Web Service Composition Using Knowledge-Based Planning Systems

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1 Problem definition

Nowadays software architecture tends to focus on building platform-independent software components, called Web services (WS), that are available in a cloud environment[1]. Web applications are to be assembled from a set of appropriate Web services and no longer be developed from scratch. Artificial intelligence (AI) planning techniques can be applied to automate WS composition through means of threaten service composition as a planning problem.

This master thesis addresses the Web service composition using knowledge-based planning systems in AI and analyses its benefits for building complex Web applications, their intergrations and for supporting the business world.

2 Expected results

Current major knowledge-based planning techniques and systems which are suitable for WS composition should be discussed and evaluated. Through benchmarking the evaluation results an appropriate planning system should be chosen in implementation of a prototype system.

The prototype system under an assumption of a real world scenario should be implemented and demonstrated. Evaluation of prototype system will be given.

3 Methodological approach

Current and relevant literatures on WS composition and planning techniques will be reviewed. Gather knowledges about these two areas and understand how planning techniques could contribute to the advance of WS composition development.

For reviewing and evaluation of major knowledge-based planning techniques which are suitable to WS compositions issued literatures like [2,3,4] etc. will be discussed. Find out available planning tools for further use.

A real world scenario for WS composition will be defined and formalized. According to this scenario a suited planning technique and its corresponding planning tool will be selected for application usage.

The prototype Web application composed of simple Web services for demonstration purpose will leverage the selected planning tool to compose the services in a dynamic manner. The corresponding development tools should be open source softwares. After system implementation an evaluation and extension possibilities of it will be given in the end.
4 State of the art

WS could be especially useful for building dynamic e-business applications and to enable divergent Web technologies to interoperate with each other[5]. Due to the potential that enterprises tend to offer and consume their IT-Services via Web Services, the composition of WS should be automated so that the behaviour of Web applications can be changed dynamically and the development of these kind of applications can be done with ease. Rao and Su[6] presented various planning techniques like situation calculus, rule-based planning, theorem proving etc. which are currently available to WS composition. Vukovic and Robinson [2] also introduced two major planning tools: SHOP2[8] which is based on HTN planning and TLPlan[9] which is based on declarative search control for a possible composition implementation.

Nevertheless, because of the natures of real world scenarios, different planning techniques with their own pros and cons have to overcome issues like domain complexity, complex goals, incomplete information, non-deterministic behaviour etc.[7]

References