



Towards Creating Workflows On-the-Fly and Maintaining Them Using the Semantic Web: The sButler Project at Linköpings universitet

Nahid Shahmehri, Juha Takkinen, and Cécile Åberg {nahsh, juhta, cecab}@ida.liu.se
Department of Computer and Information Science, Linköpings universitet, SE-581 83 Linköping, Sweden

Motivation

- Web service market and **e-commerce** important for companies.
- The users of Web services (the customers):
 - 1) have **workflow** systems with tasks defined
 - 2) need support to **discover** Web services
 - 3) need help to **integrate** the use of Web services with the users' **workflow** systems.
- If **no** Web service exists that matches the task to be done in the users' workflows then:
 - 1) a **composition** of several **Web services** can fit the definition of the task.
 - 2) when a Web service **changes**, the composition needs to be **maintained** over time.

Goal

– Develop technology **Web service composition**.

Approach (see figure to the right)

- 1. Modelling language** to describe workflows and Web services, and reasoning about them, using Petri Nets.

Both workflows and network protocols can be described & simulated → Web services can be modeled both as **components** with protocols, and as **processes** with workflows to be composed.
- 2. sButler agents** to handle communication between user and providers of services.

sButlers **search** the Semantic Web and suggest one or more matching Web services to the user. They also keep the composition of services **up-to-date** with changes.
- 3. Network push-and-pull protocol** for communication between sButlers, and between sButlers and providers.

The protocol pushes information about Web service **changes**, and pulls **updates** of Web services as needed, with a minimum of network traffic.
- 4. Ontologies** to describe the user's requirements and changes in workflows and Web services.

Ontologies, and the Petri net, enable sButlers to **reason** about Web services and **workflows**, and also to bridge gap between users' and providers' understanding of tasks.

Abstract

We examine the modeling and instantiation of workflows based on Web services (services described in a rule-based language). The aim of the project, which is part of the Swedish Semantic Web initiative, is to create workflows on-the-fly and subsequently maintain them, that is, to support and maintain the relation between the workflows of companies/users and existing Web services/providers. Our sButler agent will manage workflows and Web services modeled as Petri Nets, use the language facilities provided by the Semantic Web, and employ a new push-and-pull protocol to handle communication with other sButlers.

sButler components

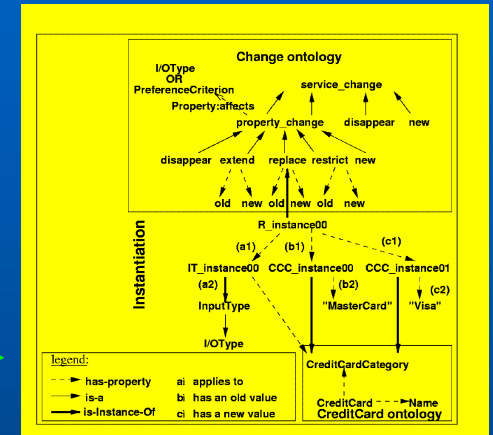
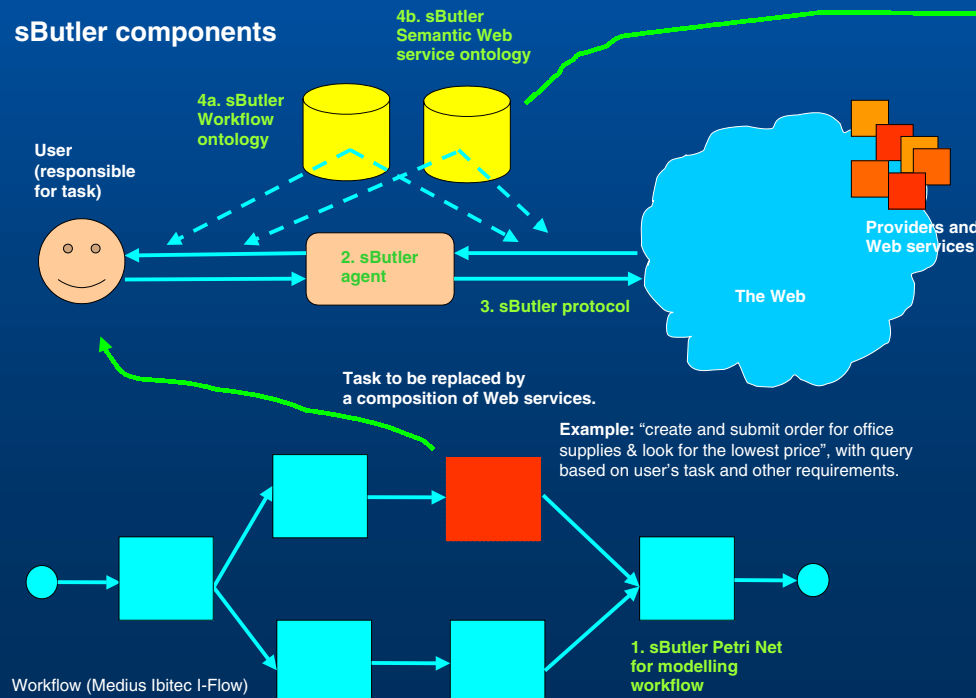


Figure above: An example use of the ontology for Web service changes, handling the change of a credit card type

Current status

The sButler project at Linköpings universitet includes the development of a base ontology for Web service workflows, a Web service workflow specification technique, and a Web service push-and-pull protocol.

We are currently implementing a prototype based on a standard platform and the usage of OWL-DL. In parallel we are analysing the design space of protocol specifications and workflow descriptions as compared to Petri Nets. For the network protocol we are looking at extending the Tacoma push-protocol to a push-and-pull protocol so as to handle information about Web service changes.

The project lasts until 2005.