

Experiment Name: CGPA App with SQLite, ActionBar and Widget

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Aim:

To create a mobile application that has a SQLite database insertion and updation facility to store students details, an action bar to navigate to display page, homepage and edit page and finally a widget view of all students

Description of App:

The application starts in the insert student details page. On clicking add, new student details gets added to sqlite database student table.

List of all students details is visible in next activity with a search bar feature that dynamically filters queries of student ids.

Action Bar to navigate back to homepage, go to display page and go to edit page is also present.

We can add a widget of this app that shows student details from homescreen itself. On clicking widget we get redirected to main application.

Device Specifications:

App runs on the minSDK version of 16 and Android version 11 using Pixel 3A API emulator and samsung device. Only default libraries were used.

Technical Concepts Learnt:

- SQLite insertion, updation, Selection
- Event Listeners and handlers
- Action Bars
- SearchViews
- Back navigation
- Homescreen Widgets

SOURCE CODE:

MainActivity.java:

```
package com.example.actionbar;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.os.Bundle;
import android.view.Menu;
import android.view.MenuItem;
```

```

import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {

    EditText etName, etId, etCgpa;
    Button btnAdd;
    StudentDB sdb;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        etName = (EditText) findViewById(R.id.etName);
        etId = (EditText) findViewById(R.id.etId);
        etCgpa = (EditText) findViewById(R.id.etCgpa);

        btnAdd = (Button) findViewById(R.id.btnAdd);

        sdb = new StudentDB(this);

        btnAdd.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                String name = etName.getText().toString();
                int id = Integer.parseInt(etId.getText().toString());
                String cgpa = etCgpa.getText().toString();
                Boolean b = sdb.insertData(id, name, cgpa);
                if(b)
                {
                    Toast.makeText(getApplicationContext(), "Data inserted
Successfully", Toast.LENGTH_SHORT).show();
                }
                else
                {
                    Toast.makeText(getApplicationContext(), "Data insertion
Failed", Toast.LENGTH_SHORT).show();
                }

                Intent intent = new Intent(getApplicationContext(),
ShowStudents.class);
                intent.putExtra("ID", id);
                startActivity(intent);
            }
        });
    }
}

```

```

@Override
public boolean onCreateOptionsMenu(Menu menu) {
    // Inflate the menu; this adds items to the action bar if it is
present.
    getMenuInflater().inflate(R.menu.menu_main, menu);
    MenuItem search = menu.findItem(R.id.app_bar_search);
    search.setVisible(false);
    return true;
}

@Override
public boolean onOptionsItemSelected(MenuItem item) {
    int id = item.getItemId();
    switch (id) {
        case R.id.mdisplay: {
            Intent intent1 = new Intent(getApplicationContext(),
ShowStudents.class);
            intent1.putExtra("ID", id);
            startActivity(intent1);
            return true;
        }
        case R.id.medit: {
            Intent intent2 = new Intent(getApplicationContext(),
EditStudents.class);
            intent2.putExtra("ID", id);
            startActivity(intent2);
            return true;
        }
        default:
            return super.onOptionsItemSelected(item);
    }
}
}
}

```

ShowStudents.java:

```

package com.example.actionbar;

import androidx.appcompat.app.ActionBar;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.view.MenuItemCompat;

import android.content.Intent;
import android.database.Cursor;
import android.os.Bundle;
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;

