SSN COLLEGE OF ENGINEERING, KALAVAKKAM

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UCS1711 - MOBILE APPLICATION DEVELOPMENT LAB

Assignment 4

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Develop a Product information application in Android that enables to perform CRUD operations on data stored in SQLite Database.

In main activity display the following buttons: Create, Insert, Update, Delete, Retrieve, Retrieve All

1. On clicking Create Button, create a new database to store the Product details. (Use SQLite Database)
    a. Product ID (Make this field as primary key)
    b. Product Name
    c. Product Brand
    d. Description
    e. Product Price
2. On Clicking Insert, move to a new view which contains the following details: (Insert new Product to the database)
    a. Product ID (EditText-Validation checking- 4 digit Numbers)
    b. Product Name (Spinner)
    c. Product Brand (RadioButton)
    d. Description (EditText-Alphanumeric characters)
    e. Product Price (EditText-Validation checking Numbers)
    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 Product Price using Product ID.
4. On clicking Delete, Delete the whole row in the table by Product ID.
5. On clicking Retrieve, Retrieve the product using Product ID.
6. On clicking Retrieve All, retrieve the details of all the products in a particular brand.

Ex. No:4 **Date:**30/9/2023

Title of the Program: Android Application Development using Database

Objective:

The objective of the provided Android application is to manage a list of products. Users can perform various operations such as inserting new products, updating product prices, deleting products, searching for product details by ID, and viewing products grouped by brand.

Algorithm:

1. MainActivity:
    - Set up buttons for inserting, deleting, updating, searching, and viewing products.
    - On button click, navigate to the respective activities.
2. InsertActivity:
    - Provide input fields for product ID, name, brand, description, and price.
    - On the "INSERT" button click:
        - Validate user input.
        - Insert a new product into the database.
3. UpdateActivity:
    - Allow users to input a product ID and a new price.
    - On the "UPDATE" button click:
        - Validate user input.
        - Update the price of the specified product in the database.
4. DeleteActivity:
    - Allow users to input a product ID for deletion.
    - On the "DELETE" button click:
        - Validate user input.
        - Delete the specified product from the database.
5. SearchActivity:
    - Enable users to search for product details by entering a product ID.
    - On the "SEARCH" button click:
        - Retrieve and display product details if found.
6. ViewActivity:
    - Display a list of product brands in a ListView.
    - On selecting a brand:
        - Retrieve and display a list of products for that brand.
7. DatabaseHelper:
    - Manage the SQLite database for storing product information.
    - Define database schema and operations for creating, querying, updating, and deleting records.

Features used:

- Android activities for user interaction.
- SQLite database for data storage.
- Input validation for user data.

- Navigation between activities.
- ListView for displaying lists of items.
- Custom XML layouts for UI design.

Source code:

- `MainActivity.java`

```java
package com.example.products;

import androidx.appcompat.app.AppCompatActivity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;

public class MainActivity extends AppCompatActivity {

    Button insertButton;
    Button deleteButton;
    Button updateButton;
    Button searchButton;
    Button viewButton;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        // Initialize buttons inside the onCreate method
        insertButton = findViewById(R.id.insert);
        deleteButton = findViewById(R.id.delete);
        updateButton = findViewById(R.id.update);
        searchButton = findViewById(R.id.search);
        viewButton = findViewById(R.id.view);

        insertButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, InsertActivity.class);
                startActivity(intent);
            }
        });

        deleteButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, DeleteActivity.class);
                startActivity(intent);
            }
        });

        updateButton.setOnClickListener(new View.OnClickListener() {
```

```
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, UpdateActivity.class);
                startActivity(intent);
            }
        });

        searchButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, SearchActivity.class);
                startActivity(intent);
            }
        });

        viewButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, ViewActivity.class);
                startActivity(intent);
            }
        });

    }
}
```

- activity_main.xml

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

    <TextView android:id="@+id/Heading" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:text="Product Database"
app:layout_constraintBottom_toBottomOf="parent" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.06" android:textSize="35sp" />

    <Button android:id="@+id/insert" android:layout_width="122dp"
android:layout_height="55dp" android:text="Insert"
app:layout_constraintTop_toBottomOf="@+id/Heading"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp" android:textSize="20sp" />
```

```
    <Button android:id="@+id/delete" android:layout_width="122dp"
android:layout_height="55dp" android:text="Delete"
app:layout_constraintTop_toBottomOf="@+id/insert"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp" android:textSize="20sp" />

    <Button android:id="@+id/update" android:layout_width="122dp"
android:layout_height="55dp" android:text="Update"
app:layout_constraintTop_toBottomOf="@+id/delete"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp" android:textSize="20sp" />

    <Button android:id="@+id/search" android:layout_width="122dp"
android:layout_height="55dp" android:text="Search"
app:layout_constraintTop_toBottomOf="@+id/update"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp" android:textSize="20sp" />

    <Button android:id="@+id/view" android:layout_width="122dp"
android:layout_height="55dp" android:text="View"
app:layout_constraintTop_toBottomOf="@+id/search"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp" android:textSize="20sp" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

- InsertActivity.java

```
package com.example.products;

import android.content.ContentValues;
import android.database.sqlite.SQLiteDatabase;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;
import androidx.appcompat.app.AppCompatActivity;

public class InsertActivity extends AppCompatActivity {

    private EditText productIdEditText, productNameEditText, productBrandEditText,
productDescriptionEditText, productPriceEditText;
    private Button submitButton;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.insert);

        // Initialize UI elements
        productIdEditText = findViewById(R.id.id);
```

```
        productNameEditText = findViewById(R.id.name);
        productBrandEditText = findViewById(R.id.brand);
        productDescriptionEditText = findViewById(R.id.desc);
        productPriceEditText = findViewById(R.id.price);
        submitButton = findViewById(R.id.submit);

        // Set click listener for the Submit button
        submitButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                // Get user input
                String productId = productIdEditText.getText().toString();
                String productName = productNameEditText.getText().toString();
                String productBrand = productBrandEditText.getText().toString();
                String productDescription =
productDescriptionEditText.getText().toString();
                String productPriceStr = productPriceEditText.getText().toString();

                // Check if any of the fields are empty
                if (productId.isEmpty() || productName.isEmpty() || productBrand.isEmpty()
|| productDescription.isEmpty() || productPriceStr.isEmpty()) {
                    Toast.makeText(InsertActivity.this, "Please fill in all fields",
Toast.LENGTH_SHORT).show();
                    return;
                }

                // Convert product price to double
                double productPrice = Double.parseDouble(productPriceStr);

                // Insert data into the database
                insertProduct(productId, productName, productBrand, productDescription,
productPrice);

                // Show success message
                Toast.makeText(InsertActivity.this, "Product inserted successfully",
Toast.LENGTH_SHORT).show();

                // Clear input fields
                productIdEditText.getText().clear();
                productNameEditText.getText().clear();
                productBrandEditText.getText().clear();
                productDescriptionEditText.getText().clear();
                productPriceEditText.getText().clear();
            }
        });
    }

    private void insertProduct(String productId, String productName, String productBrand,
String productDescription, double productPrice) {
        // Create or open the database for writing
        DatabaseHelper dbHelper = new DatabaseHelper(this);
        SQLiteDatabase db = dbHelper.getWritableDatabase();

        // Create a new map of values, where column names are the keys
```

```
        ContentValues values = new ContentValues();
        values.put(DatabaseContract.ProductEntry.COLUMN_PRODUCT_ID, productId);
        values.put(DatabaseContract.ProductEntry.COLUMN_PRODUCT_NAME, productName);
        values.put(DatabaseContract.ProductEntry.COLUMN_PRODUCT_BRAND, productBrand);
        values.put(DatabaseContract.ProductEntry.COLUMN_PRODUCT_DESCRIPTION,
productDescription);
        values.put(DatabaseContract.ProductEntry.COLUMN_PRODUCT_PRICE, productPrice);

        // Insert the new row, returning the primary key value of the new row
        long newRowId = db.insert(DatabaseContract.ProductEntry.TABLE_NAME, null, values);

        // Close the database
        db.close();
    }
}
```

