

Department of CSE

SSN College of Engineering

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UCS 1711 - Mobile Application Development Lab

Exercise 4: Android Application Development Using Database

Aim:

To develop an Android application that generates the following using graphical primitives. In main activity have the following buttons: Create, Insert, Update, Delete, Retrieve

1. On clicking Create Button, create a new database to store the following contents.
(Use SQLite Database)
 - (a) Name
 - (b) Gender
 - (c) Employee Code
 - (d) Department
 - (e) Salary

2. On Clicking Insert, move to a new view which contains the following details: (Insert new Employee to the database)
 - (a) Name (EditText - Validation checking - Alphabet)
 - (b) Gender (RadioButton)
 - (c) Employee Code (EditText - Validation checking - Alphanumeric)
 - (d) Department (Spinner)
 - (e) Salary (EditText - Validation checking - Numeric)
 - (f) Submit (Button – On press, Insert the data into database)
3. On clicking Update, move to a new view which contains above details and Update by Employee Code.
4. On clicking Delete, Delete the whole row in the table by Employee Code.
5. On clicking Retrieve, Retrieve an employee by Employee Code. Also retrieve the details of all the employees in a particular department.

Code: Main Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.content.Intent;
6 import android.database.sqlite.SQLiteDatabase;
7 import android.database.sqlite.SQLiteException;
8 import android.database.sqlite.SQLiteOpenHelper;
9 import android.os.Bundle;
10 import android.view.View;
11 import android.widget.Button;
12 import android.widget.Toast;
13
14 public class MainActivity extends AppCompatActivity {
15
16     @Override
17     protected void onCreate(Bundle savedInstanceState) {
18         super.onCreate(savedInstanceState);
19         setContentView(R.layout.activity_main);
20
21         final Button createButton = findViewById(R.id.createButton);
22         final Button insertButton = findViewById(R.id.insertButton);
23         final Button updateButton = findViewById(R.id.updateButton);
24         final Button deleteButton = findViewById(R.id.deleteButton);
25         final Button retrieveButton = findViewById(R.id.retrieveButton);
26         final Button retrieveByDeptButton = findViewById(R.id.
retrieveByDeptButton);
27
28         final SQLiteOpenHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
29
30         createButton.setOnClickListener(new View.OnClickListener() {
31             @Override
32             public void onClick(View v) {
33                 try{
34                     SQLiteDatabase db = employeeDatabaseHelper.
getReadableDatabase();
35                     Toast toast = Toast.makeText(MainActivity.this, "
Database created!", Toast.LENGTH_SHORT);
36                     toast.show();
37                 } catch (SQLiteException e){
38                     Toast toast = Toast.makeText(MainActivity.this, "
Database unavailable!", Toast.LENGTH_SHORT);
39                     toast.show();
40                 }
41             }
42         });
```

```

43
44     insertButton.setOnClickListener(new View.OnClickListener() {
45         @Override
46         public void onClick(View v) {
47             Intent insertIntent = new Intent(getApplicationContext(),
InsertActivity.class);
48             startActivity(insertIntent);
49         }
50     });
51
52     updateButton.setOnClickListener(new View.OnClickListener() {
53         @Override
54         public void onClick(View v) {
55             Intent updateIntent = new Intent(getApplicationContext(),
UpdateActivity.class);
56             startActivity(updateIntent);
57         }
58     });
59
60     deleteButton.setOnClickListener(new View.OnClickListener() {
61         @Override
62         public void onClick(View v) {
63             Intent deleteIntent = new Intent(getApplicationContext(),
DeleteActivity.class);
64             startActivity(deleteIntent);
65         }
66     });
67
68     retrieveButton.setOnClickListener(new View.OnClickListener() {
69         @Override
70         public void onClick(View v) {
71             Intent retrieveIntent = new Intent(getApplicationContext()
, RetrieveActivity.class);
72             startActivity(retrieveIntent);
73         }
74     });
75
76     retrieveByDeptButton.setOnClickListener(new View.OnClickListener()
{
77         @Override
78         public void onClick(View v) {
79             Intent retrieveByDeptIntent = new Intent(
getApplicationContext(), RetrieveManyActivity.class);
80             startActivity(retrieveByDeptIntent);
81         }
82     });
83 }
84 }

```

Code: Insert Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.database.sqlite.SQLiteException;
6 import android.os.Bundle;
7 import android.text.TextUtils;
8 import android.view.View;
9 import android.widget.Button;
10 import android.widget.EditText;
11 import android.widget.RadioButton;
12 import android.widget.RadioGroup;
13 import android.widget.Spinner;
14 import android.widget.Toast;
15
16 public class InsertActivity extends AppCompatActivity {
17
18     @Override
19     protected void onCreate(Bundle savedInstanceState) {
20         super.onCreate(savedInstanceState);
21         setContentView(R.layout.activity_insert);
22
23         final EditText empCodeText = findViewById(R.id.empCodeText);
24         final EditText nameText = findViewById(R.id.nameText);
25         final RadioButton maleRadioButton = findViewById(R.id.
maleRadioButton3);
26         final RadioButton femaleRadioButton = findViewById(R.id.
femaleRadioButton3);
27         final RadioButton otherRadioButton = findViewById(R.id.
otherRadioButton3);
28         final RadioGroup genderRadioGroup = findViewById(R.id.
genderRadioGroup3);
29         final Spinner deptSpinner = findViewById(R.id.deptSpinner);
30         final EditText salaryText = findViewById(R.id.salaryText);
31         final Button addButton = findViewById(R.id.addButton);
32         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
33
34         addButton.setOnClickListener(new View.OnClickListener() {
35             @Override
36             public void onClick(View v) {
37                 String eCode = empCodeText.getText().toString();
38                 String eName = nameText.getText().toString();
39                 int selectedRadioButtonID = genderRadioGroup.
getCheckedRadioButtonId();
40                 String department = (String) deptSpinner.getSelectedItem()
;
```

```

41         String salaryValue = salaryText.getText().toString();
42
43         //Validity Checking
44         if(TextUtils.isEmpty(eCode)){
45             //Empty employee code field
46             Toast eCodeToast = Toast.makeText(InsertActivity.this,
47 "Employee Code cannot be empty!", Toast.LENGTH_SHORT);
48             eCodeToast.show();
49         } else if(TextUtils.isEmpty(eName)){
50             //Empty name field
51             Toast nameToast = Toast.makeText(InsertActivity.this,
52 "Name Field cannot be empty!", Toast.LENGTH_SHORT);
53             nameToast.show();
54         } else if(TextUtils.isEmpty(salaryValue)){
55             //Empty salary field
56             Toast salaryToast = Toast.makeText(InsertActivity.this,
57 "Salary must not be empty!", Toast.LENGTH_SHORT);
58             salaryToast.show();
59         } else if(eCode.charAt(0) != 'E'){
60             //Wrong employee code format
61             empCodeText.setText("");
62             Toast eCodeToast = Toast.makeText(InsertActivity.this,
63 "Employee Code must be of the format E1024.", Toast.LENGTH_SHORT);
64             eCodeToast.show();
65         } else if(eName.matches(".*\\d.*")){
66             //Name contains numeric characters
67             nameText.setText("");
68             Toast eNameToast = Toast.makeText(InsertActivity.this,
69 "Employee Name must contain only alphabets.", Toast.LENGTH_SHORT);
70             eNameToast.show();
71         } else if(selectedRadioButtonID < 0){
72             //Gender was not selected
73             Toast genderToast = Toast.makeText(InsertActivity.this,
74 "Please identify your gender.", Toast.LENGTH_SHORT);
75             genderToast.show();
76         }
77         else{
78             //All information valid, proceed to add to database
79
80             RadioButton selectedRadioButton = genderRadioGroup.
81 findViewById(selectedRadioButtonID);
82             String gender = selectedRadioButton.getText().toString
83 ();
84
85             double salary = Double.parseDouble(salaryValue);
86
87             try{
88                 employeeDatabaseHelper.addRecord(eCode, eName,
89 gender, department, salary);
90                 Toast insertSuccessToast = Toast.makeText(
91 InsertActivity.this, eCode + "'s record was added!", Toast.LENGTH_SHORT

```

```

);
82         insertSuccessToast.show();
83     } catch (SQLException e){
84         Toast insertFailureToast = Toast.makeText(
InsertActivity.this, e.getMessage() , Toast.LENGTH_SHORT);
85         insertFailureToast.show();
86     }
87 }
88 }
89 });
90 }
91 }

```

Code: Update Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.database.sqlite.SQLiteException;
6 import android.os.Bundle;
7 import android.text.TextUtils;
8 import android.view.View;
9 import android.widget.Button;
10 import android.widget.EditText;
11 import android.widget.RadioButton;
12 import android.widget.RadioGroup;
13 import android.widget.Spinner;
14 import android.widget.Toast;
15
16 public class UpdateActivity extends AppCompatActivity {
17
18     @Override
19     protected void onCreate(Bundle savedInstanceState) {
20         super.onCreate(savedInstanceState);
21         setContentView(R.layout.activity_update);
22
23         final EditText empCodeText = findViewById(R.id.empCodeText3);
24         final EditText nameText = findViewById(R.id.nameText3);
25         final RadioButton maleRadioButton = findViewById(R.id.
maleRadioButton3);
26         final RadioButton femaleRadioButton = findViewById(R.id.
femaleRadioButton3);
27         final RadioButton otherRadioButton = findViewById(R.id.
otherRadioButton3);
28         final RadioGroup genderRadioGroup = findViewById(R.id.
genderRadioGroup3);
29         final Spinner deptSpinner = findViewById(R.id.deptSpinner3);
30         final EditText salaryText = findViewById(R.id.salaryText3);
31         final Button changeButton = findViewById(R.id.changeButton);
32         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
33
34         changeButton.setOnClickListener(new View.OnClickListener() {
35             @Override
36             public void onClick(View v) {
37                 String empCode = empCodeText.getText().toString();
38                 String empName = nameText.getText().toString();
39                 int selectedRadioButtonID = genderRadioGroup.
getCheckedRadioButtonId();
40                 String department = (String) deptSpinner.getSelectedItem()
;
```



