÚKOL

Nakreslete sněhuláka v canvas.

CLICK EVENTY

```
const DRAW_CANVAS = document.getElementById("draw");

DRAW_CANVAS.addEventListener('click', function(evt) {
  const CX = evt.pageX;
  const CY = evt.pageY;
  const CANVAS_BOX = DRAW_CANVAS.getBoundingClientRect();
  const RX = CX - CANVAS_BOX.left;
  const RY = CY - CANVAS_BOX.top;
  alert("CX:" + CX + ", CY:" + CY + " | " + "RX:" + RX + ", RY:" +
    ↪ RY);
}, false);
```

KOREKTNÍ DETEKCE MÝŠI

viz http://www.quirksmode.org/js/events_properties.html#position

```
function doSomething(e) {
  let posx = 0;
  let posy = 0;
  if (!e) let e = window.event;
  if (e.pageX || e.pageY) {
    posx = e.pageX;
    posy = e.pageY;
  }
  else if (e.clientX || e.clientY)    {
    posx = e.clientX + document.body.scrollLeft
      + document.documentElement.scrollLeft;
    posy = e.clientY + document.body.scrollTop
      + document.documentElement.scrollTop;
  }
  // posx and posy contain the mouse position relative to the
  ↪ document
}
```

KOREKTNÍ DETEKCE MYŠI 2

```
function doSomething(e) {  
  ...  
  // posx and posy contain the mouse position relative to the  
  ↪ document  
  const CANVAS_BOX =  
    ↪ document.getElementById("draw").getBoundingClientRect();  
  
  const C_POSX = CANVAS_BOX.left + document.body.scrollLeft  
    + document.documentElement.scrollLeft;  
  const C_POSY = CANVAS_BOX.top + document.body.scrollTop  
    + document.documentElement.scrollTop;  
  
  const RELATIVE_X = POSX - C_POSX;  
  const RELATIVE_Y = POSY - C_POSY;  
  
  alert(RELATIVE_X + " " + RELATIVE_Y);  
}
```

2. ÚKOL

- V canvas vytvořte bílou plochu
- Po kliknutí do plochy se v ní objeví červený kruh s orámováním na pozici myši

2. ÚKOL – BONUS

- V canvas vytvořte bílou plochu
- Po kliknutí do plochy se v ní objeví červený kruh s orámováním na pozici myši
- V ploše zůstane zobrazeno maximálně 5 kruhů, starší budou postupně blednout

3. ÚKOL

- Vytvořte 2 verze hry “Tic Tac Toe”
- Jedna z těchto verzí bude v **SVG (+JS)** a druhá v **HTML5 canvas (+JS)**
- Pravidla viz <http://en.wikipedia.org/wiki/Tic-tac-toe>
- Hra nemusí obsahovat „umělou inteligenci“. V tomto případě se „hráči“ střídají. (Jednou po kliknutí křížek, jednou kolečko).
- Použijte co nejvíce **společného JS kódu**.
- **3 týdny na vypracování**, 17. konzultační hodina
- možno získat až **60 bodů**
- úkol odevzdávejte jako **jeden HTML** soubor nebo **archiv .zip**
- 24. 4. JS knihovny, 15. 5. animace?

Díky za pozornost!

<https://discord.gg/UHTPUDU>