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# **Smart Energy Recommender (SmartER)**

**FIT 5046 Practical Assignment Phase 2 – 2018  
(Semester I)**

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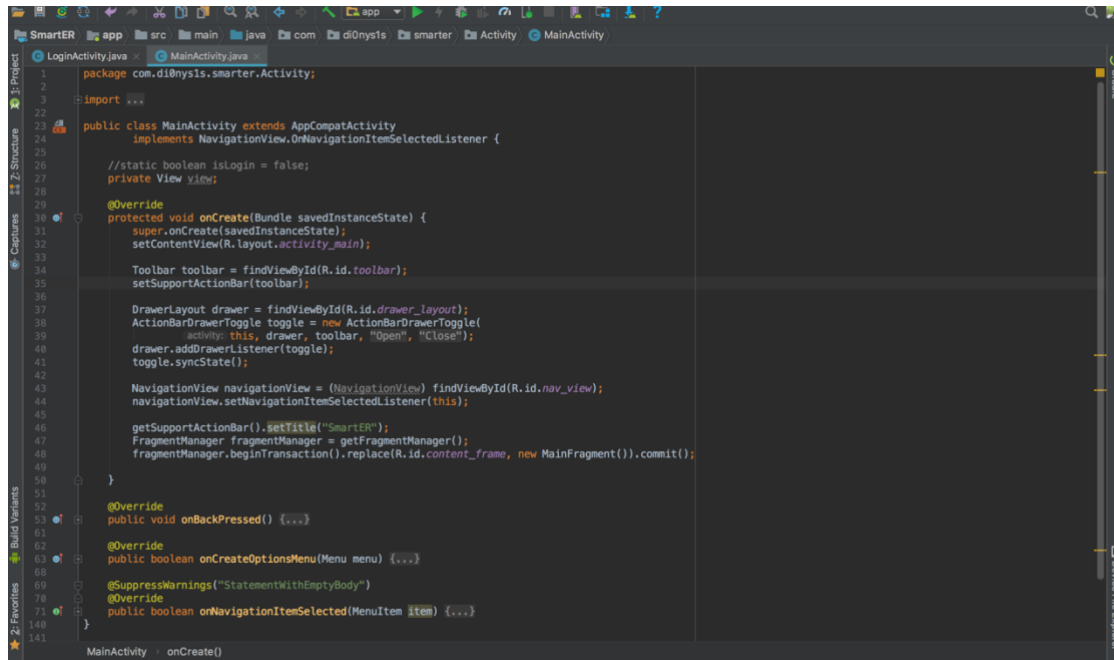
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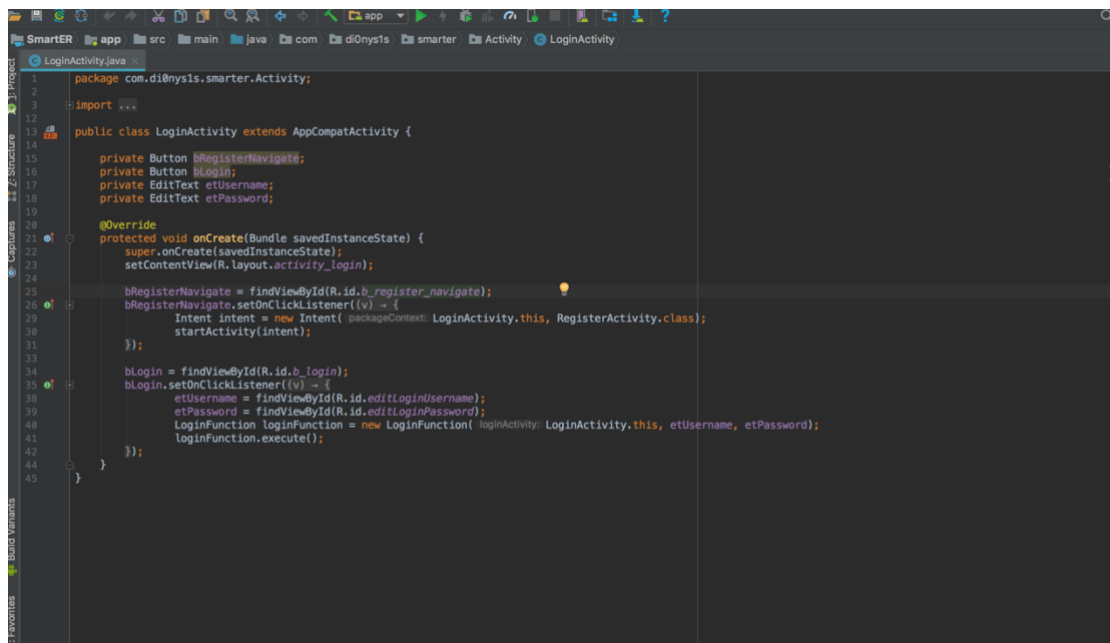
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# Task 1 – Activity

## 1. Main Activity



## 2. Login Activity



### 3. Register Activity

```
SmartER app src main java com diOnyals smarter Activity RegisterActivity
LoginActivity.java RegisterActivity.java
1 package com.diOnyals.smarter.Activity;
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31 public class RegisterActivity extends AppCompatActivity {
32
33     private RegisterFunction.RegisterPageInfo registerPageInfo;
34     private final SimpleDateFormat sdf = new SimpleDateFormat("yyyy-MM-dd");
35
36     private EditText etFirstName;
37     private EditText etLastName;
38     private EditText etEmail;
39     private EditText etUsername;
40     private EditText etPassword;
41     private EditText etDOB;
42     private EditText etAddress;
43     private EditText etPostcode;
44     private EditText etMobile;
45     private Spinner residentNumbersSpinner;
46     private EditText etProvider;
47     private Spinner providerSpinner;
48     private Button bRegisterSubmit;
49     private Button bCancel;
50
51
52     private TextView msgFirstName;
53     private TextView msgLastName;
54     private TextView msgDOB;
55     private TextView msgAddress;
56     private TextView msgPostcode;
57     private TextView msgPhone;
58     private TextView msgEmail;
59     private TextView msgNoOfResident;
60     private TextView msgEnergyProvider;
61     private TextView msgUsername;
62     private TextView msgPwd;
63
64
65     @Override
66     protected void onCreate(Bundle savedInstanceState) {
67         super.onCreate(savedInstanceState);
68         setContentView(R.layout.activity_register);
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```

SmartER app src main java com di0nys1s smarter Activity RegisterActivity
LoginActivity.java RegisterActivity.java
122         e.printStackTrace();
123     } catch (IOException e) {
124         e.printStackTrace();
125     } catch (ParseException e) {
126         e.printStackTrace();
127     } catch (Exception e) {
128         e.printStackTrace();
129     }
130 }
131
132 });
133
134 thread.start();
135
136 // Intent intent = new Intent(RegisterActivity.this, MainActivity.class);
137 // startActivity(intent);
138 // });
139
140 }
141
142 }
143
144 private boolean validateRegister(RegisterFunction.RegisterPageInfo entity) {...}
145
146 private boolean isEmpty(String str, String message, TextView msgView) {...}
147
148 private boolean isUserNameNullOrEmpty(String str, String message) {...}
149
150 private boolean isEmailFormat(String str, String message) {...}
151
152 private boolean isPasswordFormat(String str, String message) {...}
153
154 private boolean checkDOB(String date, String message) {...}
155
156 private void setDatePickerDialog() {...}
157
158 public void initialVariable() {...}
159
160 }
161
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```

## Task 2 – DB Manager and DB Structure

### DB MANAGER

