AI Planning for Automating Web Service Composition in Tourism Domain

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This report is submitted as partial fulfilment of the requirements for the Honours Programme of the School of Computer Science and Software Engineering, The University of Western Australia, 2005

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

Acknowledgements

Thank you God for all the blessings.

I would like to thank Dr Wei Liu for her continuous support and guidance during the research period. Without her help, this research will not have been materialized. Thanks also to the Australian Tourism Data Warehouse (ATDW) for the permission to access and consume the services provided. I would also like to thank my family and Suhairizam Omar for their love and endless motivational and emotional support throughout the year. Finally, thank you also to my friends for all the help and encouragement.

In memory of Jimmy, Timmy, and Abu.

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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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