```

41         String salaryValue = salaryText.getText().toString();
42
43         if(TextUtils.isEmpty(empCode)){
44             //Employee code not entered
45             Toast empCodeToast = Toast.makeText(UpdateActivity.
this, "Please enter an employee code.", Toast.LENGTH_SHORT);
46             empCodeToast.show();
47         } else if(TextUtils.isEmpty(empName)){
48             //Employee name not entered
49             Toast empNameToast = Toast.makeText(UpdateActivity.
this, "Please enter the employee name.", Toast.LENGTH_SHORT);
50             empNameToast.show();
51         } else if(TextUtils.isEmpty(salaryValue)){
52             //Empty salary field
53             Toast salaryToast = Toast.makeText(UpdateActivity.this
, "Salary must not be empty!", Toast.LENGTH_SHORT);
54             salaryToast.show();
55         } else if(empCode.charAt(0) != 'E'){
56             //Wrong employee code format
57             empCodeText.setText("");
58             Toast eCodeToast = Toast.makeText(UpdateActivity.this,
"Employee Code must be of the format E1024.", Toast.LENGTH_SHORT);
59             eCodeToast.show();
60         } else if(empName.matches(".*\\d.*")){
61             //Employee name contains numeric characters
62             nameText.setText("");
63             Toast eNameToast = Toast.makeText(UpdateActivity.this,
"Employee Name must contain only alphabets.", Toast.LENGTH_SHORT);
64             eNameToast.show();
65         } else if(selectedRadioButtonID < 0){
66             //Gender was not selected
67             Toast genderToast = Toast.makeText(UpdateActivity.this
, "Please identify your gender.", Toast.LENGTH_SHORT);
68             genderToast.show();
69         } else{
70             //All information valid, proceed to update table
record
71
72             RadioButton selectedRadioButton = genderRadioGroup.
findViewById(selectedRadioButtonID);
73             String gender = selectedRadioButton.getText().toString
();
74
75             double salary = Double.parseDouble(salaryValue);
76
77             try{
78                 //Check if an employee with the given Employee
Code exists
79                 String results[] = employeeDatabaseHelper.
retrieveRecord(empCode);
80

```

```

81         if(results == null){
82             //Employee doesn't exist under the specified
employee code
83             Toast empNotFoundToast = Toast.makeText(
UpdateActivity.this, "Employee with code: " + empCode + " doesn't exist
!", Toast.LENGTH_SHORT);
84             empNotFoundToast.show();
85         } else{
86             //Employee exists, update the record
87             employeeDatabaseHelper.updateRecord(empCode,
empName, gender, department, salary);
88             Toast updateSuccessToast = Toast.makeText(
UpdateActivity.this, empCode + "'s record was updated!", Toast.
LENGTH_SHORT);
89             updateSuccessToast.show();
90         }
91     } catch (SQLException e){
92         Toast updateFailureToast = Toast.makeText(
UpdateActivity.this, e.getMessage() , Toast.LENGTH_SHORT);
93         updateFailureToast.show();
94     }
95 }
96 }
97 }
98 }
99 });
100 }
101 }

```

Code: Delete Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.text.TextUtils;
7 import android.view.View;
8 import android.widget.Button;
9 import android.widget.EditText;
10 import android.widget.TextView;
11 import android.widget.Toast;
12
13 public class DeleteActivity extends AppCompatActivity {
14
15     @Override
16     protected void onCreate(Bundle savedInstanceState) {
17         super.onCreate(savedInstanceState);
18         setContentView(R.layout.activity_delete);
19
20         final EditText empCodeText = findViewById(R.id.empCodeText4);
21         final TextView nameTextView = findViewById(R.id.empCodeTextView5);
22         final TextView genderTextView = findViewById(R.id.nameTextView5);
23         final TextView departmentTextView = findViewById(R.id.
genderTextView5);
24         final TextView salaryTextView = findViewById(R.id.salaryTextView5)
;
25         final Button removeButton = findViewById(R.id.getButton);
26         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
27
28         removeButton.setOnClickListener(new View.OnClickListener() {
29             @Override
30             public void onClick(View v) {
31                 String empCode = empCodeText.getText().toString();
32
33                 if(TextUtils.isEmpty(empCode)){
34                     //If the employee code hasn't been entered
35                     Toast empCodeToast = Toast.makeText(DeleteActivity.
this, "Please enter the Employee Code.", Toast.LENGTH_SHORT);
36                     empCodeToast.show();
37                     return;
38                 }
39
40                 String[] results = employeeDatabaseHelper.retrieveRecord(
empCode);
41
42                 if(results == null){
```

```

43         //Record does not exist
44         Toast missingRecordToast = Toast.makeText(
DeleteActivity.this, empCode + "'s record doesn't exist!", Toast.
LENGTH_SHORT);
45         missingRecordToast.show();
46         return;
47     }
48
49     //Record exists, set the TextViews accordingly
50     nameTextView.setText(results[0]);
51     genderTextView.setText(results[1]);
52     departmentTextView.setText(results[2]);
53     salaryTextView.setText("$ " + results[3]);
54
55     //Delete the record from the table
56     int deleteStatus = employeeDatabaseHelper.deleteRecord(
empCode);
57
58     if(deleteStatus > 0){
59         //Record purged successfully
60         Toast deleteSuccessToast = Toast.makeText(
DeleteActivity.this, empCode + "'s record has been deleted successfully
.", Toast.LENGTH_SHORT);
61         deleteSuccessToast.show();
62     } else{
63         //Record purge unsuccessful
64         Toast deleteFailureToast = Toast.makeText(
DeleteActivity.this, empCode + "'s record could not be deleted.", Toast
.LENGTH_SHORT);
65         deleteFailureToast.show();
66     }
67
68     }
69     });
70 }
71 }

```

Code: Retrieve Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.text.TextUtils;
7 import android.view.View;
8 import android.widget.Button;
9 import android.widget.EditText;
10 import android.widget.TextView;
11 import android.widget.Toast;
12
13 public class RetrieveActivity extends AppCompatActivity {
14
15     @Override
16     protected void onCreate(Bundle savedInstanceState) {
17         super.onCreate(savedInstanceState);
18         setContentView(R.layout.activity_retrieve);
19
20         final EditText empCodeText = findViewById(R.id.empCodeText4);
21         final TextView nameTextView = findViewById(R.id.empCodeTextView5);
22         final TextView genderTextView = findViewById(R.id.nameTextView5);
23         final TextView departmentTextView = findViewById(R.id.
genderTextView5);
24         final TextView salaryTextView = findViewById(R.id.salaryTextView5)
;
25         final Button fetchButton = findViewById(R.id.getButton);
26         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
27
28         fetchButton.setOnClickListener(new View.OnClickListener() {
29             @Override
30             public void onClick(View v) {
31                 String empCode = empCodeText.getText().toString();
32
33                 if(TextUtils.isEmpty(empCode)){
34                     //If the employee code hasn't been entered
35                     Toast empCodeToast = Toast.makeText(RetrieveActivity.
this, "Please enter the Employee Code.", Toast.LENGTH_SHORT);
36                     empCodeToast.show();
37                     return;
38                 }
39
40                 String[] results = employeeDatabaseHelper.retrieveRecord(
empCode);
41
42                 if(results == null){
```

```

43         //Record does not exist
44         Toast missingRecordToast = Toast.makeText(
RetrieveActivity.this, empCode + "'s record doesn't exist!", Toast.
LENGTH_SHORT);
45         missingRecordToast.show();
46         return;
47     }
48
49     //Record exists, set the TextViews accordingly
50     nameTextView.setText(results[0]);
51     genderTextView.setText(results[1]);
52     departmentTextView.setText(results[2]);
53     salaryTextView.setText("$ " + results[3]);
54     }
55     });
56 }
57 }

```

Code: Retrieve Many Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.database.Cursor;
6 import android.os.Bundle;
7 import android.text.TextUtils;
8 import android.view.View;
9 import android.widget.Button;
10 import android.widget.EditText;
11 import android.widget.ImageButton;
12 import android.widget.Spinner;
13 import android.widget.TextView;
14 import android.widget.Toast;
15
16 public class RetrieveManyActivity extends AppCompatActivity {
17
18     public void enableButton(ImageButton button, boolean enabled){
19         //To enable and disable the scroll buttons
20         button.setEnabled(enabled);
21
22         //Change background color of the button
23         if(!enabled){
24             //dark gray color
25             button.setBackgroundTintList(this.getResources().
getColorStateList(R.color.darker_gray, this.getTheme()));
26         } else{
27             //holo red light color
28             button.setBackgroundTintList(this.getResources().
getColorStateList(R.color.holo_red_light, this.getTheme()));
29         }
30     }
31
32     Cursor results = null; //To store the retrieved records
33
34     @Override
35     protected void onCreate(Bundle savedInstanceState) {
36         super.onCreate(savedInstanceState);
37         setContentView(R.layout.activity_retrieve_many);
38
39         final Spinner deptSpinner = findViewById(R.id.deptSpinner5);
40         final TextView empCodeTextView = findViewById(R.id.
empCodeTextView5);
41         final TextView nameTextView = findViewById(R.id.nameTextView5);
42         final TextView genderTextView = findViewById(R.id.genderTextView5)
;
43     }
44 }
```

```

43     final TextView salaryTextView = findViewById(R.id.salaryTextView5)
44 ;
45     final Button getButton = findViewById(R.id.getButton);
46     final ImageButton prevButton = findViewById(R.id.prevButton);
47     final ImageButton nextButton = findViewById(R.id.nextButton);
48     final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
49
50     //Disable scroll behavior on initial load
51     enableButton(prevButton, false);
52     enableButton(nextButton, false);
53
54     getButton.setOnClickListener(new View.OnClickListener() {
55         @Override
56         public void onClick(View v) {
57             //Disable scroll behavior by default
58             enableButton(prevButton, false);
59             enableButton(nextButton, false);
60
61             String department = (String) deptSpinner.getSelectedItem()
62 ;
63
64             results = employeeDatabaseHelper.retrieveByDeptRecords(
65 department);
66
67             if(results == null){
68                 //No records were retrieved
69                 Toast noRecordsToast = Toast.makeText(
70 RetrieveManyActivity.this, "There are no employees in the " +
71 department + " department.", Toast.LENGTH_SHORT);
72                 noRecordsToast.show();
73
74                 //Clear the TextViews
75                 empCodeTextView.setText("");
76                 nameTextView.setText("");
77                 genderTextView.setText("");
78                 salaryTextView.setText("");
79
80                 return;
81             }
82
83             //Records were retrieved, display the first one by default
84             results.moveToFirst();
85
86             empCodeTextView.setText(results.getString(0));
87             nameTextView.setText(results.getString(1));
88             genderTextView.setText(results.getString(2));
89             salaryTextView.setText("$ " + results.getString(3));
90
91             if(results.getCount() > 1){
92                 //More than one record was retrieved