- Insert.xml

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

    <TextView android:id="@+id/Heading" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:text="Insert" android:textSize="35sp"
app:layout_constraintBottom_toBottomOf="parent" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.06" />

    <TableLayout android:layout_width="0dp" android:layout_height="0dp"
app:layout_constraintTop_toBottomOf="@+id/Heading"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintBottom_toBottomOf="parent" android:layout_marginTop="16dp">

        <!-- First Row -->
        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product ID" android:gravity="center" />

            <EditText android:id="@+id/id" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <!-- Second Row -->
        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Name" android:gravity="center" />
```

```
            <EditText android:id="@+id/name" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <!-- Third Row (and so on) -->
        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Brand" android:gravity="center" />

            <EditText android:id="@+id/brand" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Description" android:gravity="center" />

            <EditText android:id="@+id/desc" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Price" android:gravity="center" />

            <EditText android:id="@+id/price" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="numberDecimal" android:text="" />
        </TableRow>

        <TableRow android:layout_height="wrap_content">
            <Button android:id="@+id/submit" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:text="INSERT"
android:background="@color/black" android:textColor="@color/white"/>
        </TableRow>
    </TableLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

- UpdateActivity.java

```
package com.example.products;

import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;
```

```
import androidx.appcompat.app.AppCompatActivity;

public class UpdateActivity extends AppCompatActivity {

    private EditText productIdEditText;
    private EditText newPriceEditText;
    private Button updateButton;
    private DatabaseHelper dbHelper;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.update);

        productIdEditText = findViewById(R.id.id);
        newPriceEditText = findViewById(R.id.price);
        updateButton = findViewById(R.id.submit);
        dbHelper = new DatabaseHelper(this);

        updateButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                // Get the product ID and new price from the EditText fields
                String productIdText = productIdEditText.getText().toString().trim();
                String newPriceText = newPriceEditText.getText().toString().trim();

                if (productIdText.isEmpty() || newPriceText.isEmpty()) {
                    // Product ID or new price field is empty, show an error message
                    Toast.makeText(UpdateActivity.this, "Product ID and new price are
required", Toast.LENGTH_SHORT)
                            .show();
                } else {
                    try {
                        // Parse the product ID and new price as needed (integer and
double)
                        int productId = Integer.parseInt(productIdText);
                        double newPrice = Double.parseDouble(newPriceText);

                        // Update the product price in the database
                        boolean isUpdated = dbHelper.updateProductPrice(productId,
newPrice);

                        if (isUpdated) {
                            // Show a success message
                            Toast.makeText(UpdateActivity.this, "Price updated
successfully", Toast.LENGTH_SHORT)
                                    .show();
                        } else {
                            // Show an error message if the update failed
                            Toast.makeText(UpdateActivity.this, "Failed to update price.
Product not found.",
                                    Toast.LENGTH_SHORT).show();
                        }
```

```
                        // Clear the EditText fields
                        productIdEditText.setText("");
                        newPriceEditText.setText("");
                    } catch (NumberFormatException e) {
                        // Handle invalid input (non-integer or non-double)
                        Toast.makeText(UpdateActivity.this, "Invalid Product ID or new
price", Toast.LENGTH_SHORT)
                                .show();
                    }
                }
            }
        });
    }
}
```

- update.xml

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

    <TextView android:id="@+id/Heading" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:text="Update" android:textSize="35sp"
app:layout_constraintBottom_toBottomOf="parent" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.06" />

    <TableLayout android:id="@+id/searchTable" android:layout_width="0dp"
android:layout_height="wrap_content" app:layout_constraintTop_toBottomOf="@+id/Heading"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp">

        <!-- Row for Product ID Search -->
        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product ID" android:gravity="center" />

            <EditText android:id="@+id/id" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>
        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Price" android:gravity="center" />

            <EditText android:id="@+id/price" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="numberDecimal" android:text="" />
```

```
        </TableRow>
        <TableRow android:layout_height="wrap_content">
            <Button android:id="@+id/submit" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:text="UPDATE PRICE"
android:background="@color/black" android:textColor="@color/white"
app:layout_constraintTop_toBottomOf="@id/price" />
        </TableRow>

    </TableLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

- DeleteActivity.java

```
package com.example.products;

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

import androidx.appcompat.app.AppCompatActivity;

public class DeleteActivity extends AppCompatActivity {

    private EditText productIdEditText;
    private Button deleteButton;
    private DatabaseHelper dbHelper;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.delete);

        productIdEditText = findViewById(R.id.id);
        deleteButton = findViewById(R.id.submit);
        dbHelper = new DatabaseHelper(this);

        deleteButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                // Get the product ID from the EditText
                String productIdText = productIdEditText.getText().toString().trim();

                if (productIdText.isEmpty()) {
                    // Product ID field is empty, show an error message
                    Toast.makeText(DeleteActivity.this, "Product ID is required",
Toast.LENGTH_SHORT).show();
                } else {
                    try {
                        // Parse the product ID as an integer
```

```
                        int productId = Integer.parseInt(productIdText);

                        // Attempt to delete the product by ID
                        boolean isDeleted = dbHelper.deleteProductById(productId);

                        if (isDeleted) {
                            // Product deleted successfully
                            Toast.makeText(DeleteActivity.this, "Product deleted
successfully", Toast.LENGTH_SHORT).show();

                            // Clear the product ID EditText
                            productIdEditText.setText("");
                        } else {
                            // Product not found, show an error message
                            Toast.makeText(DeleteActivity.this, "Product not found for
deletion", Toast.LENGTH_SHORT).show();
                        }
                    } catch (NumberFormatException e) {
                        // Handle invalid input (non-integer)
                        Toast.makeText(DeleteActivity.this, "Invalid Product ID",
Toast.LENGTH_SHORT).show();
                    }
                }
            }
        });
    }
}
```

