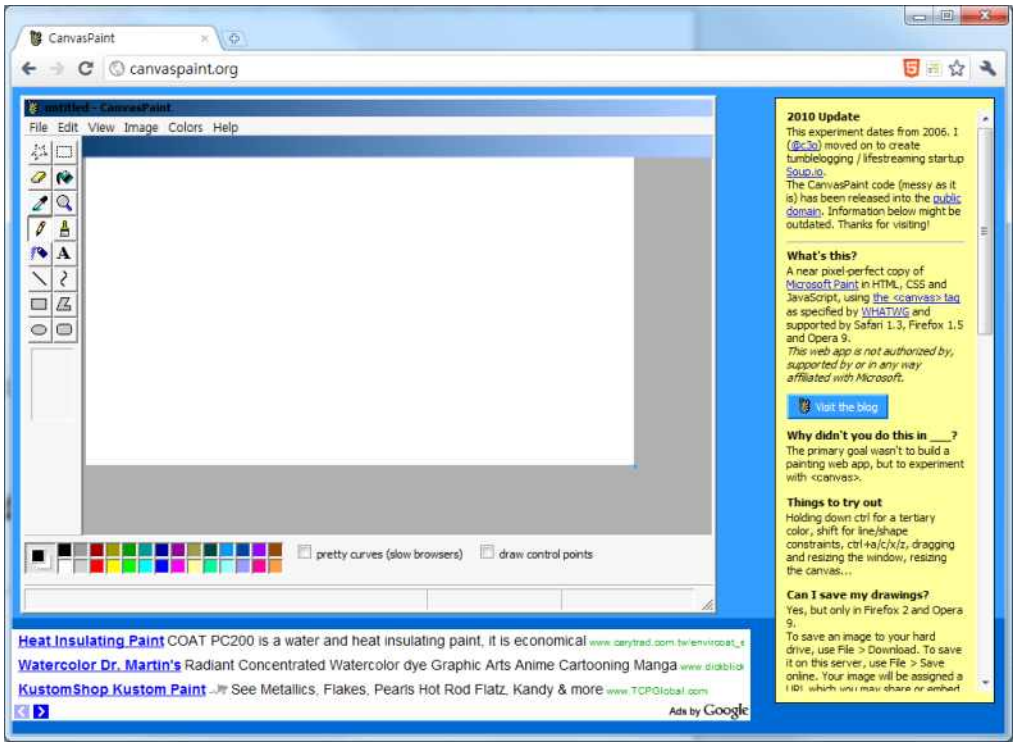
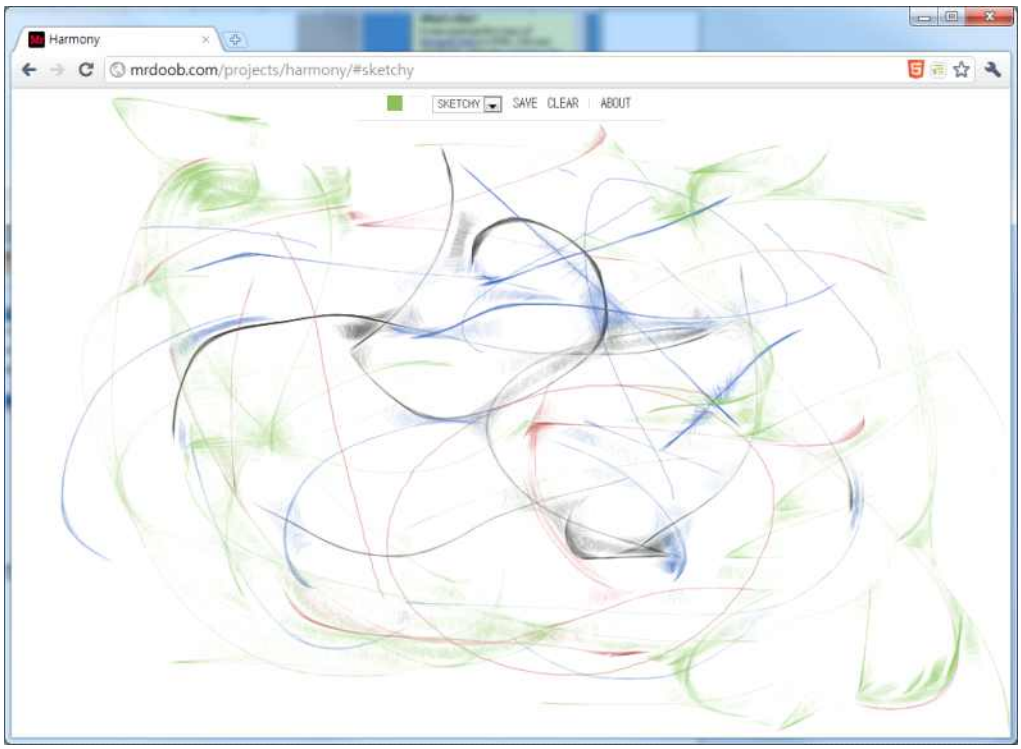
■ Canvas 요소

1. Canvas의 개요



http://canvaspaint.org/



http://mrdoob.com/projects/harmony/

▢ 2D 그래픽 기반의 API

▢ 선, 채우기, 이미지, 텍스트

▢ 그래프 제작도구, 이미지 편집용, 게임등 다양한 웹 어플리케이션에서 사용

□ http://excanvas.sourceforge.net/

2. Canvas API

□ 현재는 2D canvas만 모든 브라우저에서 지원

□ 기본크기는 300 x 150px

□ 인라인 / 대체되는 요소

□ css에서 width / height 지정시 확대 / 축소됨

```
    window.onload = function(){
        var canvas =
        document.querySelector("canvas");

        var ctx = canvas.getContext('2d');
        ctx.fillRect(10, 20, 50, 50);
    }
</script>
ead>
dy>
<canvas></canvas>
```

