# 5COSC023W - MOBILE APPLICATION DEVELOPMENT
# Lecture 5: Android Shared Preferences

Dr Dimitris C. Dracopoulos

# Saving Data in an Android Application

- Use `onSaveInstanceState()` for configuration changes or system destroying and re-creating the activity.
- Saving Key-Value Sets (small amounts)
- Saving in Files
- Saving in SQL databases (large amounts of structured data)

# SharedPreferences (Saving Key-Value Sets)

To create a new shared preference file or access an existing one, call one of the following methods to get a `SharedPreferences` object:

- `getSharedPreferences()`: if you need multiple shared preferences files (the name of the preference file is the first argument) - can be called from any `Context` in the app

```
sharedPref: SharedPreferences =
        getSharedPreferences("preference_filename",
                             Context.MODE_PRIVATE);
```

- `getPreferences()`: call from an activity to use only one shared preference file associated with the activity

```
sharedPref = getPreferences(Context.MODE_PRIVATE);
```

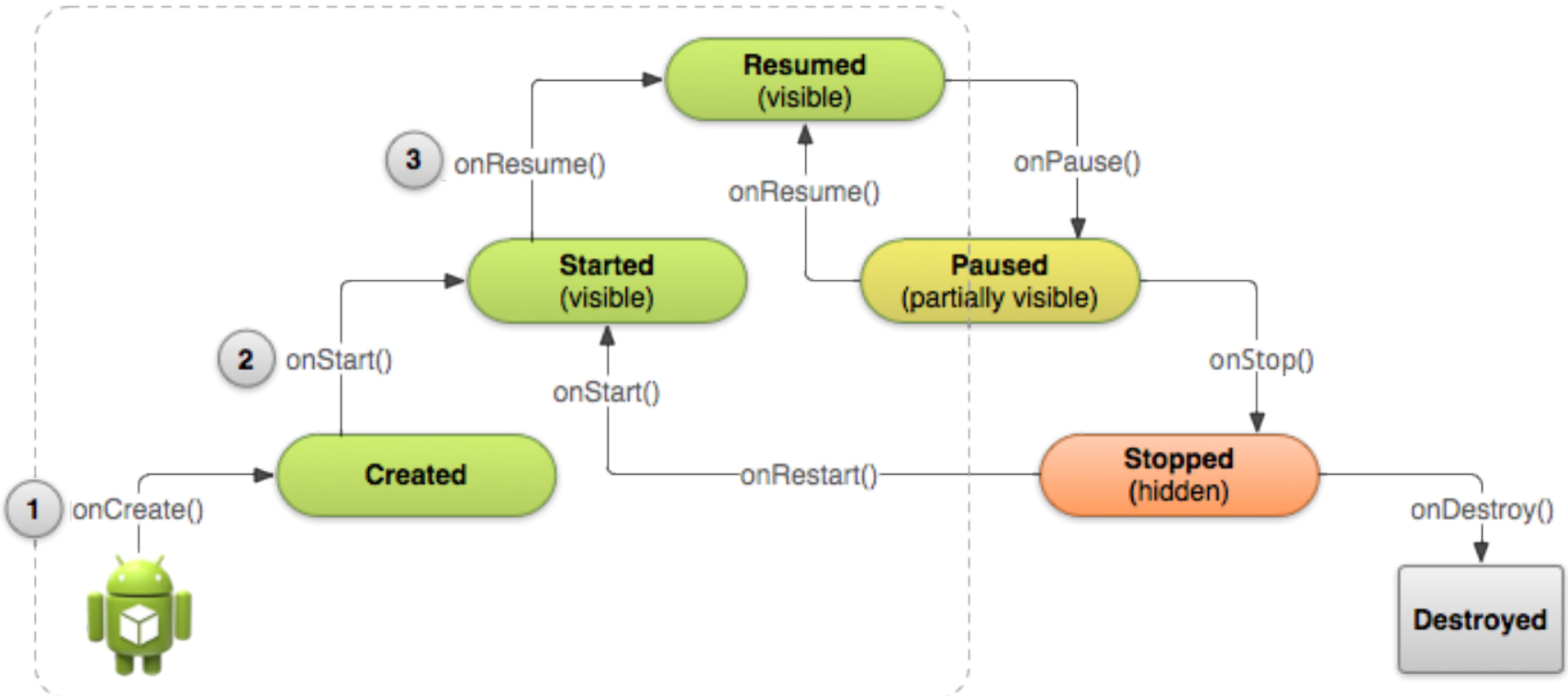
Usage of `MODE_WORLD_READABLE` or `MODE_WORLD_WRITEABLE` imply that any other app can access your data (if it knows the filename)

# Saving Key-Value Sets (Writing to Shared Preferences)

1. Create a `SharedPreferences.Editor` by calling `edit()` on `SharedPreferences`.
2. Write the keys and values with `putInt()`, `putString()`, etc.
3. Call `apply()` or `commit()`.

