MOBILE DEVELOPMENT

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PROCESSING XML AND JSON ENCODED DATA (Why Internet data is encoded?)

Two important data issues that need to be considered by developers attempting to securely exchange data on the web are: size and transparency.

Size is clearly important because small data packets require less transmission time than equivalent larger versions of the same data.

Transparency gives data a human-readable quality that allows developers to better understand the nature of their data an create portable cross-platform solutions more rapidly.

In this lesson we will discuss XML and JSON, two public-domain strategies commonly used for encoding data to be exchanged on a cross-platform environment.

READING XML DATA
(What is XML data?)

Extensible Markup Language (XML) is a set of rules established by the W3C organization. The rules provide a framework for uniformly encoding documents in a human readable form.

XML is similar to HTML but all the <tags> are user-defined.

Example: Defining a golf Tee-Time

```
<?xml version=‘1.0’ encoding=‘UTF-8’?>
<time golfcourse=“Augusta Ntl” tournament=“The Masters” >
  <hour> 21 </hour>
  <minutes> 25 </minutes>
  <seconds> 45 </seconds>
  <zone> UTC–05:00 </zone>
</time>
```

READING XML DATA
(Why should XML be used?)

The main role of XML is to facilitate a transparent exchange of data over the Internet.

Example of technologies using XML include RSS , Atom, SOAP, XHTML, KML, Xquery, Xpath, OpenDocument, OpenMath, etc.(see http://en.wikipedia.org/wiki/List_of_XML_markup_languages)

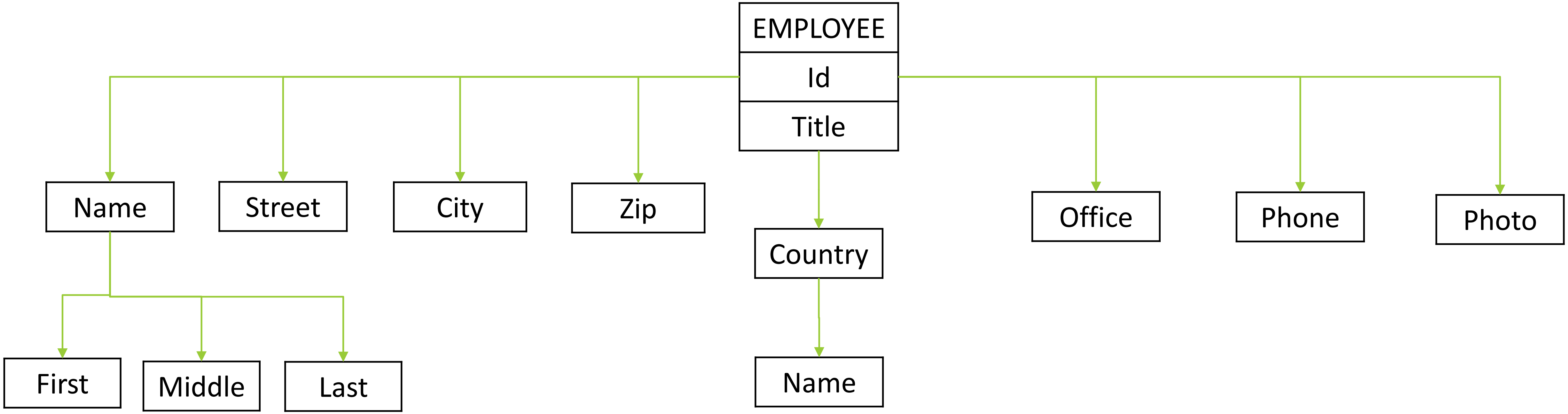
Several document management productivity tools default to XML format for internal data storage. Example: Microsoft Office, OpenOffice.org, and Apple's iWork.

Android OS relies heavily on XML to save its various resources such as layouts, string-sets, manifest, etc.

READING XML DATA
(Example 1: How is XML used?)

XML is used for defining (.xsd files) and documenting (.xml) classes.

Consider the complex Employee class depicted here. Each node is an XML element. The fields Id and Title are attributes of the Employee class.

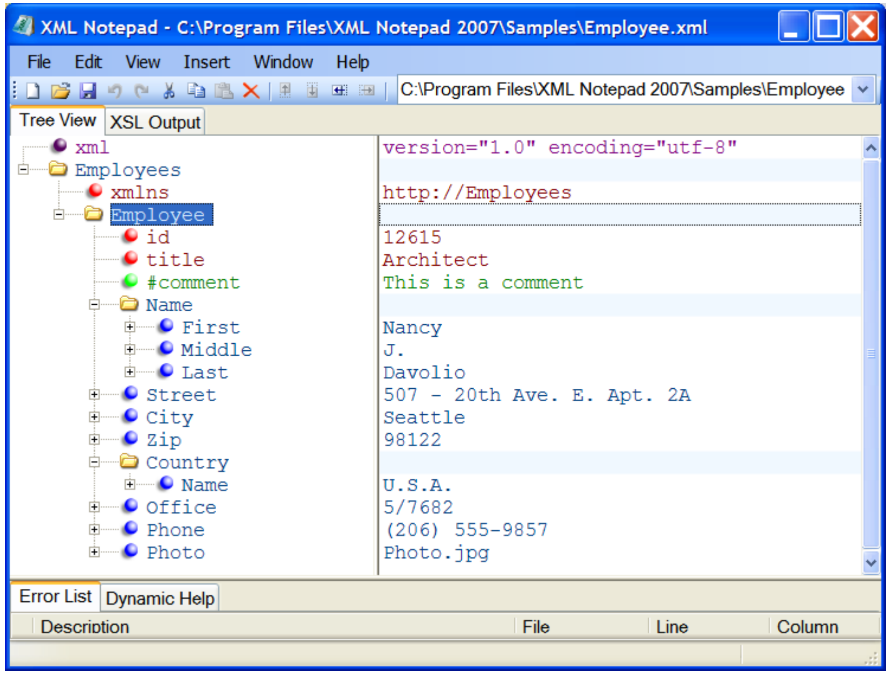


READING XML DATA
(Example 1: How is XML used?)

This image was made using Microsoft XML Notepad.

On the left, the structure of the Employee class is depicted as a tree.

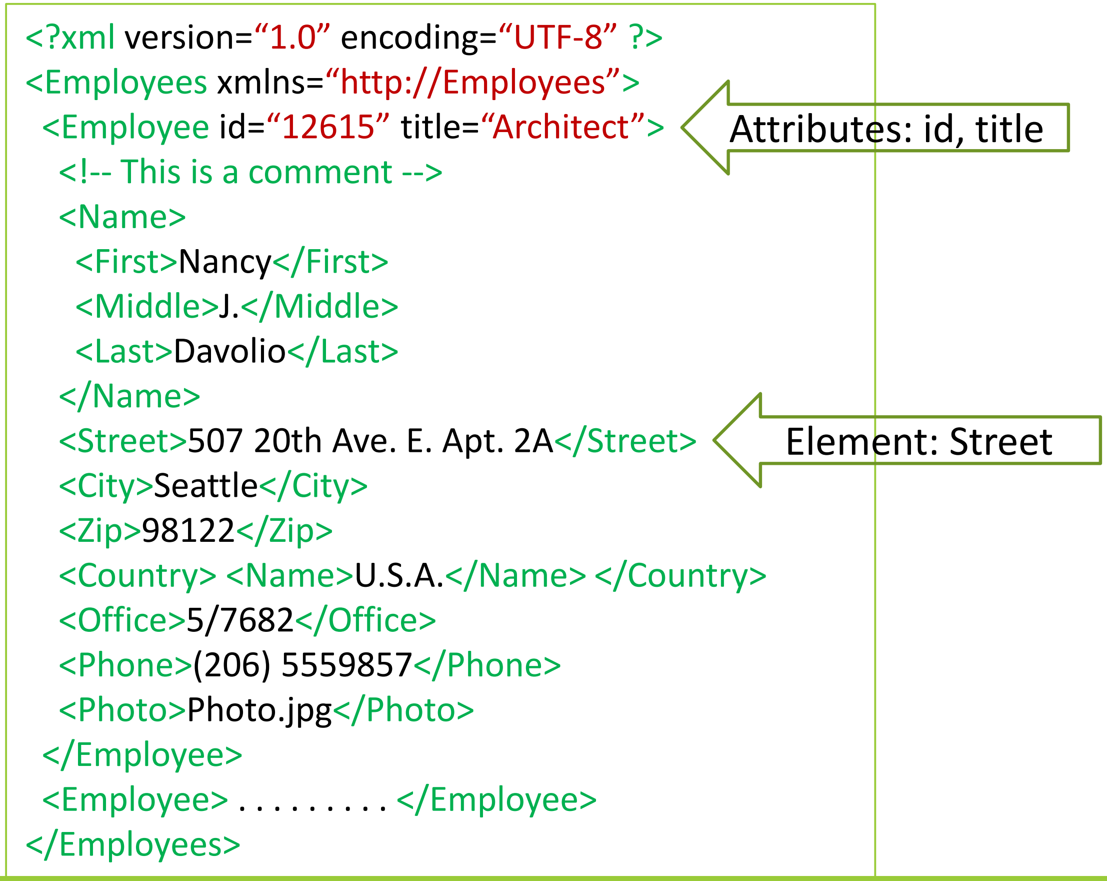
On the right, a data sample from the current node is provided.


XML Notepad - C:\Program Files\XML Notepad 2007\Samples\Employee.xml
File
Edit
View
Insert
Window
Help
C:\Program Files\XML Notepad 2007\Samples\Employee
Tree View
XSL Output
Error List
Dynamic Help
Description
File
Line
Column

```
xml                      version="1.0" encoding="utf-8"
Employees
  xmlns                  http://Employees
  Employee
    id                   12615
    title                Architect
    #comment             This is a comment
    Name
      First              Nancy
      Middle             J.
      Last               Davolio
    Street               507 - 20th Ave. E. Apt. 2A
    City                 Seattle
    Zip                  98122
    Country
      Name               U.S.A.
    Office               5/7682
    Phone                (206) 555-9857
    Photo                Photo.jpg
```

READING XML DATA
(Example 1: How is XML used?)

The XML fragment below depicts the structure and data for a set of Employee objects.



```
<?xml version=“1.0” encoding=“UTF-8” ?>
<Employees xmlns=“http://Employees”>
 <Employee id=“12615” title=“Architect”>
  <!-- This is a comment -->
  <Name>
   <First>Nancy</First>
   <Middle>J.</Middle>
   <Last>Davolio</Last>
  </Name>
  <Street>507 20th Ave. E. Apt. 2A</Street>
  <City>Seattle</City>
  <Zip>98122</Zip>
  <Country> <Name>U.S.A.</Name> </Country>
  <Office>5/7682</Office>
  <Phone>(206) 5559857</Phone>
  <Photo>Photo.jpg</Photo>
 </Employee>
 <Employee> . . . . . . . . . </Employee>
</Employees>
```

Attributes: id, title

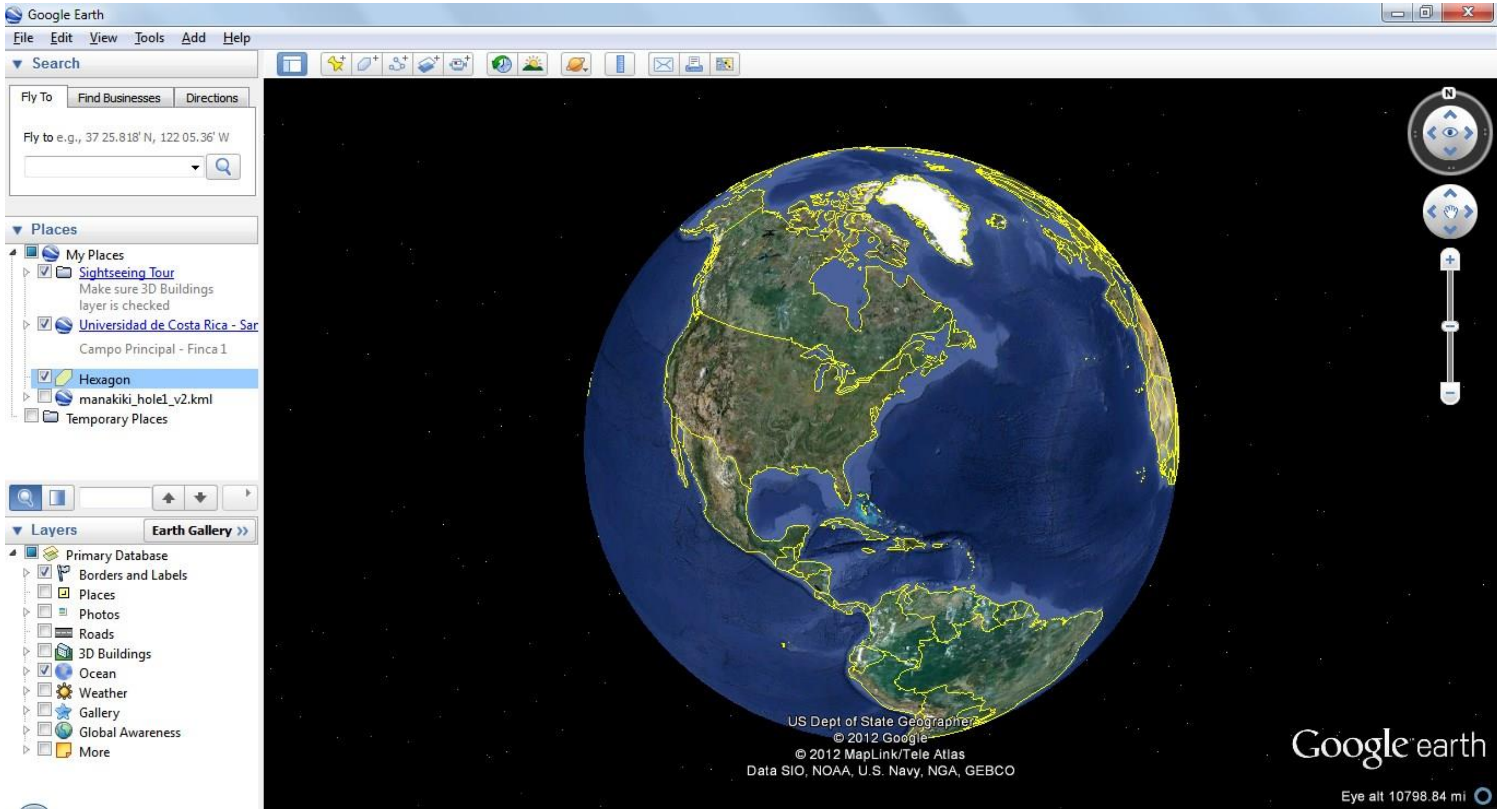
Element: Street

READING XML DATA
(Example 1: How is XML used?)