- delete.xml

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


    <TextView android:id="@+id/Heading" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:text="Delete" android:textSize="35sp"
app:layout_constraintBottom_toBottomOf="parent" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.06" />

    <TableLayout android:id="@+id/searchTable" android:layout_width="0dp"
android:layout_height="wrap_content" app:layout_constraintTop_toBottomOf="@+id/Heading"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp">

        <!-- Row for Product ID Search -->
        <TableRow android:layout_height="wrap_content">
```

```
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product ID" android:gravity="center" />

            <EditText android:id="@+id/id" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <TableRow android:layout_height="wrap_content">
            <Button android:id="@+id/submit" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:text="DELETE"
android:background="@color/black" android:textColor="@color/white"
app:layout_constraintTop_toBottomOf="@id/id" />
        </TableRow>
    </TableLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

- SearchActivity.java

```
package com.example.products;

import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TableLayout;
import android.widget.TextView;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;

public class SearchActivity extends AppCompatActivity {

    private EditText productIdEditText;
    private TableLayout outputTable;
    private TextView nameTextView;
    private TextView brandTextView;
    private TextView descriptionTextView;
    private TextView priceTextView;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.search);

        // Initialize UI elements
        productIdEditText = findViewById(R.id.id);
        outputTable = findViewById(R.id.outputTable);
        nameTextView = findViewById(R.id.name);
        brandTextView = findViewById(R.id.brand);
        descriptionTextView = findViewById(R.id.desc);
        priceTextView = findViewById(R.id.price);
```

```
        Button searchButton = findViewById(R.id.submit);

        searchButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                searchProduct();
            }
        });
    }

    private void searchProduct() {
        // Get the product ID entered by the user
        String productIdText = productIdEditText.getText().toString();

        if (productIdText.isEmpty()) {
            // Product ID field is empty, show an error message or handle it as needed
            Toast.makeText(this, "Please enter a Product ID", Toast.LENGTH_SHORT).show();
            return;
        }

        int productId = Integer.parseInt(productIdText);

        // Use the DatabaseHelper to search for the product by ID
        DatabaseHelper databaseHelper = new DatabaseHelper(this);
        Product product = databaseHelper.searchProductById(productId);

        if (product != null) {
            // Display the product information in the outputTable
            nameTextView.setText(product.getName());
            brandTextView.setText(product.getBrand());
            descriptionTextView.setText(product.getDescription());
            priceTextView.setText(String.valueOf(product.getPrice()));

            // Make the outputTable visible
            outputTable.setVisibility(View.VISIBLE);
        } else {
            // Product not found, you can display an error message or handle it as needed
            Toast.makeText(this, "Product not found", Toast.LENGTH_SHORT).show();

            // For now, let's hide the outputTable
            outputTable.setVisibility(View.GONE);
        }
    }
}
```

- search.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
```

```
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools" android:id="@+id/linearLayout"
android:layout_width="match_parent" android:layout_height="match_parent">

    <!-- Heading TextView -->
    <TextView android:id="@+id/Heading" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:text="Search" android:textSize="35sp"
app:layout_constraintBottom_toBottomOf="parent" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.06" />

    <TableLayout android:id="@+id/searchTable" android:layout_width="0dp"
android:layout_height="wrap_content" app:layout_constraintTop_toBottomOf="@+id/Heading"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
android:layout_marginTop="16dp">

        <!-- Row for Product ID Search -->
        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product ID" android:gravity="center" />

            <EditText android:id="@+id/id" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <!-- Row for Search Button -->
        <TableRow android:layout_height="wrap_content">
            <Button android:id="@+id/submit" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:text="Search"
android:background="@color/black" android:textColor="@color/white"
app:layout_constraintTop_toBottomOf="@id/id" />
        </TableRow>
    </TableLayout>

    <TableLayout android:id="@+id/outputTable" android:layout_width="0dp"
android:layout_height="0dp" app:layout_constraintTop_toBottomOf="@+id/searchTable"
app:layout_constraintStart_toStartOf="parent" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintBottom_toBottomOf="parent" android:layout_marginTop="16dp"
android:visibility="gone">

        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Name" android:gravity="center" />

            <EditText android:id="@+id/name" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Brand" android:gravity="center" />
```

```
            <EditText android:id="@+id/brand" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Description" android:gravity="center" />

            <EditText android:id="@+id/desc" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="text" android:text="" />
        </TableRow>

        <TableRow android:layout_height="wrap_content">
            <TextView android:layout_width="0dp" android:layout_height="wrap_content"
android:layout_weight="1" android:text="Product Price" android:gravity="center" />

            <EditText android:id="@+id/price" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1" android:ems="10"
android:inputType="numberDecimal" android:text="" />
        </TableRow>
    </TableLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

- ViewActivity.java

```
package com.example.products;

import android.os.Bundle;

import androidx.appcompat.app.AppCompatActivity;

import android.view.ViewGroup;
import android.widget.AdapterView;
import android.widget.ArrayAdapter;
import android.widget.LinearLayout;
import android.widget.ListView;
import android.widget.TextView;
import java.util.List;

public class ViewActivity extends AppCompatActivity {
    private DatabaseHelper databaseHelper;
    private LinearLayout rightSideLayout;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.view);

        ListView brandListView = findViewById(R.id.brandListView);
```

```
        rightSideLayout = findViewById(R.id.rightSideLayout);

        databaseHelper = new DatabaseHelper(this);

        List<String> brandList = databaseHelper.getBrandList();

        ArrayAdapter<String> adapter = new ArrayAdapter<>(this,
android.R.layout.simple_list_item_1, brandList);

        brandListView.setAdapter(adapter);

        brandListView.setOnItemClickListener(new AdapterView.OnItemClickListener() {
            @Override
            public void onItemClick(AdapterView<?> parent, android.view.View view, int
position, long id) {
                String selectedBrand = brandList.get(position);

                List<Product> productList =
databaseHelper.getProductsByBrand(selectedBrand);

                // Clear the existing product information
                rightSideLayout.removeAllViews();

                // ...

                if (!productList.isEmpty()) {
                    for (Product product : productList) {
                        // Create a TextView for each product
                        TextView productTextView = new TextView(ViewActivity.this);
                        productTextView.setLayoutParams(new ViewGroup.LayoutParams(
                                ViewGroup.LayoutParams.MATCH_PARENT,
                                ViewGroup.LayoutParams.WRAP_CONTENT // Set height to
wrap_content
                        ));
                        productTextView.setText("Product ID: " + product.getId() + "\n" +
                                "Product Name: " + product.getName() + "\n" +
                                "Product Price: " + product.getPrice());

                        // Add the TextView to the rightSideLayout
                        rightSideLayout.addView(productTextView);

                        // Add space (spacer TextView)
                        TextView spacer = new TextView(ViewActivity.this);
                        spacer.setLayoutParams(new ViewGroup.LayoutParams(
                                ViewGroup.LayoutParams.MATCH_PARENT,
                                50
                        ));
                        rightSideLayout.addView(spacer);
                    }
                } else {
                    // Display a message if no products are available for the selected
brand
                    TextView noProductsTextView = new TextView(ViewActivity.this);
                    noProductsTextView.setLayoutParams(new ViewGroup.LayoutParams(
```

```
                        ViewGroup.LayoutParams.MATCH_PARENT,
                        ViewGroup.LayoutParams.WRAP_CONTENT
                ));
                noProductsTextView.setText("No products available for this brand.");

                // Add the message to the rightSideLayout
                rightSideLayout.addView(noProductsTextView);
            }

        }
    });

}
}
```

