
TRY
ANDROID

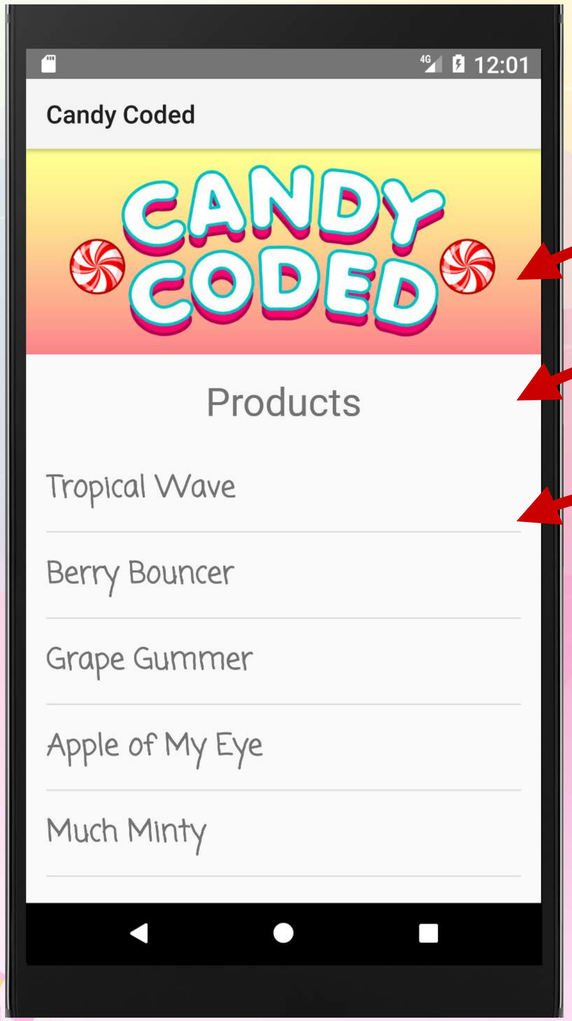
Level 3

ListView & Adapters

Using Adapters to Put Data Into a ListView

Adding a ListView

Now that we've added a TextView **and** ImageView**, we want to add a** ListView **to list our store's available candy.**



An `ImageView` with our Candy Coded logo

A `TextView` with text "Products"

A `ListView` listing all of our candy products

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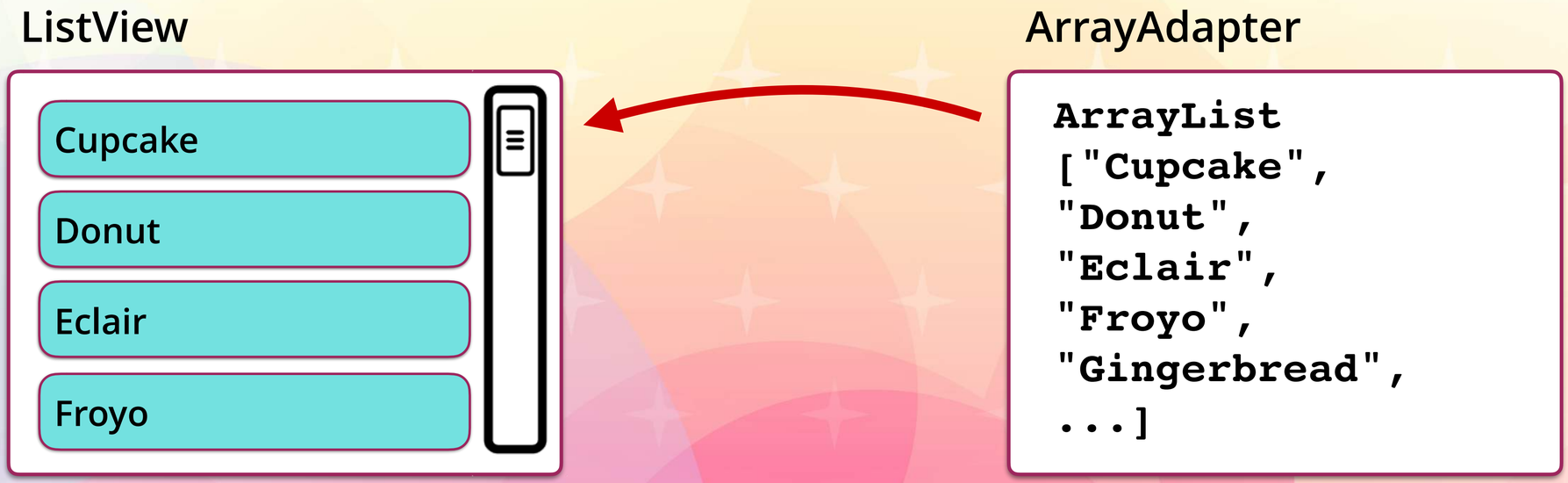
ListView & ArrayAdapter

