Practical 1

ActivityMain.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:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp"
    tools:context=".MainActivity">

    <EditText
        android:id="@+id/user_id"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="80dp"
        android:layout_marginRight="20dp"
        android:hint="User ID"
        android:padding="20dp"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent"

tools:ignore="Autofill,HardcodedText,TextContrastCheck,TextFields,VisualLintTextFie
ldSize" />

    <EditText
        android:id="@+id/password"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="80dp"
        android:layout_marginRight="20dp"
        android:hint="Password"
        android:inputType="textPassword"
        android:padding="20dp"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/user_id"

tools:ignore="Autofill,HardcodedText,TextContrastCheck,VisualLintTextFieldSize" />

    <Button
        android:id="@+id/submit_button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="center_horizontal"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="20dp"
        android:text="Submit"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/password"
        tools:ignore="HardcodedText" />

    <TextView
        android:id="@+id/message"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="center_horizontal"
        android:layout_marginTop="16dp"
        android:text=""
        android:textSize="18sp" />
</LinearLayout>
```

MainActivity.kt

```
package com.example.practical1

import android.os.Bundle
import android.widget.Button
import android.widget.EditText
import android.widget.TextView
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

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

        val userIdEditText = findViewById<EditText>(R.id.user_id)
        val passwordEditText = findViewById<EditText>(R.id.password)
        val submitButton = findViewById<Button>(R.id.submit_button)
        val messageTextView = findViewById<TextView>(R.id.message)

        val predefinedUserId = "admin"
        val predefinedPassword = "1234"

        submitButton.setOnClickListener {
            val enteredUserId = userIdEditText.text.toString()
            val enteredPassword = passwordEditText.text.toString()

            if (enteredUserId == predefinedUserId && enteredPassword ==
predefinedPassword) {
                messageTextView.text = "Login successful!"

messageTextView.setTextColor(resources.getColor(android.R.color.holo_green_dark
))
            } else {
                messageTextView.text = "Invalid user ID or password."

messageTextView.setTextColor(resources.getColor(android.R.color.holo_red_dark))
            }
        }
    }
}
```

practical 2

ActivityMain.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="20dp"
tools:context=".MainActivity">

<EditText
    android:id="@+id/email"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginLeft="12dp"
    android:layout_marginTop="60dp"
    android:layout_marginRight="12dp"
    android:hint="Enter your email"
    android:inputType="textEmailAddress"
    android:padding="20dp"
    app:layout_constraintLeft_toLeftOf="parent"
    app:layout_constraintRight_toRightOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<EditText
    android:id="@+id/password"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginLeft="12dp"
    android:layout_marginTop="60dp"
    android:layout_marginRight="12dp"
    android:hint="Enter your password"
    android:inputType="textPassword"
    android:padding="20dp"
    app:layout_constraintLeft_toLeftOf="parent"
    app:layout_constraintRight_toRightOf="parent"
    app:layout_constraintTop_toBottomOf="@id/email" />

<Button
    android:id="@+id/loginButton"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginLeft="20dp"
    android:layout_marginTop="60dp"
    android:layout_marginRight="20dp"
    android:enabled="false"
    android:padding="15dp"
    android:text="Log In"
    app:layout_constraintLeft_toLeftOf="parent"
```

```
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/password" />

    <TextView
        android:id="@+id/errorTextView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="20dp"
        android:textColor="@android:color/holo_red_dark"
        android:visibility="gone"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/password" />
</LinearLayout>
```

Welcome.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"
    android:gravity="center"
    android:orientation="vertical">

    <TextView
        android:id="@+id/welcomeTextView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginRight="12dp"
        android:padding="20dp"
        android:text="Welcome!"
        android:textSize="24sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        tools:ignore="MissingConstraints" />

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

Welcome.kt

```
package com.example.practical3

import android.os.Bundle
import android.widget.TextView
import androidx.appcompat.app.AppCompatActivity
import com.example.practical2.R

class WelcomeActivity : AppCompatActivity() {

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

        val email = intent.getStringExtra("email")

        val welcomeTextView: TextView = findViewById(R.id.welcomeTextView)
        welcomeTextView.text = "Welcome, $email!"
    }
}
```

MainActivity.kt

```
package com.example.practical3

import android.content.Intent
import android.os.Bundle
import android.text.Editable
import android.text.TextWatcher
import android.util.Patterns
import android.widget.Button
import android.widget.EditText
import android.widget.TextView
import androidx.appcompat.app.AppCompatActivity
import com.example.practical2.R
```

```
class MainActivity : AppCompatActivity() {

    private lateinit var emailEditText: EditText
    private lateinit var passwordEditText: EditText
    private lateinit var loginButton: Button
    private lateinit var errorTextView: TextView

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

        emailEditText = findViewById(R.id.email)
        passwordEditText = findViewById(R.id.password)
        loginButton = findViewById(R.id.loginButton)
        errorTextView = findViewById(R.id.errorTextView)

        // Listen for changes in the email EditText to validate email format
        emailEditText.addTextChangedListener(object : TextWatcher {
            override fun beforeTextChanged(s: CharSequence?, start: Int, count: Int,
after: Int) {}
            override fun onTextChanged(s: CharSequence?, start: Int, before: Int, count:
Int) {
                loginButton.isEnabled = isEmailValid(s.toString())
            }
            override fun afterTextChanged(s: Editable?) {}
        })

        loginButton.setOnClickListener {
            val email = emailEditText.text.toString()
            val password = passwordEditText.text.toString()

            if (authenticateUser(email, password)) {
                // Authentication successful
                val intent = Intent(this, WelcomeActivity::class.java)
                intent.putExtra("email", email)
                startActivity(intent)
                finish()
            } else {
                // Authentication failed
                errorTextView.text = "Authentication failed. Please check your credentials."
                errorTextView.visibility = TextView.VISIBLE
            }
        }
    }

    // Function to validate email format
    private fun isEmailValid(email: String): Boolean {
        return Patterns.EMAIL_ADDRESS.matcher(email).matches()
    }

    // Dummy authentication function (replace with actual authentication logic)
    private fun authenticateUser(email: String, password: String): Boolean {
        return email == "user@example.com" && password == "password123"
    }
}
```

