Computer Programming Fundamentals

CS 152
Professor: Leah Buechley
TAs: Melody Horn, Noah Garcia, Andrew Geyko, Juan Ormaza
Time: MWF 10:00-10:50am
https://handandmachine.cs.unm.edu/classes/CS152_Fall2021/

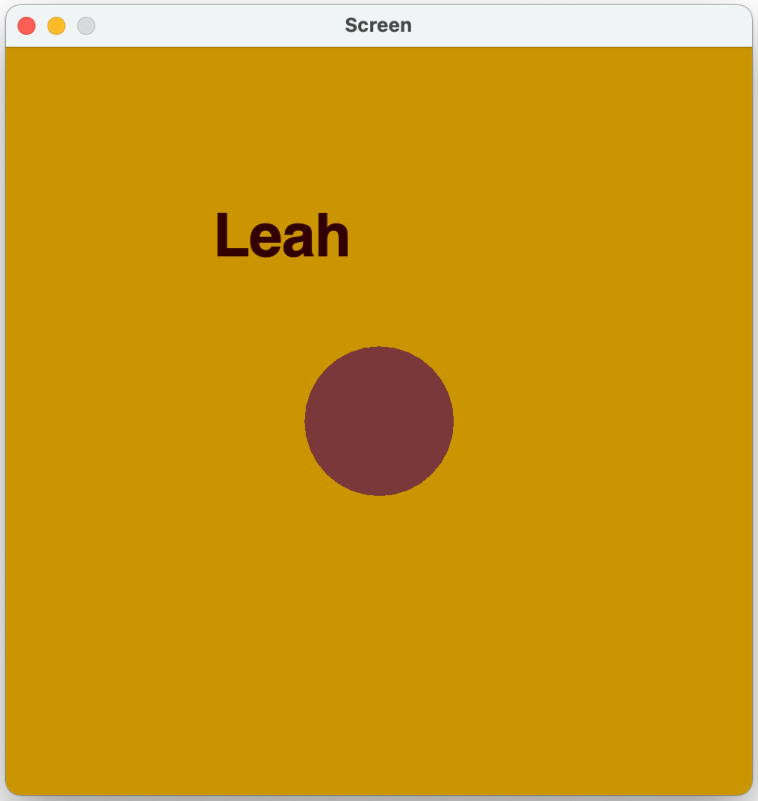
USE PIAZZA FOR QUESTIONS

EXAMPLES

OPEN UP CODE FROM LAST CLASS

WHERE WE LEFT OFF

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(196, 154, 6);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color rectColor = new Color(119, 60, 60);
    g.setColor(rectColor);
    int rectWidth = 100;
    int rectHeight = 100;
    g.fillOval(screen.width/2-rectWidth/2, screen.height/2-rectHeight/2, rectWidth, rectHeight);

    Color textColor = new Color(45, 1, 1);
    g.setColor(textColor);
    Font helvetica = new Font("Helvetica", Font.BOLD, 40);
    g.setFont(helvetica);
    String name = "Leah";
    g.drawString(name, screen.mouseX, screen.mouseY);

    //update the screen with the drawing that you made
    screen.update(g);
}
```


Screen
Leah

FIX VARIABLE NAMES

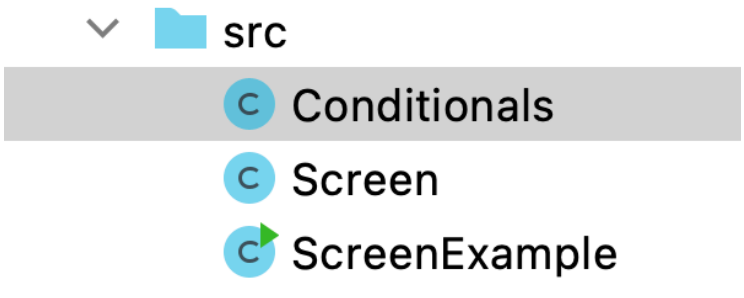
```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(196, 154, 6);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color rectColor = new Color(119, 60, 60);
    g.setColor(rectColor);
    int shapeWidth = 100;
    int shapeHeight = 100;
    g.fillOval(screen.width/2-shapeWidth/2, screen.height/2-shapeHeight/2, shapeWidth, shapeHeight);

    Color textColor = new Color(45, 1, 1);
    g.setColor(textColor);
    Font helvetica = new Font("Helvetica", Font.BOLD, 40);
    g.setFont(helvetica);
    String name = "Leah";
    g.drawString(name, screen.mouseX, screen.mouseY);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

questions?