```

```

import android.widget.ArrayAdapter;
import android.widget.ListView;
import android.widget.SearchView;
import android.widget.TextView;

import java.util.ArrayList;

public class ShowStudents extends AppCompatActivity {

    ListView listView;
    StudentDB sdb;
    TextView tvList;
    ArrayList<String> list;
    ArrayAdapter<String > adapter;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_show_students);
        // Get a support ActionBar corresponding to this toolbar
        ActionBar ab = getSupportActionBar();

        // Enable the Up button
        ab.setDisplayHomeAsUpEnabled(true);
        // tvList = (TextView) findViewById(R.id.tvList);

        Bundle myBundle = getIntent().getExtras();
        int id = myBundle.getInt("ID");

        sdb = new StudentDB(getApplicationContext());

        Cursor c = sdb.getAllData();
        // String result = "";
        // for(c.moveToFirst();!c.isAfterLast();c.moveToNext())
        // {
        //     result = result + c.getInt(0) + ":" +c.getString(1) + " "
        //         + c.getString(2)+ "\n";
        // }
        // tvList.setText(result);

        // LISTVIEW
        listView = (ListView) findViewById(R.id.listView);
        list = new ArrayList<>();
        for(c.moveToFirst();!c.isAfterLast();c.moveToNext())
        {
            String re = String.valueOf(c.getInt(0)) + " " + c.getString(1) + " "
+
                c.getString(2);
            list.add(re);
        }
        adapter = new ArrayAdapter<String>(this,
        android.R.layout.simple_list_item_1,list);
    }
}

```

```

        listView.setAdapter(adapter);
    }

    @Override
    public boolean onCreateOptionsMenu(Menu menu) {
        MenuInflater inflater = getMenuInflater();
        inflater.inflate(R.menu.menu_main, menu);
        MenuItem searchViewItem = menu.findItem(R.id.app_bar_search);
        final SearchView searchView = (SearchView)
MenuItemCompat.getActionView(searchViewItem);
        searchView.setOnQueryTextListener(new SearchView.OnQueryTextListener() {
            @Override
            public boolean onQueryTextSubmit(String query) {
                searchView.clearFocus();
                /* if(list.contains(query)){
                    adapter.getFilter().filter(query);
                }else{
                    Toast.makeText(MainActivity.this, "No Match
found", Toast.LENGTH_LONG).show();
                }*/
                return false;
            }

            @Override
            public boolean onQueryTextChange(String newText) {
                adapter.getFilter().filter(newText);
                return false;
            }
        });
        return super.onCreateOptionsMenu(menu);
    }

    @Override
    public boolean onOptionsItemSelected(MenuItem item) {
        int id = item.getItemId();
        switch (id) {
            case R.id.mdisplay: {
                Intent intent1 = new Intent(getApplicationContext(),
ShowStudents.class);
                intent1.putExtra("ID", id);
                startActivity(intent1);
                return true;
            }
            case R.id.medit: {
                Intent intent2 = new Intent(getApplicationContext(),
EditStudents.class);
                intent2.putExtra("ID", id);
                startActivity(intent2);
                return true;
            }
        }
    }

```

```

        default:
            return super.onOptionsItemSelected(item);
    }
}

```

EditStudents.java:

```

package com.example.actionbar;

import androidx.appcompat.app.ActionBar;
import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.os.Bundle;
import android.view.Menu;
import android.view.MenuItem;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

public class EditStudents extends AppCompatActivity {

    EditText etName1, etId1, etCgpa1;
    Button btnEdit;
    StudentDB sdb;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_edit_students);
        // Get a support ActionBar corresponding to this toolbar
        ActionBar ab = getSupportActionBar();

        // Enable the Up button
        ab.setDisplayHomeAsUpEnabled(true);

        etName1 = (EditText) findViewById(R.id.etName1);
        etId1 = (EditText) findViewById(R.id.etId1);
        etCgpa1 = (EditText) findViewById(R.id.etCgpa1);
        btnEdit = (Button) findViewById(R.id.btnEdit);

        sdb = new StudentDB(this);

        btnEdit.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {

                String name = etName1.getText().toString();