Employee.xsd – Schema Definition

```
<?xml version=“1.0” ?>
<xs:schema xmlns:xs=“http://www.w3.org/2001/XMLSchema” elementFormDefault=“qualified” attributeFormDefault=“unqualified”
           targetNamespace=“http://Employees” xmlns=“http://Employees”>
 <xs:complexType name=“Country”>
  <xs:sequence><xs:element name=“Name” type=“xs:string” default=“U.S.A.” /></xs:sequence>
  <xs:attribute name=“code” type=“xs:language”>
   <xs:annotation>
    <xs:documentation>Registered IANA country code – Format xxxx. Example: enus.</xs:documentation>
   </xs:annotation>
  </xs:attribute>
 </xs:complexType>
 <xs:simpleType name=“City”>
  <xs:restriction base=“xs:string”>
   <xs:minLength value=“1” /> <xs:maxLength value=“50” />
  </xs:restriction>
 </xs:simpleType>
 <xs:simpleType name=“Zip”>
  <xs:restriction base=“xs:positiveInteger”>
   <xs:maxInclusive value=“99999” /> <xs:minInclusive value=“00001” />
  </xs:restriction>
 </xs:simpleType>
```

Only a few lines shown here


Google Earth
File Edit View Tools Add Help
Search
Fly To
Find Businesses
Directions
Fly to e.g., 37 25.818' N, 122 05.36' W
Places
Layers
Earth Gallery »
US Dept of State Geographer
© 2012 Google
© 2012 MapLink/Tele Atlas
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth
Eye alt 10798.84 mi

My Places
☑ Sightseeing Tour
Make sure 3D Buildings layer is checked
☑ Universidad de Costa Rica - Sar
Campo Principal - Finca 1
☑ Hexagon
□ manakiki_hole1_v2.kml
□ Temporary Places

Primary Database
☑ Borders and Labels
□ Places
□ Photos
□ Roads
□ 3D Buildings
☑ Ocean
□ Weather
□ Gallery
□ Global Awareness
□ More

READING XML DATA (Example 2: KML and Geographic data)

KeyHole Markup Languale (KML) [1] is a file format used to record geographic data. Currently it is under the purview of the Open Geospatial Consortium (OGC) [2].

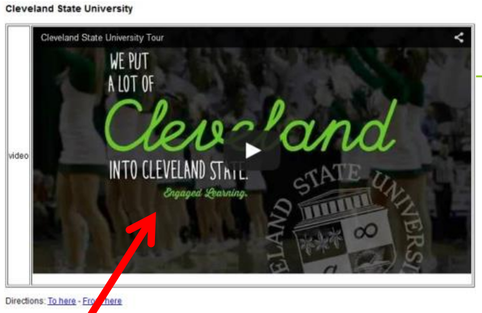
The goal of KML is to become the single international standard language for expressing geographic annotation and visualization on existing or future web-based online and mobile maps and earth browsers.

Example of applications using the format are: Google Earth, Google Maps, and Google Maps for Mobile Apps.

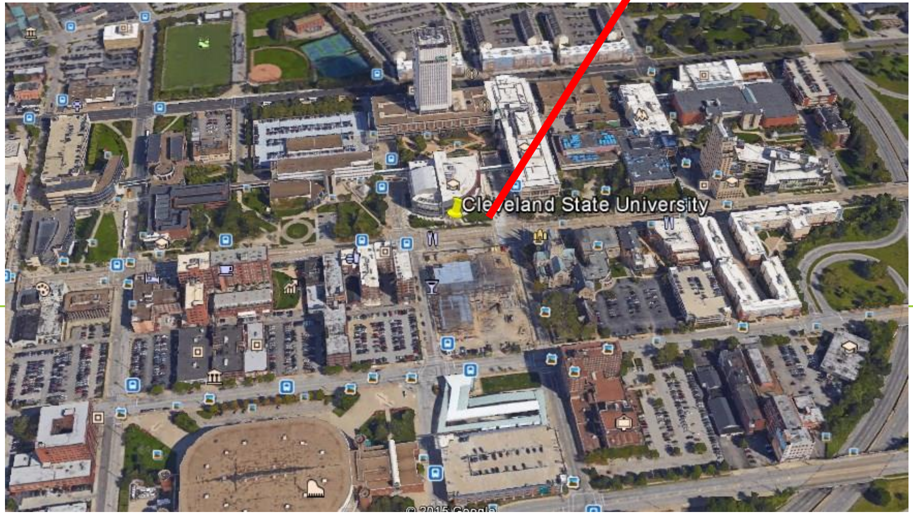
[1] Displaying KML files in your Maps application. https://developers.google.com/maps/tutorials/kml/

[2] Open Geospatial Consortium. http://www.opengeospatial.org/standards/kml#overview

READING XML DATA
(Example 2A: KML and geographic data)


Cleveland State University
Cleveland State University Tour
video
WE PUT
A LOT OF
Cleveland
INTO CLEVELAND STATE
Engaged Learning.
CLEVELAND STATE UNIVERSITY
Directions: To here - From here

```
<Placemark>
  <name>Cleveland State University</name>
  <ExtendedData>
    <Data name=“video”>
      <value>
        <![CDATA[<iframe width=“640” height=“360” src=“http://www.youtube.com/embed/es9KEhVlOiw” frameborder=“0” allowfullscreen></iframe><br><br>]]>
      </value>
    </Data>
  </ExtendedData>
  <Point>
    <coordinates> -81.675281, 41.501792, 0</coordinates>
  </Point>
</Placemark>
```



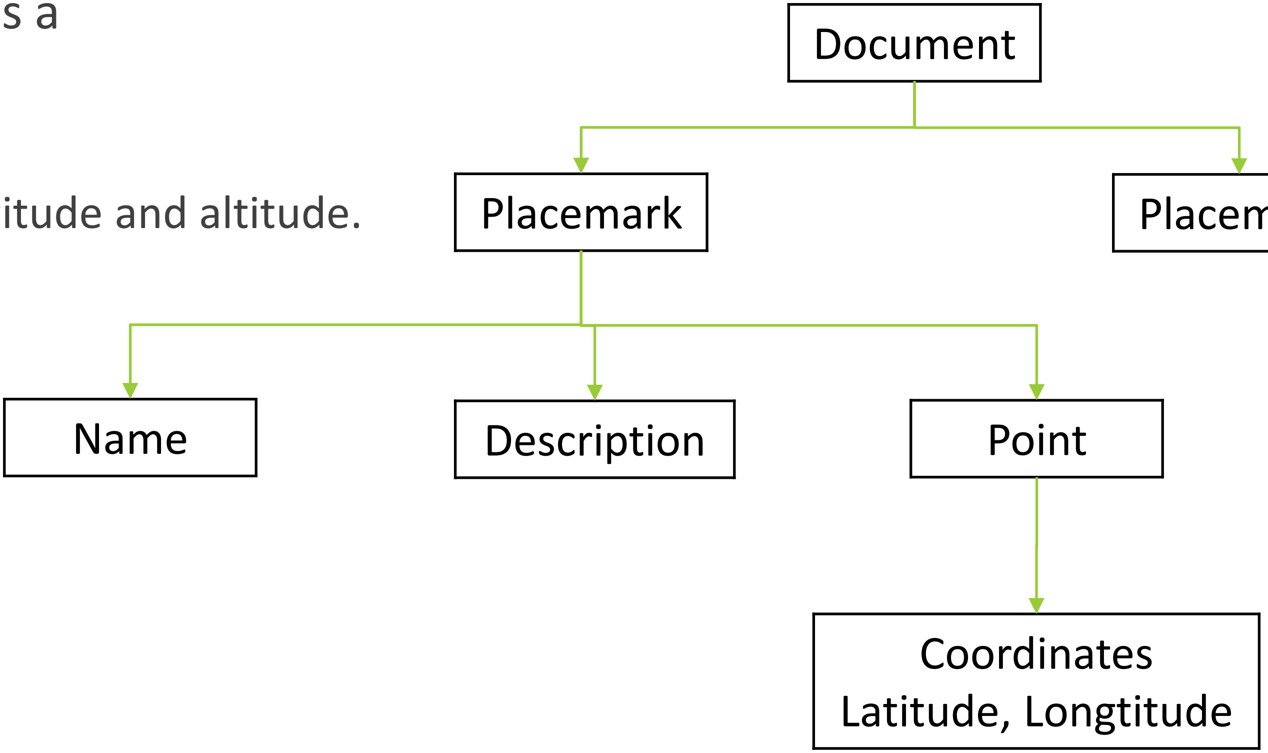
https://developers.google.com/maps/documentation/javascript/kml
https://developers.google.com/kml/documentation/kmlreference?hl=en

READING XML DATA (Example 2B: KML and geographic data)

In this example a Document consists of various Placemark elements. The markers identify a set of points-of-interest.

Each of our <placemarks> includes a

- Name,
- Description, and a
- Geo-Point including: latitude, longitude and altitude.



https://developers.google.com/kml/documentation/kml_tut?csw=1

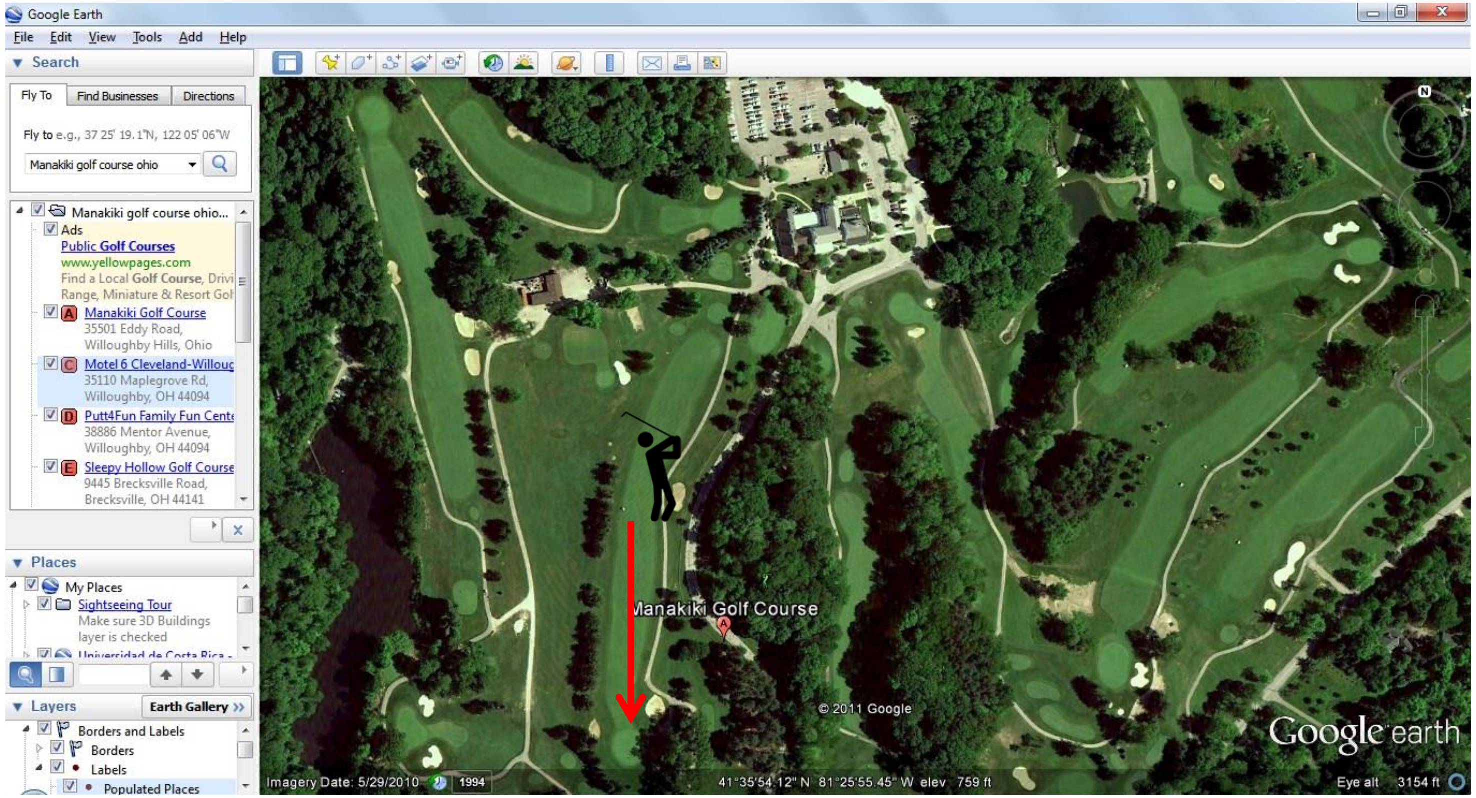
READING XML DATA
(Example 2B: Mapping with KML (fragment))

```
<?xml version=“1.0” encoding=“utf-8” ?>
<kml xmlns=“http://www.opengis.net/kml/2.2”>
<Document>
 <gcPlace gcName=“Manakiki Golf Course” gcCity=“Willoughby Hills” gcState=“Ohio”/>
 <Placemark>
  <name par=“4” yards=“390”>Tee Hole 1</name>
  <Point><coordinates>81.4324182271957,41.5984273639879,0</coordinates></Point>
 </Placemark>
 <Placemark>
  <name>Front of Green Hole 1</name>
  <Point><coordinates>81.433182656765,41.5955730479591,0</coordinates></Point>
 </Placemark>
 <Placemark>
  <name>Middle of Green Hole 1</name>
  <Point><coordinates>81.4331665635109,41.5954647298964,0</coordinates></Point>
 </Placemark>
</Document>
</kml>
```

Data downloaded from http://www.bbgpsgolf.com/viewcourselistg.php

READING XML DATA
(Example 3: Helping golfers with KML)

After a rather mediocre Tee-shot, the player on the picture is trying to reach the green. How far away is it?, what club should he pick?



