

# CS 473 – MDP

## Mobile Device Programming

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# CS 473 – MDP

## Mobile Device Programming

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Maharishi International  
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# CS 473 – MDP

## Mobile Device Programming

Lesson-6  
User Input Controls – Day 2  
Advanced UI – RecyclerView and CardView



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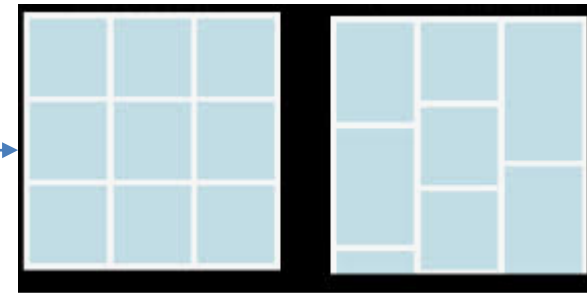
# Contents

- What is a Recycler View?
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- Hands on Example – 1 using RecyclerView to show the Book List
- CardView
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# What is a Recycler View?

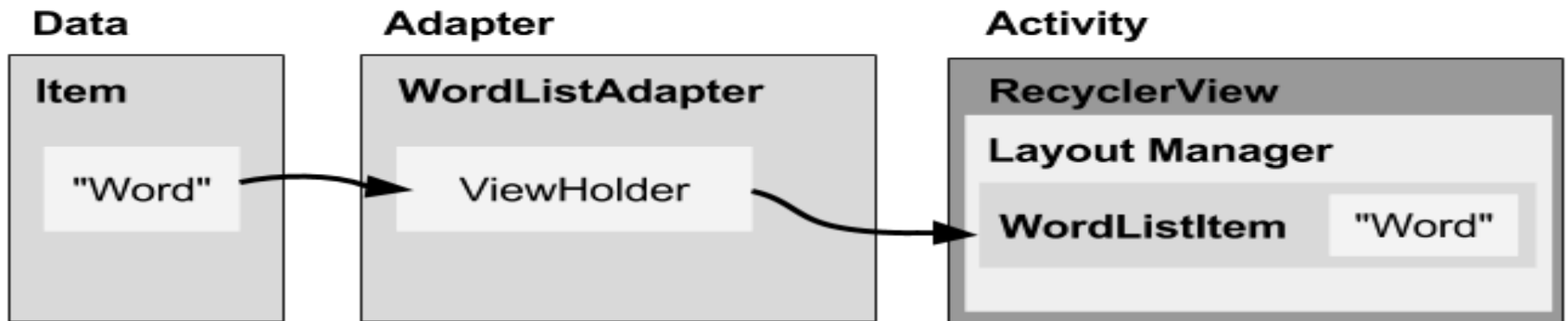
- Scrollable container for large data sets
- Efficient
  - uses and reuses limited number of views
  - Updates changing data fast
- RecyclerView als
- o provides a choice of three built-in layout managers to control the way in which the list items are presented to the user
  - LinearLayoutManager
  - GridLayoutManager
  - StaggeredGridLayoutManager

WordListSQL
Android Performance
ViewHolder
LinkedList
Data model
SQLiteOpenHelper
SQLiteDatabase
Android Studio
AsyncTask
ListView
Adapter
inflate



# RecyclerView Components Overview

- **Data**
- **RecyclerView** scrolling list — [RecyclerView](#)
- **Layout** for one item of data—XML file
- **Layout manager** handles the organization of UI components in a view—[RecyclerView.LayoutManager](#)
- **Adapter** connects data to the RecyclerView—[RecyclerView.Adapter](#)
- **View holder** has view information for displaying one item—[RecyclerView.ViewHolder](#)



# Implementing RecyclerView Steps

1. Add the RecyclerView dependency to app/build.gradle file
2. Add RecyclerView to layout
3. Create XML layout for item
4. Extend RecyclerView.Adapter
5. Extend RecyclerView.ViewHolder
6. In onCreate of activity, create a RecyclerView with adapter and layout manager

