

Android程序设计

数据格式

2018.6.20

isszym sysu.edu.cn

<http://www.runoob.com/w3cnote/android-tutorial-socket1.html>

目录

- Json格式
- XML格式
- SOAP格式
- ProtoBuf格式

Json格式

- Json数据格式

```
{  "firstName": "John",
  "lastName": "Smith",
  "sex": "male",
  "age": 25,
  "address":
  {  "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021"
  },
  "phoneNumber":
  [{  "type": "home",
    "number": "212 555-1234"
  },
  {  "type": "fax",
    "number": "646 555-4567"
  }
]
```

JSON数据格式是JavaScript使用的是中数据格式，可以用于在不同系统中传递数据。它比XML格式效率更高，比ProtoBuf格式效率低，但是它很容易转换为JavaScript中的对象和数据，因此，使用最普遍。



- 第一种转换方法

Json1

不需要加入包

```
class Phone {  
    String type, number;  
    void setType(String val) { type = val; }  
    String getType() { return type; }  
    void setNumber(String val) { number = val; }  
    String getNumber() { return number; }  
}
```

```
class Address {  
    String streetAddress, city, state, postalCode;  
    void setStreetAddress(String val) { streetAddress = val; }  
    String getStreetAddress() { return streetAddress; }  
    void setCity(String val) { city = val; }  
    String getCity() { return city; }  
    void setState(String val) { state = val; }  
    String getState() { return state; }  
    void setPostalCode(String val) { postalCode = val; }  
    String getPostalCode() { return postalCode; }  
}
```

```

class User {
    String firstName;      String lastName;
    String sex;            int age;
    Address address;       List<Phone> phones;
    User(){}
    User(String firstName, String lastName, String sex, int age) {
        this.firstName = firstName;
        this.lastName = lastName;
        this.sex = sex;
        this.age = age;
    }
    public void setFirstName(String val) { firstName = val; }
    public String getFirstName() { return firstName; }
    public void setLastName(String val) { lastName = val; }
    public String getLastName() { return lastName; }
    public void setSex(String val) { sex = val; }
    public String getSex() { return sex; }
    public void setAge(int val) { age = val; }
    public int getAge(){ return age; }
    public void setAddress(Address val) { address = val;}
    public Address getAddress() { return address;}
    public void setPhoneNumber(List<Phone> phones) { this.phones = phones; }
    public List<Phone> getPhoneNumber() { return phones;}
    public String toString() {
        return "name: " + firstName + " " + lastName+", age: " + age;
    }
}

```

```

import org.json.JSONArray;
import org.json.JSONObject;                                /*安卓相关包，不用另外加入包*/
public class MainActivity extends AppCompatActivity {
    String user1 = "{\n" +
        "    \"firstName\": \"John\", \n" +
        "    \"lastName\": \"Smith\", \n" +
        "    \"sex\": \"male\", \n" +
        "    \"age\": 25, \n" +
        "    \"address\": \n" +
        "    {\n" +
        "        \"streetAddress\": \"21 2nd Street\", \n" +
        "        \"city\": \"New York\", \n" +
        "        \"state\": \"NY\", \n" +
        "        \"postalCode\": \"10021\" \n" +
        "    }, \n" +
        "    \"phoneNumber\": \n" +
        "    [\n" +
        "        {\n" +
        "            \"type\": \"home\", \n" +
        "            \"number\": \"212 555-1234\" \n" +
        "        }, \n" +
        "        {\n" +
        "            \"type\": \"fax\", \n" +
        "            \"number\": \"646 555-4567\" \n" +
        "        } \n" +
        "    ] \n" +
        "    }";
    User user;

