Mapping points of interest using Java ME

This article explains how to use Nokia SDK 2.0 to create application for mapping points of interest for a Series 40 full touch device. The app also gets weather and news information from web services.

17 Nov 2013

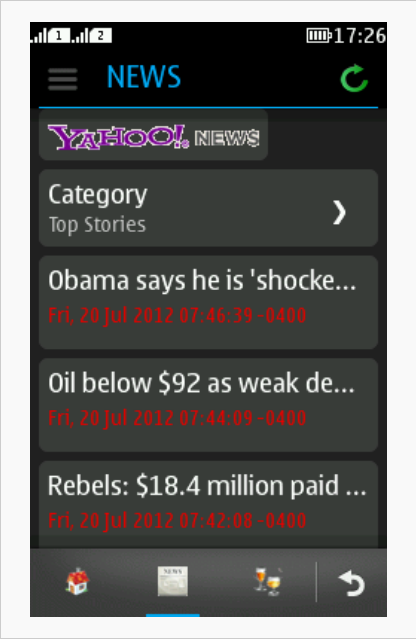
Note: This is an entry in the Asha Touch Competition 2012Q3

Prerequisites

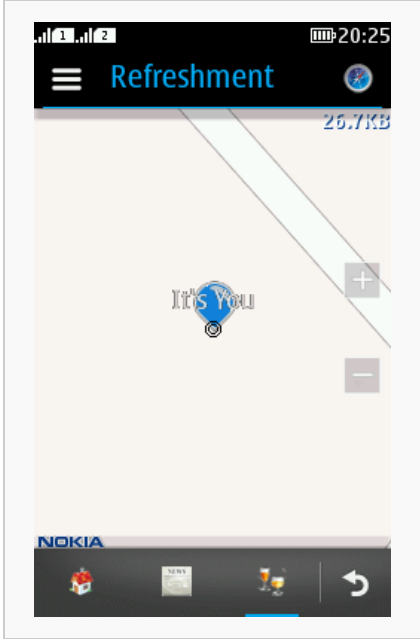
- Download Nokia SDK 2.0 for Java
- To use the HERE Maps API, you need to acquire a set of API Credentials from the Nokia Developer (registration is free)
- Acquire a key from worldweatheronline.com (a free weather information provider)
- Keep an eye on the notes and tips below :-)

Quick Walk through

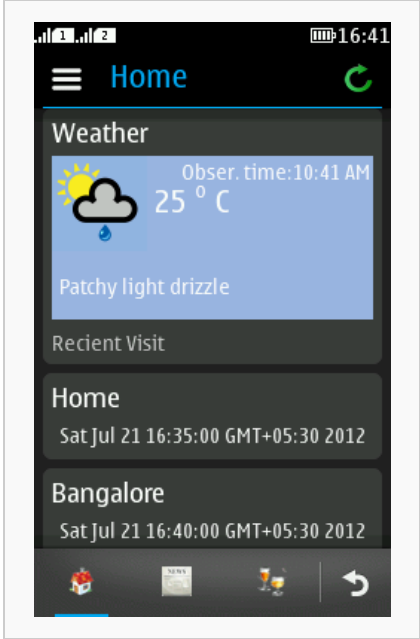
The code example uses the content of a *Refreshment* app. The app provides information about current weather, contains news, and includes mapping features to help you locate refreshment.



Yahoo News Feed



Current Location



Home Screen

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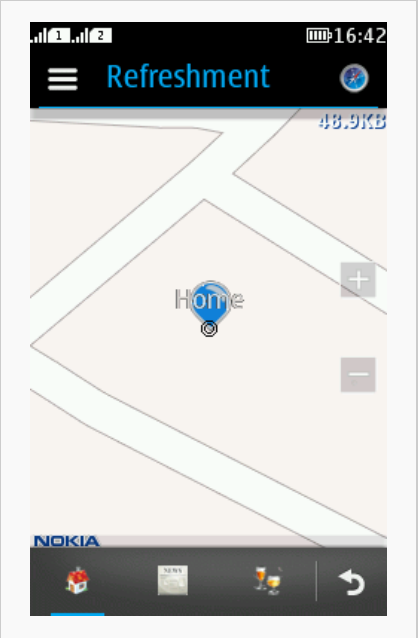

Locating Bookmarked place on map

In future the app may be extended to include navigation information with transits, walk and drive, or to additionally help users locate ATM's, bus stops, metro stations, nearby taxi stand and many more.