A ListView **get its data from a data source via an** Adapter**.**



An `ArrayAdapter` *can populate a* `ListView` *with an* `ArrayList`

But why do we need an `Adapter`*? Can't we just send a* `ListView` *a list?*

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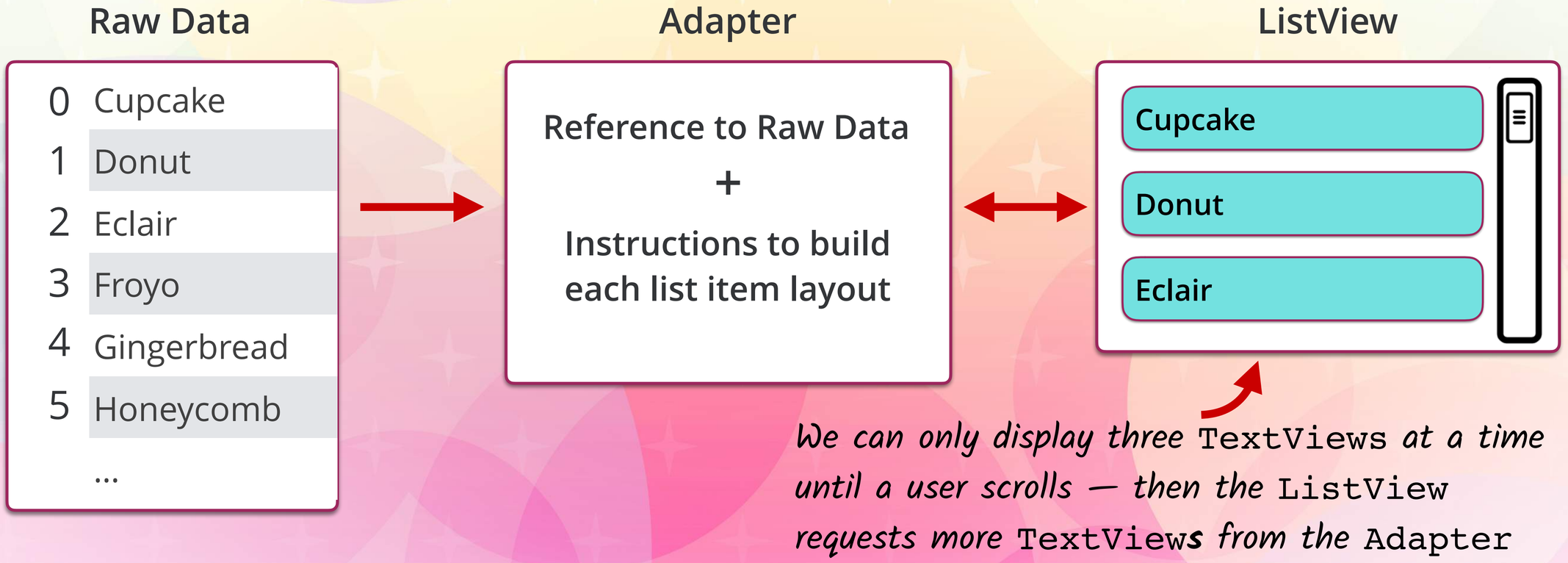
How Adapters Work

The ArrayAdapter **allows us to only create the items requested by the** ListView**.**