```

```
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    TextView textView=(TextView)findViewById(R.id.textview);
    textView.setText(user1);
    System.out.print(user1);
}

public static User parserJSON(String str) {
    JSONObject userObj=null;
    try {
        userObj = new JSONObject(str);
    } catch (Exception ex) {
        ex.printStackTrace();
    }
    User user = new User();
    user.setFirstName(userObj.optString("firstName"));
    user.setLastName(userObj.optString("lastName"));
    user.setSex(userObj.optString("sex"));
    user.setAge(userObj.optInt("age"));

    JSONObject addressObj = userObj.optJSONObject("address");
```

```
Address address = new Address();
address.setStreetAddress(addressObj.optString("streetAddress"));
address.setCity(addressObj.optString("city"));
address.setState(addressObj.optString("state"));
address.setPostalCode(addressObj.optString("postalCode"));

user.setAddress(address);

JSONArray phoneNumber = userObj.optJSONArray("phoneNumber");

List<Phone> phones = new ArrayList<>();
for (int i = 0; i < phoneNumber.length(); i++) {
    Phone phone = new Phone();
    JSONObject phoneObj = phoneNumber.optJSONObject(i);
    phone.setType(phoneObj.optString("type"));
    phone.setNumber(phoneObj.optString("number"));
    phones.add(phone);
}
user.setPhoneNumber(phones);

return user;
}
```



```

public static String toJSON(User user){
    JSONObject userObj = new JSONObject();
    try { userObj.put("firstName", user.getFirstName());
        userObj.put("lastName", user.getLastName());
        userObj.put("sex", user.getSex());
        userObj.put("age", user.getAge());

        JSONObject addressObj = new JSONObject();
        Address address = user.getAddress();
        addressObj.put("streetAddress", address.getStreetAddress());
        addressObj.put("city", address.getCity());
        addressObj.put("state", address.getState());
        addressObj.put("postalCode", address.getPostalCode());

        userObj.put("address", addressObj);

        List<Phone> phoneNumber = user.getPhoneNumber();
        JSONArray phoneArrayObj = new JSONArray();
        for (int i = 0; i < phoneNumber.size(); i++) {
            JSONObject phoneObj = new JSONObject();
            phoneObj.put("type", phoneNumber.get(i).getType());
            phoneObj.put("number", phoneNumber.get(i).getNumber());
            phoneArrayObj.put(phoneObj);
        }
        userObj.put("phoneNumber", phoneArrayObj);
    } catch (Exception ex){
        ex.printStackTrace();
    }
    return userObj.toString();
}

```

```

public void jsonSerialize1(View vw) {
    String user1=toJSON(user);
    Toast.makeText(this, user1, Toast.LENGTH_LONG).show();
}

public void jsonParse1(View vw) {
    user = parserJSON(user1);
    Toast.makeText(this, user.toString(),Toast.LENGTH_LONG).show();
}
}