```

```

        int id = Integer.parseInt(etId1.getText().toString());
        String cgpa = etCgpa1.getText().toString();

        Boolean b = sdb.updateData(id, name, cgpa);
        if(b)
        {
            Toast.makeText(getApplicationContext(), "Successfully updated",
Toast.LENGTH_SHORT).show();
        }

    });

}

@Override
public boolean onCreateOptionsMenu(Menu menu) {
    // Inflate the menu; this adds items to the action bar if it is present.
    getMenuInflater().inflate(R.menu.menu_main, menu);
    MenuItem search = menu.findItem(R.id.app_bar_search);
    search.setVisible(false);
    return true;
}

@Override
public boolean onOptionsItemSelected(MenuItem item) {
    int id = item.getItemId();
    switch (id) {
        case R.id.mdisplay: {
            Intent intent1 = new Intent(getApplicationContext(),
ShowStudents.class);
            intent1.putExtra("ID", id);
            startActivity(intent1);
            return true;
        }
        case R.id.medit: {
            Intent intent2 = new Intent(getApplicationContext(),
EditStudents.class);
            intent2.putExtra("ID", id);
            startActivity(intent2);
            return true;
        }
        default:
            return super.onOptionsItemSelected(item);
    }
}
}
}

```

StudentDB.java:

```
package com.example.actionbar;

import android.content.ContentValues;
import android.content.Context;
import android.database.Cursor;
import android.database.sqlite.SQLiteDatabase;
import android.database.sqlite.SQLiteOpenHelper;

import androidx.annotation.Nullable;

public class StudentDB extends SQLiteOpenHelper {
    public static final String DATABASE_NAME="Student.db";
    public static final String TABLE_NAME="Student_Table";
    public static final String COL_1="_id";
    public static final String COL_2="NAME";
    public static final String COL_3="CGPA";

    public StudentDB(@Nullable Context context) {
        super(context, DATABASE_NAME, null, 1);
        SQLiteDatabase db = this.getWritableDatabase();
    }

    @Override
    public void onCreate(SQLiteDatabase db) {
        db.execSQL("create table " + TABLE_NAME + " (_id INTEGER PRIMARY KEY ,
NAME TEXT,CGPA TEXT)");
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int newVersion) {
        db.execSQL("DROP TABLE IF EXISTS "+TABLE_NAME);
        onCreate(db);
    }

    public boolean insertData(int id, String name, String cgpa)
    {
        SQLiteDatabase db=this.getWritableDatabase();
        ContentValues contentValues=new ContentValues();
        contentValues.put(COL_1, id);
        contentValues.put(COL_2, name);
        contentValues.put(COL_3, cgpa);
        long results=db.insert(TABLE_NAME,null, contentValues);
        if(results==-1)
            return false;
        else
            return true;
    }
}
```



```

}

public Cursor getAllData()
{
    SQLiteDatabase db=this.getWritableDatabase();
    Cursor res=db.rawQuery("select * from "+TABLE_NAME,null);
    return res;
}

public String getStringData()
{
    SQLiteDatabase db=this.getWritableDatabase();
    Cursor res=db.rawQuery("select * from "+TABLE_NAME,null);
    String ans="";
    for(res.moveToFirst();!res.isAfterLast();res.moveToNext())
    {
        ans = ans + res.getInt(0) + " "+res.getString(1)
                + " "+ res.getString(2)+"\n";
    }
    return ans;
}

public boolean updateData(int id, String name, String cgpa)
{
    SQLiteDatabase db=this.getWritableDatabase();
    ContentValues contentValues=new ContentValues();
    contentValues.put(COL_2, name);
    contentValues.put(COL_3, cgpa);
    db.update(TABLE_NAME,contentValues,"_id=?",new String[]
{String.valueOf(id)});
    return true;
}
}

```

StudentWidget.java:

```

package com.example.actionbar;

import android.app.PendingIntent;
import android.appwidget.AppWidgetManager;
import android.appwidget.AppWidgetProvider;
import android.content.ActivityNotFoundException;
import android.content.ComponentName;
import android.content.Context;
import android.content.Intent;
import android.widget.RemoteViews;
import android.widget.TextView;
import android.widget.Toast;