```



```

88         enableButton(nextButton, true);
89     }
90 }
91 });
92
93     nextButton.setOnClickListener(new View.OnClickListener() {
94         @Override
95         public void onClick(View v) {
96             enableButton(prevButton, true);    //enable prevButton to
move backwards
97             results.moveToNext();    //move by 1 position forward
98
99             empCodeTextView.setText(results.getString(0));
100             nameTextView.setText(results.getString(1));
101             genderTextView.setText(results.getString(2));
102             salaryTextView.setText("$ " + results.getString(3));
103
104             if(results.isLast()){
105                 enableButton(nextButton, false);
106             }
107         }
108     });
109
110     prevButton.setOnClickListener(new View.OnClickListener() {
111         @Override
112         public void onClick(View v) {
113             enableButton(nextButton, true);    //enable nextButton to
move forwards
114             results.moveToPrevious();    //move by 1 position backward
115
116             empCodeTextView.setText(results.getString(0));
117             nameTextView.setText(results.getString(1));
118             genderTextView.setText(results.getString(2));
119             salaryTextView.setText("$ " + results.getString(3));
120
121             if(results.isFirst()){
122                 enableButton(prevButton, false);
123             }
124         }
125     });
126 }
127 }

```

Code: Employee Database Helper:

```
1 package com.example.employeemanager;
2
3 import android.content.ContentValues;
4 import android.content.Context;
5 import android.database.Cursor;
6 import android.database.sqlite.SQLiteDatabase;
7 import android.database.sqlite.SQLiteException;
8 import android.database.sqlite.SQLiteOpenHelper;
9
10
11 public class EmployeeDatabaseHelper extends SQLiteOpenHelper {
12     private static final String DB_NAME = "employees";
13     private static final int DB_VERSION = 1;
14
15     public EmployeeDatabaseHelper(Context context){
16         super(context, DB_NAME, null, DB_VERSION);
17     }
18
19     @Override
20     public void onCreate(SQLiteDatabase db) {
21         db.execSQL("CREATE TABLE IF NOT EXISTS EMPLOYEES (" +
22             "ECODE TEXT PRIMARY KEY, " +
23             "NAME TEXT, " +
24             "GENDER TEXT, " +
25             "DEPARTMENT TEXT, " +
26             "SALARY NUMERIC );");
27     }
28
29     @Override
30     public void onUpgrade(SQLiteDatabase db, int oldVersion, int
newVersion) {
31         db.execSQL("DROP TABLE IF EXISTS EMPLOYEES;");
32         onCreate(db);
33     }
34
35     public void addRecord(String eCode, String name, String gender, String
department, double salary){
36         SQLiteDatabase db = this.getWritableDatabase();
37         ContentValues record = new ContentValues();
38
39         record.put("ECODE", eCode);
40         record.put("NAME", name);
41         record.put("GENDER", gender);
42         record.put("DEPARTMENT", department);
43         record.put("SALARY", salary);
44
45
```

```

46     //throws SQLiteException if the insertion was unsuccessful
47     db.insertOrThrow("EMPLOYEES", null, record);
48
49     db.close();
50 }
51
52 public String[] retrieveRecord(String eCode){
53     SQLiteDatabase db = this.getReadableDatabase();
54     Cursor cursor = db.query("EMPLOYEES", new String[] {"NAME", "
55     GENDER", "DEPARTMENT", "SALARY"}, "ECODE = ?", new String[] {eCode},
56     null, null, null);
57     String results[] = new String[4];
58
59     if(cursor.moveToNext()){
60         //If record exists, retrieve it into results array and return
61         results[0] = cursor.getString(0);
62         results[1] = cursor.getString(1);
63         results[2] = cursor.getString(2);
64         results[3] = Double.toString(cursor.getDouble(3));
65
66         return results;
67     } else{
68         //Record doesn't exist, return null
69         return null;
70     }
71 }
72
73 public void updateRecord(String eCode, String name, String gender,
74 String department, double salary){
75     SQLiteDatabase db = this.getWritableDatabase();
76     ContentValues updatedRecord = new ContentValues();
77
78     updatedRecord.put("NAME", name);
79     updatedRecord.put("GENDER", gender);
80     updatedRecord.put("DEPARTMENT", department);
81     updatedRecord.put("SALARY", salary);
82
83     db.update("EMPLOYEES", updatedRecord, "ECODE = ?", new String[] {
84     eCode});
85 }
86
87 public int deleteRecord(String eCode){
88     SQLiteDatabase db = this.getWritableDatabase();
89
90     //Returns the number of rows affected
91     return db.delete("EMPLOYEES", "ECODE = ?", new String[] {eCode});
92 }
93
94 public Cursor retrieveByDeptRecords(String department){
95     SQLiteDatabase db = this.getReadableDatabase();

```

```

92         Cursor cursor = db.query("EMPLOYEES", new String[] {"ECODE", "NAME", "GENDER", "SALARY"}, "DEPARTMENT = ?", new String[] {department}, null, null, null);
93
94         if(cursor.getCount() == 0){
95             //No records were retrieved
96             return null;
97         }
98
99         return cursor;
100     }
101 }

```

Code: Main Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <Button
10      android:id="@+id/createButton"
11      android:layout_width="250dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="48dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="CREATE"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/textView" />
22
23   <Button
24      android:id="@+id/updateButton"
25      android:layout_width="250dp"
26      android:layout_height="50dp"
27      android:layout_marginTop="32dp"
28      android:backgroundTint="@android:color/holo_red_light"
29      android:fontFamily="@font/cagliostro"
30      android:text="UPDATE"
31      android:textSize="20sp"
32      android:textStyle="bold"
33      app:layout_constraintEnd_toEndOf="parent"
34      app:layout_constraintHorizontal_bias="0.498"
35      app:layout_constraintStart_toStartOf="parent"
36      app:layout_constraintTop_toBottomOf="@+id/insertButton" />
37
38   <Button
39      android:id="@+id/insertButton"
40      android:layout_width="250dp"
41      android:layout_height="50dp"
42      android:layout_marginTop="32dp"
43      android:backgroundTint="@android:color/holo_red_light"
44      android:fontFamily="@font/cagliostro"
45      android:text="INSERT"
46      android:textSize="20sp"
```

```

47         android:textStyle="bold"
48         app:layout_constraintEnd_toEndOf="parent"
49         app:layout_constraintHorizontal_bias="0.498"
50         app:layout_constraintStart_toStartOf="parent"
51         app:layout_constraintTop_toBottomOf="@+id/createButton" />
52
53     <Button
54         android:id="@+id/deleteButton"
55         android:layout_width="250dp"
56         android:layout_height="50dp"
57         android:layout_marginTop="32dp"
58         android:backgroundTint="@android:color/holo_red_light"
59         android:fontFamily="@font/cagliostro"
60         android:text="DELETE"
61         android:textSize="20sp"
62         android:textStyle="bold"
63         app:layout_constraintEnd_toEndOf="parent"
64         app:layout_constraintHorizontal_bias="0.501"
65         app:layout_constraintStart_toStartOf="parent"
66         app:layout_constraintTop_toBottomOf="@+id/updateButton" />
67
68     <Button
69         android:id="@+id/retrieveButton"
70         android:layout_width="250dp"
71         android:layout_height="50dp"
72         android:layout_marginTop="32dp"
73         android:backgroundTint="@android:color/holo_red_light"
74         android:fontFamily="@font/cagliostro"
75         android:text="RETRIEVE"
76         android:textSize="20sp"
77         android:textStyle="bold"
78         app:layout_constraintEnd_toEndOf="parent"
79         app:layout_constraintHorizontal_bias="0.498"
80         app:layout_constraintStart_toStartOf="parent"
81         app:layout_constraintTop_toBottomOf="@+id/deleteButton" />
82
83     <Button
84         android:id="@+id/retrieveByDeptButton"
85         android:layout_width="250dp"
86         android:layout_height="50dp"
87         android:layout_marginTop="32dp"
88         android:backgroundTint="@android:color/holo_red_light"
89         android:fontFamily="@font/cagliostro"
90         android:text="RETRIEVE BY DEPT"
91         android:textSize="20sp"
92         android:textStyle="bold"
93         app:layout_constraintEnd_toEndOf="parent"
94         app:layout_constraintHorizontal_bias="0.498"
95         app:layout_constraintStart_toStartOf="parent"
96         app:layout_constraintTop_toBottomOf="@+id/retrieveButton" />
97

```