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ActivityMain.xml

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

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="0"
        android:textSize="32sp" />

    <Button
        android:id="@+id/startButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="16dp"
        android:text="Start Increment" />

    <Button
        android:id="@+id/stopButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="16dp"
        android:enabled="true"
        android:text="Stop Increment" />

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical5

import android.os.Bundle
import android.os.Handler
import android.os.Looper
import androidx.appcompat.app.AppCompatActivity
import android.widget.Button
import android.widget.TextView

class MainActivity : AppCompatActivity() {

    private lateinit var tvValue: TextView
    private lateinit var btnStart: Button
    private lateinit var btnStop: Button

    private var value = 0
    private val handler = Handler(Looper.getMainLooper())
    private lateinit var incrementRunnable: Runnable
    private var isIncrementing = false

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

        tvValue = findViewById(R.id.textView)
        btnStart = findViewById(R.id.startButton)
        btnStop = findViewById(R.id.stopButton)
        incrementRunnable = object : Runnable {
            override fun run() {
                if (isIncrementing) {
                    value++
                    tvValue.text = value.toString()
                    handler.postDelayed(this, 1000) // Increment every 1 second
                }
            }
        }

        btnStart.setOnClickListener {
            if (!isIncrementing) {
                isIncrementing = true
                handler.post(incrementRunnable)
            }
        }

        btnStop.setOnClickListener {
            isIncrementing = false
            handler.removeCallbacks(incrementRunnable)
        }
    }

    override fun onDestroy() {
        super.onDestroy()
        handler.removeCallbacks(incrementRunnable)
    }
}
```

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ActivityMain.xml

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="16dp">

    <ProgressBar
        android:id="@+id/progressBar"
        style="@style/Widget.AppCompat.ProgressBar.Horizontal"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:max="100"
        android:progress="0"
        android:layout_centerInParent="true"
        android:layout_marginTop="50dp" />

    <TextView
        android:id="@+id/tvProgress"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Progress: 0%"
        android:layout_below="@id/progressBar"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="20dp"
        android:textSize="18sp"
        android:textColor="@android:color/black"/>

    <Button
        android:id="@+id/btnStart"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Start Progress"
        android:layout_below="@id/tvProgress"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="30dp"/>

</RelativeLayout>
```

MainActivity.kt

```
package com.example.practical6

import android.os.Bundle
import android.os.Handler
import android.os.Looper
import android.widget.Button
import android.widget.ProgressBar
import android.widget.TextView
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

    private lateinit var progressBar: ProgressBar
    private lateinit var tvProgress: TextView
private lateinit var btnStart: Button

private var progressStatus = 0
private val handler = Handler(Looper.getMainLooper())

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

    progressBar = findViewById(R.id.progressBar)
    tvProgress = findViewById(R.id.tvProgress)
    btnStart = findViewById(R.id.btnStart)

    btnStart.setOnClickListener {
        progressStatus = 0
        progressBar.progress = progressStatus
        tvProgress.text = "Progress: 0%"

        Thread {
            while (progressStatus < 100) {
                progressStatus += 1

                // Update the progress bar and display the current percentage
                handler.post {
                    progressBar.progress = progressStatus
                    tvProgress.text = "Progress: $progressStatus%"
                }

                try {
                    // Sleep for 50 milliseconds to simulate a time-consuming task
                    Thread.sleep(50)
                } catch (e: InterruptedException) {
                    e.printStackTrace()
                }
            }

            // Show the completion message
            handler.post {
                tvProgress.text = "Task Completed!"
            }
        }.start()
    }
    }
}
```

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ActivityMain.xml

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

    <Button
        android:id="@+id/startServiceButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Start Service" />

    <Button
        android:id="@+id/stopServiceButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Stop Service"
        android:layout_marginTop="16dp"/>
</LinearLayout>
```

Myservice.kt

```
package com.example.practical7

import android.app.Service
import android.content.Intent
import android.os.Handler
import android.os.IBinder
import android.util.Log
import android.widget.Toast

class MyService : Service() {
    private val handler = Handler()
    private val interval: Long = 5000 // 5 seconds
    private lateinit var runnable: Runnable

    override fun onStartCommand(intent: Intent?, flags: Int, startId: Int): Int {
        Log.d("MyService", "Service started")

        runnable = object : Runnable {
            override fun run() {
                showMessage()
                handler.postDelayed(this, interval)
            }
        }
        handler.post(runnable)

        return START_STICKY
    }

    private fun showMessage() {
        Toast.makeText(this, "Service is running", Toast.LENGTH_SHORT).show()
        Log.d("MyService", "Message displayed")
    }

    override fun onDestroy() {
        super.onDestroy()
        handler.removeCallbacks(runnable)
        Log.d("MyService", "Service stopped")
    }

    override fun onBind(intent: Intent?): IBinder? {
        return null
    }
}
```

MainActivity.kt

```
package com.example.practical7

import android.content.Intent
import android.os.Bundle
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {
    private lateinit var binding: activity_main

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        binding = activity_main.inflate(layoutInflater)
        setContentView(binding.root)

        binding.startServiceButton.setOnClickListener {
            startService(Intent(this, MyService::class.java))
        }

        binding.stopServiceButton.setOnClickListener {
            stopService(Intent(this, MyService::class.java))
        }
    }
}
```

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ActivityMain.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">

    <EditText
        android:id="@+id/upperBoundEditText"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:hint="Enter upper bound"
        android:inputType="number"
        android:textSize="20sp"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
    <EditText
        android:id="@+id/lowerBoundEditText"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:hint="Enter lower bound"
        android:inputType="number"
        android:textSize="20sp"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/upperBoundEditText" />

    <Button
        android:id="@+id/findPrimesButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:text="Find Prime Numbers"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/lowerBoundEditText" />

    <TextView
        android:id="@+id/resultTextView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:text="Prime numbers will be displayed here"
        android:textSize="16sp"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/findPrimesButton" />
</LinearLayout>
```

