Have all images in the repo
ViewPager in class lab
See ViewPager3 class demo

with and without threaded pages

1. First create a project (Use the one with a Floating Action Button (FAB)) because it gives you an appBar.

2. Get rid of FAB in MainActvity.java and in MainActivity.xml
   Get rid of the fragments (java) and their layouts(XML)
   Test to see if working

3. Place images of interest in res/drawable (p0,p1,p2,p3,p4,p5)

The XML

4. Add the viewpager widget to activity_main.xml (replace the content main). Be sure to give it an ID

```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"
    tools:context=".MainActivity"
    android:orientation="vertical">
    <com.google.android.material.appbar.AppBarLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:theme="@style/AppTheme.AppBarOverlay">
        <androidx.appcompat.widget.Toolbar
            android:id="@+id/toolbar"
            android:layout_width="match_parent"
            android:layout_height="?attr/actionBarSize"
            android:background="?attr/colorPrimary"
            app:popupTheme="@style/AppTheme.PopupOverlay" />
    </com.google.android.material.appbar.AppBarLayout>
    <androidx.viewpager2.widget.ViewPager2
        android:id="@+id/view_pager"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:background="@color/colorAccent">
    </androidx.viewpager2.widget.ViewPager2>
</LinearLayout>
```

5. Need a layout to define what each page displayed in the viewpager looks like. Here we will have an image and a text (see Viewpager3 for page look demo).

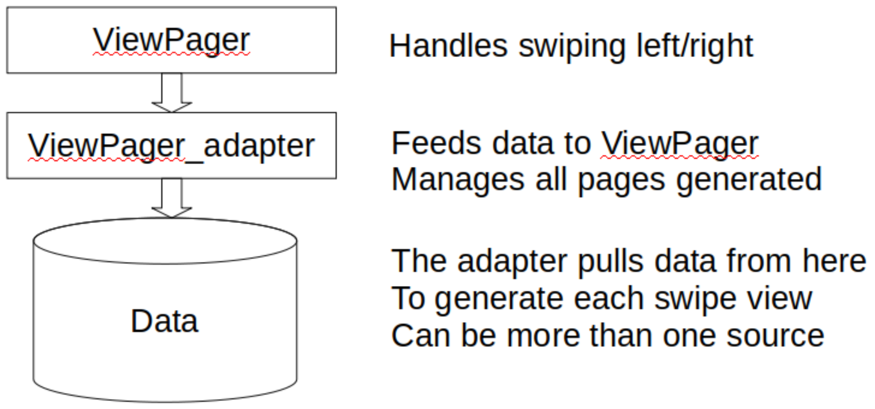
In layout folder create swipe_layout (or any name you want) (from Layout folder→right click →new→xml→layout XML file. Give it a name and (choose FrameLayout for Root Tag)

Add an ImageView and a TextView to the above layout

```xml
<?xml version="1.0" encoding="utf-8"?>

<FrameLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:orientation="vertical"
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <ImageView
        android:id="@+id/imageView"
        android:scaleType="fitXY"
        android:layout_width="match_parent"
        android:layout_height="match_parent" />
    <TextView
        android:id="@+id/tv"
        android:layout_width="match_parent"
        android:text="sample text"
        android:textSize="60dp"
        android:textStyle="bold"
        android:gravity="center"
        android:layout_gravity="bottom"
        android:layout_height="120dp"
        android:background="#33777777"/>
</FrameLayout>
```

The Adapter


ViewPager
Handles swiping left/right
ViewPager_adapter
Feeds data to ViewPager
Manages all pages generated
Data
The adapter pulls data from here
To generate each swipe view
Can be more than one source

6. Create an adapter (the brains of the operation). It supplies the ViewPager with 1 page of data at a time whose appearance is defined by swipe_layout above.

