Multimedia-Programmierung
Übung 5

Ludwig-Maximilians-Universität München
Sommersemester 2015

Today

- Recap on javascript
- CreateJS, “a suite of javascript libraries & tools for building rich, interactive experiences with HTML5.”

JavaScript - Introduction

- scripting language
- often used for dynamic web applications → client-side scripts
- can be combined with HTML and CSS
- asynchronous communication with web server possible
- many tools and libraries available for JavaScript e.g. jQuery or CreateJS

- Useful Links:
  - JavaScript API
  - W3-Schools Tutorials
  - SELFHTML Tutorials

JavaScript - JavaScript and HTML

- embedding JavaScript in HTML directly

```
<html>
   <head>
          <script>
                // Do something
          </script>
   </head>
   <body>...
```

a comment in JavaScript

- embedding external JavaScript

```
    <script src="myScript.js"></script>
```

JavaScript - Variables

- Declaring variables

```
var a, b, c;
var d = 0;
```

declare multiple variables within a single statement

- Using variables

```
var myString = "text";
myString = ‘some other text’
myString = 42;
```

the type of a variable changes dynamically at runtime depending to its content

JavaScript - Arrays and Objects

- Arrays

```
var array = [0,1,"many"];
var first = array[0];
```

- Objects

```
var person = {firstName: "MMP",
       lastName: "rocks", id: 42};
var firstName = person["firstName"];
var lastName = person.lastName;
```

both notations are equivalent

JavaScript - Events and DOM Manipulation

```
<script>
   function onClickFunction() {
      var par=document.getElementById("p1");
      par.innerHTML="Hello World";
   }
</script>
…

<button onclick="onClickFunction()">Klick mich</button>
<p id="p1"> </p>
```

get DOM elements

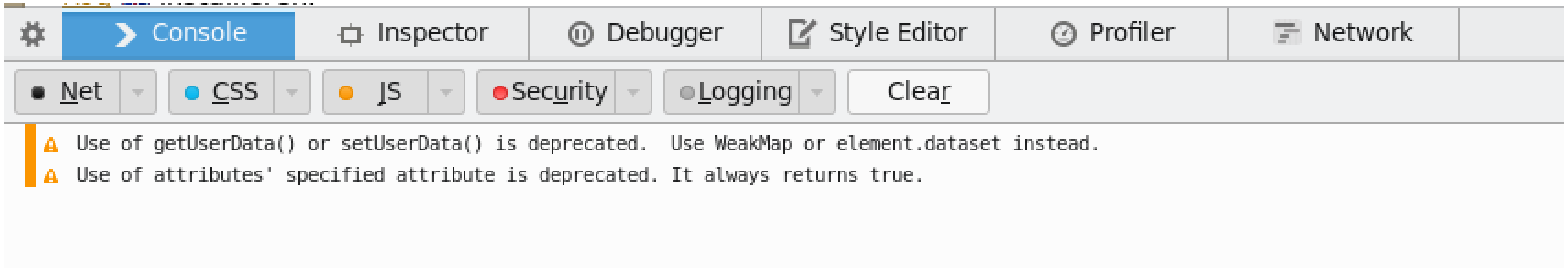
manipulate DOM elements

event handling

JavaScript - Debugging

Use web console in your browser to debug your javascript code:

- Web Console in Firefox (Ctrl + Shift + K)
- JavaScript Console in Chrome (Ctrl + Shift + J)
- Safari (Ctrl + Alt + I)
- Opera (Ctrl + Shift + I)



```
Use of getUserData() or setUserData() is deprecated.  Use WeakMap or element.dataset instead.
Use of attributes' specified attribute is deprecated. It always returns true.
```

Use `console.log(“my log message”)` to output text to the console

JavaScript - Libraries

Popular JavaScript Libraries:

- jQuery
- Modernizr
- D3
- Ext JS
- MooTools
- Prototype
- ASP.NET Ajax
- AngularJS
- YUI Library
- JQuery Mobile
- …
- EaselJS, TweenJS, SoundJS, PreloadJS
  More on the following slides!