CONDITIONALS

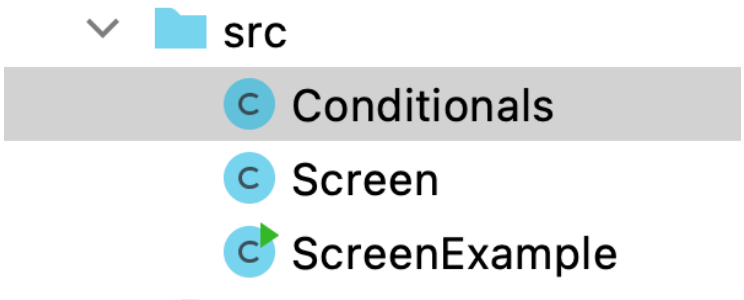
CREATE A NEW JAVA CLASS FILE NAMED Conditionals.java

COPY & PASTE ScreenExample.java CODE FROM CLASS WEBSITE



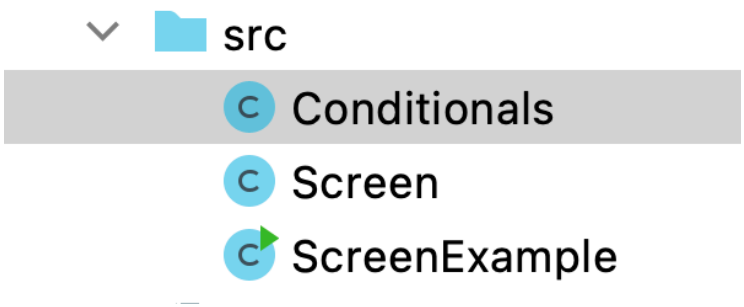

```java
/*******************************************************************************
 * Author: Leah Buechley
 * Date:   8/2021
 * This is an example to help you use the Screen class
 * Refer to Java graphics documentation for information on drawing:
 * https://docs.oracle.com/en/java/javase/16/docs/api/java.desktop/java/awt/Gra
 *******************************************************************************/

import java.awt.*;

public class ScreenExample {
    //Create a screen/window to draw in
    static Screen screen= new Screen();

    //Main just paints the screen over and over forever
    public static void main(String[] args) {
        while (true) {
            paint();
        }
    }

    //The paint() method is where all the interesting stuff happens
    public static void paint() {
        //clear the screen
        screen.clearScreen();
        Color backgroundColor = new Color(196, 154, 6);
```

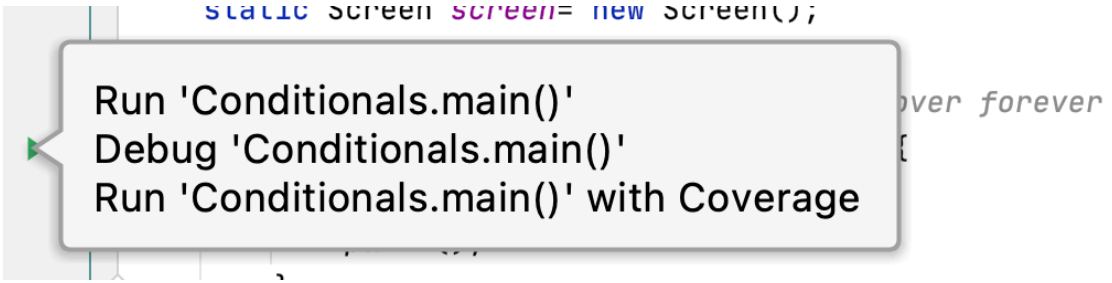
RENAME CLASS Conditionals




```
/*******************************************************************************
 * Author: Leah Buechley
 * Date:   8/2021
 * This is an example to help you use the Screen class
 * Refer to Java graphics documentation for information on drawing:
 * https://docs.oracle.com/en/java/javase/16/docs/api/java.desktop/java/awt/Gra
 *******************************************************************************/

import java.awt.*;

public class Conditionals {
    //Create a screen/window to draw in
    static Screen screen= new Screen();

    //Main just paints the screen over and over forever
    public static void main(String[] args) {
        while (true) {
            paint();
        }
    }

    //The paint() method is where all the interesting stuff happens
    public static void paint() {
        //clear the screen
        screen.clearScreen();
        Graphics g = screen.getGraphics();

        //Do all drawing here
```