Quick intro to Location API

We need the current location to request Weather data to the server. I will explain how to request to the server to obtain weather data later in the coming topics. Current location is also used with maps to find out the nearest chat center and hangouts.

Creating object of location

```
LocationProvider myloc;
```

Current location through Cellular ID

Series 40 supports cellular ID and WLAN positioning. Series 40 extends the Location API with the com.nokia.mid.location.LocationUtil class. Therefore, I have used `LocationUtil.getLocationProvider(type, null)`. However, support for this in specific devices vary. So, I will be using `MTE_CELLID`, `MTY_NETWORKBASED` and `MTA_ASSISTED`.

Use the following statements in `startApp()` method.

```
int[] type = {Location.MTE_CELLID|Location.MTY_NETWORKBASED|Location.MTA_ASSISTED};
try {
  myloc = LocationUtil.getLocationProvider(type, null);
  javax.microedition.location.Location Loc =  myloc.getLocation(300);
  if(Loc != null){
   QualifiedCoordinates cor = Loc.getQualifiedCoordinates();
   lat = cor.getLatitude();
   lon = cor.getLongitude();
  }
} catch (Exception ex) {}
```

Quick intro to Nokia Map API

Creating object of MapCanvas and setting up the things

```
MapCanvas mapCanvas = new MapCanvas(Display.getDisplay(this)) {
```


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```
public void onMapUpdateError(String arg0, Throwable arg1, boolean arg2) {
 // TODO Auto-generated method stub

}

public void onMapContentComplete() {
 // TODO Auto-generated method stub

}
};
```

In startApp() method add the following lines to setup initial things.

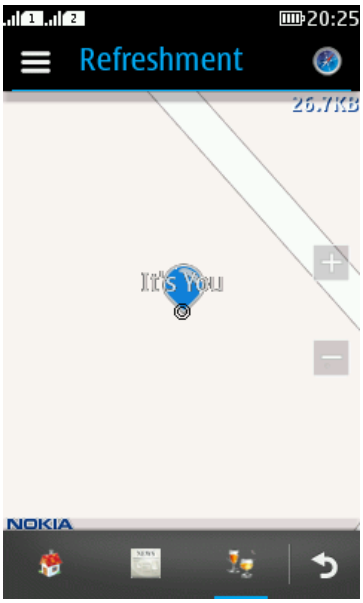
```
ApplicationContext.getInstance().setAppID("Your_App_ID");
ApplicationContext.getInstance().setToken("Your_App_Token");
```

Positioning the map to current location and zooming

We will start with positioning to current location on map and extend this location to find out refreshment places near.

```
mapCanvas.getMapDisplay().zoomTo(new GeoBoundingBox(new GeoCoordinate(lat, lon, 0)),
false);
mapCanvas.getMapDisplay().addMapObject(mapCanvas.getMapFactory().createStandardMarker(new
GeoCoordinate(lat, lon, 0), 1, "It's You", 2));
```

Tip: It is good practice to create a marker to indicate current position. Use `createStandardMarker()` method of `MapFactory` class as shown above.



Nokia UI Components used in here

Apart from using pure LCDUI components, I will make use of two new components provided and supported on Series 40 full touch devices. These are Category Bar and Icon Command.

Tip: If you are interested in designing an app UI with Category Bar see this article.

CategoryBar

Creating Category Bar and making it visible.

