

## CPEN 475

### Project 4: Networked ListView with custom data adapter and display

**Deliverables:** Complete Android Studio Project

**SampleProject:** Project4Base is a sample project with some of the content you need for this assignment. **You may use this as the basis for your project or you can develop a solution on your own. It's your choice.**

#### Overview:

You are going to build an app that mimics craigslist. It will download a static JSON string representing 30 or so bikes for sale. The string has a good bit of data associated with each bike including a URL that points to a thumbnail image of the bike. Please parse this data and display it in a listview or listactivity. Please also provide a means of sorting this list. (see sorting portion of listview

This app follows a common data presentation pattern;

1. Present the user a sortable list with a little bit about every item.
2. On item selection display a lot of information about that particular item.

**You will use this technique a lot in industry.**

#### Grading:

**40% -** Get parsed JSON in a list and display it in ListView

10% - Pref activity and Pref change Listener to select download site

20% - Imageviews displayed properly and pegged to proper row of data

20% - Sorting done correctly

10% - Refresh button working correctly

#### Essential Readings:

1. A fantastic how to of listview optimizations, includes viewholder and convertview patterns and downloading images asynchronously for each row in the listview;  
<http://lucasr.org/2012/04/05/performance-tips-for-androids-listview/>
2. Making ListView Scrolling Smooth

<http://developer.android.com/training/improving-layouts/smooth-scrolling.html>

## Requirements:

1. On startup **your app launches an async task which downloads** either of the following files. This file contains all the data associated with each bike in JSON format. The tetonsoftware link does not work, the pcs one does.

<http://www.tetonsoftware.com/bikes/bikes.json>

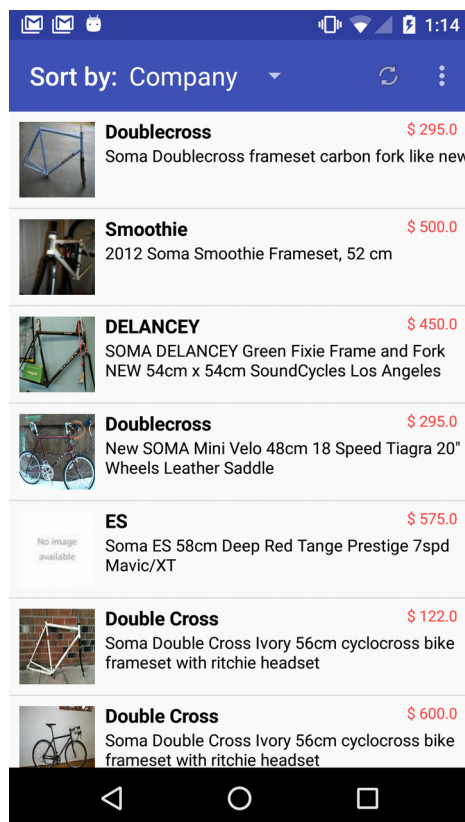
<http://www.pcs.cnu.edu/~kperkins/bikes/bikes.json>

bikes.json has a list of roughly 30 bikes. This is the data in the file associated with **one** bike.

```
{
    "Company": "Surly",
    "Model": "LHT",
    "Location": "WI",
    "Price": 875.00,
    "Date": "Jan 18, 2013",
    "Description": "Surly Long Haul Trucker 52cm - NEW",
    "Picture": "29.jpg",
    "Link": "Link To website"
},
```

2. Please develop a suitable object model to hold each bikes JSON data. For instance, a **Bikedata** object that holds Strings for Company, Model etc. ***Note that Price is not a string. You should also override the toString() method to return a suitably formatted string for displaying characteristics of a particular bike (see alert diagram in second figure below). These bike objects are complicated objects with several optional fields, therefore please use a builder to create them (see Builderpattern demo code)***
3. Please choose a suitable Java collection to hold the list of **Bikedata** objects.
4. Please develop **suitable comparator classes** for sorting your collection of **Bikedata** objects. If you are rusty on comparators and collection sorting there is a small tutorial in the Listview lecture and a more in depth one here: <http://www.vogella.com/blog/2009/08/04/collections-sort-java/> . Please be able to sort on the following fields.
  - a. Company

- b. Location
  - c. Price
5. The downloaded JSON data is in the form of a string. Parse this into objects and insert the objects into your chosen sortable collection. I've included a parser (JSONHelper) as part of the sample project.
  6. Please read Essential Readings 1 and 2 for help on implementing steps 7-9.
  7. Your Apps main UI consists of a Toolbar and a ListView that will look something like the following. Note the image and the custom view layouts for each row. (See lecture and sample code for listview with custom adapter).



