

Chapter 90

Social Networks and Web Services–Based Systems

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INTRODUCTION

Web services are paving the way for a new type of business applications. This can be noticed from the large number of standards and initiatives related to Web services (Margaria, 2007; Papazoglou et al., 2007; Yu et al., 2008), which tackle a variety of issues such as security, fault tolerance, and substitution. These issues hinder the automatic composition of Web services. Composition handles the situation of a user's request that cannot be satisfied by any single, available Web service, whereas a composite Web service obtained by combining available Web services may be used.

Despite the tremendous capabilities that empower Web services, they still lack some capabilities that would propel them to a higher level

of adoption by the IT community and make them compete with other integration middleware like CORBA and .Net. As a result, Web services adoption could be slowed down if some issues such as the complexity of their discovery are not properly addressed (Langdom, 2003). For this particular issue of discovery, we examine in this chapter the use of social networks (Ethier, visited in 2008; Wasserman and Glaskiewics, 1994). Such networks permit to establish between people relationships of different types like friendship, kinship, and conflict. These relationships are dynamic and, hence, adjusted over time depending on different factors like outcomes of previous interaction experiences, and natures of partners dealt with. Replacing people with Web services is doable since Web services constantly engage in different types of interaction sessions with users and peers as well (Manuel Serra da Cruz et al., 2003).

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The purpose of the discovery process is to find a suitable Web service for a given consumer's request. A consumer could be a user or another Web service. This process relies a lot on the Web Services Description Language (WSDL) documents that providers of Web services post on registries like Universal Description, Discovery and Integration (UDDI) and Electronic Business using eXtensible Markup Language (eXML). Unfortunately, the current registries still struggle with different limitations (e.g., lack of semantics, consistency, and security) despite the extensions that are reported in the literature. A social network could help address some of these limitations by making Web services for instance take into account the previous composition scenarios in which they took part, so they can establish relationships with the peers that were in these composition scenarios.

In this chapter we define a social network in the context of Web services and show how this network is built and then used to discover Web services. Different initiatives embrace social networks but a few examine Web services discovery.

BRIEF LITERATURE REVIEW

Social networks have been used in different domains ranging from social sciences to artificial intelligence and e-business. According to Ethier, "the study of social networks is important since it helps us to better understand how and why we interact with each other, as well as how technology can alter this interaction. The field of social network theory has grown considerably during the past few years as advanced computing technology has opened the door for new research" (Ethier, visited in 2008).

Generally, a network consists of nodes and edges. The nodes refer to any type of object or entity like individuals or organizations, and the edges refer to relationships (or associations) between these nodes like degree of friendship

between two persons or distance between two cities. Relationships are sometimes directional, bidirectional, with weight, or a mixture of all of these. Research in a number of academic fields has revealed that social networks operate on many levels, from families up to the level of nations, and play a critical role in determining the way problems are solved, organizations are run, and the degree to which individuals succeed in achieving their goals (Jackson and Wolinsky, 1996; Moody and White, 2003). In the field of recommender systems, O'Donovan and Smyth propose two computational models of trust and show how these models could be incorporated into collaborative-based recommender systems (O'Donovan and Smyth, 2005). The authors report that users tend to ask friends (i.e., persons that they normally trust and are part of their social networks) for advice prior to taking actions or making decisions. To address the reliability problem that could undermine the provided recommendations, O'Donovan and Smyth consider historical evaluations that users give to these recommendations. Therefore, if a user is behind a good number of accurate recommendations over time, her level of trust as a reliable partner increases compared to the one who makes poor (or misleading) recommendations.

SOCIAL NETWORKS AND WEB SERVICES

How to Build a Network?

Building a social network means identifying the type of nodes and edges that will constitute this network. In terms of nodes, Web services would be the sole constituents. In terms of edges, we would suggest three types of associations namely Recommendation (R), Similarity (S), and Collaboration (C) with focus on the recommendation association in this chapter.

Formally, a Social Network SN of a Web Service WS is a couple: $SN_{ws} = (N, E)$ where N and

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