□ 사각형 그리기

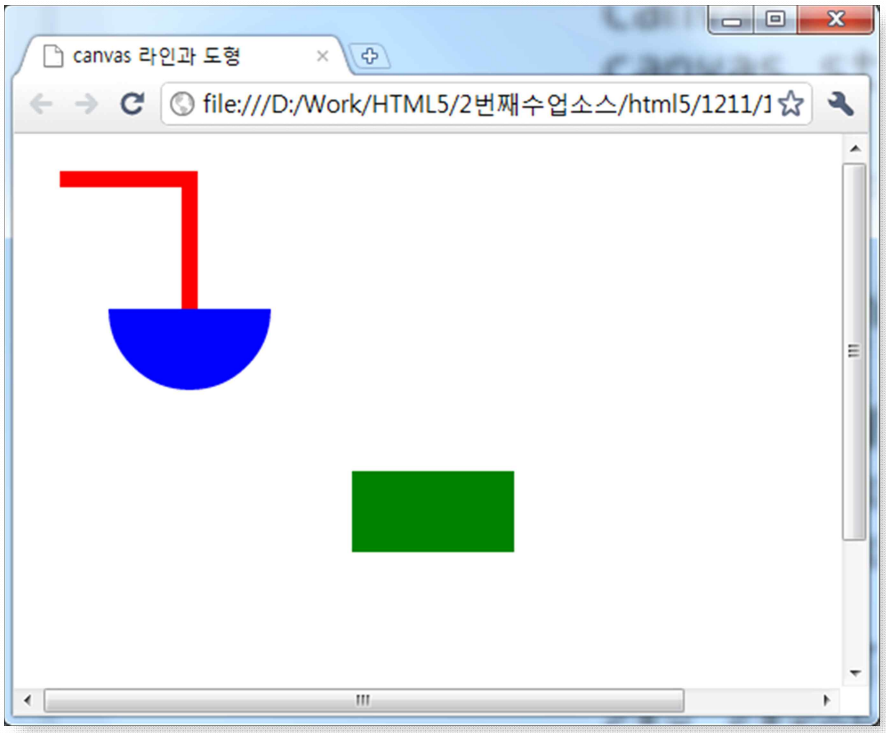
```
    var ctx = canvas.getContext('2d');
    ctx.strokeRect(10,10,100,50);
    ctx.fillRect(10,70, 50,50);
}
function clearCanvas() {
    var canvas =
    document.querySelector("canvas");

    var ctx = canvas.getContext('2d');
    ctx.clearRect(0,0, 400, 200);
}
```

▢ 선 / 도형

```
ctx.beginPath();

ctx.moveTo(20,10);

ctx.lineTo(300,100);

ctx.lineTo(50,40);

ctx.stroke();
```

```
ctx.beginPath();

ctx.arc(50, 50, 25, 0, 2*Math.PI, true);

ctx.fill();
```

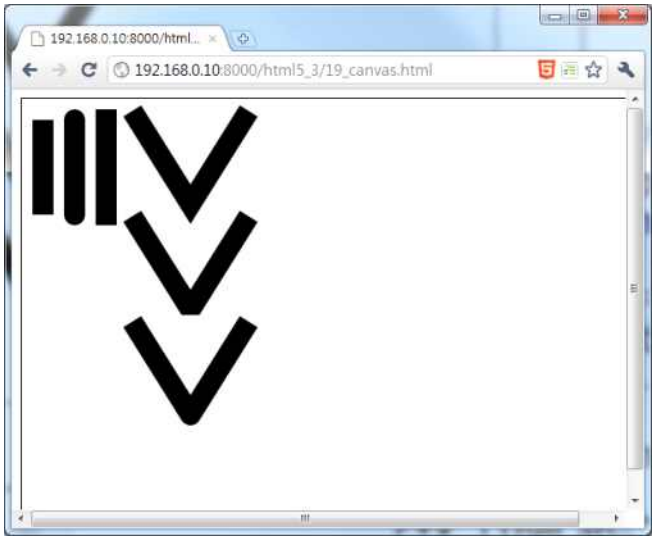
```
ctx.beginPath();
ctx.rect(100,100,100,100);
ctx.lineWidth="10";
ctx.strokeStyle="blue";
ctx.stroke();

ctx.lineTo(500,50);
ctx.strokeStyle="red";
ctx.stroke();
ctx.closePath();

ctx.beginPath();
ctx.lineWidth="1";
ctx.strokeStyle="black";
ctx.moveTo(10,10);
ctx.quadraticCurveTo(60,110,110,10);
ctx.stroke();
ctx.closePath();
```



▢ 라인의 모양 조절

```
ctx.lineCap="butt";
ctx.beginPath();
ctx.lineWidth="20";
ctx.moveTo(20,20);
ctx.lineTo(20,110);
ctx.stroke();
ctx.closePath();

ctx.lineCap="round";
ctx.beginPath();
ctx.moveTo(50,20);
ctx.lineTo(50,110);
ctx.stroke();
ctx.closePath();

ctx.lineCap="square";
ctx.beginPath();
ctx.moveTo(80,20);
ctx.lineTo(80,110);
ctx.stroke();
ctx.closePath();
```

```
ctx.lineJoin = "miter";
ctx.beginPath();
ctx.moveTo(110, 20);
ctx.lineTo(160, 100);
ctx.lineTo(210,20);
ctx.stroke();
ctx.closePath();

ctx.lineJoin = "bevel";
ctx.beginPath();
ctx.moveTo(110, 120);
ctx.lineTo(160, 200);
ctx.lineTo(210,120);
ctx.stroke();
ctx.closePath();

ctx.lineJoin = "round";
ctx.beginPath();
ctx.moveTo(110, 220);
ctx.lineTo(160, 300);
ctx.lineTo(210,220);
ctx.stroke();
ctx.closePath();
```



▢ 투명도 조절

```
ctx.fillStyle = "rgba(255, 122,0, 0.4)";
ctx.fillRect(10,10,60,60);

ctx.fillStyle = "rgb(200,100,150)";
ctx.globalAlpha = "0.5";
ctx.fillRect(20,20,50,100);
```

