# Android Asynchronous Task
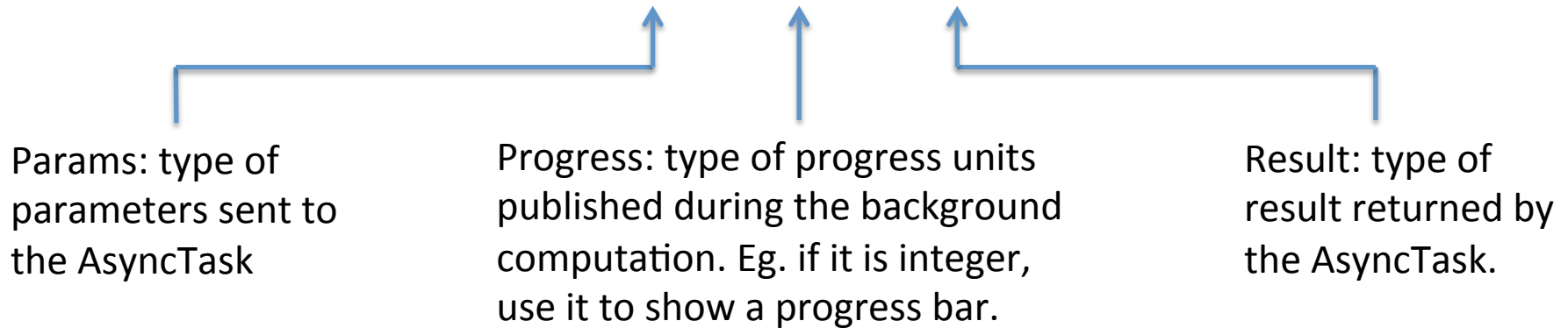
Android asynchronous task runs on a background thread.

Android asynchronous task comprises 4 steps:

- onPreExecute

- doInBackground

- onProgressUpdate

- onPostExecute

# Accessing Internet with Android

- Create an Activity

- Within the Activity, create a class (eg. ReadCurrencyJSON) that extends from AsyncTask<String, Void, String>

Params: type of parameters sent to the AsyncTask

Progress: type of progress units published during the background computation. Eg. if it is integer, use it to show a progress bar.

Result: type of result returned by the AsyncTask.

Example: **private class** ReadCurrencyJSON **extends** AsyncTask<String, Void, String> {

- Within ReadCurrencyJSON class, define the following:

```
protected String doInBackground(String... urls) {
    return getJSON(urls[0]);
}
```

- Within ReadCurrencyJSON class, define the following:

```java
public String getJSON(String URL_string) {

    /**** HttpClient and HttpGet are deprecated from API 22 onwards
     HttpClient httpClient = new DefaultHttpClient();
     HttpGet httpGet = new HttpGet(URL);
     ***/

    URL url                              = convertToUrl(URL_string);

    HttpURLConnection httpUrlConnection = null;

    int  responseCode                   = -1;

    StringBuilder stringBuilder          = new StringBuilder();
```

```java
try {

    httpUrlConnection = (HttpURLConnection) url.openConnection();

    httpUrlConnection.setRequestMethod("GET");

    httpUrlConnection.connect();

    responseCode = httpUrlConnection.getResponseCode();

    if (responseCode == httpUrlConnection.HTTP_OK) {

        InputStream inputStream  = httpUrlConnection.getInputStream();

        BufferedReader reader      = new BufferedReader(
                                        new InputStreamReader(inputStream));
        String line;
        while ((line = reader.readLine()) != null) {
            stringBuilder.append(line);
        }
        inputStream.close();
    }
```

URL url = converttourl(url_string);

HttpURLConnection httpUrlConnection = null;

StringBuilder stringBuilder = new StringBuilder();

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```java
} catch (MalformedURLException e) {

    System.out.println("Error -- Bad URL " + e.getMessage());

    e.printStackTrace();

} catch (Exception e) {

    System.out.println("Error: " + e.getMessage());

    e.printStackTrace();

} finally {   httpUrlConnection.disconnect();  }

  return stringBuilder.toString();

}
```

- Within ReadCurrencyJSON class, define also the following:

```
JSONArray response = new JSONArray();

protected void onPostExecute(String result) {

    try {
        JSONObject jsonObject = new JSONObject(result);

        JSONObject ratesObj = jsonObject.getJSONObject("rates");

        String rate =  ratesObj.getString(txtToCurrency.getEditableText().
                toString().toUpperCase( ));

        Toast.makeText(InternetActivity.this, "rate is " + rate,
                                    Toast.LENGTH_LONG).show();

    } catch (Exception e) {
        Log.d("ReadCurrencyJSON", e.getLocalizedMessage());
    }
}
```

*// the following code convertToUrl is from*
*// http://fancifulandroid.blogspot.sg/2013/07/android-convert-string-to-valid-url.html*

