Lecture 7: Introduction to Processing

Processing

- Processing started by Ben Fry and Casey Reas while both were graduate students at MIT Media Lab in 2001.
- Processing is Java.
- Designed for visual artists with limited programming experience who want to create art, animation and games without knowing complicated Java syntax.
- In its current version, hundred of libraries have been written for computer vision, data visualization, music composition, networking, 3D drawings, programming electronics, etc…

Processing

A program, called a sketch, in Processing, at its most basic, consists of just two **methods**: setup() and draw().

setup(): initializing variables, setting up window size, etc…

draw(): repeats 60 times a second(60hz refresh rate), responsible for the animation and flow of a program.

A basic sketch

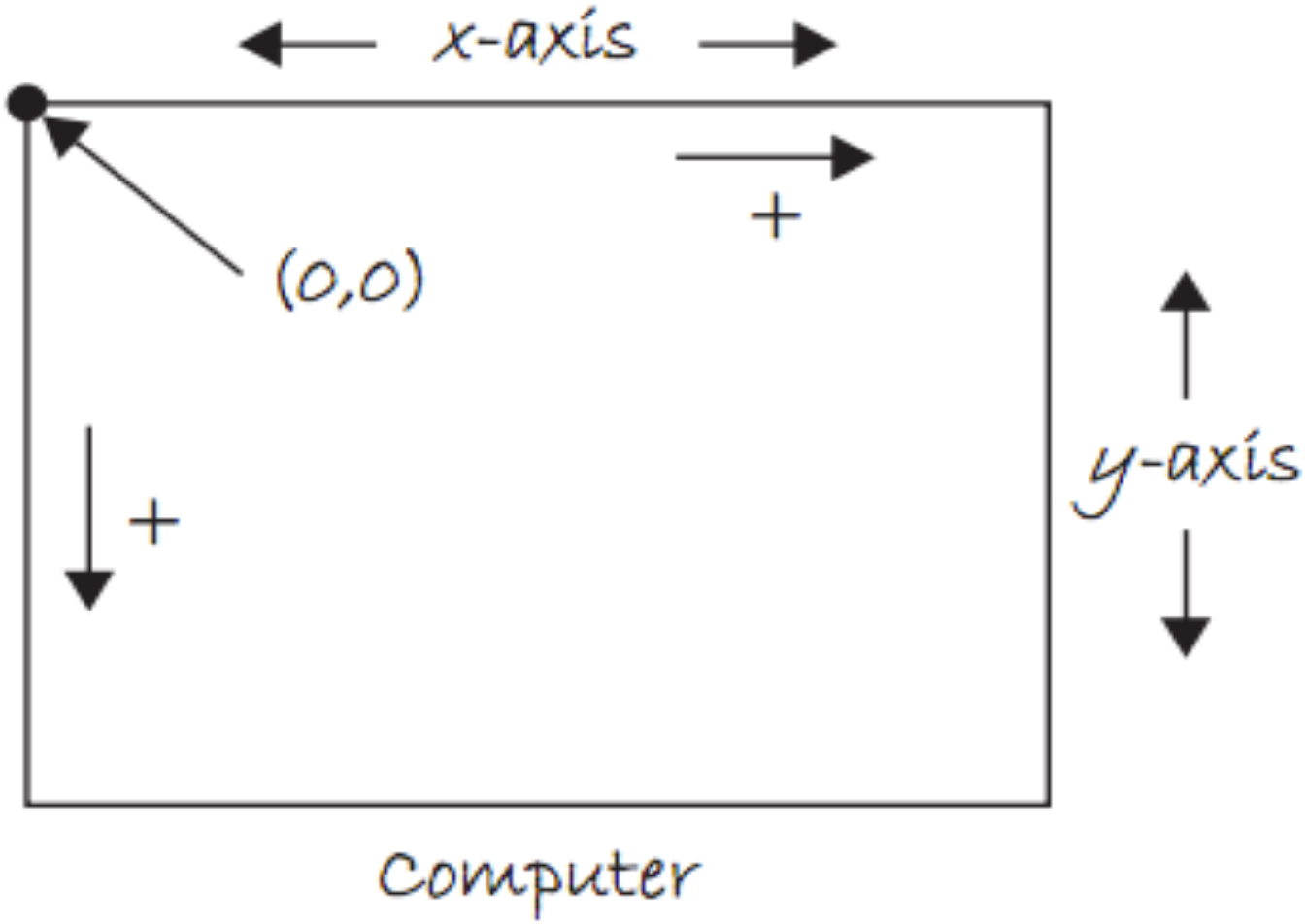
```
// global variables are declared at the top before setup()
void setup(){
        // code here to initialize global variables,
        // background color, window size, etc…
        // setup() is run only once.
}

// draw is a loop that runs
// automatically 60 frames per second
// used for animation
void draw(){
        // code for updating variables for next frame
        // creating illusion of animation
}
```