```



activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/activity_main"
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Hello World!"
        android:id="@+id/textView" />
    <Button
        android:text="Json串行化1"
        android:onClick="jsonSerialize1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/button"/>
    <Button
        android:text="Json解析1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/button2"
        android:onClick="jsonParse1" />
</RelativeLayout>
```

• 第二种转换方法 Json2

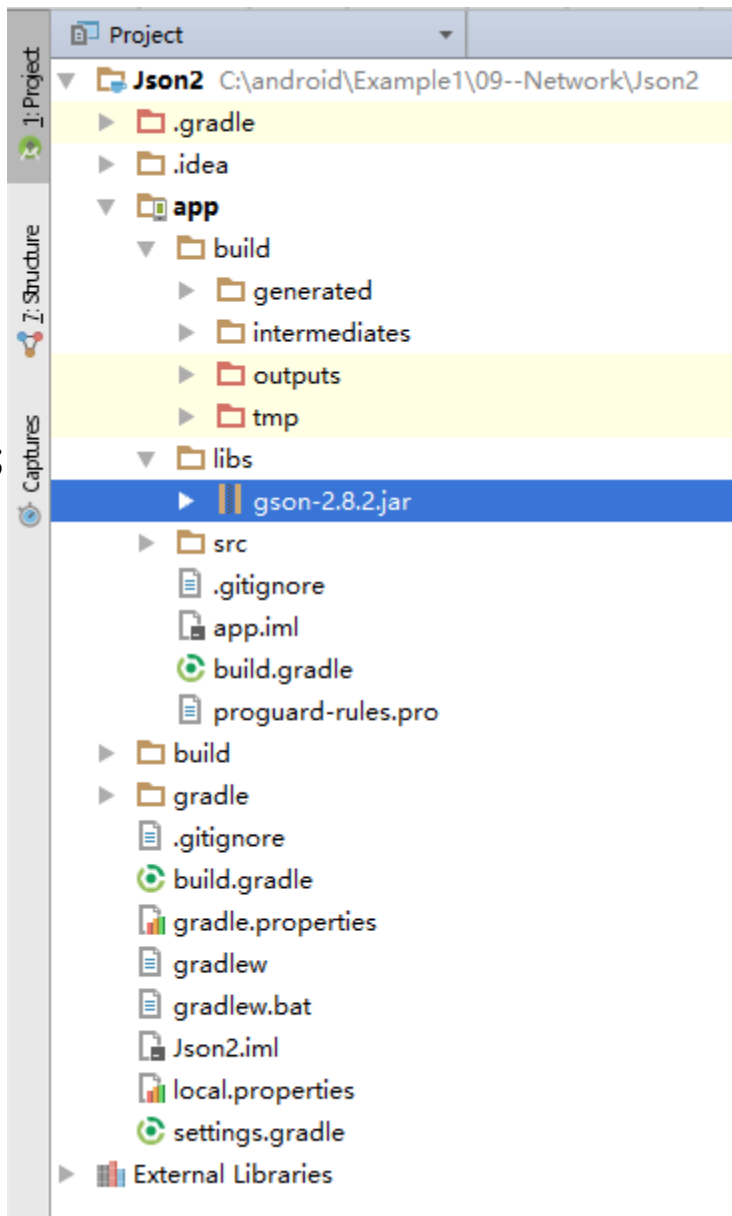
这种方法采用了Java的反射技术，使转换程序更简洁，但是需要引入外部包gson-2.8.2.jar

```
import com.google.gson.Gson;
import com.google.gson.JsonSyntaxException;
import com.google.gson.reflect.TypeToken;
```

```
class Phone {    /* 与前一种方法相同 */
    ...
}
```

```
class Address { /* 与前一种方法相同 */
    ...
}
```

```
class User {    /* 与前一种方法相同 */
    ...
}
```



粘贴一个包进来，右键点出菜单
“Add As a Library”

```

class GsonTools {
    /**TODO 转换为json字符串
     * @param src 要转换成json格式的 对象
     * @return
     */
    public static String createJsonString(Object src) {
        Gson gson = new Gson();
        String jsonString = gson.toJson(src);
        return jsonString;
    }
    /**TODO 转换为指定的 对象
     * @param jsonString
     * @param type 指定对象的类型 , 即 T.class
     * @return
     */
    public static <T> T getObject(String jsonString, Class<T> type) {
        T t = null;
        try {
            Gson gson = new Gson();
            t = gson.fromJson(jsonString, type);
        } catch (JsonSyntaxException e) {
            // TODO Auto-generated catch block
            e.printStackTrace();
        }
        return t;
    }
}

```

```

/**得到 一个List<T>集合
 * @param jsonString
 * @param type T的类型
 */
public static <T> List<T> getList(String jsonString, Class<T> type) {
    List<T> list = new ArrayList<T>();
    Gson gson = new Gson();
    list = gson.fromJson(jsonString, new TypeToken<List<T>>() {
    }.getType());
    return list;
}
/**TODO 得到一个List<T> 的集合
 * @param jsonString json字符串
 * @param type 数组的类型 , 即T[].class
 */
public static <T> List<T> StringTolist(String jsonString,Class<T[]>type){
    T[] list = null;
    try {
        Gson gson = new Gson();
        list = gson.fromJson(jsonString, type);
    } catch (JsonSyntaxException e) {
        // TODO Auto-generated catch block
        e.printStackTrace();
    }
    return Arrays.asList(list);
}

```

