JavaScript animations and JQuery

cs380

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DIFFERENCE BETWEEN ‘==‘ AND ‘===‘

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Why two operators for comparison : ‘==’ and ‘===‘?

- JavaScript allows users the flexibility to make data types optional, while performing equivalence comparisons.
- Therefore, to implement these two different type of equivalence comparisons, JavaScript has two operators: “==“ and “===”.
- Other languages does not provide user with this flexibility . Hence, there is no requirement to have an additional comparison operator.

‘==’ Operator

- This operator compares the values without caring about their types.
- For example, if we have 2 == “2”, we will get true because this operator did not worry about the type but the value itself.
- Similarly, if we have 0 ==false, we get true as 0 is associated with false.
- We can write 2==2 and get true. But with this kind of comparisons (strict comparison), we would want to use ===.

‘===’ operator

- This operator is equivalent to our conventional equivalence comparison operator which is ‘==’
- We use === to compare the variables along with their data types
- For example, if we have 2 ===“2”, we will get false because we are comparing an integer with string.
- Similarly, if we have 0 === false, we will get false as these two are not the same: one is an integer while other is a Boolean.

Sources

- https://www.c-sharpcorner.com/article/difference-between-and-in-javascript2/

Presentations

- Scoping in JavaScript
  - https://docs.google.com/presentation/d/1GW1pH190pLh5rMZ0YBJphW3YbcMDbAufthnHgM71PLc/edit#slide=id.p
- Var, Let and Const
  - https://docs.google.com/presentation/d/1vSGR2S_uAYfFHCaO1KzerXLwdvp7X_ZvkJyorIoDflc/edit#slide=id.p

Javascript issue #4

```
<html>
    <head>
        <script src="../JQ/jquery-1.9.1.min.js"></script>
    </head>
    <body>
        <form >
            <input id="myinput" type="text">
            <button id="mybutton" onclick="doo();">Click Me</button>
        </form>
        <div id="mydiv"></div>
        <script>
            function doo() {
                $("#mydiv").html("Hello " + $("#myinput").val());
            }
        </script>
    </body>
</html>
```

Watching closely, the expected text shows up, briefly.

Why did it go away?

file:formprob.html

Promises

- fetch(‘products.json')
  - Puts a promise into the promise cloud which will result in putting the “then” into the Job Queue
  - First return value is effectively a new Promise
    - when it completes new then goes into Job Queue.

```
fetch('products.json').then(function(response) {
  return response.json();
}).then(function(json) {
  products = json;
  initialize();
}).catch(function(err) {
  console.log('Fetch problem: ' + err.message);
});
```

Promise Chaining

- initial promise executes resolve(1) (asynch)
- resolve puts then onto JobQueue
- “then” execution acts like a new promise, putting next then onto job queue.
- Etc
- This example all could have been done in single then, but what if you want to load a page, then load another based on the contents of the first
- In second example, JSON.parse .. is async so then gets executed when parse complete

```
var promise = new Promise(function(resolve, reject) {
  resolve(1);
});

promise.then(function(val) {
  console.log(val); // 1
  return val + 2;
}).then(function(val) {
  console.log(val); // 3
})
```

```
get('story.json').then(function(response) {
  return JSON.parse(response);
}).then(function(response) {
  console.log("Yey JSON!", response);
})
```

More Promising

```
<html>
    <head>
        <script src="../JQ/jquery-1.9.1.min.js"></script>
    </head>
    <body>
        <div id="countout"></div>
        <button onclick="push()" id="mybutton">Push Me</button>
        <script>
            var pushCount=0;
            $(document).ready(function() {
                $("#countout").html("Count " + pushCount);
            });
            function push() {
                gtsleep2(1000).then(function(val) {
                    pushCount++;
                    $("#countout").html(val + " " + pushCount);
                },
                function(reason) {
                    $("#countout").html("Rejected " + reason + " " + pushCount);
                });
            }
            function gtsleep2(ms)
            {
                return(new Promise(function(resolve, reject) {
                    setTimeout(function() { resolve("success"); }, ms);
                }));
            }
        </script></body></html>
```