```
CategoryBar cbar;
```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```
try {
   Image[] unsel = { Image.createImage("/home.png"),
     Image.createImage("/news.png"),
     Image.createImage("/refreshment.png") };
   Image[] sel = { Image.createImage("/home.png"),
     Image.createImage("/news.png"),
     Image.createImage("/refreshment.png") };
   String[] lab = { "Home", "News", "Refreshments" };
   cbar = new CategoryBar(unsel, sel, lab);
   cbar.setElementListener(this);
   cbar.setTransitionSupport(true);
   cbar.setVisibility(true);

} catch (Exception ex) {}
```

Note: App can have only one Category Bar set visible at a time. However You can create multiple Category Bars but only one can be made visible. If the app requires multiple Category Bars, create as many as needed and change visibility as required. Ex: *Form f1* has *CategoryBar cbar1* with some items and *Form f2* has *CategoryBar cbar2* with some items. For *Form f1* as current display, use: *cbar1.setVisibility(true); cbar2.setVisibility(false);* and so on.

IconCommand

Creating and using Icon Command is like normal command. More on Icon Command

```
try {
 refeshCommand = new
IconCommand("Refresh",Image.createImage("/refresh.png"),Image.createImage("/refresh.png"),
Command.OK, 0);
 currentposCommand = new IconCommand("Current pos",Image.createImage("/curloc.png"),
Image.createImage("/curloc.png"), Command.OK, 0);
} catch (Exception ex) {
}
```

Weather feed

Weather feed and rss feed data will be in XML format and we need to parse these xml to extract required information. There are number of XML parsers available: About XML Parser. kXML is one of such parser I would like to use. kXML 1.2 have been included in source program.

```
public void run() {
try {
              //Url format for http request is:
http://free.worldweatheronline.com/feed/weather.ashx?
q=<latitude>,<longitude>&format=xml&num_of_days=1&key=XXXXXXXXXXXXXXXXXXXXX
             // or http://free.worldweatheronline.com/feed/weather.ashx?
q=<City>,<Country>&format=xml&num_of_days=1&key=XXXXXXXXXXXXXXXXXXXXX
  String reqUrl = url + lat + "," + lon + keys;
  con = (HttpConnection) Connector.open(reqUrl, Connector.READ_WRITE,true);
  con.setRequestMethod(HttpConnection.GET);
  weatherxmlparser(con.openDataInputStream());
} catch (Exception e) {
}
}
```

Note: Weather API returns data in XML, CSV, json format. XML is easy to parse, so I will use xml in &format field.

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```
<data>
<request>
<type>LatLon</type>
<query>Lat 28.64 and Lon 77.24</query>
</request>
<current_condition>
<observation_time>11:10 AM</observation_time>
<temp_C>33</temp_C>
<temp_F>91</temp_F>
<weatherCode>353</weatherCode>
<weatherIconUrl>
<![CDATA[
http://www.worldweatheronline.com/images/wsymbols01_png_64/wsymbol_0009_light_rain_showers.png
]]>
</weatherIconUrl>
<weatherDesc>
<![CDATA[ Light rain shower ]]>
</weatherDesc>
<windspeedMiles>11</windspeedMiles>
<windspeedKmph>17</windspeedKmph>
<winddirDegree>60</winddirDegree>
<winddir16Point>ENE</winddir16Point>
<precipMM>1.4</precipMM>
<humidity>59</humidity>
<visibility>3</visibility>
<pressure>998</pressure>
<cloudcover>75</cloudcover>
</current_condition>
<weather>
<date>2012-07-25</date>
<tempMaxC>37</tempMaxC>
<tempMaxF>99</tempMaxF>
<tempMinC>28</tempMinC>
<tempMinF>82</tempMinF>
<windspeedMiles>10</windspeedMiles>
<windspeedKmph>16</windspeedKmph>
<winddirection>E</winddirection>
<winddir16Point>E</winddir16Point>
<winddirDegree>87</winddirDegree>
<weatherCode>116</weatherCode>
<weatherIconUrl>
<![CDATA[
http://www.worldweatheronline.com/images/wsymbols01_png_64/wsymbol_0002_sunny_intervals.png
]]>
</weatherIconUrl>
<weatherDesc>
<![CDATA[ Partly Cloudy ]]>
</weatherDesc>
<precipMM>8.7</precipMM>
</weather>
</data>
```

Above is sample XML data response. We need to parse the xml data to obtain required information. Important information required `observation_time`, `temp_C`, `weatherIconUrl` and `weatherDesc`. We need to design the XML parser to parse the weather feed. XML parser for this will be one below:

