

Android: Intents, Menus, Reflection, and ListViews

Tommy MacWilliam

Harvard University

March 1, 2011

Announcements

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ Lecture videos available at:
<https://www.cs76.net/Lectures>
- ▶ Section schedule: <https://www.cs76.net/Sections>
- ▶ n-Puzzle walkthrough: <https://www.cs76.net/Sections>
- ▶ Mobile Local feedback this week
- ▶ Office Hours: next Tuesday and Wednesday

Today

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ Intents and Bundles
- ▶ Menus
- ▶ Reflection
- ▶ ListViews
- ▶ Tags

Section Feedback

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ <http://tommymacwilliam.com/e76/feedback>
 - ▶ let me know how I'm doing!
- ▶ I don't like long surveys either, so give me feedback via an anonymous (I promise) 140-character tweet!

Creating an Activity

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ example time!
 - ▶ don't forget to add your Activity to `AndroidManifest.xml`!

Switching Activities

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `Intent i = new Intent (Context
packageContext, Class<?> cls);`
 - ▶ `packageContext`: the **Activity** we're coming from
 - ▶ `cls`: the **Activity** in our app we're going to
- ▶ `Intent i = new Intent (this,
AnotherActivity.class);
startActivity(i);`

Calling another app

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `Intent i = new Intent(<action>, <data>);`
 - ▶ `ACTION_VIEW, ACTION_EDIT, ACTION_DIAL`
 - ▶ `scheme://host/data/segments`
- ▶ `Intent i = new
Intent(Intent.ACTION_DIAL,
Uri.parse("tel:123"));`

Intents

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

▶ example time!

Activity Results

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `startActivityForResult(i)` allows us to “return” data to the calling Activity
- ▶ `onActivityResult(int requestCode, int resultCode, Intent data);`
 - ▶ `requestCode`: unique integer to determine what Activity returned
 - ▶ `resultCode`: `RESULT_OK`, `RESULT_CANCELED`
 - ▶ `data`: `Intent` to receive additional data

Activity Results

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `setResult(int resultCode, Intent data);`
 - ▶ `resultCode: RESULT_OK, RESULT_CANCELED`
 - ▶ `data: Intent to pass additional data`
- ▶ `finish()` pops from stack and sends control back to previous Activity

Bundles

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ Bundle objects store key/value pairs via `put<type>` and `get<type>` methods
 - ▶ Boolean, Byte, Char, Double, Float, Int, Long, String, etc.
 - ▶ BooleanArray, ByteArray, CharArray, etc.
- ▶ can get `size()` and `keySet()`

Bundles

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `intent.putExtras(Bundle bundle);`
 - ▶ associate a bundle with an intent
- ▶ `getIntent().getExtras();`
 - ▶ get the bundle associated with an intent
- ▶ **can also simply** `intent.putExtra(String key, value);`
 - ▶ `intent.get<type>Extra(String key);`

Activities and Bundles

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

▶ example time!

Menus

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ described as XML, stored in `res/menu`
- ▶ `<menu>` has multiple `<item>` children
- ▶ accessed just like other resources, via `R.menu.<filename>`

Menus

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `onCreateOptionsMenu(Menu menu)`
 - ▶ user presses menu button on device
- ▶ `onCreateContextMenu(ContextMenu menu, View v, ContextMenuInfo menuInfo)`
 - ▶ user holds down a `View` (like right-clicking)
 - ▶ need to `registerForContextMenu(View v)`

Menus

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `onOptionsItemSelected()` (`MenuItem item`)
 - ▶ user selects an option from menu button menu
- ▶ `onContextItemSelected()` (`MenuItem item`)
 - ▶ user selects an option from a context menu
- ▶ `item.getItemId()` gets ID of selected item

Submenus

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `<item>` elements can also contain other `<menu>` items
- ▶ when `<item>` is selected, a submenu will open as a context menu

Menus

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

▶ example time!

Reflection

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ general term that refers to an application working with its own data structure at runtime
 - ▶ invoke methods specified by strings
 - ▶ iterate through class properties
- ▶ `java.lang.reflect.*;`

Reflection

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ **get class from instance:** `int x = 5; Class c = x.getClass();`
- ▶ **get class from type:** `Class c = boolean.class;`
 - ▶ we've been using this for Intents all along
- ▶ **get class from String:** `Class c = Class.forName("net.cs76.Hello");`
- ▶ **get superclass from class:** `Class c = MyActivity.class.getSuperClass();`

Reflection

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ once we have a class, we can see what it looks like
- ▶ get all fields: `c.getFields()`;
 - ▶ get single field: `f = c.getField(String name);`
 - ▶ get value of an instance: `f.get(Object instance);`
 - ▶ also `getInt`, `getBoolean`, etc.
 - ▶ set value of an instance: `f.set(Object instance, value);`
- ▶ get all methods: `c.getMethods()`;

Reflection

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ so... what?
- ▶ R is an auto-generated class
 - ▶ difficult to iterate over until now

Reflection

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

▶ example time!

ListViews

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ display a vertically scrollable list items
- ▶ special type of Activity: extends `ListActivity`
- ▶ each item defined by a layout (containing a `TextView`) in `res/layouts/<layout>.xml`
 - ▶ as usual, accessible via `R.layout.<filename>`

ArrayAdapter

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ adapters bridge the model and view
- ▶ `ArrayAdapter<String> a = new ArrayAdapter<String>(Context c, int resource, List objects);`
 - ▶ creates an adapter to display a list of objects
- ▶ `ListView` uses an `ListAdapter` to get data to be displayed in the `View`
- ▶ `setListAdapter(listAdapter)` sets the `ListAdapter` for a `View`

ListViews

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ **every `ListActivity` has an associated `ListView`**
 - ▶ `getListView()`;
- ▶ **event handlers attached to `ListView`, NOT individual elements**
 - ▶ `getListView().setOnClickListener()`;

StringArray

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `res/values/strings.xml` can also contain arrays of strings
- ▶ `<string-array>` has `<item>` children
 - ▶

```
String[] a = getResources().  
getStringArray(R.array.<array name>);
```

ListViews

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

▶ example time!

ArrayAdapter

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ what if we want more than just a `TextView`?
- ▶ we can also create our own adapters by extending `BaseAdapter`, `CursorAdapter`, **etc.**
 - ▶ need to define:
 - ▶ `getCount()`, `getItem()`, `getItemId()`,
`getView()`

ArrayAdapter

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ what if we don't want to write all those methods?
- ▶ `extends ArrayAdapter` means we already have those methods written for a simple `List` of items
- ▶ `@Override` to redefine those methods to add more functionality than the default

ArrayAdapter

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

▶ example time!

Tags

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ tags allow us to associate data with any `View`
- ▶ any object can be a tag, and a `View` can have multiple tags
- ▶ `java.util.HashMap`, `java.util.ArrayList`, **etc.**

Getting/Setting Tags

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ `view.setTag(int key, Object tag);`
 - ▶ **key: optional, index of tag**
 - ▶ **tag: any object**
- ▶ `view.getTag(int key)`
 - ▶ **key: optional, index of tags**

Finding by Tag

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

- ▶ miss jQuery selectors as much as I do yet?
- ▶ `view.findViewByIdWithTag(Object tag);`
 - ▶ **WARNING:** much slower than `findViewById`

Tags

Android:
Intents,
Menus,
Reflection,
and ListViews

Tommy
MacWilliam

Intents
Review

Menus

Reflection

ListViews

Tags

▶ example time!