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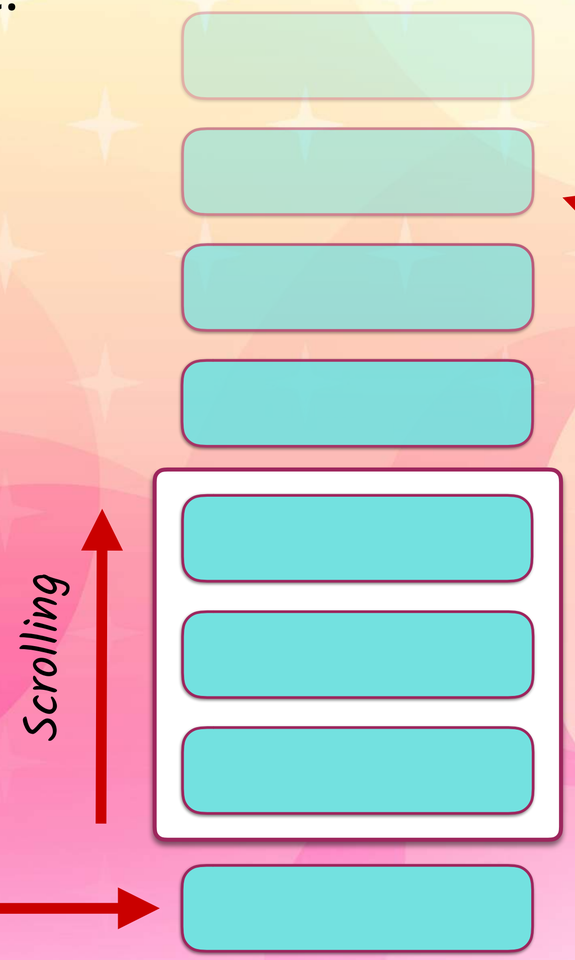
A ListView Without Recycling Views

If we don't recycle the TextViews that make up our ListView cell as they scroll offscreen, we would quickly affect memory and performance.

A `ListView` with its visible `TextViews` and one in either direction:

If we create a new `TextView` as the user scrolls...



We would quickly affect memory and performance by creating all these cells for a list with thousands of records

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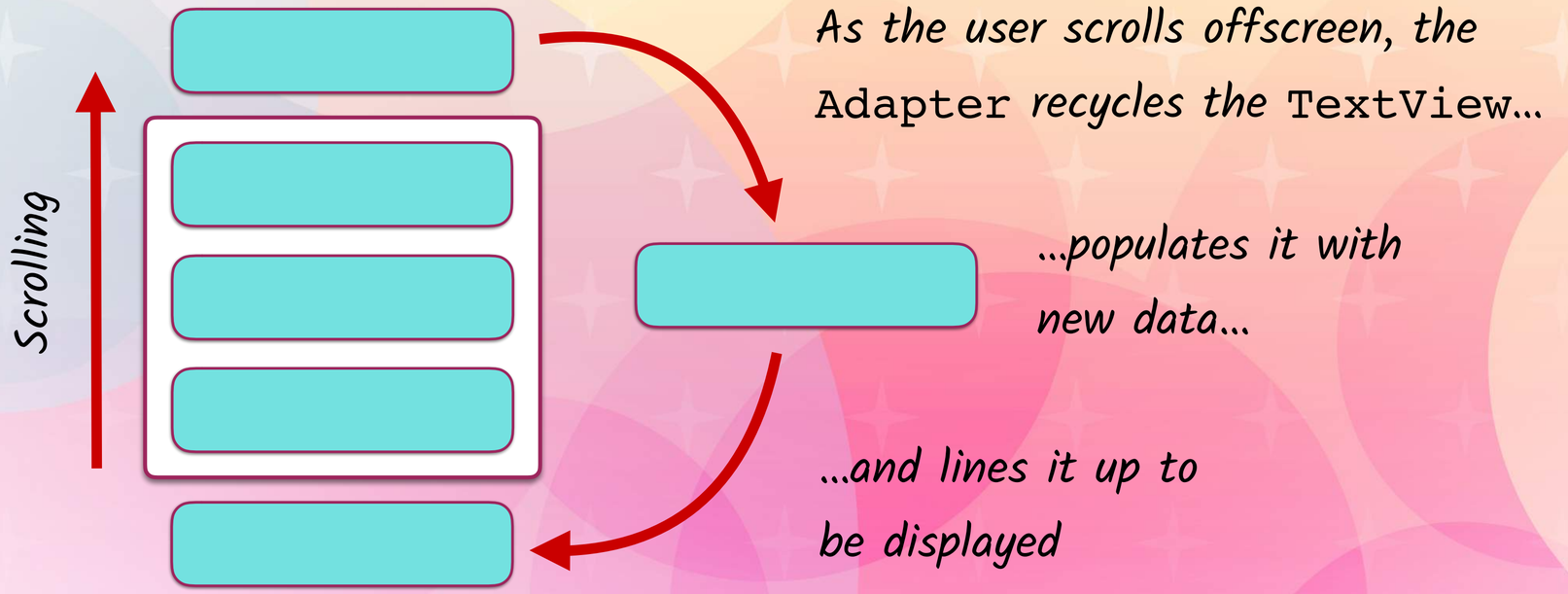
How ListView Recycling Works