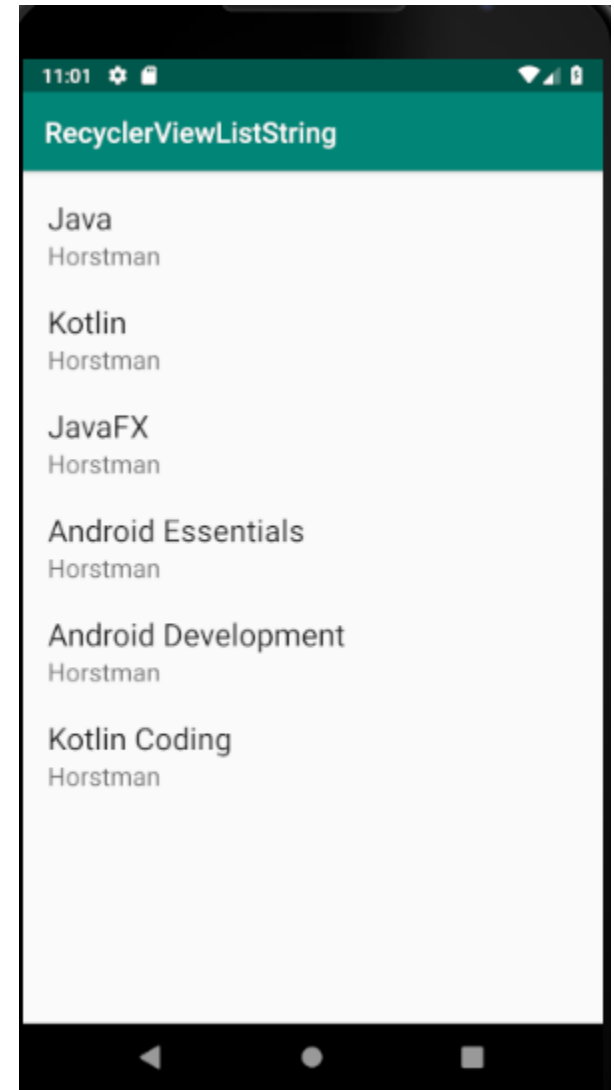
Refer step by step implementation and Demo codes from Lesson6 Day2

# Hands on Example - 1

Problem : Show the RecyclerView with the list of Books.

Book is data class with the attributes book name and author.

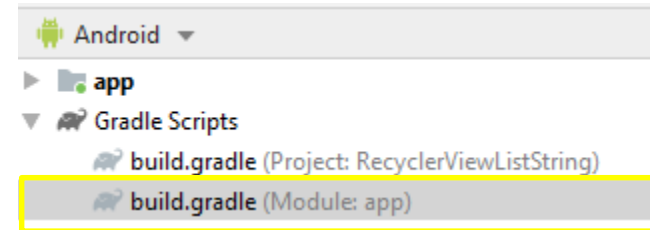
Refer : Lesson6/  
RecyclerViewListString





# Implementing RecyclerView

**Step 1 : Add dependency to app/build.gradle**  
**Click Gradle Scripts from Android Explorer**



```
dependencies {  
    ...  
    implementation 'androidx.recyclerview:recyclerview:1.0.0'  
    ...  
}  
dependencies {  
    implementation fileTree(dir: 'libs', include: ['*.jar'])  
    implementation"org.jetbrains.kotlin:kotlin-stdlib-jdk7:$kotlin_version"  
    implementation 'androidx.appcompat:appcompat:1.1.0'  
    implementation 'androidx.core:core-ktx:1.1.0'  
    implementation 'androidx.constraintlayout:constraintlayout:1.1.3'  
    testImplementation 'junit:junit:4.12'  
    androidTestImplementation 'androidx.test.ext:junit:1.1.1'  
    androidTestImplementation 'androidx.test.espresso:espresso-core:3.2.0'  
    implementation 'androidx.recyclerview:recyclerview:1.0.0'  
}
```

