Chapter 2

Current approaches to SOAP optimization

2.1 Introduction

In the previous chapter an introduction was given about the SOAP message and the importance of reducing its size to increase the performance. It also introduced about the context based communication method which has been inspired by the human communication. This chapter presents the literature survey carried out about the current approaches taken by some other people to optimize web-services. Even though there is no research done with AI based approach to improve the web-services there are several researches that are being carried out in this area to increase the performance of web services. Some researches have been carried out for a specific domain and some in a more general context.

2.2 Static context based approach

Sangyoon Oh and his colleagues have presented the Handheld Flexible Representation (HHFR) [26] on their paper which claims to optimize the SOAP communication. On their paper they have stated that the performance and efficiency of web service messaging can be greatly improved by removing redundant parts of SOAP message. They have compared the existing compression methods available for reduction of SOAP message size. The compression methods they have compared like XMill [13] and GZip [21] will require more processing power than which is available on mobile devices. Therefore they have rejected those compression methods as the solution for optimizing problem. Instead they have proposed a method based on context aware communication to reduce the SOAP message being transferred. On their method of SOAP optimization they use a Context-store [26]. This static store contains set of common SOAP message elements frequently transferred among devices and then use the existing store instead of transferring the same content over and over again. It appears that it has not been considered dynamically identifying the context patterns that are to be stored during their research. It may be because of fewer resources available on mobile devices or it may be not required for mobile devices

because most of the time the messages transferred between mobile devices are pre-defined. The web-service messages transferred on mobile devices are totally based on the applications installed on those mobile devices and most of the time mobile devices contain only a small number of such applications. Therefore it may be sufficient to use a static content store on the mobile devices but when it comes to personal computers or servers it will not. Because those are general purpose computers and can be used to run any kind of application. The messaging of the applications may also change from time to time depending on the enhancements done to the web service application.

2.3 Differential parsing based approach

Nayef AbuGhazaleh and his colleagues have published two research papers on optimizing SOAP communication based on optimizing the object to message serialization process and optimizing the message to object deserialization process. A method of optimizing the SOAP communication by reducing the effort to put on de-serializing the message into Objects is discussed by Nayef AbuGhazaleh and Michael J. Lewis on their research [20]. They have used their previous research work [19] and introduced the Differential Deserialization (DDS) [20] method as the solution. They have compared the current existing methods of XML parsing including Document Object Model (DOM) [31], Simple API for XML (SAX) [4] and XML Pull Parser (XPP) [14]. They have concluded the comparison stating that all those three passers require a two stage parsing. They introduce their parser which they have named bSOAP[20] and it has two modes of operations namely “fast mode” and “regular mode”. Checksum is used to switch between two modes and to calculate the checksum checkpoints are used. Nine states are saved in each checkpoint. This research has also proven that it is possible to increase the SOAP communication performance by avoiding the repeating operations on de-serializing messages.

2.4 Comparison of encoders

Christian Werner and his colleagues have presented their paper based on a research done about the encoders for web service messages [3]. On their paper they have compared the text based compression techniques and XML based compression techniques. When it is required to do a change to the transmitting XML document it is

better to use XML based compression technique over text based compression because when text based compression is used it is required to decompress the entire document and then do the change. They have stated that transmitting of the coding table on the compressed message is a disadvantage of these compression techniques. They have presented the differential SOAP compression method [3] as a solution to reduce the SOAP message being transferred. Because the web services are session less, they have used the WSDL as the skeleton to do the differential calculation. It appears that this method of encoding will not recognize the commonly transmitted dataset as the skeleton.

2.5 Network adaptable middleware

Shahra Ghandeharizadeh and his colleagues have presented A Network Adaptable Middleware (NAM) to enhance the response time of web services [27]. In their research they have mainly focused on reducing the response time. For that they have considered the message transfer time as well as the message compression and decompression time at the client and server machines. To compare the performance of compression techniques they have used the TPC-H benchmark [23] and from that they have found that XMill [9] yields more compact messages when compared with Zip for messages larger than 1 KB. But XMill is more time consuming than Zip. NAM [27] still uses these two compression methods as well as uncompressed SOAP messages depending on the network conditions. It appears that instead of introducing new method of compression, they have introduced a system to use existing compressions such that the total time of transmission will be less.

2.6 Problem in brief

Because of the redundant elements of the SOAP message the size of it become larger. But because of this extra size it takes more time to transfer the message through the internet.

2.7 Summary

This chapter presented some of the current approaches used to optimize the web service communication in detail. Some of the research works mentioned above are trying to use compression techniques such as GZip, Xmill to compress the message.

This method reduces the length of the message but do not use any pre-knowledge of the message. Therefore the final output contains all the information required to re-build the original message. Also the compressed output will be in binary format. This method will be a disadvantage when communication through internet, especially when routers are configured to allow text based messages. Also there are researches carried out on context based communication using static context stores. For the mobile domain on which the research is done it is perfectly acceptable. By using the static context store they have reduced the message size that should be transferred through mobile network. But for general purpose web-service applications it is not possible to rely on static context store because the data is dynamic.

In next chapter it will be discussed about the genetic algorithms and about the multi agent systems basically focused on the multi agent negotiation.