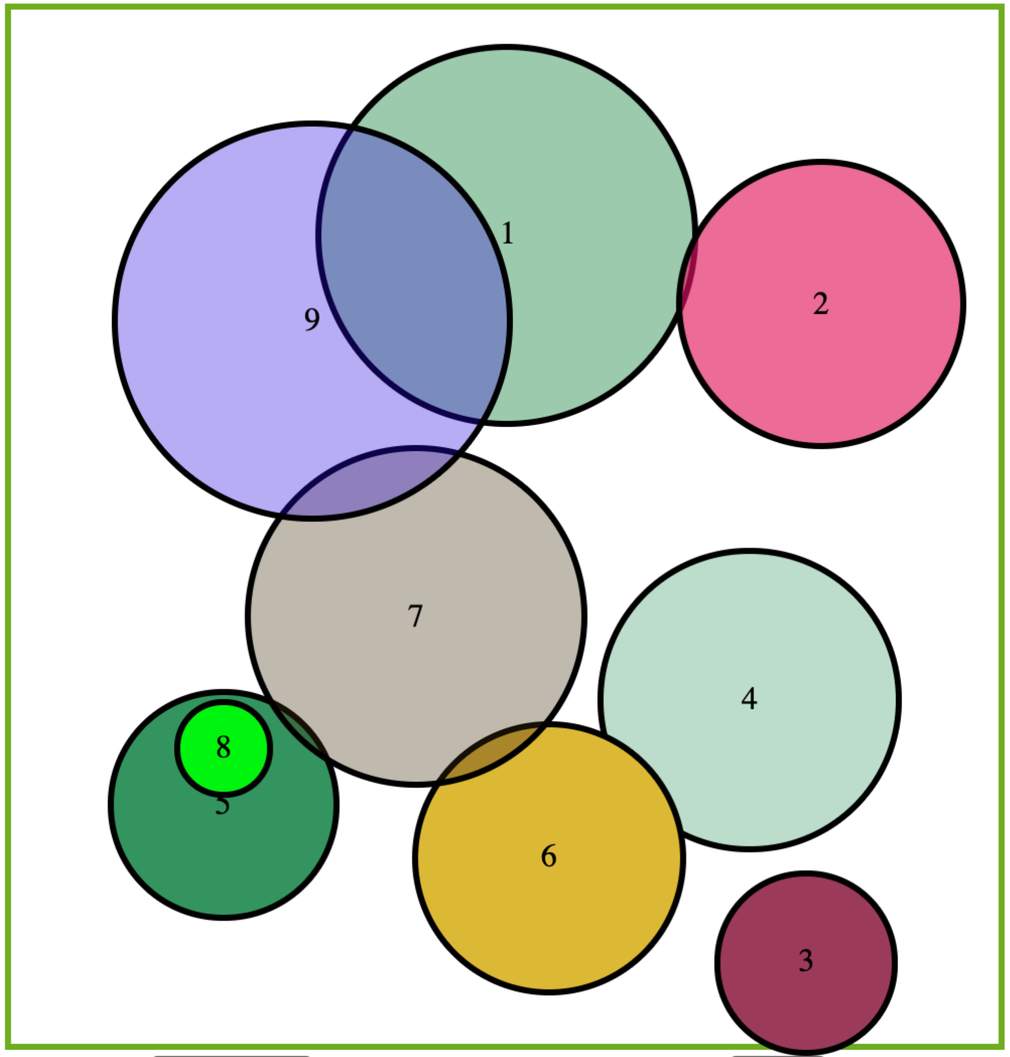
Two functions in then

depending on call to resolve

or reject in promise

file:eventloop3.html

Screen Drawing



b2.html

“Drawing” with divs

idea: make a div and put it where you want it

```
<html>
    <head>
        <script src="../JQ/jquery-1.9.1.min.js"></script>
        <style>
            .maind {
                width: 90%;
                height: 90%;
                margin-left: 50px;
                margin: auto;
                border: 3px solid #73AD21;
            }
            .balld {
                position: absolute;
                text-align: center;
                border: 3px solid black;
            }
            .bttn {
                height:45px
            }
        </style>
    </head>
```

DwD, part 2

The Layout

```
    <body>
        <div id="mdiv" class="maind"></div>
        <table width="100%">
        <tr><td width="50%"><center><button class="bttn" onclick="makeBall()">Add A Ball</button></center></td>
            <td><center><button class="bttn" onclick="clearBalls()">Clear</button></center></center></td>
        </tr>
        </table>
```