```
98     <TextView
99         android:id="@+id/textView"
100         android:layout_width="wrap_content"
101         android:layout_height="wrap_content"
102         android:layout_marginTop="64dp"
103         android:fontFamily="@font/cagliostro"
104         android:text="Employee Management"
105         android:textColor="?android:attr/textColorPrimary"
106         android:textSize="34sp"
107         android:textStyle="bold"
108         app:layout_constraintEnd_toEndOf="parent"
109         app:layout_constraintStart_toStartOf="parent"
110         app:layout_constraintTop_toTopOf="parent" />
111 </androidx.constraintlayout.widget.ConstraintLayout>
```

Code: Insert Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".InsertActivity">
8
9   <Button
10      android:id="@+id/addButton"
11      android:layout_width="150dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="50dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="ADD"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/salaryText" />
22
23   <TextView
24      android:id="@+id/textView3"
25      android:layout_width="wrap_content"
26      android:layout_height="wrap_content"
27      android:layout_marginTop="64dp"
28      android:fontFamily="@font/cagliostro"
29      android:text="Insert Record"
30      android:textColor="?android:attr/textColorPrimary"
31      android:textSize="34sp"
32      android:textStyle="bold"
33      app:layout_constraintEnd_toEndOf="parent"
34      app:layout_constraintStart_toStartOf="parent"
35      app:layout_constraintTop_toTopOf="parent" />
36
37   <TextView
38      android:id="@+id/textView4"
39      android:layout_width="wrap_content"
40      android:layout_height="wrap_content"
41      android:layout_marginStart="16dp"
42      android:layout_marginTop="64dp"
43      android:fontFamily="@font/cagliostro"
44      android:text="Emp. Code"
45      android:textColor="?android:attr/textColorPrimary"
46      android:textSize="20sp"
```



```

47         android:textStyle="bold"
48         app:layout_constraintStart_toStartOf="parent"
49         app:layout_constraintTop_toBottomOf="@+id/textView3" />
50
51     <TextView
52         android:id="@+id/textView5"
53         android:layout_width="wrap_content"
54         android:layout_height="wrap_content"
55         android:layout_marginStart="16dp"
56         android:layout_marginTop="56dp"
57         android:fontFamily="@font/cagliostro"
58         android:text="Name"
59         android:textColor="?android:attr/textColorPrimary"
60         android:textSize="20sp"
61         android:textStyle="bold"
62         app:layout_constraintStart_toStartOf="parent"
63         app:layout_constraintTop_toBottomOf="@+id/textView4" />
64
65     <TextView
66         android:id="@+id/textView6"
67         android:layout_width="wrap_content"
68         android:layout_height="wrap_content"
69         android:layout_marginStart="16dp"
70         android:layout_marginTop="44dp"
71         android:fontFamily="@font/cagliostro"
72         android:text="Gender"
73         android:textColor="?android:attr/textColorPrimary"
74         android:textSize="20sp"
75         android:textStyle="bold"
76         app:layout_constraintStart_toStartOf="parent"
77         app:layout_constraintTop_toBottomOf="@+id/textView5" />
78
79     <TextView
80         android:id="@+id/textView7"
81         android:layout_width="wrap_content"
82         android:layout_height="wrap_content"
83         android:layout_marginStart="16dp"
84         android:layout_marginTop="40dp"
85         android:fontFamily="@font/cagliostro"
86         android:text="Department"
87         android:textColor="?android:attr/textColorPrimary"
88         android:textSize="20sp"
89         android:textStyle="bold"
90         app:layout_constraintStart_toStartOf="parent"
91         app:layout_constraintTop_toBottomOf="@+id/textView6" />
92
93     <TextView
94         android:id="@+id/textView8"
95         android:layout_width="wrap_content"
96         android:layout_height="wrap_content"
97         android:layout_marginStart="16dp"

```

```

98         android:layout_marginTop="44dp"
99         android:fontFamily="@font/cagliostro"
100        android:text="Salary"
101        android:textColor="?android:attr/textColorPrimary"
102        android:textSize="20sp"
103        android:textStyle="bold"
104        app:layout_constraintStart_toStartOf="parent"
105        app:layout_constraintTop_toBottomOf="@+id/textView7" />
106
107    <EditText
108        android:id="@+id/empCodeText"
109        android:layout_width="230dp"
110        android:layout_height="wrap_content"
111        android:layout_marginStart="16dp"
112        android:layout_marginTop="48dp"
113        android:ems="10"
114        android:fontFamily="sans-serif"
115        android:hint="E1024"
116        android:inputType="textPersonName"
117        android:textColor="?android:attr/textColorPrimary"
118        android:textSize="20sp"
119        app:layout_constraintStart_toEndOf="@+id/textView7"
120        app:layout_constraintTop_toBottomOf="@+id/textView3" />
121
122    <EditText
123        android:id="@+id/nameText"
124        android:layout_width="230dp"
125        android:layout_height="wrap_content"
126        android:layout_marginStart="16dp"
127        android:layout_marginTop="32dp"
128        android:ems="10"
129        android:fontFamily="sans-serif"
130        android:hint="John Doe"
131        android:inputType="textPersonName"
132        android:textColor="?android:attr/textColorPrimary"
133        android:textSize="20sp"
134        app:layout_constraintStart_toEndOf="@+id/textView7"
135        app:layout_constraintTop_toBottomOf="@+id/empCodeText" />
136
137    <Spinner
138        android:id="@+id/deptSpinner"
139        android:layout_width="230dp"
140        android:layout_height="wrap_content"
141        android:layout_marginStart="16dp"
142        android:layout_marginTop="32dp"
143        android:entries="@array/departments"
144        android:textSize="20sp"
145        app:layout_constraintStart_toEndOf="@+id/textView7"
146        app:layout_constraintTop_toBottomOf="@+id/genderRadioGroup3" />
147
148    <EditText

```

```

149     android:id="@+id/salaryText"
150     android:layout_width="230dp"
151     android:layout_height="wrap_content"
152     android:layout_marginStart="16dp"
153     android:layout_marginTop="32dp"
154     android:ems="10"
155     android:hint="100000"
156     android:inputType="numberDecimal"
157     android:textColor="?android:attr/textColorPrimary"
158     app:layout_constraintStart_toEndOf="@+id/textView7"
159     app:layout_constraintTop_toBottomOf="@+id/deptSpinner" />
160
161 <RadioGroup
162     android:id="@+id/genderRadioGroup3"
163     android:layout_width="230sp"
164     android:layout_height="wrap_content"
165     android:layout_marginStart="16dp"
166     android:layout_marginTop="32dp"
167     android:orientation="horizontal"
168     app:layout_constraintStart_toEndOf="@+id/textView7"
169     app:layout_constraintTop_toBottomOf="@+id/nameText" />
170
171 <RadioButton
172     android:id="@+id/maleRadioButton3"
173     android:layout_width="70dp"
174     android:layout_height="wrap_content"
175     android:fontFamily="sans-serif"
176     android:text="Male"
177     android:textColor="?android:attr/textColorPrimary"
178     android:textSize="16sp"
179     android:typeface="normal" />
180
181 <RadioButton
182     android:id="@+id/femaleRadioButton3"
183     android:layout_width="85dp"
184     android:layout_height="wrap_content"
185     android:fontFamily="sans-serif"
186     android:text="Female"
187     android:textColor="?android:attr/textColorPrimary"
188     android:textSize="16sp"
189     android:typeface="normal" />
190
191 <RadioButton
192     android:id="@+id/otherRadioButton3"
193     android:layout_width="75dp"
194     android:layout_height="wrap_content"
195     android:fontFamily="sans-serif"
196     android:text="Other"
197     android:textColor="?android:attr/textColorPrimary"
198     android:textSize="16sp"
199     android:typeface="normal" />

```

```
200         </RadioGroup>
201
202
203 </androidx.constraintlayout.widget.ConstraintLayout>
```

Code: Update Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".UpdateActivity">
8
9   <Button
10      android:id="@+id/changeButton"
11      android:layout_width="150dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="50dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="CHANGE"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/salaryText3" />
22
23   <EditText
24      android:id="@+id/salaryText3"
25      android:layout_width="230dp"
26      android:layout_height="wrap_content"
27      android:layout_marginStart="16dp"
28      android:layout_marginTop="32dp"
29      android:ems="10"
30      android:hint="100000"
31      android:inputType="numberDecimal"
32      android:textColor="?android:attr/textColorPrimary"
33      app:layout_constraintStart_toEndOf="@+id/textView13"
34      app:layout_constraintTop_toBottomOf="@+id/deptSpinner3" />
35
36   <Spinner
37      android:id="@+id/deptSpinner3"
38      android:layout_width="230dp"
39      android:layout_height="wrap_content"
40      android:layout_marginStart="16dp"
41      android:layout_marginTop="32dp"
42      android:entries="@array/departments"
43      android:textSize="20sp"
44      app:layout_constraintStart_toEndOf="@+id/textView13"
45      app:layout_constraintTop_toBottomOf="@+id/genderRadioGroup3" />
46
```

```

47 <RadioGroup
48     android:id="@+id/genderRadioGroup3"
49     android:layout_width="230sp"
50     android:layout_height="wrap_content"
51     android:layout_marginStart="16dp"
52     android:layout_marginTop="32dp"
53     android:orientation="horizontal"
54     app:layout_constraintStart_toEndOf="@+id/textView13"
55     app:layout_constraintTop_toBottomOf="@+id/nameText3">
56
57     <RadioButton
58         android:id="@+id/maleRadioButton3"
59         android:layout_width="70dp"
60         android:layout_height="wrap_content"
61         android:fontFamily="sans-serif"
62         android:text="Male"
63         android:textColor="?android:attr/textColorPrimary"
64         android:textSize="16sp"
65         android:typeface="normal" />
66
67     <RadioButton
68         android:id="@+id/femaleRadioButton3"
69         android:layout_width="85dp"
70         android:layout_height="wrap_content"
71         android:fontFamily="sans-serif"
72         android:text="Female"
73         android:textColor="?android:attr/textColorPrimary"
74         android:textSize="16sp"
75         android:typeface="normal" />
76
77     <RadioButton
78         android:id="@+id/otherRadioButton3"
79         android:layout_width="75dp"
80         android:layout_height="wrap_content"
81         android:fontFamily="sans-serif"
82         android:text="Other"
83         android:textColor="?android:attr/textColorPrimary"
84         android:textSize="16sp"
85         android:typeface="normal" />
86 </RadioGroup>
87
88 <EditText
89     android:id="@+id/nameText3"
90     android:layout_width="230dp"
91     android:layout_height="wrap_content"
92     android:layout_marginStart="16dp"
93     android:layout_marginTop="32dp"
94     android:ems="10"
95     android:fontFamily="sans-serif"
96     android:hint="John Doe"
97     android:inputType="textPersonName"

```