Fly to e.g., 37 25' 19.1"N, 122 05' 06"W

Manakiki golf course ohio

Manakiki golf course ohio...

Ads

Public Golf Courses
www.yellowpages.com
Find a Local Golf Course, Drivi
Range, Miniature & Resort Gol

A Manakiki Golf Course
35501 Eddy Road,
Willoughby Hills, Ohio

C Motel 6 Cleveland-Willoug
35110 Maplegrove Rd,
Willoughby, OH 44094

D Putt4Fun Family Fun Cente
38886 Mentor Avenue,
Willoughby, OH 44094

E Sleepy Hollow Golf Course
9445 Brecksville Road,
Brecksville, OH 44141

My Places
Sightseeing Tour
Make sure 3D Buildings
layer is checked
Universidad de Costa Rica -

Borders and Labels
Borders
Labels
Populated Places

Imagery Date: 5/29/2010 1994 41°35'54.12" N 81°25'55.45" W elev 759 ft Eye alt 3154 ft

https://developers.google.com/kml/documentation/kml_tut?csw=1

READING XML DATA (Example 3: Helping golfers with KML)

Typical Distances for (good) Amateur Players

Club	Men	Women
Driver	200-230-260	150-175-200
3-wood	180-215-235	125-150-180
2-Hybrid	170-195-210	105-135-170
3-Hybrid	160-180-200	100-125-160
4-iron	150-170-185	90-120-150
5-iron	140-160-170	80-110-140
6-iron	130-150-160	70-100-130
7-iron	120-140-150	65-90-120
8-iron	110-130-140	60-80-110
9-iron	95-115-130	55-70-95
PW	80-105-120	50-60-80
SW	60-80-100	40-50-60

By the end of the lesson you should know how to create a golf GPS device.

"Your main problem is you are standing too close to the ball... after you have hit it."

http://golfcartoons.blogspot.com/ Golf Monthly 2009

READING XML DATA
(Strategies for reading/parsing an XML file)

Several approaches are available. Here we will explore two options:

OPTION 1 A SAX (Simple API for XML) XmlPullParser SAX Simple API for XML	OPTION 2 W3C-DOM Document Builder
You traverse the document programmatically looking for the beginning and ending of element tags, their associated text and internal attributes.	A Document Builder object dissects the XML document producing an equivalent tree-like representation. Nodes in the tree are treated as familiar Java ArrayLists.
	The World Wide Web Consortium (W3C.org) is an “international community that develops open standards to ensure the long-term growth of the Web”

http://www.saxproject.org/
https://dom.spec.whatwg.org/

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

In this example we will read a XML file saved in the app's /res/xml folder. The file contains a set of KML placemark nodes pointing to locations in a golf course (tee-boxes, front/center/back of each green, obstacles, etc)

A SAX (Simple API for XML) XmlPullParser will traverse the document using the .next() method to detect the following main eventTypes

START_TAG
TEXT
END_TAG
END_DOCUMENT

When the beginning of a tag is recognized, we will use the .getName() method to grab the tag's name.

We will use the method .getText() to extract data after TEXT event.

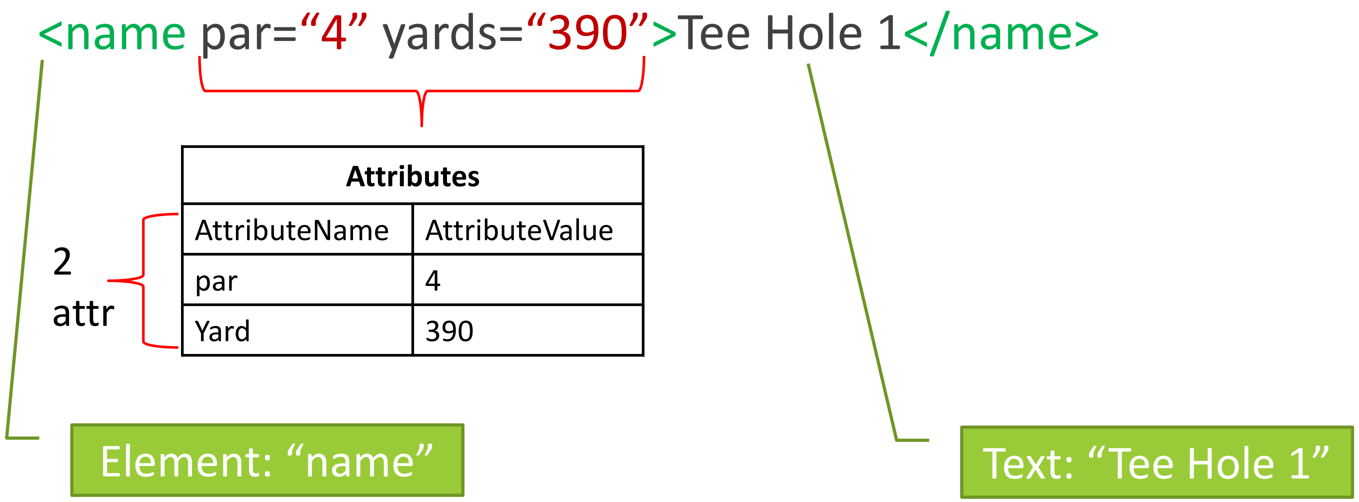
http://www.saxproject.org/

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

Inner attributes from an <element> can be extracted using the methods:

- .getAttributeCount()
- .getAttributeName()
- .getAttributeValue()

Consider the name-element in the example below:



<name par=“4” yards=“390”>Tee Hole 1</name>

Attributes	
AttributeName	AttributeValue
par	4
Yard	390

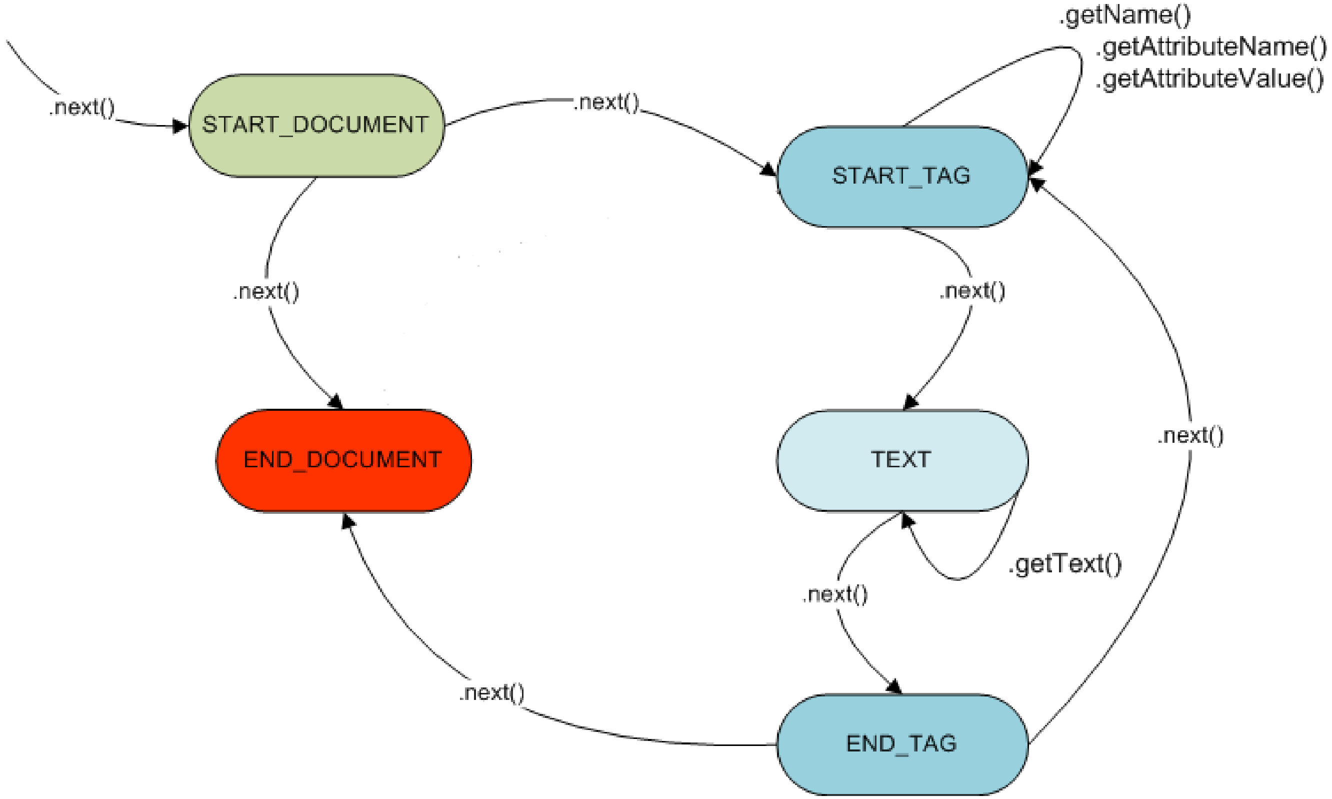
2 attr

Element: "name"

Text: "Tee Hole 1"

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

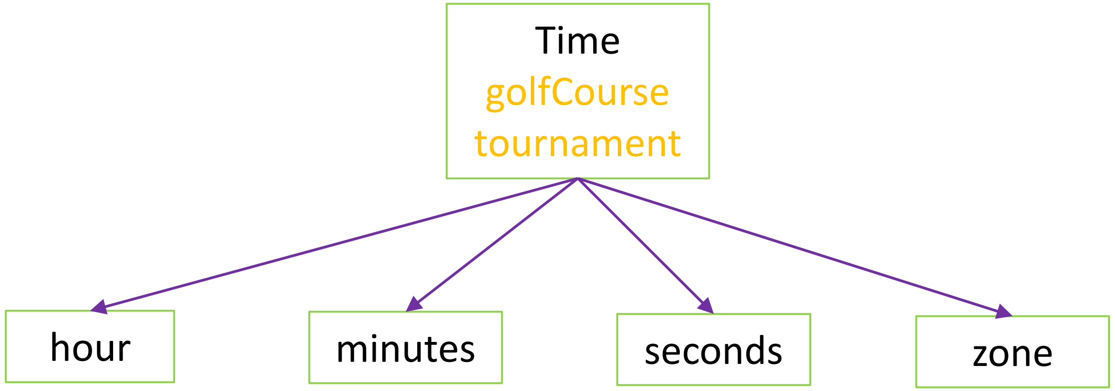
Diagram showing the life-cycle of the XmlPullParser class. Any well-formed XML input document could be processed as suggested in the figure.

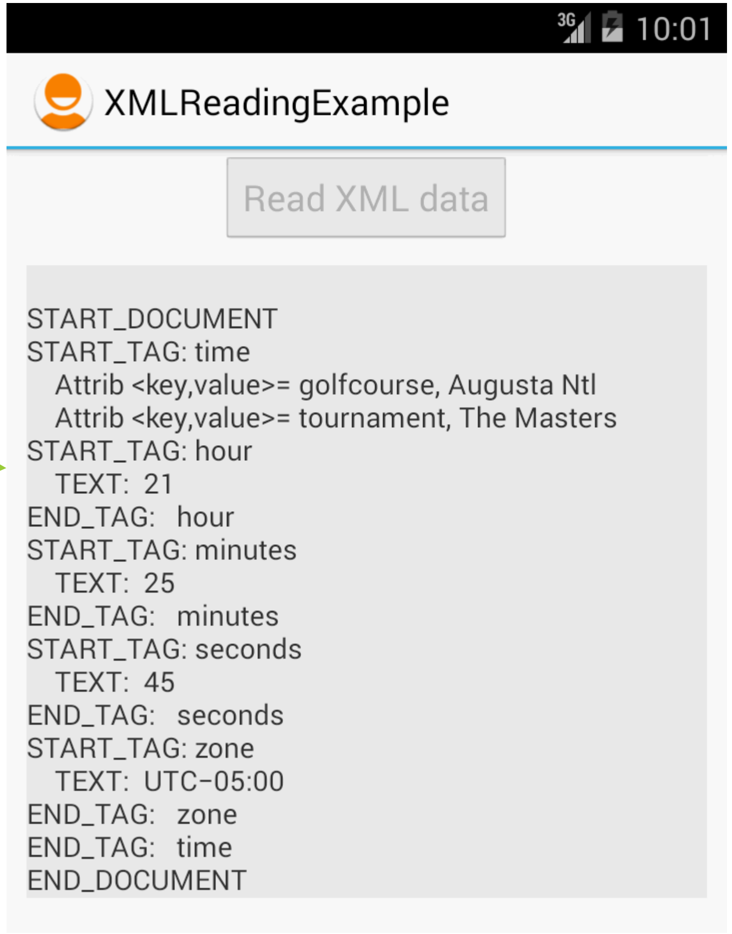


READING XML DATA
(Example 4: SAX-parsing a resource XML file)

Parsing the Tee-Time XML file listed below

```
<?xml version=‘1.0’ encoding=‘UTF-8’?>
<time golfcourse=“Augusta Ntl” tournament=“The Masters”>
  <hour> 21 </hour>
  <minutes> 25 </minutes>
  <seconds> 45 </seconds>
  <zone> UTC−05:00 </zone>
</time>
```