```

```

/**
 * Implementation of App Widget functionality.
 */
public class StudentWidget extends AppWidgetProvider {

    static void updateAppWidget(Context context, AppWidgetManager
appWidgetManager,
                                int appWidgetId) {

        StudentDB sdb = new StudentDB(context);
        CharSequence ans = sdb.getStringData();

        // Construct the RemoteViews object
        RemoteViews views = new RemoteViews(context.getPackageName(),
R.layout.student_widget);
        views.setTextViewText(R.id.appwidget_text, ans);

        Intent configIntent = new Intent(context, MainActivity.class);
        PendingIntent configPendingIntent = PendingIntent.getActivity(context, 0,
configIntent, 0);
        views.setOnClickPendingIntent(R.id.widget, configPendingIntent);
        // Instruct the widget manager to update the widget
        appWidgetManager.updateAppWidget(appWidgetId, views);

    }

    @Override
    public void onUpdate(Context context, AppWidgetManager appWidgetManager, int[]
appWidgetIds) {
        // There may be multiple widgets active, so update all of them

        //      Get data
        for(int appWidgetid : appWidgetIds)
            updateAppWidget(context, appWidgetManager, appWidgetid);
    }

    @Override
    public void onEnabled(Context context) {
        // Enter relevant functionality for when the first widget is created
    }

    @Override
    public void onDisabled(Context context) {
        // Enter relevant functionality for when the last widget is disabled
    }
}

```

Activity_main.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout 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"
    android:orientation="vertical"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView2"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_margin="20dp"
        android:gravity="center_horizontal"
        android:text="Enter Details:"
        android:textColor="#D10E0E"
        android:textSize="20sp"
        android:textStyle="bold" />

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginTop="70dp"
        android:orientation="vertical">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:orientation="horizontal">

            <TextView
                android:id="@+id/tvName"
                android:layout_width="0dp"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="Name:" />

            <EditText
                android:id="@+id/etName"
                android:layout_width="0dp"
                android:layout_height="wrap_content"
                android:layout_weight="3"
                android:ems="10"
                android:hint="Enter Name"
                android:inputType="textPersonName" />
        </LinearLayout>

        <LinearLayout
            android:layout_width="match_parent"
```

```

        android:layout_height="wrap_content"
        android:orientation="horizontal">

        <TextView
            android:id="@+id/tvId"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="ID:" />

        <EditText
            android:id="@+id/etId"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="3"
            android:ems="10"
            android:hint="Enter ID"
            android:inputType="number" />
    </LinearLayout>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal">

        <TextView
            android:id="@+id/tvCgpa"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="CGPA:" />

        <EditText
            android:id="@+id/etCgpa"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="3"
            android:ems="10"
            android:hint="Enter CGPA"
            android:inputType="numberDecimal" />
    </LinearLayout>
</LinearLayout>

<Button
    android:id="@+id/btnAdd"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginStart="30dp"
    android:layout_marginLeft="30dp"
    android:layout_marginTop="20dp"
    android:layout_marginEnd="30dp"

```

```
        android:layout_marginRight="30dp"
        android:text="Add"
        app:backgroundTint="#FFC107" />
```

```
</LinearLayout>
```

Activity_show_students.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout 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"
    android:orientation="vertical"
    tools:context=".ShowStudents">

    <TextView
        android:id="@+id/tvList"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginStart="20dp"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="30dp"
        android:layout_marginEnd="20dp"
        android:layout_marginRight="20dp" />

    <ListView
        android:id="@+id/listView"
        android:layout_width="match_parent"
        android:layout_height="fill_parent"
        />

</LinearLayout>
```

Activty_edit_students.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout 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"
    android:orientation="vertical"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView2"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_margin="20dp"
        android:gravity="center_horizontal"
```

```
android:text="Edit Details:"
android:textColor="#D10E0E"
android:textSize="20sp"
android:textStyle="bold" />
```

```
<LinearLayout
```

```
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginTop="70dp"
    android:orientation="vertical">
```

