

Analyzing XML Parsers Performance for Android Platform

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Abstract—As Internet communication technologies are growing up. XML are rising up as a popular way for data transfer and for exchange of data across the Internet. Now a day's choosing the right parser for a task is crucial and critical since improper parser will lead to degradation and effect in performance and productivity. In this paper we have done tedious extensive comparative study on various xml parsers available for Android Mobile Platform.

Keywords-XML Parser; SAX Parser; DOM Parser; PULL Parser; VTD-XML Parser; Android.

I. INTRODUCTION

XML stands for eXtensible Markup Language. It is a set of rules which goals to achieve generality, simplicity and usability over the Internet. XML is a powerful defacto standard which is mainly intended to store, data transfer and not for displaying purpose.XML important feature is allowing the user to create his/her own tags and his/her own document structure. It is a software and hardware independent tool focus mainly on store and data transfer.

The Present paper is classified mainly into 4 main sections. First Section Mainly focuses on the core technologies which we used it i.e. XML Parsers and Android Technology. Second Section explains about the Implementation details and Third Section through light on Comparison parameters with respect to Parsers and finally it concludes with the conclusion.

II. TECHNOLOGY OVERVIEW

In this section we describe about different XML Parsers used and Android Technology.

A. Overview of XML Parsers

Any XML [1] would not be able to perform its desired task before it has been parsed. As a new generation of Internet communication technologies are growing up XML Parser Technology has become significant in this matter. Generally parser is a small piece of program which takes input as data and creates a way for programs to use xml. It plays important role in reading, detecting its well formedness and validating the xml with the help of xml schema. There are three main parsers which are included in built-in android. Jar each parser has it own advantages and drawbacks. They are SAX, DOM and Pull Parser.

1 SAX Parser:-

SAX stands for Simple API for Xml. It provides a way of reading each unit of XML and creates an event that the calling program can use. This parser functions as a stream parser which is purely based on event-driven. It provides the user with number of call back methods. This are called

when an even occurs during the parsing mechanism. XML Text nodes, Element nodes etc are the events which are included in the SAX Parsing [2] mechanism.

2 DOM Parser:-

DOM stands for Document Object Model [3] is a standard model for parsing the xml document. Generally it is an application for validating XML Documents. It defines the logical structure of documents and the way a document is accessed and manipulated. It defines the objects and properties of all elements in xml and the methods to access them .It represents entire document in tree structure. It treats everything as a form of node and the real text is present in the form of text node.

3 PULL Parser:-

PULL [4] is stream based parser. The main motto towards the use of parser is to optimize the tasks. It treats every document as a series of items. It uses the iterator function to that process sequentially and traverses all the elements, attributes and data and exacts the information from the necessary node. It allows for writing all recursive-descent parsers.

4 VTD-XML Parser:-

VTD stands for Virtual Token Descriptor. It is innovative XML processing technologies centered on a non-extractive XML parsing technique. Depending on the way of perceptive it can be viewed in different ways like document centric parser, native xml indexer, and xml content modifier. It is also portable to custom hardware to achieve multi-Giga bit performance.

B. Android Technology

The three famous smart phone operating system in mobile application market are Android [6-9], Symbian and Microsoft Windows. In this section we compare them with parameters like

1 User Interface and Availability

User Interface is an interaction space between humans and device. The motto of interaction is effective operation and control of the device. Application Availability mainly deals with readiness of an application to handle requests and generate responses

OS	User Interface (On Scale Of 10)	Application Availability (On Scale Of 5)	Total
Android	9	4	13
Windows Phone	9	2	11
Symbian	7	2.5	9.5

Table1. Comparisons based on UI and Availability

2 Programming Languages

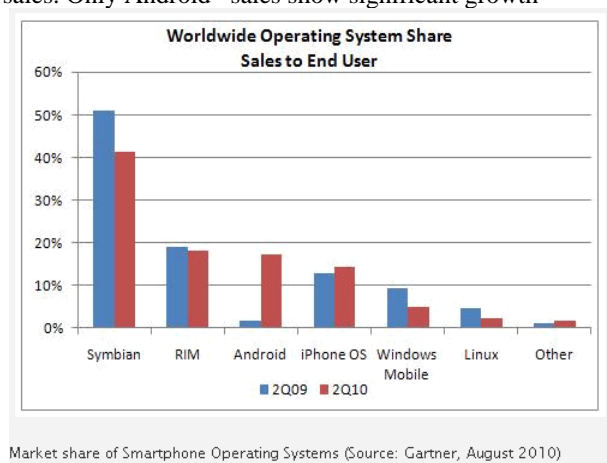
Symbian Applications are written using Java Me. We use .NET CF for Windows Mobile and Android Applications are primarily written in java and compiled into Dalvik executable format.