RUN. CLICK ON ARROW NEXT TO MAIN SELECT RUN LINE.MAIN()



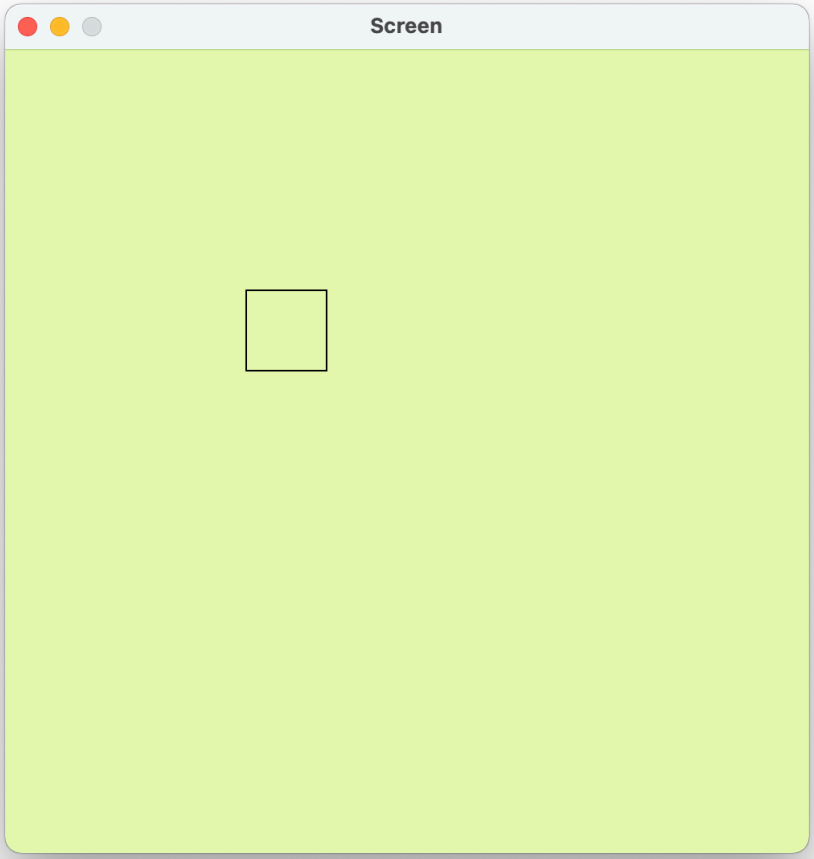


YOU CAN HAVE SEVERAL PROGRAMS IN SAME PROJECT!

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Graphics g = screen.getGraphics();

    //Do all drawing here
    g.setColor(Color.BLACK);
    g.drawRect(150,150,50,50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

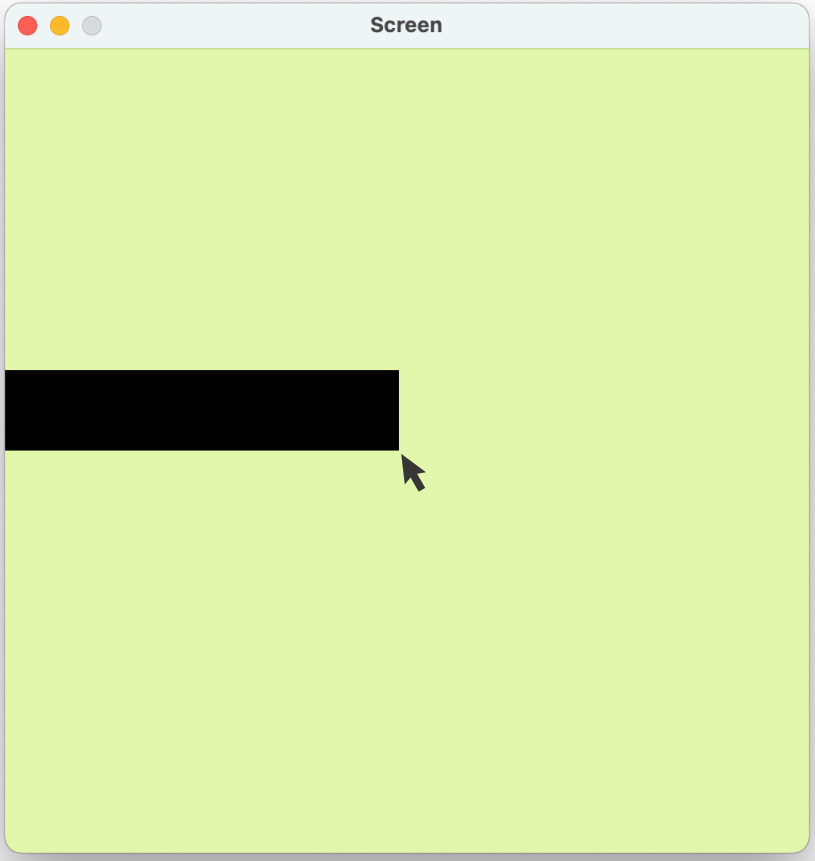
ADD A NICE BACKGROUND

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    g.setColor(Color.BLACK);
    g.drawRect(150,150,50,50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```


