

AI Planning for Automating Web Service Composition in Tourism Domain

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Abstract

Web services are changing the way how online business operates, especially in tourism domain. Typically, existing Web services are built individually as atomic services. The rapid growth of Web services has created the need for Web service composition so that clients can compose atomic services to achieve more complex tasks. Thus, to ease the process, automation is important. Automation means that the service composition is done with less or no user interference. Hence, we propose a framework to automatically compose Web services using SHOP2 planner. SHOP2 is a planner that implements AI planning technique, called Hierarchical Task Network (HTN). We propose and implement a framework to compose services available from the Australian Tourism Data Warehouse (ATDW) and present the example execution results. We also outline some drawbacks of our approach, identify open problems, and suggest future work to improve the framework.

Keywords: Web service composition, automatic composition, AI planning, SHOP2, ATDW

CR Categories: D.1.3, D.1.6, D.1.5, I.2.8

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In memory of Jimmy, Timmy, and Abu.

Contents

Abstract	ii
Acknowledgements	iii
1 Introduction	1
1.1 Problem Definition and Motivation	1
1.2 Overview	3
2 Web Service Composition: Techniques and Tools	4
2.1 Introduction to Web Services	4
2.2 Web Service with Semantics	6
2.3 Web Service Composition Framework	7
2.4 Discussion on the Framework	8
2.5 Web Service Composition Tools using Workflow	9
2.5.1 Service Composition and Execution Tool (SCET)	10
2.5.2 Adaptive and Dynamic Composition with eFlow	10
2.6 Web Service Composition using AI Planning	11
2.6.1 Rule-Based Composition—SWORD	12
2.6.2 Hierarchical Task Network based Composition—SHOP2	13
2.7 Summary	14
3 Web Service Composition Using SHOP2 Planner	15
3.1 Australian Tourism Data Warehouse (ATDW)	15
3.1.1 ATWS Request	16
3.1.2 ATWS Response	17
3.1.3 SOAP Messages for ATDW Request and Response	17
3.2 SHOP2: The Technical Details	19

3.3	Case Study: Visiting Perth	22
3.4	The Design of the Framework	22
3.5	Summary	24
4	The Implementation	25
4.1	WSDL Description of ATDW	25
4.2	Inside SHOP2: The HTN Planning	28
4.3	The Implementation in Details	31
4.4	Summary	34
5	Example Execution Results	35
5.1	JSHOP Domain and Problem Definitions	35
5.2	parser1	36
5.3	The Web Service Client	37
5.4	parser2	39
5.5	Summary	41
6	Conclusion and Future Work	42
6.1	Conclusion	42
6.2	Future Work and Open Problems	43
6.2.1	Industry Implementation of Web Services	43
6.2.2	AI Planning: The SHOP2 Planner	43
6.2.3	World-Altering vs. Information-Providing Web Services . .	45
6.2.4	The Implementation of Other Web Services	45
A	Original Honours Proposal	46
A.1	Background	46
A.1.1	Web Service Composition	46
A.1.2	AI Planning	47
A.1.3	Problems and Motivations	47
A.2	Research Aim	48
A.3	Methodology	48

A.4 Research Timeline	49
B Glossary	50
C ATDW's SOAP Request and Response Messages	53
D The WSDL File and ATDW Response	55
E SHOP2 Domain and Problem Definitions	57
E.1 Domain Definition	57
E.2 Problem Definition	58
E.3 Alternative Domain Definition	59

List of Figures

2.1	The Web service architecture adapted from Gottschalk [14].	5
2.2	Web service composition framework [24].	7
2.3	The modified Web service composition framework.	8
2.4	An example of a composite service in eFlow's process schema adapted from [11].	11
3.1	ATDW request and response as input and output.	17
3.2	The design of Web service composition architecture using SHOP2 and ATDW.	23
4.1	The components of WSDL [15].	26
4.2	An example of action decomposition for <i>Visiting Perth</i>	29
4.3	An example of total-order plans for <i>Visiting Perth</i>	31
4.4	The detailed design architecture of Web service composition using JSHOP.	32
5.1	The invocation of JSHOP using the command prompt.	36
5.2	The composition plan generated by JSHOP in a text file after the invocation.	36
5.3	The regular expression that is used as input to <code>parser1</code>	37
5.4	Stub communication model for Web Service Client (adapted from [26]).	39
5.5	Running <code>parser2</code> in command prompt and its output.	40

CHAPTER 1

Introduction

The Web is no longer only an information repository, but evolving towards a virtual environment for business process integration. This vision is realized by many of Web services available for interactive business purposes. A Web Service is a software system designed to support interoperable machine-to-machine interactions over the Web [9]. *Interoperable* means that Web services are operable and composable regardless of the programming languages, the platform, and the communication protocol used [13]. Online banking, flight booking, temperature control, hotel reservations, online bookshop, etc. are examples of Web services that are available and ready for client consumptions. Web service has created enormous industry commitment because of its potential for improving the way we do business online [39].

1.1 Problem Definition and Motivation

According to Gartner Inc. review [1, 17], a survey on 111 companies in the U.S. shows that 65% of the companies are already working on Web service projects or they are considering implementing the services very soon. According to the survey report, these companies still engaging in Web service projects despite the economic slowdown in 2003. The survey also estimated that \$3 billions worth of Web service projects have been carried out in 2003. By 2008, it will increase to \$15.8 billions. However, the developed Web services are individual, standalone services termed as atomic services. As the services grow rapidly on the Web, the clients' needs for achieving more complex tasks increase. Web service composition is seen as a new way of accessing or consuming the services online. Service composition is a powerful key promise of service-oriented programming paradigm. With service composition, not only can we consume a single atomic Web service, we can now integrate existing services together to perform more complex tasks. One of the most promising domain for such integration is in tourism, where we already have access to many Web services. For example, flight booking,

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