ROYAL UNIVERSITY OF BHUTAN
COLLEGE OF SCIENCE AND TECHNOLOGY
PHUENTSHOLING: BHUTAN

PLAGIARISM DECLARATION FORM

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Student No: 0□001□□

Module No and Title of the module: CTE306 - Mobile Application Development
Assignment no and Title of the Assignment: Lab Wok 06

Section H2 of the Royal University of Bhutan's *Wheel of Academic Law* provides the following definition of academic dishonesty:
"Academic dishonesty may be defined as any attempt by a student to gain an unfair advantage in any assessment. It may be demonstrated by one of the following:
Collusion: the representation of a piece of unauthorized group work as the work of a single candidate.
Commissioning: submitting an assignment done by another person as the student's own work.
Duplication: the inclusion in coursework of material identical or substantially similar to material which has already been submitted for any other assessment within the University.
False declaration: making a false declaration in order to receive special consideration by an Examination Board or to obtain extensions to deadlines or exemption from work.
Falsification of data: presentation of data in laboratory reports, projects, etc., based on work purported to have been carried out by the student, which have been invented, altered or copied by the student.
Plagiarism: the unacknowledged use of another's work as if it were one's own.

Examples are:
- verbatim copying of another's work without acknowledgement
- paraphrasing of another's work by simply changing a few words or altering the order of presentation, without acknowledgement
- ideas or intellectual data in any form presented as one's own without acknowledging the source(s)
- making significant use of unattributed digital images such as graphs, tables, photographs, etc. taken from test books, articles, films, plays, handouts, internet, or any other source, whether published or unpublished
- submission of a piece of work which has previously been assessed for a different award or module or at a different institution as if it were new work
- use of any material without prior permission of copyright from appropriate authority or owner of the materials used"

Student Declaration

I confirm that I have read and understood the above definitions of academic dishonesty. I declare that I have not committed any academic dishonesty when completing the attached piece of work.

Signature of Student: [illegible] Date: 11 Sept 2022

Lab 06

CTE306 – Mobile Application Development

Date – 5th September 2022

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Aim

Perform the task on following topics:

1. AsyncTask
2. AsyncTaskLoader
3. InternetConnection

Theory

The purpose of AsyncTask is to make it simple and appropriate to use the UI thread. The most frequent use case, however, is UI integration, which leads to Context leaks, missed callbacks, or crashes when settings are changed. Additionally, it behaves differently depending on the platform version, swallows exceptions from doInBackground, and offers no benefit over using Executors directly.

AsyncTask is not a general-purpose threading system; rather, it is intended to be a support class for Thread and Handler. AsyncTasks are best utilized for quick activities (a few seconds at the most.) It is strongly advised to use the various APIs offered by the java.util.concurrent package, such as Executor, ThreadPoolExecutor, and FutureTask, if threads are to be kept running for extended periods of time.

Adaptive Layout

Program Code

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:layout_margin="16dp"
    tools:context=".MainActivity">

    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:id="@+id/instructions"
        android:text="@string/instructions"
        android:textAppearance="@style/TextAppearance.AppCompat.Title"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"/>

    <EditText
```

```
        android:id="@+id/bookInput"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginTop="8dp"
        android:hint="@string/input_hint"
        android:inputType="text"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/instructions" />

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/searchButton"
        android:layout_marginTop="8dp"
        android:text="@string/button_text"
        android:onClick="searchBooks"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/bookInput"/>

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/titleText"
        android:layout_marginTop="16dp"
        android:textAppearance="@style/TextAppearance.AppCompat.Headline"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/searchButton"/>

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/authorText"
        android:layout_marginTop="8dp"
        android:textAppearance="@style/TextAppearance.AppCompat.Headline"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/titleText"/>

</androidx.constraintlayout.widget.ConstraintLayout>
```

Strings.xml

```
<resources>
    <string name="app_name">AsyncTask</string>
    <string name="instructions">Enter a book name to find out who wrote the
book. </string>
    <string name="button_text">Search Books</string>
    <string name="input_hint">Book Title</string>
    <string name="no_results">"No Results Found"</string>
    <string name="loading">Loading...</string>
    <string name="no_search_term">Please enter a search term</string>
    <string name="no_network">Please check your network connection and try
again.</string>
</resources>
```

MainActivity.java

```
package com.example.asynctask;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Context;
import android.net.ConnectivityManager;
import android.net.NetworkInfo;
import android.os.Bundle;
import android.view.View;
import android.view.inputmethod.InputMethodManager;
import android.widget.EditText;
import android.widget.TextView;

public class MainActivity extends AppCompatActivity {

    private EditText mBookInput;
    private TextView mTitleText;
    private TextView mAuthorText;