Create a new JavaClass ViewPager2_Adapter(or any name you like) and have it extend...

```
    public class ViewPager2_Adapter extends RecyclerView.Adapter
```

alt-enter to import RecyclerView

6. Add unimplemented required methods (alt-enter on red squiggly lines)

7. ViewPager2_Adapter is going to serve up images, so add the list of images in the drawable folder to ViewPager2_Adapter as member variable array. (copy the images in from the sample project online, or add your own images)

```
private int[] image_resources =
{ R.drawable.p0,R.drawable.p1,R.drawable.p2,R.drawable.p3,R.drawable.p4,R.drawable.p5 };
```

8.Each time a user swipes on a Viewpager image a new image slides in, that image consists of a swipe_layout that will be populated with images from image_resources and text. But first we have to create it. For that we need a layout inflator (remember its use in the spinner project?). Add one to to ViewPager2_Adapter as member variable

```
private final LayoutInflater li;
```

9. And we need a context to get this inflator. Add one to to ViewPager2_Adapter as member variable.

```
private final Context ctx;
```

10. Now add a constructor. (hover over class name and hit alt-insert) and pass in a reference to Mainactivity save in a member

```
public ViewPager2_Adapter(Context ctx){

    this.ctx=ctx;
    li=(LayoutInflater)ctx.getSystemService(Context.LAYOUT_INFLATER_SERVICE);
}
```

11. Add a RecyclerView.ViewHolder inner class to the ViewPager2_Adapter class

When each swipe_layout swipes off the screen do we garbage collect it? Or reuse this fully constructed object to hold the next layout?

Answer: Reuse them. That way we can forgo repeating expensive operations like findViewById), thats what the PagerViewHolder does for us

```
class PagerViewHolder extends RecyclerView.ViewHolder {

        ImageView iv;
        TextView tv;

                                        //with a view in onBindViewHolder
        public PagerViewHolder(@NonNull View itemView) {
            super(itemView);
            iv = (ImageView)itemView.findViewById(R.id.imageView);
            tv = (TextView)itemView.findViewById(R.id.tv);
        }
    }
```

12. Fill in the method that **CREATES** a ViewHolder, notice that expensive calls to the inflator are made here as well as the findviewbyID calls that are made once in the constructor of the PagerViewHolder. The object with its associated views is now available for use and reuse until its garbage collected.

```
public RecyclerView.ViewHolder onCreateViewHolder(@NonNull ViewGroup parent, int viewType) {

    //call this when we need to create a brand new PagerViewHolder
    View view = li.inflate(R.layout.swipe_layout, parent, false);
    return new PagerViewHolder(view);   //the new one
}
```

13. Fill in the method that **REUSES** the viewholder. Notice that we do not need to reinflate the views in this layout (they have already been created in onCreateViewHolder). We are just reusing them.

```
public void onBindViewHolder(@NonNull RecyclerView.ViewHolder holder, int position) {
    //passing in an existing instance, reuse the internal resources (iv and tv) to set
    //the imageview and textview to widgets corresponding to position
    PagerViewHolder viewHolder = (PagerViewHolder) holder;
    viewHolder.iv.setImageResource(image_resources[position]);
    viewHolder.tv.setText("Image : " + position);
}
```

14. The ViewPager2_Adapter has to know how many items it will hold

```
public int getItemCount() {

    //the size of the collection that contains the items we want to display
    return image_resources.length;
}
```

In MainActivity

Now all we have to do is bind the adapter to the viewpager2

15. Add these 2 member variables

```
public class MainActivity extends AppCompatActivity {

    ViewPager2 vp;
    ViewPager2_Adapter csa;
```

16.In on create bind the viewpager

```
@Override

protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    Toolbar toolbar = findViewById(R.id.toolbar);
    setSupportActionBar(toolbar);
    //get a ref to the viewpager
    vp=findViewById(R.id.view_pager);
    //create an instance of the swipe adapter
    csa = new ViewPager2_Adapter(this);
    //set this viewpager to the adapter
    vp.setAdapter(csa);
}
```

Now lets do multithreaded

Heavy lifting time - Lets retreive the images in a thread and update the recyclerview at a later time. Why? Because often screens consists of easy to get data, like the image number, and hard to get data, like an image located on another server.