MainActivity.kt

```
package com.example.practical8

import android.content.BroadcastReceiver
import android.content.Context
import android.content.Intent
import android.content.IntentFilter
import android.os.Bundle
import android.widget.Toast
import androidx.appcompat.app.AppCompatActivity
import com.example.practical8.databinding.ActivityMainBinding

class MainActivity : AppCompatActivity() {

    private lateinit var binding: ActivityMainBinding

    private val primeResultReceiver = object : BroadcastReceiver() {
        override fun onReceive(context: Context?, intent: Intent?) {
            val primes = intent?.getIntegerArrayListExtra("PRIME_NUMBERS")
            binding.resultTextView.text = primes?.joinToString(", ") ?: "No primes found"
            Toast.makeText(this@MainActivity, "Prime search complete!",
Toast.LENGTH_SHORT).show()
        }
    }

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        binding = ActivityMainBinding.inflate(layoutInflater)
        setContentView(binding.root)

        registerReceiver(primeResultReceiver,
IntentFilter("com.example.practical7.PRIME_RESULT"))

        binding.findPrimesButton.setOnClickListener {
            val lowerBound = binding.lowerBoundEditText.text.toString().toIntOrNull() ?:
0
            val upperBound = binding.upperBoundEditText.text.toString().toIntOrNull() ?:
0

            if (lowerBound >= upperBound) {
                Toast.makeText(this, "Lower bound should be less than upper bound",
Toast.LENGTH_SHORT).show()
                return@setOnClickListener
            }
            val intent = Intent(this, PrimeNumberService::class.java).apply {
                putExtra("LOWER_BOUND", lowerBound)
                putExtra("UPPER_BOUND", upperBound)
            }
            startService(intent)
        }
    }

    override fun onDestroy() {
        super.onDestroy()
        unregisterReceiver(primeResultReceiver)
    }
}
```

PrimeNumberService.kt

```
package com.example.practical8

import android.Manifest
import android.app.Service
import android.content.Intent
import android.content.pm.PackageManager
import android.os.IBinder
import androidx.core.app.ActivityCompat
import androidx.core.app.NotificationCompat
import androidx.core.app.NotificationManagerCompat

class PrimeNumberService : Service() {

    override fun onStartCommand(intent: Intent?, flags: Int, startId: Int): Int {
        val lowerBound = intent?.getIntExtra("LOWER_BOUND", 0) ?: 0
        val upperBound = intent?.getIntExtra("UPPER_BOUND", 0) ?: 0

        val primes = findPrimes(lowerBound, upperBound)
        val resultIntent = Intent("com.example.practical7.PRIME_RESULT")
        resultIntent.putIntegerArrayListExtra("PRIME_NUMBERS", primes as
ArrayList<Int>)
        sendBroadcast(resultIntent)

        showCompletionNotification(primes.size)

        stopSelf()
        return START_NOT_STICKY
    }

    private fun findPrimes(lowerBound: Int, upperBound: Int): List<Int> {
        val primes = mutableListOf<Int>()
        for (i in lowerBound..upperBound) {
            if (isPrime(i)) primes.add(i)
        }
        return primes
    }

    private fun isPrime(n: Int): Boolean {
        if (n < 2) return false
        for (i in 2..Math.sqrt(n.toDouble()).toInt()) {
            if (n % i == 0) return false
        }
        return true
    }

    private fun showCompletionNotification(primeCount: Int) {
        val notification = NotificationCompat.Builder(this, "PRIME_CHANNEL")
            .setSmallIcon(android.R.drawable.ic_dialog_info)
            .setContentTitle("Prime Number Search")
            .setContentText("Found $primeCount prime numbers")
            .setPriority(NotificationCompat.PRIORITY_HIGH)
            .build()

        val notificationManager = NotificationManagerCompat.from(this)
        if (ActivityCompat.checkSelfPermission(
                this,
                Manifest.permission.POST_NOTIFICATIONS
            ) != PackageManager.PERMISSION_GRANTED
        ) {
            // TODO: Consider calling
            //    ActivityCompat#requestPermissions
            // here to request the missing permissions, and then overriding
            //   public void onRequestPermissionsResult(int requestCode, String[]
permissions,
            //                                          int[] grantResults)
            // to handle the case where the user grants the permission. See the
documentation
            // for ActivityCompat#requestPermissions for more details.
            return
        }
        notificationManager.notify(1, notification)
    }

    override fun onBind(intent: Intent?): IBinder? {
        return null
    }
}
```

practical 9

ActivityMain.xml

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

    <ListView
        android:id="@+id/contactsListView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content" />

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical9

import android.Manifest
import android.R
import android.content.pm.PackageManager
import android.database.Cursor
import android.os.Bundle
import android.provider.ContactsContract
import android.widget.ArrayAdapter
import android.widget.ListView
import android.widget.Toast
import androidx.appcompat.app.AppCompatActivity
import androidx.core.app.ActivityCompat
import androidx.core.content.ContextCompat
```

```
class MainActivity : AppCompatActivity() {


    private lateinit var binding: ActivityMainBinding
    private lateinit var contactsListView: ListView

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        binding = ActivityMainBinding.inflate(layoutInflater)
        setContentView(binding.root)

        contactsListView = binding.contactsListView

        // Check for permission to read contacts
        if (ContextCompat.checkSelfPermission(this,
Manifest.permission.READ_CONTACTS)
            != PackageManager.PERMISSION_GRANTED) {
            // Request permission if not granted
            ActivityCompat.requestPermissions(this,
arrayOf(Manifest.permission.READ_CONTACTS), 1)
        } else {
            // If permission is already granted, fetch contacts
            fetchContacts()
        }
    }

    override fun onRequestPermissionsResult(
        requestCode: Int, permissions: Array<out String>, grantResults: IntArray
    ) {
        super.onRequestPermissionsResult(requestCode, permissions, grantResults)
        if (requestCode == 1) {
            if (grantResults.isNotEmpty() && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {
                // If permission granted, fetch contacts
                fetchContacts()
            } else {
                // If permission denied, show a toast
                Toast.makeText(this, "Permission denied",
Toast.LENGTH_SHORT).show()
            }
        }
    }
    private fun fetchContacts() {
        val contactsList = mutableListOf<String>()
        val cursor: Cursor? = contentResolver.query(
            ContactsContract.CommonDataKinds.Phone.CONTENT_URI,
            null, null, null, null
        )

        cursor?.use {
            val nameIndex =
it.getColumnIndex(ContactsContract.CommonDataKinds.Phone.DISPLAY_NAME)
            val numberIndex =
it.getColumnIndex(ContactsContract.CommonDataKinds.Phone.NUMBER)

            while (it.moveToNext()) {
                val name = it.getString(nameIndex)
                val number = it.getString(numberIndex)
                contactsList.add("$name: $number")
            }
        }

        val adapter = ArrayAdapter(this, R.layout.simple_list_item_1, contactsList)
        contactsListView.adapter = adapter
    }
}
```

---

in gradle ->