```

/**把json字符串转换为 String 集合
 * @param jsonString
 */
public static List<String> getStrings(String jsonString) {
    List<String> list = new ArrayList<String>();
    Gson gson = new Gson();
    new TypeToken<List<String>>(){}.getType();
    list = gson.fromJson(jsonString, new TypeToken<List<String>>() {
    }.getType());
    return list;
}
/**TODO 将json数据解析为Map<String, Object>集合
 * @param jsonString
 */
public static List<Map<String, Object>> getMaps(String jsonString) {
    List<Map<String, Object>>list=new ArrayList<Map<String, Object>>();
    Gson gson = new Gson();
    list = gson.fromJson(jsonString,
        new TypeToken<List<Map<String, Object>>>() {
        }.getType());
    return list;
}
}

```

```

public class MainActivity extends AppCompatActivity {
    String user1 =...; /* 与前一种方法相同 */
    String phones =
        "[\n" +
        "    {\n" +
        "        \"type\": \"home\", \n" +
        "        \"number\": \"212 555-1234\" \n" +
        "    }, \n" +
        "    {\n" +
        "        \"type\": \"fax\", \n" +
        "        \"number\": \"646 555-4567\" \n" +
        "    } \n" +
        "]" \n";

    User user;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        TextView textView=(TextView)findViewById(R.id.textView);
        textView.setText(user1);
    }
    public void jsonSerialize1(View vw) {
        String user1=GsonTools.createJsonString(user);
        Toast.makeText(this, user1,
            Toast.LENGTH_LONG).show();
    }
}

```



```

public void jsonParse1(View vw) {
    user = GsonTools.getObject(user1, User.class);
    List<Phone> ph= GsonTools.getList(phones, Phone.class);
    user.setPhoneNumber(ph);
    Toast.makeText(this, user.toString(),
        Toast.LENGTH_LONG).show();
}
public static User parserJSON(String str) {
    JSONObject userObj=null;
    try {
        userObj = new JSONObject(str);
    } catch (Exception ex) {
        ex.printStackTrace();
    }
    User user = new User();
    user.setFirstName(userObj.optString("firstName"));
    user.setLastName(userObj.optString("lastName"));
    user.setSex(userObj.optString("sex"));
    user.setAge(userObj.optInt("age"));

    JSONObject addressObj = userObj.optJSONObject("address");

```

```

Address address = new Address();
address.setStreetAddress(addressObj.optString("streetAddress"));
address.setCity(addressObj.optString("city"));
address.setState(addressObj.optString("state"));
address.setPostalCode(addressObj.optString("postalCode"));

user.setAddress(address);

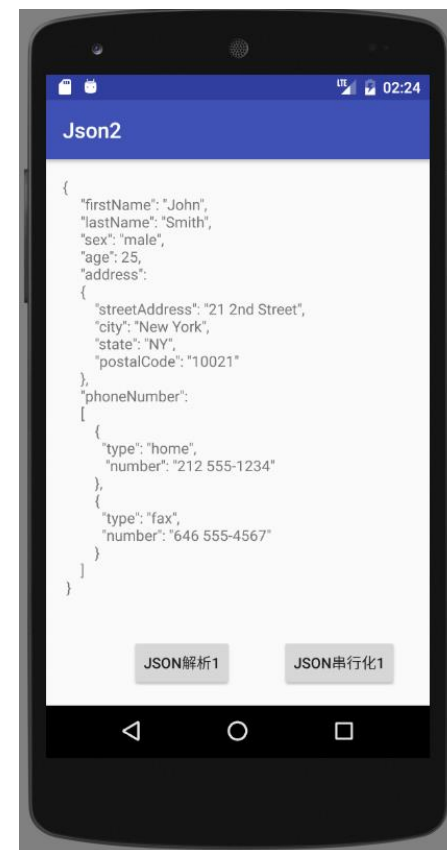
JSONArray phoneNumber = userObj.optJSONArray("phoneNumber");