Screen

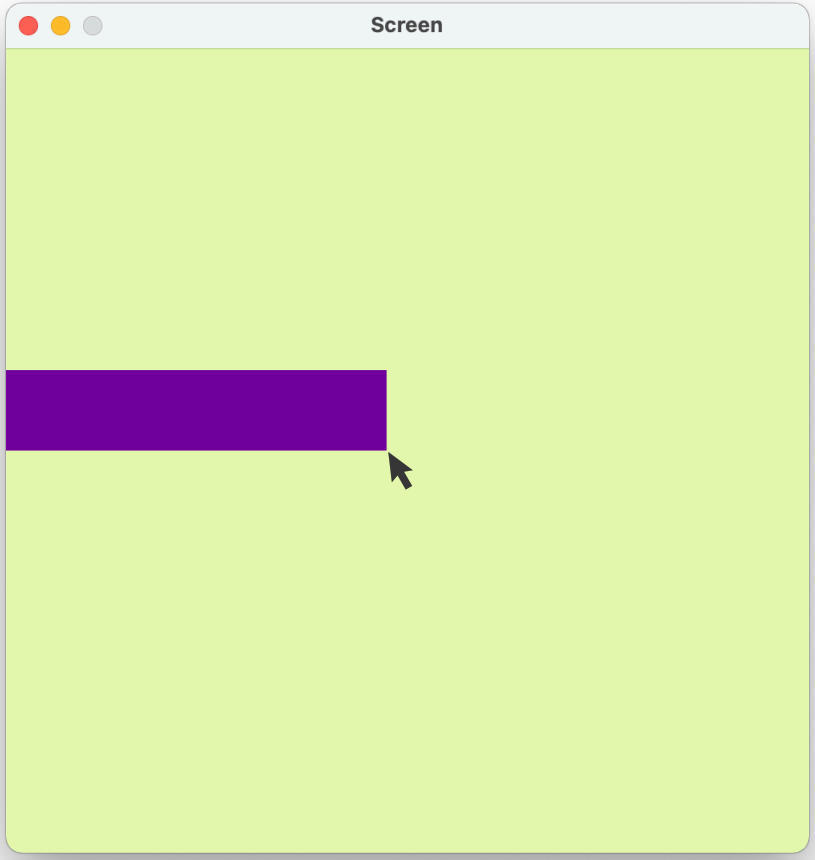
ADD A SOME INTERACTIVITY

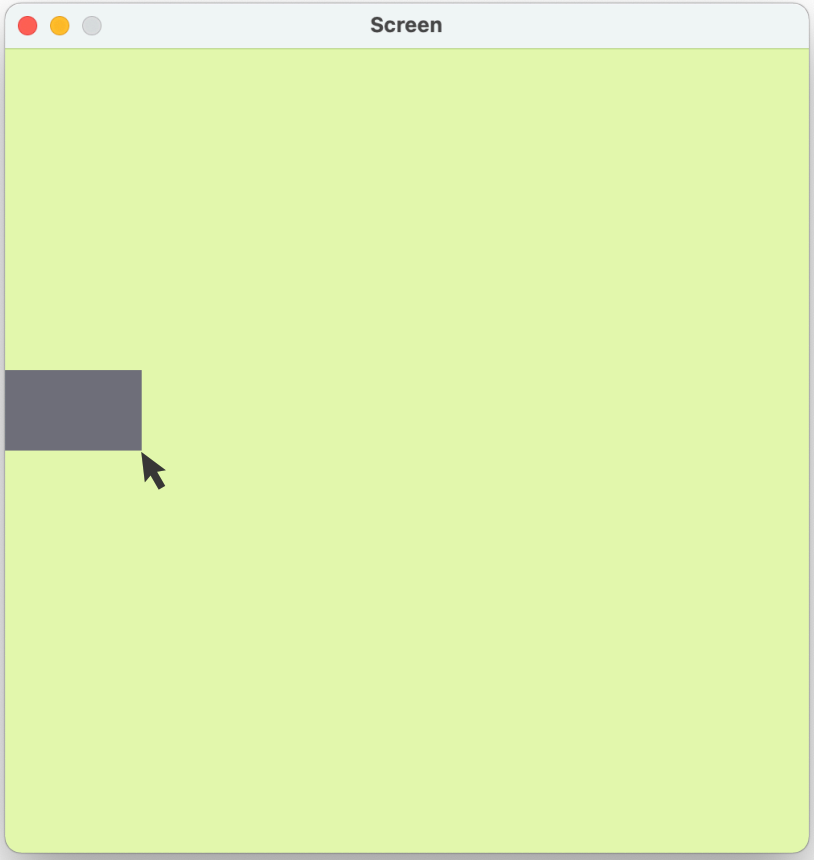
```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    g.setColor(Color.BLACK);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```


Screen

ADD AN “IF” STATEMENT

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (screen.mouseX < 100) {
        fillColor = new Color(110, 113, 122);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```


Screen


Screen

`if`

https://docs.oracle.com/javase/tutorial/java/nutsandbolts/if.html

BOOLEAN EXPRESSIONS

- A question with an answer that is either TRUE or FALSE
- A logical statement that is either TRUE or FALSE
- In our program: `screen.mouseX < screen.width/2`
  Is the mouse in the left half of the screen?
- More examples:

  `screen.mouseY < screen.height/2`

  Is the mouse in the upper half of the screen?

  `x <= 50`

  Is x less than or equal to 50?

  `a == 10.5`

  Is a equal to 10.5?

RELATIONAL OPERATORS

- Relational operators ask about the relationships between things. They ask our questions. They are:

==	equal to	x == 10	is x equal to 10?
!=	NOT equal to	x != 10	is x not equal to 10?
<	less than	x < 10	is x less than 10?