```

49 public DBManager(Context ctx) {
50     this.context = ctx;
51     myDBHelper = new MySQLiteOpenHelper(context);
52 }
53
54 private static class MySQLiteOpenHelper extends SQLiteOpenHelper {...}
55
56 public DBManager open() throws SQLException {...}
57
58 public void close() { myDBHelper.close(); }
59
60 public long insertUsage(Integer resid, String date,
61     Integer usagehour, Double fridgeusage,
62     Double acusage, Double wusage,
63     Double temperature) {...}
64
65 public int deleteUsageHour(String rowId) {...}
66
67 public Cursor getAllAppliances() {...}
68
69 public Cursor getFridgeUsage(String usageId) throws SQLException {...}
70
71 public Cursor getUserUsage(String id) throws SQLException {...}
72
73 public int deleteUsageById(int resid) {...}
74
75 }
76
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```

## DB STRUCTURE

```
49 public DBManager(Context ctx) {
50     this.context = ctx;
51     myDBHelper = new MySQLiteOpenHelper(context);
52 }
53
54 private static class MySQLiteOpenHelper extends SQLiteOpenHelper {...}
55
56 public DBManager open() throws SQLException {...}
57
58 public void close() { myDBHelper.close(); }
59
60 public long insertUsage(Integer resid, String date,
61     Integer usagehour, Double fridgeusage,
62     Double acusage, Double wusage,
63     Double temperature) {...}
64
65 public int deleteUsageHour(String rowId) {...}
66
67 public Cursor getAllAppliances() {...}
68
69 public Cursor getFridgeUsage(String usageId) throws SQLException {...}
70
71 public Cursor getUserUsage(String id) throws SQLException {...}
72
73 public int deleteUsageById(int resid) {...}
74
75 }
76
```

## Task 3 – Fragments, Functions, Services and Classes

### 3.1 Fragments

#### 3.1.1 Main Fragment

```
1 package com.dionysis.smarter.Fragment;
2
3 import ...
4
43 public class MainFragment extends Fragment implements View.OnClickListener {
44     View vMain;
45     private ImageView imgUsage;
46     private TextView tvTemperature;
47     private TextView tvName;
48     private TextView tvAddress;
49     private TextView tvDay;
50     private TextView tvNice;
51     private Button bGenerate;
52     private Button bPost;
53     private double temperature;
54     protected DBManager dbManager;
55     private ApplianceGenerator generator;
56
57     weatherApiTask weatherApiTask = new weatherApiTask();
58     usageServiceTask serviceTask = new usageServiceTask();
59
60     Date currentDate = new GregorianCalendar().getTime();
61     DateFormat dfDay = new SimpleDateFormat( pattern: "d");
62     DateFormat dfTime = new SimpleDateFormat( pattern: "HH:mm");
63     DateFormat dfHour = new SimpleDateFormat( pattern: "HH");
64
65     //int hour = Integer.parseInt(dfHour.format(currentDate));
66     String strCurrentDay = dfDay.format(currentDate);
67     String strCurrentTime = dfTime.format(currentDate);
68
69     @Nullable
70     @Override
71     public View onCreateView(LayoutInflater inflater, ViewGroup container, Bundle savedInstanceState) {
72         vMain = inflater.inflate(R.layout.fragment_main, container, attachToRoot: false);
73
74         dbManager = new DBManager(this.getActivity());
75
76         findPageElement();
77
78         weatherApiTask.execute(URLs.WEATHER_WS_URL + Universal.getPostcode() + "," + "AU" + URLs.WS_KEY_WEATHER_APPID);
79         serviceTask.execute(URLs.FIND_USAGE_BY_RESID + Universal.getResId());
80
81     }
82 }
```

```

DbManager.java  DbStructure.java  MapFragment.java
40 weatherApiTask.execute(URLS.API_WEATHER_URL + Universal.getPostcode() + ";" + "AU" + URLS.WS_KEY_WEATHER_APPID);
41 serviceTask.execute(URLS.FIND_USAGE_BY_RESID + Universal.getResId());
42
43 pickCurrentDay();
44 showUserInformation();
45
46 bGenerate.setOnClickListener(this);
47 bPost.setOnClickListener(this);
48
49 return vMain;
50 }
51
52 @Override
53 public void onClick(View v) {...}
54
55 public class usageServiceTask extends AsyncTask<String, Void, String> {...}
56
57 public class weatherApiTask extends AsyncTask<String, Void, String> {...}
58
59 public void insertApplianceUsageToLocalDB() {...}
60
61 public void postApplianceUsageToREST() {...}
62
63 public Cursor readData() {...}
64
65 public void deleteDataById(Integer resid) {...}
66
67 private void mainUsageMessage(Double hourlyUsage) {...}
68
69 public void pickCurrentDay() {...}
70
71 public void showUserInformation() {...}
72
73 public void findPageElement() {...}
74
75 public static void createUsage(ElectricityUsage usage){...}
76
77 }

```

### 3.1.2 Map Fragment

```

MapFragment.java
1 package com.dionysis.smarter.Fragment;
2
3 import ...
4
42 public class MapFragment extends Fragment {
43     View mMapFragment;
44     private Double dailyTotal;
45     private Double hourlyTotal;
46     private MapboxMap mMapboxMap;
47     private MapView mMapView;
48     private LatLng userAddressLatLng;
49
50     mapApiTask mapTask = new mapApiTask();
51     //residentServiceTask residentServiceTask = new residentServiceTask();
52
53     private Spinner spinnerDailyHourly;
54     String types[] = {"daily", "hourly"};
55     ArrayAdapter<String> adapter;
56
57     Date currentDate = new GregorianCalendar().getTime();
58     DateFormat dftime = new SimpleDateFormat("HH:mm:ss");
59     String time = dftime.format(currentDate.getTime());
60     int t = Integer.parseInt(time);
61
62     @Override
63     public View onCreateView(LayoutInflater inflater, ViewGroup container, Bundle savedInstanceState) {...}
64
65     @Override
66     public void onResume() {
67         super.onResume();
68         mMapView.onResume();
69     }
70
71     @Override
72     public void onPause() {
73         super.onPause();
74         mMapView.onPause();
75     }
76
77 }

```

```

181
182 @Override
183 public void onSaveInstanceState(Bundle outState) {
184     super.onSaveInstanceState(outState);
185     mMapView.onSaveInstanceState(outState);
186 }
187
188 private void addGreenMarker(MapboxMap mapboxMap) {...}
189
190 private void addRedMarker(MapboxMap mapboxMap) {...}
191
192 public class mapApiTask extends AsyncTask<String, Void, String> {
193
194     @Override
195     protected String doInBackground(String... urls) {...}
196
197     @Override
198     protected void onPostExecute(String result) {...}
199 }
200
201 public class residentServiceTask extends AsyncTask<String, Void, String> {...}
202
203 public class dailyUsageServiceTask extends AsyncTask<String, Void, String> {
204
205     @Override
206     protected String doInBackground(String... urls) {...}
207
208     @Override
209     protected void onPostExecute(String result) {
210         super.onPostExecute(result);
211
212         try {
213             Log.i("Map: Daily Total Usage", result.toString());
214             JSONArray jsonArray = new JSONArray(result);
215             for(int i = 0; i < jsonArray.length(); i++) {
216                 JSONObject resInfo = jsonArray.getJSONObject(i);