- view.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.core.widget.NestedScrollView
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:id="@+id/linearLayout"
android:layout_width="match_parent" android:layout_height="match_parent">

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

        <!-- Heading TextView -->
        <TextView android:id="@+id/Heading" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:text="View" android:textSize="35sp"
android:layout_gravity="center" android:layout_marginTop="16dp"
android:layout_marginBottom="16dp" />

        <LinearLayout android:layout_width="match_parent" android:layout_height="600dp"
android:orientation="horizontal">

            <!-- Left side: List of Brands -->
            <ListView android:id="@+id/brandListView" android:layout_width="0dp"
android:layout_height="wrap_content" android:layout_weight="1"
android:divider="@android:color/darker_gray" android:dividerHeight="1dp" />

            <View android:layout_width="1dp" android:layout_height="match_parent"
android:background="@android:color/darker_gray" />

            <LinearLayout android:id="@+id/rightSideLayout" android:layout_width="0dp"
android:layout_height="wrap_content" android:orientation="vertical"
android:layout_weight="1">



            </LinearLayout>
```

```
        </LinearLayout>
    </LinearLayout>
</androidx.core.widget.NestedScrollView>
```

- DatabaseHelper.java

```
// DatabaseHelper.java
package com.example.products;

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

import java.util.ArrayList;
import java.util.List;

public class DatabaseHelper extends SQLiteOpenHelper {
    private static final String DATABASE_NAME = "products";
    private static final int DATABASE_VERSION = 1;

    public static final String TABLE_NAME = "products";

    public static final String COLUMN_PRODUCT_ID = "product_id";
    public static final String COLUMN_PRODUCT_NAME = "product_name";
    public static final String COLUMN_PRODUCT_BRAND = "product_brand";
    public static final String COLUMN_PRODUCT_DESCRIPTION = "product_description";
    public static final String COLUMN_PRODUCT_PRICE = "product_price";

    private static final String SQL_CREATE_PRODUCT_TABLE =
            "CREATE TABLE " + TABLE_NAME + " (" +
                    COLUMN_PRODUCT_ID + " INTEGER PRIMARY KEY AUTOINCREMENT," +
                    COLUMN_PRODUCT_NAME + " TEXT," +
                    COLUMN_PRODUCT_BRAND + " TEXT," +
                    COLUMN_PRODUCT_DESCRIPTION + " TEXT," +
                    COLUMN_PRODUCT_PRICE + " REAL)";

    private static final String SQL_DELETE_PRODUCT_TABLE =
            "DROP TABLE IF EXISTS " + TABLE_NAME;

    public DatabaseHelper(Context context) {
        super(context, DATABASE_NAME, null, DATABASE_VERSION);
    }

    @Override
    public void onCreate(SQLiteDatabase db) {
        db.execSQL(SQL_CREATE_PRODUCT_TABLE);
    }
```

```
    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int newVersion) {
        db.execSQL(SQL_DELETE_PRODUCT_TABLE);
        onCreate(db);
    }

    public Product searchProductById(int productId) {
        SQLiteDatabase db = this.getReadableDatabase();

        String[] projection = {
                COLUMN_PRODUCT_NAME,
                COLUMN_PRODUCT_BRAND,
                COLUMN_PRODUCT_DESCRIPTION,
                COLUMN_PRODUCT_PRICE
        };

        String selection = COLUMN_PRODUCT_ID + " = ?";
        String[] selectionArgs = {String.valueOf(productId)};

        Cursor cursor = db.query(
                TABLE_NAME,
                projection,
                selection,
                selectionArgs,
                null,
                null,
                null
        );

        Product product = null;
        if (cursor != null && cursor.moveToFirst()) {
            String name =
cursor.getString(cursor.getColumnIndexOrThrow(COLUMN_PRODUCT_NAME));
            String brand =
cursor.getString(cursor.getColumnIndexOrThrow(COLUMN_PRODUCT_BRAND));
            String description =
cursor.getString(cursor.getColumnIndexOrThrow(COLUMN_PRODUCT_DESCRIPTION));
            double price =
cursor.getDouble(cursor.getColumnIndexOrThrow(COLUMN_PRODUCT_PRICE));

            product = new Product(productId, name, brand, description, price);
            cursor.close();
        }

        db.close();
        return product;
    }
    public boolean deleteProductById(int productId) {
        SQLiteDatabase db = this.getWritableDatabase();
        String whereClause = COLUMN_PRODUCT_ID + " = ?";
        String[] whereArgs = {String.valueOf(productId)};

        int rowsDeleted = db.delete(TABLE_NAME, whereClause, whereArgs);
```

```
        // Close the database
        db.close();

        // Check if any rows were deleted (deletion successful)
        return rowsDeleted > 0;
    }
    public boolean updateProductPrice(int productId, double newPrice) {
        SQLiteDatabase db = this.getWritableDatabase();

        ContentValues values = new ContentValues();
        values.put(COLUMN_PRODUCT_PRICE, newPrice);

        String whereClause = COLUMN_PRODUCT_ID + " = ?";
        String[] whereArgs = {String.valueOf(productId)};

        int rowsUpdated = db.update(TABLE_NAME, values, whereClause, whereArgs);

        // Close the database
        db.close();

        // Check if any rows were updated (update successful)
        return rowsUpdated > 0;
    }

    public List<String> getBrandList() {
        List<String> brandList = new ArrayList<>();
        SQLiteDatabase db = this.getReadableDatabase();

        // SQL query to select distinct brands
        String query = "SELECT DISTINCT " + COLUMN_PRODUCT_BRAND + " FROM " + TABLE_NAME;

