CS260 Intro to Java & Android 09.AndroidAdvUI (Part I)

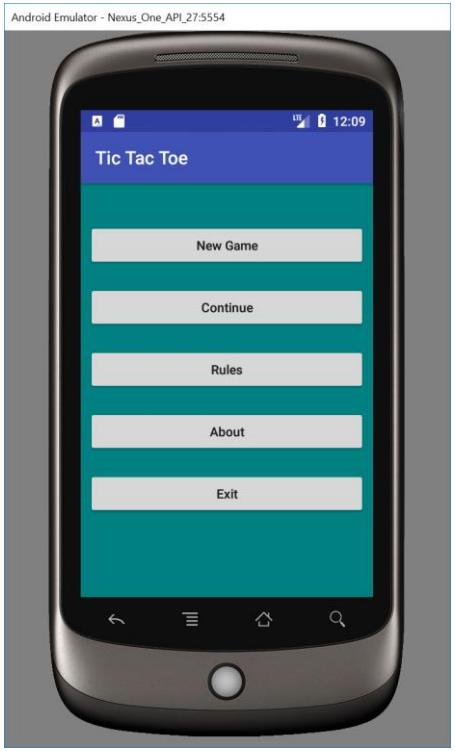
Winter 2018

Creating TicTacToe for Android

- We are going to begin to use everything we've learned thus far to produce the shell of an Android TicTacToe game

TicTacToe for Android
Step #1

- Using the GameSkeleton app, change the app title to Tic Tac Toe



TicTacToe for Android
Step #2
Add an Array Resource

- Create a string array in strings.xml where the string-array name is gameDifficulty and the items are:
  - Easy
  - Medium
  - Hard

```
<?xml version="1.0" encoding="utf-8"?>
<resources>

    <string name="app_name">TicTacToeAndroid</string>
    <string name="action_settings">Settings</string>
    <string name="hello_world">Hello world!</string>

    <string name="sNewGame">New Game</string>
    <string name="sContinue">Continue</string>
    <string name="sRules">Rules</string>
    <string name="sAbout">About</string>
    <string name="sExit">Exit</string>
    <string name="sGameDifficulty">Game Difficulty</string>

    <string-array name="gameDifficulty">
        <item >Easy</item>
        <item >Medium</item>
        <item >Hard</item>
    </string-array>

</resources>

```

TicTacToe for Android
Step #3
Create Ask Difficulty Dialog

```
private void newGameDialog ()
{
  new AlertDialog.Builder (this)
  .setTitle (R.string.sGameDifficulty)
  .setItems (R.array.gameDifficulty, new DialogInterface.OnClickListener()
  {
    public void onClick (DialogInterface dialog, int difficultyLevel)
    {
      startGame (difficultyLevel);
    }
  }).show ();
}

private void startGame (int difficultyLevel)
{

}
```

Start the game

- In the private method startGame that accepts the difficulty level, use the Log.d method to display the difficulty level in the logcat window based on the difficulty level the user selected.
- Hook up the New Game button so that when the button is pressed:
  - the Game Difficulty dialogue appears allowing the user to enter Easy (0), Medium (1), or Hard (2)
  - after the user enters their selection, the difficulty value shows up in the logcat window

Graphics

- We will explore still graphics and then graphic animation
- Android provides libraries to perform 2D and 3D graphics
- android.graphics provides low-level graphics drawing tools such as
  - canvases
  - color filters
  - points
  - rectangles

Android colors

- Represented with four 8-bit numbers (ARGB)
  - alpha - measures transparency where 0 is completely transparent and 255 is completely opaque
  - red
  - green
  - blue

```
int color = Color.BLACK;
int color = Color.argb (127, 0, 255, 255);
```

Accessing Color Information

- It is best to define your colors in an xml file

```
<?xml version="1.0" encoding="UTF-8"?>
<resources>
  <color name="steelblue">#4682b4</color>
  <color name="navy">#000080</color>
</resources>
```

- Note: Four values is ARGB while three values is RGB where A is fully opaque
- Colors can be accessed by `int color = getResources ().getColor (R.color.navy);`

Paint

- The Paint class holds information about
  - style and color
  - how to draw geometries, text, and bitmaps
- Before drawing a color, it is common to set the color with the method setColor (Color.BLUE); which is part of the Paint class

Canvas

- The canvas is a surface to draw on
- Android framework APIs provide 2D drawing APIs to:
  a) render your own graphics on a canvas - need to call onDraw () method passing a Canvas
  b) modify (customizing) existing Views - draw graphics or animations into an existing View
- a) is best for simple graphics with no animation
- b) is best for video games with complex animation and frequent redraws

Basic Display

- An Activity provides the UI for the display screen
- An Activity hosts a View
- A View hosts a Canvas
- The onDraw () method can be overridden to perform custom drawing on the Canvas

Custom View

```
public class CustomDrawableView extends View
{
  private ShapeDrawable mDrawable;
  public CustomDrawableView (Context context)
  {
    super (context);
    int x = 10, y = 10, width = 300, height = 50;

    mDrawable = new ShapeDrawable (new OvalShape());
    mDrawable.getPaint ().setColor (0xff74AC23);
    mDrawable.setBounds (x, y, x + width, y + height);
  }
  protected void onDraw (Canvas canvas)
  {
    mDrawable.draw (canvas);
  }
} // http://developer.android.com/guide/topics/graphics/2d-graphics.html
```

Drawing Custom View

```
CustomDrawableView mCustomDrawableView;

protected void onCreate (Bundle savedInstanceState)
{
  super.onCreate (savedInstanceState);
  mCustomDrawableView = new CustomDrawableView (this);

  setContentView (mCustomDrawableView);
} // http://developer.android.com/guide/topics/graphics/2d-graphics.html
```

TicTacToe for Android
Step #4

- Let's draw a simple graphic in our Android game before getting into more complicated graphics.
- Create a new class called CustomDrawableView in your tictactoeandroid package. Place the previous CustomDrawableView code in this class.
- For now, comment out displaying the TicTacToe main activity and simply write the code necessary to display a new CustomDrawableView instead.
- You should end up with the UI on the following slide. If you get this, check your updated TicTacToe into subversion.

TicTacToe for Android
Step #4

CustomView Modifications

- You can do any kind of drawing in the onDraw of a custom view.
- The following slides allow you to draw the lines of a TicTacToe board
- See if you can get this to work

Add Instance Variables

```
private Paint mBackground = new Paint ();
private Paint mDarkLines = new Paint ();
private float mNUMBER_OF_RECTANGLES = 3f;
private int mRectangleHeight, mRectangleWidth;
```

Add onDraw Logic

```
mBackground.setColor (getResources ().getColor (R.color.teal));
canvas.drawRect (0, 0, getWidth (), getHeight (), mBackground);
// Compute mRectangleHeight and mRectangleWidth here

mDarkLines.setColor (Color.BLACK);

for (int i = 0; i < (int) mNUMBER_OF_RECTANGLES; i++)
{
     canvas.drawLine (0, i * mRectangleHeight, getWidth(),
                      i * mRectangleHeight, mDarkLines);
     canvas.drawLine (i * mRectangleWidth, 0,
                      i * mRectangleWidth, getHeight(), mDarkLines);
}
```

Result