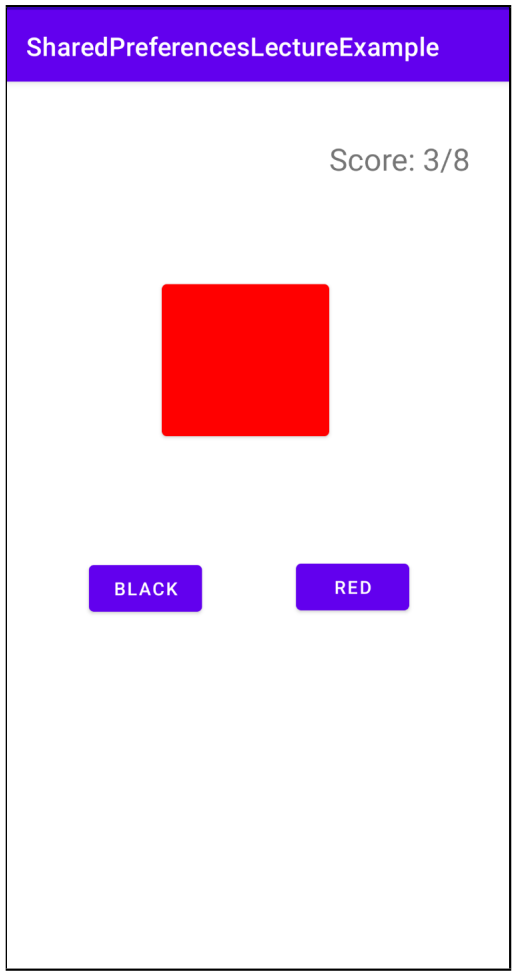
```
sharedPref: SharedPreferences  = getActivity().getPreferences(
                                        Context.MODE_PRIVATE);
editor: SharedPreferences.Editor = sharedPref.edit(); // step 1
editor.putInt("key_name", newHighScore); // step 2
editor.apply();  // step 3
```

# The Activity Lifecycle (cont'ed)



# An Example Application for SharedPreferences

An application which the user can guess the displayed colour. The score is persisted even the application is killed and restarted (even if the device reboots).



# An Example Application for SharedPreferences (cont'ed)

The layout file `activity_main.xml`:

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <Button
        android:id="@+id/button"
        android:layout_width="130dp"
        android:layout_height="130dp"
        android:layout_marginStart="118dp"
        android:layout_marginTop="152dp"
        android:layout_marginEnd="141dp"
        android:text=""
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="1.0"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
```

# An Example Application for SharedPreferences (cont'ed)

```
<Button
    android:id="@+id/button2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginStart="60dp"
    android:layout_marginBottom="276dp"
    android:text=""
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toStartOf="@+id/button3"
    app:layout_constraintHorizontal_bias="0.059"
    app:layout_constraintStart_toStartOf="parent" />

<Button
    android:id="@+id/button3"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="79dp"
    android:layout_marginBottom="277dp"
    android:text=""
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent" />
```

# An Example Application for SharedPreferences (cont'ed)

```
    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="44dp"
        android:text="Score: 0/0"
        android:textSize="24sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.889"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

# An Example Application for SharedPreferences (cont'ed)

## The activity code `MainActivity.kt`:

```
package uk.ac.westminster.sharedpreferenceslectureexample

import android.content.SharedPreferences
import android.graphics.Color
import androidx.appcompat.app.AppCompatActivity
import android.os.Bundle
import android.widget.Button
import android.widget.TextView
import java.util.*

class MainActivity : AppCompatActivity() {
    lateinit var prefs: SharedPreferences

    var colours = listOf(Color.BLACK, Color.BLUE, Color.RED, Color.GREEN, Color.WHITE, Color.YELLOW)
    var colours_str = listOf("BLACK", "BLUE", "RED", "GREEN", "WHITE", "YELLOW")
    var generator = Random()

    lateinit var bt: Button
    lateinit var bt2: Button
    lateinit var bt3: Button
    lateinit var tv: TextView

    var correct = 0  // number of correct answers
    var total = 0   // number of colours presented to the user
    var r = 0

    // this corresponds to either the left (if 0) or the right button (if 1)
    var correct_button = 0
```

# An Example Application for SharedPreferences (cont'ed)

```
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)

    // inflate the 3 buttons and the textview  from XML
    bt = findViewById(R.id.button)
    bt2 = findViewById(R.id.button2)
    bt3 = findViewById(R.id.button3)

    tv = findViewById<TextView>(R.id.textView)

    // create the shared preferences object
    prefs = getSharedPreferences("uk.ac.westminster.sharedpreferenceslectureexample", MODE_PRIVATE)
    // restore the data
    total = prefs.getInt("total", 0)
    correct = prefs.getInt("correct", correct)

    nextGame()

    // associate the 2 buttons with listeners
    bt2.setOnClickListener{
        ++total
        if (correct_button == 0)   // left button contains the correct answerr
            ++correct

        tv.setText("Score: $correct/$total" )

        // present the user with a new colour
        nextGame()
    }
```

# An Example Application for SharedPreferences (cont'ed)

```
        bt3.setOnClickListener {
            ++total
            if (correct_button == 1)  // right buttons contains the correct answer
                ++correct

            tv.setText("Score: $correct/$total")

            // present the user with a new colour
            nextGame()
        }
    }

    /* what happens when the activity goes away
    *  save tha data that I am interested in restoring later on*/
    override fun onPause() {
        super.onPause()

        /* give me the editor associated with the sharedpreferences
           object created in the onCreate() method */
        var editor = prefs.edit()
        // start saving the data - in this case I just save the score
        editor.putInt("total", total)
        editor.putInt("correct", correct)

        // persist the data
        editor.apply()
    }
```

# An Example Application for SharedPreferences (cont'ed)

```
    fun nextGame() {
        tv.setText("Score: $correct/$total" )

        // generate a random number in the range 0->5
        r = generator.nextInt(colours.size)

        // choose the corresponding colour from the colours list - i.e. the r-th element in the list
        var random_colour_chosen = colours[r]

        // set the colour of the top button to the random colour chosen
        bt.setBackgroundColor(random_colour_chosen)

        // choose which button (left or right) contains the correct answer
        correct_button = generator.nextInt(2)

        // if the correct answer corresponds to the left button
        if (correct_button == 0 ) {
            bt2.setText("" + colours_str[r])
            bt3.setText("" + colours_str.random())
        }
        else {   // the right button contains the correct answer
            bt3.setText("" + colours_str[r])
            bt2.setText("" + colours_str.random())
        }
    }
}
```