# Adding RecyclerView in the layout

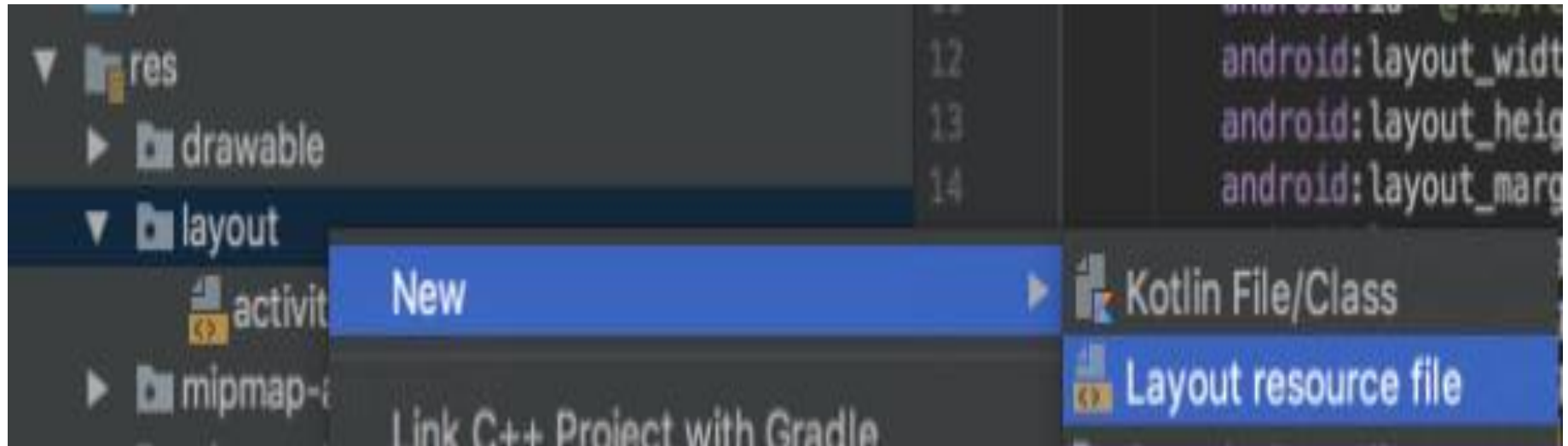
Step:2 In your activity\_main.xml layout add the RecyclerView as below

## **Add RecyclerView to XML Layout**

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

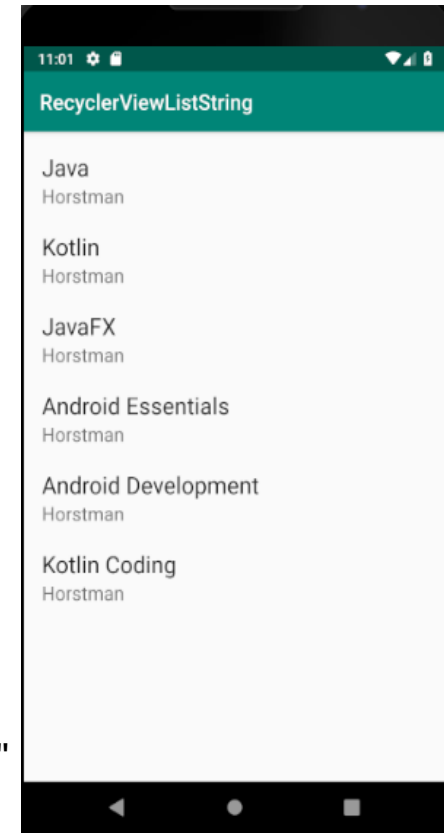
# Creating new layout to display the list item

Step 3. Create layout to show the Book item as per the screenshot and give a name as item\_layout.xml