        Cursor cursor = db.rawQuery(query, null);

        if (cursor != null && cursor.moveToFirst()) {
            do {
                String brand = cursor.getString(0); // 0 is the column index for brand
                brandList.add(brand);
                Log.d("DatabaseHelper", "Brand: " + brand); // Add this line for debugging
            } while (cursor.moveToNext());

            cursor.close();
        }

        db.close();
        return brandList;
    }


    // Add a method to select all items in a brand
    public List<Product> getProductsByBrand(String brandName) {
        List<Product> productList = new ArrayList<>();
        SQLiteDatabase db = this.getReadableDatabase();

        String[] projection = {
```

```
                COLUMN_PRODUCT_ID,
                COLUMN_PRODUCT_NAME,
                COLUMN_PRODUCT_PRICE
        };

        String selection = COLUMN_PRODUCT_BRAND + " = ?";
        String[] selectionArgs = {brandName};

        Cursor cursor = db.query(
                TABLE_NAME,
                projection,
                selection,
                selectionArgs,
                null,
                null,
                null
        );

        if (cursor != null && cursor.moveToFirst()) {
            do {
                int productId =
cursor.getInt(cursor.getColumnIndexOrThrow(COLUMN_PRODUCT_ID));
                String name =
cursor.getString(cursor.getColumnIndexOrThrow(COLUMN_PRODUCT_NAME));
                double price =
cursor.getDouble(cursor.getColumnIndexOrThrow(COLUMN_PRODUCT_PRICE));

                Product product = new Product(productId, name, brandName, null, price);
                productList.add(product);
            } while (cursor.moveToNext());

            cursor.close();
        }

        db.close();
        return productList;
    }

}
```

- DatabaseContract.java

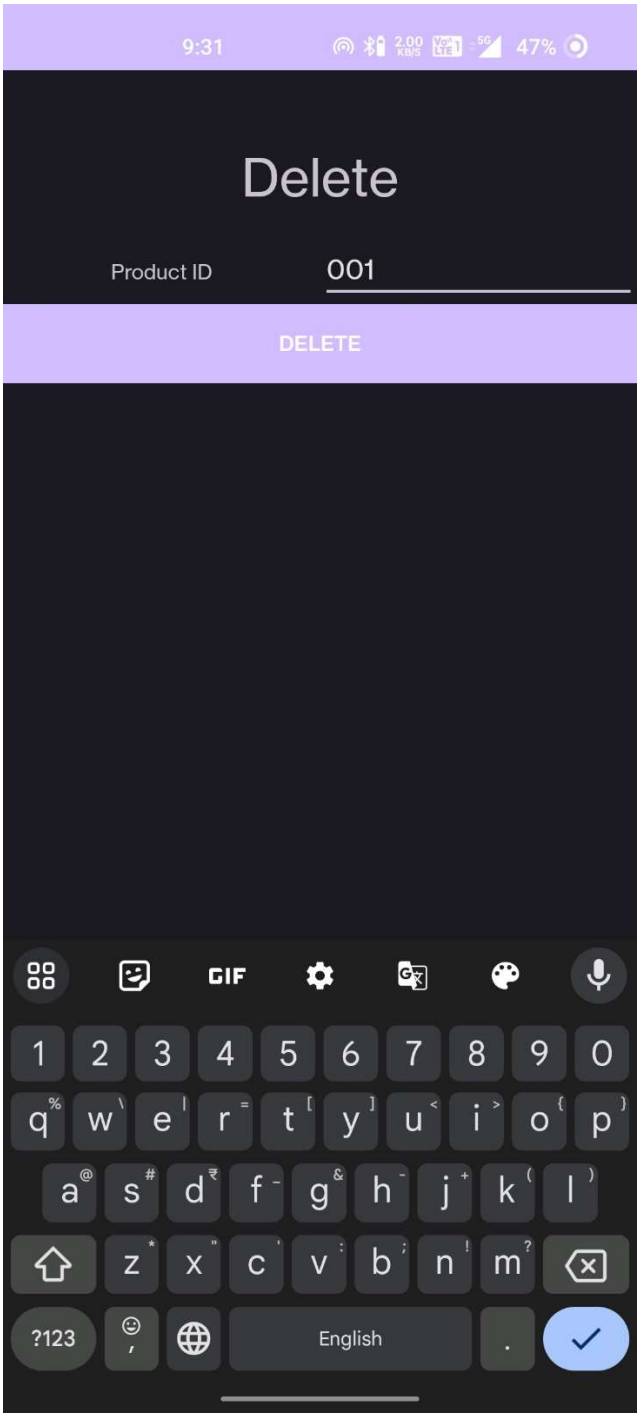
```
// DatabaseContract.java
package com.example.products;

import android.provider.BaseColumns;