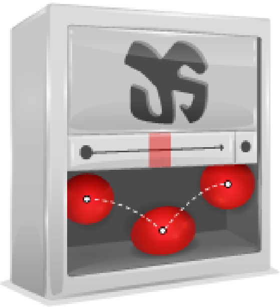
CreateJS - Introduction

- “A suite of Javascript libraries & tools for building rich, interactive experiences with HTML5”
- Download, Docs and Demos : http://www.createjs.com

graphics from www.createjs.com

CreateJS - Modules

EaselJS



TweenJS

SoundJS

PreloadJS

graphics from www.createjs.com

CreateJS - Getting Started

```
<!DOCTYPE html>
<html>
   <head>
      <script src="http://code.createjs.com/
            createjs-2013.12.12.min.js"></script>
      ...

   </head>
   <body onload="init()">
      <canvas width="500px" height="800" id="canvas">
            Your Browser does not support Canvas</canvas>
   </body>
</html>
```

HTML 5

embed createJS

start your own code once all elements are loaded

id to access the canvas within your javascript code

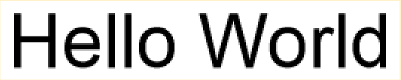
EaselJS - The canvas is your stage

```
<script>
      var stage, text;
      function init() {
            stage = new createjs.Stage("canvas");
            text = new createjs.Text("Hello World", "50px
                  Arial", "black");
            stage.addChild(text);
            stage.update();
      }
</script>
```

create a stage-Object from your Canvas

never forget to update the stage :)

Output :



Hello World

EaselJS - Shapes

- Drawing shapes with EaselJS

use shape objects to display and transform graphics

```
var shape = new createjs.Shape();
shape.graphics.beginFill("green").drawRect(0,0,100,100);
stage.addChild(shape);

var graphics= new createjs.Graphics();
graphics.beginFill("blue").drawRect(50,50,100,100);
var blueRect = new createjs.Shape(graphics);
stage.addChild(blueRect);

stage.update();
```

use this approach to share the same graphics

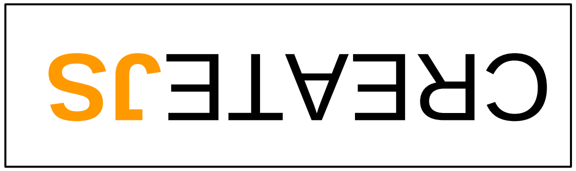
EaselJS - Shape transformations

- Transforming Shapes

```
shape.x = 50;
shape.scaleX = 1;
shape.regX = 50;
shape.regY = 50;
shape.rotation = 180;
```

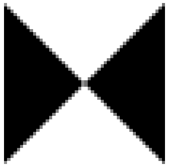
use negative scaling values to flip an object

use the reg attribute to set an object's center (i.e. for later rotation)



EaselJS - Drawing and Images

- Method chaining with graphics



```
var shape = new createjs.Shape();
shape.graphics.beginFill("black").moveTo(50,50)
       .lineTo(100,100).lineTo(100,50).lineTo(50,100);
shape.graphics.closePath();
```

each step returns a graphics object

- Working with images

```
var bitmap = new createjs.Bitmap("filename.jpg");
var bitmap_copy=bitmap.clone();

var blurFilter = new createjs.BlurFilter(32, 16, 2);
bitmap.filters=[blurFilter];
bitmap.cache(0,0,100,100);
```

create new bitmap from path

apply filters to the bitmap

EaselJS - Event Handling

- Shape events

  mousedown, mouseup, mouseout, mousein, pressmove, pressup, click, dblclick, rollout, rollover, tick..

- Stage events

  stagemousedown, stagemousemove, stagemouseup, drawnd, drawstart…

Get mouse position for stage event with `event.stageX` and `event.stageY`

PreloadJS - Introduction & LoadQueue

- Used for preloading images and get real-time progress information

- Preloading resources

```
var manifest = [
        {id: "id_image_1", src: "loremipsum.png" },
        {id: "id_sound_1", src: "music.mp3" }
];
var queue = new createjs.LoadQueue(false);
queue.installPlugin(createjs.Sound);
queue.loadManifest(manifest);
```

list of resources to preload

Plugins need to be installed before loading resources that need them

PreloadJS - LoadQueue

start your main application here

- Queue Events

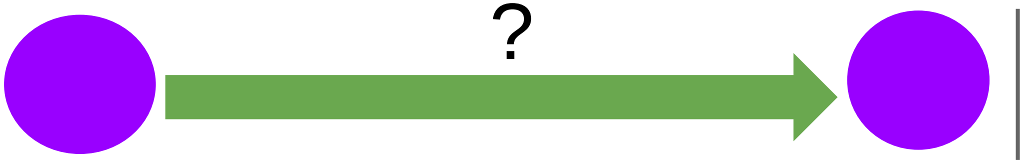
```
queue.addEventListener("complete", handleComplete);
queue.addEventListener("error", handleError);
...
```

- Retrieving Resources

```
var image = queue.getResult("id_image_1");
var bitmap = new createjs.Bitmap(image);
```

create a bitmap from your image to e.g. draw it on the stage

Simple Animations with EaselJS



How can we move the red circle from left to right?