```
public void weatherxmlparser(InputStream xmldata) {
  Reader r = new InputStreamReader(xmldata);
```


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```
  try {
   XmlParser parser = new XmlParser(r);
    traverse( parser, "" );
  } catch (Exception e) {
  }
}
```

```
public void traverse(XmlParser parser, String indent) {
  try {
   boolean leave = false;
   do {
    ParseEvent event = parser.read();
    ParseEvent pe;
    switch (event.getType()) {
    // For example, <title>
    case Xml.START_TAG:
     // see API doc of StartTag for more access methods
     // Pick up Time for display
     if ("observation_time".equals(event.getName())) {
      pe = parser.read();
      this.r.wtr.time = pe.getText();
     }
     // Pick up temperature for display and so on
     if ("temp_C".equals(event.getName())) {
      pe = parser.read();
      this.r.wtr.tempINDegC = pe.getText();
     }

     if ("weatherIconUrl".equals(event.getName())) {
      pe = parser.read();
      //download image for the corresponding URL
      this.r.wtr.wicon = loadImage(pe.getText());

     }
     if ("weatherDesc".equals(event.getName())) {
      pe = parser.read();
      this.r.wtr.climate = pe.getText();
     }
     traverse( parser, "" ) ;   // recursion call for each <tag></tag>
     break;
    // For example </title>
    case Xml.END_TAG:
     leave = true;
     break;
    // For example </data>
    case Xml.END_DOCUMENT:
     leave = true;
     break;
    // For example, the text between tags
    case Xml.TEXT:
     break;
    case Xml.WHITESPACE:
     break;
    default:
    }
   } while (!leave);
```


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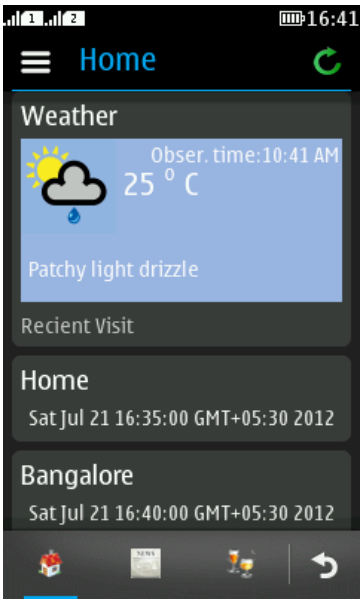
```
    } catch (Exception e) {
    }
  }
```



Weather data obtained from server is parsed and painted on `Canvas` of a `CustomItem`.

News Feed

To get latest new, we will be using Yahoo News RSS feed.

Category	Feed URL
Top Stories	http://news.yahoo.com/rss/topstories
World News	http://news.yahoo.com/rss/world
Entertainment	http://news.yahoo.com/rss/entertainment
Movies	http://news.yahoo.com/rss/movies