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

        mBookInput = (EditText)findViewById(R.id.bookInput);
        mTitleText = (TextView)findViewById(R.id.titleText);
        mAuthorText = (TextView)findViewById(R.id.authorText);
    }

    public void searchBooks(View view) {
        String queryString = mBookInput.getText().toString();

        InputMethodManager inputManager = (InputMethodManager)
                getSystemService(Context.INPUT_METHOD_SERVICE);
        if (inputManager != null ) {
            inputManager.hideSoftInputFromWindow(view.getWindowToken(),
                    InputMethodManager.HIDE_NOT_ALWAYS);
        }
        ConnectivityManager connMgr = (ConnectivityManager)
                getSystemService(Context.CONNECTIVITY_SERVICE);
        NetworkInfo networkInfo = null;
        if (connMgr != null) {
            networkInfo = connMgr.getActiveNetworkInfo();
        }

        if (networkInfo != null && networkInfo.isConnected()
                && queryString.length() != 0) {
            new FetchBook(mTitleText, mAuthorText).execute(queryString);
            mAuthorText.setText("");
            mTitleText.setText(R.string.loading);
        } else {
            if (queryString.length() == 0) {
                mAuthorText.setText("");
                mTitleText.setText(R.string.no_search_term);
            } else {
                mAuthorText.setText("");
                mTitleText.setText(R.string.no_network);
            }
        }
    }
}
```

FetchBook.java

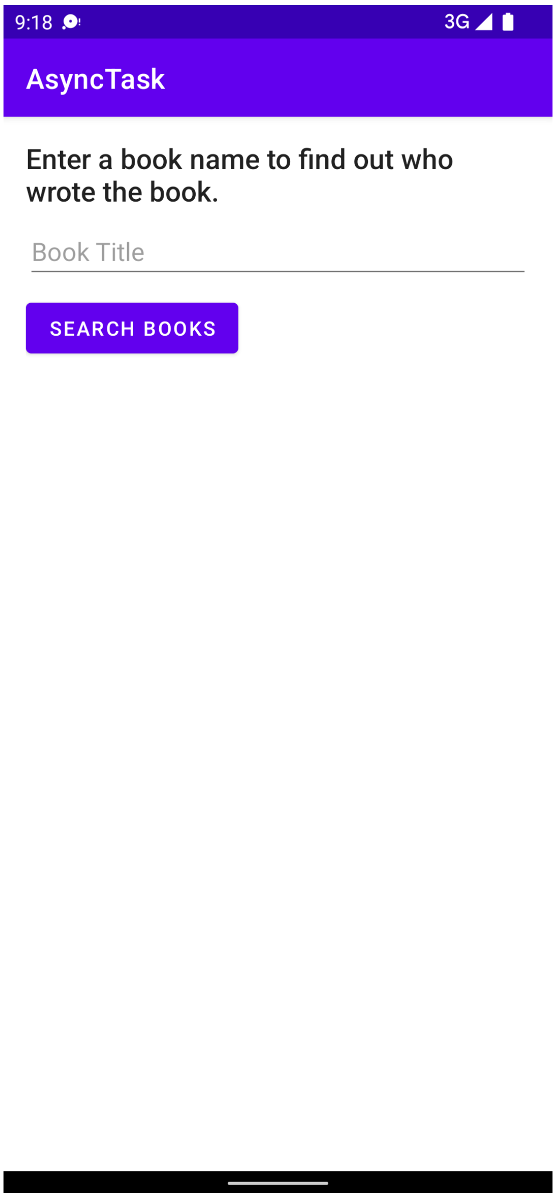
```
package com.example.asynctask;

import android.os.AsyncTask;
import android.widget.TextView;

import org.json.JSONArray;
import org.json.JSONObject;

import java.lang.ref.WeakReference;

public class FetchBook extends AsyncTask<String, Void, String> {

    private WeakReference<TextView> mTitleText;
    private WeakReference<TextView> mAuthorText;

    public FetchBook(TextView titleText, TextView authorText) {
        this.mTitleText = new WeakReference<>(titleText);
        this.mAuthorText = new WeakReference<>(authorText);
    }
    @Override
    protected String doInBackground(String... strings) {
        return NetworkUtils.getBookInfo(strings[0]);
    }