ListView cells are recycled as they scroll offscreen, and any new cells are just recycled cells filled with new data.



As the user scrolls offscreen, the `Adapter` *recycles the* `TextView`*...*

...populates it with new data...

...and lines it up to be displayed

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The Steps to Create the ListView and ArrayAdapter

In order to get our ListView **populated with data from the** ArrayAdapter**, we need to do the following steps:**

Steps to set up a `ListView` *and* `ArrayAdapter`*:*

Layout steps

1) Create a **`ListView`** in the **`main_activity.xml`** layout
2) Create a separate layout to describe what each list item will look like

Java steps

3) Get the raw data we want to display into an **`ArrayList`**
4) Create the **`ArrayAdapter`**
5) Connect the **`ArrayAdapter`** to the **`ListView`**

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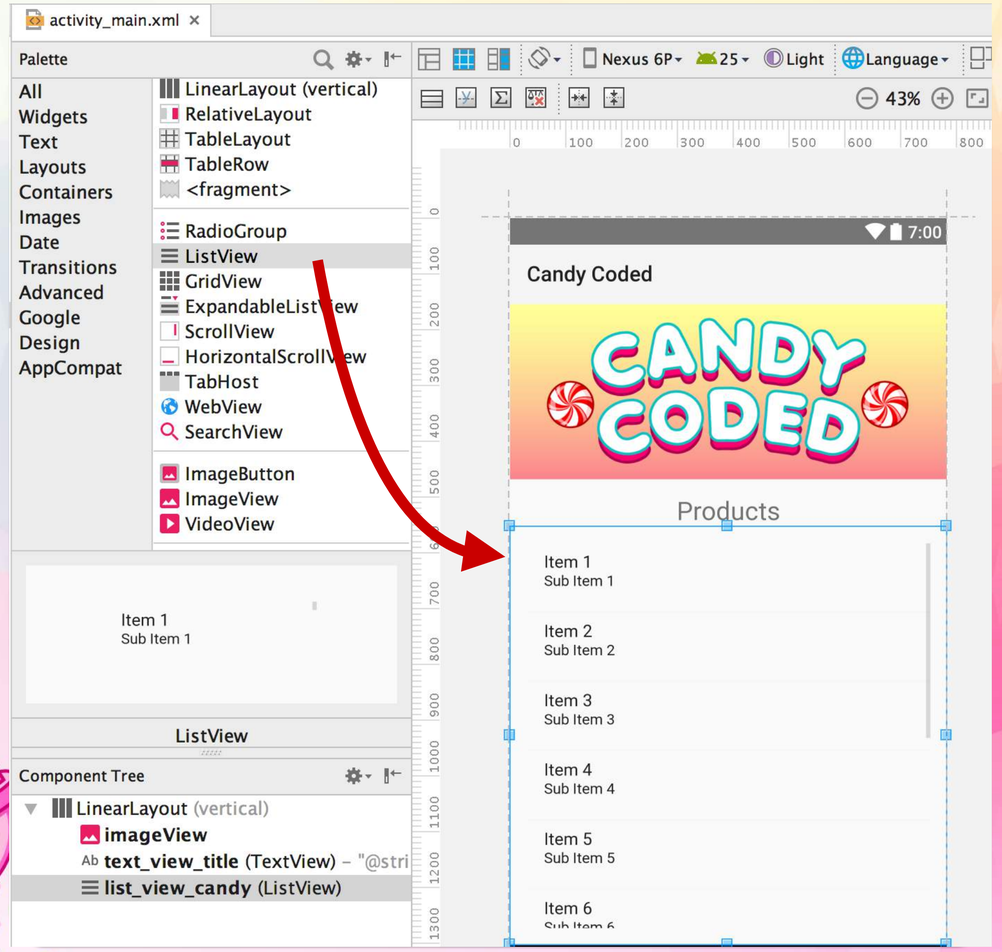
1 Creating a ListView in the MainActivity Layout