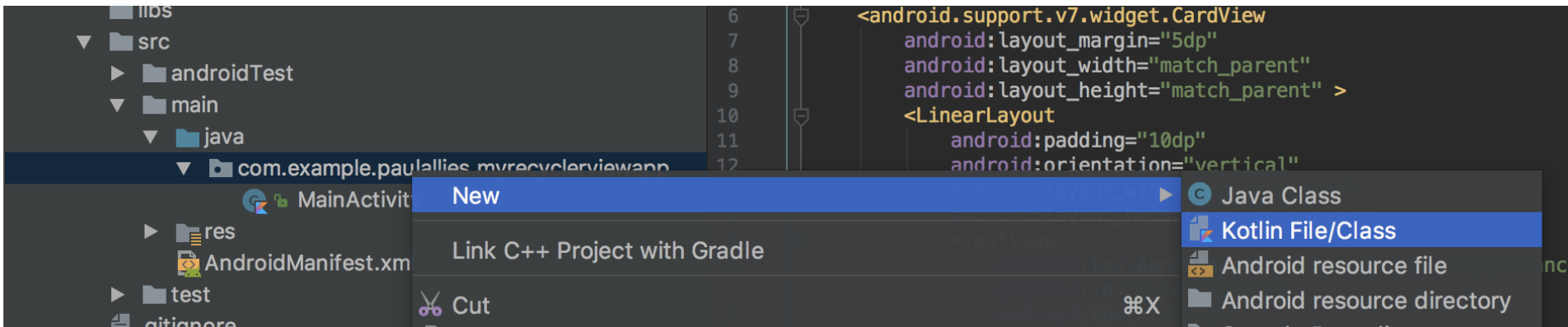
# item\_layout.xml

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:padding="10dp">
    <TextView
        android:textAppearance="@style/Base.TextAppearance.AppCompat.Large"
        android:id="@+id/name"
        android:text="Book Name"
        android:layout_width="match_parent"
        android:layout_height="wrap_content" />
    <TextView
        android:textAppearance="@style/Base.TextAppearance.AppCompat.Medium"
        android:text="Author"
        android:id="@+id/author"
        android:layout_width="match_parent"
        android:layout_height="wrap_content" />
</LinearLayout>
```



# Create a Data Class for Book

- Create Book.kt file as per the screenshot.



Book.kt file code

```
data class Book(val name: String, val author: String)
```

# Implementing RecyclerView

## 4. Implement the adapter by creating CustomAdapter.kt

Adapter has 3 required methods need to implement

- `onCreateViewHolder()`
  - This method creates and returns a `ViewHolder` object initialized with the view that is to be used to display the data. This view is typically created by inflating the XML layout file.
- `onBindViewHolder()`
  - This method is passed the `ViewHolder` object created by the `onCreateViewHolder()` method together with an integer value indicating the list item that is about to be displayed. Contained within the `ViewHolder` object is the layout assigned by the `onCreateViewHolder()` method. It is the responsibility of the `onBindViewHolder()` method to populate the views in the layout with the text and graphics corresponding to the specified item and to return the object to the `RecyclerView` where it will be presented to the user.
- `getItemCount()`
  - This method must return a count of the number of items that are to be displayed in the list.

## 4. Implement the adapter in CustomAdapter.kt

```
class CustomAdapter(val booklist: ArrayList<Book>):  
    RecyclerView.Adapter<CustomAdapter.MyViewHolder>() {  
  
    override fun onBindViewHolder(holder: MyViewHolder, position: Int) {  
        holder?.bName?.text = booklist[position].name  
        holder?.bAuthor.text = booklist[position].author  
    }  
  
    override fun onCreateViewHolder(parent: ViewGroup, viewType: Int):  
        MyViewHolder {  
        val v =  
            LayoutInflater.from(parent?.context).inflate(R.layout.item_layout,  
                parent, false)  
        return MyViewHolder(v);  
    }  
  
    override fun getItemCount(): Int {  
        return booklist.size  
    }  
}
```

# MyViewHolder.kt

## inner class

/\*RecyclerView.Adapter accepts the generic type of your Adapter inner class ViewHolder type.

In this example Adapter class name is CustomAdapter and the MyViewHolder is the inner class \*/

```
class MyViewHolder(itemView: View):  
    RecyclerView.ViewHolder(itemView){  
    val bName = itemView.findViewById<TextView>(R.id.name)  
    val bAuthor = itemView.findViewById<TextView>(R.id.author)  
    }  
}
```



# Implementing RecyclerView in MainActivity.kt

## 5. Integrate adapter with RecyclerView

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

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

# Implementing RecyclerView in MainActivity.kt

```
// get recycler view
val rv = findViewById<RecyclerView>(R.id.recyclerView1)
// Give the recycler view with Linear layout manager.
rv?.layoutManager = LinearLayoutManager(this)
// Populate Book data list
val books = ArrayList<Book>()
books.add(Book("Java","Horstman"))
books.add(Book("Kotlin","Horstman"))
books.add(Book("JavaFX","Horstman"))
books.add(Book("Android Essentials","Horstman"))
books.add(Book("Android Development","Horstman"))
books.add(Book("Kotlin Coding","Horstman"))
// Create an adapter and supply the data to be displayed.
var adapter = CustomAdapter(books)
// Connect the adapter with the recycler view.
rv.adapter = adapter
}
}
```

# CardView

- Android 7.0 introduces a new widget called CardView.
- CardView wraps a layout and will often be the container used in a layout for each item within a ListView or RecyclerView.
- Appeared with shadow effects and rounded corners.
- CardView API is an easy way for you to show information inside cards that have a consistent look across the platform.



# Hands on Example - 2

- This example uses
  - RecyclerView displays the Fruit list
  - Each item displayed using CardView. Each row displayed with Fruit image, name of the fruit and small description about the fruit.
  - To display the image in circle shape needs third party library xml code as mentioned below.

