Ex. No. : 06 **Date :**

Register No. : 221701051 **Name : SELVAHARIBALAN S**

SD Card

Aim

Implement an application to write the Register Number, Name and CGPA to the SD card in text file format.

Procedure:

Step 1 : File → New Project

Provide the application name (e.g.,"SD Card") and click “Next”.

Step 2 : Select the target Android devices

Select the minimum SDK to run the application. Click “Next”.

Step 3 : Choose the activity for the application

By default, choose “Blank Activity”. Click “Next”.

Step 4 : Enter activity name and click “Finish”.

Step 5 : Edit the program

Request storage permissions in the manifest file.

Use file input/output streams in MainActivity.kt to read from and write to

SD card or internal storage.

Step 6 : Run the application

Two ways to run the application:

1. Running through emulator (with SD card configured)

2. Running through mobile device

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.SdCard"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

Activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp"
    tools:context=".MainActivity">

    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="SD Card"
        android:textSize="24sp"
        android:textStyle="bold"
        android:textColor="@android:color/white"
        android:background="#6200EE"
        android:padding="12dp"/>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="vertical"
        android:layout_marginTop="16dp">

        <EditText
            android:id="@+id/editTextRegisterNumber"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:hint="Enter the register number..."
            android:inputType="text"
            android:padding="12dp"
            android:background="@drawable/edit_text_background"
```

```
        android:layout_marginBottom="8dp"/>

    <EditText
        android:id="@+id/editTextName"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Enter the name..."
        android:inputType="textPersonName"
        android:padding="12dp"
        android:background="@drawable/edit_text_background"
        android:layout_marginBottom="8dp"/>

    <EditText
        android:id="@+id/editTextCGPA"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Enter the CGPA..."
        android:inputType="numberDecimal"
        android:padding="12dp"
        android:background="@drawable/edit_text_background"
        android:layout_marginBottom="16dp"/>

    <Button
        android:id="@+id/buttonSave"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Save"
        android:textColor="@android:color/white"
        android:backgroundTint="#6200EE"
        android:padding="12dp"
        android:layout_marginBottom="8dp"/>

    <Button
        android:id="@+id/buttonLoad"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Load"
```

```
            android:textColor="@android:color/white"
            android:backgroundTint="#6200EE"
            android:padding="12dp"/>
    </LinearLayout>

</LinearLayout>
```

MainActivity.kt

```
package com.example.sdcard

import android.Manifest
import android.content.pm.PackageManager
import android.os.Bundle
import android.os.Environment
import android.widget.Button
import android.widget.EditText
import android.widget.Toast
import androidx.appcompat.app.AppCompatActivity
import androidx.core.app.ActivityCompat
import androidx.core.content.ContextCompat
import java.io.File
import java.io.FileOutputStream
import java.io.IOException

class MainActivity : AppCompatActivity() {
    private lateinit var registerNumberEditText: EditText
    private lateinit var nameEditText: EditText
    private lateinit var cgpaEditText: EditText
    private lateinit var saveButton: Button
    private lateinit var loadButton: Button
```

```
    private val STORAGE_PERMISSION_CODE = 100

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

        // Initialize UI components
        registerNumberEditText = findViewById(R.id.editTextRegisterNumber)
        nameEditText = findViewById(R.id.editTextName)
        cgpaEditText = findViewById(R.id.editTextCGPA)
        saveButton = findViewById(R.id.buttonSave)
        loadButton = findViewById(R.id.buttonLoad)

        // Request storage permissions
        requestStoragePermission()

        // Set click listeners
        saveButton.setOnClickListener {
            saveDataToSD()
        }

        loadButton.setOnClickListener {
            loadDataFromSD()
        }
    }

    private fun requestStoragePermission() {
        if (ContextCompat.checkSelfPermission(
                this,
                Manifest.permission.WRITE_EXTERNAL_STORAGE
```

