



IBM Software Group

IBM® WebSphere® Application Server V6.1 Feature Pack for Web Services

SOAP message transmission optimization mechanism



@business on demand.

© 2007 IBM Corporation
Updated August 6, 2007

This presentation will provide an overview of the SOAP Message Transmission Optimization Mechanism technologies provided by the Feature Pack for Web Services.

Agenda

- SOAP message transmission optimization mechanism (MTOM)
- Problem determination



This presentation will explain the SOAP Message Transmission Optimization Mechanism support in the Feature Pack for Web Services, and explain problem determination for this component.

Section

SOAP message transmission optimization mechanism

This section will provide an overview of the SOAP Message Transmission Optimization Mechanism.

MTOM

- SOAP message transmission optimization mechanism is a specification that focuses on optimizing binary attachments
 - ▶ A W3C recommendation
 - ▶ Has both SOAP 1.1 and 1.2 bindings
- The format of an MTOM optimized message is the same as a SOAP with attachments message



MTOM is a specification to define an optimized way to attach binary data to a SOAP message, with support for both SOAP 1.1 and 1.2 bindings. MTOM uses the XML-binary Optimized Packaging or XOP to transmit binary data. Other methods of attaching the binary data have included encoding the data using base64encoding or referencing it with a URL. MTOM messages are compatible with SAAJ messages allowing for backward compatibility.

Traditional approaches

- Two options for dealing with data in XML
- By value
 - ▶ Embeds data, after encoding, as an element or attribute content of the XML
 - ▶ Gives applications the ability to process and describe data based only on the XML
- By reference
 - ▶ Attaches pure binary data as external, unparsed entities outside of the XML document
 - ▶ Embeds reference URIs to those entities as elements or attribute values
 - ▶ Minimizes the amount of data and prevents wasting processing power
 - ▶ Heavy reliance on DTDs impedes modularity and use of XML namespaces

Traditional approaches have been either “by value” or “by reference”. To understand “by value”, XML supports opaque data as content through the use of either base64 or hexadecimal text encoding. Both these techniques bloat the size of the data. For UTF-8 underlying text encoding, base64 encoding increases the size of the binary data by a factor of 1.33x the original size, while hexadecimal encoding expands data by a factor of 2x. Above factors will be doubled if UTF-16 text encoding is used. Also of concern is the overhead in processing costs (both real and perceived) for these formats, especially when decoding back into raw binary. Alternatively, there were several specifications introduced in the Web services world to deal with this binary attachment problem using the “by reference” technique. SOAP with Attachments is one such example. Since SOAP prohibits document type declarations in messages, this leads to the problem of not representing data as part of the message information set, creating two data models. This scenario is like sending attachments with an e-mail message. Even though those attachments are related to the message content they are not inside the message.

MTOM notes

- WebSphere Application Server streams attachments to disk at 100k
- With small payloads it is faster to inline the binary data
- To enable server-side (for responses) – usage of a binding type annotation is required
SOAP11HTTP_MTOM_BINDING or SOAP12HTTP_MTOM_BINDING
@WebService
@BindingType (SOAPBinding.SOAP12HTTP_MTOM_BINDING)
- Client-side
 - ▶ On client side, get the binding provider through
getBindingProvider.getBinding()
cast to SOAPBinding, and issue setMtomEnabled()

6

SOAP message transmission optimization mechanism

© 2007 IBM Corporation

The Feature Pack for Web Services will keep the attachments in memory unless they are larger than 100k in which case they will be streamed to disk. This can result in odd performance behavior for an application that handles attachments around 100k, as some may be streamed to disk and others may not. With smaller attachment payloads, under 5k, it can be faster to inline the binary data in the message, rather than using an attachment.

In the Feature Pack for Web Services, MTOM is enabled in the Web Service by an annotation specifying the binding type (either SOAP11HTTP_MTOM_BINDING or SOAP12HTTP_MTOM_BINDING). On the client side, it is enabled using an API call.

Section

Problem determination

The next section will explain problem determination for the MTOM technologies.

MTOM problem determination

- Problems **reported by** the code associated with MTOM are frequently data model related
- The data model is streamed through the various components (axis2, jaxws, sandesha, security, and WebSphere Application Server)
- Therefore, the best approach is to use several trace strings:
com.ibm.xml.xlsp.*=all, org.apache.*=all com.ibm.ws.webservices.*=all
com.ibm.ws.websvcs.*=all
 - ▶ open source tracing may be disappointing (that is insufficient trace points)
- Prior to determining the trace string, try to determine if the problem is client or server related. This may not be obvious, for example.:
 - ▶ an exception may occur on the server, but the server is responding to invalid information from the client
 - ▶ client may report exception but exception is really occurring on server due to some internal error happening on service side
- Using tcpmon to collect message traces is extremely useful

8

SOAP message transmission optimization mechanism

© 2007 IBM Corporation

Most problems related to MTOM will be related to the Data Model or form of the SOAP message. Some issues may also be encountered due to extremely large attachments being sent. Since the data is streamed through numerous components it is best to use multiple trace strings, capturing data for each of those components. Prior to running the trace, it is good practice to determine if the problem is specific to the client or service provider. Using a TCP monitor to view the SOAP message can help to determine where the problem originates.

Section

Summary

Now for a summary of the information from this presentation.

Summary

- IBM WebSphere Application Server V6.1 Feature Pack for Web Services supports:
 - ▶ MTOM
 - ▶ JAX-WS
 - ▶ JAXB
- Problem determination



In addition to introducing JAX-WS and JAXB technologies, IBM WebSphere Application Server V6.1 Feature Pack for Web Services supports the message transmission optimization mechanism, an attachment technology for binary data. This presentation has given some high level information on these technologies and some guidance for problem determination related to the MTOM technologies.

Feedback

Your feedback is valuable

You can help improve the quality of IBM Education Assistant content to better meet your needs by providing feedback.

- Did you find this module useful?
- Did it help you solve a problem or answer a question?
- Do you have suggestions for improvements?

Click to send e-mail feedback:

mailto:iea@us.ibm.com?subject= Feedback about WASv61_WSFP_MTOM.ppt



You can help improve the quality of IBM Education Assistant content by providing feedback.

Trademarks, copyrights, and disclaimers

The following terms are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM WebSphere

Product data has been reviewed for accuracy as of the date of initial publication. Product data is subject to change without notice. This document could include technical inaccuracies or typographical errors. IBM may make improvements or changes in the products or programs described herein at any time without notice. Any statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business. Any reference to an IBM Program Product in this document is not intended to state or imply that only that program product may be used. Any functionally equivalent program, that does not infringe IBM's intellectual property rights, may be used instead.

Information is provided "AS IS" without warranty of any kind. THE INFORMATION PROVIDED IN THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER EXPRESS OR IMPLIED. IBM EXPRESSLY DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT. IBM shall have no responsibility to update this information. IBM products are warranted, if at all, according to the terms and conditions of the agreements (for example, IBM Customer Agreement, Statement of Limited Warranty, International Program License Agreement, etc.) under which they are provided. Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products.

IBM makes no representations or warranties, express or implied, regarding non-IBM products and services.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents or copyrights. Inquiries regarding patent or copyright licenses should be made, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput or performance improvements equivalent to the ratios stated here.

© Copyright International Business Machines Corporation 2007. All rights reserved.

Note to U.S. Government Users - Documentation related to restricted rights-Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract and IBM Corp.

