Chapter XVIII

Resource Discovery Using Mobile Agents

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ABSTRACT

Discovery of the multimedia resources on network is the focus of the many researches in post semantic web. The task of resources discovery can be automated by using agent. This chapter reviews the current most used technologies that facilitate the resource discovery process. The chapter also the presents the case study to present a fully functioning resource discovery system using mobile agents.

INTRODUCTION

Resource discovery is one of the main issues in the today’s networks. The main target for any resource sharing system is to make available it resources to all other users. This can only be achieved if there is a service that allows discovering or matching of the attributes or the multi-attributes across heterogeneous domains. Such service is defined as resource discovery service (Paolo Trunfio, June 2007) (Miguel Castro, 2004). Typically, such system after matching the attributes will return a list of possible resource location where the resource is available. Peer-to-Peer (P2P) systems have been used for sharing resources (Miguel Castro, 2004). As nodes share resource a diverse set of techniques have been developed for discovering of the resource provider, assuming initial heuristics are available. The P2P systems are
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distinguished from other systems based on the fact of decentralization. There is not central authority that maintains the networks. Nodes can join the network and leave the network without destroying the resource network. The communication between two peers is a direct connection (Clip2, 2002). There has been multiple ways that have been devised to enhance the scalability of such networks.

Semantic Web addresses the navigation as compared to World Wide Web by creating a new approach in knowledge representation and different way of representing information on the Internet (McGuinness, March 2001). The Semantic Web is a network of information that could be easily processed by machines, on a global scale. It empowers the human user to employ agent software for searching as well as it enables the agent to act as the user’s representative and that can enter transaction on behalf of the human user (McGuinness, March 2001) (Siderean Software, 2003).

A mobile agent is an autonomous and intelligent entity executing in computer environments. In addition to the characteristics inherited from the fixed agent, mobility is the most important attribute, which greatly improves the flexibility in multi-agent systems. As a fundamental building block of the mobile computing paradigm, the mobile agent has many potential applications in e-commerce and e-business (Yang, April, 2006). As a replacement of the traditional Remote Process Call (RPC) mode in which clients communicate with a non-local server with a static client-server interface, mobile agent enables the execution of the server side services within the server by travel to the local server host and interacts with it. After the completion of tasks, mobile agent will travel back to the client (service requester) with the service results. This reduces the need for bandwidth, as mobile agent can be very small in size (but can grow dynamically as needed to accommodate more data) (Dunne, 2001). In addition, there is no need for the centralized and real-time control of mobile agents. After a mobile agent is sent to the server (or other hosts), the creator of the mobile agent does not need to keep an eye on it until it travels back. The tasks are performed asynchronously. Also, users can create more than one agent for a specific task, and thereby enables the parallel processing of tasks. (Mobile agents are assigned to different sites to perform subtasks in parallel, and return the results of the sub tasks to the user. The user then would be able to make final decisions according to the returned results.)

The purpose of this chapter is provide a review of various technologies that have been applied in the field of resource discovery, so that a qualitative comparison of existing approaches can be performed and the conclusions can drawn to design an algorithm that can be applied to resource discovery using mobile agents. We will also depict what mobile agents are, and why they are in particular suitable for resource discovery.

A sample mobile agent system, demonstrating how resource discovery is achieved in a mobile agent system will be illustrated as well.

TECHNOLOGIES USED IN EXISTING RESOURCE DISCOVERY SYSTEMS

There are diverse set of solutions that are available for resource discovery. The solutions have been characterized through the routing strategies that have been applied by them. The main categories are algorithms that are used by unstructured networks and algorithms that are used by the overlay network between peers (Mordacchini, 2007).

In the unstructured networks the first technology that was applied was that of central servers. The technology was refined to get decentralized system for example GNUtella like systems, where the search message were routed using flooding techniques throughout the network that lead to saturation in the
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