```

98     android:textColor="?android:attr/textColorPrimary"
99     android:textSize="20sp"
100    app:layout_constraintStart_toEndOf="@+id/textView13"
101    app:layout_constraintTop_toBottomOf="@+id/empCodeText3" />
102
103    <EditText
104        android:id="@+id/empCodeText3"
105        android:layout_width="230dp"
106        android:layout_height="wrap_content"
107        android:layout_marginStart="16dp"
108        android:layout_marginTop="48dp"
109        android:ems="10"
110        android:fontFamily="sans-serif"
111        android:hint="E1024"
112        android:inputType="textPersonName"
113        android:textColor="?android:attr/textColorPrimary"
114        android:textSize="20sp"
115        app:layout_constraintStart_toEndOf="@+id/textView13"
116        app:layout_constraintTop_toBottomOf="@+id/textView9" />
117
118    <TextView
119        android:id="@+id/textView14"
120        android:layout_width="wrap_content"
121        android:layout_height="wrap_content"
122        android:layout_marginStart="16dp"
123        android:layout_marginTop="44dp"
124        android:fontFamily="@font/cagliostro"
125        android:text="Salary"
126        android:textColor="?android:attr/textColorPrimary"
127        android:textSize="20sp"
128        android:textStyle="bold"
129        app:layout_constraintStart_toStartOf="parent"
130        app:layout_constraintTop_toBottomOf="@+id/textView13" />
131
132    <TextView
133        android:id="@+id/textView13"
134        android:layout_width="wrap_content"
135        android:layout_height="wrap_content"
136        android:layout_marginStart="16dp"
137        android:layout_marginTop="40dp"
138        android:fontFamily="@font/cagliostro"
139        android:text="Department"
140        android:textColor="?android:attr/textColorPrimary"
141        android:textSize="20sp"
142        android:textStyle="bold"
143        app:layout_constraintStart_toStartOf="parent"
144        app:layout_constraintTop_toBottomOf="@+id/textView12" />
145
146    <TextView
147        android:id="@+id/textView12"
148        android:layout_width="wrap_content"

```

```

149     android:layout_height="wrap_content"
150     android:layout_marginStart="16dp"
151     android:layout_marginTop="44dp"
152     android:fontFamily="@font/cagliostro"
153     android:text="Gender"
154     android:textColor="?android:attr/textColorPrimary"
155     android:textSize="20sp"
156     android:textStyle="bold"
157     app:layout_constraintStart_toStartOf="parent"
158     app:layout_constraintTop_toBottomOf="@+id/textView11" />
159
160 <TextView
161     android:id="@+id/textView11"
162     android:layout_width="wrap_content"
163     android:layout_height="wrap_content"
164     android:layout_marginStart="16dp"
165     android:layout_marginTop="56dp"
166     android:fontFamily="@font/cagliostro"
167     android:text="Name"
168     android:textColor="?android:attr/textColorPrimary"
169     android:textSize="20sp"
170     android:textStyle="bold"
171     app:layout_constraintStart_toStartOf="parent"
172     app:layout_constraintTop_toBottomOf="@+id/textView10" />
173
174 <TextView
175     android:id="@+id/textView10"
176     android:layout_width="wrap_content"
177     android:layout_height="wrap_content"
178     android:layout_marginStart="16dp"
179     android:layout_marginTop="64dp"
180     android:fontFamily="@font/cagliostro"
181     android:text="Emp. Code"
182     android:textColor="?android:attr/textColorPrimary"
183     android:textSize="20sp"
184     android:textStyle="bold"
185     app:layout_constraintStart_toStartOf="parent"
186     app:layout_constraintTop_toBottomOf="@+id/textView9" />
187
188 <TextView
189     android:id="@+id/textView9"
190     android:layout_width="wrap_content"
191     android:layout_height="wrap_content"
192     android:layout_marginTop="64dp"
193     android:fontFamily="@font/cagliostro"
194     android:text="Update Record"
195     android:textColor="?android:attr/textColorPrimary"
196     android:textSize="34sp"
197     android:textStyle="bold"
198     app:layout_constraintEnd_toEndOf="parent"
199     app:layout_constraintStart_toStartOf="parent"

```



```
200         app:layout_constraintTop_toTopOf="parent" />
201
202 </androidx.constraintlayout.widget.ConstraintLayout>
```

Code: Delete Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".DeleteActivity">
8
9   <Button
10     android:id="@+id/getButton"
11     android:layout_width="150dp"
12     android:layout_height="50dp"
13     android:layout_marginTop="40dp"
14     android:backgroundTint="@android:color/holo_red_light"
15     android:fontFamily="@font/cagliostro"
16     android:text="REMOVE"
17     android:textSize="20sp"
18     android:textStyle="bold"
19     app:layout_constraintEnd_toEndOf="parent"
20     app:layout_constraintStart_toStartOf="parent"
21     app:layout_constraintTop_toBottomOf="@+id/empCodeText4" />
22
23   <TextView
24     android:id="@+id/textView46"
25     android:layout_width="wrap_content"
26     android:layout_height="wrap_content"
27     android:layout_marginStart="16dp"
28     android:layout_marginTop="36dp"
29     android:fontFamily="@font/cagliostro"
30     android:text="Salary"
31     android:textColor="?android:attr/textColorPrimary"
32     android:textSize="20sp"
33     android:textStyle="bold"
34     app:layout_constraintStart_toStartOf="parent"
35     app:layout_constraintTop_toBottomOf="@+id/textView45" />
36
37   <TextView
38     android:id="@+id/textView45"
39     android:layout_width="wrap_content"
40     android:layout_height="wrap_content"
41     android:layout_marginStart="16dp"
42     android:layout_marginTop="40dp"
43     android:fontFamily="@font/cagliostro"
44     android:text="Department"
45     android:textColor="?android:attr/textColorPrimary"
46     android:textSize="20sp"
```

```

47     android:textStyle="bold"
48     app:layout_constraintStart_toStartOf="parent"
49     app:layout_constraintTop_toBottomOf="@+id/textView44" />
50
51 <TextView
52     android:id="@+id/textView44"
53     android:layout_width="wrap_content"
54     android:layout_height="wrap_content"
55     android:layout_marginStart="16dp"
56     android:layout_marginTop="44dp"
57     android:fontFamily="@font/cagliostro"
58     android:text="Gender"
59     android:textColor="?android:attr/textColorPrimary"
60     android:textSize="20sp"
61     android:textStyle="bold"
62     app:layout_constraintStart_toStartOf="parent"
63     app:layout_constraintTop_toBottomOf="@+id/textView43" />
64
65 <TextView
66     android:id="@+id/textView43"
67     android:layout_width="wrap_content"
68     android:layout_height="wrap_content"
69     android:layout_marginStart="16dp"
70     android:layout_marginTop="40dp"
71     android:fontFamily="@font/cagliostro"
72     android:text="Name"
73     android:textColor="?android:attr/textColorPrimary"
74     android:textSize="20sp"
75     android:textStyle="bold"
76     app:layout_constraintStart_toStartOf="parent"
77     app:layout_constraintTop_toBottomOf="@+id/textView27" />
78
79 <EditText
80     android:id="@+id/empCodeText4"
81     android:layout_width="230dp"
82     android:layout_height="wrap_content"
83     android:layout_marginStart="16dp"
84     android:layout_marginTop="48dp"
85     android:ems="10"
86     android:fontFamily="sans-serif"
87     android:hint="E1024"
88     android:inputType="textPersonName"
89     android:textColor="?android:attr/textColorPrimary"
90     android:textSize="20sp"
91     app:layout_constraintStart_toEndOf="@+id/textView45"
92     app:layout_constraintTop_toBottomOf="@+id/textView47" />
93
94 <TextView
95     android:id="@+id/textView42"
96     android:layout_width="wrap_content"
97     android:layout_height="wrap_content"

```

```

98     android:layout_marginStart="16dp"
99     android:layout_marginTop="64dp"
100    android:fontFamily="@font/cagliostro"
101    android:text="Emp. Code"
102    android:textColor="?android:attr/textColorPrimary"
103    android:textSize="20sp"
104    android:textStyle="bold"
105    app:layout_constraintStart_toStartOf="parent"
106    app:layout_constraintTop_toBottomOf="@+id/textView47" />
107
108    <TextView
109        android:id="@+id/textView47"
110        android:layout_width="wrap_content"
111        android:layout_height="wrap_content"
112        android:layout_marginTop="64dp"
113        android:fontFamily="@font/cagliostro"
114        android:text="Delete Record"
115        android:textColor="?android:attr/textColorPrimary"
116        android:textSize="34sp"
117        android:textStyle="bold"
118        app:layout_constraintEnd_toEndOf="parent"
119        app:layout_constraintStart_toStartOf="parent"
120        app:layout_constraintTop_toTopOf="parent" />
121
122    <TextView
123        android:id="@+id/empCodeTextView5"
124        android:layout_width="230dp"
125        android:layout_height="wrap_content"
126        android:layout_marginStart="16dp"
127        android:layout_marginTop="40dp"
128        android:textColor="?android:attr/textColorPrimary"
129        android:textSize="20sp"
130        app:layout_constraintStart_toEndOf="@+id/textView45"
131        app:layout_constraintTop_toBottomOf="@+id/textView27" />
132
133    <TextView
134        android:id="@+id/nameTextView5"
135        android:layout_width="230dp"
136        android:layout_height="wrap_content"
137        android:layout_marginStart="16dp"
138        android:layout_marginTop="46dp"
139        android:textColor="?android:attr/textColorPrimary"
140        android:textSize="20sp"
141        app:layout_constraintStart_toEndOf="@+id/textView45"
142        app:layout_constraintTop_toBottomOf="@+id/empCodeTextView5" />
143
144    <TextView
145        android:id="@+id/genderTextView5"
146        android:layout_width="230dp"
147        android:layout_height="wrap_content"
148        android:layout_marginStart="16dp"