In news form, user selects an choice from choice group. Through `itemState` listener we are able to identify the change in the selection. Depending upon the selection, request to server is sent through HTTP request. Which is done using Thread. Using Thread because server may busy at the time of request and may not respond to our request. Therefore we make repeated request until server responds to our request. Then by opening I/O streams we can read the data. The thread t handles the task of requesting and opening I/O connection.

```
public void getFeeds(String url) {
  yahooNewURL = url;
  t = new Thread(this);
  t.start();
 }
```

```
public void run() {
  try {
   con = (HttpConnection) Connector.open(yahooNewURL,Connector.READ_WRITE, true);
   con.setRequestMethod(HttpConnection.GET);
   getData(con.openInputStream());
  } catch (Exception e) {
   // TODO: handle exception
  }
 }
```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```
<rss xmlns:media="http://search.yahoo.com/mrss/" version="2.0">
<channel>
<title>Movies News Headlines - Yahoo! News</title>
<link>http://news.yahoo.com/movies/</link>
<description>
Get the latest Movies news headlines from Yahoo! News. Find breaking Movies news,
including analysis and opinion on top Movies stories, photos and more.
</description>
<language>en-US</language>
<copyright>Copyright (c) 2012 Yahoo! Inc. All rights reserved</copyright>
<pubDate>Mon, 23 Jul 2012 20:19:11 -0400</pubDate>
<ttl>5</ttl>
<image>
<title>Movies News Headlines - Yahoo! News</title>
<link>http://news.yahoo.com/movies/</link>
<url>http://l.yimg.com/a/i/us/nws/th/main_142c.gif</url>
</image>
<item>
<title>"Dark Knight Rises" earns $160.8 million in debut</title>
<description>
<p><a href="http://news.yahoo.com/dark-knight-rises-earns-160-8-million-debut-001911324-
-finance.html"><img src="http://l3.yimg.com/bt/api/res/1.2/34Jg14ltXARef75.MHa9rw--
/YXBwaWQ9eW5ld3M7Zmk9ZmlsbDtoPTg2O3E9ODU7dz0xMzA-
/http://media.zenfs.com/en_us/News/Reuters/2012-07-
24T002136Z_1_CBRE86N010600_RTROPTP_2_FILM-US-USA-SHOOTING-BOXOFFICE-OFFICIAL.JPG"
width="130" height="86" alt="A poster for &quot;The Dark Knight Rises&quot; is displayed
in Burbank" align="left" title="A poster for &quot;The Dark Knight Rises&quot; is
displayed in Burbank" border="0" /></a>LOS ANGELES (Reuters) - Warner Bros said on
Monday &quot;The Dark Knight Rises&quot; took in $160.8 million at U.S. and Canadian box
offices over the weekend, which is lower than industry estimates for the debut that felt
the impact of last week&#039;s movie theater massacre in Colorado. &quot;Dark Knight
Rises&quot; also opened in 17 international markets with $88 million in ticket sales to
put its global total at just under $250 million for its debut. Warner Bros, a unit of
Time Warner Inc, made no initial comment beyond simply releasing the figures. ...</p><br
clear="all"/>
</description>
<link>
http://news.yahoo.com/dark-knight-rises-earns-160-8-million-debut-001911324--
finance.html
</link>
<pubDate>Mon, 23 Jul 2012 20:19:11 -0400</pubDate>
<source url="http://www.reuters.com/">Reuters</source>
<guid isPermaLink="false">
dark-knight-rises-earns-160-8-million-debut-001911324--finance
</guid>
<media:content url="http://l3.yimg.com/bt/api/res/1.2/34Jg14ltXARef75.MHa9rw--
/YXBwaWQ9eW5ld3M7Zmk9ZmlsbDtoPTg2O3E9ODU7dz0xMzA-
/http://media.zenfs.com/en_us/News/Reuters/2012-07-
24T002136Z_1_CBRE86N010600_RTROPTP_2_FILM-US-USA-SHOOTING-BOXOFFICE-OFFICIAL.JPG"
type="image/jpeg" width="130" height="86"/>
<media:text type="html">
<p><a href="http://news.yahoo.com/dark-knight-rises-earns-160-8-million-debut-001911324-
-finance.html"><img src="http://l3.yimg.com/bt/api/res/1.2/34Jg14ltXARef75.MHa9rw--
/YXBwaWQ9eW5ld3M7Zmk9ZmlsbDtoPTg2O3E9ODU7dz0xMzA-
/http://media.zenfs.com/en_us/News/Reuters/2012-07-
24T002136Z_1_CBRE86N010600_RTROPTP_2_FILM-US-USA-SHOOTING-BOXOFFICE-OFFICIAL.JPG"
width="130" height="86" alt="A poster for &quot;The Dark Knight Rises&quot; is displayed
in Burbank" align="left" title="A poster for &quot;The Dark Knight Rises&quot; is
displayed in Burbank" border="0" /></a>LOS ANGELES (Reuters) - Warner Bros said on
```


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```
Monday &quot;The Dark Knight Rises&quot; took in $160.8 million at U.S. and Canadian box
offices over the weekend, which is lower than industry estimates for the debut that felt
the impact of last week&#039;s movie theater massacre in Colorado. &quot;Dark Knight
Rises&quot; also opened in 17 international markets with $88 million in ticket sales to
put its global total at just under $250 million for its debut. Warner Bros, a unit of
Time Warner Inc, made no initial comment beyond simply releasing the figures. ...</p><br
clear="all"/>
</media:text>
<media:credit role="publishing company"/>
</item>
</channel>
</rss>
```