```java
private URL convertToUrl(String urlStr) {
    try {
        URL url = new URL(urlStr);
        URI uri = new URI(url.getProtocol(), url.getUserInfo(),
                url.getHost(), url.getPort(), url.getPath(),
                url.getQuery(), url.getRef());
        url = uri.toURL();
        return url;
    } catch (Exception e) {
        e.printStackTrace();
    }
    return null;
}
```

- Finally, to initiate the internet access, use the following:

**new** ReadCurrencyJSON().execute(
    **"http://api.fixer.io/latest?base="**+
txtFromCurrency.getEditableText().toString().toUpperCase());

Eg. if txtFromCurrency.getEditableText() == "USD", then
    http://api.fixer.io/latest?base=USD   will return

{"base":"USD","date":"2015-08-28","rates":{"AUD":1.4012,"BGN":1.7357,"BRL": 3.5651,"CAD":1.3271,"CHF":0.9591,"CNY":6.3896,"CZK":24.004,"DKK":6.6232,"GBP": 0.6497,"HKD":7.75,"HRK":6.7102,"HUF":279.38,"IDR":14017.35,"ILS":3.9208,"INR": 66.162,"JPY":120.84,"KRW":1177.85,"MXN":16.93,"MYR":4.1857,"NOK": 8.289,"NZD":1.551,"PHP":46.708,"PLN":3.7633,"RON":3.9326,"RUB":67.039,"SEK": 8.4268,"SGD":1.4061,"THB":35.888,"TRY":2.9216,"ZAR":13.236,"EUR":0.8875}}

Don't forget to add the following in AndroidManifest.xml:

**<uses-permission android:name="android.permission.INTERNET"/>**

# Async Task Skeleton Code

```
new ReadCurrencyJSON().execute("http://api.fixer.io/latest?base=USD");
```

```
protected String doInBackground(String... urls) {  return getJSON(urls[0]);  }
```

```
public String getJSON(String URL_string) {
```

```
    httpUrlConnection = (HttpURLConnection) url.openConnection();
    httpUrlConnection.setRequestMethod("GET");
    httpUrlConnection.connect();
    responseCode = httpUrlConnection.getResponseCode();
    if (responseCode == httpUrlConnection.HTTP_OK) {
      InputStream inputStream       = httpUrlConnection.getInputStream();
        •
        •
        •
finally {   httpUrlConnection.disconnect();  }
    return stringBuilder.toString();
```

```
protected void onPostExecute(String result) {
```

```
JSONObject
jsonObject = new
JSONObject(result);
```

# Asynchronous Task Skeleton Code

```java
public class ClassAsyncTask extends AsyncTask<String, Void, String> {

    public String doInBackground(String... str) {
        return "This string is from doInBackground";
    }


    public void onPostExecute(String result) {
        Toast.makeText(getApplicationContext(), "in onPostExecute, string = "+result,
Toast.LENGTH_SHORT).show();
    }

}

public void onClick_AsyncTask1(View view) {
    ClassAsyncTask classAsyncTask = new ClassAsyncTask();
    classAsyncTask.execute("This is my input String");
}
```

# Access Internet

```java
public String getJSON(String urlStr) {
    URL url = convertToUrl(urlStr);
    HttpURLConnection httpURLConnection = null;
    int responseCode;
    StringBuilder stringBuilder = new StringBuilder();
    String line;
    try {
        httpURLConnection = (HttpURLConnection)url.openConnection();
        httpURLConnection.setRequestMethod("GET");
        httpURLConnection.connect();
        responseCode = httpURLConnection.getResponseCode();
        if (responseCode == httpURLConnection.HTTP_OK) {
            InputStream inputStream = httpURLConnection.getInputStream();
            BufferedReader reader = new BufferedReader(new InputStreamReader(inputStream));
            while ((line = reader.readLine()) != null) {
                stringBuilder.append(line);
            }
            inputStream.close();
        }
    } catch (Exception e) {
        System.out.println("Error : " + e.getMessage());
        e.printStackTrace();
    } finally {
        httpURLConnection.disconnect();
    }
    return stringBuilder.toString();
}
```

```
// the following code convertToUrl is from
// http://fancifulandroid.blogspot.sg/2013/07/android-convert-string-to-valid-url.html
//
private URL convertToUrl(String urlStr) {
    try {
        URL url = new URL(urlStr);
        URI uri = new URI(url.getProtocol(), url.getUserInfo(),
                    url.getHost(), url.getPort(), url.getPath(),
                    url.getQuery(), url.getRef());
        url = uri.toURL();
        return url;
    } catch (Exception e) {
        e.printStackTrace();
    }
    return null;}
```

# Parse JSON

```java
public class ClassAsyncTask4 extends AsyncTask<String, Void, String> {

    public String doInBackground(String... str) {
        return getJSON(str[0]);
    }

    public void onPostExecute(String result) {

    try {
        JSONObject jsonObject = new JSONObject(result);

        JSONObject ratesObj = jsonObject.getJSONObject("rates");

        rate = ratesObj.getString(txtToCurrency.getEditableText().toString().toUpperCase());

        currencyRateDisplay = (TextView) findViewById(R.id.textView_currencyRate);

        currencyRateDisplay.setText("1 " + txtFromCurrency.getEditableText().toString().toUpperCase() +
" = " + rate + " " + txtToCurrency.getEditableText().toString().toUpperCase());
        } catch (Exception e) {
        Log.d("ReadCurrencyJSON", e.getLocalizedMessage());
        }
    }
}
```

```
public void btnGetCurrency(View view) {
    EditText txtFromCurrency = (EditText) findViewById(R.id.editText_fromCurrency);

ClassAsyncTask4 classAsyncTask4 = new ClassAsyncTask4();

    classAsyncTask4.execute("http://api.fixer.io/latest?
base="+txtFromCurrency.getEditableText().toString().toUpperCase());
}
```