<=	less than or equal to	x <= 10	is x less than or equal to 10?
>	greater than	x > 10	is x greater than 10?
>=	greater than or equal to	x>=10	is x greater than or equal to 10?

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (screen.mouseX > 100) {
        fillColor = new Color(110, 113, 122);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (screen.mouseX == 100) {
        fillColor = new Color(110, 113, 122);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (10 <= 100) {
        fillColor = new Color(110, 113, 122);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

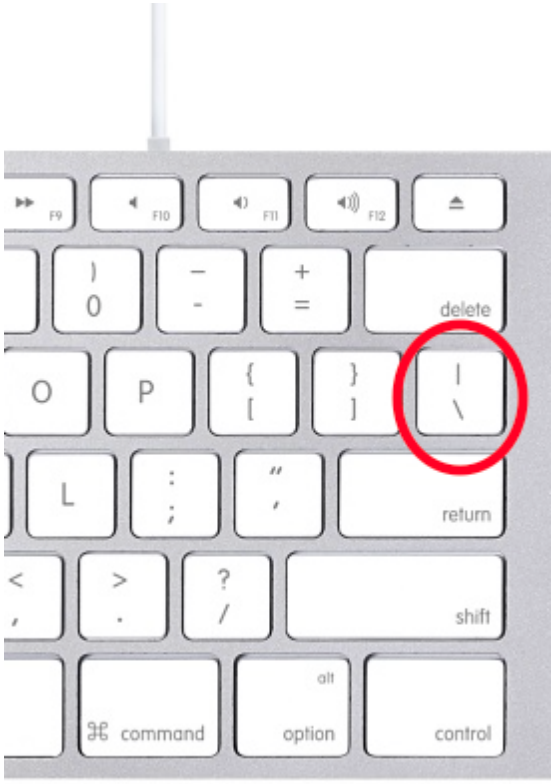
```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (true) {
        fillColor = new Color(110, 113, 122);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

BOOLEAN EXPRESSIONS

- Create more complex expressions by combining them with AND and OR
  - » AND && combines 2 statements, TRUE if both are TRUE
  - » OR || combines 2 statements, TRUE if either is TRUE
- Examples
  - » mouseY < 250 && mouseX < 250
    (is mouseY less than 250 and mouseX less than 100?)
  - » x==0 || x==5
    (is x less equal to 0 or 5?)
  - » (mouseY < 250 && mouseX < 250) || (x != 7)

Where is the OR symbol (|) on my keyboard?