Above shows the sample RSS feed in XML format received from server. We need to parse this XML to retrieve the required information. We are interested in reading title, link and published date. Therefore our parser should be designed to read only these fields located between <item> and </item> tag. So we do recursive parsing between each <item>and </item> tags until the end of document is reached.
Code for the same will be:

```
public void getData(InputStream xmldata) {
  Reader r = new InputStreamReader(xmldata);
  try {
   XmlParser parser = new XmlParser(r);
   ParseEvent pe = null;
   parser.skip();
   parser.read(Xml.START_TAG, null, "rss");
   parser.skip();
   parser.read(Xml.START_TAG, null, "channel");
   boolean trucking = true;
   while (trucking) {
    pe = parser.read();
    if (pe.getType() == Xml.START_TAG) {
     String name = pe.getName();
     if (name.equals("item")) {
      String title, link, description;
      title = link = description = null;
      while ((pe.getType() != Xml.END_TAG)
        || (pe.getName().equals(name) == false)) {
       pe = parser.read();
       if (pe.getType() == Xml.START_TAG
         && pe.getName().equals("title")) {
        pe = parser.read();
        title = pe.getText();
       } else if (pe.getType() == Xml.START_TAG
         && pe.getName().equals("link")) {
        pe = parser.read();
        link = pe.getText();
       } else if (pe.getType() == Xml.START_TAG
         && pe.getName().equals("pubDate")) {
        pe = parser.read();
        description = pe.getText();
       }
      }
      this.r.newsf.append(new customlist(title, link,
        description, this.r));
     } else {
      while ((pe.getType() != Xml.END_TAG)
        || (pe.getName().equals(name) == false))
```


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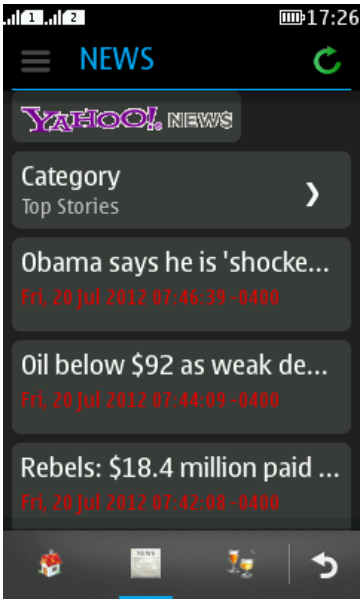
```
        pe = parser.read();
      }
     }
     if (pe.getType() == Xml.END_TAG && pe.getName().equals("rss")){
      trucking = false;
      t = null;
     }
    }
   } catch (Exception e) {
   }
 }
```

Once we get these required information, we need to append this to our form. Which is done using this.r.newsf.append(new customlist(title,link,description, this.r)); . Where r - instance of Refreshment MIDlet, newsf is the form where we need to append.



Finally after parsing and appending the whole XML document. News Form looks like as above.

