# Notifications Lab

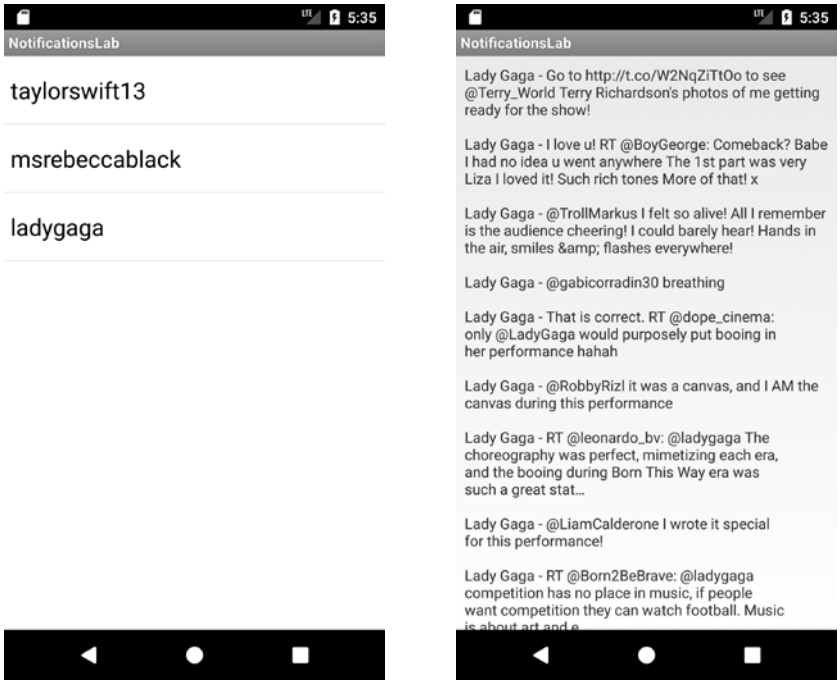
*Notifications and BroadcastReceivers*

## Objectives:

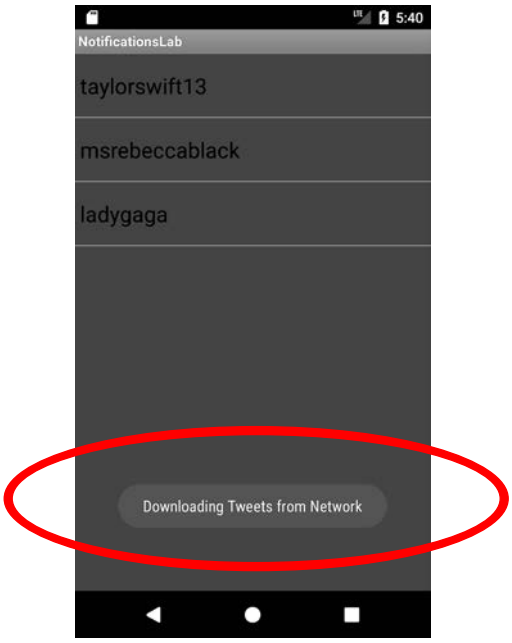
This week's Lab explores User Notifications and Broadcast Receivers. After finishing this Lab, you will have a better understanding of how to create and display different types of User Notifications in order to inform users of your application's actions. You will also learn how to broadcast and receive Intents.

## Exercise A:

This Lab involves an app that displays locally stored Twitter data from a set of friends. The basic interface appears below.



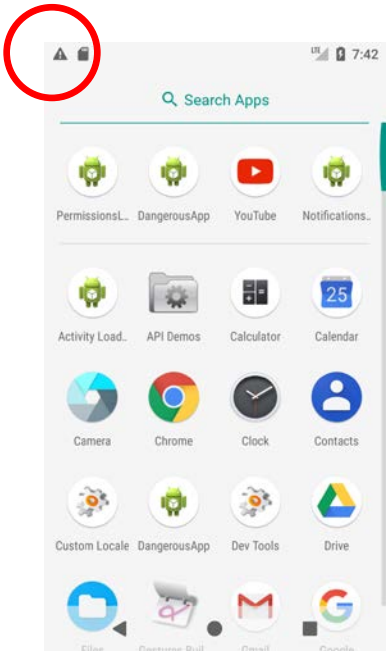

When the application's MainActivity begins running, it determines whether any Tweet data has been downloaded within the last two minutes. If not, it considers any existing data to be stale and therefore downloads fresh Twitter data. To do the "downloading" step the Activity causes an AsyncTask to execute, which will loads the Twitter data off of the main Thread. As the AsyncTask begins to download the Twitter data, the application creates and displays a Toast message, alerting the users that the download is starting. The Toast message is shown below:



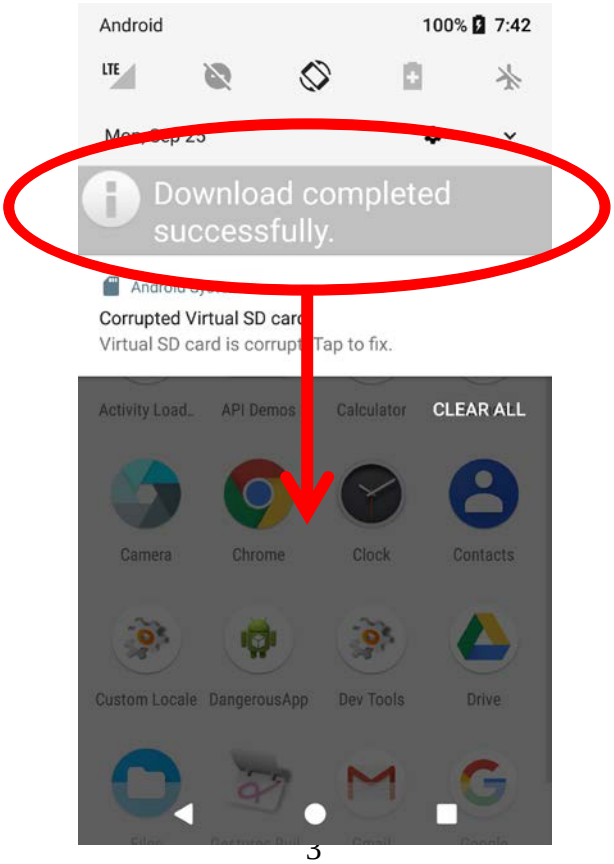

The download process takes a noticeable amount of time. Therefore, it's possible that the might exit the application while the download is in progress. If that happens, the application uses a Notification Area Notification to inform the user once the download finishes. To do this, when the AsyncTask finishes downloading the tweet data, it broadcasts an Intent. If the application's MainActivity is not running and in the foreground when the Intent is broadcast, then the AsyncTask creates a Notification Area Notification and places it in the Notification area. However, if the MainActivity is running and in the foreground, then the AsyncTask does not create this Notification. Instead, it displays a Toast message informing the user that the download is finished.

Specifically, the AsyncTask uses the sendOrderedBroadcast() method to broadcast an Intent once downloading has finished. It also passes its own BroadcastReceiver into this call so that it can receive the result of the broadcast. The MainActivity dynamically registers a BroadcastReceiver to receive this Intent, only when the MainActivity is visible and in the foreground. If the BroadcastRecevier receives this Intent, then it will return a specific result code, which lets the AsyncTask know that the MainActivity is currently visible and in the foreground. If this result code does not arrive back to the AsyncTask, then the AsyncTask assumes that the Activity is not visible and in the foreground and therefore it will send the Notification Area Notification.

If the AsyncTask does send the Notification Area notification, an icon appears in the Notification Area and the user can then examine the notification.

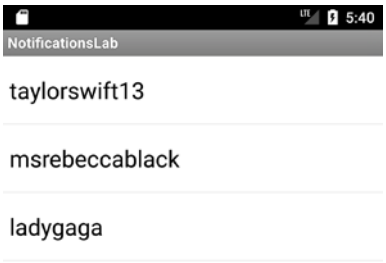


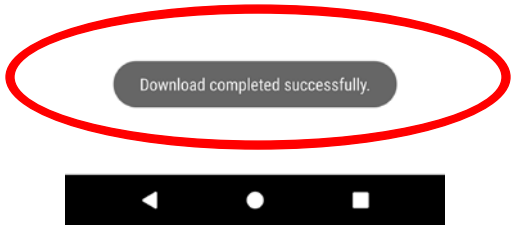

When the user pulls down on the Notification drawer, he or she will see an indication of whether or not the data was successfully downloaded. An example is shown below:



If the user clicks on this Notification's View, the MainActivity should re-open. Again, if the MainActivity starts more than two minutes after the data was downloaded, then MainActivity should download the data again. Otherwise, it should not.

Finally, if the download finishes while the MainActivity is visible and in the foreground, the app displays a Toast message to that effect.




## Implementation Notes:

1. Download the application skeleton files and import them into your IDE.
2. Implement the TODO comments found in the MainActivity.java and DownloadTaskFragment.java files
   In MainActivity.java.
   a. Create a BroadcastReceiver that returns a result code (MainActivity.IS_ALIVE) to inform the AsyncTask that the MainActivity's active and in the foreground, and therefore, the AsyncTask should not send the Notification Area Notification.
   b. Register the broadcast receiver in the protected void onResume() method.
   c. Unregister the broadcast receiver in the protected void onPause() method.

   In DownloadTaskFragment.java.
   d. Implement the logic to notify the user that the feed has been downloaded using sendOrderedBroadcast(). You will need to create a BroadcastReceiver to receive the result of this broadcast. If that result is not MainActivity.IS_ALIVE then this BroadcastReceiver should create a Notification Area Notification and create a NotificationChannel to support API level 26.

### Testing:

The test cases for this Lab are in the Lab6_Notifications project. You can run the test cases either all at once, by right clicking the test package and then selecting Run 'Tests in 'course.lab…', or one at a time, by right clicking on an individual test case class and then continuing as before. The test classes are Robotium test cases. As you implement various steps of the Lab, run the test cases every so often to see if you are making progress toward completion of the Lab.

**Warnings:**

1. These test cases have been tested on a Galaxy Nexus AVD emulator with API level 26. To limit configuration problems, you should test you app against a similar AVD.
2. These test cases will start the application, not at the MainActivity, but at another Activity called, TestFrontEndActivity. If you look into the AndroidManifest.xml file for this application, you'll see that both of these Activities are main entry points for the app. In fact, when you install this app, two icons will appear in the launcher. This approach allows us to modify the age of any already downloaded Tweet data before starting the MainActivity. The interface for this Activity is shown below.


Once you've passed all the test cases, submit your project to GitLab.

## Submission

To submit your work you will need to commit your solution to your repo on GitLab by running the following command: git push origin master.
Note: if you have not already pushed this branch to your repo on GitLab you will need to make a slight modification for this first time and run this instead: git push –u origin master. This sets up tracking between your local branch and a branch with the same name on your repo in GitLab.

## Optional Exercise B: Add Alarms

Modify your application so that your Tweet data is always fresh. Use an Alarm to re-download the Tweet data every two minutes. Note: In a real application, downloading every two minutes would probably be excessive. You can play with the download frequency. In addition, since our data will never change, the whole operation is somewhat pointless, but it nevertheless gives you a chance to create Alarms.