To add a ListView **to our** activity_main **layout, we can drag it over in the design view, which will generate the following** ListView **XML.**



activity_main.xml

```
<?xml ...>
<LinearLayout ...>
    <ImageView .../>
    <TextView .../>

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

</LinearLayout>
```

Our ListView's Properties

The ListView**'s** layout_width**,** layout_height**, and** id **were set to default values for us.**

activity_main.xml

```
<?xml ...>
<LinearLayout ...>
    <ImageView .../>
    <TextView .../>

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

</LinearLayout>
```

`match_parent` *means the view will try to be as big as its parent by expanding to take up the remaining space in the layout*

`@+id` *means this id will be created as a resource at runtime*

`list_view_candy` *is this* `ListView`*'s id we picked, but we could name it anything*

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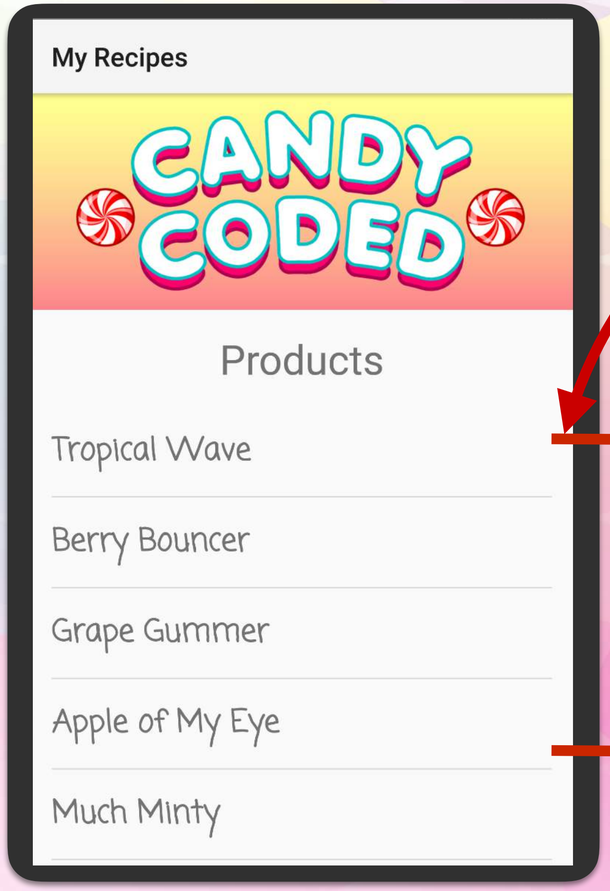
What Does match_parent Mean?

The ListView**'s** layout_width **and** layout_height **are** match_parent**.**



`match_parent` *as the* `layout_height` *means the list will take up the available height left in its parent layout*

So it will be the height from the bottom of the `ImageView` *to the bottom of the screen*