```

```

217                 for(int i = 0; i < jsonArray.length(); i++) {
218                     JSONObject resInfo = jsonArray.getJSONObject(i);
219                     dailyTotal = resInfo.getDouble("totalUsageKwh");
220                     Log.i("Map: Total Daily Content", dailyTotal.toString());
221
222                     if (dailyTotal < 21)
223                         addGreenMarker(mMapboxMap);
224                     else
225                         addRedMarker(mMapboxMap);
226                 }
227             } catch (JSONException e) {
228                 e.printStackTrace();
229             }
230         }
231     }
232
233     public class hourlyUsageServiceTask extends AsyncTask<String, Void, String> {...}
234
235     public void mapTaskExecute() {
236         String address = Universal.getAddress();
237         String[] addressParts = address.split(" ");
238
239         ArrayList<String> urlList = new ArrayList<>();
240         String urlBuilder = "http://api.openweathermap.org/data/2.5/weather?lat=";
241         String urlBuilder = urlBuilder + "lon=";
242         for (int i = 0; i < addressParts.length; i++) {
243             urlBuilder.append(addressParts[i] + "&");
244             urlList.add(urlBuilder);
245         }
246         System.out.println(urlList.get(urlList.size()-1));
247         String urlAddress = urlList.get(urlList.size()-1);
248
249         mapTask.execute(urlAddress.toString());
250     }
251 }

```

```

252 private void addGreenMarker(MapboxMap mapboxMap) {...}
253
254 private void addRedMarker(MapboxMap mapboxMap) {...}
255
256 public class mapApiTask extends AsyncTask<String, Void, String> {...}
257
258 public class residentServiceTask extends AsyncTask<String, Void, String> {...}
259
260 public class dailyUsageServiceTask extends AsyncTask<String, Void, String> {...}
261
262 public class hourlyUsageServiceTask extends AsyncTask<String, Void, String> {...}
263
264 public void mapTaskExecute() {...}
265
266 public void spinnerSelectionShowUsage() {...}
267
268 }

```



### 3.1.3 Report Fragment

#### PIE FRAGMENT

```
ReportFragment.java
1 package com.di0nysis.smarter.Fragment;
2
3 import xxx;
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37
38 public class ReportFragment extends Fragment {
39     private View vReport;
40     private Button bReport;
41     private TextView tvReport;
42     private PieChart pieChart;
43     private Calendar myCalendar;
44     private EditText editText;
45     private DatePickerDialog.OnDateSetListener date;
46
47     dailyUsageServiceTask dailyUsageServiceTask = new dailyUsageServiceTask();
48
49
50
51
52 @Nullable
53 @Override
54 public View onCreateView(LayoutInflater inflater, ViewGroup container, Bundle
55     savedInstanceState) {
56
57     vReport = inflater.inflate(R.layout.fragment_report, container, attachToRoot: false);
58     tvReport = vReport.findViewById(R.id.tv_report);
59
60     pieChart = (PieChart) vReport.findViewById(R.id.piechart);
61     myCalendar = Calendar.getInstance();
62     editText = (EditText) vReport.findViewById(R.id.piechart_selectdate);
63
64     final Context mContext = vReport.getContext();
65
66     dailyUsageServiceTask.execute(URLs.FIND_APP_USAGE_BY_RESID_DATE_URL + Universal.getResId() + "/" + "2018-03-18");
67
68     datePickerDialog();
69
70
71     editText.setOnClickListener(v -> {
72         DatePickerDialog dialog = new DatePickerDialog(v.getContext(), date, myCalendar.get(Calendar.YEAR), myCalendar.get(Calendar.MONTH), myCalendar.get(Calendar.DAY_OF_MONTH));
73         dialog.show();
74     });
75
76     editText.addTextChangedListener(new TextWatcher() {xxx});
77
78     return vReport;
79 }
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```

1 package com.dianysis.smarter.Fragment;
2
3 import ...
4
43 public class LineFragment extends Fragment {
44
45     private View vReport;
46     Calendar myCalendar;
47     EditText editText;
48     private DatePickerDialog.OnDateSetListener date;
49     private LineChart chart;
50     Double totalUsage;
51
52
53
54     List<Entry> entries = new ArrayList<>();
55
56     dailyUsageServiceTask dailyUsageServiceTask = new dailyUsageServiceTask();
57
58     @Nullable
59     @Override
60     public View onCreateView(LayoutInflater inflater, ViewGroup container, Bundle
61         savedInstanceState) {
62
63         vReport = inflater.inflate(R.layout.fragment_line_chart, container, attachToRoot: false);
64
65         chart = (LineChart) vReport.findViewById(R.id.chart);
66
67         myCalendar = Calendar.getInstance();
68         editText = (EditText) vReport.findViewById(R.id.linechart_selectdate);
69
70         final Context mContext = vReport.getContext();
71
72         datePickerDialog();
73
74         editText.setOnClickListener((v) -> {
75             DatePickerDialog dialog = new DatePickerDialog(v.getContext(), date, myCalendar.get(Calendar.YEAR), myCalendar.get(Calendar.MONTH), myCalendar.get(C
76             dialog.show();
77         });
78
79
80
81

```

## 3.2 - Functions

### LOGIN FUNCTION

```

1 package com.dianysis.smarter.Function;
2
3 import ...
4
19 public class LoginFunction extends AsyncTask<Void, Void, Void> {
20
21     private TextView tvUserName;
22     private TextView tvPassword;
23     private Activity loginActivity;
24     private boolean isMatch;
25     private boolean isProblem;
26     User user;
27
28     public LoginFunction(Activity loginActivity, TextView tvUserName, TextView tvPassword) {...}
29
30     @Override
31     protected void onPreExecute() {...}
32
33     @Override
34     protected void doInBackground(Void... params) {...}
35
36     @Override
37     protected void onPostExecute(Void result) {}
38
39     @SuppressWarnings("HandlerLeak")
40     Handler handler = handleMessage(message) -> {
41         if(message.what == 0)
42             Toast.makeText(loginActivity, text: "Exception occurred please try again later.", Toast.LENGTH_LONG).show();
43         else if(message.what == 1) {
44             TextView tvMessage = loginActivity.findViewById(R.id.textErrorMessage);
45             tvMessage.setText("Invalid username and/or password.");
46         } else {
47             Universal.setPostcode(Integer.parseInt(user.getPostCode()));
48             Universal.setFirstName(user.getFirstName());
49             Universal.setLastName(user.getLastName());
50             Universal.setResId(user.getResId());
51             Universal.setAddress(user.getAddress().replaceAll( regex: "[+,.:;]", replacement: ""));
52             TextView tvMessage = loginActivity.findViewById(R.id.textErrorMessage);
53             tvMessage.setText("");
54             Intent intent = new Intent(loginActivity, MainActivity.class);
55             loginActivity.startActivityForResult(intent, requestCode: 1);
56         }
57     }
58
59 }
60
61