public final class DatabaseContract {

    private DatabaseContract() {}

    public static class ProductEntry implements BaseColumns {
        public static final String TABLE_NAME = "products";
```

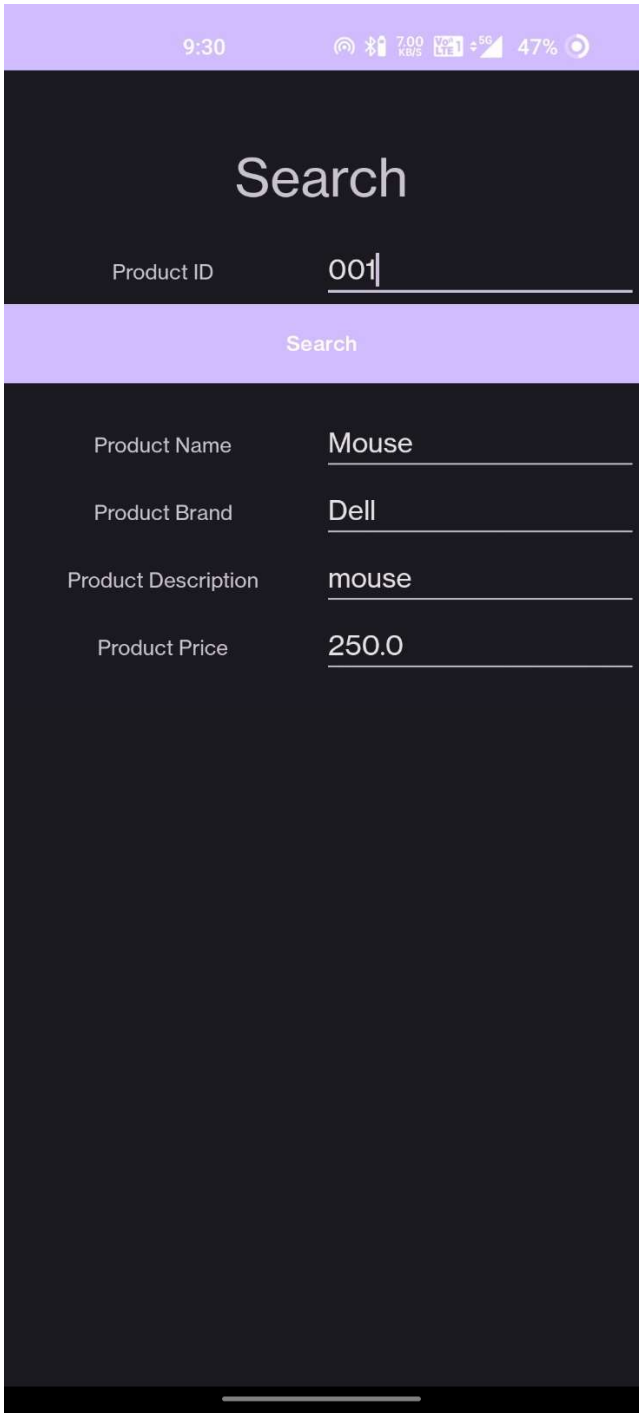
```
        public static final String COLUMN_PRODUCT_ID = "product_id";
        public static final String COLUMN_PRODUCT_NAME = "product_name";
        public static final String COLUMN_PRODUCT_BRAND = "product_brand";
        public static final String COLUMN_PRODUCT_DESCRIPTION = "product_description";
        public static final String COLUMN_PRODUCT_PRICE = "product_price";
    }
}
```

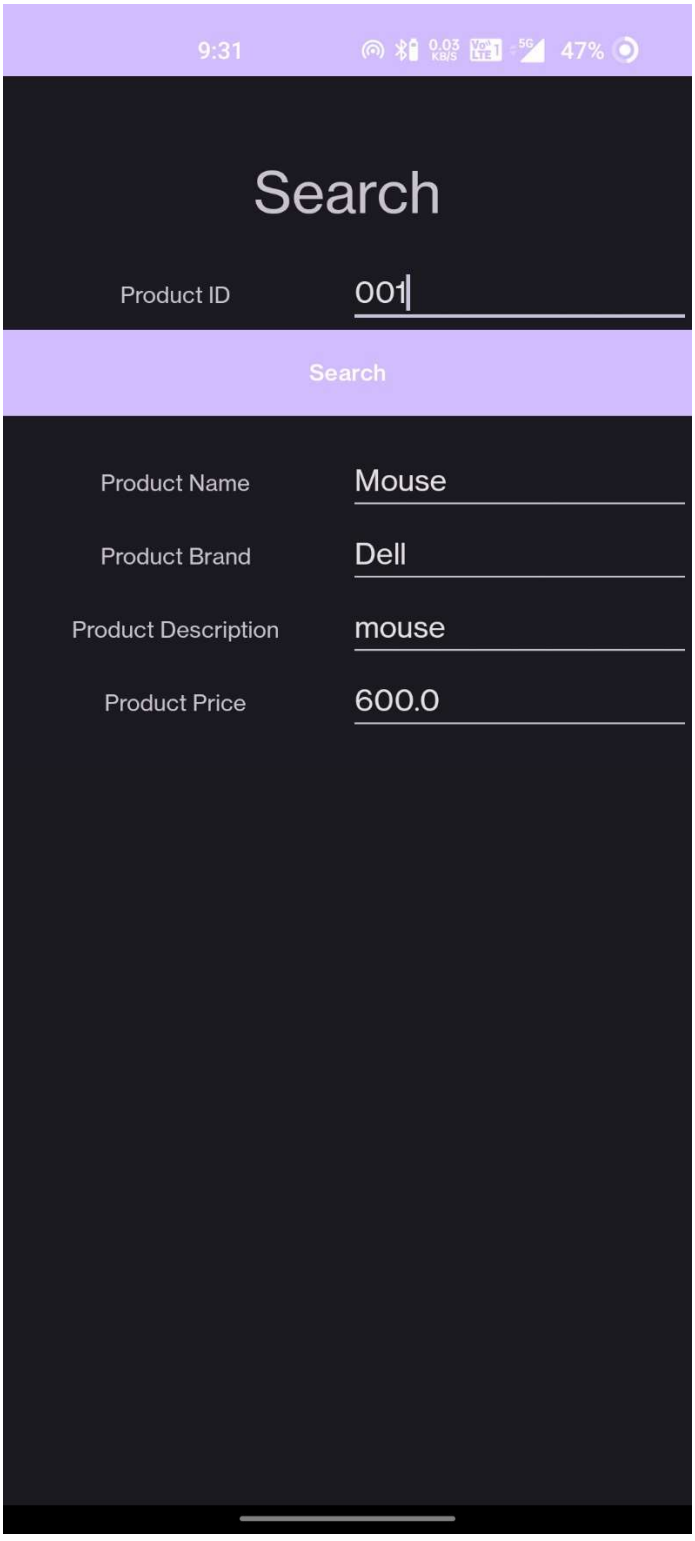
- Product.java

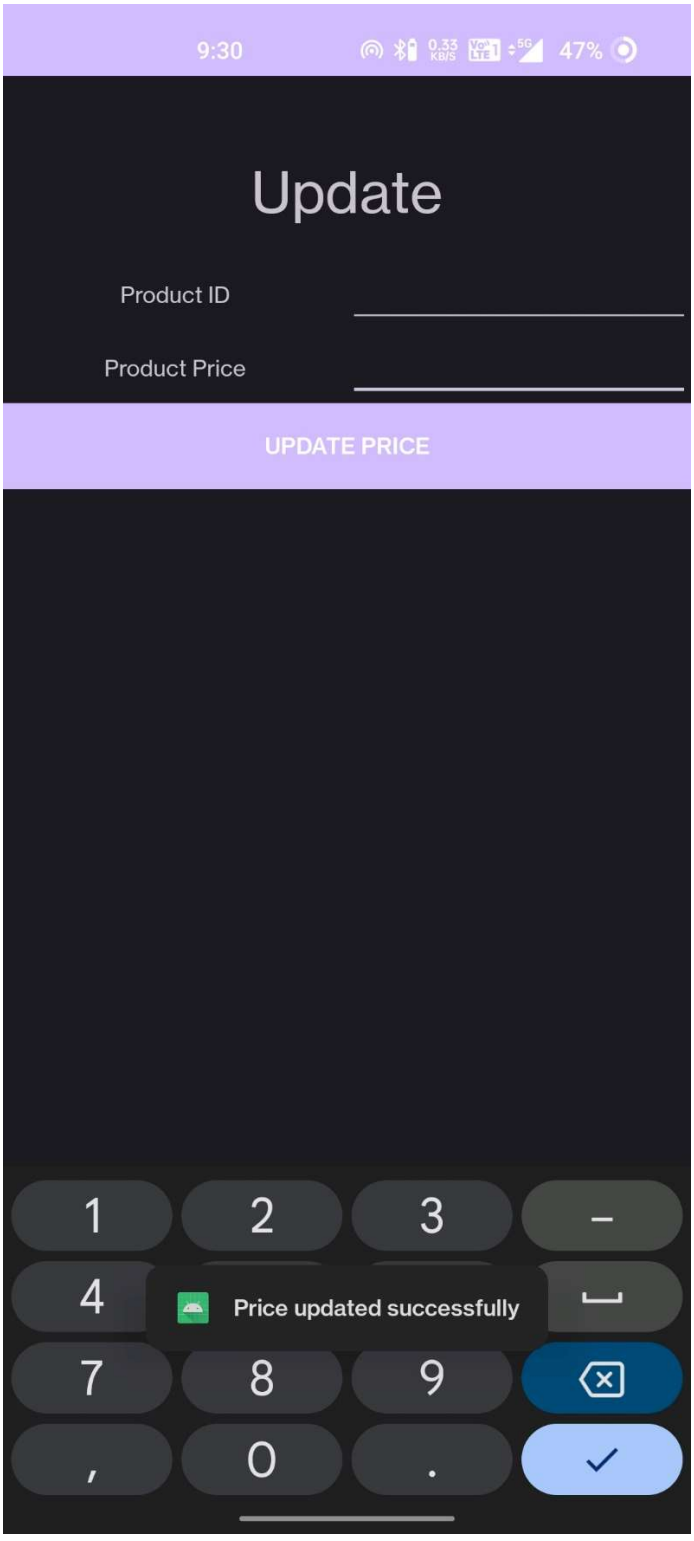
```
// Product.java
package com.example.products;