    @Override
    protected void onPostExecute(String s) {
        super.onPostExecute(s);

        try {
            JSONObject jsonObject = new JSONObject(s);
            JSONArray itemsArray = jsonObject.getJSONArray("items");

            int i = 0;
            String title = null;
            String authors = null;

            while (i < itemsArray.length() &&
                    (authors == null && title == null)) {
                JSONObject book = itemsArray.getJSONObject(i);
                JSONObject volumeInfo = book.getJSONObject("volumeInfo");

                try {
                    title = volumeInfo.getString("title");
                    authors = volumeInfo.getString("authors");
                } catch (Exception e) {
                    e.printStackTrace();
                }
                i++;
            }

            if (title != null && authors != null) {
                mTitleText.get().setText(title);
                mAuthorText.get().setText(authors);
            } else {
                mTitleText.get().setText(R.string.no_results);
                mAuthorText.get().setText("");
            }

        } catch (Exception e) {
            mTitleText.get().setText(R.string.no_results);
            mAuthorText.get().setText("");
        }
    }
}
```

NetworkUtils.java

```java
package com.example.asynctask;

import android.net.Uri;
import android.util.Log;
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStream;
import java.io.InputStreamReader;
import java.net.HttpURLConnection;
import java.net.URL;

public class NetworkUtils {

    private static final String LOG_TAG =
NetworkUtils.class.getSimpleName();
    private static final String BOOK_BASE_URL =
"https://www.googleapis.com/books/v1/volumes?";
    private static final String QUERY_PARAM = "q";
    private static final String MAX_RESULTS = "maxResults";
    private static final String PRINT_TYPE = "printType";

    static String getBookInfo(String queryString){
        HttpURLConnection urlConnection = null;
        BufferedReader reader = null;
        String bookJSONString = null;

        try {
            Uri builtURI = Uri.parse(BOOK_BASE_URL).buildUpon()
                    .appendQueryParameter(QUERY_PARAM, queryString)
                    .appendQueryParameter(MAX_RESULTS, "10")
                    .appendQueryParameter(PRINT_TYPE, "books")
                    .build();
            URL requestURL = new URL(builtURI.toString());

            urlConnection = (HttpURLConnection)
requestURL.openConnection();
            urlConnection.setRequestMethod("GET");
            urlConnection.connect();

            InputStream inputStream = urlConnection.getInputStream();
            reader = new BufferedReader(new
InputStreamReader(inputStream));
            StringBuilder builder = new StringBuilder();
```

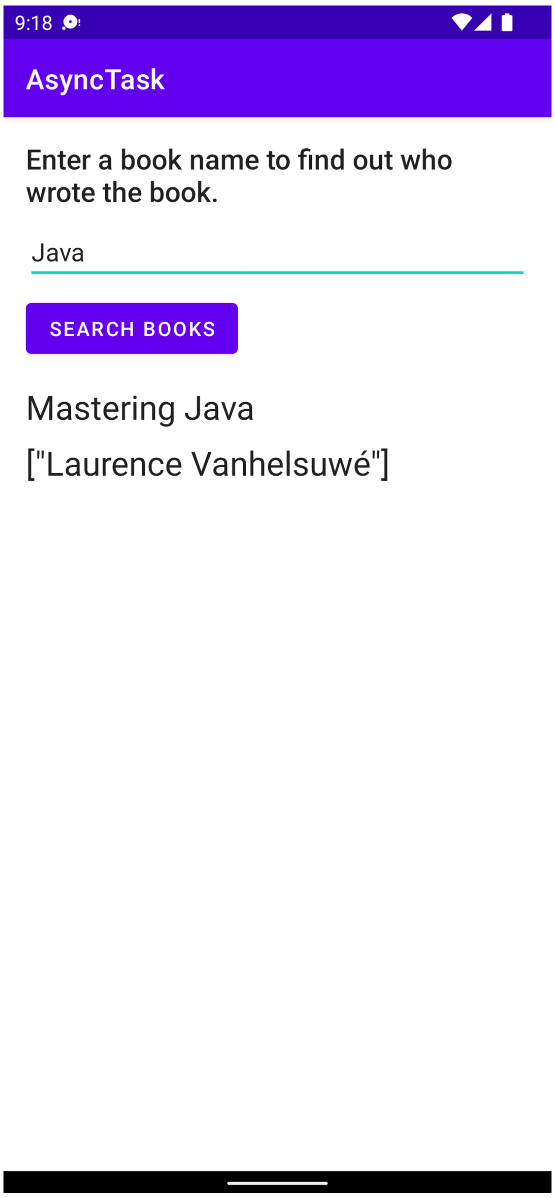
```
                String line;
                while ((line = reader.readLine()) != null) {
                    builder.append(line);
                    builder.append("\n");
                }

                if (builder.length() == 0) {
                    return null;
                }

                bookJSONString = builder.toString();