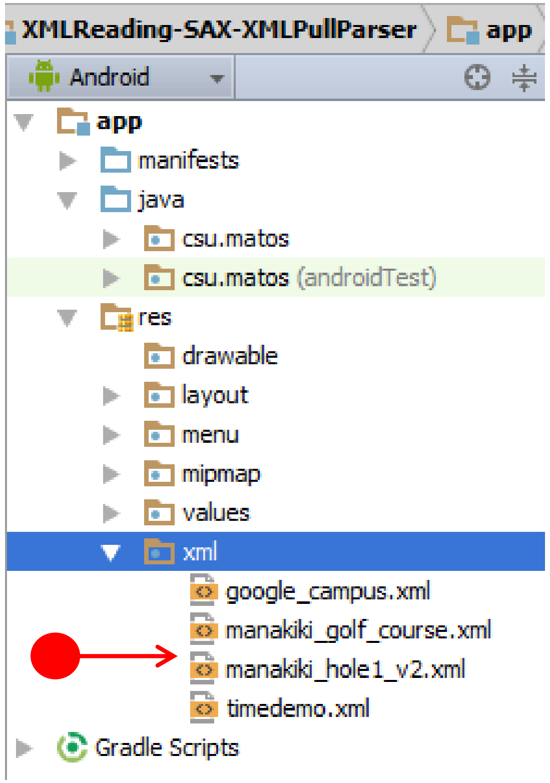




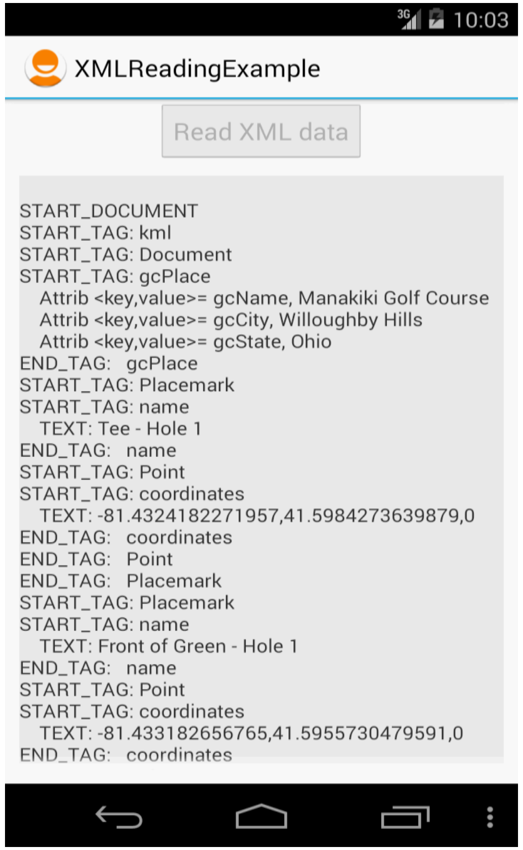
```
START_DOCUMENT
START_TAG: time
   Attrib <key,value>= golfcourse, Augusta Ntl
   Attrib <key,value>= tournament, The Masters
START_TAG: hour
   TEXT:  21
END_TAG:   hour
START_TAG: minutes
   TEXT:  25
END_TAG:   minutes
START_TAG: seconds
   TEXT:  45
END_TAG:   seconds
START_TAG: zone
   TEXT:  UTC−05:00
END_TAG:   zone
END_TAG:   time
END_DOCUMENT
```

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

The XMLPullParser used in the previous example will now be used to dissect a KML file holding <placemark> elements mapping a golf course.



Observation: AT the time of writing, Android Studio 1.3 requires .kml files to be renamed with the extension .xml



```
START_DOCUMENT
START_TAG: kml
START_TAG: Document
START_TAG: gcPlace
   Attrib <key,value>= gcName, Manakiki Golf Course
   Attrib <key,value>= gcCity, Willoughby Hills
   Attrib <key,value>= gcState, Ohio
END_TAG:   gcPlace
START_TAG: Placemark
START_TAG: name
   TEXT: Tee - Hole 1
END_TAG:   name
START_TAG: Point
START_TAG: coordinates
   TEXT: -81.4324182271957,41.5984273639879,0
END_TAG:   coordinates
END_TAG:   Point
END_TAG:   Placemark
START_TAG: Placemark
START_TAG: name
   TEXT: Front of Green - Hole 1
END_TAG:   name
START_TAG: Point
START_TAG: coordinates
   TEXT: -81.433182656765,41.5955730479591,0
END_TAG:   coordinates
```

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

```
<?xml version=‘1.0’ encoding=‘UTF-8’?>
<kml xmlns=‘http://www.opengis.net/kml/2.2’>
<Document>
 <gcPlace gcName=“Manakiki Golf Course” gcCity=“Willoughby Hills” gcState=“Ohio”></gcPlace>
 <Placemark>
  <name>Tee - Hole 1</name>
  <Point><coordinates>-81.4324182271957,41.5984273639879,0</coordinates></Point>
 </Placemark>
 <Placemark>
  <name>Front of Green - Hole 1</name>
  <Point><coordinates>-81.433182656765,41.5955730479591,0</coordinates></Point>
 </Placemark>
  . . .
 </Document>
</kml>
```

This is an abbreviated version of the geographic KML file read by the app

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

App’s Screen Layout

```
<?xml version=“1.0” encoding=“utf-8”?>
<LinearLayout xmlns:android=“http://schemas.android.com/apk/res/android”
              android:layout_width=“match_parent”
              android:layout_height=“match_parent”
              android:orientation=“vertical” >
 <Button      android:id=“@+id/btnReadXml” android:layout_width=“wrap_content”
              android:layout_height=“wrap_content” android:layout_gravity=“center” android:text=“Read XML data” />
 <ScrollView  android:id=“@+id/ScrollView01”
              android:layout_width=“match_parent”
              android:layout_height=“0dp”
              android:layout_weight=“2”
              android:padding=“10dp”>
  <TextView   android:id=“@+id/txtMsg”
               android:layout_width=“match_parent”
               android:layout_height=“wrap_content”
               android:background=“#ffeeeeee” />
 </ScrollView>
</LinearLayout>
```

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

```
public class ActivityMain extends Activity {
 private TextView txtMsg; Button btnGoParser;
 @Override
 public void onCreate(Bundle savedInstanceState) {
  super.onCreate(savedInstanceState);
  setContentView(R.layout.main);
  txtMsg = (TextView) findViewById(R.id.txtMsg);
  btnGoParser = (Button) findViewById(R.id.btnReadXml);
  btnGoParser.setOnClickListener(new View.OnClickListener() {
   @Override
   public void onClick(View v) {
    btnGoParser.setEnabled(false);
    // do slow XML reading in a separated thread (AsyncTask)
1 → Integer xmlResFile = R.xml.manakiki_hole1_v2;
2 → new backgroundAsyncTask().execute(xmlResFile);
   }
  });
 }// onCreate
```

READING XML DATA (Example 4: SAX-parsing a resource XML file)

```
   public class backgroundAsyncTask extends AsyncTask<Integer, Void, StringBuilder> {
    ProgressDialog dialog = new ProgressDialog(ActivityMain.this);
3   @Override protected void onPostExecute(StringBuilder result) { super.onPostExecute(result); dialog.dismiss(); txtMsg.setText(result.toString()); }
4   @Override protected void onPreExecute() { super.onPreExecute(); dialog.setMessage(“Please wait...”); dialog.setCancelable(false); dialog.show(); }
    @Override protected void onProgressUpdate(Void... values) { super.onProgressUpdate(values); /*Nothing here. Needed by the interface*/ }
    @Override
    protected StringBuilder doInBackground(Integer... params) {
     int xmlResFile = params[0];
5    XmlPullParser parser = getResources().getXml(xmlResFile);
     StringBuilder stringBuilder = new StringBuilder(); String nodeText = “”, nodeName = “”;
     try {
      int eventType = -1;
6     while (eventType != XmlPullParser.END_DOCUMENT) {
       eventType = parser.next();
       if (eventType == XmlPullParser.START_DOCUMENT) { stringBuilder.append(“\nSTART_DOCUMENT”); }
       else if (eventType == XmlPullParser.END_DOCUMENT) {stringBuilder.append(“\nEND_DOCUMENT”); }
       else if (eventType == XmlPullParser.START_TAG) {
        nodeName = parser.getName();
7       stringBuilder.append(“\nSTART_TAG: ” + nodeName);
        stringBuilder.append(getAttributes(parser));
       }
       else if (eventType == XmlPullParser.END_TAG) { nodeName = parser.getName(); stringBuilder.append(“\nEND_TAG: ” + nodeName ); }
       else if (eventType == XmlPullParser.TEXT) { nodeText = parser.getText(); stringBuilder.append(“\n TEXT: ” + nodeText); }
      }
     }
     catch (Exception e) { Log.e(“<<PARSING ERROR>>”, e.getMessage()); }
     return stringBuilder;
    } // doInBackground
```

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

```
 private String getAttributes(XmlPullParser parser) {
    StringBuilder stringBuilder = new StringBuilder();
    // trying to detect inner attributes nested inside a node tag
    String name = parser.getName();
    if (name != null) {
      int size = parser.getAttributeCount();
      for (int i = 0; i < size; i++) {
❽→     String attrName = parser.getAttributeName(i), attrValue = parser.getAttributeValue(i);
        stringBuilder.append(“\n Attrib <key,value>= ” + attrName + “, ” + attrValue);
      }
    }
    return stringBuilder.toString();
   }// getAttribures
  }// backgroundAsyncTask
}// ActivityMain
```

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

1. The XML file is held as an internal resource in the /res/xml folder.

2. Invoke the reading-parsing process inside an AsyncTask. Pass the XML file id as argument to the slow background thread.

3. The parsing process has finished. The progress dialog box is dismissed.

4. Housekeeping. Create and show a simple ProgressDialog box so the user gets reassured about his task been taken care of.

5. Create an XmlPullParser using the supplied file resource.

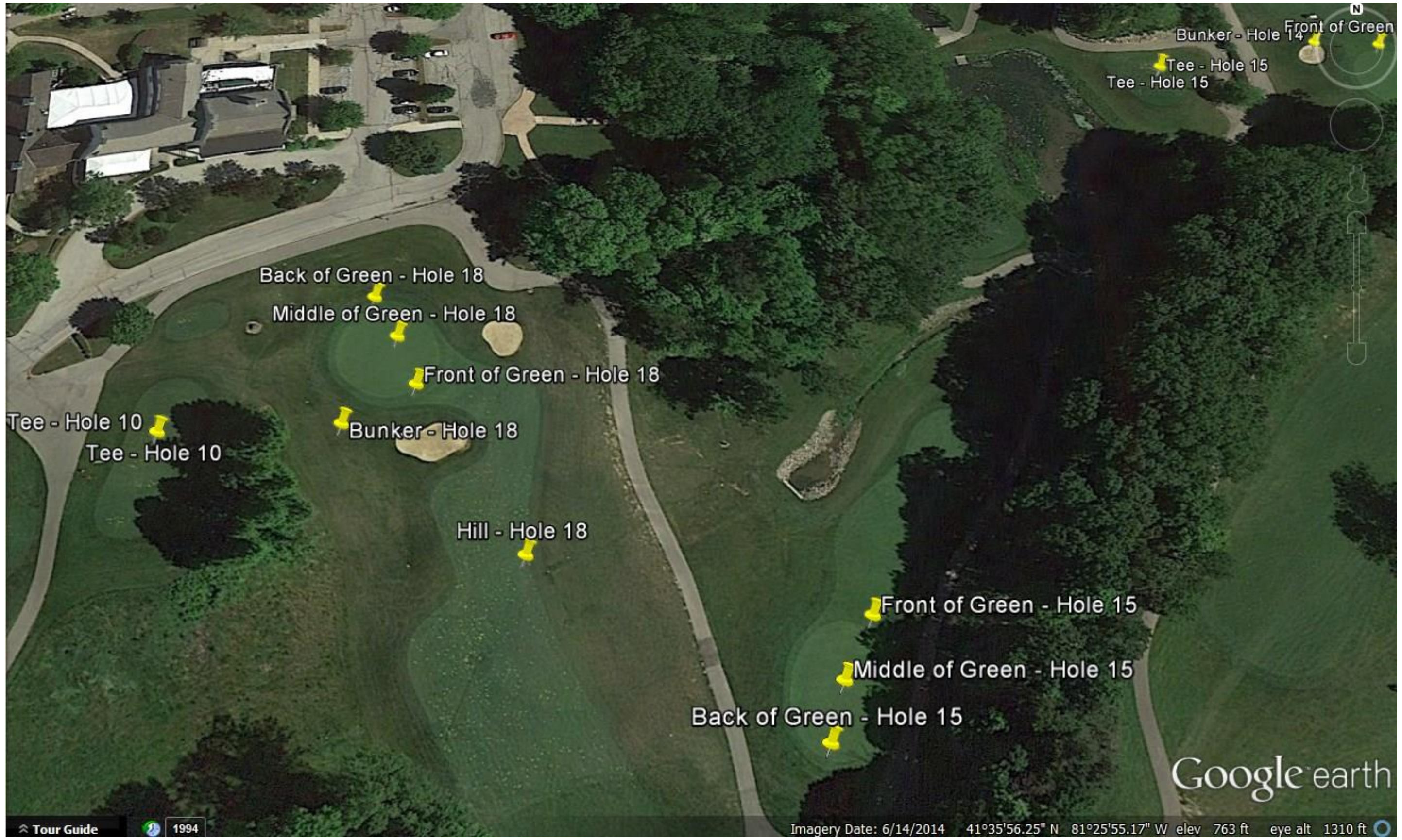
6. The while-loop implements the process of stepping through the SAX's parser state diagram. Each call to .next() provides a new token. The if-then logic decides what event is in progress and from there the process continues looking for text, attributes, or end event.

7. When a START_TAG event is detected the parser checks for possible inner attributes. If found, they are reported as a sequence of <key, value> pairs.

8. The method getAttributes() extracts attributes (if possible). A loop driven by the count of those attributes attempts to get the name and value of each pair 'name=value' for the current element. The result is returned as a string.