▢ gradient / shadow

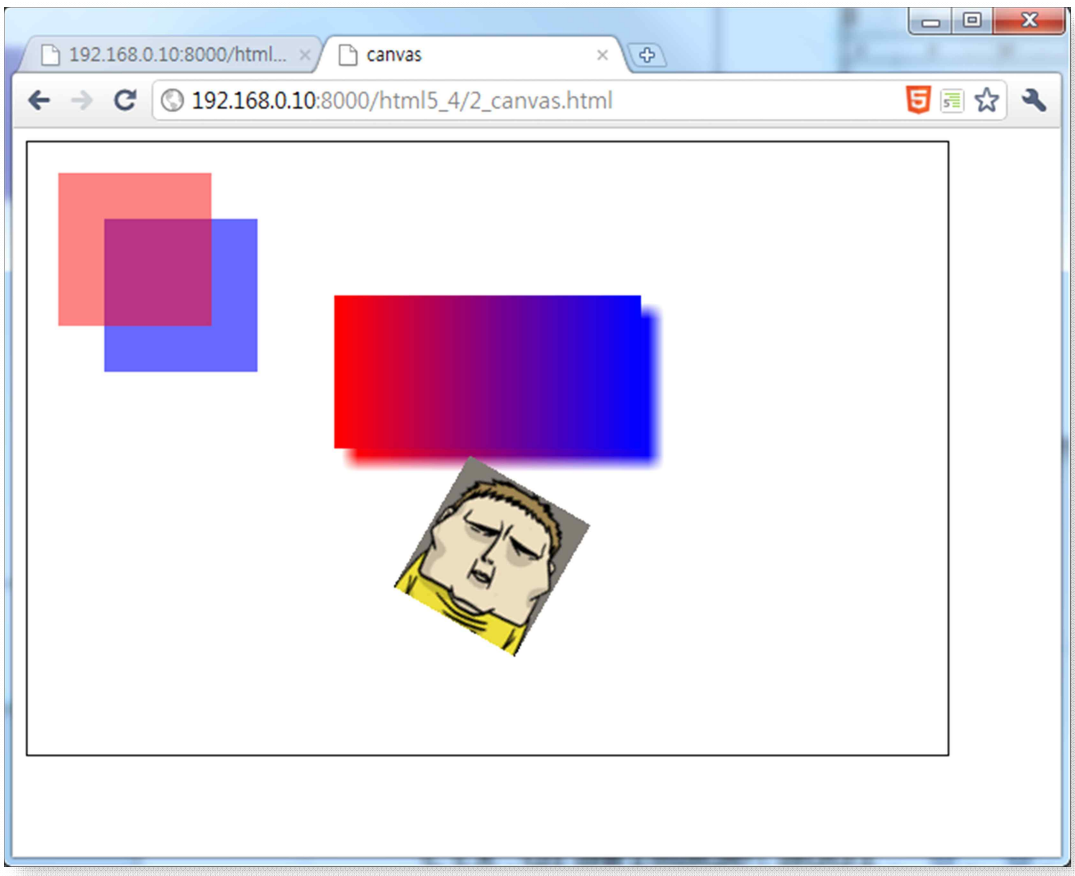
```
var gradient = ctx.createLinearGradient(0,0,200,0);
gradient.addColorStop(0,"red");
gradient.addColorStop(1,"blue");

ctx.fillStyle=gradient;
ctx.fillRect(10,10,200,100);

ctx.shadowOffsetX=10;
ctx.shadowOffsetY=10;
ctx.shadowBlur=20;
ctx.shadowColor="black";

ctx.fillStyle="#00bfff";
ctx.fillRect(10,150, 200, 100);
```

▢ 이미지 삽입

```
var audi = new Image();
audi.src="assets/Audi.jpg";
audi.onload=function () {
    ctx.drawImage(audi, 0, 0, 160, 120);
}
```

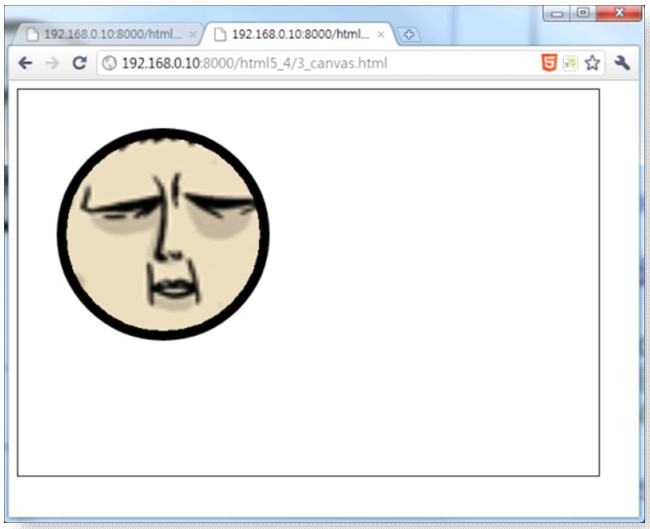
▢ 변환관련 메서드

```
ctx.rotate(Math.PI * 30 / 180);
ctx.scale(2,2);
ctx.translate(100,100);

img.onload=function() {

    ctx.drawImage(img, 0,0,100,100);
}
```