```

## REGISTER FUNCTION

```
18 RegisterFunction.java
19 import ...
20
21 public class RegisterFunction extends AsyncTask<Void, Void, Void> {
22     private String username;
23     private String email;
24     private TextView tvUserName;
25     private TextView tvEmail;
26     private Activity activity;
27
28     private RegisterFunction.RegisterPageInfo registerPageInfo;
29     boolean isSuccess;
30
31     public RegisterFunction(Activity activity, TextView tvUserName, TextView tvEmail, RegisterFunction.RegisterPageInfo registerPageInfo) {...}
32
33     protected Void doInBackground(Void... params) {...}
34
35     @Override
36     protected void onPostExecute(Void result) {}
37     @SuppressWarnings("HandlerLeak")
38     Handler handler = handleMessage(message) -> {
39         if (message.what == 0) {
40             try {
41                 if (isSuccess) {
42                     Universal.setAddress(registerPageInfo.getAddress());
43                     Universal.setFirstName(registerPageInfo.getFirstName());
44                     Intent intent = new Intent(activity, MainActivity.class);
45                     activity.startActivityForResult(intent, requestCode 1);
46                 } else {
47                     Toast.makeText(activity, text: "Error occurs in the page. Please try again.", Toast.LENGTH_LONG);
48                 }
49             } catch (Exception ex) {
50                 Toast.makeText(activity, text: "Error occurs in the page. Please try again.", Toast.LENGTH_LONG);
51             }
52         } else if (message.what == 1) {
53             tvEmail.setBackgroundColor(activity.getResources().getColor(R.color.errorBackground));
54             ((TextView)activity.findViewById(R.id.textEmailErrorMsg)).setText("User with same email exists");
55         } else {
56             tvUserName.setBackgroundColor(activity.getResources().getColor(R.color.errorBackground));
57             ((TextView)activity.findViewById(R.id.textUserNameErrorMsg)).setText("User name exists");
58         }
59     };
60
61     public static class RegisterPageInfo {...}
62 }
```

```
18 RegisterFunction.java
19 import ...
20
21 public class RegisterFunction extends AsyncTask<Void, Void, Void> {
22     private String username;
23     private String email;
24     private TextView tvUserName;
25     private TextView tvEmail;
26     private Activity activity;
27
28     private RegisterFunction.RegisterPageInfo registerPageInfo;
29     boolean isSuccess;
30
31     public RegisterFunction(Activity activity, TextView tvUserName, TextView tvEmail, RegisterFunction.RegisterPageInfo registerPageInfo) {...}
32
33     protected Void doInBackground(Void... params) {...}
34
35     @Override
36     protected void onPostExecute(Void result) {}
37     @SuppressWarnings("HandlerLeak")
38     Handler handler = handleMessage(message) -> {
39         if (message.what == 0) {
40             try {
41                 if (isSuccess) {
42                     Universal.setAddress(registerPageInfo.getAddress());
43                     Universal.setFirstName(registerPageInfo.getFirstName());
44                     Intent intent = new Intent(activity, MainActivity.class);
45                     activity.startActivityForResult(intent, requestCode 1);
46                 } else {
47                     Toast.makeText(activity, text: "Error occurs in the page. Please try again.", Toast.LENGTH_LONG);
48                 }
49             } catch (Exception ex) {
50                 Toast.makeText(activity, text: "Error occurs in the page. Please try again.", Toast.LENGTH_LONG);
51             }
52         } else if (message.what == 1) {
53             tvEmail.setBackgroundColor(activity.getResources().getColor(R.color.errorBackground));
54             ((TextView)activity.findViewById(R.id.textEmailErrorMsg)).setText("User with same email exists");
55         } else {
56             tvUserName.setBackgroundColor(activity.getResources().getColor(R.color.errorBackground));
57             ((TextView)activity.findViewById(R.id.textUserNameErrorMsg)).setText("User name exists");
58         }
59     };
60
61     public static class RegisterPageInfo {...}
62 }
```

## PIE REPORT FUNCTION

```

1 package com.di0nysis.smarter.Function;
2
3 import ...
4
5 public class PieReportFunction extends AsyncTask<Void, Void, Void> {
6     private PieChart chart;
7     private Context context;
8     private String selectedDate;
9     private JSONObject json;
10    private Typeface mTfLight;
11    dailyUsageServiceTask dailyUsageServiceTask = new dailyUsageServiceTask();
12    Double totalUsage;
13    Double fridge;
14    Double ac;
15    Double wm;
16
17    public PieReportFunction(Context context, PieChart chart, String selectedDate) {...}
18
19    @Override
20    protected void onPreExecute() {
21        super.onPreExecute();
22    }
23
24    @Override
25    protected void doInBackground(Void... params) {
26        try {
27            dailyUsageServiceTask.execute(URIs.FIND_APP_USAGE_BY_RESID_DATE_URL + Universal.getResId() + "/" + "2018-03-18");
28        } catch (Exception e) {
29            Log.e("Exception", Universal.getExceptionInfo(e));
30        }
31        return null;
32    }
33
34 }

```

```

35
36 @Override
37 protected void onPostExecute(Void result) {
38     handler.sendMessage(msg);
39 }
40
41 @SuppressWarnings("HandlerLeak")
42 Handler handler = new Handler() {
43     if(msg.what == 0) {
44         try {
45             runPieChart(json);
46         } catch (Exception e) {
47             Log.e("Exception", Universal.getExceptionInfo(e));
48         }
49     } else {
50     }
51 };
52
53 private void runPieChart(JSONObject json) throws JSONException {...}
54
55 private void setDataToPieChart(JSONObject json, float range) throws JSONException {...}
56
57 public class dailyUsageServiceTask extends AsyncTask<String, Void, String> {
58
59     @Override
60     protected String doInBackground(String... urls) {
61         String result = "";
62         URL url;
63         HttpURLConnection urlConnection = null;
64
65         try {
66             url = new URL(urls[0]);
67
68             urlConnection = (HttpURLConnection) url.openConnection();
69             InputStream in = urlConnection.getInputStream();
70             InputStreamReader reader = new InputStreamReader(in);
71             int data = reader.read();
72
73             while (data != -1) {
74                 char current = (char) data;
75                 result += current;
76                 data = reader.read();
77             }
78
79             return result;
80         } catch (MalformedURLException e) {
81             e.printStackTrace();
82         } catch (IOException e) {
83             e.printStackTrace();
84         }
85
86         return null;
87     }
88
89     @Override
90     protected void onPostExecute(String result) {
91         super.onPostExecute(result);
92
93         try {
94             JSONArray jsonArray = new JSONArray(result);
95             json = jsonArray.getJSONObject(0);
96
97             for(int i = 0; i < json.length(); i++) {
98                 fridge = json.getDouble("fridgeusagekwh");
99                 ac = json.getDouble("airconditionusagekwh");
100                wm = json.getDouble("washingmachineusagekwh");
101                totalUsage = fridge + ac + wm;
102            }
103
104        } catch (JSONException e) {
105            e.printStackTrace();
106        }
107    }
108 }