List<Phone> phones = new ArrayList<>();
for (int i = 0; i < phoneNumber.length(); i++) {
    Phone phone = new Phone();
    JSONObject phoneObj
        = phoneNumber.optJSONObject(i);
    phone.setType(phoneObj.optString("type"));
    phone.setNumber(phoneObj.optString("number"));
    phones.add(phone);
}
user.setPhoneNumber(phones);

return user;
}
}

```

activity_main.xml和执行结果与前一种方法相同。



XML格式

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!-- Edited with XML Spy v2007 (http://www.altova.com) -->
<CATALOG>
  <PLANT>
    <COMMON>Bloodroot</COMMON>
    <BOTANICAL>Sanguinaria canadensis</BOTANICAL>
    <ZONE>4</ZONE>
    <LIGHT>Mostly Shady</LIGHT>
    <PRICE>$2.44</PRICE>
    <AVAILABILITY>031599</AVAILABILITY>
  </PLANT>
  <PLANT>
    <COMMON>Columbine</COMMON>
    <BOTANICAL>Aquilegia canadensis</BOTANICAL>
    <ZONE>3</ZONE>
    <LIGHT>Mostly Shady</LIGHT>
    <PRICE>$9.37</PRICE>
    <AVAILABILITY>030699</AVAILABILITY>
  </PLANT>
</CATALOG>
```

[参考 解析](#)

XML解析举例:

在Assets文件夹中模拟创建XML文件

```
<students>
  <student>
    <name sex="man">小明</name>
    <nickName>明明</nickName>
  </student>
  <student>
    <name sex="woman">小红</name>
    <nickName>红红</nickName>
  </student>
  <student>
    <name sex="man">小亮</name>
    <nickName>亮亮</nickName>
  </student>
</students>
```

```

public class Student {
    private String name;
    private String sex;
    private String nickName;
    public String getName() {
        return name;
    }
    public void setName(String name) { this.name = name; }
    public String getSex() { return sex; }
    public void setSex(String sex) { this.sex = sex; }
    public String getNickName() { return nickName; }
    public void setNickName(String nickName) {
        this.nickName = nickName;
    }
    @Override
    public String toString() {
        return "Student{" +
            "name='" + name + '\'' +
            ", sex='" + sex + '\'' +
            ", nickName='" + nickName + '\'' +
            '}';
    }
}

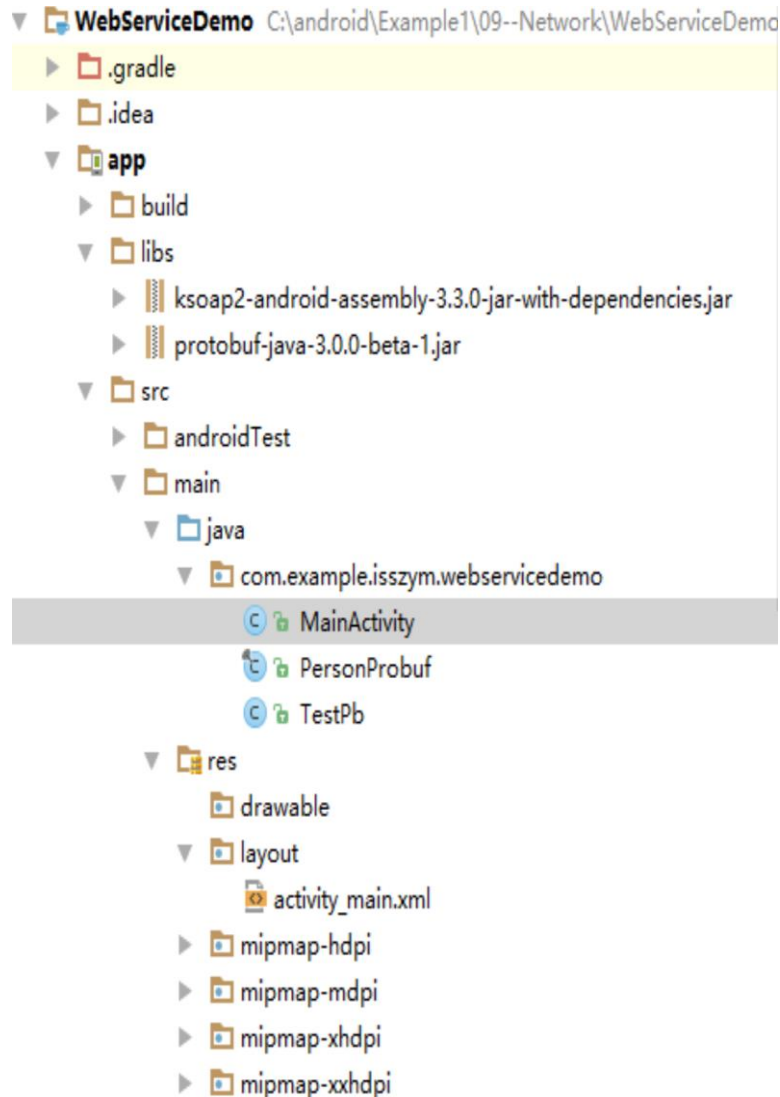
```

```

public List<Student> dom2xml(InputStream is) throws Exception {
    List<Student> list = new ArrayList<>();
    DocumentBuilderFactory factory = DocumentBuilderFactory.newInstance();
    DocumentBuilder builder = factory.newDocumentBuilder();
    Document document = builder.parse(is);
    NodeList studentList = document.getElementsByTagName("student");
    for (int i = 0; i < studentList.getLength(); i++) {
        Node node_student = studentList.item(i);
        NodeList childNodes = node_student.getChildNodes();
        Student student = new Student();
        for (int j = 0; j < childNodes.getLength(); j++) {
            Node childNode = childNodes.item(j);
            if ("name".equals(childNode.getNodeName())) {
                String name = childNode.getTextContent();
                student.setName(name);
                NamedNodeMap nnm = childNode.getAttributes();
                Node n = nnm.item(0);
                student.setSex(n.getTextContent());
            } else if ("nickName".equals(childNode.getNodeName())) {
                String nickName = childNode.getTextContent();
                student.setNickName(nickName);
            }
        }
        list.add(student);
    }
    return list;
}