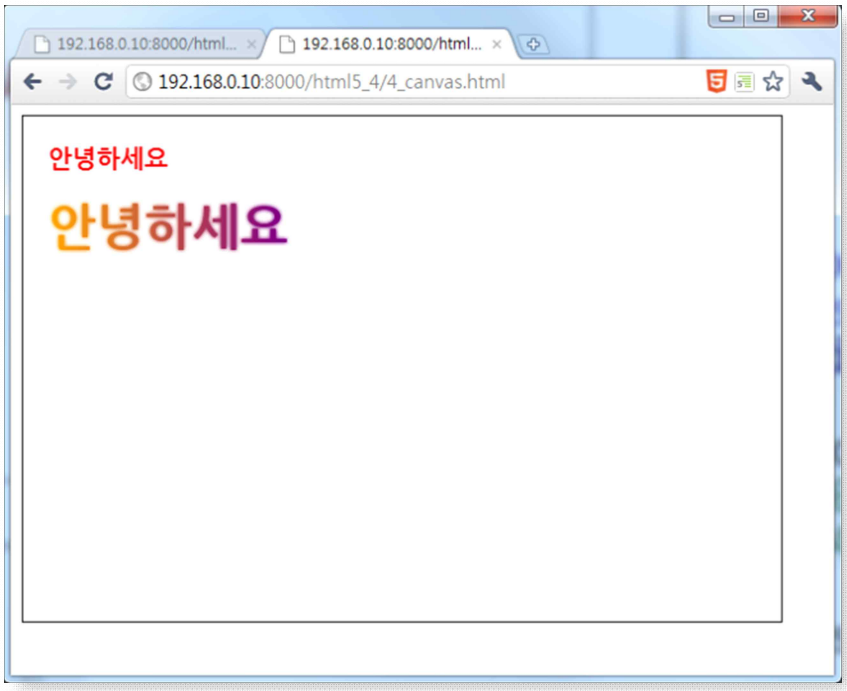
▢ clip

```
audi.onload = function() {
    ctx.drawImage(audi,0,0,160,120);
}

ctx.beginPath();
ctx.arc(60,50,30,0, 2*Math.PI, true);
ctx.clip();
```



▢ text

```
//text
ctx.font="bold 20px 나눔고딕,sans-serif";
ctx.fillStyle="red";
ctx.fillText("안녕하세요",20,40,100);

var gradient=ctx.createLinearGradient(20,0,200,0);
gradient.addColorStop(0,"orange");
gradient.addColorStop(1,"purple");
ctx.font="bold 40px 나눔고딕";
ctx.fillStyle=gradient;

ctx.shadowOffX=20;
ctx.shadowOffY=20;
ctx.shadowBlur=5;
ctx.shadowColor="black";
ctx.fillText("안녕하세요",20,100,300);
```



□ 다양한 캔버스 예제들

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8" />
<title>캔버스</title>
<style>

/*
 * canvas기본크기 : 300 x 150
 * css에서 width,height주면
 * 확대축소됩니다.
 */
canvas{
        box-shadow: 0 12px 15px 0 rgba(0, 0, 0, 0.24),
        0 17px 50px 0 rgba(0, 0, 0, 0.19);
}

</style>
</head>
<body>
<canvas width="1000" height="800"></canvas>
<script src="js/jquery.js"></script>
<script>

        var $canvas = $("canvas");

        //이놈이 바로 HTML5 API중에
```

```
        //canvas API를 사용할 수 있는 canvas요소
        //(종이)
        var canvas = $canvas.get(0);

        //펜
        var ctx = canvas.getContext("2d");

        //색상이 채워진 사각형
        //ctx.fillRect(x,y,width,height);

        ctx.fillRect(20,20,80,50);

        //라인만 있는 사각형
        ctx.strokeRect(200,20,50,100);



        //호(360도의 호)

        //ctx.arc(x,y,반지름,시작각도,끝각도,방향)

        ctx.arc(500,400,100,0,Math.PI*2,false);

        ctx.fillStyle="pink";

        ctx.fill();
</script>
</body>
</html>
```

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8" />
<title>캔버스2</title>
<style>
        #canvasBox {
                width:1000px;
                height:800px;
                border:1px solid #424242;
        }

        canvas {
                box-shadow:0 0 2px red;
        }
</style>
</head>
<body>
```

```
<button>저장</button>
<div id="canvasBox">
        <canvas></canvas>
</div>
<script src="js/jquery.js"></script>
<script>

        //jquery객체
        var $canvas = $("canvas");

        //1000 x 800크기를 변경
        //$canvas.width(1000).height(800);

        $canvas.attr({width:1000,height:800});

        //javascript객체
        var canvas = $canvas.get(0);

        //붓,펜
        var ctx = canvas.getContext("2d");

        //채우는 색상
        ctx.fillStyle="#2196F3";

        ctx.fillRect(20,20,200,100);

        //사각형을 그리는 메서드
        //1) fillRect(x,y,width,height)
        //2) strokeRect(x,y,width,height)
        //3) clearRect(x,y,width,height)

        //라인의 색상
        ctx.strokeStyle="hotpink";
        //라인의 두께
        ctx.lineWidth=20;

        ctx.strokeRect(120,80,150,200);

        //지우기
        ctx.clearRect(100,50,50,50);

        //사각형만 닫힌도형

        //선을 그리는 방법

        //1) 시작점으로 움직임 : moveTo(x,y)
        //2) 끝점으로 line을 연결 : lineTo(x,y)
```

```
        //3) 선을 그려라 : stroke()
        //4) 면을 그려라 : fill()

        //새로운 path의 시작
        ctx.beginPath();

        ctx.lineWidth=10;

        ctx.strokeStyle="#F44336";

        ctx.moveTo(0,800);

        ctx.lineTo(200,400);

        ctx.lineTo(400,400);

        ctx.stroke();

        //새로운 path 시작
        ctx.beginPath();

        ctx.strokeStyle="green";
        ctx.lineWidth=20;

        ctx.moveTo(600,250);

        ctx.lineTo(800,450);

        ctx.stroke();


        //새로운 도형의 시작
        ctx.beginPath();

        ctx.lineWidth=2;
        ctx.strokeStyle="#03A9F4";

        ctx.moveTo(500,550);

        ctx.arc(500,550,80,0,Math.PI/180*300,false);
        //패스를 막아버리기
        ctx.closePath();

        ctx.fill();


        ctx.beginPath();
```

```
        ctx.lineWidth=2;
        ctx.strokeStyle="#03A9F4";
        ctx.fillStyle="red";

        ctx.moveTo(500,550);

        ctx.arc(500,550,80,Math.PI/180*300,Math.PI/180*360,false);
        //패스를 막아버리기
        ctx.closePath();

        ctx.fill();

        $("button").click(function() {

                var data = canvas.toDataURL();

                window.open(data);

        });

</script>
</body>
</html>
```