```

```

149     android:layout_marginTop="40dp"
150     android:textColor="?android:attr/textColorPrimary"
151     android:textSize="20sp"
152     app:layout_constraintStart_toEndOf="@+id/textView45"
153     app:layout_constraintTop_toBottomOf="@+id/nameTextView5" />
154
155     <TextView
156         android:id="@+id/salaryTextView5"
157         android:layout_width="230dp"
158         android:layout_height="wrap_content"
159         android:layout_marginStart="16dp"
160         android:layout_marginTop="36dp"
161         android:textColor="?android:attr/textColorPrimary"
162         android:textSize="20sp"
163         app:layout_constraintStart_toEndOf="@+id/textView45"
164         app:layout_constraintTop_toBottomOf="@+id/genderTextView5" />
165
166     <TextView
167         android:id="@+id/textView27"
168         android:layout_width="wrap_content"
169         android:layout_height="wrap_content"
170         android:layout_marginTop="30dp"
171         android:fontFamily="@font/cagliostro"
172         android:text="Purged Record"
173         android:textColor="?android:attr/textColorPrimary"
174         android:textSize="24sp"
175         android:textStyle="bold"
176         app:layout_constraintEnd_toEndOf="parent"
177         app:layout_constraintStart_toStartOf="parent"
178         app:layout_constraintTop_toBottomOf="@+id/getButton" />
179 </androidx.constraintlayout.widget.ConstraintLayout>

```

Code: Retrieve Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".RetrieveActivity">
8
9   <Button
10      android:id="@+id/getButton"
11      android:layout_width="150dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="60dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="FETCH"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/salaryTextView5" />
22
23   <TextView
24      android:id="@+id/textView46"
25      android:layout_width="wrap_content"
26      android:layout_height="wrap_content"
27      android:layout_marginStart="16dp"
28      android:layout_marginTop="44dp"
29      android:fontFamily="@font/cagliostro"
30      android:text="Salary"
31      android:textColor="?android:attr/textColorPrimary"
32      android:textSize="20sp"
33      android:textStyle="bold"
34      app:layout_constraintStart_toStartOf="parent"
35      app:layout_constraintTop_toBottomOf="@+id/textView45" />
36
37   <TextView
38      android:id="@+id/textView45"
39      android:layout_width="wrap_content"
40      android:layout_height="wrap_content"
41      android:layout_marginStart="16dp"
42      android:layout_marginTop="40dp"
43      android:fontFamily="@font/cagliostro"
44      android:text="Department"
45      android:textColor="?android:attr/textColorPrimary"
46      android:textSize="20sp"
```

```

47         android:textStyle="bold"
48         app:layout_constraintStart_toStartOf="parent"
49         app:layout_constraintTop_toBottomOf="@+id/textView44" />
50
51     <TextView
52         android:id="@+id/textView44"
53         android:layout_width="wrap_content"
54         android:layout_height="wrap_content"
55         android:layout_marginStart="16dp"
56         android:layout_marginTop="44dp"
57         android:fontFamily="@font/cagliostro"
58         android:text="Gender"
59         android:textColor="?android:attr/textColorPrimary"
60         android:textSize="20sp"
61         android:textStyle="bold"
62         app:layout_constraintStart_toStartOf="parent"
63         app:layout_constraintTop_toBottomOf="@+id/textView43" />
64
65     <TextView
66         android:id="@+id/textView43"
67         android:layout_width="wrap_content"
68         android:layout_height="wrap_content"
69         android:layout_marginStart="16dp"
70         android:layout_marginTop="56dp"
71         android:fontFamily="@font/cagliostro"
72         android:text="Name"
73         android:textColor="?android:attr/textColorPrimary"
74         android:textSize="20sp"
75         android:textStyle="bold"
76         app:layout_constraintStart_toStartOf="parent"
77         app:layout_constraintTop_toBottomOf="@+id/textView42" />
78
79     <EditText
80         android:id="@+id/empCodeText4"
81         android:layout_width="230dp"
82         android:layout_height="wrap_content"
83         android:layout_marginStart="16dp"
84         android:layout_marginTop="48dp"
85         android:ems="10"
86         android:fontFamily="sans-serif"
87         android:hint="E1024"
88         android:inputType="textPersonName"
89         android:textColor="?android:attr/textColorPrimary"
90         android:textSize="20sp"
91         app:layout_constraintStart_toEndOf="@+id/textView45"
92         app:layout_constraintTop_toBottomOf="@+id/textView47" />
93
94     <TextView
95         android:id="@+id/textView42"
96         android:layout_width="wrap_content"
97         android:layout_height="wrap_content"

```

```

98     android:layout_marginStart="16dp"
99     android:layout_marginTop="64dp"
100    android:fontFamily="@font/cagliostro"
101    android:text="Emp. Code"
102    android:textColor="?android:attr/textColorPrimary"
103    android:textSize="20sp"
104    android:textStyle="bold"
105    app:layout_constraintStart_toStartOf="parent"
106    app:layout_constraintTop_toBottomOf="@+id/textView47" />
107
108    <TextView
109        android:id="@+id/textView47"
110        android:layout_width="wrap_content"
111        android:layout_height="wrap_content"
112        android:layout_marginTop="64dp"
113        android:fontFamily="@font/cagliostro"
114        android:text="Retrieve Record"
115        android:textSize="34sp"
116        android:textStyle="bold"
117        app:layout_constraintEnd_toEndOf="parent"
118        app:layout_constraintStart_toStartOf="parent"
119        app:layout_constraintTop_toTopOf="parent"
120        android:textColor="?android:attr/textColorPrimary" />
121
122    <TextView
123        android:id="@+id/empCodeTextView5"
124        android:layout_width="230dp"
125        android:layout_height="wrap_content"
126        android:layout_marginStart="16dp"
127        android:layout_marginTop="50dp"
128        android:textColor="?android:attr/textColorPrimary"
129        android:textSize="20sp"
130        app:layout_constraintStart_toEndOf="@+id/textView45"
131        app:layout_constraintTop_toBottomOf="@+id/empCodeText4" />
132
133    <TextView
134        android:id="@+id/nameTextView5"
135        android:layout_width="230dp"
136        android:layout_height="wrap_content"
137        android:layout_marginStart="16dp"
138        android:layout_marginTop="46dp"
139        android:textColor="?android:attr/textColorPrimary"
140        android:textSize="20sp"
141        app:layout_constraintStart_toEndOf="@+id/textView45"
142        app:layout_constraintTop_toBottomOf="@+id/empCodeTextView5" />
143
144    <TextView
145        android:id="@+id/genderTextView5"
146        android:layout_width="230dp"
147        android:layout_height="wrap_content"
148        android:layout_marginStart="16dp"

```



```

149     android:layout_marginTop="40dp"
150     android:textColor="?android:attr/textColorPrimary"
151     android:textSize="20sp"
152     app:layout_constraintStart_toEndOf="@+id/textView45"
153     app:layout_constraintTop_toBottomOf="@+id/nameTextView5" />
154
155     <TextView
156         android:id="@+id/salaryTextView5"
157         android:layout_width="230dp"
158         android:layout_height="wrap_content"
159         android:layout_marginStart="16dp"
160         android:layout_marginTop="44dp"
161         android:textColor="?android:attr/textColorPrimary"
162         android:textSize="20sp"
163         app:layout_constraintStart_toEndOf="@+id/textView45"
164         app:layout_constraintTop_toBottomOf="@+id/genderTextView5" />
165 </androidx.constraintlayout.widget.ConstraintLayout>

```

Code: Retrieve Many Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".RetrieveManyActivity">
8
9   <Spinner
10      android:id="@+id/deptSpinner5"
11      android:layout_width="230dp"
12      android:layout_height="wrap_content"
13      android:layout_marginStart="16dp"
14      android:layout_marginTop="64dp"
15      android:entries="@array/departments"
16      android:textSize="20sp"
17      app:layout_constraintStart_toEndOf="@+id/textView42"
18      app:layout_constraintTop_toBottomOf="@+id/textView47" />
19
20   <Button
21      android:id="@+id/getButton"
22      android:layout_width="150dp"
23      android:layout_height="50dp"
24      android:layout_marginTop="40dp"
25      android:backgroundTint="@android:color/holo_red_light"
26      android:fontFamily="@font/cagliostro"
27      android:text="GET"
28      android:textSize="20sp"
29      android:textStyle="bold"
30      app:layout_constraintEnd_toEndOf="parent"
31      app:layout_constraintStart_toStartOf="parent"
32      app:layout_constraintTop_toBottomOf="@+id/salaryTextView5" />
33
34   <TextView
35      android:id="@+id/textView46"
36      android:layout_width="wrap_content"
37      android:layout_height="wrap_content"
38      android:layout_marginStart="16dp"
39      android:layout_marginTop="44dp"
40      android:fontFamily="@font/cagliostro"
41      android:text="Salary"
42      android:textColor="?android:attr/textColorPrimary"
43      android:textSize="20sp"
44      android:textStyle="bold"
45      app:layout_constraintStart_toStartOf="parent"
46      app:layout_constraintTop_toBottomOf="@+id/textView45" />
```

```

47
48 <TextView
49     android:id="@+id/textView45"
50     android:layout_width="wrap_content"
51     android:layout_height="wrap_content"
52     android:layout_marginStart="16dp"
53     android:layout_marginTop="40dp"
54     android:fontFamily="@font/cagliostro"
55     android:text="Gender"
56     android:textColor="?android:attr/textColorPrimary"
57     android:textSize="20sp"
58     android:textStyle="bold"
59     app:layout_constraintStart_toStartOf="parent"
60     app:layout_constraintTop_toBottomOf="@+id/textView44" />
61
62 <TextView
63     android:id="@+id/textView44"
64     android:layout_width="wrap_content"
65     android:layout_height="wrap_content"
66     android:layout_marginStart="16dp"
67     android:layout_marginTop="44dp"
68     android:fontFamily="@font/cagliostro"
69     android:text="Name"
70     android:textColor="?android:attr/textColorPrimary"
71     android:textSize="20sp"
72     android:textStyle="bold"
73     app:layout_constraintStart_toStartOf="parent"
74     app:layout_constraintTop_toBottomOf="@+id/textView43" />
75
76 <TextView
77     android:id="@+id/textView43"
78     android:layout_width="wrap_content"
79     android:layout_height="wrap_content"
80     android:layout_marginStart="16dp"
81     android:layout_marginTop="56dp"
82     android:fontFamily="@font/cagliostro"
83     android:text="Emp. Code"
84     android:textColor="?android:attr/textColorPrimary"
85     android:textSize="20sp"
86     android:textStyle="bold"
87     app:layout_constraintStart_toStartOf="parent"
88     app:layout_constraintTop_toBottomOf="@+id/textView42" />
89
90 <TextView
91     android:id="@+id/textView42"
92     android:layout_width="wrap_content"
93     android:layout_height="wrap_content"
94     android:layout_marginStart="16dp"
95     android:layout_marginTop="64dp"
96     android:fontFamily="@font/cagliostro"
97     android:text="Department"