```

```

83
84 while (data != -1) {
85     char current = (char) data;
86     result += current;
87     data = reader.read();
88 }
89
90 return result;
91
92 } catch (MalformedURLException e) {
93     e.printStackTrace();
94 } catch (IOException e) {
95     e.printStackTrace();
96 }
97
98 return null;
99
100 }
101
102 @Override
103 protected void onPostExecute(String result) {
104     super.onPostExecute(result);
105
106     try {
107         JSONArray jsonArray = new JSONArray(result);
108         json = jsonArray.getJSONObject(0);
109
110         for(int i = 0; i < json.length(); i++) {
111             fridge = json.getDouble("fridgeusagekwh");
112             ac = json.getDouble("airconditionusagekwh");
113             wm = json.getDouble("washingmachineusagekwh");
114             totalUsage = fridge + ac + wm;
115         }
116
117     } catch (JSONException e) {
118         e.printStackTrace();
119     }
120 }

```

## 3.3 - Services

### GENERAL WEB SERVICE

```
GeneralWebService.java  URLs.java  UserService.java
1 package com.di0nysis.smarter.Service;
2
3 import java.io.*;
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22 public class GeneralWebService {
23
24     public static JSONArray requestRESTServiceArray(String restURL) throws IOException, JSONException {
25         disableConnectionReuseIfNecessary();
26
27         HttpURLConnection urlConnection = null;
28         JSONArray resultJSONArray = null;
29         int statusCode;
30         String exceptionJSON = "{%s:%s}";
31         String responseFromREST;
32
33         try {
34             URL urlToRequest = new URL(restURL);
35             urlConnection = (HttpURLConnection)urlToRequest.openConnection();
36             urlConnection.setRequestMethod("GET");
37             urlConnection.setRequestProperty("Content-Type", "application/json");
38             urlConnection.setRequestProperty("Accept", "application/json");
39             statusCode = urlConnection.getResponseCode();
40             switch (statusCode) {
41                 case HttpURLConnection.HTTP_UNAUTHORIZED:
42                     resultJSONArray = new JSONArray(String.format(exceptionJSON, URLs.WS_KEY_EXCEPTION, URLs.MSG_401));
43                     break;
44                 case HttpURLConnection.HTTP_NOT_FOUND:
45                     throw new NullPointerException("");
46                 case HttpURLConnection.HTTP_INTERNAL_ERROR:
47                     resultJSONArray = new JSONArray(String.format(exceptionJSON, URLs.WS_KEY_EXCEPTION, URLs.MSG_500));
48                     break;
49                 case HttpURLConnection.HTTP_OK:
50                     InputStream in = new BufferedInputStream(urlConnection.getInputStream());
51                     responseFromREST = getResponseText(in);
52                     resultJSONArray = new JSONArray(responseFromREST);
53                     break;
54                 default:
55                     break;
56             }
57         } catch (MalformedURLException e) {
58             throw e;
59         } catch (SocketTimeoutException e) {
60             throw e;
61         } catch (IOException e) {
62             throw e;
63         }
64     }
65 }
```

### USER SERVICE

```
package com.di0nysis.smarter.Service;
import java.io.*;
import java.util.*;

public class UserService {

    public static JSONArray findByEmail(String email) throws IOException, JSONException {
        JSONArray jsonObject;
        try {
            jsonObject = GeneralWebService.requestRESTServiceArray(restURL: URLs.FIND_USER_BY_EMAIL_WS + email);
        } catch (NullPointerException ex) {
            return null;
        } catch (Exception ex) {
            throw ex;
        }
        return jsonObject;
    }

    public static JSONArray findByUsername(String username) throws IOException, JSONException {
        JSONArray jsonObject = new JSONArray();
        try {
            jsonObject = GeneralWebService.requestRESTServiceArray(restURL: URLs.FIND_CREDENTIAL_BY_USERNAME_WS + username);
        } catch (NullPointerException ex) {
            return null;
        } catch (Exception ex) {
            throw ex;
        }
        return jsonObject;
    }

    public static List<User> findAllUsers() throws IOException, JSONException, ParseException {
        List<User> users = new ArrayList<>();
        JSONArray jsonArray = new JSONArray();
        try {
            jsonArray = GeneralWebService.requestRESTServiceArray(URLs.GET_ALL_USERS);
            int position = 0;
            while (position < jsonArray.length()) {
                JSONObject jsonObj = jsonArray.getJSONObject(position);
                User user = new User(jsonObj);
                users.add(user);
                position++;
            }
        } catch (Exception ex) {
            throw ex;
        }
    }
}
```

## POST REST SERVICE

```
GeneralWebService.java | URLs.java | UserService.java |
71     return resultJSONArray;
72 }
73
74 @
75 public static String postRESTService(String restURL, JSONObject jsonParam) throws IOException {
76     String result = "";
77     if (jsonParam.length() == 0)
78         return URLs.SUCCESS_MSG;
79     HttpURLConnection urlConnection=null;
80
81     try {
82         URL urlToRequest = new URL(restURL);
83         urlConnection = (HttpURLConnection)urlToRequest.openConnection();
84         urlConnection.setRequestMethod("POST");
85         urlConnection.setUseCaches(false);
86         urlConnection.setConnectTimeout(10000);
87         urlConnection.setReadTimeout(15000);
88         urlConnection.setRequestProperty("Content-Type","application/json; charset=UTF-8");
89         urlConnection.setDoOutput(true);
90
91         OutputStream outputPost = new BufferedOutputStream(urlConnection.getOutputStream());
92         outputPost.write(jsonParam.toString().getBytes());
93         outputPost.flush();
94         outputPost.close();
95
96         urlConnection.connect();
97
98         int HttpResult = urlConnection.getResponseCode();
99         if(HttpResult == HttpURLConnection.HTTP_NO_CONTENT){
100             result = URLs.SUCCESS_MSG;
101         }else{
102             result = urlConnection.getResponseMessage();
103         }
104     } catch (IOException ex) {
105         throw ex;
106     } catch (Exception ex) {
107         throw ex;
108     } finally {
109         if(urlConnection!=null)
110             urlConnection.disconnect();
111         return result;
112     }
113 }
```

## 3.4 Classes

### USER

```
User.java
1 package com.di0nysis.smarter.JavaClass;
2
3 import ...
4
5 public class User {
6     private int resId;
7     private String address;
8     private String dob;
9     private String email;
10    private String energyProvider;
11    private String firstName;
12    private String mobile;
13    private int residentNumber;
14    private String postCode;
15    private String lastName;
16
17    public User(String firstName,String lastName, String dob, String address, String postCode,
18    String mobile, String email, int residentNumber, String energyProvider) {...}
19
20
21    public User(JSONObject jsonObject) throws JSONException, ParseException {...}
22
23    public int getResId() { return resId; }
24
25    public String getAddress() { return address; }
26
27    public String getDob() { return dob; }
28
29    public String getEmail() { return email; }
30
31    public String getEnergyProvider() { return energyProvider; }
32
33    public String getFirstName() { return firstName; }
34
35    public String getPhone() { return mobile; }
36
37    public int getResidentNumber() { return residentNumber; }
38
39    public String getPostCode() { return postCode; }
40
41    public String getLastName() { return lastName; }
42
43    public void setAddress(String address) { this.address = address; }
```



```

    public void setDob(String dob) { this.dob = dob; }

    public void setEmail(String email) { this.email = email; }

    public void setEnergyProvider(String energyProvider) { this.energyProvider = energyProvider; }

    public void setFirstName(String firstName) { this.firstName = firstName; }

    public void setPhone(String mobile) { this.mobile = mobile; }

    public void setResidentNumber(int residentNumber) { this.residentNumber = residentNumber; }

    public void setPostCode(String postCode) { this.postCode = postCode; }

    public void setLastName(String lastName) { this.lastName = lastName; }
}

