

Demonstrationsprogramm

Improving Service Discovery through Enriched Service Descriptions

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Abstract:

The increasing popularity of the Software-as-a-Service and Cloud Computing trends has been among the main factors behind the *increasing number of public web services* in several domains, e.g., e-commerce, enterprise, education, government, etc. Moreover, the functionalities of such web services are becoming *more complex* due to the complexities of modern business needs and marketplaces. Additionally, it has been observed that service providers, who represent the single source of information about web services, typically release *poor service descriptions*.

Due to the aforementioned factors, service discovery has become one of the main challenges in Service-oriented Computing (SOC). In this demo, we show how to enrich service descriptions enabling enhanced service discovery. In our approach, web services are enriched with annotations (textual descriptions and tags) that are automatically extracted from the websites of their providers and from the analysis of their invocations.

1 Web Service Discovery

The problem of web service discovery is similar to looking for a needle in a haystack. Seeking the right service based on user's search criteria is still one of the main challenges in Service-oriented Computing (SOC). Typically, service descriptions released by service providers are used to perform service discovery. However, several factors exacerbate this challenge, such as the increasing number of public web services, their complex functionalities, and poor service descriptions. Further details on this problem and its related literature are provided in [AN10a].

In spite of their crucial role in SOC, researchers have identified several limitations in service descriptions. For instance, the "Internet of Services" (IoS) vision introduced the concept of *business services* [SAP09]. Business services represent an abstraction of the IT web services. Their requirements need much information about the considered services rather than the technical information provided by service providers in the form of service descriptions. In [SAP09], the authors state that "... there is definitely the need for more than the technical description of a web service interface".

To handle the challenge of poor service descriptions that are not suitable for service discovery, we use additional sources of information to enrich them. These sources are automatic

annotations based on the providers' websites and invocation analysis.

This demo is part of our Depot project [ACM⁺09, AN10b].

2 Enriching Service Descriptions

Enriched service descriptions have many benefits in SOC, e.g., enhanced service discovery. Several approaches have been proposed to enrich service descriptions. For instance, the Adaptive Service Grid (ASG) project¹ enables domain experts to enrich service descriptions with ontology annotations *manually*. In our approach, we enrich service descriptions automatically with two types of additional information, namely, service annotations and invocation analysis.

2.1 Annotating Web Services

Along with the technical service descriptions (published in service registries) that service providers release about their web services, they give additional textual descriptions (usually on their own websites) to explain their functionalities. Typically, such textual descriptions do not appear in their counterpart technical service descriptions. We developed a *focused crawler* to collect public web services from the Internet automatically [ACM⁺09]. Using only the collected technical service descriptions to perform service discovery was not efficient, because they are typically poor. To enhance service discovery, we introduced an *information parser* to extract additional information about the collected web services from the crawled websites [ANC10].

Two types of information are generated using our information parser, namely, textual annotations and tags. Text in a webpage that is close to a reference to a web service is extracted as an annotation to that web service. The entire content of a webpage where a web service is referenced is used to generate tags for that web service. These generated tags are then used to help service consumers browse web services through tag clouds.

2.2 Dynamic Tags via Invocation Analysis

Invocation analysis is an additional source of information about web services. This source is instance-based, where actual service invocations are used to generate tags for the invoked web services. In our approach, we consider dynamic data web services only, such as news, events, promotions and offers, etc. For such web services, dynamic tags are generated based on the analysis of their invocations [AN10a]. These tags are integrated with the tags generated by the information parser to provide a unified tag cloud.