```

获取天气预报



SOAP格式

- SOAP(Simple Object Access Protocol)是一种信息传递协议，与HTTP协议一起可以用于远程程序调用（RPC），提供WebService。


```
package com.example.isszym.webservedemo;

import org.ksoap2.SoapEnvelope;
import org.ksoap2.serialization.SoapObject;
import org.ksoap2.serialization.SoapPrimitive;
import org.ksoap2.serialization.SoapSerializationEnvelope;
import org.ksoap2.transport.HttpTransportSE;
import org.w3c.dom.Document;
import org.w3c.dom.Node;
import org.w3c.dom.NodeList;

import java.io.BufferedReader;
import java.io.InputStream;
import java.io.InputStreamReader;
import java.io.OutputStream;
import java.io.OutputStreamWriter;
import java.net.HttpURLConnection;
import java.net.URL;
import java.net.URLConnection;

import javax.xml.parsers.DocumentBuilder;
import javax.xml.parsers.DocumentBuilderFactory;
```

```

public class MainActivity extends AppCompatActivity implements View.OnClickListener {
    private EditText edit_param;
    private TextView txt_result;
    private String result;
    //定义一个Handler用来更新页面:
    private Handler handler = new Handler() {
        public void handleMessage(Message msg) {
            switch (msg.what) {
                case 0x001:
                    txt_result.setText("结果显示: \n" + result);
                    Toast.makeText(MainActivity.this, "获取信息成功", Toast.LENGTH_SHORT).show();
                    break;
                case 0x002:
                    txt_result.setText("结果显示: \n" + result);
                    Toast.makeText(MainActivity.this, "获取信息成功", Toast.LENGTH_SHORT).show();
                    break;
            }
        }
    };
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);        setContentView(R.layout.activity_main);
        edit_param = (EditText) findViewById(R.id.edit_param);
        txt_result = (TextView) findViewById(R.id.txt_result);
        Button btn_query_xml_weather = (Button) findViewById(R.id.btn_query_xml_weather);
        ...
        btn_query_xml_weather.setOnClickListener(this);
        btn_query_json_weather.setOnClickListener(this);
        btn_query_soap_weather.setOnClickListener(this);
        btn_post_web_server.setOnClickListener(this);
        btn_protobuf.setOnClickListener(this);
    }
}