Example

```
int x; //declaring global variables; not initialized
void setup(){
      //initializing x and y
      x = 5;
}
void draw()
{
      x = x + 1; //x increases by 1
      // 60 times per second.
}
```

Coordinate System



Example 1

Note: Red-colored text denotes reserved methods or variables.

```
int centerX, centerY;
void setup(){
        size(800,600); // window width=800 pixels, height=600 pixels
        centerX = width/2; // 400
        centerY = height/2; // 300
}
void draw(){
        background(255); //white background
        fill(255,0,0); //red fill (Red,Green,Blue) color (RGB)
        ellipse(centerX,centerY,80,80);
        //red circle radius 40(diameter=80)
}
```

Making it move!

```
int centerX, centerY, xspeed;

void setup(){
        size(800,600); // window width=800 pixels, height=600 pixels
        centerX = width/2; // 400
        centerY = height/2; // 300
        xspeed = 5;


}
void draw(){
        background(255); //white background
        fill(255,0,0); //red fill (Red,Green,Blue) color (RGB)
        //red circle radius 40 (diameter=80)
        ellipse(centerX,centerY,80,80);
        centerX = centerX + xspeed; //updating centerX
}
```

Back and Forth

```
int centerX, centerY, xspeed;
void setup(){
        size(800,600); // window width=800 pixels, height=600 pixels
        centerX = width/2; // 400
        centerY = height/2; // 300
        xspeed = 5;
}
void draw(){
        background(255); //white background
        fill(255,0,0); //red fill (Red,Green,Blue) color (RGB)
        //red circle radius 40 (diameter=80)
        ellipse(centerX,centerY,80,80);
        centerX = centerX + xspeed; //updating centerX
        if (centerX > width || centerX < 0) {
                xspeed = -xspeed;
        }
}
```

Processing References

The Processing website is a great reference for learning about Processing. There are tutorials on different topics, videos, etc…

A quick way to learn how to do something on Processing is through Google. If I want to know how to draw a rectangle. Search for "draw rectangle processing", the first result will take you directly to the code on Processing.

There are also many videos on Processing on youtube.

Lab 1

Download Processing at https://www.processing.org/.

Retype the previous program to see the ball bouncing back and forth. Please, for this first time, DO NOT copy and paste. Practice learning how to do this without any reference.

Modify the program so that the ball has a vertical velocity component by adding a vertical speed, yspeed.

Add an "if" conditional to make sure the ball bounces of the top and bottom of the screen.

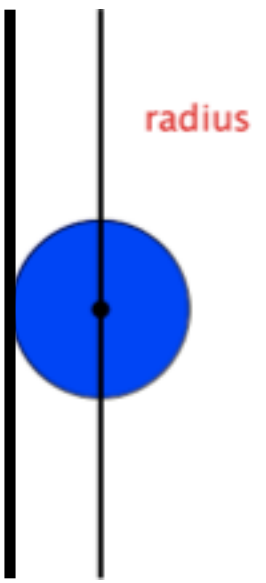
Lab 1(continued)

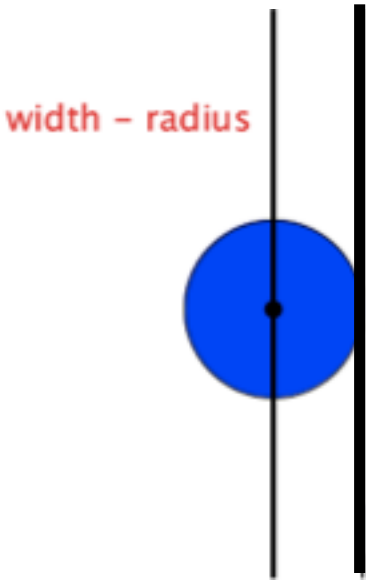
Some more things to try.

- Play around with the window size.
- Try changing the background into RGB color instead of greyscale.

Lab 1(continued)

- As the program is written here, the ball does not perfectly bounces off the edge of the window. Fix it by introducing a radius variable! **Write your program so that the ball bounces correctly for any window size and for any radius without explicitly fixing your code.**





Lab 2

Refactor your code from the ball bouncing program now to include three methods:

void drawBall(){…}

void moveBall(){…}

void bounceBall(){…}

Your draw() method should now be very simple:

```
void draw(){
  background(255);
  drawBall();
  moveBall();
  bounceBall();
}
```

Lab 3

We won't specifically cover Processing's API in class lectures. Some of this will be covered in your homework by watching youtube videos.

Watch the first two videos(Drawing Basic Shapes and Basic Animation) of the **Introduction to Processing Series** on my Youtube channel. See links on my website.

Write a sketch that:

- Draw a circle, a line, a rectangle, a square of different sizes and color.
- Add some text to the screen.
- Draw a shape that follows your mouse.
- Use beginShape() to draw any polygon with 6 sides.