```
<com.mikhaellopez.circularimageview.CircularImageView  
    android:id="@+id/imageView"  
    android:layout_width="90dp"  
    android:layout_height="90dp"  
    android:src="@mipmap/ic_launcher" />
```

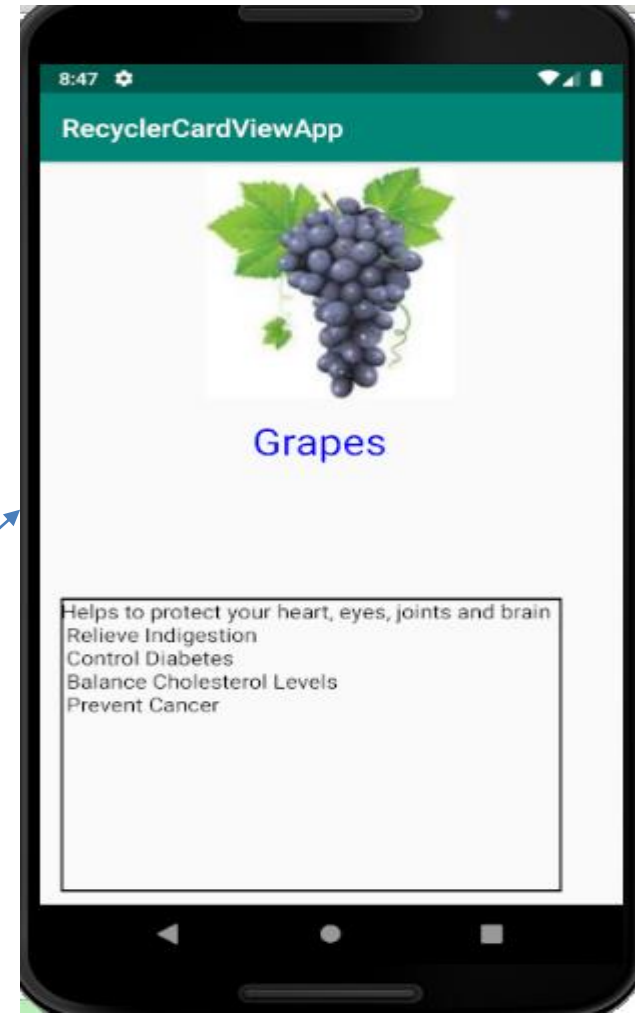
- Include the below line in build.gradle dependencies

```
implementation 'de.hdodenhof:circleimageview:3.0.1'
```



# Hands on Example - 2

- Once clicking each item, opens another activity gives detail description about the fruit. Here is the screen after clicking Grapes.
- Refer : Lesson6\RecyclerViewApp



# Adding CardView dependency

Inside build.gradle dependencies add this line

```
dependencies {
```

```
implementation 'androidx.cardview:cardview:1.0.0'
```

```
}
```

# Adding CardView Layout

Add into below dependency in the Gradle Module.app to use cardview implementation 'androidx.cardview:cardview:1.0.0'

XML Code for the CardView

```
<androidx.cardview.widget.CardView
    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="wrap_content"
    android:padding="20dp"
    android:id="@+id/card_view"
    app:cardBackgroundColor="#e4b9f1"
    app:cardCornerRadius="12dp"
    android:layout_marginBottom="4dp">
```

# Hands on Example - 2

- ListView
  - ListView provides only one type of view i.e Vertical ListView, and there is no way to implement the others such as Horizontal ListView, GridView etc.
- RecyclerView :
  - RecyclerView, with faster performance, is the advanced version of ListView which can be used to implement Vertical List, Horizontal List and Gridview with the help of Layout Managers.
  - RecyclerView is a container for **displaying large data sets** that can be scrolled very efficiently by maintaining a limited number of views.



# Main Point 4

- **RecyclerView** is flexible and efficient version of ListView. It is a container for rendering larger data set of views that can be recycled and scrolled very efficiently. **RecyclerView** is like traditional ListView widget, but with more flexibility to customizes and optimized to work with larger datasets.
- ***Science of Consciousness: pure awareness is an abstraction of individual awareness; each individual provides a specific, concrete realization of unbounded and unmoving pure awareness. Pure awareness is more efficient and powerful.***