List & Tab View

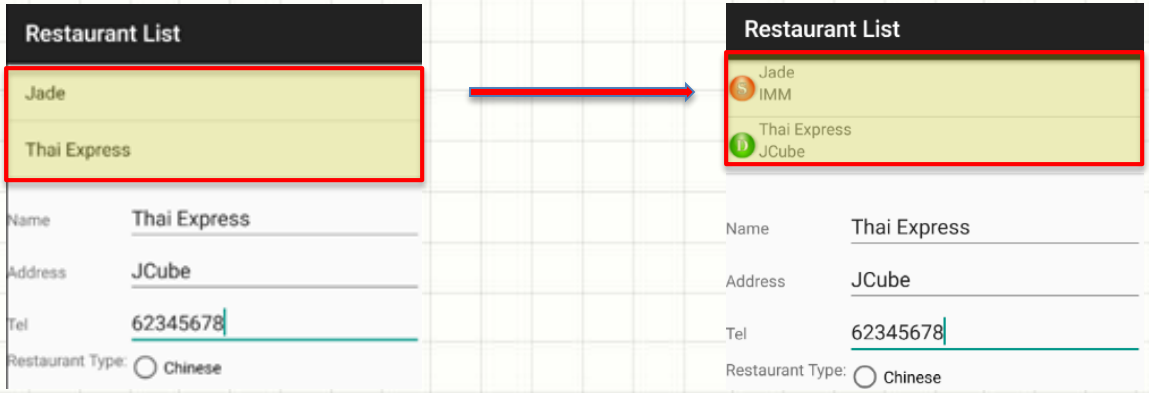
Today's Overview

1. Creating Fancier ListView
2. Creating Tabs

Fancier ListView

Fancier ListView

- Instead of a simple row display in a *ListView*, it can be customized to enhanced the look. As shown below, the new row display comprises restaurant name and address of the restaurant, plus an image icon



Fancier ListView

- Let's check what do we need to modify from the previous exercise to incorporate the new row display?
  - ❑Model - Any change in Data Model?
  - ❑View - Do you need to modify any of the user interface view?
  - ❑Controller - Do you need to tell the Controller to do any thing new?

Fancier ListView

- Model → NO

  No change in *ArrayList* with Restaurant Data Model

- View → YES

  New row layout in *ListView* is needed. We will create a *row.xml* layout

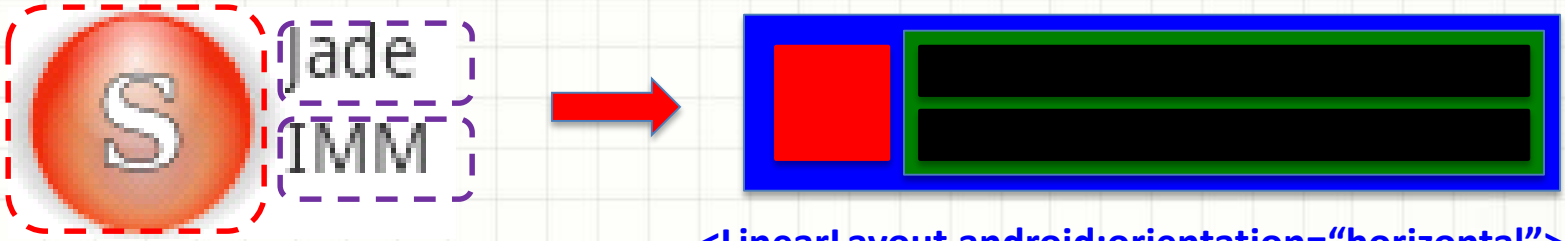
- Controller → YES

  New customized Adapter to inflate the new row display in the *ListView*. We create a subclass *RestaurantAdapter* of *ArrayAdapter* to control the row design and populate row data from the *ArrayList*

View - New Row Layout

Row Layout

- The new row layout *row.xml* will contain
  - one *ImageView* widget for image icon
  - two *TextView* widgets for name and address




```
<LinearLayout android:orientation="horizontal">
  <ImageView android:id="@+id/icon"/>
  <LinearLayout android:orientation="vertical">
    <TextView android:id="@+id/restName"/>
    <TextView android:id="@+id/restAddr"/>
  <\LinearLayout>
<\LinearLayout>
```

Basic skeleton layout for row.xml

Row Layout

- *row.xml* Listing

```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="wrap_content"
    android:orientation="horizontal">

    <ImageView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        app:srcCompat="?android:attr/listChoiceIndicatorSingle"
        android:id="@+id/icon"
        android:layout_weight="1" />

    <LinearLayout
        android:orientation="vertical"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_weight="1">

        <TextView
            android:text="TextView"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:id="@+id/restName" />

        <TextView
            android:text="TextView"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:id="@+id/restAddr" />
    </LinearLayout>
</LinearLayout>
```