```

```

@Override
public void onClick(View v) {
    final String sss=edit_param.getText().toString();//北京
    switch (v.getId()) {
        case R.id. btn_query_xml_weather:
            new Thread() {
                @Override
                public void run() {
                    try {
                        result = getXmlWeather("北京");
                        handler.sendMessage(0x001);
                    } catch (Exception ex) {
                        ex.printStackTrace();
                    }
                }
            }.start();
            break;
        case R.id. btn_query_json_weather:
            new Thread() {
                @Override
                public void run() {
                    try {
                        result = getJsonWeather("北京");
                        System.out.print(result);
                        handler.sendMessage(0x001);
                    } catch (Exception ex) {
                        ex.printStackTrace();
                    }
                }
            }.start();
            break;
    }
}

```

```

case R.id. btn_query_soap_weather:
    new Thread() {
        @Override
        public void run() {
            try {
                result = getSoapWeather("北京");
                System.out.print(result);
                handler.sendMessage(0x001);
            } catch (Exception ex) {
                ex.printStackTrace();
            }
        }
    }.start();
    break;

```

```

case R.id. btn_post_web_server:
    new Thread(new Runnable() {
        public void run() {
            try {
                result = postToWebServer();
                System.out.print(result);
                handler.sendMessage(0x001);
            } catch (Exception ex) {
                ex.printStackTrace();
            }
        }
    }).start();
    break;

```

```

        case R.id.btn_protobuf:
            new Thread() {
                @Override
                public void run() {
                    try {
                        result=TestPb.getProtoBufString();
                        System.out.print(result);
                        handler.sendMessage(0x001);
                    } catch (Exception ex) {
                        ex.printStackTrace();
                    }
                }
            }.start();
            break;
    }
}

static String getInputStreamText(InputStream is) throws Exception {
    InputStreamReader isr = new InputStreamReader(is, "utf8");
    BufferedReader br = new BufferedReader(isr);
    StringBuilder sb=new StringBuilder();
    String line;
    while ((line = br.readLine()) != null) {
        sb.append(line);
    }
    return sb.toString();
}

```

```
public String getJsonWeather(String city) throws Exception{
    String city1 = java.net.URLEncoder.encode(city, "utf-8");
    String apiUrl = String.format("https://www.sojson.com/open/api/weather/json.shtml?city=%s",
                                   city1);

    URL url= new URL(apiUrl);
    URLConnection open = url.openConnection();
    InputStream inputStream = open.getInputStream();
    return getInputStreamText(inputStream);
}
```

```
public String getXmlWeather(String city) throws Exception{
    String city1 = java.net.URLEncoder.encode(city, "utf-8");
    String apiUrl = String.format("https://www.sojson.com/open/api/weather/xml.shtml?city=%s",
                                   city1);

    URL url= new URL(apiUrl);
    URLConnection open = url.openConnection();
    InputStream inputStream = open.getInputStream();
    return getInputStreamText(inputStream);
}
```

```

public String getSoapWeather(String city) throws Exception{
    //soap协议 基于http
    String service_url = "http://ws.webxml.com.cn/WebServices/WeatherWS.asmx";
    String name_space = "http://WebXml.com.cn/";
    String method_name = "getWeather";    //具体请求的服务

    HttpTransportSE httpTransportSE = new HttpTransportSE(service_url);    //创建信封
    SoapSerializationEnvelope envelope = new SoapSerializationEnvelope(SoapEnvelope.VER11);
    SoapObject soapObject = new SoapObject(name_space, method_name);
    soapObject.addProperty("theCityCode", city);
    soapObject.addProperty("theUserID", "905f90f0788f41498a29affacc38d27c");
    envelope.bodyOut = soapObject;
    envelope.dotNet = true;    //设置跨语言的兼容性
    httpTransportSE.call(name_space + method_name, envelope);    //连接服务器并发送请求
    if (envelope.getResponse() == null) { //判断响应消息不为空, 如果为空就没有请求成功
        return "请求失败! ";
    }
    // SoapObject result = (SoapObject) envelope.getResponse();
    SoapObject result1 = (SoapObject) envelope.bodyIn;
    //int count = result.getPropertyCount();    //得到属性集的数量
    SoapObject subSoapObj = (SoapObject) result1.getProperty("getWeatherResult");
    String ss = "属性个数: " + subSoapObj.getPropertyCount();
    for (int i = 0; i < subSoapObj.getPropertyCount(); i++) {
        SoapPrimitive childResult = (SoapPrimitive) subSoapObj.getProperty(i);
        ss=ss+"    " + childResult.getName()+":"+childResult.getValue();
    }
    return ss;
}
}