```

## UNIVERSAL

```

package com.dionysis.smarter.JavaClass;

import java.util.*;

public class Universal extends Application {

    private static int resId;
    private static String address;
    private static String firstName;
    private static String lastName;
    private static Context mContext;
    private static int postcode;

    public static String getExceptionInfo(Exception ex) {...}

    public static int getResId() { return resId; }
    public static void setResId(int resId) { Universal.resId = resId; }

    public static String getFirstName() { return firstName; }
    public static void setFirstName(String firstName) { Universal.firstName = firstName; }

    public static String getLastName() { return lastName; }
    public static void setLastName(String lastName) { Universal.lastName = lastName; }

    public static String getAddress() { return address; }
    public static void setAddress(String address) { Universal.address = address; }

    public static Context getmContext() { return mContext; }
    public static void setmContext(Context mContext) { Universal.mContext = mContext; }

    public static int getPostCode() { return postcode; }
    public static void setPostCode(int postcode) { Universal.postcode = postcode; }

    public static boolean isEmptyOrNull (String str) { return str == null || "".equals(str); }
}

```

## APPLIANCE GENERATOR

```

package com.dionysis.smarter.JavaClass;

import java.util.Random;

public class ApplianceGenerator {
    private double randomFridge;
    private double randomWM;
    private double randomAC;
    private int randomHour;
    private int hour = 0;

    public double[] getRandomFridgeUsage() {
        double minFridge = 0.3;
        double maxFridge = 0.8;
        double fridge = minFridge + Math.random() * (maxFridge - minFridge);
        randomFridge = Math.round(fridge * 100.00) / 100.0;

        double[] fridgeUsages = new double[24];

        while (hour <= 23) {
            for (int i = hour; i <= hour; i++) {
                fridgeUsages[i] = randomFridge;
            }
            hour++;
        }

        return fridgeUsages;
    }

    public double[] getRandomWMUsage() {
        double minWM = 0.4;
        double maxWM = 1.3;
        double wm = minWM + Math.random() * (maxWM - minWM);
        randomWM = Math.round(wm * 100.00) / 100.0;
        double zeroWM = 0.0;
        int maxHour = 21;
        int minHour = 6;

        double[] wmUsages = new double[24];

        boolean isHour = true;
        while (isHour) {
            double h = (minHour + (Math.random() * (maxHour - minHour + 1)));

```

```

ApplianceGenerator.java
44 double h = (minHour + (Math.random() * (maxHour - minHour + 1)));
45 randomHour = (int) (Math.round(h * 100) / 100);
46 int hour = 0;
47 while (hour <= 23) {
48     for (int i = hour; i <= hour; i++) {
49         wmUsages[i] = zeroWm;
50     }
51     hour++;
52     if (randomHour == hour && randomHour <= 19) {
53         for (int counter = 0; counter <= 2; counter++) {
54             for (int i = randomHour; i <= 19; i++) {
55                 wmUsages[i] = randomWm;
56             }
57             isHour = false;
58             randomHour++;
59             hour++;
60         }
61     }
62     else if (randomHour == 20) {
63         for (int counter = 0; counter <= 1; counter++) {
64             wmUsages[19] = randomWm;
65             isHour = false;
66             randomHour++;
67             hour++;
68         }
69     }
70     else if (randomHour == 21) {
71         wmUsages[20] = randomWm;
72         isHour = false;
73         randomHour++;
74         hour++;
75     }
76 }
77 }
78
79 return wmUsages;
80 }
81
82 public double[] getRandomAcUsage(Double temperature) {
83     double minAC = 1;
84     double maxAC = 5;
85     double ac = minAC + Math.random() * (maxAC - minAC);
86     randomAC = Math.round(ac * 100.00) / 100.0;
87     double zeroAC = 0.0;

```

```

ApplianceGenerator.java
88 int maxHourAC = 23;
89 int minHourAC = 9;
90 Random random = new Random();
91 Boolean isAcOpen;
92 int counter = 0;
93
94 double[] acUsages = new double[24];
95
96 while (hour <= maxHourAC) {
97     if (temperature < 20) {
98         while (hour <= maxHourAC) {
99             for (int i = hour; i <= maxHourAC; i++) {
100                 acUsages[i] = zeroAC;
101             }
102             hour++;
103         }
104     }
105     else {
106         if (hour < minHourAC) {
107             for (int i = hour; i < minHourAC; i++) {
108                 acUsages[i] = zeroAC;
109             }
110             hour++;
111         }
112         if (hour >= minHourAC) {
113             isAcOpen = random.nextBoolean();
114             while (hour <= maxHourAC) {
115                 while (counter < 10 && hour <= 23) {
116                     if (isAcOpen) {
117                         for (int i = hour; i <= maxHourAC; i++) {
118                             acUsages[i] = randomAC;
119                         }
120                         hour++;
121                         counter++;
122                         isAcOpen = random.nextBoolean();
123                     }
124                     else if (!isAcOpen) {
125                         for (int i = hour; i <= maxHourAC; i++) {
126                             acUsages[i] = zeroAC;
127                         }
128                         hour++;
129                         isAcOpen = random.nextBoolean();
130                     }
131                 }
132             }
133         }
134     }
135 }

```

```

        }
        if (hour <= maxHourAC) {
            while (hour <= maxHourAC) {
                for (int i = hour; i <= maxHourAC; i++) {
                    acUsages[i] = zeroAC;
                }
                hour++;
            }
        }
    }
}
return acUsages;
}

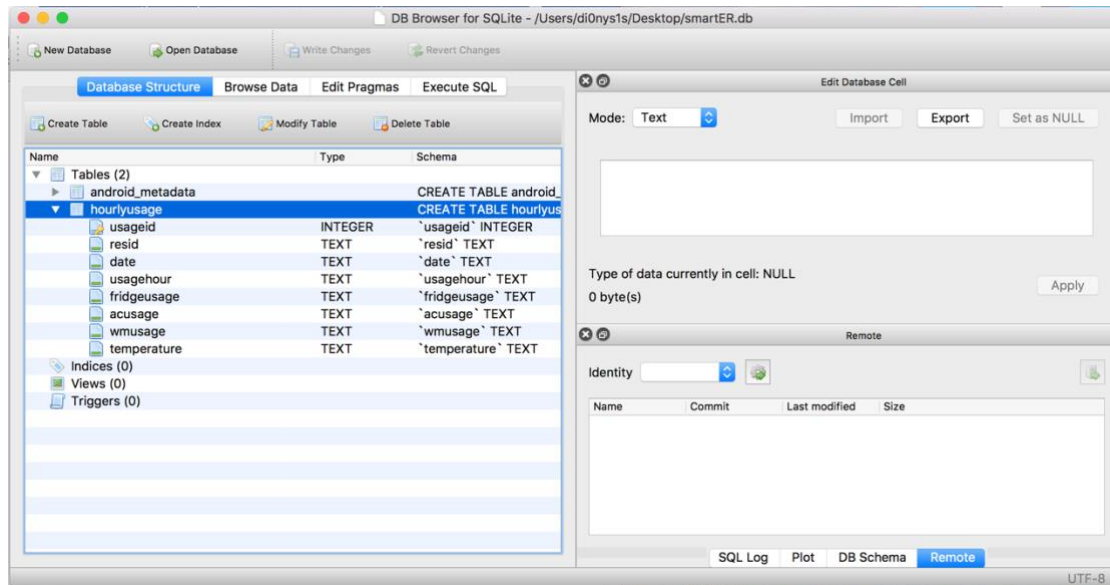
```