Controller – Customized Adapter

Customized Adapter

- In Practical 1, you have learnt that a *ListView* inflates its rows with the *ArrayList* of Restaurant Data Model through *ArrayAdapter*
- New Customized *Adapter* (a sub-class of *ArrayAdapter* class) is implemented to incorporate the *row.xml* layout with the *ArrayList*

```
List<Restaurant> model = new ArrayList<Restaurant>();
```

```
class RestaurantAdapter extends ArrayAdapter<Restaurant> {
    RestaurantAdapter() {
        super(RestaurantList.this, R.layout.row, model);
    }
```

Customized Adapter

- getView() method is responsible for creating the individual rows of *ListView*
- The method determines the layout and the data assignment of the row

```
public View getView(int position, View convertView, ViewGroup parent) {
    View row = convertView;
    RestaurantHolder holder = null;

    if (row == null) {
        LayoutInflater inflater = getLayoutInflater();

        row = inflater.inflate(R.layout.row, parent, false);
        holder = new RestaurantHolder(row);
        row.setTag(holder);
    } else {
        holder = (RestaurantHolder) row.getTag();
    }
    holder.populateFrom(model.get(position));

    return (row);
}
```

Customized Adapter

- If user scrolls the list, certain rows will not be visible anymore in *ListView*
- Android recycles rows which are not displayed anymore and allow these rows to be reused
- A performance optimized adapter assigns the new content to the recycled row. Only updating the content of the row avoids loading the *row.xml* XML layout

Customized Adapter

- If *ListView* has a recycled row, it passes these rows to getView() method as convertView parameter
- convertView may be NULL if there is no row to recycle

```
public View getView(int position, View convertView, ViewGroup parent) {
    View row = convertView;
    RestaurantHolder holder = null;

    if (row == null) {
        LayoutInflater inflater = getLayoutInflater();

        row = inflater.inflate(R.layout.row, parent, false);
        holder = new RestaurantHolder(row);
        row.setTag(holder);
    } else {
        holder = (RestaurantHolder) row.getTag();
    }
    holder.populateFrom(model.get(position));

    return (row);
}
```

No recycled row

Recycled row available

View Holder

- The findViewById() method is an "expensive" operation, therefore a "View Holder" (*RestaurantHolder*) is created in *Adapter to* hold references to the widgets (restName, restAddress and icon) in the row layout
- This is faster then the repetitive call of the findViewById() method

View Holder

- This “View Holder” is attached to the row via setTag() method. If row is recycled, the “View Holder” can be called via getTag() method

```
public View getView(int position, View convertView, ViewGroup parent) {
    View row = convertView;
    RestaurantHolder holder = null;

    if (row == null) {
        LayoutInflater inflater = getLayoutInflater();

        row = inflater.inflate(R.layout.row, parent, false);
        holder = new RestaurantHolder(row);
        row.setTag(holder);
    } else {
        holder = (RestaurantHolder) row.getTag();
    }
    holder.populateFrom(model.get(position));

    return (row);
}
```

View Holder

- *RestaurantHolder* Class Listing

```
static class RestaurantHolder {
    private TextView restName = null;
    private TextView addr = null;
    private ImageView icon = null;

    RestaurantHolder(View row) {
        restName = (TextView) row.findViewById(R.id.restName);
        addr = (TextView) row.findViewById(R.id.restAddr);
        icon = (ImageView) row.findViewById(R.id.icon);
    }

    void populateFrom(Restaurant r) {
        restName.setText(r.getName());
        addr.setText(r.getAddress() + ", " + r.getTelephone());

        if (r.getRestaurantType().equals("Chinese")) {
            icon.setImageResource(R.drawable.ball_red);
        } else if (r.getRestaurantType().equals("Western")) {
            icon.setImageResource(R.drawable.ball_yellow);
        } else {
            icon.setImageResource(R.drawable.ball_green);
        }
    }
```