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8" />
<title>캔버스를 이용한 이미지</title>
<style>
#canvasBox {
        width:1000px;
        height:800px;
        margin:auto;
        border:1px solid #424242;
}
canvas {
        cursor: pointer;
}
</style>
</head>
<body>
<input type="file" id="file"/>
<div id="canvasBox">
<canvas width="1000" height="800"></canvas>
</div>
```

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

//HTML5 FileReader API를
//사용하여 File을 읽어옵니다.

var reader = new FileReader();

//파일이 변경되면
$("#file").change(function(){

//input type=file인 요소객체는
//files라는 배열을 가지고 있습니다.
//HTML5 API
var file = this.files[0];

console.log(file);

if(file.size<=0) {
        alert("제대로 된 파일을 선택하세요~");
        return;
}

var type = file.type;


alert(type);

//iamge/로 시작하는 문자열일 경우 true
var regExp = /^image\//;

//alert(regExp.test(type));

if(!regExp.test(type)) {
        alert("이미지파일을 선택해주세요~");
        return;
}

//여기 왔다는 것은 우리가 선택한 파일이
//용량이 0보다 크고,
//실제 이미지입니다.

//파일리더로 파일을 읽어들입니다.
reader.readAsDataURL(file);

reader.onload = function(){
```

```
        //다 읽은 결과물
        //(base64인코딩됨)
        var result = reader.result;

        //alert(result);

        //이미지 객체 생성
        var img = new Image();

        //src집어넣고
        img.src = result;

        //이미지 로딩
        img.onload = function() {
                ctx.drawImage(img,0,0);
        };

        //캔버스에 drawImage()메서드로 그림을 그림

};//load이벤트 발생시 호출되는 콜백함수

});

//jquery객체
var $canvas = $("canvas");

//javascript객체
var canvas = $canvas.get(0);

//붓
var ctx = canvas.getContext("2d");

$canvas.click(function(e) {

        //오프셋
        var offset = $canvas.offset();
        var x = e.pageX-offset.left-1;
        var y = e.pageY-offset.top-1;

        ctx.beginPath();

        ctx.fillStyle=getRanColor();

        ctx.arc(x,y,25,0,Math.PI*2,true);

        ctx.closePath();
```

```
        ctx.fill();

});


//랜덤한 정수 발생함수
function getRan(start,size) {
        return Math.floor(Math.random()*size)+start;
}

//랜덤한 색상함수
function getRanColor() {

        var r = getRan(0,256);
        var g = getRan(0,256);
        var b = getRan(0,256);

        return "rgba("+r+","+g+","+b+",.6)";
}

</script>
</body>
</html>
```

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>이미지 올리기</title>
    <link rel="stylesheet" href="css/reset.css"/>
    <link rel="stylesheet" href="css/font-awesome.min.css"/>
    <style>
        .box_canvas {
            width:1000px;
            height:400px;
            border:1px solid #424242;
            text-align: center;
            line-height:100px;
            position: relative;
            overflow: hidden;
            float: left;
        }
        .box_select {
            min-width:500px;
            min-height:200px;
            box-shadow: 0 12px 15px 0 rgba(0, 0, 0, 0.24), 0 17px 50px 0 rgba(0, 0, 0, 0.19);
            float: left;
            margin-left:10px;
```

```
            position: relative;
        }
        canvas {
            display: block;
        }
        .box_canvas .fa-camera {
            width:1000px;
            height:400px;
            display: block;
            position: absolute;
            font-size:100px;
            cursor: pointer;
            line-height:400px;
        }
        #mainCanvas {
            position: absolute;
            left:0;
            top:0;
            background:#fff;
            display: none;
            cursor: pointer;
        }
        .box_canvas .btn_delete {
            color:#F44336;
            background:transparent;
            border:none;
            position: absolute;
            right:0;
            top:0;
            padding:0;
            cursor: pointer;
            font-size:25px;
            text-align:center;
            display: none;
        }
        .box_canvas.select #mainCanvas {
            display: block;
        }
        .box_canvas.select .btn_delete {
            display: inline;
        }
        .box_btn {
            margin:10px;
            clear: both;
        }
        #selectedBox {
            width:500px;
```

```
            height:200px;
            border:1px solid #fff;
            outline:1px solid #000;
            box-shadow: 0 2px 5px 0 rgba(0, 0, 0, 0.16), 0 2px 10px 0 rgba(0, 0, 0, 0.12);
            display: none;
            position: absolute;
            left:-1px;
            top:0;
            cursor: pointer;
            background:rgba(0,0,0,.1);
        }
        #selectedBox.show {
            display: block;
        }
        #loader {
            width:100%;
            height:100%;
            background-color:rgba(237,233,233,1);
            opacity: .9;
            background-image:url(img/loader.gif);
            background-repeat:no-repeat;
            background-position: center;
            position: fixed;
            left:0;
            top:0;
            display: none;
        }
        h1 {
            font-size:50px;
            margin:20px;
        }
    </style>
</head>
<body>
<h1>이미지 올리기</h1>
<form>

<div class="box_canvas">
    <label>
        <input id="main" type="file" name="main" placeholder="이미지" class="screen_out">
        <i class="fa fa-camera"></i>
    </label>
    <canvas id="mainCanvas" width="1000" height="400"></canvas>
    <button class="btn_delete" type="button"><i class="fa fa-times-circle-o"></i></button>
</div>
<div class="box_select">
    <div id="selectedBox"></div>
```

```
    <canvas id="selectCanvas" width="0" height="0"></canvas>
</div>
    <div class="box_btn">
    <button>올리기</button>
    </div>
</form>
<div id="loader"></div>
<script src="js/jquery.js"></script>
<script>
var $btn_delete = $(".btn_delete"),
        $mainCanvas= $("#mainCanvas"),
        $main=$("#main"),
        mainCanvas = $mainCanvas.get(0),
        $selectCanvas = $("#selectCanvas"),
        selectCanvas = $selectCanvas.get(0),
        mainCtx = mainCanvas.getContext("2d"),
        selectCtx = selectCanvas.getContext("2d"),
        width=0,height=0,$selectedBox = $("#selectedBox"),$loader = $("#loader"), x = 0,  y = 0;


var img= null;