READING XML DATA
(Example 4: SAX-parsing a resource XML file)

A segment of the Google Earth’s map depicted using the .kml file of Example 4



READING XML DATA
(Example 5: W3C DocumentBuilder class)

In this example we will explore a second approach for decoding an XML document.

1. A W3C DocumentBuilder parser will be used for decoding an arbitrary (well-formed) XML file.

2. In our example, the input file is stored externally in the SD card.

3. The file includes various elements: <course>, <name>, <coordinates>.

4. For each <element> -type in the document, the parser will create a NodeList collection to store the text and attributes held in each node type.

5. For instance, our sample XML file describes a regulation golf course. The Document contains three type of elements: <name>, <coordinates>, and <course>.

6. The <name> elements identify important locations in the course such as: ‘Tee-Box Hole1’, ‘Front of Green – Hole1’, ‘Bunker1-GreenLeft-Hole1’, …, ‘Back of Green – Hole18’.

7. The NodeList made for the <coordinates> elements contain the latitude and longitude of each entry held in the <name> list.

8. The <course> element uses xml-attributes to keep the course’s name, phone, and total length.

READING XML DATA
(Example 5: W3C DocumentBuilder class)

Parser’s Strategy

<Elements> from the input XML file become nodes in an internal tree representation of the dataset. The node labeled <Document> acts as the root of the tree.

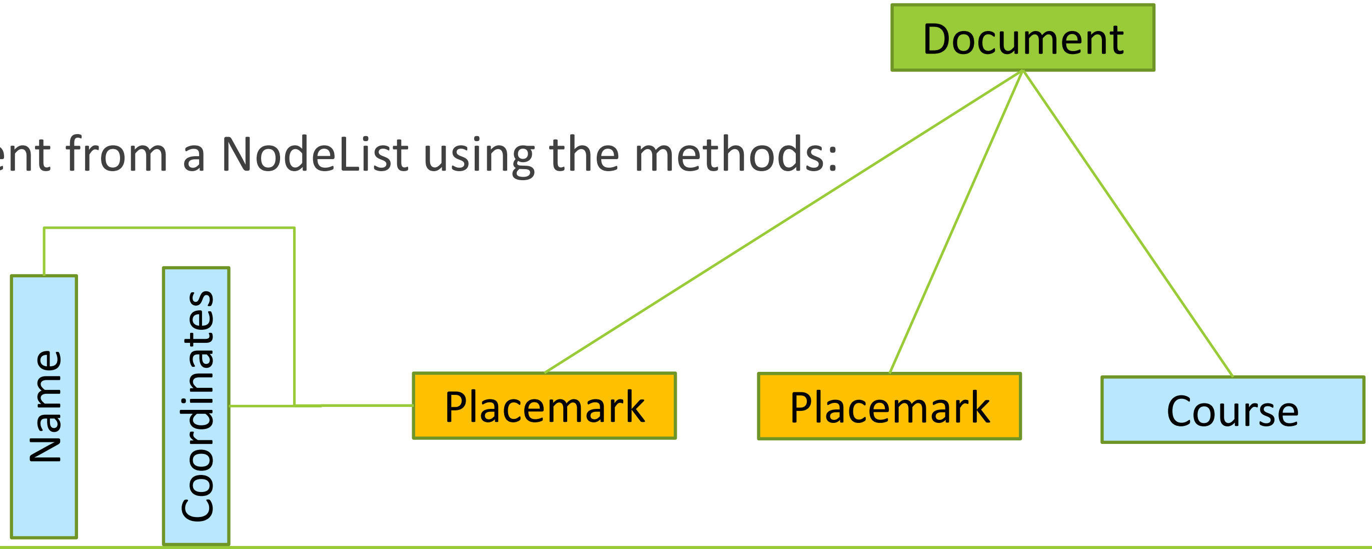
Your Turn

PHASE 1. For each selected XML element you request the construction of a NodeList collection using the method:

- document.getElementsByTagName(...)

PHASE2. Explore an individual node element from a NodeList using the methods:

- list.item(i)
- node.getName()
- node.getValue()
- node.getFirstChild()
- node.getAttributes(), etc.



READING XML DATA
(Example 5: W3C DocumentBuilder class)

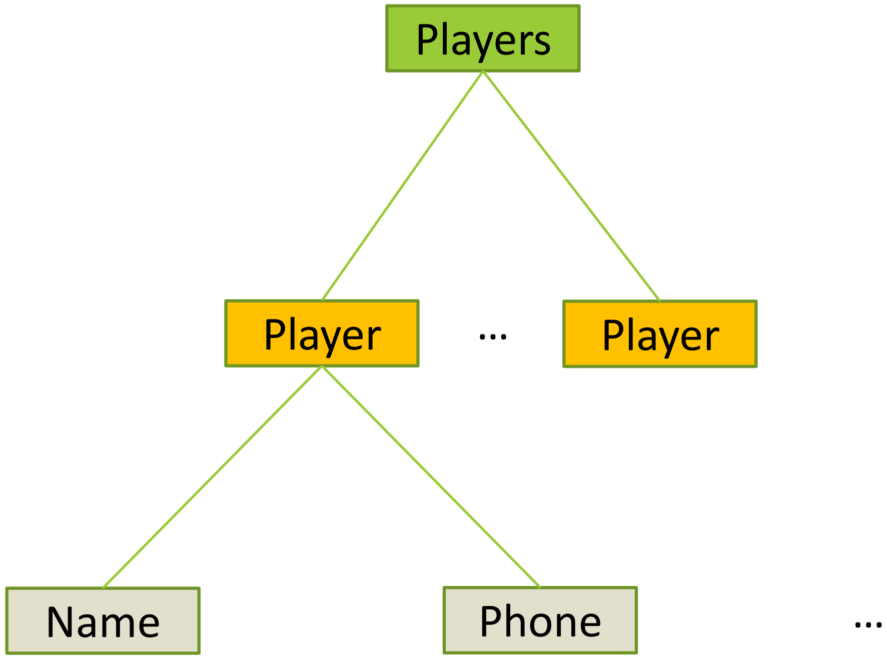
Only a few entries are shown for the input XML file used in this example. Later, we will request lists to be made for the elements: course, name, and coordinate.

```
<?xml version=“1.0” encoding=“utf-8”?>
<kml xmlns=“http://www.opengis.net/kml/2.2”>
 <Document>
  <course phone=“(440)942-2500” length=“6500”>Manakiki Golf Course</course>
  <Placemark>
   <name>Tee Box - Hole 1</name>
   <Point><coordinates>-81.4324182271957,41.5984273639879,0</coordinates></Point>
  </Placemark>
  <Placemark>
   <name>Front of Green - Hole 1</name>
   <Point><coordinates>-81.433182656765,41.5955730479591,0</coordinates></Point>
  </Placemark>
  <Placemark>
   <name>Middle of Green - Hole 1</name>
   <Point><coordinates>-81.4331665635109,41.5954647298964,0</coordinates></Point>
  </Placemark>
```

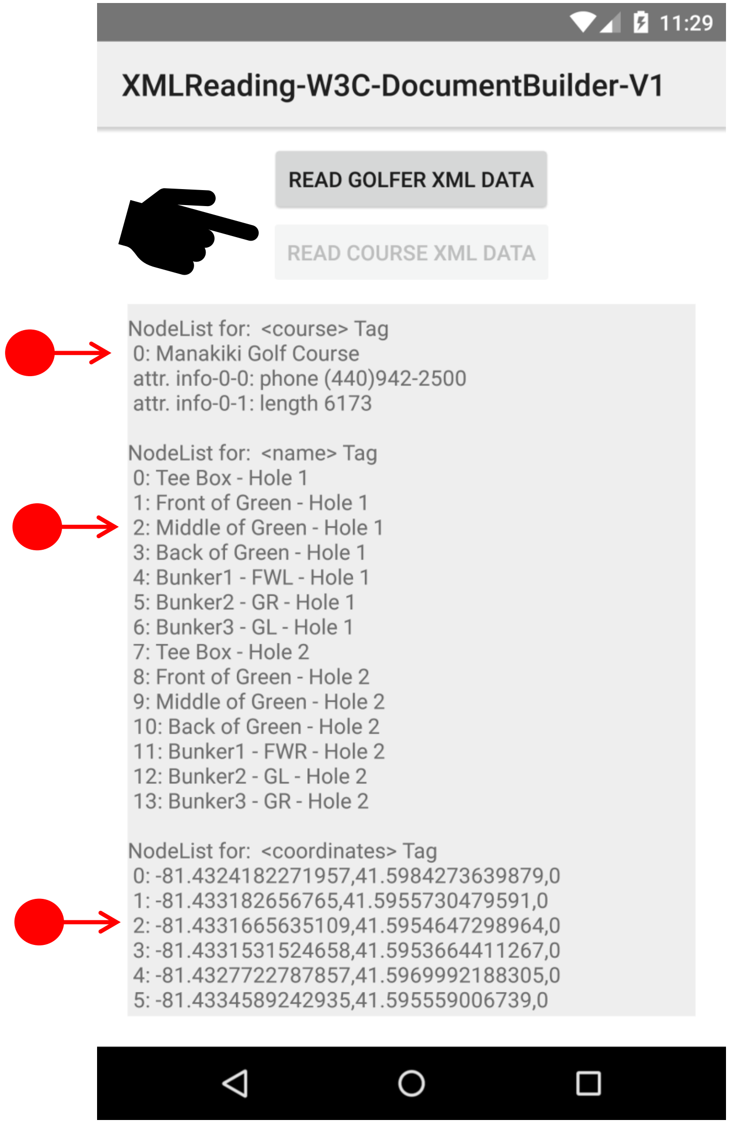
READING XML DATA
(Example 5: W3C DocumentBuilder class)

A second XML data set (Golfers.xml) is used to store the name and phone of a few friendly golfers.

```
<Players xmlns="http://Players">
 <!– Arnie and Lee do not like early tee times -->
 <Player>
   <Name>Arnie Palmer</Name>
   <Phone>555-0001</Phone>
 </Player>
 <Player>
   <Name>Lee Trevino</Name>
   <Phone>555-0002</Phone>
 </Player>
 <Player>
   <Name>Annika Sorenstan</Name>
   <Phone>555-0003</Phone>
 </Player>
 <Player>
   <Name>Happy Gilmore</Name>
   <Phone>555-0004</Phone>
 </Player>
<Player>
   <Name>Ty Webb</Name>
   <Phone>555-0005</Phone>
 </Player>
</Players>
```



READING XML DATA
(Example 5: W3C DocumentBuilder class)

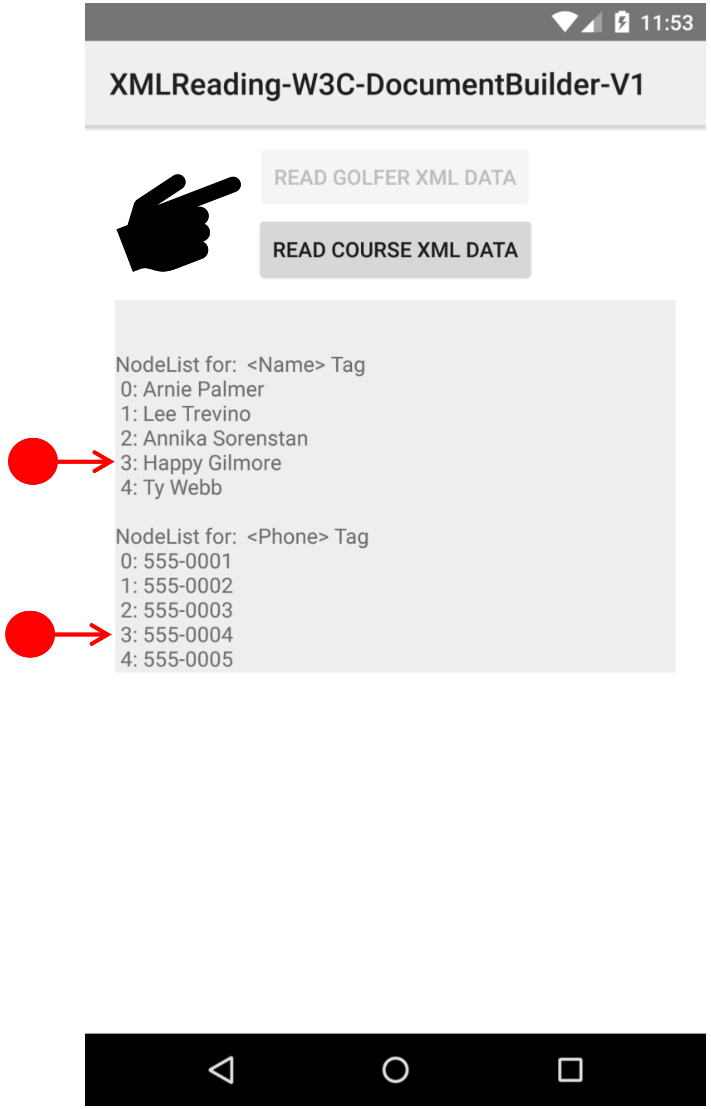


```
NodeList for:  <course> Tag
 0: Manakiki Golf Course
 attr. info-0-0: phone (440)942-2500
 attr. info-0-1: length 6173

NodeList for:  <name> Tag
 0: Tee Box - Hole 1
 1: Front of Green - Hole 1
 2: Middle of Green - Hole 1
 3: Back of Green - Hole 1
 4: Bunker1 - FWL - Hole 1
 5: Bunker2 - GR - Hole 1
 6: Bunker3 - GL - Hole 1
 7: Tee Box - Hole 2
 8: Front of Green - Hole 2
 9: Middle of Green - Hole 2
 10: Back of Green - Hole 2
 11: Bunker1 - FWR - Hole 2
 12: Bunker2 - GL - Hole 2
 13: Bunker3 - GR - Hole 2

NodeList for:  <coordinates> Tag
 0: -81.4324182271957,41.5984273639879,0
 1: -81.433182656765,41.5955730479591,0
 2: -81.4331665635109,41.5954647298964,0
 3: -81.4331531524658,41.5953664411267,0
 4: -81.4327722787857,41.5969992188305,0
 5: -81.4334589242935,41.595559006739,0
```

The screen shows the result of parsing the xml-geo-data file describing the golf course.