```
android {
    viewBinding {
        var enabled = true
    }
}
```

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ActivityMain.xml

```
<!-- activity_main.xml -->
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp">
    <EditText
        android:id="@+id/numberInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="270dp"
        android:layout_marginRight="12dp"
        android:hint="Enter a number"
        android:inputType="number"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/generateButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="50dp"
        android:layout_marginRight="12dp"
        android:text="Generate List"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

</LinearLayout>
```

ActivityList.xml

```
<!-- activity_list.xml -->
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp">

    <androidx.recyclerview.widget.RecyclerView
        android:id="@+id/recyclerView"
        android:layout_width="match_parent"
        android:layout_height="match_parent"/>

</LinearLayout>
```

ActivityList.kt

```
package com.example.practical10

import android.os.Bundle
import androidx.appcompat.app.AppCompatActivity
import androidx.recyclerview.widget.LinearLayoutManager
import androidx.recyclerview.widget.RecyclerView

class ListActivity : AppCompatActivity() {

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

        val recyclerView = findViewById<RecyclerView>(R.id.recyclerView)
        recyclerView.layoutManager = LinearLayoutManager(this)

        val numberOfItems = intent.getIntExtra("NUMBER_OF_ITEMS", 0)
        val items = List(numberOfItems) { "Item #${it + 1}" }

        recyclerView.adapter = ListAdapter(items)
    }
}
```

ActivityMain.kt

```
package com.example.practical10

import android.content.Intent
import androidx.appcompat.app.AppCompatActivity
import android.os.Bundle
import android.widget.Button
import android.widget.EditText
import android.widget.Toast

class MainActivity : AppCompatActivity() {

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

        val numberInput = findViewById<EditText>(R.id.numberInput)
        val generateButton = findViewById<Button>(R.id.generateButton)
        generateButton.setOnClickListener {
            val numberText = numberInput.text.toString()
            if (numberText.isNotEmpty()) {
                val number = numberText.toInt()
                val intent = Intent(this, ListActivity::class.java).apply {
                    putExtra("NUMBER_OF_ITEMS", number)
                }
                startActivity(intent)
            } else {
                Toast.makeText(this, "Please enter a number",
Toast.LENGTH_SHORT).show()
            }
        }
    }
}
```

ListAdapter.kt

```
package com.example.practical10

import android.view.LayoutInflater
import android.view.View
import android.view.ViewGroup
import android.widget.TextView
import androidx.recyclerview.widget.RecyclerView

class ListAdapter(private val items: List<String>) :
    RecyclerView.Adapter<ListAdapter.ViewHolder>() {

    class ViewHolder(view: View) : RecyclerView.ViewHolder(view) {
        val textView: TextView = view.findViewById(android.R.id.text1)
    }

    override fun onCreateViewHolder(parent: ViewGroup, viewType: Int): ViewHolder {
        val view = LayoutInflater.from(parent.context)
            .inflate(android.R.layout.simple_list_item_1, parent, false)
        return ViewHolder(view)
    }

    override fun onBindViewHolder(holder: ViewHolder, position: Int) {
        holder.textView.text = items[position]
    }
    override fun getItemCount(): Int = items.size
}
```

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ActivityMain.xml

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

    <EditText
        android:id="@+id/phoneNumberInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Enter mobile number"
        android:inputType="phone"
        android:layout_marginBottom="16dp"/>

    <Button
        android:id="@+id/callButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Call" />

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical11

import android.Manifest
import android.content.Intent
import android.content.pm.PackageManager
import android.net.Uri
import android.os.Bundle
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

class MainActivity : AppCompatActivity() {

    private lateinit var phoneNumberInput: EditText
    private lateinit var callButton: Button

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

        phoneNumberInput = findViewById(R.id.phoneNumberInput)
        callButton = findViewById(R.id.callButton)

        callButton.setOnClickListener {
            val phoneNumber = phoneNumberInput.text.toString()
            if (phoneNumber.isNotEmpty()) {
                makePhoneCall(phoneNumber)
            } else {
                Toast.makeText(this, "Please enter a valid phone number",
Toast.LENGTH_SHORT).show()
            }
        }
    }

    private fun makePhoneCall(phoneNumber: String) {
        if (ContextCompat.checkSelfPermission(this,
Manifest.permission.CALL_PHONE) !=
PackageManager.PERMISSION_GRANTED) {
            ActivityCompat.requestPermissions(this,
arrayOf(Manifest.permission.CALL_PHONE), 1)
        } else {
            val callIntent = Intent(Intent.ACTION_CALL)
            callIntent.data = Uri.parse("tel:$phoneNumber")
            startActivity(callIntent)
        }
    }

    override fun onRequestPermissionsResult(requestCode: Int, permissions:
Array<out String>, grantResults: IntArray) {
        super.onRequestPermissionsResult(requestCode, permissions, grantResults)
        if (requestCode == 1) {
            if (grantResults.isNotEmpty() && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {
                val phoneNumber = phoneNumberInput.text.toString()
                makePhoneCall(phoneNumber)
            } else {
                Toast.makeText(this, "Permission denied",
Toast.LENGTH_SHORT).show()
            }
        }
    }
}
```

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ActivityMain.xml

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

    <ListView
        android:id="@+id/smsListView"
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1"
        android:dividerHeight="1dp"/>