Working with MapCanvas

Bookmarking the location

Bookmarking feature enables to save the favorite locations on mobile. You visit some place or hotels, you may forget the address or name of the hotel. So using bookmark feature you can tag and save the current location in mobile phone.

```
if(c == bookmarkCommand){
   Display.getDisplay(this).setCurrent(bookmark);
  }
  else if(c == okCommand){
   writeSavedData(bookmark.getString(), lat, lon);
   Display.getDisplay(this).setCurrent(mapCanvas);
  }
  else if(c == deleteCommand){
   clearbookmark();
   homef.deleteAll();
   homef.append(wtr);
   readSavedData();
}
```

Locating bookmarked location on map

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```
public void updateMap(double lat, double lon, String name){
  mapCanvas.getMapDisplay().removeAllMapObjects();
  mapCanvas.getMapDisplay().reconnect();
  mapCanvas.getMapDisplay().zoomTo(
    new GeoBoundingBox(new GeoCoordinate(lat, lon, 0)), false);
  mapCanvas.getMapDisplay().addMapObject(
    mapCanvas.getMapFactory().createStandardMarker(
      new GeoCoordinate(lat, lon, 0), 1, name, 2));
  Display.getDisplay(this).setCurrent(mapCanvas);
}
```

Saving, Loading and Clearing bookmarks

We will be using record store to save the bookmark location, including name and date of bookmark using RMS.

We need a some structured way to store - latitude, longitude, date of bookmark and bookmark name. So that we can retrieve and use the same point to locate on map. Fist let us construct a schema to store in our database (record store).

Type	Column 1	Column 2	Column 3	Column 4
Field name	Latitude	Bookmark name	Longitude	Bookmark date
Datatype	double	String	double	String

Saving Bookmark name in between Latitude and Longitude is that we can differentiate two double value, i.e String between them acts as a delimiter.

```
public void readSavedData() {
  homef.append("Recient Visit");
  openRefreshmentRecordStore();
  try {

   if(refreshmentRecordStore.getNumRecords() == 0){ /*Checking the record store for
records. if total no. of record is zero*/
    homef.append("\nYou have not visited any place.");  /* append some string like, you
have not bookmarked any places */
   }
   byte[] byt = new byte[1000]; /*  read the records from record store and add them to
home screen */
   ByteArrayInputStream Istream = new ByteArrayInputStream(byt);
   DataInputStream dinp = new DataInputStream(Istream);
   for (int i = 1; i <= refreshmentRecordStore.getNumRecords(); i++) {
    refreshmentRecordStore.getRecord(i,byt,0);
    double lat = dinp.readDouble(); /* latitude is a double value, that is stored at
first column */
    String place = dinp.readUTF(); /* Favorite name a string value, that is stored at
second column */
    double lon = dinp.readDouble(); /* longitude is double value, that is stored at
third column */
    String date = dinp.readUTF();  /* date is string value, that is stored at fourth
column */
    homef.append(new recentvisitlist(place, lat, lon,date,this)); /*create a list item
with these value and append to home form*/
    dinp.reset();
    }
                                dinp.close();
    Istream.close();


  } catch (Exception e) {
```


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```
  }closeRefreshmentRecordStore();
}
```

```
public void writeSavedData(String title, double lat, double lon) {
  DateField now = new DateField("",DateField.DATE_TIME); /* get current system date and
time */
  now.setDate(new Date());
  String date = now.getDate().toString(); /* convert the date to string, so that we can
store it in record store */
  openRefreshmentRecordStore(); /* open record store and save */
  try{
   ByteArrayOutputStream Ostream = new ByteArrayOutputStream();
   DataOutputStream dout = new DataOutputStream(Ostream);
   dout.writeDouble(lat);
   dout.writeUTF(title);
   dout.writeDouble(lon);
   dout.writeUTF(date);
   dout.flush();
   byte[] byt = Ostream.toByteArray();
   refreshmentRecordStore.addRecord(byt, 0, byt.length);
   Ostream.close();
   dout.close();
  }catch (Exception e) {
   // TODO: handle exception
  }
  closeRefreshmentRecordStore();
}
```

```
public void clearbookmark(){
  try{
   RecordStore.deleteRecordStore("refreshmentDataBase"); /* to clear all bookmark,
delete the record store */
  }catch (Exception e) {
   // TODO: handle exception
  }
}
```

More with maps

You can add functions like finding route between two locations, searching an address and locating them on map. Since there are wiki articles on working on map, I am not covering them here in this article or example.

Source Files

File:Refreshment.zip

References

Category Bar
Icon Command
Custom Item
Canvas
Alert

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