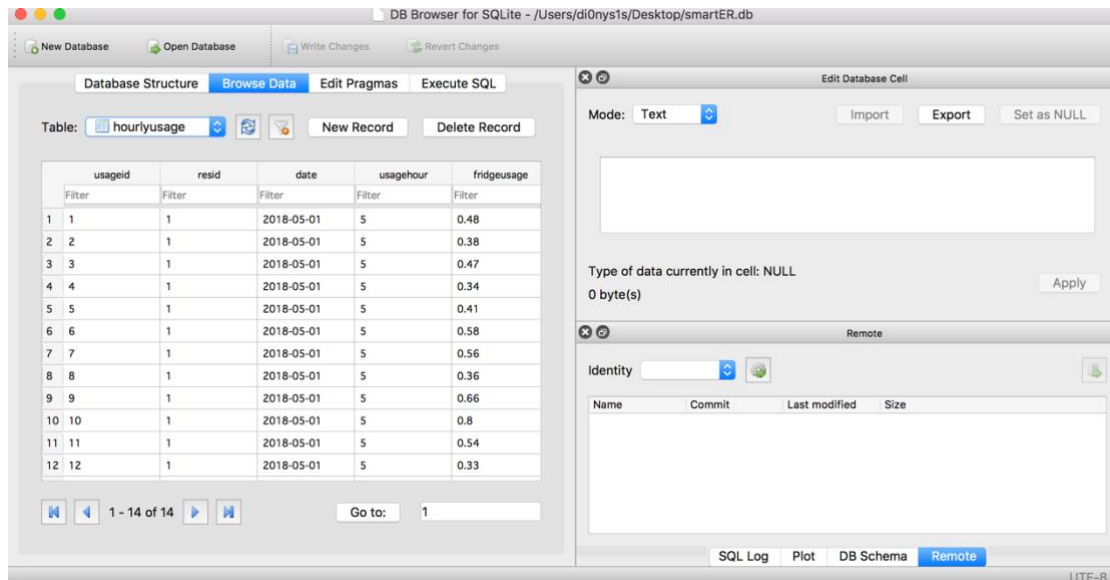
# Task 4 – SQLite and AVD

## 4.1 - SQLite

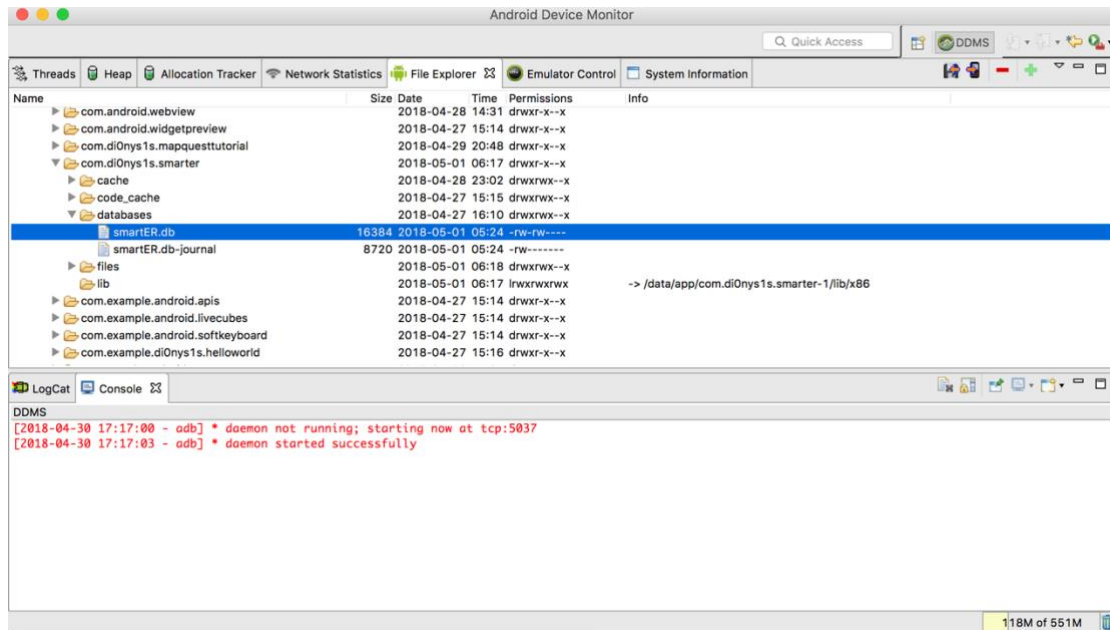
### DB STRUCTURE



### DB DATA



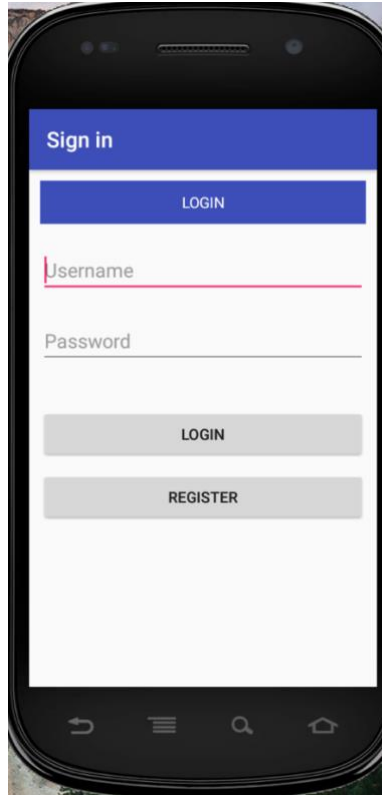
## 4.2 - AVD



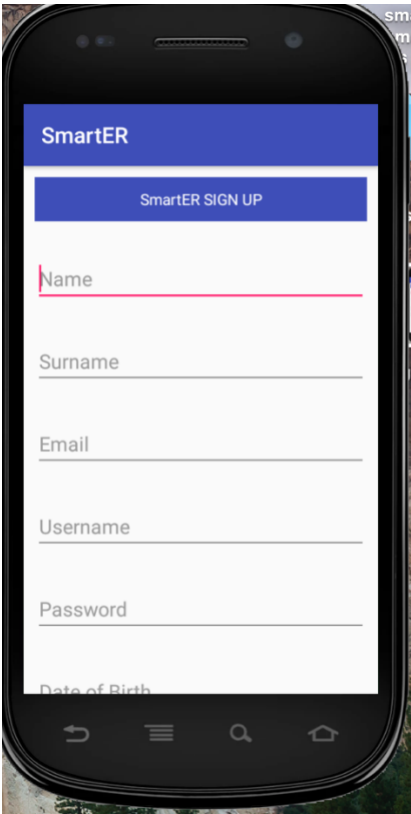
---

## Task 5 – Application

### LOGIN

A screenshot of a mobile application's login screen. The screen is displayed on a black smartphone. At the top, there is a blue header bar with the text "Sign in" in white. Below the header, there is a blue button with the text "LOGIN" in white. Underneath the button, there are two text input fields: the first is labeled "Username" and the second is labeled "Password". Below the input fields, there are two grey buttons: the first is labeled "LOGIN" and the second is labeled "REGISTER". At the bottom of the screen, there is a black navigation bar with four white icons: a back arrow, a hamburger menu, a magnifying glass, and a home icon.