Parameter	Java Me	NET CF	Android
Packaging	Java Application Development (JAD) and Java Archive Files(JAR) files	Cabinet File Installers(CAB)	Android Package Files(APK)
Run Time Memory	Less Than 0.5 Mbytes	Approx 0.5 Mbytes	Minimum 32 Mbytes
Speed	Average	Average	Average
Debugger Availability	Excellent	Excellent	Integrated in Eclipse
Cross-Platform	Executes on Device Which Supports CLDC/MIDP	Windows Mobile, Symbian Devices (Need Tools)	Android Only
Learning Curve	Moderate	Average	Average
Current Version	3.0	3.5	3.0
Tools Used	Eclipse, Net Beans	Visual Studio	Eclipse, Net Beans
Core Language	Java	C#, Visual Basic .Net	Java

Table2. Comparisons for Java Me, .Net CF, Android

3 Numbers of Users

The Figure below is the North America Smart Phone unit sales. Only Android sales show significant growth



Market share of Smartphone Operating Systems (Source: Gartner, August 2010)

Figure1. Market Share for Various Mobile OS

III. IMPLEMENTATION TOOLS

In the present paper we developed front end application using eclipse and android sdk 2.2 and for working with VTD-XML Parser we included the vtd-xml.jar file.

IV. COMPARISONS

In this section we use to compare the four parsers with parameters. We use common xml file for all the four parsers in measuring the performance. Here we have file of 3 types i.e. small, medium and large. Small file contains 20 book records, Medium file contains 50 book records and large file contains 100 book records. Given is the sample xml file we used in this paper.

Sample XML File:-

```
<? xml version="1.0"?>
<Catalog List library name="xyz" college="VIT">
  <book id="book1">
    <author>Gambardella, Matthew</author>
    <title>XML Developer's Guide</title>
    <price>44.95</price>
  </book>
</Catalog List>
```

1 Included with Sdk

Generally sdk stands for Software Development Kit .Where as in android when we create android project Android.jar file is used by default. All the classes which are used for DOM, SAX and PULL Parsers are existed by default in Android.jar file. Where as to work with VTD-XML we have to include the vtd-xml.jar file.

	SAX	DOM	PULL	VTD-XML
Included With Sdk	Yes	Yes	Yes	No

Table3. Comparisons with Included with Sdk Parameter

2 Memory Usages

Memory refers to state of information stored in the computer. Now a memory usage plays a prominent role in defining the status of the parser. In SAX and PULL Parsers entire document is not loaded into the memory which leads to resulting in low memory consumption. In DOM Parser Entire tree loaded into parsed at one time memory. Whereas VTD-XML is a most memory-efficient (1.3x~1.5x the size of an XML document) random-access XML parser.

2 Edit/Save

Editing is a process of adding or deleting the content from the original data. SAX, PULL Parser doesn't support the editing of xml .Where as DOM, VTD-XML Parsers support this mechanism .Both has a separate class functions which does this task.

2.1 DOM:-

```
TransformerFactory tranFact=TransformerFactory.newInstance ();
Transformer tranfor = tranFact.newTransformer ();
Source src=new DOMSource (element);
Result dest=new StreamResult (file);
Tranfor.transform (src, dest);
```

2.2 VTD-XML:-

```
VTDGen vg = new VTDGen ();
VTDNav vn = vg.getNav ();
FileOutputStream fos = new FileOutputStream (oldfilelocation);
fos.write(vn.getXML().getBytes()); fos.close ();
```

	SAX	DOM	PULL	VTD-XML
Edit/Save	No	Yes	No	Yes

Table4. Comparisons with Edit/Save Parameter

4 XPath Support

XPath is used for navigating through elements and attributes in an XML Document. XQuery and XPointer are both built on XPath Expressions. It is generally used to query the language for selecting the nodes from the document.

	SAX	DOM	PULL	VTD-XML
XPath	No	Yes	No	Yes

Table5. Comparisons with XPath Parameter

5 Read/Write

Read and Write Operations are the two basic operations when we are dealing with xml. All the Parsers support default read operation. Whereas DOM and VTD-XML Parsers support for Write Operation.