If our list content is longer than the screen, it will automatically scroll

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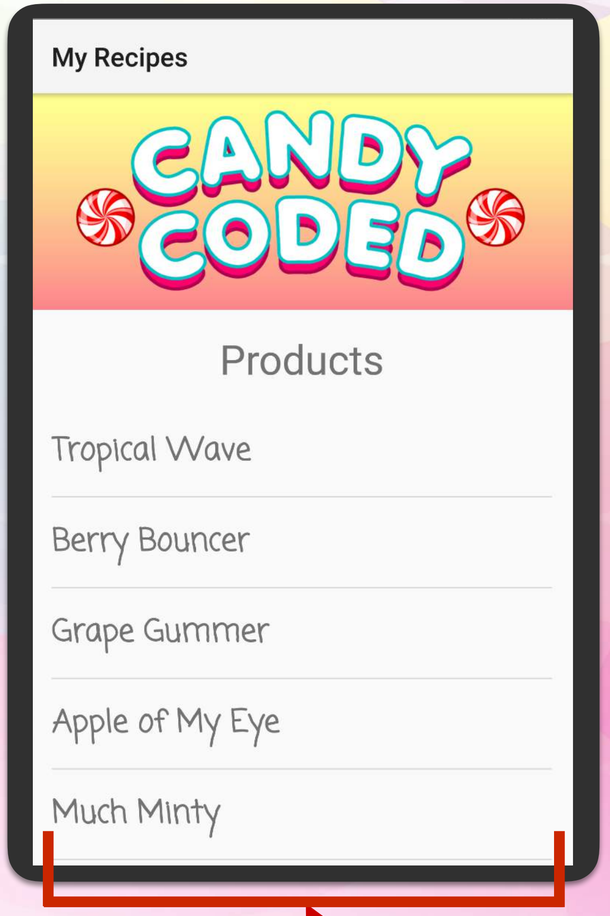
What Does match_parent Mean?

The ListView**'s** layout_width **and** layout_height **are** match_parent**.**



`match_parent` *as the* `layout_width` *means the view list will be the entire width of the screen*

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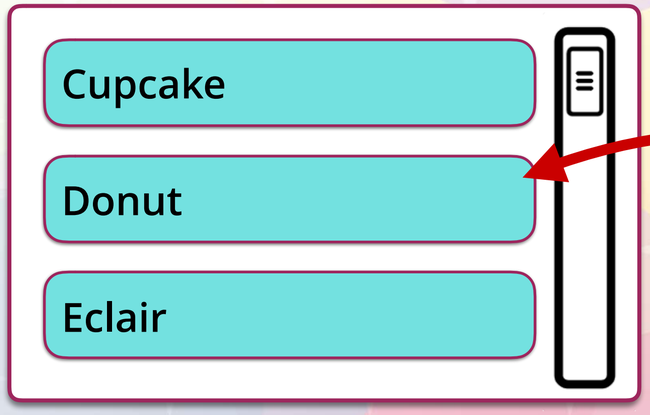
2 Creating a Layout for Each Item in Our ListView

We need a layout to tell the ArrayAdapter **how to build each item for the** ListView**.**



We'll use a single `TextView` *for each item in our* `ListView`

list_item_candy.xml

```
<?xml version="1.0" encoding="utf-8"?>
<TextView xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:id="@+id/text_view_candy">
</TextView>
```

`match_parent` *since we want each list item to fill the* `ListView`

We need an id to reference this later

Screencast: The Layout for the Items in Our ListView

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Where to Add Code in MainActivity.java

We'll add our code to the bottom of the onCreate() **method, after we set the** TextView**'s text.**

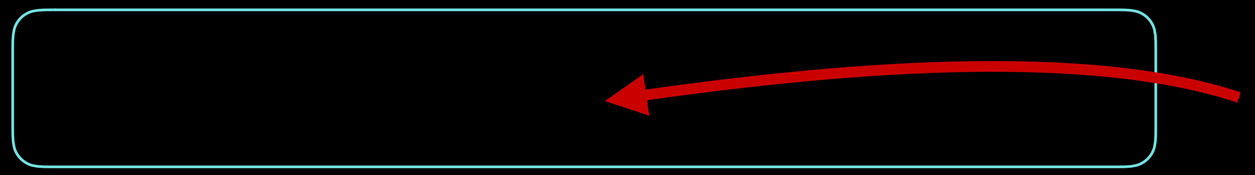
MainActivity.java **Java**

```
...
public class MainActivity extends AppCompatActivity {

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

        TextView textView = (TextView)this.findViewById(
                R.id.text_view_title);
        textView.setText(R.string.welcome_msg);

    }
}
```



We'll add all the code to create our `ListView` *here*

3 Creating the ArrayList of Raw Data

We need to create the list of raw data to display. We'll use an ArrayList for that.