Get different icon if the restaurant's type is different

Binding

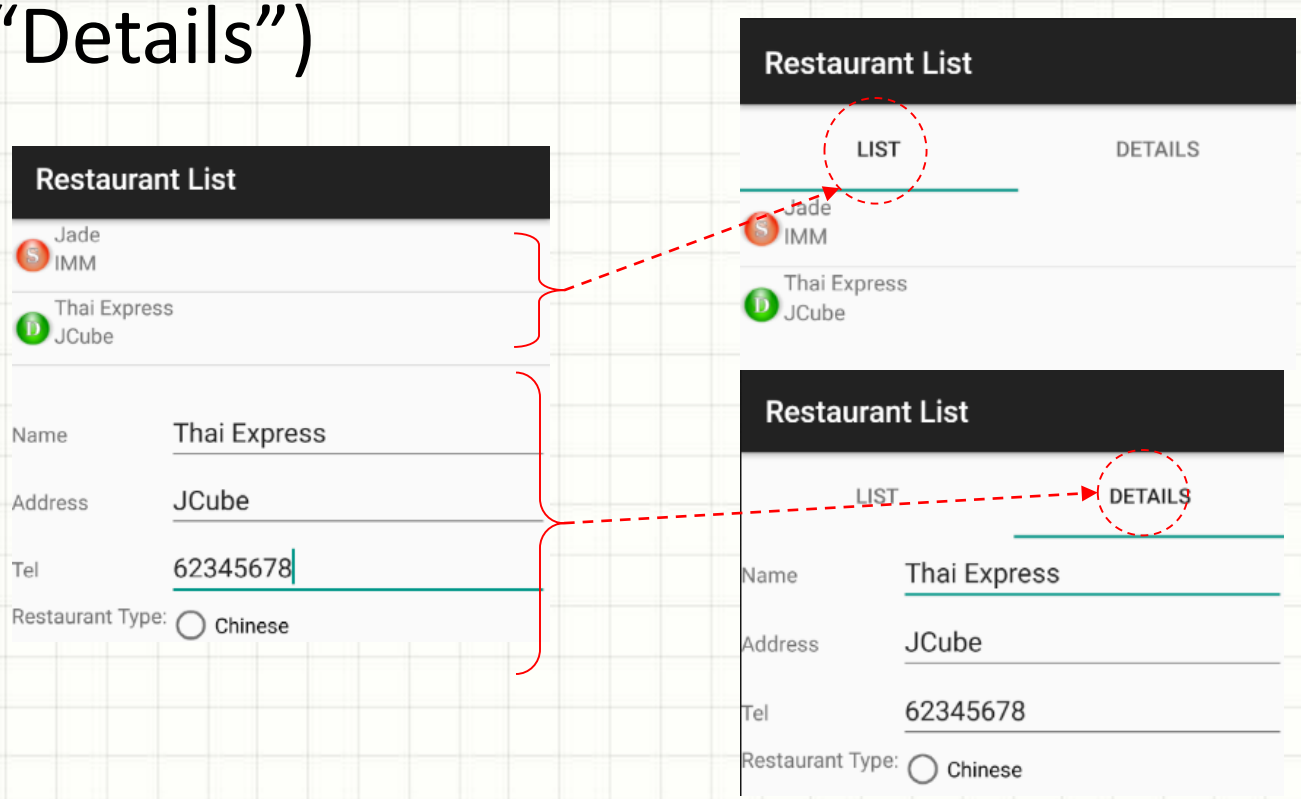
- With the customized adapter (*RestaurantAdapter*) ready, it is time to bind the *ListView* to new *ArrayAdapter* -> *RestaurantAdapter* using *setAdapter* method

```
list = (ListView) findViewById(R.id.restaurants);
adapter = new RestaurantAdapter();
list.setAdapter(adapter);
```

Splitting The Views

Tabs

- In second part of Practical 2 exercise, the *ListView* and Restaurant Form are split and displayed into two separated tabs (“List” and “Details”)



Tabs

- Let's check what do we need to modify from the previous exercise to split the views?
  - Model - Any change in Data Model?
  - View - Do you need to modify any of the user interface view?
  - Controller - Do you need to tell the Controller to do any thing new?

Tabs

- Model → NO

  No change in *ArrayList* with Restaurant Data Model

- View → YES

  Tab layout is needed. We will modify the *main.xml* layout to use *TabHost*, *TabWidget* and *FrameLayout* to create the new view