    $btn_delete.click(function() {
        mainCtx.clearRect(0,0,1000,400);
        selectCtx.clearRect(0,0,width,height);
        selectCanvas.width=0;
        selectCanvas.height=0;

        $(".box_canvas").removeClass("select");
        $main.val("");
        $selectedBox.removeClass("show");
    });

$main.change(function() {
        $(".box_canvas").addClass("select");

        $loader.show();

        var file = $main.get(0).files[0];

        //alert(logoFile);

    var reg =  /^image\//;

    if(!reg.test(file.type)) {
```

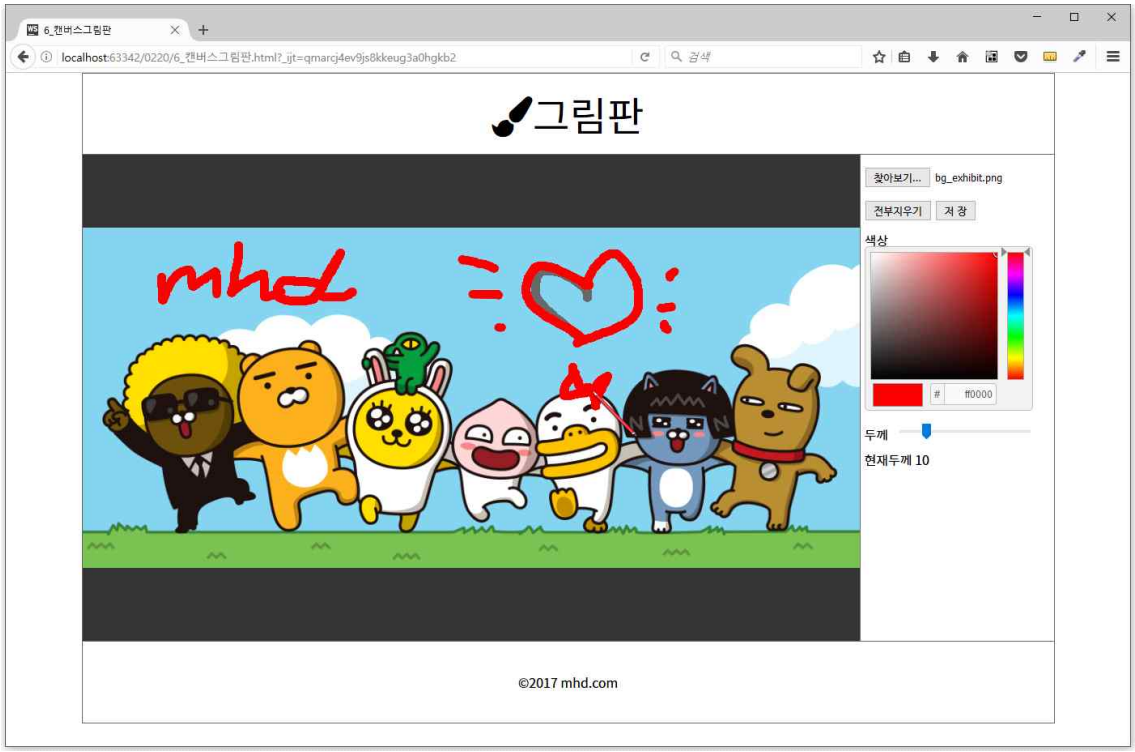
```
        alert("이미지를 선택해주세요~");

        $file.val("");

        return;
    }



        var reader = new FileReader();

        //파일을 DataURL로 읽어옵니다.
        reader.readAsDataURL(file);


        //다 읽었으면 onload 이벤트 발생
        reader.onload = function() {
            //alert("다 읽었어요!");

            //alert(reader.result);

            //$("img").attr("src",reader.result);

            //이미지 객체 생성후

            img = new Image();
            img.src = reader.result;


            //이미지 로딩후
            img.onload = function() {

                x = 0;
                y = 0;

                width = img.width;
                height = img.height;

                if(width<=500 || height<=500) {

                    selectCtx.clearRect(0,0,width,height);
                    selectCanvas.width=0;
                    selectCanvas.height=0;
                    $main.val("");
                    $(".box_canvas").removeClass("select");
                    mainCtx.clearRect(0,0,1000,400);
                    $selectedBox.removeClass("show");
```

```
                    $loader.hide();
                    alert("더 큰 이미지를 선택하세요");

                    return;
                }

                // img Width의 500px 기준 배율
                var imgWidthPct = 500/img.width;
                // img Height의 500px 기준 배율
                var imgHeightPct = 500/img.height;
                console.log(imgWidthPct);
                console.log(imgHeightPct);

                if(imgWidthPct < 1 || imgHeightPct < 1){
                    if(imgWidthPct <= imgHeightPct){
                        width *= imgHeightPct;
                        height *= imgHeightPct;
                    } else {
                        width *= imgWidthPct;
                        height *= imgWidthPct;
                    }
                }

               x = ( width-500)/2;
                y = (height-200)/2;

                //캔버스의 크기를 변경
                $selectCanvas.attr({width:width,height:height});

                $selectedBox.addClass("show").css({left:x,top:y});

               // $imgCan.attr({width:imgW,height:imgH}).css({left:x,top:y});

                selectCtx.clearRect(0,0,width,height);
                selectCtx.drawImage(img,0,0,width,height);
                //mainCtx.drawImage(img,0,0,width,height);
                drawMain(x,y);
                $loader.hide();

            };
        };

    });


$selectedBox.mousedown(function(e) {
```

```
    e.preventDefault();

    var offset = $selectCanvas.offset();

    var mouseX = e.pageX - offset.left-x;
    var mouseY = e.pageY - offset.top-y;

    $selectedBox.mousemove(function(e) {

        var offset = $selectCanvas.offset();

        x =e.pageX -offset.left-mouseX;

        y = e.pageY - offset.top-mouseY;