    <EditText
        android:id="@+id/recipientInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Enter recipient number"
        android:inputType="phone"
        android:layout_marginBottom="8dp"/>

    <EditText
        android:id="@+id/messageInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Enter your message"
        android:layout_marginBottom="8dp"/>
    <Button
        android:id="@+id/sendButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Send"/>

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical12

import android.Manifest
import android.content.ContentResolver
import android.content.pm.PackageManager
import android.database.Cursor
import android.net.Uri
import android.os.Bundle
import android.telephony.SmsManager
import android.widget.*
import androidx.appcompat.app.AppCompatActivity
import androidx.core.app.ActivityCompat
import androidx.core.content.ContextCompat

class MainActivity : AppCompatActivity() {

    private lateinit var smsListView: ListView
    private lateinit var recipientInput: EditText
    private lateinit var messageInput: EditText
    private lateinit var sendButton: Button
    private lateinit var smsAdapter: ArrayAdapter<String>

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

        smsListView = findViewById(R.id.smsListView)
        recipientInput = findViewById(R.id.recipientInput)
        messageInput = findViewById(R.id.messageInput)
        sendButton = findViewById(R.id.sendButton)
        if (ContextCompat.checkSelfPermission(this,
Manifest.permission.READ_SMS) != PackageManager.PERMISSION_GRANTED) {
            ActivityCompat.requestPermissions(this,
arrayOf(Manifest.permission.READ_SMS, Manifest.permission.SEND_SMS), 1)
        } else {
            loadSmsInbox()
        }

        sendButton.setOnClickListener {
            val recipient = recipientInput.text.toString()
            val message = messageInput.text.toString()
            if (recipient.isNotEmpty() && message.isNotEmpty()) {
                sendSms(recipient, message)
            } else {
                Toast.makeText(this, "Please enter both recipient and message",
Toast.LENGTH_SHORT).show()
            }
        }
    }

    private fun loadSmsInbox() {
        val smsList = ArrayList<String>()
        val uri: Uri = Uri.parse("content://sms/inbox")
        val contentResolver: ContentResolver = contentResolver
        val cursor: Cursor? = contentResolver.query(uri, null, null, null, null)

        if (cursor != null && cursor.moveToFirst()) {
            do {
                val address = cursor.getString(cursor.getColumnIndexOrThrow("address"))
                val body = cursor.getString(cursor.getColumnIndexOrThrow("body"))
                smsList.add("From: $address\nMessage: $body")
            } while (cursor.moveToNext())
            cursor.close()
        }

        smsAdapter = ArrayAdapter(this, android.R.layout.simple_list_item_1, smsList)
        smsListView.adapter = smsAdapter
    }

    private fun sendSms(recipient: String, message: String) {
        try {
            val smsManager: SmsManager = SmsManager.getDefault()
            smsManager.sendTextMessage(recipient, null, message, null, null)
            Toast.makeText(this, "SMS sent successfully",
Toast.LENGTH_SHORT).show()
            messageInput.text.clear()
            recipientInput.text.clear()
        } catch (e: Exception) {
            Toast.makeText(this, "Failed to send SMS: ${e.message}",
Toast.LENGTH_SHORT).show()
        }
    }

    override fun onRequestPermissionsResult(requestCode: Int, permissions:
Array<out String>, grantResults: IntArray) {
        super.onRequestPermissionsResult(requestCode, permissions, grantResults)
        if (requestCode == 1) {
            if (grantResults.isNotEmpty() && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {
                loadSmsInbox()
            } else {
                Toast.makeText(this, "Permission denied",
Toast.LENGTH_SHORT).show()
            }
        }
    }
}
```

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ActivityMain.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"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="16dp">

    <EditText
        android:id="@+id/name"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:layout_marginBottom="16dp"
        android:hint="Enter your name"
        android:inputType="textPersonName"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/email"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:layout_marginBottom="16dp"
        android:hint="Enter your email"
        android:inputType="textEmailAddress"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/name" />

    <EditText
        android:id="@+id/password"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:layout_marginBottom="16dp"
        android:hint="Enter your password"
        android:inputType="textPassword"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/email" />

    <Button
        android:id="@+id/registerButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="60dp"
```

```
        android:layout_marginRight="20dp"
        android:text="Register"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/password" />

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical13

import android.content.Context
import android.os.Bundle
import android.widget.Button
import android.widget.EditText
import android.widget.Toast
import androidx.appcompat.app.AppCompatActivity
import java.io.File
import java.io.FileOutputStream

class MainActivity : AppCompatActivity() {

    private lateinit var nameInput: EditText
    private lateinit var emailInput: EditText
    private lateinit var passwordInput: EditText
    private lateinit var registerButton: Button

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

        nameInput = findViewById(R.id.name)
        emailInput = findViewById(R.id.email)
        passwordInput = findViewById(R.id.password)
        registerButton = findViewById(R.id.registerButton)

        registerButton.setOnClickListener {
            val name = nameInput.text.toString()
            val email = emailInput.text.toString()
            val password = passwordInput.text.toString()
            if (name.isNotEmpty() && email.isNotEmpty() && password.isNotEmpty()) {
                saveUserDataToFile(name, email, password)
            } else {
                Toast.makeText(this, "Please fill all the fields",
Toast.LENGTH_SHORT).show()
            }
        }
    }

    private fun saveUserDataToFile(name: String, email: String, password: String) {
        val fileName = "user_data.txt"
        val fileContents = "Name: $name\nEmail: $email\nPassword: $password\n\n"

        try {
            val fileOutputStream: FileOutputStream = openFileOutput(fileName,
Context.MODE_APPEND)
            fileOutputStream.write(fileContents.toByteArray())
            fileOutputStream.close()
            Toast.makeText(this, "User data saved successfully",
Toast.LENGTH_SHORT).show()

            // Clear the input fields
            nameInput.text.clear()
            emailInput.text.clear()
            passwordInput.text.clear()
        } catch (e: Exception) {
            Toast.makeText(this, "Failed to save user data: ${e.message}",
Toast.LENGTH_SHORT).show()
        }
    }
}
```