```
            ) != PackageManager.PERMISSION_GRANTED
        ) {
            ActivityCompat.requestPermissions(
                this,
                arrayOf(
                    Manifest.permission.WRITE_EXTERNAL_STORAGE,
                    Manifest.permission.READ_EXTERNAL_STORAGE
                ),
                STORAGE_PERMISSION_CODE
            )
        }
    }

    private fun saveDataToSD() {
        // Validate inputs
        val registerNumber = registerNumberEditText.text.toString().trim()
        val name = nameEditText.text.toString().trim()
        val cgpa = cgpaEditText.text.toString().trim()

        if (registerNumber.isEmpty() || name.isEmpty() || cgpa.isEmpty()) {
            Toast.makeText(this, "Please fill all fields",
Toast.LENGTH_SHORT).show()
            return
        }

        try {
            // Try multiple storage options for emulator compatibility
            val file = try {
                // Option 1: Using app-specific external storage (works on most
emulators)
                val appDir = getExternalFilesDir(null)
                val dir = File(appDir, "SDCardApp")
```

```
                if (!dir.exists()) {
                    dir.mkdirs()
                }
                File(dir, "$registerNumber.txt")
            } catch (e: Exception) {
                // Option 2: Using legacy external storage as fallback
                val dir = File(Environment.getExternalStorageDirectory(),
"SDCardApp")
                if (!dir.exists()) {
                    dir.mkdirs()
                }
                File(dir, "$registerNumber.txt")
            }

            // Create file
            val fileOutputStream = FileOutputStream(file)
            val data = "Register Number: $registerNumber\nName: $name\nCGPA:
$cgpa"

            fileOutputStream.write(data.toByteArray())
            fileOutputStream.close()

            Toast.makeText(this, "Data saved successfully to
${file.absolutePath}", Toast.LENGTH_LONG).show()

            // Clear fields after saving
            registerNumberEditText.text.clear()
            nameEditText.text.clear()
            cgpaEditText.text.clear()

        } catch (e: IOException) {
            e.printStackTrace()
```

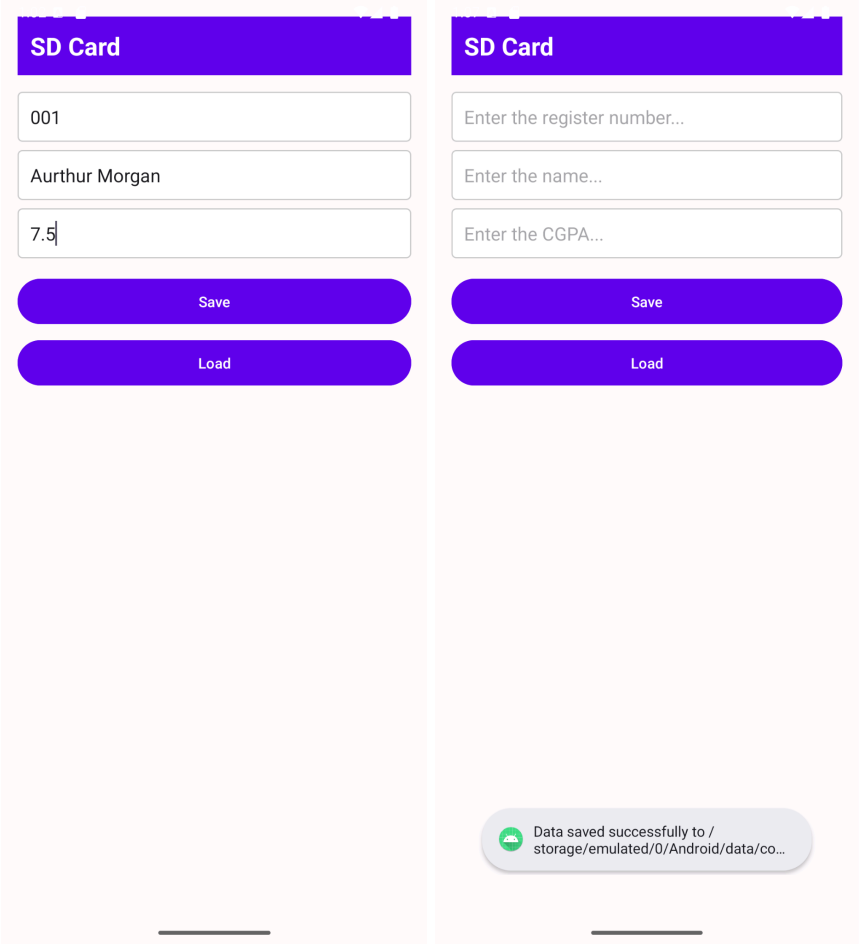
```
            Toast.makeText(this, "Error saving data: ${e.message}",
Toast.LENGTH_SHORT).show()
        }
    }