```

```

98         android:textColor="?android:attr/textColorPrimary"
99         android:textSize="20sp"
100        android:textStyle="bold"
101        app:layout_constraintStart_toStartOf="parent"
102        app:layout_constraintTop_toBottomOf="@+id/textView47" />
103
104    <TextView
105        android:id="@+id/textView47"
106        android:layout_width="250dp"
107        android:layout_height="wrap_content"
108        android:layout_marginTop="64dp"
109        android:fontFamily="@font/cagliostro"
110        android:text="Retrieve Records By Department"
111        android:textAlignment="center"
112        android:textColor="?android:attr/textColorPrimary"
113        android:textSize="34sp"
114        android:textStyle="bold"
115        app:layout_constraintEnd_toEndOf="parent"
116        app:layout_constraintStart_toStartOf="parent"
117        app:layout_constraintTop_toTopOf="parent" />
118
119    <TextView
120        android:id="@+id/empCodeTextView5"
121        android:layout_width="230dp"
122        android:layout_height="wrap_content"
123        android:layout_marginStart="16dp"
124        android:layout_marginTop="58dp"
125        android:textColor="?android:attr/textColorPrimary"
126        android:textSize="20sp"
127        app:layout_constraintStart_toEndOf="@+id/textView42"
128        app:layout_constraintTop_toBottomOf="@+id/deptSpinner5" />
129
130    <TextView
131        android:id="@+id/nameTextView5"
132        android:layout_width="230dp"
133        android:layout_height="wrap_content"
134        android:layout_marginStart="16dp"
135        android:layout_marginTop="46dp"
136        android:textColor="?android:attr/textColorPrimary"
137        android:textSize="20sp"
138        app:layout_constraintStart_toEndOf="@+id/textView42"
139        app:layout_constraintTop_toBottomOf="@+id/empCodeTextView5" />
140
141    <TextView
142        android:id="@+id/genderTextView5"
143        android:layout_width="230dp"
144        android:layout_height="wrap_content"
145        android:layout_marginStart="16dp"
146        android:layout_marginTop="40dp"
147        android:textColor="?android:attr/textColorPrimary"
148        android:textSize="20sp"

```

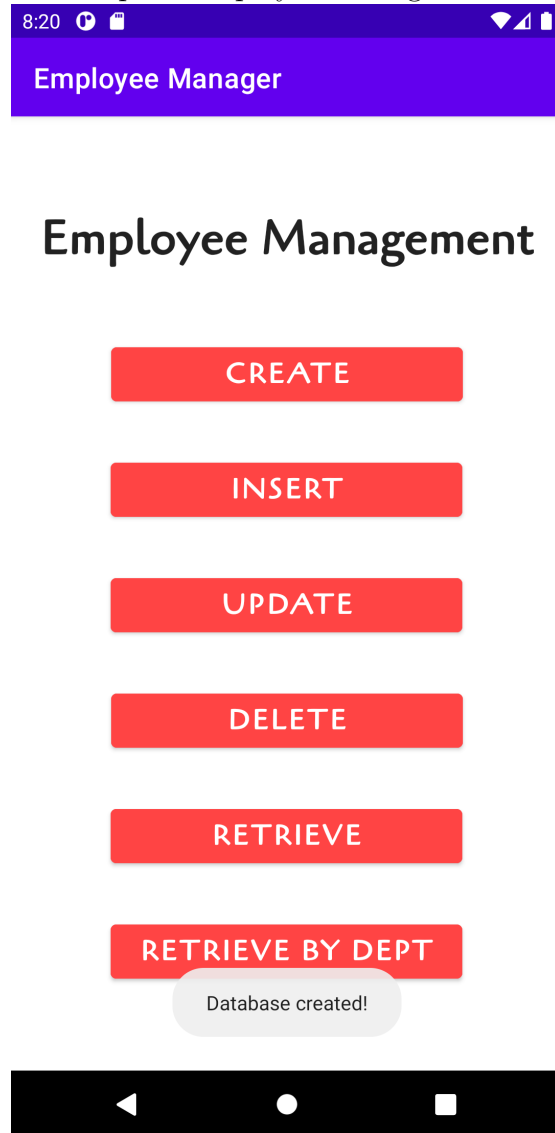
```

149         app:layout_constraintStart_toEndOf="@+id/textView42"
150         app:layout_constraintTop_toBottomOf="@+id/nameTextView5" />
151
152     <TextView
153         android:id="@+id/salaryTextView5"
154         android:layout_width="230dp"
155         android:layout_height="wrap_content"
156         android:layout_marginStart="16dp"
157         android:layout_marginTop="44dp"
158         android:textColor="?android:attr/textColorPrimary"
159         android:textSize="20sp"
160         app:layout_constraintStart_toEndOf="@+id/textView42"
161         app:layout_constraintTop_toBottomOf="@+id/genderTextView5" />
162
163     <ImageButton
164         android:id="@+id/prevButton"
165         android:layout_width="50dp"
166         android:layout_height="50dp"
167         android:layout_marginTop="40dp"
168         android:backgroundTint="@android:color/holo_red_light"
169         app:layout_constraintEnd_toStartOf="@+id/getButton"
170         app:layout_constraintStart_toStartOf="parent"
171         app:layout_constraintTop_toBottomOf="@+id/salaryTextView5"
172         app:srcCompat="@drawable/ic_navigate_before_white_48dp" />
173
174     <ImageButton
175         android:id="@+id/nextButton"
176         android:layout_width="50dp"
177         android:layout_height="50dp"
178         android:layout_marginTop="40dp"
179         android:backgroundTint="@android:color/holo_red_light"
180         app:layout_constraintEnd_toEndOf="parent"
181         app:layout_constraintStart_toEndOf="@+id/getButton"
182         app:layout_constraintTop_toBottomOf="@+id/salaryTextView5"
183         app:srcCompat="@drawable/ic_navigate_next_white_48dp" />
184
185 </androidx.constraintlayout.widget.ConstraintLayout>

```

Output: Employee Manager Home Screen:

Figure 1: Output: Employee Manager Home Screen.



Output: Employee Manager - Insert Record:

Figure 2: Output: Employee Manager - Insert Record.

The screenshot shows a mobile application interface with a purple header bar containing the text "Employee Manager". Below the header, the title "Insert Record" is centered. The form consists of several fields: "Emp. Code" with the value "E2048", "Name" with the value "Saul Goodman", "Gender" with radio buttons for "Male" (selected), "Female", and "Other", "Department" with a dropdown menu showing "Legal & Auditing", and "Salary" with the value "170000". A red "ADD" button is positioned below the form fields. A light gray toast message at the bottom of the form area states "E2048's record was added!". The bottom of the screen features a black navigation bar with three white icons: a back arrow, a home circle, and a recent apps square.

8:24

Employee Manager

Insert Record

Emp. Code

Name

Gender ☒ Male ☐ Female ☐ Other

Department

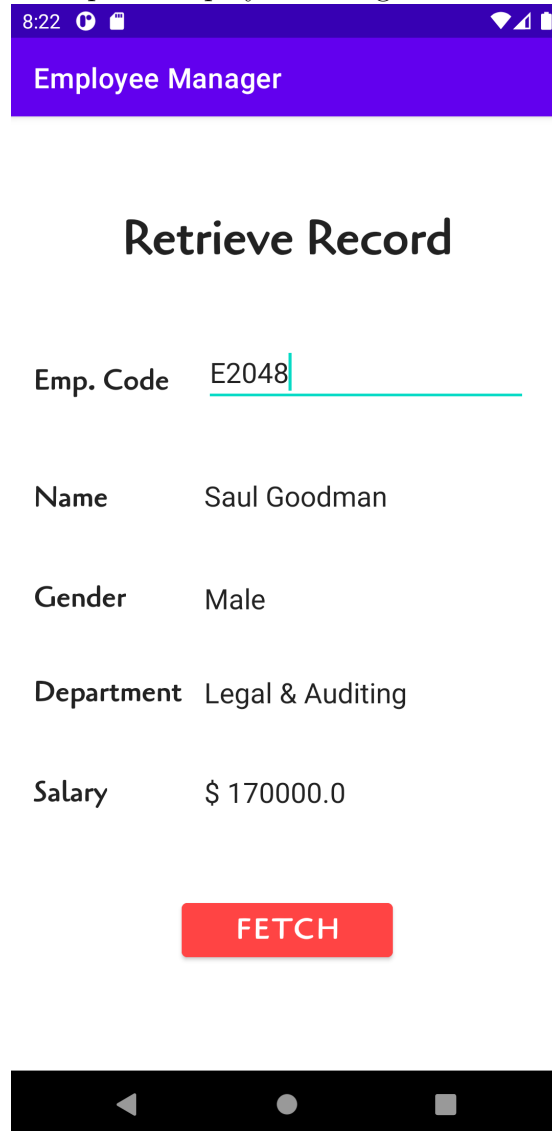
Salary

ADD

E2048's record was added!

Output: Employee Manager - Retrieve Record:

Figure 3: Output: Employee Manager - Retrieve Record.