```

```

public String postToWebServer() throws Exception {
    HttpURLConnection client = null;
    //    try {
        byte[] data = new String("name="
            +java.net.URLEncoder.encode("测试", "UTF-8")
            +"&age=27").getBytes("UTF-8");

        URL url =
            new URL("http://172.18.187.11:8080/jsp/getFromAndroid.jsp");
        client = (HttpURLConnection) url.openConnection();
        client.setRequestMethod("POST");
        client.setConnectTimeout(1500);
        client.setReadTimeout(1500);
        client.setDoOutput(true);
        client.setDoInput(true);
        OutputStream out = client.getOutputStream();
        out.write(data);
        out.flush();
        out.close();
        //当调用getInputStream方法时才真正将请求体数据上传至服务器
        InputStream is = client.getInputStream();
        Log.d("TAG", client.getResponseCode()+""); //打印响应状态码, 200成功
        return getInputStreamText(is);
    }
}

```


ProtoBuf格式

msg.proto

```
option java_package = "com.example.isszym.webservicedemo";
option java_outer_classname = "PersonProbuf";
message Person {
  required string name = 1;
  required int32 id = 2;
  optional string email = 3;
  enum PhoneType {
    MOBILE = 0;
    HOME = 1;
    WORK = 2;
  }
  message PhoneNumber {
    required string number = 1;
    optional PhoneType type = 2 [default = HOME];
  }
  repeated PhoneNumber phone = 4;
```

```

message CountryInfo {
    required string name = 1;
    required string code = 2;
    optional int32 number = 3;
}
}
message AddressBook {
    repeated Person person = 1;
}

```

```

C:>protoc --java_out=./src ./msg.proto
C:>java -cp ./protobuf-java-3.0.0-beta-1.jar TestPb
TestName, kkk@email.com
1311111111
0111111
[B@65b54208

```

PersonProbuf.class

xcu > proto > src > com > example > isszym > webservicedemo

名称	修改日期	类型	大小
 PersonProbuf.java	2018/6/20 10:59	JAVA 文件	114 KB

```
import com.google.protobuf.InvalidProtocolBufferException;
import com.example.isszym.webservicedemo.PersonProbuf;
import com.example.isszym.webservicedemo.PersonProbuf.Person;
import com.example.isszym.webservicedemo.PersonProbuf.Person.PhoneNumber;

public class TestPb {
    public static String getProtoBufString() {
        // TODO Auto-generated method stub
        PersonProbuf.Person.Builder builder = PersonProbuf.Person.newBuilder();
        builder.setEmail("kkk@email.com");
        builder.setId(1);
        builder.setName("TestName");
        builder.addPhone(PersonProbuf.Person.PhoneNumber.newBuilder()
            .setNumber("131111111").setType(PersonProbuf.Person.PhoneType.MOBILE));
        builder.addPhone(PersonProbuf.Person.PhoneNumber.newBuilder()
            .setNumber("011111").setType(PersonProbuf.Person.PhoneType.HOME));

        Person person = builder.build();
        byte[] buf = person.toByteArray();
        String res="";
    }
}
```

```

try {
    Person person2 = PersonProbuf.Person.parseFrom(buf);
    //System.out.println(person2.getName() + ", " + person2.getEmail());
    res=res+" name:" + person2.getName() + ", email:" + person2.getEmail();
    List<PhoneNumber> lstPhones = person2.getPhoneList();
    for (PhoneNumber phoneNumber : lstPhones) {
        // System.out.println(phoneNumber.getNumber());
        res=res+" phone#:" + phoneNumber.getNumber();
    }
} catch (InvalidProtocolBufferException e) {
    // TODO Auto-generated catch block
    e.printStackTrace();
}

return res;
//System.out.println(buf);

}

}

```