¹ASG Project: <http://www.asg-platform.org>

3 Enhanced Service Discovery

Based on the enriched service descriptions, four types of service discovery are provided on our platform:

1. Browse by category: The increasing complexity of web services and their driving business needs makes finding “good” keywords for full-text search a difficult task. For such cases, we provide web service browsing based on categories. Collected web services are automatically classified in several application domains, e.g., education, finance, entertainment, etc. This classification is based on the enriched descriptions of web services.
2. Browse by tag cloud: For a quick way of exploring common web services, regardless of their providers or categories, we provide a tag cloud that enables service consumers to browse through common tags attached to web services. Part of these tags are automatically generated from websites of service providers during service crawling through the information parser. Additional dynamic tags are generated from invocation analysis of dynamic data web services.
3. Full-text search: This type requires basic knowledge in the application domain to choose “good” keywords, e.g., address normalization, credit card validation, etc. Figure 1 shows a screenshot of our search interface.
4. Browse by provider: This type of service exploration enables service consumers to find relevant web services from specific service providers. For instance, service consumers prefer to use web services from service providers with high reputation or well-known providers.

4 The Demonstration

Depot allows service providers to register their web services explicitly. Additionally, we allow service consumers to suggest web services by providing the URL of their provider. Depot crawls that URL, collects web services provided on that URL, extracts annotations for the collected web services from the same URL, and classifies them based on the extracted annotations. For a small website with a few HTML pages and a few web services, these steps take a couple of minutes.

In this demo, we show how Depot collects public web services released on a provided URL and annotates them. Based on these annotations, Depot derives classifications for these web services automatically. We show how service consumers can then browse web services based on their provider, category, tags, or annotations (keyword-based).

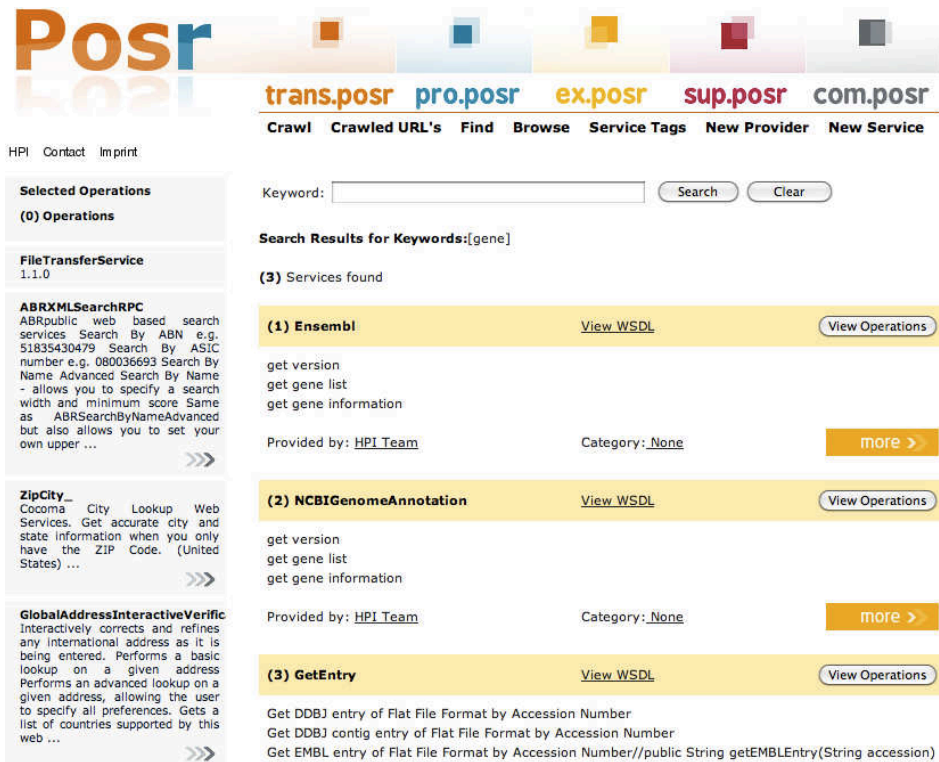


Figure 1: A screenshot of our full-text search interface. Available online at: <https://www.hpi.uni-potsdam.de/naumann/sites/servicedepot/>

References

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