MainActivity.java Java

```
import java.util.ArrayList;

...
        ArrayList<String> candyList = new ArrayList<String>();

        candyList.add("Tropical Wave");
        candyList.add("Berry Bouncer");
        candyList.add("Grape Gummer");
        candyList.add("Apple of My Eye");
        ...
        candyList.add("ROYGBIV Spinner");
...
```

Creating an empty `ArrayList` *of* `Strings`

Adding `Strings` *to the list*

4 Creating the ArrayAdapter From an ArrayList

We need a few things in the ArrayAdapter **constructor: the** Activity**, the** Layout **for each item, the** TextView **for each item, and the** ArrayList **we just created.**

MainActivity.java **Java**

```
import java.util.ArrayList;

...
        ArrayList<String> candyList = new ArrayList<String>();
        ...

        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
                this,
                R.layout.list_item_candy,
                R.id.text_view_candy,
                candyList  );

...
```

We need these things in our ArrayAdapter *constructor to create our* ArrayAdapter

4 Creating the ArrayAdapter From an ArrayList

We need a few things in the ArrayAdapter **constructor: the** Activity**, the** Layout **for each item, the** TextView **for each item, and the** ArrayList **we just created.**

MainActivity.java **Java**

```
import java.util.ArrayList;

...
        ArrayList<String> candyList = new ArrayList<String>();
        ...

        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
                this,
                R.layout.list_item_candy,
                R.id.text_view_candy,
                candyList  );

...
```

Where this `ArrayAdapter` *will be used, or the context, is* `this` `Activity`

4 Creating the ArrayAdapter From an ArrayList

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MainActivity.java **Java**

```
import java.util.ArrayList;

...
        ArrayList<String> candyList = new ArrayList<String>();
        ...

        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
                this,
                R.layout.list_item_candy,
                R.id.text_view_candy,
                candyList  );

...
```

The `Layout` *file we created to build each item in the* `ListView`

4 Creating the ArrayAdapter From an ArrayList

We need a few things in the ArrayAdapter **constructor: the** Activity**, the** Layout **for each item, the** TextView **for each item, and the** ArrayList **we just created.**

MainActivity.java **Java**

```
import java.util.ArrayList;

...
        ArrayList<String> candyList = new ArrayList<String>();
        ...

        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
                this,
                R.layout.list_item_candy,
                R.id.text_view_candy,
                candyList  );

...
```

We need the specific `TextView` *inside the* `Layout` *file. Remember we created an id for this previously...*

4 Creating the ArrayAdapter From an ArrayList

We need a few things in the ArrayAdapter **constructor: the** Activity**, the** Layout **for each item, the** TextView **for each item, and the** ArrayList **we just created.**

MainActivity.java **Java**

```java
import java.util.ArrayList;

...
        ArrayList<String> candyList = new ArrayList<String>();
        ...

        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
                this,
                R.layout.list_item_candy,
                R.id.text_view_candy,
                candyList );

...
```

Finally, the `ArrayList` *of our candies*

5 Connecting the ArrayAdapter to the ListView

To connect the ArrayAdapter **to the** ListView**, we first need to find the** ListView **so we have a reference to it. We can find** Views **with the** findViewById() **method.**

MainActivity.java **Java**

```
import java.util.ArrayList;

...
        ArrayList<String> candyList = new ArrayList<String>();
        ...

        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
                ... );

        ListView listView = (ListView)this.findViewById(
                R.id._____________);

...
```

Remember we created an id for the ListView *in the* MainActivity*'s Layout*

The id for the ListView in main_activity.xml

We need the id **for the** ListView **so we can find it and then attach our** ArrayAdapter **to it.**

activity_main.xml XML

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout ...>
    <TextView …/> <ImageView …/>
    <ListView
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:id="@+id/list_view_candy"/>
</LinearLayout>
```

MainActivity.java

```
...
    ListView listView = (ListView)this.findViewById(
            R.id.list_view_candy);
...
```

5 Connecting the ArrayAdapter to the ListView

Finally! We can connect the ListView **to the** ArrayAdapter **and see our** ListView **in action.**

MainActivity.java **Java**

```
...
        ArrayList<String> candyList = new ArrayList<String>();
        ...

        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
                ... );

        ListView listView = (ListView)this.findViewById(
                R.id.list_view_candy);

        listView.setAdapter(adapter);
...
```

Now that we found the ListView *by its* id, *we can set its* Adapter

Screencast: Demo All the Code in MainActivity.java


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