       // if(x>0&&x<width-500&&y>0&&y<height-200) {
            console.log("x: "+x + " / y :" + y) ;
            $(this).css({left:x,top:y});

            drawMain(x,y);

       // }

    });//mousemove() end

    $(window).mouseup(function() {
        $selectedBox.off("mousemove");
    });

});//$area.mousedown() end

    function drawMain(x,y) {
        mainCtx.clearRect(0,0,1000,400);
        var rate = (img.width/(selectCanvas.width*2));
        //console.log(img.width+"/"+selectCanvas.width*2+"/"+(img.width/(selectCanvas.width*2)));
       /                                                                                /
console.log(img.height+"/"+selectCanvas.height*2+"/"+(img.height/(selectCanvas.height*2)));

mainCtx.drawImage(img,(x*2)*rate,(y*2)*rate,img.width,img.height,0,0,selectCanvas.width*2,selectCa
nvas.height*2);
    }

</script>
</body>
</html>
```

3. canvas를 이용한 그림판

▢ 자바스크립트의 이벤트 핸들러의 바인딩을 이용하여 캔버스에 각기 다른 이벤트를 바인딩 / 언바인딩 해야 함




```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>6_캔버스그림판</title>
<link rel="stylesheet" href="css/reset.css"/>
<link rel="stylesheet" href="css/font-awesome.min.css"/>
<link rel="stylesheet" href="css/notosanskr.css"/>
<link rel="stylesheet" href="css/colpick.css" type="text/css"/>
<style>

body {
        font-family:'Noto Sans KR', sans-serif;
}

#wrap {
        width:1200px;
        border:1px solid #666;
        margin:auto;
}
#header {
        width:1200px;
        height:99px;
```

```
        border-bottom:1px solid #666;
}

#header h1 {
        font-size:50px;
        text-align:center;
        line-height:99px;
}

#content {
        width:960px;
        height:600px;
        border-right:1px solid #666;
        float: left;
        position: relative;
        background:#333;
}
#sidebar {
        width:229px;
        height:600px;
        float: left;
        padding:0 5px;
}
#footer {
        border-top:1px solid #666;
        clear:both;
        width:1200px;
        height:100px;
        line-height: 100px;
        text-align: center;
}

#sidebar>div {
        margin:15px 0;
}

#canvas {
        cursor: url(img/pencil.png),crosshair;
        position: absolute;
}

#imgCanvas {
        position: absolute;
        background:#fff;
}

#loader {
```

```
        width:100%;
        height:100%;
        position:fixed;
        left:0;
        top:0;
        background:url(img/loader.gif) no-repeat;
        background-color:rgba(255,255,255,.5);
        background-position:center;
        display: none;
}

</style>
</head>
<body>
<div id="wrap">
<div id="header">
        <h1><i class="fa fa-paint-brush"></i>그림판</h1>
</div><!-- // header-->
<div id="content">
        <!-- 이미지용 캔버스 -->
        <canvas width="960"
         height="600"
         id="imgCanvas"></canvas>
         <!-- 우리가 직접 그림을 그리는 캔버스 -->
        <canvas
        width="960"
        height="600"
         id="canvas"></canvas>
</div><!-- // content-->
<div id="sidebar">
        <div>
                <input type="file" id="file"/>
        </div>
        <div>
                <button id="eraseBtn">전부지우기</button>
                <button id="saveBtn">저 장</button>
        </div>
        <div>
                <label for="color">색상</label>
                <div id="picker"></div>
        </div>
        <div>
                <label>두께
                <input id="size" value="10"
                 type="range" min="1" max="50"/>
                </label>
        </div>
```

```
        <div>
                <label for="sizeTxt">현재두께</label>
                <output id="sizeTxt">10</output>
        </div>
</div><!-- // sidebar-->
<div id="footer">
        &copy;2017 mhd.com
</div><!-- // footer-->
</div><!-- // wrap-->
<div id="loader"></div>
<script src="js/jquery.js"></script>
<script src="js/colpick.js"></script>
<script>

var color = "#666";
var $size = $("#size");
var $sizeTxt = $("#sizeTxt");
var $color = $("#color");
//그림그리는 용
var $canvas = $("#canvas");
//이미지가 보여지는 캔버스
var $imgCan = $("#imgCanvas");
//그림 붓
var ctx = $canvas.get(0).getContext("2d");
//이미지 붓
var imgCtx = $imgCan.get(0).getContext("2d");
var $eraseBtn = $("#eraseBtn");
var $file = $("#file");

//로딩이미지
var $loader = $("#loader");

var imgW = 0;
var imgH = 0;

var $saveBtn = $("#saveBtn");

$('#picker').colpick({
        flat:true,
        layout:'hex',
        submit:0,
        color:"#666666",
        onChange:function(hsb,hex) {
                color = "#"+hex;
        }
});
```

```
var size = 10;

$saveBtn.click(function(){

	//canvas의 그림을 imgCanvas에 그리기
	var data = null;

	if(imgW>0 && imgH>0) {

		alert("tes");

	imgCtx.drawImage($canvas.get(0),0,0,imgW,imgH);

	data = $imgCan.get(0).toDataURL();

	}else {
		data = $canvas.get(0).toDataURL();
	}

	//data = $canvas.get(0).toDataURL();

	//base64인코딩방식으로 이미지를 글자로
	//alert(data);

	//새 텝 띄우기
	window.open(data);

});

$file.change(function() {

	//HTML5 API

	//<input type="file">인 요소
	//자바스크립트 DOM객체

	//HTML5의 File API
	//input type=file요소에는
	//files배열이 있습니다.
	//그 안에 File객체들이 들어가 있습니다.
	var file = this.files[0];

	//file.name, file.type, file.size,
	//file.lastModifiedDate

	//alert(file.name);
	//alert(file.type);
```

```
	//alert(file.size);
	//alert(file.lastModifiedDate);

	if(file.size<=0) {
		alert("이미지를 선택해주세요~");

		$file.val("");
		return;
	}

	//image/jpeg , image/png, image/gif
	//아닐때
	var reg =  /^image\//;

	if(!reg.test(file.type)) {

		alert("이미지를 선택해주세요~");