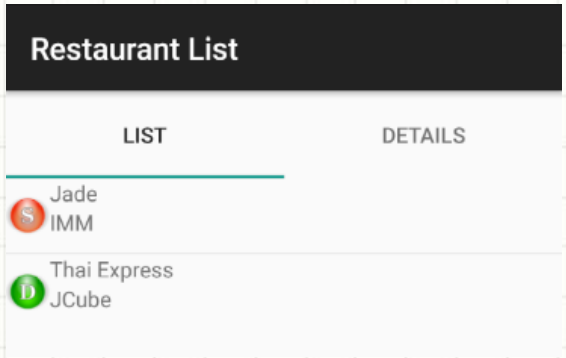
- Controller → YES

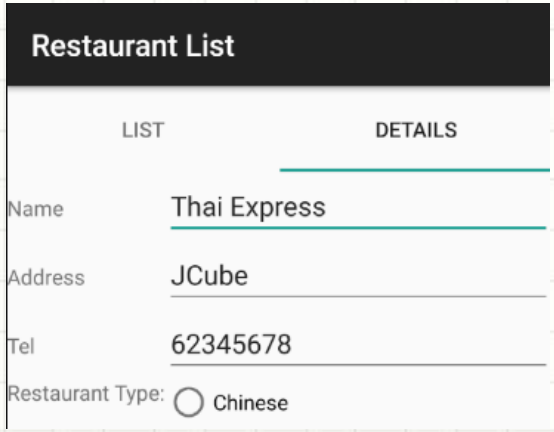
  Change the Activity to *TabActivity* and create tabs for “List” and “Details” UI views

UI View - New Main Layout

Tab View

- Update the *main.xml* layout with *TabHost*, *TabWidget* and *FrameLayout* for the new layout






```
<TabHost>
  <LinearLayout android:orientation="vertical" >
    <TabWidget />
    <FrameLayout>

      <LinearLayout android:id="@+id/restaurants_tab>
        <ListView android:id="@+id/restaurants" />
      </LinearLayout>

      <LinearLayout android:id="@+id/details_tab>
        <TableLayout android:id="@+id/details" >
          <TableRow>
          </TableRow>
            ..........
        </TableLayout>
      </LinearLayout>

    </FrameLayout>
  </LinearLayout>
</TabHost>
```

Basic Skeleton of main.xml

Tab View

TabHost

- Container for a tabbed window view
- This object holds two children:
  - a set of tab labels that the user clicks to select a specific tab, and
  - a FrameLayout object that displays the contents of that page.

Tab View

TabHost

- *TabHost* is used to add labels, add the callback handler, and manage callbacks. For instance, switching the displayed page
- You might call this object to iterate the list of tabs, or to tweak the layout of the tab list

Tab View

TabWidget

- Displays a list of tab labels representing each page in the TabHost's collection
- When the user selects a tab, *TabWidget* sends a message to the parent container, *TabHost*, to tell it to switch the displayed page. You typically won't use many methods directly on this object.

Main Layout

- *main.xml* Listing (partial)

```
13  <TabHost
14      android:id="@+id/tabHost"
15      android:layout_width="match_parent"
16      android:layout_height="match_parent">
17
18      <LinearLayout
19          android:layout_width="match_parent"
20          android:layout_height="match_parent"
21          android:orientation="vertical">
22
23          <TabWidget
24              android:id="@android:id/tabs"
25              android:layout_width="match_parent"
26              android:layout_height="wrap_content" />
27
28          <FrameLayout
29              android:id="@android:id/tabcontent"
30              android:layout_width="match_parent"
31              android:layout_height="match_parent">
```

Controller – Setting up Tabs View

Controller

- Create the two tabs and load with different UI View content defined in *FrameLayout*
  - restaurants (*ListView*) for 'List' tab

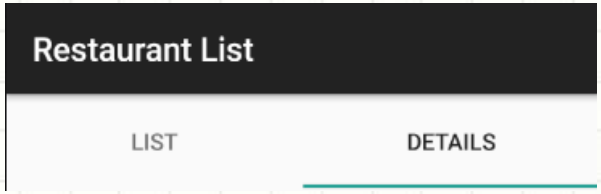
```
//Tab 1
TabHost.TabSpec spec = host.newTabSpec("List");
spec.setContent(R.id.restaurants_tab);
spec.setIndicator("List");
host.addTab(spec);
```

  - restaurantDetails (*TableLayout*) for 'Details' tab

```
//Tab 2
spec = host.newTabSpec("Details");
spec.setContent(R.id.details_tab);
spec.setIndicator("Details");
host.addTab(spec);
```

```
<FrameLayout
    android:id="@android:id/tabcontent"
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <LinearLayout
        android:id="@+id/restaurants_tab"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="vertical">

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

    <LinearLayout
        android:id="@+id/details_tab"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="vertical">

        <TableLayout...>

        <Button...>
    </LinearLayout>

</FrameLayout>
```

Controller



- Setup the title display (“LIST” and “DETAILS”) of each tab using *setIndicator* method
- Add the new tab to the *TabHost* using *addTab* method

```
spec.setIndicator("List");
host.addTab(spec);
```

```
spec.setIndicator("Details");
host.addTab(spec);
```