DwD, part 3

Javascript (using JQuery)

```
<script>
    //The number of balls created.
    var counter = 0;

    /**
     * Create a random color.  Actually this returns a string
     * which can be evaluated into a random color
     */
    function randomColor() {
        return (
            "rgba(" +
                Math.round(Math.random() * 250) + "," +
                Math.round(Math.random() * 250) + "," +
                Math.round(Math.random() * 250) + "," +
                Math.ceil(Math.random() * 10) / 3 + ")"
            );
        }
    /**
     * Clear all of the balls
     */
     function clearBalls() {
        $(".balld").remove();
    }
```

```
        function makeBall() {
                counter=counter+1;
                cnvas = $("#mdiv"); // get the place where the ball will
                tx = cnvas.width();
                ty = cnvas.height();
                radius = 14 + Math.random() * (0.4*(tx<ty ? tx : ty)); //
                x = Math.random() * (tx-radius); // ball location
                y = Math.random() * (ty-radius);
                // make the ball
                jelem = $('<div>'+counter+"</div>"); //document.createEle
                jelem.addClass("balld");
                jelem.css( {
                    'line-height':radius+'px',
                    'margin-left': x+'px',
                    'margin-top':y+'px',
                    "height": radius+'px',
                    'width':radius+'px',
                    'border-radius':radius+'px',
                    'background-color': randomColor() });
                jelem.hover(function(){  //mouseover and mouseout
                    $(this).css('border', '3px solid yellow');
                    }, function(){
                    $(this).css('border', '3px solid black');
                });
                //put the ball into the target div
                cnvas.append(jelem);
            }
```

Putting things in Motion

CSS transforms

- transform allow you to do simple things to an html element
  - translate
  - scale
  - rotate
  - skew
  - matrix
    - all of the above

```
<html>
    <head>
        <script src="../JQ/jquery-1.9.1.min.js"></script>
        <style>
            .maind {
                position: relative;
                width: 50%;
                height: 50%;
                margin-left: 25%;
                margin-top:25%;
                border: 3px solid #73AD21;
            }
            </style>
    </head>
    <body>
        <div class="maind" id="thediv">
                DIV
        </div>
        <button class="bttn" onclick='rotate(10)'>Rotate</button>

        <script>
            function rotate(ramt) {
                console.log("Rotate " + ramt);
                let div=$("#thediv");
                div.css("transform", "rotate("+ramt+"deg)");
            }
        </script>
    </body>
</html>
```

Button causes one 10 degree rotation. How do you make it do more rotation on each tap?

How to you make it do more than one move?

file:rotateo.html

JQuery Animations

- JQuery animate function lets you animate transition of several properties.
  - Things transforms work on
- When complete, perform completion function

```
<html>
    <head>
        <script src="../JQ/jquery-1.9.1.min.js"></script>
        <style>
            .maind { …              }
            .rdiv { … }
            </style>
    </head>
    <body>
        <div class="maind">
            <div class="rdiv" id=“rdiv"> DIV2 </div>
        </div>
        <button class="bttn" onclick="rotate()">Rotate</button>

        <script>
            var openn=true;
            function rotate() {
                let div=$(".rdiv");
                let wid = parseInt(div.css("width"));
                let marl = parseInt(div.css("margin-left"));
                div.animate({width:0, marginLeft:(marl+wid/2)}, 500, function() {
                    div.css("background-color", (openn?"red":"gold"));
                    openn=!openn;
                    div.animate({width: wid, marginLeft:marl}, 500);
                });
            }
        </script>
    </body>
</html>
```

file:rotatingdiv.html

This could use a skew also to create some forced perspective

Question: make the door rotate 3 times

Rotate in Other divs

- Rather than just resizing a div, one goes away a new appears
- Get a classic “slideshow” effect
- Again, how to make it continuous?

Show in VS code: rotatingdiv4.html

URL rotatingDiv4.html

DwD, adding animation

Adjustments to CSS and html layout

```
.bttn {
     height:45px;
     width:50%
 }
 .telem {
     width:33%;
     text-align: center;
 }
```

```
    <body>
        <div id="mdiv" class="maind"></div>
        <table width="100%">
        <tr><td class="telem"><button class="bttn"
onclick="addBall()">Add A Ball</button></td>
            <td class="telem"><button class="bttn"
onclick="moveOneStep()">Move</button></td>
            <td class="telem"><button class="bttn"
onclick="clearBalls()">Clear</button></td>
        </tr>
        </table>
```

file:b2anim.html, b2animu.html

DwD, adding animation

Javascript changes

```
        // unchanged above here
        cnvas.append(jelem);
        // new .. create and fill an object for each ball
        ball = new Object();
        ball.element = jelem;
        ball.addx = Math.random()*20*(Math.random()>0.5?1:-1);
        ball.addy = Math.random()*20*(Math.random()>0.5?1:-1);
        ball.radius = radius;
        ball.xloc=x;
        ball.yloc=y;
        return ball;
    }

    var balls = [];
    function addBall() {
        balls.push(makeBall());
    }
```

```
function moveOneStep() {
    for (ball of balls) {
        let cnvas = $("#mdiv"); // get the place where th
        let tx = cnvas.width();
        let ty = cnvas.height();
        ball.xloc += ball.addx;
        ball.yloc += ball.addy;
        if (ball.xloc >= (tx-ball.radius)) {
            ball.xloc=tx-ball.radius;
            ball.addx=-ball.addx;
        }
        if (0>ball.xloc) {
            ball.xloc=0;
            ball.addx = -ball.addx;
        }
        if (ball.yloc >= (ty-ball.radius)) {
            ball.yloc = ty-ball.radius;
            ball.addy = -ball.addy;
        }
        if (0 > ball.yloc) {
            ball.yloc = 0;
            ball.addy = -ball.addy;
        }
        ball.element.css({   'margin-left': ball.xloc+'px
        'margin-top':ball.yloc+'px',});
    }
}
```