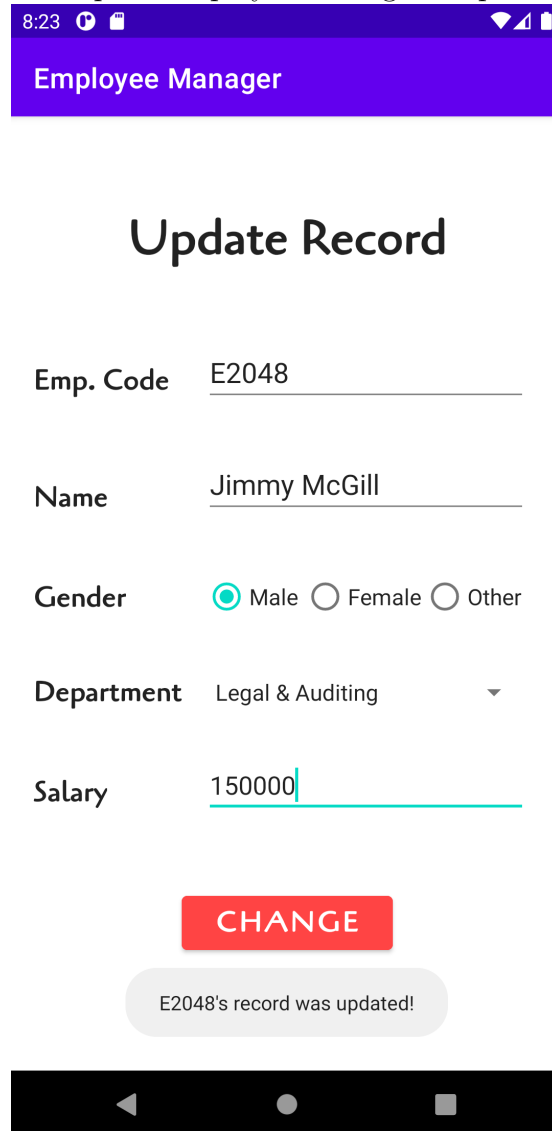
The screenshot shows an Android application interface. At the top, there is a status bar with the time 8:22 and icons for signal, Wi-Fi, and battery. Below the status bar is a purple header bar with the text "Employee Manager". The main content area has a title "Retrieve Record" in bold. Below the title, there are five rows of data, each with a label and a value: "Emp. Code" with "E2048", "Name" with "Saul Goodman", "Gender" with "Male", "Department" with "Legal & Auditing", and "Salary" with "\$ 170000.0". At the bottom of the data rows is a red button with the text "FETCH". The bottom of the screen shows the Android navigation bar with back, home, and recent apps icons.

Emp. Code	E2048
Name	Saul Goodman
Gender	Male
Department	Legal & Auditing
Salary	\$ 170000.0

FETCH

Output: Employee Manager - Update Record:

Figure 4: Output: Employee Manager - Update Record.



The screenshot shows a mobile application interface for updating an employee record. At the top, there is a status bar with the time 8:23 and icons for signal, Wi-Fi, and battery. Below the status bar is a purple header bar with the text "Employee Manager". The main content area has a large heading "Update Record". Below this heading are five form fields: "Emp. Code" with the value "E2048", "Name" with the value "Jimmy McGill", "Gender" with three radio buttons (Male is selected), "Department" with a dropdown menu showing "Legal & Auditing", and "Salary" with the value "150000". Below the form fields is a red button labeled "CHANGE". Below the button is a light gray notification bubble with the text "E2048's record was updated!". At the bottom of the screen is a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

8:23

Employee Manager

Update Record

Emp. Code

Name

Gender ☒ Male ☐ Female ☐ Other

Department

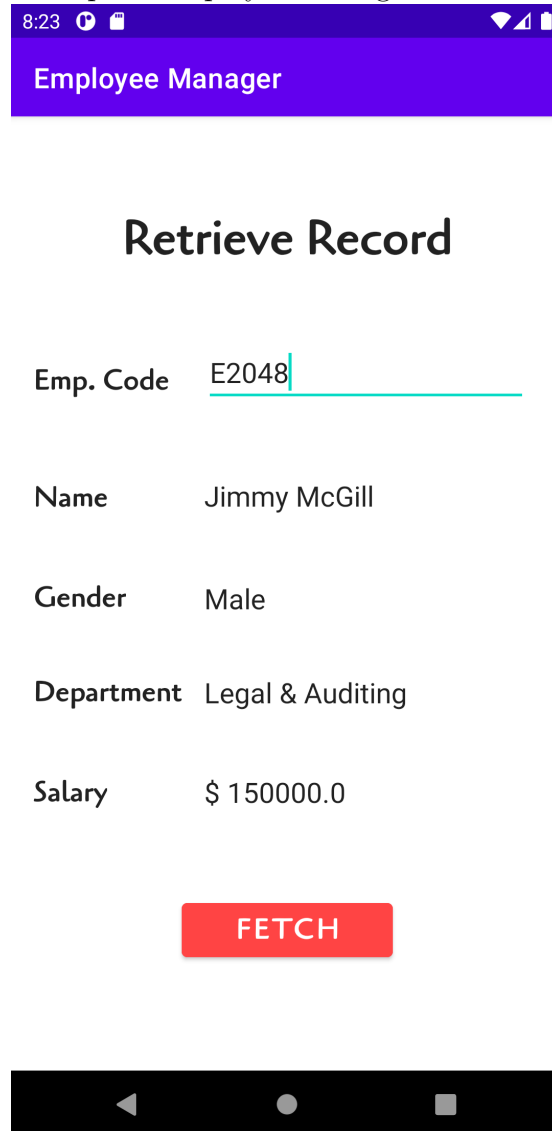
Salary

CHANGE

E2048's record was updated!

Output: Employee Manager - Retrieve Record:

Figure 5: Output: Employee Manager - Retrieve Record.



The screenshot shows an Android application interface. At the top, there is a status bar with the time 8:23 and icons for signal, Wi-Fi, and battery. Below the status bar is a purple header bar with the text "Employee Manager". The main content area has a white background with the title "Retrieve Record" in bold black text. Below the title, there are five rows of data, each with a label and a value: "Emp. Code" with "E2048", "Name" with "Jimmy McGill", "Gender" with "Male", "Department" with "Legal & Auditing", and "Salary" with "\$ 150000.0". At the bottom of the data section is a red button with the text "FETCH". At the very bottom of the screen is a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

Emp. Code	E2048
Name	Jimmy McGill
Gender	Male
Department	Legal & Auditing
Salary	\$ 150000.0

FETCH

Output: Employee Manager - Delete Record:

Figure 6: Output: Employee Manager - Delete Record.

8:23

Employee Manager

Delete Record

Emp. Code

REMOVE

Purged Record

Name Jimmy McGill

Gender Male

Department Legal & Auditing

Salary E2048's record has been deleted successfully.

Output: Employee Manager - Retrieve Records By Department (1):

Figure 7: Output: Employee Manager - Retrieve Records By Department (1).



The screenshot shows a mobile application interface with a purple header bar containing the text 'Employee Manager'. Below the header, the title 'Retrieve Records By Department' is displayed in a large, bold, black font. The form consists of several input fields with labels on the left and values on the right: 'Department' with the value 'Management', 'Emp. Code' with 'E1024', 'Name' with 'John Doe', 'Gender' with 'Male', and 'Salary' with '\$ 120000'. At the bottom of the form, there are three buttons: a grey button with a left arrow, a red button with the text 'GET', and a red button with a right arrow. The entire interface is set against a light grey background.

8:25	🔍	📄	📶	🔋
Employee Manager				
Retrieve Records By Department				
Department	Management ▼			
Emp. Code	E1024			
Name	John Doe			
Gender	Male			
Salary	\$ 120000			
<div>< GET ></div>				
◀ ● ▶				

Output: Employee Manager - Retrieve Records By Department (2):

Figure 8: Output: Employee Manager - Retrieve Records By Department (2).



The screenshot shows an Android application titled "Employee Manager". The main heading is "Retrieve Records By Department". Below this, there are five rows of data, each with a label and a value: "Department" with "Management", "Emp. Code" with "E1026", "Name" with "Michael G. Scott", "Gender" with "Male", and "Salary" with "\$ 125000". At the bottom of the data section are three red buttons: a left arrow, a "GET" button, and a right arrow. The bottom of the screen shows the standard Android navigation bar with back, home, and recent apps icons.

8:25	🔍	📄	📶	🔋
Employee Manager				
Retrieve Records By Department				
Department	Management	▼		
Emp. Code	E1026			
Name	Michael G. Scott			
Gender	Male			
Salary	\$ 125000			
<div>< GET ></div>				
◀ ● ▶				

Learning Outcome:

- I understood Android makes use of **SQLite** for its database purposes, and why SQLite is preferred over a full-fledged DBMS service.
- I learnt to implement a **Helper Class** extending from the **SQLiteOpenHelper Class** to construct methods for my own database handling.
- I learnt about **SQLite Primitives** like **TEXT, NUMERIC, REAL, INTEGER, BLOB & NULL**.
- I implemented the mandatory **onCreate()** and **onUpdate()** methods in my helper class.
- I was able to execute SQL Queries for **Creating the Table, Inserting a Record, Updating a Record, Deleting a Record, Retrieving Records by Emp. Code & Retrieving by Department** in the helper class and provided a facade to access the query results for the main program.
- I learnt how to traverse **Cursor** objects that are returned by SQLite methods on execution of a **SELECT** query.
- I learnt how to alert users with the help of small **Toast** messages in Android.
- I was able to implement the CRUD operations along with the Retrieve By Department operation as dictated by the objective of the program.
- I learnt to use **TextUtils** for validating user-input and **Regex** to check for numbers in a given string.
- I was able to design a **navigator** using **< & > buttons** to traverse through multiple records returned from the Retrieve by Department query.
- I learnt how to change **BackgroundTint** for buttons programatically, to highlight enabled/disabled behaviour.
- I learnt basics of **SQLite Programming in Android**.