

PROGRAMMING HANDHELD SYSTEMS

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NETWORKING

TODAY'S TOPICS

NETWORKING

ANDROID NETWORKING CLASSES

PROCESSING HTTP RESPONSES

NETWORKING

EARLY HANDHELD DEVICES GAVE US MOBILITY

BUT WITH LIMITED CONNECTIVITY

TODAY'S DEVICES HAVE GREATER MOBILITY
AND CONNECTIVITY

MANY APPLICATIONS USE DATA AND SERVICES
VIA THE INTERNET

NETWORKING

ANDROID INCLUDES MULTIPLE NETWORKING
SUPPORT CLASSES, E.G.,

JAVA.NET – (SOCKET, URL)

ORG.APACHE – (HTTPREQUEST,
HTTPRESPONSE)

ANDROID.NET – (URI, ANDROIDHTTPCLIENT,
AUDIOSTREAM)

EXAMPLE APPLICATION

APPLICATION SENDS A REQUEST TO A
NETWORKED SERVER FOR EARTHQUAKE DATA
THEN DISPLAYS THE REQUESTED DATA

SENDING HTTP REQUESTS

Socket

HttpURLConnection

AndroidHttpClient





HTTPURLConnection

HIGHER-LEVEL THAN SOCKETS

LESS FLEXIBLE API THAN

HTTPANDROIDCLIENT



ANDROIDHTTPCLIENT

AN IMPLEMENTATION OF APACHE'S
DEFAULTHTTPCLIENT

BREAKS HTTP TRANSACTION INTO SEPARATE
REQUEST AND RESPONSE OBJECTS

PROCESSING HTTP RESPONSES

SEVERAL POPULAR FORMATS INCLUDING

JSON

XML

JAVASCRIPT OBJECT NOTATION (JSON)

INTENDED TO BE A LIGHTWEIGHT DATA
INTERCHANGE FORMAT

DATA PACKAGED IN TWO TYPES OF
STRUCTURES:

MAPS OF KEY/VALUE PAIRS

ORDERED LISTS OF VALUES

SEE: [HTTP://WWW.JSON.ORG/](http://www.json.org/)

EARTHQUAKE DATA (JSON OUTPUT)

[http://api.geonames.org/earthquakesJSON?
north=44.1&south=-9.9&east=-22.4&west=55.
2&username=demo](http://api.geonames.org/earthquakesJSON?north=44.1&south=-9.9&east=-22.4&west=55.2&username=demo)

EARTHQUAKE DATA (JSON OUTPUT)

```
{"earthquakes": [  
  {"eqid": "c0001xgp", "magnitude": 8.8, "lng": 142.369,  
    "src": "us", "datetime": "2011-03-11 04:46:23", "depth":  
    24.4, "lat": 38.322}  
  {"eqid": "2007hear", "magnitude": 8.4, "lng": 101.3815,  
    "src": "us", "datetime": "2007-09-12 09:10:26", "depth":  
    30, "lat": -4.5172},  
  ...  
  {"eqid": "2010xkbv", "magnitude": 7.5, "lng": 91.9379,  
    "src": "us", "datetime": "2010-06-12 17:26:50", "depth":  
    35, "lat": 7.7477}  
]  
}
```



EXTENSIBLE MARKUP LANGUAGE (XML)

XML DOCUMENTS CAN CONTAIN MARKUP &
CONTENT

MARKUP ENCODES A DESCRIPTION OF THE
DOCUMENT'S STORAGE LAYOUT AND LOGICAL
STRUCTURE

CONTENT IS EVERYTHING ELSE

SEE [HTTP://WWW.W3.ORG/TR/XML](http://www.w3.org/TR/xml)

EARTHQUAKE DATA (XML)

[http://api.geonames.org/earthquakes?
north=44.1&south=-9.9&east=-22.4&
west=55.2& username=demo](http://api.geonames.org/earthquakes?north=44.1&south=-9.9&east=-22.4&west=55.2&username=demo)

EARTHQUAKE DATA (XML)

```
<geonames>
  <earthquake>
    <src>us</src>
    <eqid>c0001xgp</eqid>
    <datetime>2011-03-11 04:46:23</datetime>
    <lat>38.322</lat>
    <lng>142.369</lng>
    <magnitude>8.8</magnitude>
    <depth>24.4</depth>
  </earthquake>
  ...
</geonames>
```

PARSING XML

SEVERAL TYPES OF PARSERS AVAILABLE

DOM – CONVERTS DOCUMENT INTO A TREE OF
NODES

SAX – STREAMING WITH APPLICATION
CALLBACKS

PULL – APPLICATION ITERATES OVER XML
ENTRIES

NEXT TIME

GRAPHICS & ANIMATION