You can't pause the ViewPager2_Adapter pipeline while waiting to download the image (what would a http timeout do to your apps performance? You would be locked to a particular view waiting for the network request to complete before you move on).

So;

- **generate and show all the easy to get stuff,**
- **show a temp image while waiting for real image to be downloaded**
- **launch a thread to get the time consuming stuff**
- **when the thread finishes it will update the appropriate view.**

First add a waiting image

got error.png from another project placed in drawable

The Adapter (ViewPager2_Adapter)

modify the PagerViewHolder

```
class PagerViewHolder extends RecyclerView.ViewHolder {

    private static final int UNINITIALIZED = -1;
    ImageView iv;
    TextView tv;
    int position=UNINITIALIZED;     //start off uninitialized, set it when we are 
populating
                                               //with a view in onBindViewHolder
    public PagerViewHolder(@NonNull View itemView) {
        super(itemView);
```

```
            iv = (ImageView)itemView.findViewById(R.id.imageView);
            tv = (TextView)itemView.findViewById(R.id.tv);
        }
    }
```

Create inner class asynctask in ViewPager2_Adapter :
It just sleeps for a bit and then loads the proper image
Problem: What if in between launching the thread that retreives the image and the image finally being retreived, the user swipes the view off the screen? Would the PageViewHolder be reused and point to another image after the thread returns?

Maybe, so you must guard against this!

How?

- **have the thread keep track of what its downloading,**
- **when the thread is done, see if what it downloaded is the same thing that the PagerViewHolder says is being downloaded (if not the PagerViewHolder has been recycled, discard the threads result).**

```
private class GetImage extends AsyncTask<Void, Void, Void> {
    //ref to a viewholder, this could change if
      //PagerViewHolder myVH is recycled and reused!!!!!!!!!
      private PagerViewHolder myVh;
      //since myVH may be recycled and reused
      //we have to verify that the result we are returning
      //is still what the viewholder wants
      private int original_position;


    public GetImage(PagerViewHolder myVh) {
        //hold on to a reference to this viewholder
        //note that its contents (specifically iv) may change
        //iff the viewholder is recycled
        this.myVh = myVh;
        //make a copy to compare later, once we have the image
        this.original_position = myVh.position;
    }
    @Override
    protected Void doInBackground(Void... params) {
        //just sleep for a bit to simulate long running downloaded
        //but could just as easily make a network call
        try {
            Thread.sleep(2000); //sleep for 2 seconds
        } catch (InterruptedException e) {
            e.printStackTrace();
        }
        return null;
    }
    @Override
    protected void onPostExecute(Void param) {
     //got a result, if the following are NOT equal
    // then the view has been recycled and is being used by another
    // number DO NOT MODIFY
    if (this.myVh.position == this.original_position){
        //still valid
        //set the result on the main thread
        myVh.iv.setImageResource(image_resources[this.myVh.position ]);
    }
    else
        Toast.makeText(ViewPager2_Adapter.this.ctx,"YIKES! Recycler view reused, my result
is useless", Toast.LENGTH_SHORT).show();
}


}
```

And finaly modify onBindViewHolder to default load error image, then launch a thread which will load real image after a wait

```
public void onBindViewHolder(@NonNull RecyclerView.ViewHolder holder, int position) {
    //passing in an existing instance, reuse the internal resources
    //pass our data to our ViewHolder.
    PagerViewHolder viewHolder = (PagerViewHolder) holder;
    //set to some default image
    viewHolder.iv.setImageResource(R.drawable.error);
    viewHolder.tv.setText("Image : " + position);

     //remember which image this view is bound to
    viewHolder.position=position;

    //launch a thread to 'retreive' the image
    GetImage myTask = new GetImage(viewHolder);
    myTask.execute();
}
```