public class Product {
    private int id;
    private String name;
    private String brand;
    private String description;
    private double price;

    public Product(int id, String name, String brand, String description, double price) {
        this.id = id;
        this.name = name;
        this.brand = brand;
        this.description = description;
        this.price = price;
    }

    public int getId() {
        return id;
    }

    public String getName() {
        return name;
    }

    public String getBrand() {
        return brand;
    }

    public String getDescription() {
        return description;
    }

    public double getPrice() {
        return price;
    }
}
```

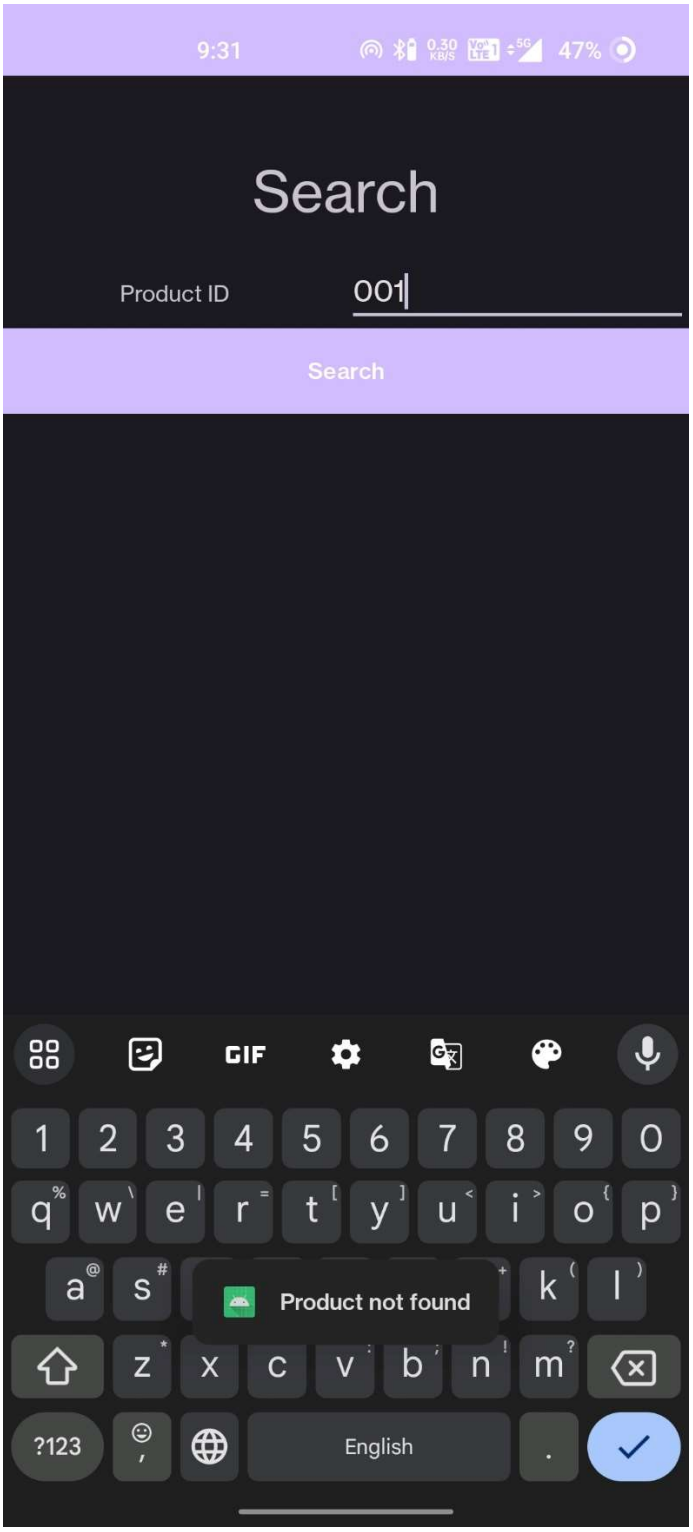
Output:

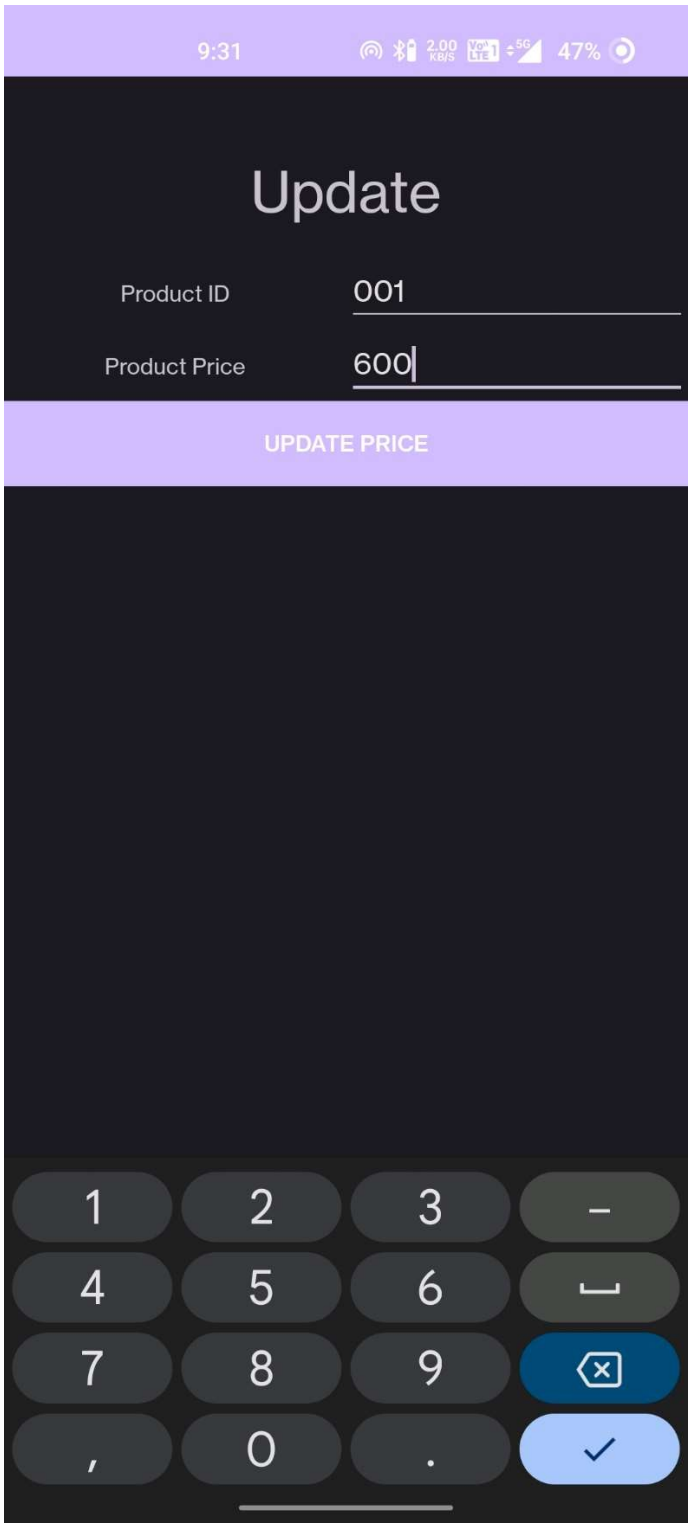

9:31
47%
Delete
Product ID
001
DELETE
GIF
1 2 3 4 5 6 7 8 9 0
q w e r t y u i o p
a s d f g h j k l
z x c v b n m
?123
English

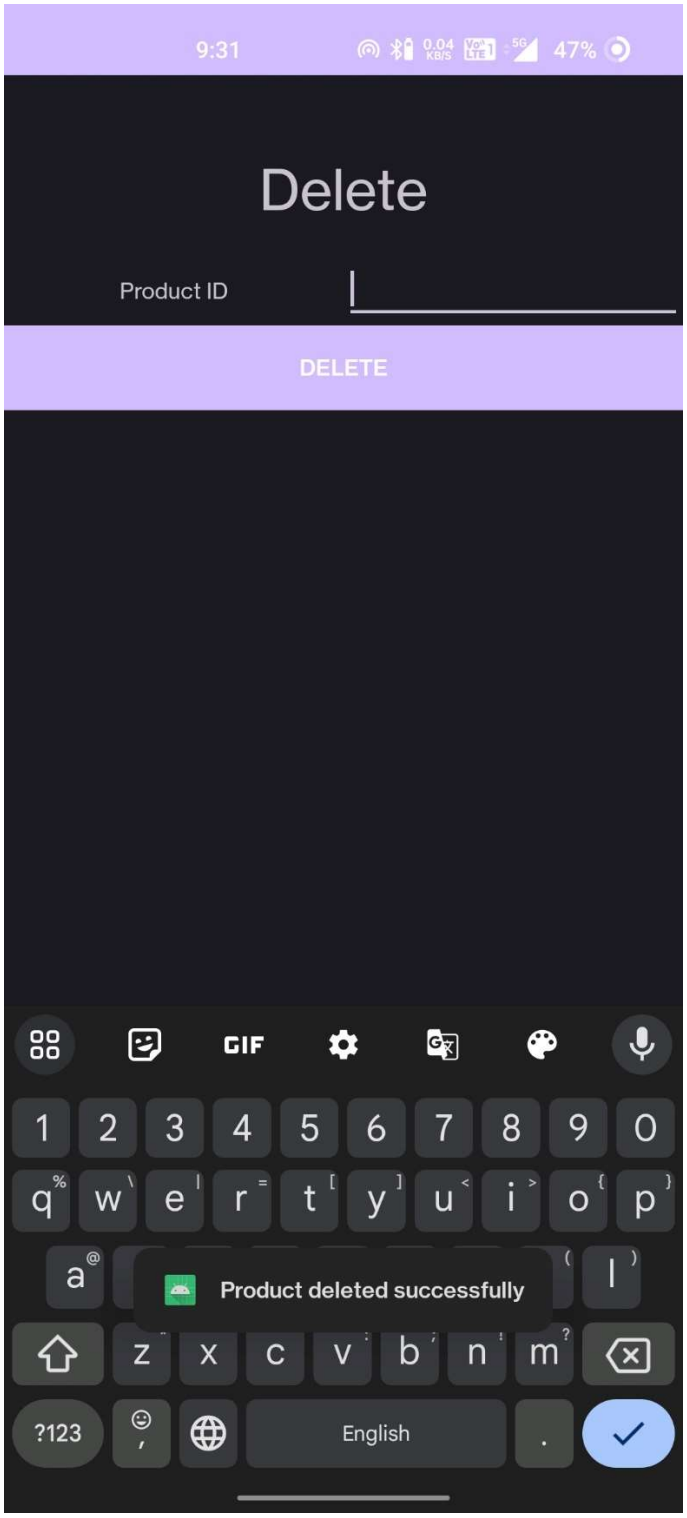

9:30
47%
Search
Product ID
001
Search
Product Name
Mouse
Product Brand
Dell
Product Description
mouse
Product Price
250.0


9:31
47%
Search
Product ID
001
Search
Product Name
Mouse
Product Brand
Dell
Product Description
mouse
Product Price
600.0


9:30
47%
Update
Product ID
Product Price
UPDATE PRICE
Price updated successfully


9:31
47%
Search
Product ID
001
Search
Product not found
English


9:31
47%
Update
Product ID
001
Product Price
600
UPDATE PRICE



Result:

The mobile application was completed successfully

Best Practices:

- Using SQLite for local data storage.
- Input validation to ensure data integrity.
- Separation of concerns by using different activities for various operations.
- Reusable database helper class.

.

Learning Outcomes:

- Creating and managing Android activities.
- Working with SQLite databases in Android.
- Implementing input validation in Android applications.
- Navigating between different activities.
- Designing user interfaces with XML layout files.
- Handling user input and performing database operations.