- Increase x-position of circle continuously until the circle hits the wall

```
var circle, stage, radius=42;
...
function moveCircleToRight(){
    circle.x += 1;
    if (circle.x > stage.canvas.width -radius)
        { circle.x = 0; }
    }
```

reset x position when circle hits wall

Simple Animations with EaselJS II

- How often should moveCircleToRight be called?
- Use a ticker to call a function with each tick

```
createjs.Ticker.addEventListener("tick",
          moveCircleToRight());
```

add event listener for tick events

equivalent

```
createjs.Ticker.setFPS(40); //set max frames per second
createjs.Ticker.setInterval(25); //OR set min ms
between frames;
```

Advanced Animation with EaselJS

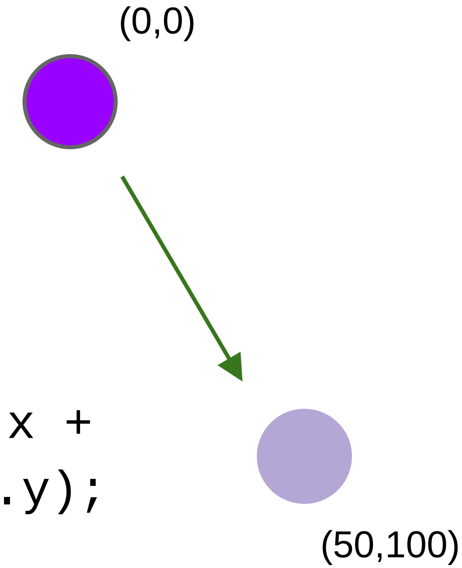
How can we move the circle in any direction?

- Use a vector to determine the direction

```
var start = {x:0,y:0};
var end = {x:50,y:100};
var tempDir = {x:(end.x - start.x),
               y:(end.y - start.y) };
```

- Normalize the direction vector

```
var length = Math.sqrt(tempDir.x * tempDir.x +
                       tempDir.y * tempDir.y);
var dir = {x:(tempDir.x/length),
           y:(tempDir.y/length)};
```



Advanced Animation with EaselJS II

- Define a speed for your circle to move with

```
var speed = 42;
```

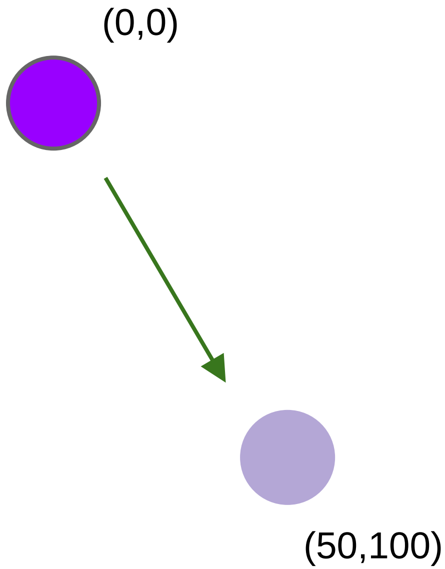
- Calculate the new position

exact values for further calculation

```
var newX = circle.x + dir.x * speed;
var newY = circle.y + dir.y * speed;

circle.x = Math.round(newX);
circle.y = Math.round(newY);
```

rounded values for the screen output



Animation with TweenJS

- Use tweens to animate properties

```
createjs.Ticker.addEventListener("tick",stage);createjs
.Tween.get(circle)
    .wait(500)
    .to({x:50,y:100},1000)
    .call(handleComplete);
```

target

target value and duration

- Loop and ease your animation

```
createjs.Tween.get(circle,{loop:true})
    .wait(500)
    .to({x:50,y:100},1000,createjs.Ease.cubicInOut);
```

More : http://www.createjs.com/#!/TweenJS/demos/sparkTable

Animation with TweenJS II

- Further Properties to add to your tween

  loop, useTicks, override, paused …

- Combine multiple tweens

create a paused tween

```
var tween1 = createjs.Tween.get(circle,{paused:true})
          .to({alpha:0},1000);

   createjs.Tween.get(circle,{useTicks:true})
          .to({x:50,y:100},25)
          .play(tween1);
```

use ticks instead of milliseconds

play the tween specified before

Useful Links

- CreateJS API: http://www.createjs.com/Docs/
- Tutorial EaselJS and Ticker: http://www.createjs.com/tutorials/Animation%20and%20Ticker/
- Tutorial Easel JS and Mouse Interaction: http://www.createjs.com/tutorials/Mouse%20Interaction/
- Tutorial EaselJS Getting Started: http://www.createjs.com/tutorials/Getting%20Started/
- CreateJS on Github (including sources for all examples, tutorials and demos): https://github.com/CreateJS