Not lowercase “L”
With \



```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (screen.mouseX < 100 || screen.mouseX > 400) {
        fillColor = new Color(110, 113, 122);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (screen.mouseX < 100 && screen.mouseY < 100) {
        fillColor = new Color(110, 113, 122);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

questions?

`else`

https://docs.oracle.com/javase/tutorial/java/nutsandbolts/if.html

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (screen.mouseX < 100) {
        fillColor = new Color(110, 113, 122);
    }
    else {
        fillColor = new Color(24, 149, 110);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(101, 9, 151);
    if (screen.mouseX < 100) {
        fillColor = new Color(110, 113, 122);
    }
    else  if (screen.mouseX < 200) {
        fillColor = new Color(24, 149, 110);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

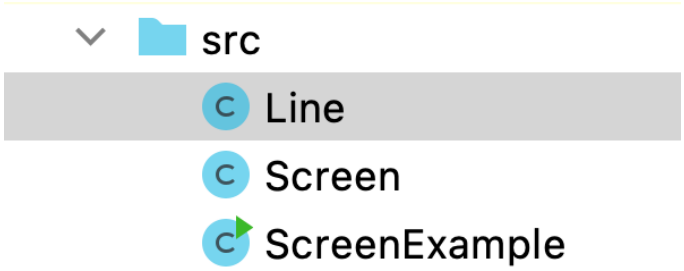
```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(231, 248, 181);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    Color fillColor = new Color(44, 165, 13);
    if (screen.mouseX < 100) {
        fillColor = new Color(217, 12, 80);
    }
    else if (screen.mouseX < 200) {
        fillColor = new Color(227, 122, 47);
    }
    else if (screen.mouseX < 300) {
        fillColor = new Color(227, 209, 47);
    }
    g.setColor(fillColor);
    g.fillRect(0,200, screen.mouseX, 50);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

questions?

AN EXAMPLE WITH LINE

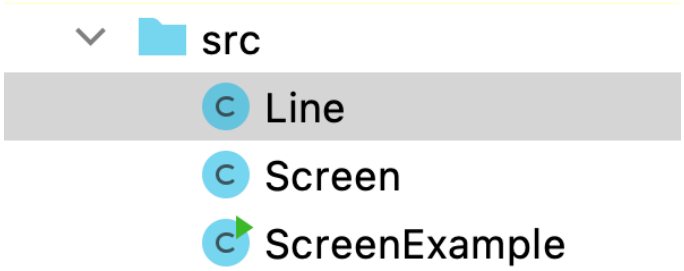
CREATE A NEW JAVA CLASS FILE NAMED Line.java

COPY & PASTE ScreenExample.java CODE FROM CLASS WEBSITE



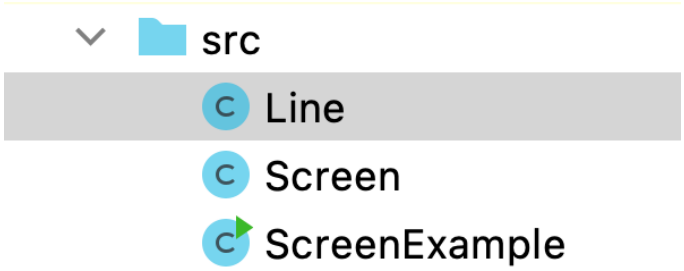

```java
/*******************************************************************************
 * Author: Leah Buechley
 * Date:   8/2021
 * This is an example to help you use the Screen class
 * Refer to Java graphics documentation for information on drawing:
 * https://docs.oracle.com/en/java/javase/16/docs/api/java.desktop/java/awt/Gra
 *******************************************************************************/

import java.awt.*;

public class ScreenExample {
    //Create a screen/window to draw in
    static Screen screen= new Screen();

    //Main just paints the screen over and over forever
    public static void main(String[] args) {
        while (true) {
            paint();
        }
    }

    //The paint() method is where all the interesting stuff happens
    public static void paint() {
        //clear the screen
        screen.clearScreen();
        Color backgroundColor = new Color(196, 154, 6);
```

