

Chapter 8.5

Taxonomy and State of the Art of Service Discovery Mechanisms and Their Relation to the Cloud Computing Stack

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ABSTRACT

Service Discovery mechanisms are gaining interest in the last years due to the growing bulk of information available, especially to distributed computing infrastructures like Grids and Clouds. However a vast number of characteristics of these implementations exist, each one suitable for a number of purposes. The aim of this chapter is to extract a taxonomy of these characteristics found in modern Service Discovery systems and produce a categorization of existing implementations in a grouped and comparative way, based on these features. Furthermore, the mapping of these characteristics to the Cloud business model is produced, in order to assist in selecting the suitable solutions for each provider based on his/her location in the value chain or identify gaps in the existing implementations.

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INTRODUCTION

Locating resources in a large scale, heterogeneous network is a non-trivial task. There may be several providers, each one with different characteristics, thus offering a variety of different levels of user-requirement fitness. In order to allow awareness about the status and the availability of these resources, a Service Discovery (SD) mechanism must be installed. All Service Providers will require registering in such a mechanism, along with all the necessary information such as URL, rates, compatibility and interface, so that their services are advertised to the end user. The information service then makes all of these available to potential clients, by matchmaking the request with the available resources and returns back the results. A high-level overview of SD's generic architecture is illustrated in the following figure (Figure 1).

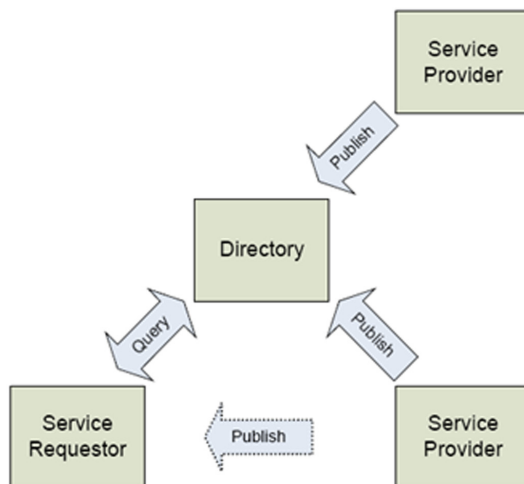
In the current model of distributed infrastructures, a number of different artifacts may be addressed. What needs to be discovered is services, their interfaces, resources and their interfaces and their matchmaking in order to produce added value.

During recent years, specific focus has been given to adding value to such mechanisms, through

adding functionality on top of this registry. This may refer to the way the registry mechanism is built, deployed or enriched, to more advanced protocol usage that enhances interoperability and management or the use of semantics and processing for increased functionality.

The basic aim of this chapter is to provide an in-depth presentation of the State of the Art with regard to Service Discovery systems and methodologies in distributed computing. This is combined with an identification of the most important characteristics of such systems, taxonomy of them based on the latter and comparison. Finally an identification of future trends will be pursued, in order to suggest which of the presented solutions show the higher perspective. The structure of this work is heavily based on the structure of Yu and Buyya (2005), which to the view of the authors is a model example of how to write taxonomies and surveys. In comparison to this, what is pursued is a specific focus on Service Discovery systems and not in general of workflow systems, an update on the state of the art and the enrichment and rearrangement of parts of the taxonomy that is presented in the former in order to include new advances and features.

Figure 1. Service Discovery Generic Architecture



TAXONOMY OF DIFFERENT DISCOVERY MECHANISM CHARACTERISTICS

Service Discovery mechanisms can be categorized according to a vast number of characteristics. These features may include their functionality, offered features or implementation differentiations.

The major categories that have been identified are:

Mechanism Structure

This feature regards the design and implementation of the entire service discovery mechanism. This

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