REGISTER



SmartER

SmartER SIGN UP

Name

Surname

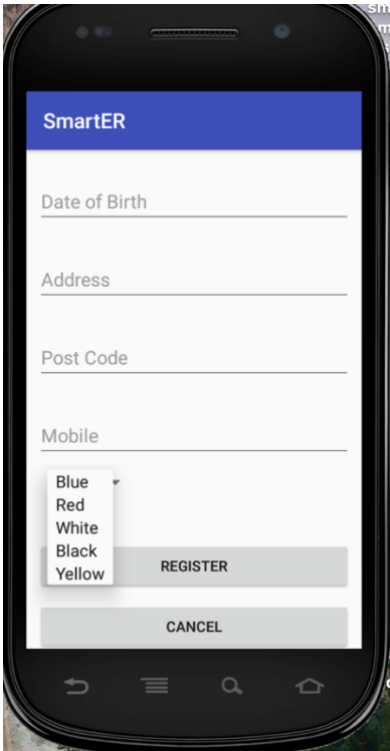
Email

Username

Password

Date of Birth

The image shows a smartphone screen with the SmartER SIGN UP form. The form has a blue header with the text 'SmartER'. Below the header is a blue button labeled 'SmartER SIGN UP'. The form fields are: Name (with a red underline), Surname, Email, Username, Password, and Date of Birth. The bottom of the screen shows the Android navigation bar with icons for back, home, and search.



SmartER

Date of Birth

Address

Post Code

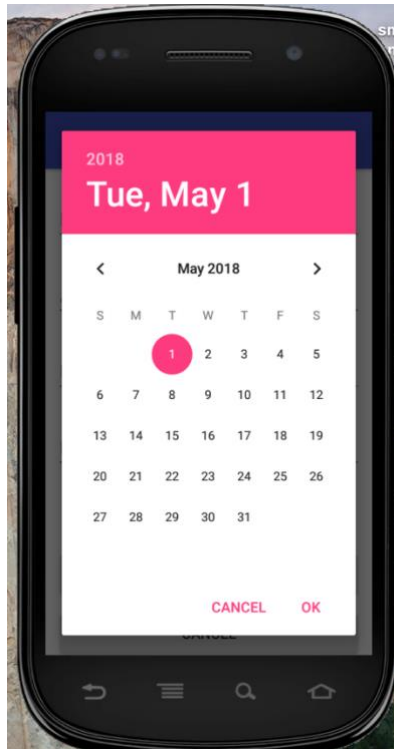
Mobile

Blue  
Red  
White  
Black  
Yellow

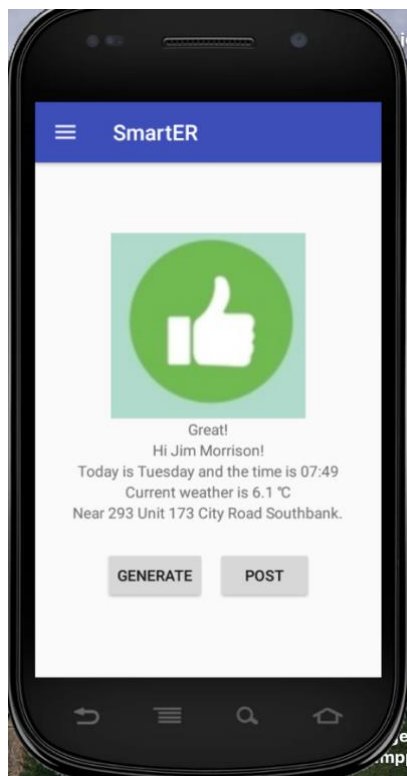
REGISTER

CANCEL

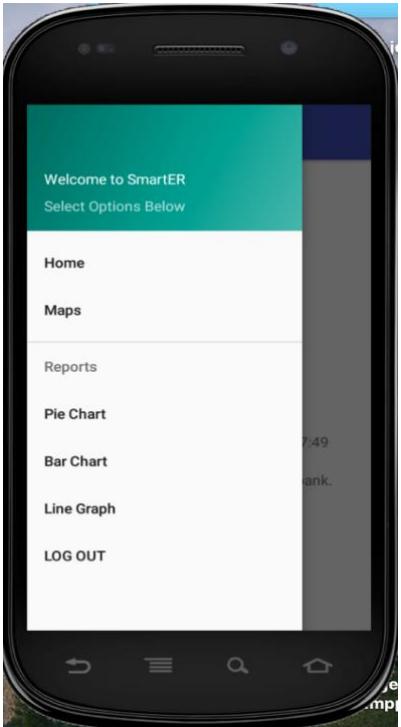
The image shows a smartphone screen with the SmartER form. The form has a blue header with the text 'SmartER'. Below the header are the following fields: Date of Birth, Address, Post Code, and Mobile. Below the Mobile field is a dropdown menu with the following options: Blue, Red, White, Black, and Yellow. Below the dropdown menu are two buttons: REGISTER and CANCEL. The bottom of the screen shows the Android navigation bar with icons for back, home, and search.



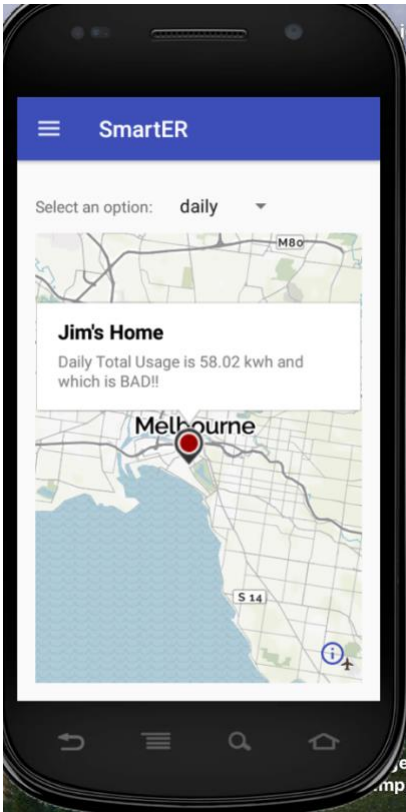
## HOME



NAVIGATION



MAP



## PIE CHART