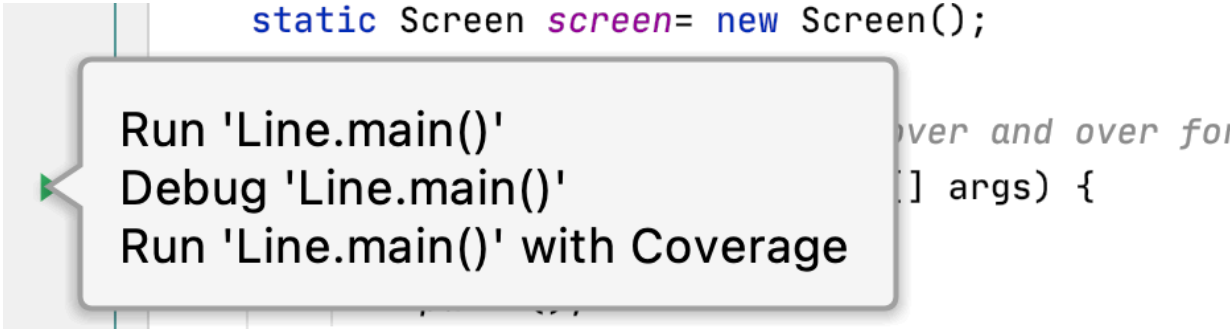
RENAME CLASS Line




```
/*******************************************************************************
 * Author: Leah Buechley
 * Date:   8/2021
 * This is an example to help you use the Screen class
 * Refer to Java graphics documentation for information on drawing:
 * https://docs.oracle.com/en/java/javase/16/docs/api/java.desktop/java/awt/Gra
 *******************************************************************************/

import java.awt.*;

public class Line {
    //Create a screen/window to draw in
    static Screen screen= new Screen();

    //Main just paints the screen over and over forever
    public static void main(String[] args) {
        while (true) {
            paint();
        }
    }

    //The paint() method is where all the interesting stuff happens
    public static void paint() {
        //clear the screen
        screen.clearScreen();
        Graphics g = screen.getGraphics();

        //Do all drawing here
```

RUN. CLICK ON ARROW NEXT TO MAIN SELECT RUN LINE.MAIN()

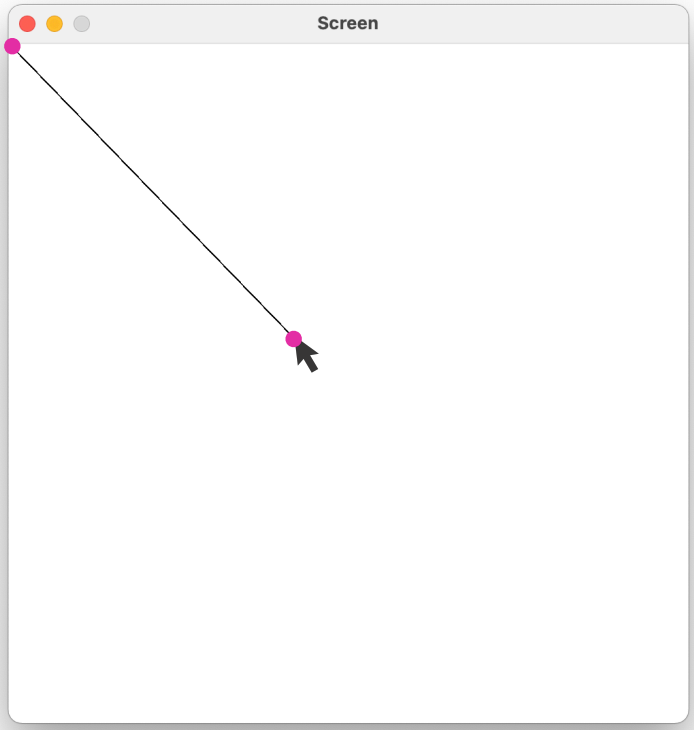




LET'S WRITE A SIMPLE LINE PROGRAM

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(186, 225, 237);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

    //Do all drawing here
    g.drawLine(0,0, screen.mouseX, screen.mouseY);

    //update the screen with the drawing that you made
    screen.update(g);
}
```

LINE PROGRAM




