Video Name: GUI 7

Topics:

- Basic drawing
- Timer class

Java Class(es): package gui_drawing, classes DrawPanel and DrawFrame

Graphics is an abstract class, so that we can use the same functions to draw regardless of the OS. Provides functions such as setting color, setting font, drawing shapes, etc.

Must understand the coordinate system in order to draw. Top left corner of component is x=0, y=0. Values increase as x goes left to right and y goes top to bottom.

VERY IMPORTANT. Graphics is abstract, so can’t call ctor directly. Best option is normally to:

- create a JComponent
- override the paintComponent method. This takes a Graphics object. Can be cast to a Graphics2D to use advanced functionality.
- NOTE: First line of paintComponent should be super.paintComponent();
- Graphics object is created automatically when needed.
- paintComponent is called by the Java VM whenever it can determine the component needs to be drawn. For example, when the program starts, when a window is resized or maximized, etc.
- If your program causes the need for a window to be drawn (e.g., if items on the window are moved) you need to inform the JVM. You do this by calling the repaint(); method.
- Do NOT call paintComponent directly (you’d need to create a Graphics object, much better for JVM to create).

Common error: go crazy with repaint and spread the command throughout your code. Strategy: determine exactly when the screen should be repainted. For example, if a player piece has just been moved on a game board. At the point when the player location is updated, call repaint.
Timer class. Can be used to cause some action to occur at regular intervals, such as creating an animation.

- Create a timer with some delay

```java
Timer t = new Timer(2000, new TimerListener());
t.start();
```

- Create a class that implements ActionListener,

```java
private class TimerListener implements ActionListener {
    public void actionPerformed(ActionEvent e) {
        drawPanel.translate(dx, dy);
    }
}
```