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ActivityMain.xml

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

```
android:id="@+id/rootLayout"
android:layout_width="match_parent"
android:layout_height="match_parent"
android:orientation="vertical"
android:padding="16dp">

<RadioGroup
    android:id="@+id/colorRadioGroup"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginLeft="12dp"
    android:layout_marginTop="20dp"
    android:layout_marginRight="12dp"
    android:orientation="vertical">

    <RadioButton
        android:id="@+id/redRadioButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:text="Red"
        android:textColor="@android:color/holo_red_dark"/>

    <RadioButton
        android:id="@+id/greenRadioButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:text="Green"
        android:textColor="@android:color/holo_green_dark"/>

    <RadioButton
        android:id="@+id/blueRadioButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:text="Blue"
```

```
            android:textColor="@android:color/holo_blue_dark"/>
    </RadioGroup>

    <Button
        android:id="@+id/applyButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginStart="30dp"
        android:layout_marginEnd="30dp"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:text="Apply" />

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical14

import android.content.Context
import android.graphics.Color
import android.os.Bundle
import android.widget.Button
import android.widget.LinearLayout
import android.widget.RadioButton
import android.widget.RadioGroup
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

    private lateinit var colorRadioGroup: RadioGroup
    private lateinit var redRadioButton: RadioButton
    private lateinit var greenRadioButton: RadioButton
    private lateinit var blueRadioButton: RadioButton
    private lateinit var applyButton: Button

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

        colorRadioGroup = findViewById(R.id.colorRadioGroup)
        redRadioButton = findViewById(R.id.redRadioButton)
        greenRadioButton = findViewById(R.id.greenRadioButton)
        blueRadioButton = findViewById(R.id.blueRadioButton)
        applyButton = findViewById(R.id.applyButton)

        loadBackgroundColor()

        applyButton.setOnClickListener {
            val selectedColor = when (colorRadioGroup.checkedRadioButtonId) {
                R.id.redRadioButton -> Color.RED
                R.id.greenRadioButton -> Color.GREEN
                R.id.blueRadioButton -> Color.BLUE
                else -> Color.WHITE
            }
            saveBackgroundColor(selectedColor)
            setAppBackgroundColor(selectedColor)
        }
    }

    private fun loadBackgroundColor() {
        val sharedPreferences = getSharedPreferences("AppPreferences",
Context.MODE_PRIVATE)
        val backgroundColor = sharedPreferences.getInt("backgroundColor",
Color.WHITE)
        setAppBackgroundColor(backgroundColor)

        // Set the corresponding radio button
        when (backgroundColor) {
            Color.RED -> redRadioButton.isChecked = true
            Color.GREEN -> greenRadioButton.isChecked = true
            Color.BLUE -> blueRadioButton.isChecked = true
        }
    }

    private fun saveBackgroundColor(color: Int) {
        val sharedPreferences = getSharedPreferences("AppPreferences",
Context.MODE_PRIVATE)
        val editor = sharedPreferences.edit()
        editor.putInt("backgroundColor", color)
        editor.apply()
    }

    private fun setAppBackgroundColor(color: Int) {
        findViewById<LinearLayout>(R.id.rootLayout).setBackgroundColor(color)
    }
}
```

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ActivityMain.xml

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

    <EditText
        android:id="@+id/userIdInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="User ID"
        android:inputType="number"
        android:layout_marginBottom="8dp"/>

    <EditText
        android:id="@+id/nameInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Name"
        android:inputType="textPersonName"
        android:layout_marginBottom="8dp"/>

    <EditText
        android:id="@+id/addressInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Address"
        android:inputType="textPostalAddress"
        android:layout_marginBottom="8dp"/>
    <EditText
        android:id="@+id/contactNumberInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Contact Number"
        android:inputType="phone"
        android:layout_marginBottom="8dp"/>

    <Button
        android:id="@+id/addButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Add User"
        android:layout_marginBottom="8dp"/>

    <Button
        android:id="@+id/updateButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Update User"
        android:layout_marginBottom="8dp"/>

    <Button
        android:id="@+id/deleteButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Delete User"
        android:layout_marginBottom="8dp"/>

    <ListView
        android:id="@+id/userListView"
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1"/>

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical15

import android.os.Bundle
import android.widget.*
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

    private lateinit var userIdInput: EditText
    private lateinit var nameInput: EditText
    private lateinit var addressInput: EditText
    private lateinit var contactNumberInput: EditText
    private lateinit var addButton: Button
    private lateinit var updateButton: Button
    private lateinit var deleteButton: Button
    private lateinit var userListView: ListView

    private lateinit var dbHelper: DatabaseHelper
    private lateinit var userAdapter: ArrayAdapter<String>

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

        userIdInput = findViewById(R.id.userIdInput)
        nameInput = findViewById(R.id.nameInput)
        addressInput = findViewById(R.id.addressInput)
        contactNumberInput = findViewById(R.id.contactNumberInput)
        addButton = findViewById(R.id.addButton)
        updateButton = findViewById(R.id.updateButton)
        deleteButton = findViewById(R.id.deleteButton)
        userListView = findViewById(R.id.userListView)

        dbHelper = DatabaseHelper(this)

        loadUsers()

        addButton.setOnClickListener {
            val id = userIdInput.text.toString().toInt()
            val name = nameInput.text.toString()
            val address = addressInput.text.toString()
            val contactNumber = contactNumberInput.text.toString()
            if (dbHelper.addUser(id, name, address, contactNumber) > -1) {
                Toast.makeText(this, "User added successfully",
Toast.LENGTH_SHORT).show()
                loadUsers()
            } else {
                Toast.makeText(this, "Failed to add user", Toast.LENGTH_SHORT).show()
            }
        }

        updateButton.setOnClickListener {
            val id = userIdInput.text.toString().toInt()
            val name = nameInput.text.toString()
            val address = addressInput.text.toString()
            val contactNumber = contactNumberInput.text.toString()
            if (dbHelper.updateUser(id, name, address, contactNumber) > 0) {
                Toast.makeText(this, "User updated successfully",
Toast.LENGTH_SHORT).show()
                loadUsers()
            } else {
                Toast.makeText(this, "Failed to update user",
Toast.LENGTH_SHORT).show()
            }
        }