            } catch (IOException e) {
                e.printStackTrace();
            } finally {

                if (urlConnection != null) {
                    urlConnection.disconnect();
                }
                if (reader != null) {
                    try {
                        reader.close();
                    } catch (IOException e) {
                        e.printStackTrace();
                    }
                }
            }

            Log.d(LOG_TAG, bookJSONString);
            return bookJSONString;

        }
    }
```

Output


9:18 3G

AsyncTask

Enter a book name to find out who wrote the book.


9:18

AsyncTask

Enter a book name to find out who wrote the book.

Java

Mastering Java

["Laurence Vanhelsuwé"]

MockTest

Program Codes

activity_main.xml

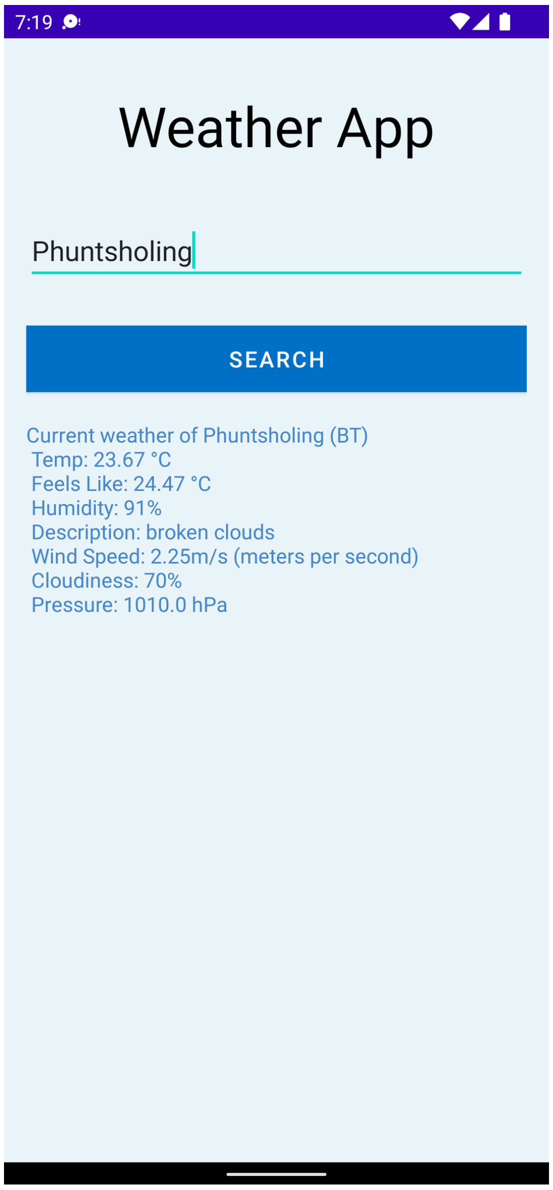
```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    tools:context=".MainActivity"
    android:background="#e8f4f8"
    android:orientation="vertical"
    android:padding="16dp">

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="center"
        android:textSize="40sp"
        android:text="Weather App"
        android:textColor="@color/black"
        android:layout_marginTop="20sp"/>
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="vertical"
        android:layout_marginTop="40sp">

        <EditText
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:id="@+id/etCity"
            android:layout_marginBottom="30dp"
            android:textSize="20sp"
            android:hint="Enter City Name....."
            android:inputType="textPersonName"/>

        <Button
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:id="@+id/btnGet"
            android:layout_marginBottom="10dp"
            android:background="#0070c7"
            android:textColor="@android:color/white"
            android:onClick="getWeatherDetails"
            android:text="Search"
            android:textSize="16sp"
            app:backgroundTint="@null" />

        <ScrollView
            android:layout_width="match_parent"
            android:layout_height="150dp">
            <TextView
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:id="@+id/tvResult"
                android:textSize="15sp"
                android:textColor="@color/black"
                android:layout_marginTop="10sp"/>
        </ScrollView>