The first arrow point to the <course> element. There is only one in the XML file. We have extracted its text, and attributes (phone, length).

The second arrows points to the third node in the <name> list (say <name> [2]) which holds the value: “Middle of the Green – Hole1”, The last arrow point to its coordinates <coordinates>[2]



```
NodeList for:  <Name> Tag
 0: Arnie Palmer
 1: Lee Trevino
 2: Annika Sorenstan
 3: Happy Gilmore
 4: Ty Webb

NodeList for:  <Phone> Tag
 0: 555-0001
 1: 555-0002
 2: 555-0003
 3: 555-0004
 4: 555-0005
```

READING XML DATA (Example 5: W3C DocumentBuilder class)

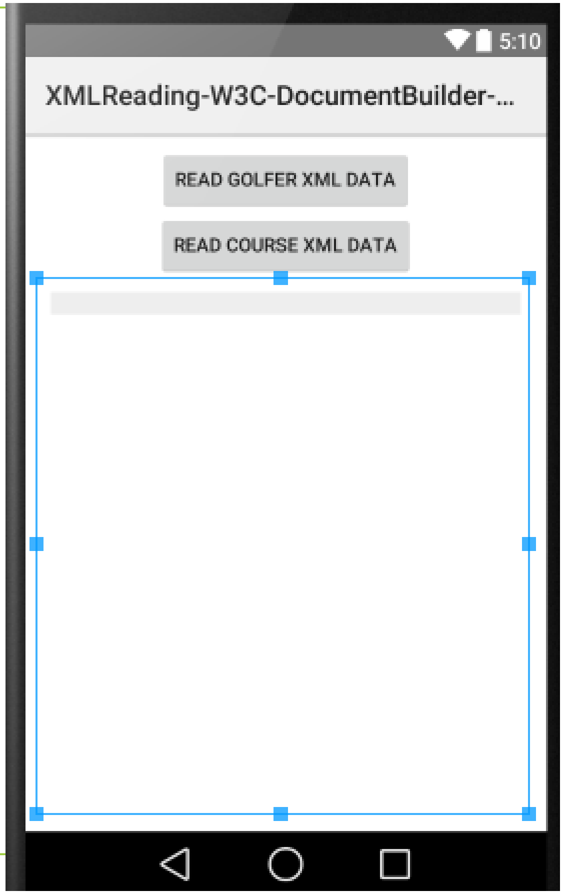
This screen shows the data obtained from parsing the “Golfers.xml” file.

For each element <name> and <phone> the parser produces a NodeList.

Observe the correspondence between the lists (parallel arrays). For instance player number 3 is Happy Gilmore, and his phone number is phone 3 which in our sample is 555-0004.

READING XML DATA
(Example 5: App’s screen layout)

```
<?xml version=“1.0” encoding=“utf-8”?>
<LinearLayout xmlns:android=“http://schemas.android.com/apk/res/android”
                          android:layout_width=“match_parent”
                          android:layout_height=“match_parent”
                          android:orientation=“vertical” >
  <Button           android:id=“@+id/btnReadXmlPlayers” android:layout_width=“wrap_content”
                          android:layout_height=“wrap_content” android:text=“Read GOLFER XML data”/>
  <Button           android:id=“@+id/btnReadXmlCourse” android:layout_width=“wrap_content”
                          android:layout_height=“wrap_content” android:text=“Read COURSE XML data”/>
  <ScrollView     android:id=“@+id/ScrollView01” android:layout_width=“match_parent”
                          android:layout_height=“0dp” android:layout_weight=“2”
                          android:padding=“10dp”>
    <TextView      android:id=“@+id/txtMsg” android:layout_width=“match_parent”
                          android:layout_height=“wrap_content” />
  </ScrollView>
</LinearLayout>
```



READING XML DATA
(Example 5: W3C DocumentBuilder class)

```
public class MainActivity extends Activity {
  private TextView txtMsg; Button btnGoParsePlayers, btnGoParseCourse;
  @Override
  public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState); setContentView(R.layout.activity_main);
    txtMsg = (TextView) findViewById(R.id.txtMsg);
    btnGoParsePlayers = (Button) findViewById(R.id.btnReadXmlPlayers);
    btnGoParsePlayers.setOnClickListener(new View.OnClickListener() {
      @Override
      public void onClick(View v) {
        btnGoParsePlayers.setEnabled(false);
        // KML stored in the SD card - needs: READ_EXTERNAL_DEVICE
        // Example1: a group of <Player> friends stored in the “golfers.xml” file holding elements: <Name>, <Phone> Case sensitive!!!
1 →     new BackgroundAsyncTask().execute(“Golfers.xml”, “Name”, “Phone”);
      }});
    btnGoParseCourse = (Button) findViewById(R.id.btnReadXmlCourse);
    btnGoParseCourse.setOnClickListener(new View.OnClickListener() {
      @Override
      public void onClick(View v) {
        btnGoParseCourse.setEnabled(false);
        // KML stored in the SD card - needs: READ_EXTERNAL_DEVICE
        // -------------------------------------------------------
        // Example2: this xml file includes elements: <course>, <name>, <coordinates> for just a few holes
        // String xmlFile = “manakiki_holes1and2.xml”;
1 →     new BackgroundAsyncTask().execute(“manakiki_holes1and2.xml”, “course”, “name”, “coordinates”);
      }});
  }// onCreate
```

READING XML DATA
(Example 5: W3C DocumentBuilder class)

```
private class BackgroundAsyncTask extends AsyncTask<String, Void, String> {
  ProgressDialog dialog = new ProgressDialog(MainActivity.this);
  @Override
  protected void onPostExecute(String result) {
    super.onPostExecute(result);
    dialog.dismiss();
    txtMsg.setText(result.toString());
  }
  @Override
  protected void onPreExecute() {
    super.onPreExecute();
    dialog.setMessage("Please wait..."); dialog.setCancelable(false); dialog.show();
  }
  @Override
  protected void onProgressUpdate(Void... values) { super.onProgressUpdate(values); }
  @Override
  protected String doInBackground(String... params) { return useW3CParser(params); }// doInBackground
}// backgroundAsyncTask
```

2

READING XML DATA
(Example 5: W3C DocumentBuilder class)

```
private String useW3CParser(String... params) {
 // params contain: xml-file-name followed by <element>s for example: “Golfers.xml”, “Name”, “Phone”
 // CAUTION: XML is case-sensitive.
 int n = params.length; // total number of parameters
 String xmlFileName = params[0]; // xml file name
 String[] elementName = new String[n - 1]; // element names
 for (int i = 0; i < n - 1; i++) elementName[i] = params[i + 1];
 StringBuilder str = new StringBuilder();
 try {
  InputStream is = new FileInputStream(new File(“mnt/sdcard/” + xmlFileName);
  DocumentBuilder docBuilder = DocumentBuilderFactory.newInstance().newDocumentBuilder(); ← 3
  Document document = docBuilder.parse(is);
  if (document == null) { Log.v(“REALLY BAD!!!!”, “document was NOT made by parser”); return “BAD-ERROR”; }
  // make a NodeList for each given <element> - prepare data to be shown
  NodeList[] elementList = new NodeList[n];
  for (int i = 0; i < n - 1; i++) {
   //make a collection of <elements> for each name in params[i+1]
   elementList[i] = document.getElementsByTagName(elementName[i]); ← 4
   //dissect node elementList[i] looking for its enclosed attributes and text
   str.append(getTextAndAttributesFromNode(elementList[i], elementName[i])); ← 5
  }
 }
 catch (FileNotFoundException e) { Log.e(“W3C Error”, e.getMessage()); }
 catch (ParserConfigurationException e) { Log.e(“W3C Error”, e.getMessage()); }
 catch (SAXException e) { Log.e(“W3C Error”, e.getMessage()); }
 catch (IOException e) { Log.e(“W3C Error”, e.getMessage()); }
 return str.toString();
}// useW3cOrgDocumentBuilder
```

```
private Object getTextAndAttributesFromNode(NodeList list, String strElementName) {
 StringBuilder str = new StringBuilder();
 // dealing with the <strElementName> tag
 str.append(“\n\nNodeList for: <” + strElementName + “> Tag”);
 for (int i = 0; i < list.getLength(); i++) {
  // extract TEXT enclosed inside <element> tags ← 6
  Node node = list.item(i);
  String text = node.getTextContent();
  str.append(“\n ” + i + “: ” + text);
  // get ATTRIBUTES inside the current element
  int size = node.getAttributes().getLength(); ← 7
  for (int j = 0; j < size; j++) {
   String attrName = node.getAttributes().item(j).getNodeName();
   String attrValue = node.getAttributes().item(j).getNodeValue();
   str.append(“\n attr. info-” + i + “-” + j + “: ” + attrName + “ ” + attrValue);
  }
 }
 return str;
}//getAllDataFromNodeList
}// ActivityMain
```

READING XML DATA (Example 5: Comments)

1. Do the slow parsing process inside an AsyncTask thread. Pass a variable number of arguments including: the external XML file’s name, followed by the name of each element to be extracted.

2. The doInBackground method calls useW3CParser where all the work is to be actually done.

3. The method useW3CParser instantiates a DocumentBuilder worker to accept the data stream coming from the XML file. This method creates an internal tree-like representation of the structured XML-document.

4. The tree version of the document is traversed and NodeLists are made for the elements: <name>, <coordinates> and <course> [Example 2].

5. Each of the lists is visited to report their corresponding contents.

6. For each node extract the text (if any) held between the beginning and end tags.

7. For each node extract its internal attribute (if any) in the form of <key, value> pairs.

READING JSON DATA (WHAT IS JSON?)

JSON (JavaScript Object Notation) is a plain-text formatting protocol for encoding and decoding hierarchically structured data.

1. JSON is based on JavaScript Programming Language

2. It is language and platform independent.

3. Arguably, it is easier to read and write than XML.

4. A JSON encoded data-set is based on the manipulation of two common programming constructs: simple arrays and objects.

5. Each object is represented as an associative-array holding a collection of attributes and their values.

6. An attribute’s value could be a simple data-type or another nested JSON object.

READING JSON DATA (SYNTAX RULES)

Example. A JSON array of three Person objects, each holding name & age.

- “Person” :[{“name”:“Daenerys”, “age”:20}, {“name”:“Arya”, “age”:12}, {“name”:“Cersei”, “age”:35}]

Object[0]	Object[1]		Object[M]

{
Attr_1 : value1
. . .
Attr_n$_0$: value_n$_0$
}
	{
	Attr_1 : value1
	. . .
	Attr_n$_1$: value_n$_1$
	}
			{
			Attr_1 : value1
			. . .
			Attr_n$_M$: value_n$_M$
			}

- Individual data items are represented as key : value pairs
- Data items are separated by commas
- Objects are enclosed inside curly braces { }
- Arrays of objects are delimited by square brackets [ ]

READING JSON DATA
(Example 6: using JSON & PHP)

```
<?php
  // define native PHP objects
  $person0 = array(‘name’ => ‘Daenerys’, ‘age’ => 20);
  $person1 = array(‘name’ => ‘Arya’, ‘age’ => 12);
  $person2 = array(‘name’ => ‘Cersei’, ‘age’ => 35);
  $people = array($person0, $person1);
  $people[2] = $person2;
  // PHP objects are converted to JSON format
  echo “<p>” . json_encode($person1);
  $jsondata = json_encode($people);
  echo “<p>” . $jsondata;
  // JSON formated data is decoded into native PHP objects
  $parr = json_decode($jsondata);
  echo “<p>” . var_export($parr);
  echo “<br>” . $parr[‘0’]->name;
  echo “<br>” . $parr[‘0’]->age;
?>
```

In this example we create a PHP array in which each cell is itself an associative array holding a person’s name and age.

READING JSON DATA
(Example 6: using JSON & PHP)

This is the output produced by the previous example:

- {“name”:“Arya”,“age”:12}

A single JSON encoded Person object

- [
  - {“name”:“Daenerys”,“age”:20},
  - {“name”:“Arya”,“age”:12},
  - {“name”:“Cersei”,“age”:35}

A JSON array of Person objects

-]
- array (Decoding from JSON to a PHP associative array
  - 0 => stdClass::__set_state(array(‘name’ => ‘Daenerys’, ‘age’ => 20,)),
  - 1 => stdClass::__set_state(array(‘name’ => ‘Arya’, ‘age’ => 12,)),
  - 2 => stdClass::__set_state(array(‘name’ => ‘Cersei’, ‘age’ => 35,)),)
- Daenerys

Individual values of a selected PHP object

- 20

READING JSON DATA
(Example 6: using JSON & PHP)

Comments

1. The PHP associative array $people is a collection of <key, value> pairs, the statement $jsonData = json_encode($people) converts this representation into a JSON string [{…}, {…}, {…}]

2. The statement json_decode($jsonData) reverses the JSON string into an ordinary PHP associative array.

3. JSON objects are enclosed by curly-braces {“name”:“Arya”, “age”:12}

4. JSON arrays hold their comma separated items inside braces […]

5. When a JSON string representing an array of PHP objects is decoded, it becomes a PHP associative array. Each cell holds the object’s attributes.