        deleteButton.setOnClickListener {
            val id = userIdInput.text.toString().toInt()
            if (dbHelper.deleteUser(id) > 0) {
                Toast.makeText(this, "User deleted successfully",
Toast.LENGTH_SHORT).show()
                loadUsers()
            } else {
                Toast.makeText(this, "Failed to delete user",
Toast.LENGTH_SHORT).show()
            }
        }
    }

    private fun loadUsers() {
        val users = dbHelper.getAllUsers()
        val userStrings = users.map { "ID: ${it.id}, Name: ${it.name}, Address: $
{it.address}, Contact: ${it.contactNumber}" }
        userAdapter = ArrayAdapter(this, android.R.layout.simple_list_item_1,
userStrings)
        userListView.adapter = userAdapter
    }
}
```

User.kt

```
package com.example.practical15

data class User(val id: Int, val name: String, val address: String, val contactNumber: 
String)
```

DatabaseHelper.kt

```
package com.example.practical15

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

class DatabaseHelper(context: Context) : SQLiteOpenHelper(context, 
DATABASE_NAME, null, DATABASE_VERSION) {

    companion object {
        private const val DATABASE_NAME = "UserManagement.db"
        private const val DATABASE_VERSION = 1
        private const val TABLE_NAME = "users"
        private const val COLUMN_ID = "id"
        private const val COLUMN_NAME = "name"
        private const val COLUMN_ADDRESS = "address"
        private const val COLUMN_CONTACT_NUMBER = "contact_number"
    }

    override fun onCreate(db: SQLiteDatabase?) {
        val createTable = ("CREATE TABLE $TABLE_NAME (" +
                "$COLUMN_ID INTEGER PRIMARY KEY," +
                "$COLUMN_NAME TEXT," +
                "$COLUMN_ADDRESS TEXT," +
            "$COLUMN_CONTACT_NUMBER TEXT)")
        db?.execSQL(createTable)
    }

    override fun onUpgrade(db: SQLiteDatabase?, oldVersion: Int, newVersion: Int) {
        db?.execSQL("DROP TABLE IF EXISTS $TABLE_NAME")
        onCreate(db)
    }

    fun addUser(id: Int, name: String, address: String, contactNumber: String): Long {
        val db = this.writableDatabase
        val contentValues = ContentValues()
        contentValues.put(COLUMN_ID, id)
        contentValues.put(COLUMN_NAME, name)
        contentValues.put(COLUMN_ADDRESS, address)
        contentValues.put(COLUMN_CONTACT_NUMBER, contactNumber)
        return db.insert(TABLE_NAME, null, contentValues)
    }

    fun updateUser(id: Int, name: String, address: String, contactNumber: String): Int {
        val db = this.writableDatabase
        val contentValues = ContentValues()
        contentValues.put(COLUMN_NAME, name)
        contentValues.put(COLUMN_ADDRESS, address)
        contentValues.put(COLUMN_CONTACT_NUMBER, contactNumber)
        return db.update(TABLE_NAME, contentValues, "$COLUMN_ID=?",
arrayOf(id.toString()))
    }

    fun deleteUser(id: Int): Int {
        val db = this.writableDatabase
        return db.delete(TABLE_NAME, "$COLUMN_ID=?", arrayOf(id.toString()))
    }

    fun getAllUsers(): List<User> {
        val userList = ArrayList<User>()
        val db = this.readableDatabase
        val cursor = db.rawQuery("SELECT * FROM $TABLE_NAME", null)

        if (cursor.moveToFirst()) {
            do {
                val id = cursor.getInt(cursor.getColumnIndexOrThrow(COLUMN_ID))
                val name =
cursor.getString(cursor.getColumnIndexOrThrow(COLUMN_NAME))
                val address =
cursor.getString(cursor.getColumnIndexOrThrow(COLUMN_ADDRESS))
                val contactNumber =
cursor.getString(cursor.getColumnIndexOrThrow(COLUMN_CONTACT_NUMBER))
                userList.add(User(id, name, address, contactNumber))
            } while (cursor.moveToNext())
        }
        cursor.close()
        return userList
    }
}
```

Practical 16

ActivityMain.xml

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

    <EditText
        android:id="@+id/UserId"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:hint="User Id"
        android:inputType="textEmailAddress"
        android:padding="20dp"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/password"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="12dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="12dp"
        android:hint="Password"
        android:inputType="textPassword"
        android:padding="20dp"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/UserId" />

    <Button
        android:id="@+id/loginButton"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="20dp"
        android:enabled="false"
        android:padding="15dp"
        android:text="Log In"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/password" />

    <TextView
        android:id="@+id/TextView"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="20dp"
        android:layout_marginTop="60dp"
        android:layout_marginRight="20dp"
        android:textColor="@android:color/holo_red_dark"
        android:visibility="gone"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toBottomOf="@id/password" />
</LinearLayout>
```

MainActivity.kt

```
package com.example.practical16

import android.os.Bundle
import android.widget.Button
import android.widget.EditText
import android.widget.TextView
import android.widget.Toast
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

    private lateinit var userIdInput: EditText
    private lateinit var passwordInput: EditText
    private lateinit var loginButton: Button
    private lateinit var resultTextView: TextView

    private lateinit var dbHelper: DatabaseHelper

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

        userIdInput = findViewById(R.id.UserId)
        passwordInput = findViewById(R.id.password)
        loginButton = findViewById(R.id.loginButton)
        resultTextView = findViewById(R.id.TextView)

        dbHelper = DatabaseHelper(this)

        // Optional: Pre-populate the database with a sample user for testing
        dbHelper.addUser(1, "password123")

        loginButton.setOnClickListener {
            val userId = userIdInput.text.toString().toIntOrNull()
            val password = passwordInput.text.toString()

            if (userId != null && password.isNotEmpty()) {
                if (dbHelper.checkUser(userId, password)) {
                    resultTextView.text = "Login successful!"
resultTextView.setTextColor(resources.getColor(android.R.color.holo_green_dark))
                } else {
                    resultTextView.text = "Invalid user ID or password"

resultTextView.setTextColor(resources.getColor(android.R.color.holo_red_dark))
                }
            } else {
                Toast.makeText(this, "Please enter valid credentials",
Toast.LENGTH_SHORT).show()
            }
        }
    }
}
```