    </LinearLayout>
</LinearLayout>
```

MainActivity.java

```
package com.example.mocktest;

import android.graphics.Color;
import android.os.Bundle;
import android.view.View;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;

import com.android.volley.Request;
import com.android.volley.RequestQueue;
import com.android.volley.Response;
import com.android.volley.VolleyError;
import com.android.volley.toolbox.StringRequest;
import com.android.volley.toolbox.Volley;

import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;

import java.text.DecimalFormat;

public class MainActivity extends AppCompatActivity {
    EditText etCity;
    TextView tvResult;
    private final String url =
"https://api.openweathermap.org/data/2.5/weather";
    private final String appid = "e53301e27efa0b66d05045d91b2742d3";
    DecimalFormat df = new DecimalFormat("#.##");


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

        etCity = findViewById(R.id.etCity);
        tvResult = findViewById(R.id.tvResult);
    }

    public void getWeatherDetails(View view) {
        String tempUrl = "";
        String city = etCity.getText().toString().trim();
        if (city.equals("")) {
            tvResult.setText("City field can not be empty!");
        } else {

            tempUrl = url + "?q=" + city + "&appid=" + appid;

            StringRequest stringRequest = new
StringRequest(Request.Method.POST, tempUrl, new Response.Listener<String>()
{
                @Override
                public void onResponse(String response) {
                    String output = "";
                    try {
                        JSONObject jsonResponse = new JSONObject(response);
                        JSONArray jsonArray =
jsonResponse.getJSONArray("weather");
                        JSONObject jsonObjectWeather =
jsonArray.getJSONObject(0);
                        String description =
jsonObjectWeather.getString("description");
                        JSONObject jsonObjectMain =
jsonResponse.getJSONObject("main");
                        double temp = jsonObjectMain.getDouble("temp") -
273.15;
```

```
                        double feelsLike =
jsonObjectMain.getDouble("feels_like") - 273.15;
                        float pressure = jsonObjectMain.getInt("pressure");
                        int humidity = jsonObjectMain.getInt("humidity");
                        JSONObject jsonObjectWind =
jsonResponse.getJSONObject("wind");
                        String wind = jsonObjectWind.getString("speed");
                        JSONObject jsonObjectClouds =
jsonResponse.getJSONObject("clouds");
                        String clouds = jsonObjectClouds.getString("all");
                        JSONObject jsonObjectSys =
jsonResponse.getJSONObject("sys");
                        String countryName =
jsonObjectSys.getString("country");
                        String cityName = jsonResponse.getString("name");
                        tvResult.setTextColor(Color.rgb(68, 134, 199));
                        output += "Current weather of " + cityName + " (" +
countryName + ")"
                                + "\n Temp: " + df.format(temp) + " °C"
                                + "\n Feels Like: " + df.format(feelsLike)
+ " °C"
                                + "\n Humidity: " + humidity + "%"
                                + "\n Description: " + description
                                + "\n Wind Speed: " + wind + "m/s (meters
per second)"
                                + "\n Cloudiness: " + clouds + "%"
                                + "\n Pressure: " + pressure + " hPa";
                        tvResult.setText(output);
                    } catch (JSONException e) {
                        e.printStackTrace();
                    }
                }
            }, new Response.ErrorListener() {

                @Override
                public void onErrorResponse(VolleyError error) {
                    Toast.makeText(getApplicationContext(),
error.toString().trim(), Toast.LENGTH_SHORT).show();
                }
            });
            RequestQueue requestQueue =
Volley.newRequestQueue(getApplicationContext());
            requestQueue.add(stringRequest);
        }
    }
}
```

Output



```
Current weather of Phuntsholing (BT)
 Temp: 23.67 °C
 Feels Like: 24.47 °C
 Humidity: 91%
 Description: broken clouds
 Wind Speed: 2.25m/s (meters per second)
 Cloudiness: 70%
 Pressure: 1010.0 hPa
```

Conclusion

By completing this lab I learnt about AsyncTask, AsyncTask Loader, NetworkConnectivity and various other background operation concepts. Android codelabs were very helpful as steps to implement AsyncTasks were explained in detail and all steps were given to implement Who Wrote It? App.

References

Android. (n.d.). *Android Studio Docs*. Retrieved 08 07, 2022, from Developers Android: https://developer.android.com/docs

Kakal, S. (2021, Dec 14). *A brief introduction to AsyncTask in Android with visualize examples*. Retrieved Sept 08, 2022, from DevGenius Blogs: https://blog.devgenius.io/a-brief-introduction-to-asynctask-in-android-with-visualize-examples-60a778de8a77?gi=299164c140ba

Googler. (2022, July 25). *Android fundamentals 07.2:AsyncTask and AsyncTaskLoader*. Retrieved Sept 08, 2022, from Android Codelabs: https://developer.android.com/codelabs/android-training-asynctask-asynctaskloader#0