```
    <LinearLayout
```

```
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal">
```

```
        <TextView
```

```
            android:id="@+id/tvName1"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Name:" />
```

```
        <EditText
```

```
            android:id="@+id/etName1"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="3"
            android:ems="10"
            android:hint="Enter Name"
            android:inputType="textPersonName" />
```

```
    </LinearLayout>
```

```
    <LinearLayout
```

```
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="horizontal">
```

```
        <TextView
```

```
            android:id="@+id/tvId1"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="ID:" />
```

```
        <EditText
```

```
            android:id="@+id/etId1"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="3"
            android:ems="10"
```

```

        android:hint="Enter ID"
        android:inputType="number" />
</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/tvCgpa1"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_weight="1"
        android:text="CGPA:" />

    <EditText
        android:id="@+id/etCgpa1"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_weight="3"
        android:ems="10"
        android:hint="Enter CGPA"
        android:inputType="numberDecimal" />
    </LinearLayout>
</LinearLayout>

<Button
    android:id="@+id/btnEdit"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginStart="30dp"
    android:layout_marginLeft="30dp"
    android:layout_marginTop="20dp"
    android:layout_marginEnd="30dp"
    android:layout_marginRight="30dp"
    android:text="Update"
    app:backgroundTint="#E91E63" />

</LinearLayout>

```

Student_widget.xml:

```

<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="?attr/appWidgetBackgroundColor"
    android:padding="@dimen/widget_margin"
    android:theme="@style/ThemeOverlay.ActionBar.AppWidgetContainer"

```

```

    android:id="@+id/widget">

    <TextView
        android:id="@+id/appwidget_text"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerHorizontal="true"
        android:layout_centerVertical="true"
        android:layout_margin="8dp"
        android:background="?attr/appWidgetBackgroundColor"
        android:contentDescription="@string/appwidget_text"
        android:text="@string/appwidget_text"
        android:textColor="?attr/appWidgetTextColor"
        android:textSize="24sp"
        android:textStyle="bold|italic" />
</RelativeLayout>

```


Menu_main.xml:






```

<?xml version="1.0" encoding="utf-8"?>
<menu xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:android="http://schemas.android.com/apk/res/android">
    <item
        android:id="@+id/app_bar_search"
        android:icon="@android:drawable/ic_menu_search"
        android:title="Search"
        app:showAsAction="ifRoom|withText"
        app:actionViewClass="android.widget.SearchView"/>
    <item
        android:id="@+id/mdisplay"
        android:title="Display"
        app:showAsAction="always" />
    <item
        android:id="@+id/medit"
        android:title="Edit"
        app:showAsAction="always" />
</menu>

```

SCREENSHOTS:

12:16 

   Vo) R LTE1  100% 

ActionBar

DISPLAY

EDIT

Enter Details:

Name:

Ram


ID:






106118073

CGPA:

10.0

ADD

12:16 

   Vo) R LTE1  100% 



ActionBar



DISPLAY

EDIT

106118004 Aditya 7.5

106118073 Ram 10.0

106118100 M Michael 8.5

106118106 Venkataraman 9.4

12:16

VoLTE R 100%



1061181



106118100 M Michael 8.5

106118106 Venkataraman 9.4



GIF



1

2

3

4

5

6

7

8

9

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a

s

d

f

g

h

j

k

l



z

x

c

v

b

n

m



!#1

,

English (US)

.



12:17

VoLTE R 100%



ActionBar

DISPLAY

EDIT

Edit Details:

Name:

Venkataraman


ID:







106118106

CGPA:

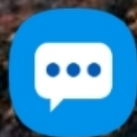
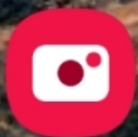
9.4

UPDATE

12:17 

     100% 

106118004 Aditya 7.5
106118073 Ram 10.0
106118100 M Michael 8.5
106118106 Venkataraman 9.4



OUTCOME:

App was coded and run successfully without any errors and bugs.