Controller

TabHost.TabSpec

- A tab has a tab indicator, content, and a tag that is used to keep track of it. This builder helps to choose among these options

Controller

TabHost.TabSpec

- For the tab indicator, your choices are

  1) set a label

  2) set a label and an icon

Controller

TabHost.TabSpec

- For the tab content, your choices are

  1) the id of a View

  2) a TabHost.TabContentFactory that creates the View content

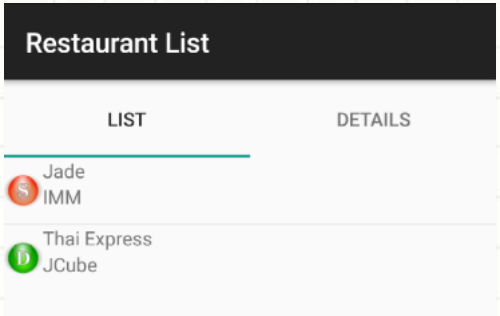
  3) an Intent that launches an Activity

Controller

- After setting up the UI View to link to the Controller, setCurrentTab(int) method can be used to control the UI View to be displayed
  - host.setCurrentTab(0) to show *ListView*
  - host.setCurrentTab(1) to show Restaurant form

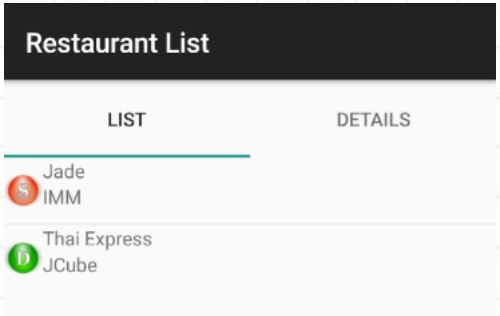
Controller – Detecting List Item Click

List Click



- Let's check what do we need to modify from the previous exercise to detect list item click?
  - ❑Model - Any change in Data Model?
  - ❑View - Do you need to modify any of the user interface view?
  - ❑Controller - Do you need to tell the Controller to do any thing new?

List Click



- Model - NO
- View - NO
- Controller - YES

Same as Button ‘click’, you need to implement an on item event listener to the *ListView*. When a ‘click’ on the list item, the Controller will activate the listener (*AdapterView* on item click listener) to handle the event

Controller

- Implement the Controller to capture the event generated by *ListView* when a row is selected using *setOnItemClickListener* method and pass the event to *onListClist* (*ArrayView* onItemClick Listener)

```
list = (ListView) findViewById(R.id.restaurants);
adapter = new RestaurantAdapter();
list.setAdapter(adapter);
```

```
list.setOnItemClickListener(onListClick);
```

Controller

- When a row is selected, the *ListView* selected event will be captured by the *AdapterView.OnItemClickListener* class and handle by onItemClick() method for the necessary action. In this case is to get the restaurant data from *ArrayList* Model to memory (restaurant Model) and transfer to the widgets (name, address, telephone and restaurantType) on the restaurant form

```
private AdapterView.OnItemClickListener onListClick = new AdapterView.OnItemClickListener() {
    public void onItemClick(AdapterView<?> parent, View view, int position, long id) {
```

Controller

- Respond to row selected event on *ListView*

```
private AdapterView.OnItemClickListener onListClick = new AdapterView.OnItemClickListener() {

    public void onItemClick(AdapterView<?> parent, View view, int position, long id) {
        Restaurant r = model.get(position);

        restaurantName.setText(r.getName());
        restaurantAddress.setText(r.getAddress());
        restaurantTel.setText(r.getTelephone());

        if (r.getRestaurantType().equals("Chinese")) {
            restaurantTypes.check(R.id.chinese);
        } else if (r.getRestaurantType().equals("Western")) {
            restaurantTypes.check(R.id.western);
        } else if (r.getRestaurantType().equals("Indian")) {
            restaurantTypes.check(R.id.indian);
        } else if (r.getRestaurantType().equals("Indonesia")) {
            restaurantTypes.check(R.id.indonesian);
        } else if (r.getRestaurantType().equals("Korean")) {
            restaurantTypes.check(R.id.korean);
        } else if (r.getRestaurantType().equals("Japanese")) {
            restaurantTypes.check(R.id.japanese);
        } else {
            restaurantTypes.check(R.id.thai);
        }

        host.setCurrentTab(1);
    }
};
```

Get data from ArrayList Model to restaurant Model

Transfer individual data element to widgets on UI View

Switch the current UI display to “Details” tab

END