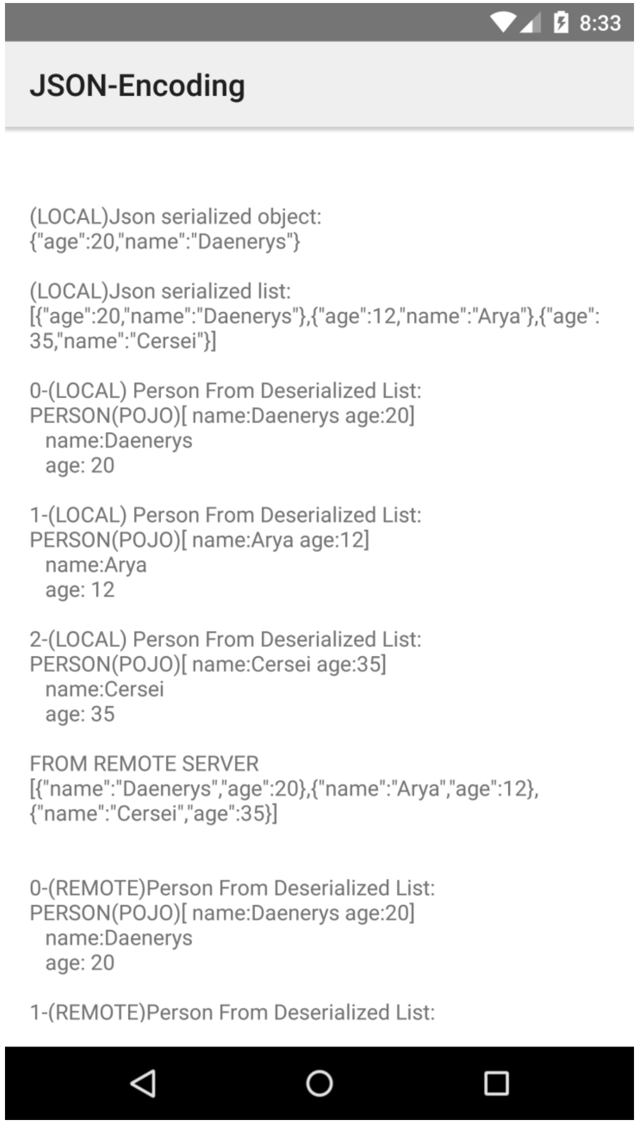
6. The expression $parr[‘0’]->name allows access to the “name” attribute of the zero-th object in the PHP array.

READING JSON DATA
(Example 6: using JSON & PHP)

```
<?php
  $person0 = array(‘name’ => ‘Daenerys’, ‘age’ => 20);
  $person1 = array(‘name’ => ‘Arya’, ‘age’ => 12);
  $person2 = array(‘name’ => ‘Cersei’, ‘age’ => 35);
  $people = array($person0, $person1, $person2);
  $jsondata = json_encode($people);
  echo “<p>JSON Encoded Data <br>” . $jsondata;
  $myfile = fopen(“westeros_ladies.txt”, “w”) or die(“Unable to open file!”);
  fwrite($myfile, $jsondata);
  fclose($myfile);
  echo ‘<br>’ . ‘Done writing file...’;
?>
```

This server-side PHP program writes to disk a JSON encoded data set.
Our Android app reads the data set, decodes it and creates an equivalent List<Person> object.

```
JSON Encoded Data
[{“name”:“Daenerys”,“age”:20},{“name”:“Arya”,“age”:12},{“name”:“Cersei”,“age”:35}]
Done writing file...
```



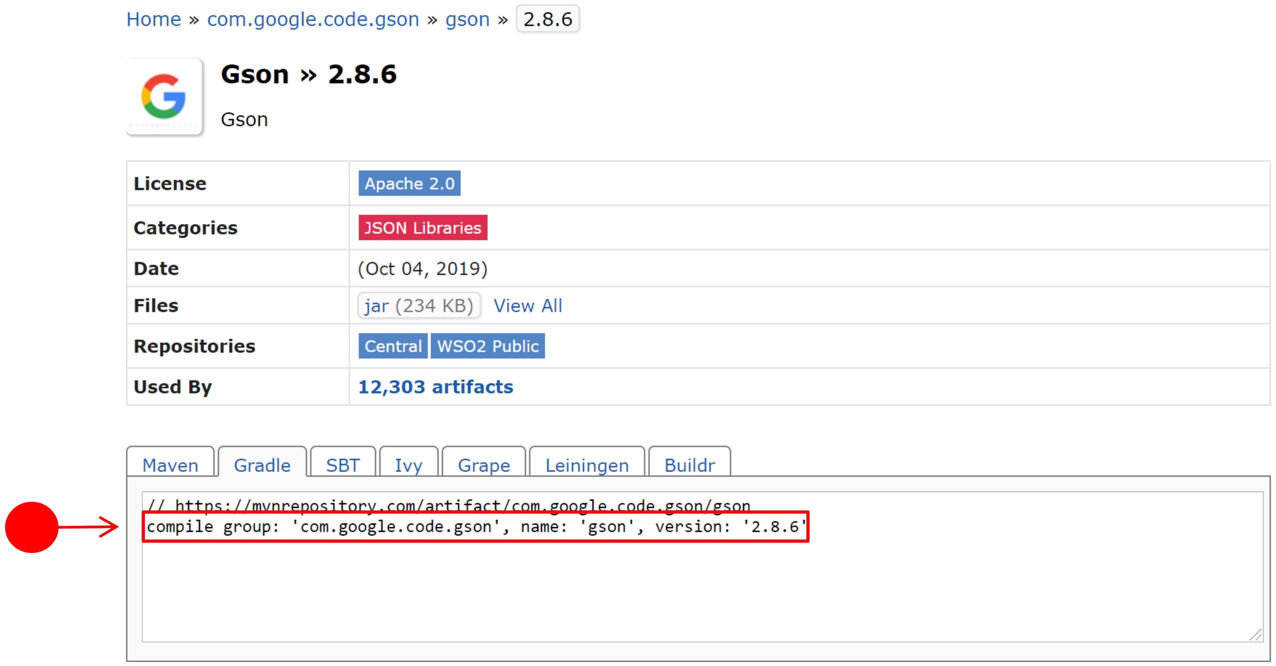
```
(LOCAL)Json serialized object:
{"age":20,"name":"Daenerys"}

(LOCAL)Json serialized list:
[{"age":20,"name":"Daenerys"},{"age":12,"name":"Arya"},{"age":
35,"name":"Cersei"}]

0-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Daenerys age:20]
  name:Daenerys
  age: 20

1-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Arya age:12]
  name:Arya
  age: 12

2-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Cersei age:35]
  name:Cersei
  age: 35

FROM REMOTE SERVER
[{"name":"Daenerys","age":20},{"name":"Arya","age":12},
{"name":"Cersei","age":35}]


0-(REMOTE)Person From Deserialized List:
PERSON(POJO)[ name:Daenerys age:20]
  name:Daenerys
  age: 20

1-(REMOTE)Person From Deserialized List:
```

READING JSON DATA (Example 7: using JSON & Android)

Assume a server-side app (similar to the PHP program depicted earlier) has created a GSON encoded data set. The set represents an array of Person objects. Each Person object includes name and age.

Our Android app connects to the server, downloads the file, and decodes it. The retrieved data is represented as a collection of Java Person objects held in a List<Person> collection.

READING JSON DATA (Example 7: using JSON & Android)



Home » com.google.code.gson » gson » 2.8.6

Gson » 2.8.6

Gson

License	Apache 2.0
Categories	JSON Libraries
Date	(Oct 04, 2019)
Files	jar (234 KB) View All
Repositories	Central WSO2 Public
Used By	**12,303 artifacts**

```
// https://mvnrepository.com/artifact/com.google.code.gson/gson
compile group: 'com.google.code.gson', name: 'gson', version: '2.8.6'
```

GSON is an implementation of JSON developed by Google. A user's guide for GSON is available from: https://sites.google.com/site/gson/gson-user-guide

To incorporate GSON to an Android app you need to follow the steps below:

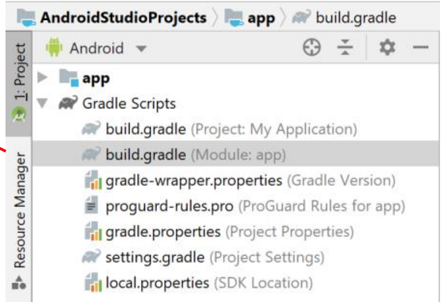
- 1. Download the latest GSON API. Use the following MAVEN repository link: http://mvnrepository.com/artifact/com.google.code.gson/gson
- 2. Look under the "Gradle" tab for the name of the current release. At the time of writing its value is:
- compile group: 'com.google.code.gson', name: 'gson', version: '2.8.6'

You will use it later to update the definition of the app's 'build.gradle'.

READING JSON DATA
(Example 7: using JSON & Android)

3. Add a reference to gson jar in module’s build.gradle file as suggested in following code:

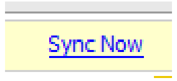
- . . .
- dependencies {
  - implementation fileTree(dir: 'libs', include: ['*.jar'])
  - implementation 'androidx.appcompat:appcompat:1.0.2'
  - implementation 'androidx.constraintlayout:constraintlayout:1.1.3'
  - testImplementation 'junit:junit:4.12'
  - androidTestImplementation 'androidx.test.ext:junit:1.1.0'
  - androidTestImplementation 'androidx.test.espresso:espresso-core:3.1.1'
  - implementation group: 'com.google.code.gson', name: 'gson', version: '2.8.6’
- }



AndroidStudioProjects › app › build.gradle

- app
- Gradle Scripts
  - build.gradle (Project: My Application)
  - build.gradle (Module: app)
  - gradle-wrapper.properties (Gradle Version)
  - proguard-rules.pro (ProGuard Rules for app)
  - gradle.properties (Project Properties)
  - settings.gradle (Project Settings)
  - local.properties (SDK Location)

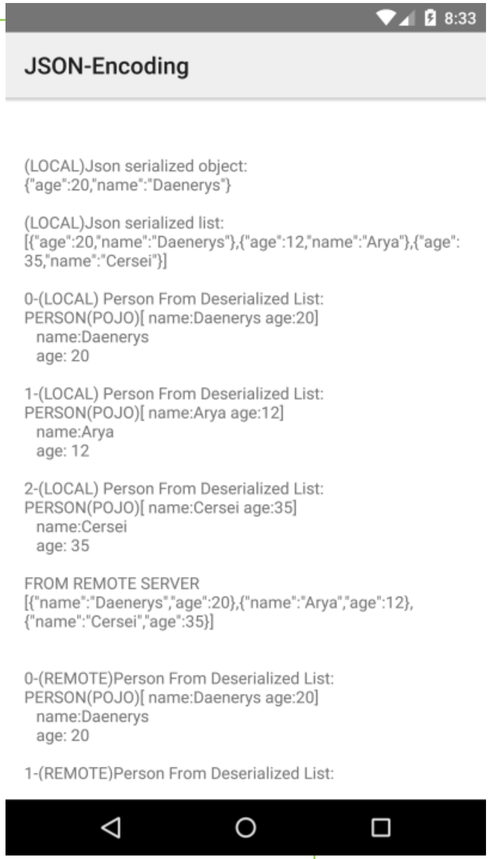
4. Click on the “Sync Now” link to update all the related Gradle files



READING JSON DATA
(Example 7: using JSON & Android)

Layout

```
<FrameLayout    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”
                android:background=“@android:color/white”>
 <ProgressBar   android:id=“@+id/progressBar” android:layout_width=“100dp”
                android:layout_height=“100dp” android:layout_gravity=“center_horizontal”/>
 <LinearLayout  android:layout_width=“match_parent” android:layout_height=“match_parent”
                android:backgroundTint=“@android:color/transparent” android:orientation=“vertical”>
  <ScrollView   android:id=“@+id/scrollView”
                android:layout_width=“wrap_content”
                android:layout_height=“wrap_content”>
   <TextView    android:id=“@+id/txtMsg” android:layout_width=“wrap_content”
                android:layout_height=“wrap_content”/>
  </ScrollView>
 </LinearLayout>
</FrameLayout>
```



```
(LOCAL)Json serialized object:
{"age":20,"name":"Daenerys"}

(LOCAL)Json serialized list:
[{"age":20,"name":"Daenerys"},{"age":12,"name":"Arya"},{"age":
35,"name":"Cersei"}]

0-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Daenerys age:20]
  name:Daenerys
  age: 20

1-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Arya age:12]
  name:Arya
  age: 12

2-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Cersei age:35]
  name:Cersei
  age: 35

FROM REMOTE SERVER
[{"name":"Daenerys","age":20},{"name":"Arya","age":12},
{"name":"Cersei","age":35}]


0-(REMOTE)Person From Deserialized List:
PERSON(POJO)[ name:Daenerys age:20]
  name:Daenerys
  age: 20

1-(REMOTE)Person From Deserialized List:
```

READING JSON DATA
(Example 7: using JSON & Android)

Code

```
public class MainActivity extends Activity {
  ProgressBar progressBar; TextView txtMsg; Gson gson;
  Handler handler = new Handler() {
    @Override
    public void handleMessage(Message msg) {
      super.handleMessage(msg);
      txtMsg.append(“\n” + (String) msg.obj);
      progressBar.setVisibility(View.INVISIBLE);
    }
  };
```

READING JSON DATA (Example 7: using JSON & Android)

Code

```
Thread slowWorkerThread = new Thread() {
 @Override
 public void run() {
  super.run();
  //a little delay here...
  try {Thread.sleep(2000);} catch (InterruptedException e) { }
  String text = “”;
  //PART2: JSON Encoding
  Person person0 = new Person(“Daenerys”, 20); ← 1
  // convert Person (Java object) to JSON format display it as a JSON formatted string
  Gson gson = new Gson(); ← 2
  String json = gson.toJson(person0);
  text = “\n(LOCAL)Json serialized object:\n” + json;
  handler.sendMessage(handler.obtainMessage(1, (String) text));
  // create a few more Person objects
  Person person1 = new Person(“Arya”, 12), person2 = new Person(“Cersei”, 35);
  // place all Person objects in an ArrayList ← 3
  ArrayList<Person> lstPerson = new ArrayList<Person>();
  lstPerson.add(person0); lstPerson.add(person1); lstPerson.add(person2);
  // convert Java ArrayList to JSON string ← 4
  String jsonList = gson.toJson(lstPerson);
  text = “\n(LOCAL)Json serialized list:\n” + jsonList;
  handler.sendMessage(handler.obtainMessage(1, (String) text));
```

```
// use Java reflection to find the list’s type ← 5
Type arrayPersonType = new TypeToken<ArrayList<Person>>(){}.getType();
// deserialize JSON string representing the list of objects
ArrayList<Person> lst2 = gson.fromJson(jsonList, arrayPersonType);
// explore the Java ArrayList ← 6
for(int i=0; i<lst2.size(); i++){
 Person p = lst2.get(i);
 text = “\n” + i + “-(LOCAL) Person From Deserialized List:\n” + p.toString()
          + “\n name:” + p.getName() + “\n age: ” + p.getAge();
 handler.sendMessage(handler.obtainMessage(1, (String) text));
}
try { // using java.net.URL;
 URL url = new URL(“http://informatos.org/westeros/westeros_ladies.txt”); ← 7
 //URL url = new URL(“http://192.168.1.70/westeros/westeros_ladies.txt”);
 // next statement reads the ENTIRE file (delimiter \A matches All input)
 // String text = new Scanner( url.openStream() ).useDelimiter(“\\A”).next();
 // scanning remote file one line at the time
 text =“”;
 Scanner scanner = new Scanner(url.openStream());
 while (scanner.hasNext()) { text += scanner.nextLine() + “\n”; }
 handler.sendMessage(handler.obtainMessage(1, “\nFROM REMOTE SERVER\n” + text));
```