DatabaseHelper.kt

```
package com.example.practical16

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

class DatabaseHelper(context: Context) : SQLiteOpenHelper(context,
DATABASE_NAME, null, DATABASE_VERSION) {

    companion object {
        private const val DATABASE_NAME = "UserAuthentication.db"
        private const val DATABASE_VERSION = 1
        private const val TABLE_NAME = "users"
        private const val COLUMN_USER_ID = "user_id"
        private const val COLUMN_PASSWORD = "password"
    }

    override fun onCreate(db: SQLiteDatabase?) {
        val createTable = ("CREATE TABLE $TABLE_NAME (" +
                "$COLUMN_USER_ID INTEGER PRIMARY KEY," +
                "$COLUMN_PASSWORD TEXT)")
        db?.execSQL(createTable)
    }
    override fun onUpgrade(db: SQLiteDatabase?, oldVersion: Int, newVersion: Int) {
        db?.execSQL("DROP TABLE IF EXISTS $TABLE_NAME")
        onCreate(db)
    }

    fun addUser(userId: Int, password: String): Long {
        val db = this.writableDatabase
        val contentValues = ContentValues()
        contentValues.put(COLUMN_USER_ID, userId)
        contentValues.put(COLUMN_PASSWORD, password)
        return db.insert(TABLE_NAME, null, contentValues)
    }

    fun checkUser(userId: Int, password: String): Boolean {
        val db = this.readableDatabase
        val cursor: Cursor = db.rawQuery(
            "SELECT * FROM $TABLE_NAME WHERE $COLUMN_USER_ID = ? AND
$COLUMN_PASSWORD = ?",
            arrayOf(userId.toString(), password)
        )
        val exists = cursor.count > 0
        cursor.close()
        return exists
    }
}
```

Practical 17

ActivityMain.xml

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

    <Spinner
        android:id="@+id/animationSpinner"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="16dp"/>

    <ImageView
        android:id="@+id/imageView"
        android:layout_width="200dp"
        android:layout_height="200dp"
        android:src="@drawable/facebook"
        android:contentDescription="Image for animation"/>

</LinearLayout>
```

Rotate.xml

```
<?xml version="1.0" encoding="utf-8"?>
<rotate
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:duration="2000"
    android:fromDegrees="0"
    android:toDegrees="360"
    android:pivotX="50%"
    android:pivotY="50%" />
```

FadeIn.xml

```
<?xml version="1.0" encoding="utf-8"?>
<alpha xmlns:android="http://schemas.android.com/apk/res/android"
    android:duration="2000"
    android:fromAlpha="0.0"
    android:toAlpha="1.0"/>
```

SlideUp.xml

```
<?xml version="1.0" encoding="utf-8"?>
<translate
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:duration="2000"
    android:fromYDelta="100%"
    android:toYDelta="0%"/>
```

MainActivity.kt

```
package com.example.practical17

import android.os.Bundle
import android.view.animation.AnimationUtils
import android.widget.AdapterView
import android.widget.ArrayAdapter
import android.widget.ImageView
import android.widget.Spinner
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

    private lateinit var animationSpinner: Spinner
    private lateinit var imageView: ImageView

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

        animationSpinner = findViewById(R.id.animationSpinner)
        imageView = findViewById(R.id.imageView)

        // Define animations in the spinner
        val animations = listOf("Rotate", "Fade In", "Slide Up")
        val adapter = ArrayAdapter(this, android.R.layout.simple_spinner_item,
animations)

adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdown_ite
m)
        animationSpinner.adapter = adapter

        // Set the onItemSelectedListener for the spinner
        animationSpinner.onItemSelectedListener = object :
AdapterView.OnItemSelectedListener {
            override fun onItemSelected(parent: AdapterView<*>, view:
android.view.View?, position: Int, id: Long) {
```

```
                when (position) {
                    0 -> applyAnimation(R.anim.rotate)
                    1 -> applyAnimation(R.anim.fade_in)
                    2 -> applyAnimation(R.anim.slide_up)
                }
            }

            override fun onNothingSelected(parent: AdapterView<*>) {
                // Do nothing
            }
        }
    }

    private fun applyAnimation(animationResource: Int) {
        val animation = AnimationUtils.loadAnimation(this, animationResource)
        imageView.startAnimation(animation)
    }
}
```

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ActivityMain.xml

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

    <Button
        android:id="@+id/startButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Start"/>

    <Button
        android:id="@+id/pauseButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Pause"
        android:layout_marginTop="16dp"/>

    <Button
        android:id="@+id/stopButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Stop"
        android:layout_marginTop="16dp"/>

</LinearLayout>
```

MainActivity.kt

```
package com.example.practical18

import android.media.MediaPlayer
import android.os.Bundle
import android.widget.Button
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

    private lateinit var startButton: Button
    private lateinit var pauseButton: Button
    private lateinit var stopButton: Button

    private var mediaPlayer: MediaPlayer? = null
    private var isPaused = false

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

        startButton = findViewById(R.id.startButton)
        pauseButton = findViewById(R.id.pauseButton)
        stopButton = findViewById(R.id.stopButton)
        startButton.setOnClickListener {
            if (mediaPlayer == null) {
                mediaPlayer = MediaPlayer.create(this, R.raw.sample_audio)
                mediaPlayer?.start()
            } else if (isPaused) {
                mediaPlayer?.start()
                isPaused = false
            }
        }

        pauseButton.setOnClickListener {
            mediaPlayer?.pause()
            isPaused = true
        }

        stopButton.setOnClickListener {
            mediaPlayer?.stop()
            mediaPlayer?.release()
            mediaPlayer = null
            isPaused = false
        }
    }

    override fun onDestroy() {
        mediaPlayer?.release()
        super.onDestroy()
    }
}
```