8. Please use a custom data adapter. It must implement both the convertview and the viewholder pattern.
9. This adapter must have a custom rowlayout. Its purpose is to define how each row will look. I've included a functioning one as part of the sample project
10. The ToolBar will have a spinner that allows you to select the sort order of the items in the list. I've included a bare bones spinner in the sample projects XML.

11. The ToolBar must have a refresh icon, please find a suitable one and place it in the menu.xml. The handler for it should clear the list and then reload the JSON list of bikes and images. It should also reset the spinner to whatever the default search is.
12. The app must have settings in the ToolBar overflow area. Please use it to pop up a preference activity that lets the user choose which site data is downloaded from (see step 1). **Use a listpreference for this! Do not make the user type in a website!**
13. Once the user changes the sort order via the spinner, the list must resort. Here is how I sort the list in my ListViews dataadapter:

```
Collections.sort(data,new ComparatorModel());
```

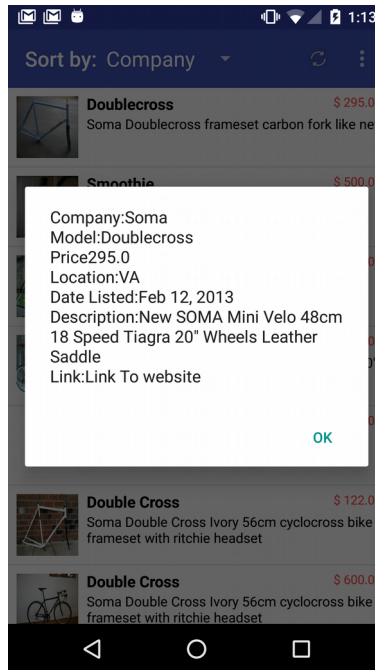
ComparatorModel() is a separate class that sorts two Bikedata objects based on the model: Here is its implementation

```
class ComparatorModel implements
    Comparator<BikeData> {
    public int compare(BikeData myData1, BikeData
        myData2) {
        // if both equal then 0
        return (myData1.Model.compareTo(myData2.Model));
    }
}
```

The sorting only resorts the collection, not the actual listview. Once you resort the data tell the listview to redraw itself by invoking the following command on the dataadapter;

```
notifyDataSetChanged();
```

14. If the user touches one of the items in the list, an onItemClick listener will respond and pop up a Dialog which displays detailed information about which item is selected. (In a real app you would use fragments to display this information in a fashion appropriate to the screen size and orientation). See the following



## Displaying Images in the list

Parsing the JSON into a list is easy. However note that all you get is a URL for the picture and that's what is stored in your list. Please launch an async task to retrieve the image as the list is populated. See Essential Readings 1 for how to do this;

## Gotchas

You probably need to set timeouts on your http connections, otherwise if rapidly scrolling the list you may exceed the maximum number of async tasks you are allowed to run.

Some versions of android limit your app to 128 separate tasks, you go over that you get a `RejectedExecutionException` failure. You don't catch it your app crashes. **The executor service is a perfect solution for this type of situation since you can create a threadpool and limit the number of active threads.**

## Locking Orientation

In this app you will be launching a bunch of threads to retrieve a lot of images asynchronously? What do you do if the user rotates the phone while these tasks are running? In a real app you would probably maintain a list of threads, when the phone rotates, detach each and every thread from its parent activity and then reattach when the activity is recreated. That's a lot of work for this app so use the following code in your manifest to lock your **activity** in portrait mode.

```
android:screenOrientation="portrait"
```