READING JSON DATA
(Example 7: using JSON & Android)

Code

```
   // use Java reflection to find the list’s type
   Type arrayPersonType3 = new TypeToken<ArrayList<Person>>(){}.getType();
   // deserialize JSON string representing the list of objects
   ArrayList<Person> lst3 = gson.fromJson(text, arrayPersonType3);←❽
   // explore the Java ArrayList
   for(int i=0; i<lst3.size(); i++){
    Person p = lst3.get(i);
    text = “\n” + i + “-(REMOTE)Person From Deserialized List:\n” + p.toString()
             + “\n name:” + p.getName() + “\n age: ” + p.getAge();
    handler.sendMessage(handler.obtainMessage(1, (String) text));
   }
  }
  catch (java.io.IOException e) {
   handler.sendMessage(handler.obtainMessage(1, “ERROR: ” + e.getMessage()));
  }
 }//run
};
```

READING JSON DATA
(Example 7: using JSON & Android)

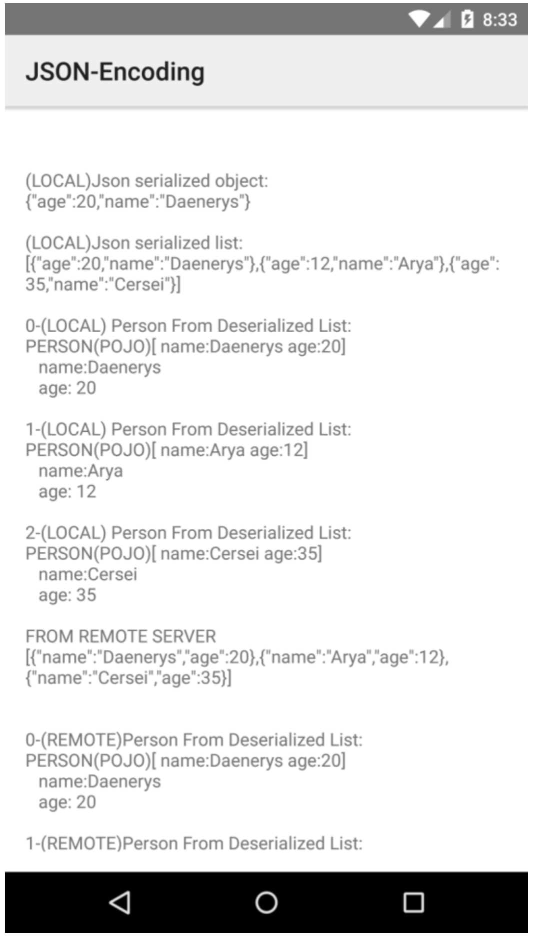
Code

```
 @Override
 protected void onCreate(Bundle savedInstanceState) {
  super.onCreate(savedInstanceState);
  setContentView(R.layout.activity_main);
  txtMsg = (TextView) findViewById(R.id.txtMsg);
  progressBar = (ProgressBar)findViewById(R.id.progressBar);
  gson = new Gson();
  slowWorkerThread.start();
 }//onCreate
}
```

READING JSON DATA
(Example 7: using JSON & Android)

Code

```
public class Person {
  private String name; ← 9
  private Integer age;
  public Person (String name, Integer age) {
    this.name = name;
    this.age = age;
  }
  public Person() {
    this.name = “n.a.”;
    this.age=0;
  }
  public String getName() { return name; }
  public void setName(String name) { this.name = name; }
  public Integer getAge() { return age; }
  public void setAge(Integer age) { this.age = age; }
  public String toString() {
    return “PERSON(POJO)=> name:” + name + “ age:” + age;
  }
}
```



```
(LOCAL)Json serialized object:
{"age":20,"name":"Daenerys"}

(LOCAL)Json serialized list:
[{"age":20,"name":"Daenerys"},{"age":12,"name":"Arya"},{"age":
35,"name":"Cersei"}]

0-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Daenerys age:20]
  name:Daenerys
  age: 20

1-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Arya age:12]
  name:Arya
  age: 12

2-(LOCAL) Person From Deserialized List:
PERSON(POJO)[ name:Cersei age:35]
  name:Cersei
  age: 35

FROM REMOTE SERVER
[{"name":"Daenerys","age":20},{"name":"Arya","age":12},
{"name":"Cersei","age":35}]


0-(REMOTE)Person From Deserialized List:
PERSON(POJO)[ name:Daenerys age:20]
  name:Daenerys
  age: 20

1-(REMOTE)Person From Deserialized List:
```

READING JSON DATA (Example 7: using JSON & Android)

Comments

1. All the slow work is performed in a background Thread. First, a POJO (plain old java object) item of type Person is created.

2. The statement gson.toJson(person0) encodes the instance of person0 (comma separated items, inside curly-braces)

3. An ArrayList<Person> structure is created and populated with the instances of three person objects.

4. The .toJson( ) method encodes the Java ArrayList<Person> object (comma separated objects inside braces)

5. You can use the GSON TypeToken class to find the generic type for a class. For example, to find the generic type for Collection<Foo>, you can use: Type typeOfCollectionOfFoo = new TypeToken<Collection<Foo>>(){}.getType(); Assumes Type implements equals() and hashCode().

READING JSON DATA (Example 7: using JSON & Android)

Comments

6. The statement .fromJson( ) uses the previously determined class type to properly decode the string representing the dynamic list of person objects.

7. The JSON data is regenerated as a common Java ArrayList<Person> class and traversed showing its contents.

8. Person is a POJO holding the attributes name and age, constructors, accessors, and a custom toString() method.

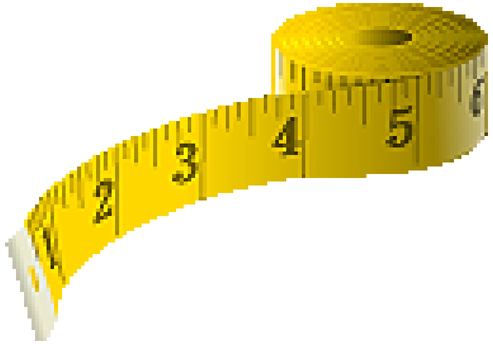
9. Observe the encoded JSON objects are exactly those previously seen in the PHP example (to be expedted - JSON is language independent)

References

- http://developer.android.com/index.html
- http://www.w3.org
- http://www.saxproject.org/
- https://code.google.com/p/google-gson/

APPENDICES
(Calculating distance between 2 coordinates)

```
import android.location.Location;
. . .
  private int distanceYards(GolfMarker gm){
    // calculating distance (yards) between two coordinates
    int intDistance = 0;
    double distance = 0;
    Location locationA = new Location("point: Here");
    locationA.setLatitude(Double.parseDouble(aLatitude));
    locationA.setLongitude(Double.parseDouble(aLongitude));
    Location locationB = new Location("point: F/M/B Green");
    locationB.setLatitude(Double.parseDouble(bLatitude));
    locationB.setLongitude(Double.parseDouble(bLongitude));
    distance = locationA.distanceTo(locationB) * METER_TO_YARDS;
    intDistance = (int) Math.round(distance);
    return intDistance;
  }
} // GolfMarker
```

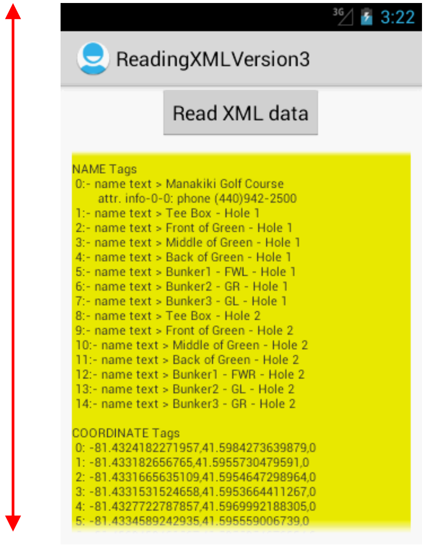


APPENDICES
(Reminder – keep your screen vertical!)

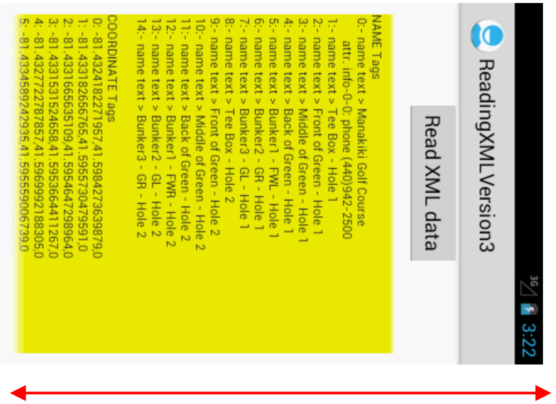
NOTE:

For this Golf-GPS app you may want to modify the Manifest to stop (landscape) re-orientation. Add the following attributes to the <activity … > entry

- android:screenOrientation = “portrait”
- android:configChanges = “keyboardHidden|orientation”



```
NAME Tags
 0:- name text > Manakiki Golf Course
       attr. info-0-0: phone (440)942-2500
 1:- name text > Tee Box - Hole 1
 2:- name text > Front of Green - Hole 1
 3:- name text > Middle of Green - Hole 1
 4:- name text > Back of Green - Hole 1
 5:- name text > Bunker1 - FWL - Hole 1
 6:- name text > Bunker2 - GR - Hole 1
 7:- name text > Bunker3 - GL - Hole 1
 8:- name text > Tee Box - Hole 2
 9:- name text > Front of Green - Hole 2
 10:- name text > Middle of Green - Hole 2
 11:- name text > Back of Green - Hole 2
 12:- name text > Bunker1 - FWR - Hole 2
 13:- name text > Bunker2 - GL - Hole 2
 14:- name text > Bunker3 - GR - Hole 2

COORDINATE Tags
 0: -81.4324182271957,41.5984273639879,0
 1: -81.433182656765,41.5955730479591,0
 2: -81.4331665635109,41.5954647298964,0
 3: -81.4331531524658,41.5953664411267,0
 4: -81.4327722787857,41.5969992188305,0
 5: -81.4334589242935,41.595559006739,0
```



```
NAME Tags
 0:- name text > Manakiki Golf Course
       attr. info-0-0: phone (440)942-2500
 1:- name text > Tee Box - Hole 1
 2:- name text > Front of Green - Hole 1
 3:- name text > Middle of Green - Hole 1
 4:- name text > Back of Green - Hole 1
 5:- name text > Bunker1 - FWL - Hole 1
 6:- name text > Bunker2 - GR - Hole 1
 7:- name text > Bunker3 - GL - Hole 1
 8:- name text > Tee Box - Hole 2
 9:- name text > Front of Green - Hole 2
 10:- name text > Middle of Green - Hole 2
 11:- name text > Back of Green - Hole 2
 12:- name text > Bunker1 - FWR - Hole 2
 13:- name text > Bunker2 - GL - Hole 2
 14:- name text > Bunker3 - GR - Hole 2

COORDINATE Tags
 0: -81.4324182271957,41.5984273639879,0
 1: -81.433182656765,41.5955730479591,0
 2: -81.4331665635109,41.5954647298964,0
 3: -81.4331531524658,41.5953664411267,0
 4: -81.4327722787857,41.5969992188305,0
 5: -81.4334589242935,41.595559006739,0
```

APPENDICES
(Parsing a JSON encoded string)

The following fragments shows an alternative JSON decoding approach on which you traverse the underlining data structure looking for jsonElements, which could be: jsonObject, jsonArray, or jsonPrimitive tokens.

```
try {
 JsonElement jelement = new JsonParser().parse(jsonHouseStr);
 JsonObject jobject = jelement.getAsJsonObject();
 String departmenName= jobject.get(“department”).toString();
 String manager= jobject.get(“manager”).toString();
 System.out.println(departmenName + “\n” + manager);
 JsonArray jarray = jobject.getAsJsonArray(“employeeList”);
 for (int i = 0; i < jarray.size(); i++) {
  jobject = jarray.get(i).getAsJsonObject();
  String result = jobject.get(“name”).toString() + “ ” + jobject.get(“age”).toString();
  System.out.println(“ ” + result);
 }
}
catch (Exception e) { System.out.println(e.getMessage()); }
```

departmentName String	manager int	employeeList ArrayList<Person> (name, age)

APPENDICES
(Traversing tree structure of JSON encoded data)

Example: The previous code fragment produces the following conversion

JSON encoded string	Equivalent Decoded Nodes

{
“houseName”:“Stark”,
“location”:“Winterfell”,
“personLst”:[
{“name”:“Catelyn Stark”, “age”:40},
{“name”:“Sansa Stark”, “age”:14},
{“name”:“Bran Stark”, “age”:9}
]
}
	“Stark”
	“Winterfell”
	“Catelyn Stark” 40
	“Sansa Stark” 14
	“Bran Stark” 9