	SAX	DOM	PULL	VTD-XML
Read	Yes	Yes	Yes	Yes
Write	No	Yes	No	Yes

Table6. Comparisons with Edit/Save Parameter

6 Time

In the present generation time parameter deciding factor for the application. In the present paper time taken for parsing is measured for all parsers over 3 types of xml file sizes.

4.1 Small File

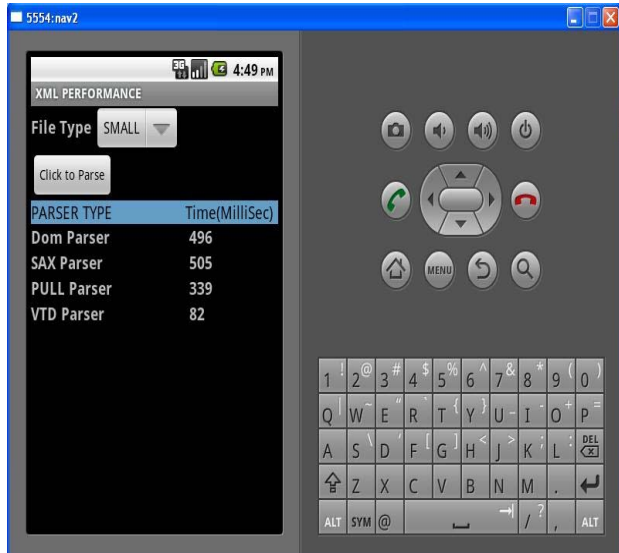


Figure2. Results of XML Parser Performance for Small File

4.2 Medium Xml File



Figure3. Results of XML Parser Performance for Med File

4.3 Large Xml File

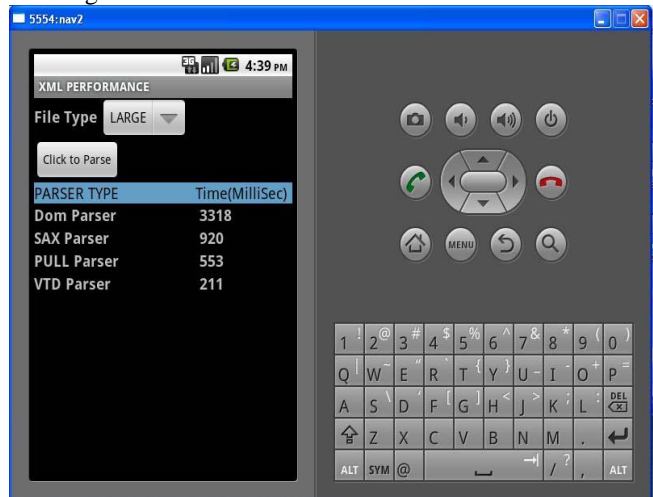


Figure4. Results of XML Parser Performance for Large File

4.4 Graph

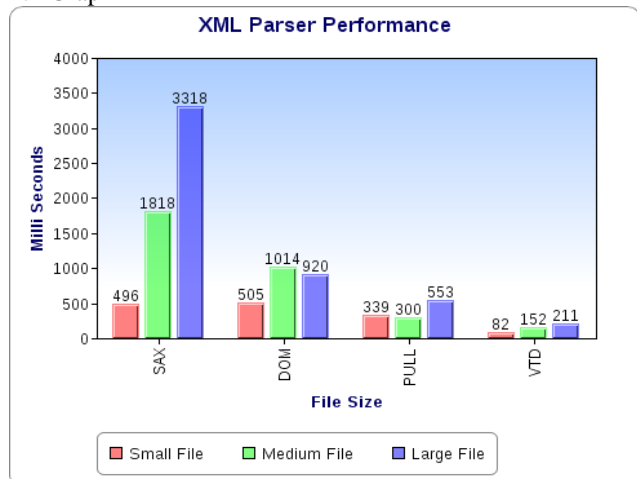


Figure5. Graph on XML Parser Performance

V. CONCLUSION

There have been a handful of studies and researches towards XML parsers. Nevertheless, most of them are not up to date. As XML parser is a technology, which is changing rapidly for the moment, there is no single study or research that would valid forever.

The result of the study indicates that VTD-XML Parser has been the best parser in terms of performance. VTD-XML has outperformed in terms of supporting large-scale of dataset efficiently. Nevertheless, performance is not the only criteria; there are lots of factors to be considered when choosing XML parser, such as organization's need, API support, platforms and license.

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