DYNAMIC WEB SERVICE INVOCATION

By

Zhitong Zhao

Thesis

Presented to the Faculty of Graduate School of
in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

Texas State University – San Marcos
December 2005
The Thesis Committee for ZHITONG ZHAO
certifies that this is the approved version of the following thesis:

DYNAMIC WEB SERVICE INVOCATION

Committee:

___________________________
Dr. Anne Hee Hiong Ngu, Supervisor

___________________________
Dr. Xiao Chen

___________________________
Dr. Greg Hall

Approved:

_____________________________
J. Michael Willoughby
Dean of the Graduate College
Acknowledgments

Many people have contributed, directly or indirectly, to the successful completion of this thesis. They will all be remembered in my heart. I would like to thank the follow:

First, I would like to thank my advisor, Dr. Anne Hee Hiong Ngu for her excellent guidance from conducting the research to writing the thesis. I really appreciate the patience and respect that she has given me.

Second, I am extremely grateful to other my thesis committee members, Dr. Xiao Chen and Dr. Greg Hall, for being a great source of advice.

Finally, I would like to say “Thank you!” to my parents, Dr. Jianai Zhao, and Mrs. Jiaru Wang, for their constant helps and encourages during my thesis writing period, and Grace Chen, for her comforting and encouraging me during my stressful time.

Zhitong Zhao

Texas State University-San Marcos

December 2005
Contents

Acknowledgments ........................................................................................................ iv
List of Figure ................................................................................................................ vii
List of Table .................................................................................................................. viii
Abstract ........................................................................................................................ ix
1. INTRODUCTION ...................................................................................................... 1
Current Stage of the Web Service .................................................................................. 2
The Challenges of the SOA .......................................................................................... 6
Motivation ...................................................................................................................... 10
The proposed solution ................................................................................................. 12
Thesis Structure ........................................................................................................... 13
2. THE RELATED WORKS .......................................................................................... 14
Background .................................................................................................................. 14
Static Invocation .......................................................................................................... 15
Dynamic Invocation ...................................................................................................... 16
Current Research Prototypes ....................................................................................... 17
Web Service Invocation Framework (WSIF) ............................................................... 17
Web Service Adapter .................................................................................................. 20
The DynWsLib .............................................................................................................. 25
Summary ...................................................................................................................... 26
3. THE DYNAMIC WEB SERVICE INVOCATION FRAMEWORK.......................... 27
The Goals of DWSIF .................................................................................................... 27
Maintainability ............................................................................................................. 27
Reliability ..................................................................................................................... 29
Performance ............................................................................................................... 30
The DWSIF Architecture .............................................................................................. 31
Dynamic Invoker ........................................................................................................ 33
Caching ......................................................................................................................... 33
Registry ......................................................................................................................... 34
List of Figures
List of Tables
With the relentless growth in Internet functionality, distributed computing systems have attracted more and more attention in the Information Technology world. This has resulted in recent standardization effort of distributed computing architecture, which is known as Service Oriented Architecture (SOA). The Web Service is the centerpiece of this architecture. Some of the key challenges in implementing the SOA architecture are maintainability, reliability, and security.

In this thesis, we propose to use dynamic Web service invocation method to address maintainability and reliability issues without sacrificing the overall system performance. To achieve our goals, we proposed and implemented a Dynamic Web Service Invocation Framework (DWSIF). The dynamic invocation of Web services allows both service providers and service consumers to remain autonomous and maintain the loosely coupled relationship without sacrificing the performance.

Through a series of experiments and objective evaluations, we have shown that the dynamic web service invocation can serve its client better than static invocation, particularly in maintainability and reliability.