		$file.val("");
		return;
	}

	//HTML5의 FileReader API
	var reader = new FileReader();

	//file을 읽어들입니다.
	reader.readAsDataURL(file);


	//loader이미지 보여주기
	$loader.show();

	//javascript객체니까
	reader.onload = function() {

		var image = new Image();

		//alert(reader.result);

		image.src=reader.result;

		image.onload = function() {
			//이때가 바로 진짜 이미지 로딩

			//alert(image.width);

			//ctx.drawImage(image,0,0,1000,600);
```

```
                        var x = 0;
                        var y = 0;

                        imgW = image.width;
                        imgH = image.height;

                        // img Width의 1000px 기준 배율
                        var imgWidthPct = 960/image.width;
                        // img Height의 1000px 기준 배율
                        var imgHeightPct = 600/image.height;
                        console.log(imgWidthPct);
                        console.log(imgHeightPct);

                        if(imgWidthPct < 1 || imgHeightPct < 1){
                                if(imgWidthPct >= imgHeightPct){
                                        imgW *= imgHeightPct;
                                        imgH *= imgHeightPct;
                                } else {
                                        imgW *= imgWidthPct;
                                        imgH *= imgWidthPct;
                                }
                        }

                        x = (960 - imgW)/2;
                        y = (600 - imgH)/2;

                        //캔버스의 크기를 변경
                        $canvas.attr({width:imgW,height:imgH})
                               .css({left:x,top:y});

                        $imgCan.attr({width:imgW,height:imgH})
                               .css({left:x,top:y});

                        imgCtx.clearRect(0,0,960,600);
                        imgCtx.drawImage(image,0,0,imgW,imgH);

                        $loader.hide();

                };
        };

});

$eraseBtn.click(function() {

        ctx.closePath();
```

```
        ctx.clearRect(0,0,1000,600);

});

//마우스를 눌렀을때 선그리기 시작
$canvas.mousedown(function(e){

        ctx.lineJoin="round";
        ctx.lineCap="round";

        //canvas의 위치
        var offset = $canvas.offset();

        var x = e.pageX-offset.left;
        var y = e.pageY-offset.top;

        //선의 시작
        ctx.beginPath();

        //색상
        ctx.strokeStyle=color;

        //사이즈
        ctx.lineWidth=size;

        //우리가 클릭한 곳으로 이동
        ctx.moveTo(x,y);

        //mousemove이벤트와 mouseup이벤트
        //바인딩
        $canvas.mousemove(function(e){

                var x = e.pageX-offset.left;
                var y = e.pageY-offset.top;

                ctx.lineTo(x,y);
                ctx.stroke();

        }).mouseup(endDraw)
          .mouseleave(endDraw);

});

function endDraw() {

        ctx.closePath();
```

```
        //붙은 이벤트 떼기
        $canvas.unbind("mousemove")
                .unbind("mouseup")
                .unbind("mouseleave");

}


//색상을 변경하면 그 색을 alert으로
$color.change(function() {

        color = $color.val();

        //alert(color);

});

$size.change(function() {

        size = $size.val();

        $sizeTxt.text(size);

});
</script>
</body>
</html>
```

□ javascript 정규표현식

■ 정규표현식이란?

1) regular expression

2) 특정한 규칙을 가진 문자열의 집합을 표현하는 데 사용하는 형식 언어

3) 문자열의 검색과 치환을 위해 지원

4) 유효성검사를 위해서 사용

■ 정규표현식 객체 만들기

```
1) var reg = new RegExp(표현식);
2) var reg = /^표현식$/;
```

■ 정규표현식의 주요문법

기 호	의 미
¦	왼쪽 혹은 오른쪽과 일치
.	반드시 한글자
\	다음에 오는 문자를 특수문자로
[]	한 개의 글자
-	글자부터~글자까지
*	0개 이상
+	1개 이상
{n}	n번 일치
{m,n}	m에서 n번 일치
{n,}	n번 이상 일치
^	문자열 시작과 일치
$	문자열의 끝과 일치
\d	숫자와 일치 ([0-9]와 같음)
\D	숫자가 아님 (\d의 반대)
\s	공백문자
\t	텝
\w	영문자,숫자와 일치([1-9¦a-z¦A-Z¦_]와 같음)

■ 정규표현식의 메서드

메서드명	의미
exec(문자열)	정규표현식과 매치될 때 첫 번째 글자 반환(없으면 null)
test(문자열)	정규표현식과 매치유무를 boolean값으로 반환

■ 예제

```
<!DOCTYPE html>
<html lang="ko">
<head>
<meta charset="utf-8">
<title>1_RegExp</title>
<style>
	#resultBox {
		width:400px;
		height:50px;
		background:#aaa;
	}
</style>
<script src="js/jquery.js"></script>
<script>
	$(function() {

		var expression = "";

		var reg = null;

		$("#numBtn").click(function() {
			expression = "^[1-9]+$";
			reg = new RegExp(expression);
		});
		$("#korBtn").click(function() {
			expression = "^[ㄱ-힣]+$";
			reg = new RegExp(expression);
		});
		$("#engBtn").click(function() {
			expression = "^[1-9¦a-z¦A-Z]+$";
			reg = new RegExp(expression);
		});
		$("#emailBtn").click(function() {
			expression = "^[a-zA-Z0-9._-]+@[a-zA-Z0-9.-]+\.[a-zA-Z]{2,6}$";
			reg = new RegExp(expression);
		});
```

```
		$("input").keyup(function() {
			var val = $("input").val();
			$("#resultBox").text(val+"의 결과 : "+reg.test(val));
		});

		$("#checkBtn").click(function() {
			$("input").keyup();
		});


	});

</script>
</head>
<body>
<p>
	<input type="text"/>
	<button id="checkBtn">검사</button>
	<button id="numBtn">숫자만</button>
	<button id="engBtn">영어/숫자만</button>
	<button id="korBtn">한글만</button>
	<button id="emailBtn">이메일</button>
</p>
<div id="resultBox"></div>
<script>

</script>
</body>
</html>
```