    private fun loadDataFromSD() {
        val registerNumber = registerNumberEditText.text.toString().trim()


        if (registerNumber.isEmpty()) {
            Toast.makeText(this, "Please enter a register number",
Toast.LENGTH_SHORT).show()
            return
        }


        try {
            // Try to find the file in multiple storage locations
            val file = findDataFile(registerNumber)


            if (file == null || !file.exists()) {
                Toast.makeText(this, "No data found for this register number",
Toast.LENGTH_SHORT).show()
                return
            }


            val fileContent = file.readText()
            val lines = fileContent.split("\n")


            // Parse the data
            for (line in lines) {
                when {
                    line.startsWith("Name:") -> {
                        val name = line.substring(line.indexOf(":") + 1).trim()
                        nameEditText.setText(name)
```

```
                    }
                    line.startsWith("CGPA:") -> {
                        val cgpa = line.substring(line.indexOf(":") + 1).trim()
                        cgpaEditText.setText(cgpa)
                    }
                }
            }

            Toast.makeText(this, "Data loaded successfully from
${file.absolutePath}", Toast.LENGTH_SHORT).show()

        } catch (e: IOException) {
            e.printStackTrace()
            Toast.makeText(this, "Error loading data: ${e.message}",
Toast.LENGTH_SHORT).show()
        }
    }

    private fun findDataFile(registerNumber: String): File? {
        // Try app-specific external storage first
        val appDir = getExternalFilesDir(null)
        val appSpecificDir = File(appDir, "SDCardApp")
        var file = File(appSpecificDir, "$registerNumber.txt")

        if (file.exists()) {
            return file
        }

        // Try legacy external storage
        try {
            val externalDir = File(Environment.getExternalStorageDirectory(),
"SDCardApp")
            file = File(externalDir, "$registerNumber.txt")
```

```
            if (file.exists()) {
                return file
            }
        } catch (e: Exception) {
            // Ignore and continue to other options
        }

        // Try cache directory as last resort
        val cacheDir = File(cacheDir, "SDCardApp")
        if (!cacheDir.exists()) {
            cacheDir.mkdirs()
        }
        file = File(cacheDir, "$registerNumber.txt")
        if (file.exists()) {
            return file
        }

        return null
    }

    // Checks if external storage is available for read and write
    private fun isExternalStorageWritable(): Boolean {
        return Environment.getExternalStorageState() ==
Environment.MEDIA_MOUNTED
    }

    // Checks if external storage is available to at least read
    private fun isExternalStorageReadable(): Boolean {
        return Environment.getExternalStorageState() in
                setOf(Environment.MEDIA_MOUNTED,
Environment.MEDIA_MOUNTED_READ_ONLY)
    }
```

```
    override fun onRequestPermissionsResult(
        requestCode: Int,
        permissions: Array<String>,
        grantResults: IntArray
    ) {
        super.onRequestPermissionsResult(requestCode, permissions,
grantResults)
        if (requestCode == STORAGE_PERMISSION_CODE) {
            if (grantResults.isNotEmpty() && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {
                Toast.makeText(this, "Storage permission granted",
Toast.LENGTH_SHORT).show()
            } else {
                Toast.makeText(this, "Storage permission denied",
Toast.LENGTH_SHORT).show()
            }
        }
    }
}
```

Output



Result:

The SD Card Access application successfully reads and writes data to the SD card or internal storage when tested on a mobile device with appropriate permissions.