```
g.drawLine(0,0, screen.mouseX, screen.mouseY);
```

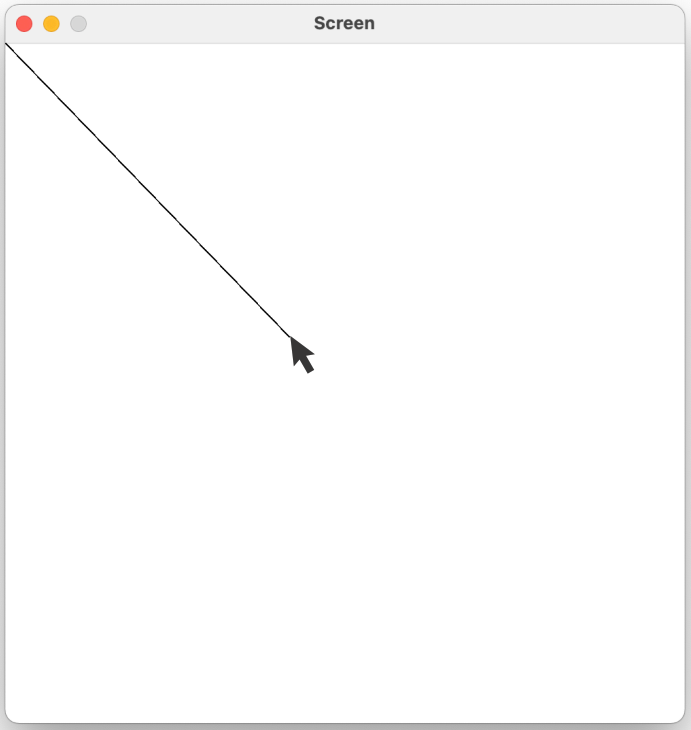
first point
x, y

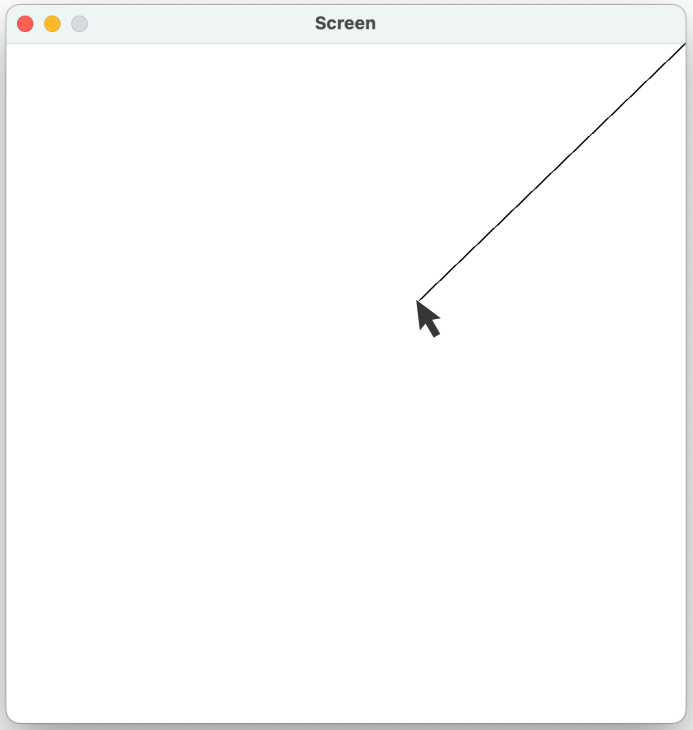
second point
x, y

WITH CONDITIONALS

```
//The paint() method is where all the interesting stuff happens
public static void paint() {
    //clear the screen
    screen.clearScreen();
    Color backgroundColor = new Color(186, 225, 237);
    screen.setBackground(backgroundColor);
    Graphics g = screen.getGraphics();

//Do all drawing here
    g.setColor(Color.BLACK);
    if (screen.mouseX < screen.width/2) {
        g.drawLine(0, 0, screen.mouseX, screen.mouseY);
    }
    else {
        g.drawLine(screen.width,0, screen.mouseX, screen.mouseY);
    }

    //update the screen with the drawing that you made
    screen.update(g);
}
```

WITH CONDITIONALS





questions?

ASSIGNMENT 2 SUBMISSION

- Due Tuesday 9/6 by 9:30am
- Use the Screen.java code from class
- Submit via UNM Learn
- Turn in:
  - .java file, upload via Learn
  - paragraph

ASSIGNMENT 2 SUBMISSION

- Naming format: LeahBuechleyAssignment2.java
- Name of file and class
- Upload that file only
- Don’t upload Screen.java
- Follow style guidelines

STYLE GUIDELINES

- Header comment
- Appropriate use of white space
- Appropriate use of comments

https://handandmachine.cs.unm.edu/classes/CS152_Fall2021/styleGuidelines.html

questions?

ASSIGNMENT 2 SUBMISSION

Thank you!

CS 152
Professor: Leah Buechley
TAs: Melody Horn, Noah Garcia, Andrew Geyko, Juan Ormaza
Time: MWF 10:00-10:50am
https://handandmachine.cs.unm.edu/classes/CS152_Fall2021/