setInterval and setTimeout

- Do Once in future:
  - handle = setTimeout(callback, time)
    - puts callback func into timerTable
  - clearTimeout(handle)
    - removes from timerTable
- Do repeatedly in future:
  - handle = setInterval(callback, time)
  - clearInterval(handle);

- Write setInterval using setTimeout() — including the ability to stop!

Clicks in a Canvas

```
$(document).ready(
    function() {
        ww = Math.floor(0.9*window.innerWidth);
        wh= Math.floor(0.9*window.innerHeight);
        cnvas = document.getElementById("canvas");
        cnvas.width=ww;;
        cnvas.height=wh;

        cnvas.addEventListener("mousedown", function(e)
        {
            getMousePosition(cnvas, e);
        });
    }
);
function getMousePosition(canvas, event) {
    let rect = canvas.getBoundingClientRect();
    let x = event.clientX - rect.left;
    let y = event.clientY - rect.top;
     console.log("Coordinate x: " + x,  "Coordinate y: " + y);
}
```

Drawing with Canvas

- canvas is an html element that you can literally draw on.
- Just doing circles so everything here could be done with divs
- Diagonal lines, etc not so much
- canvas and jquery do not talk well so using base javascript for canvas

```
<head>
    <style>
        .maind {
            border: 3px solid #73AD21;
        }
    </style>
</head>
<body>
    <script src="../JQ/jquery-1.9.1.min.js"></script>
    <canvas id="canvas" class="maind"></canvas>
    <button onclick="startBall()">New Ball</button>
```

DwC, Javascript pt 1

```
var ballcount=0;
var balls = [];
var animating=0;
$(document).ready(
    function() {
        console.log("A");
        console.log("b");
        ww = Math.floor(0.9*window.innerWidth);
        wh= Math.floor(0.9*window.innerHeight);
        cnvas = document.getElementById("canvas");
        cnvas.width=ww;;
        cnvas.height=wh;
    }
);
function randomColor() {
    return (
        "rgba(" +
            Math.round(Math.random() * 250) + "," +
            Math.round(Math.random() * 250) + "," +
            Math.round(Math.random() * 250) + "," +
            Math.ceil(Math.random() * 10) / 3 + ")"
        );
    }
```

DwC, javascript part 2

```
function makeBall() {
    ballcount = ballcount + 1;
    cnvas = document.getElementById("canvas");
    tx = cnvas.clientWidth;
    ty = cnvas.clientHeight;
    ball = new Object();
    ball.radius = Math.random() *(tx*0.1) + 14;
    ball.x = Math.random() * (tx - 2*ball.radius) + ball.radius;
    ball.y = Math.random() * (ty - 2*ball.radius) + ball.radius;
    ball.color=randomColor();
    ball.speed = Math.random()*ball.radius*0.33+1;
    ball.counter = ballcount;
    return ball;
    //drawBall(ball);
}
function startBall() {
    balls.push(makeBall());
    if (animating==0) {
        console.log("Interval start");
        animating=1;
        window.requestAnimationFrame(drawBalls);
    }
}
```

DwC, Javascript part 3

```
function drawBall(ctx, ball) {
    ctx.beginPath();
    ctx.arc(ball.x, ball.y, ball.radius, 0, 2 * Math.PI);
        console.log(ball.counter + " " + ball.x + " " + ball.y + " " + ball.radius);
        ctx.fillStyle = ball.color;
        ctx.fill();
        ctx.stroke();
        ball.x=ball.x+ball.speed;

}
function drawBalls() {
    cnvas = document.getElementById("canvas");
    var tx = cnvas.clientWidth;
    var ty = cnvas.clientHeight;
    var ctx = cnvas.getContext("2d");
    ctx.clearRect(0, 0, tx, ty);
    for (i=balls.length-1; i>=0; i--) {
        drawBall(ctx, balls[i]);
        if ((balls[i].x-balls[i].radius) > tx) {
            balls.splice(i,1);
        }
    }
    if (balls.length>0)
        window.requestAnimationFrame(drawBalls);
    else
        animating=0;
}
```