STUDY AND IMPLEMENTATION OF MOBILE INTELLIGENT AGENT FOR NETWORK MONITORING AND MANAGEMENT

Lee Yip Fei

Research and Development Unit (School of Computing and Information Technology), INTI College Malaysia, Bandar Baru Nilai, Negeri Sembilan, Malaysia.
( yflee@eternalsolutions.com )

ABSTRACT
The “Agent” metaphor has become increasingly popular in the computing world. A noticeable fact would be the aggressive involvement of Netscape, Microsoft, IBM, Reuters, Compuserve, Hewlett-Packard and many other leading companies in the research and development of Agent Technology. In this paper, a web based Network Monitoring and Management prototype system based on the generic Agent model will be presented. Apart from that, the agent concepts will also be overviewed.

INTRODUCTION
“An agent is a computational entity which acts on behalf of other entities in an autonomous fashion, performs its actions with some level of pro-activity and/or reaction and exhibits some level of the key attributes of learning, cooperation and mobility.” (Green et al. 1997).

The above definition emphasizes in what degree a software entity can be regarded as agent. Researchers and Practitioners in this area have categorised themselves into two extremes. In the first part of the extreme, it is relatively simple, client-based software applications that assist users in performing simple but tedious tasks such as downloading web pages from the web and file sorting. This category of agent implements the weak notion.

At the other end of the scale is the concept of sophisticated software entities that possess Artificial Intelligent (AI) component that autonomously travel through the network environment and has the ability of making decisions on behalf of the user. This extreme is known to be a strong notion.

ATTRIBUTES OF AGENT
The ‘Agent Technology’ is currently a hot topic in the computer science communities. When we configure computer(s) via software to perform different tasks on our behalf, we are actually using the facility of agent technology. A significant class of agent software consists of several dimensions such as mobility, autonomy, reactive or proactive, adaptive and collaboration.

Mobility

Being mobility, such architectures provides the ability to the agent to move around from its origin location to the destination location to perform the task assigned. This is especially useful when we require only a portion of information to be retrieved from a huge database. For instance, we can assign a mobile agent to help us in gathering the user profile which have a username starting with ‘A’ from the central database. The mobile agent will perform searching and information gathering by utilizing the resources where the central database is located and return to its origin with the required information only. Thereby, we could actually save time, bandwidth and resources needed in fetching the entire database to be processed locally.
Autonomy
Autonomy refers to the ability to operate without the direct intervention from humans and have its own control over their actions and internal state.

Reactive
Reactive refers to the ability to perceive or sense the environment in where it is living (might be graphical user interface, a collection of the other agents, the Internet, or combination of these), and to respond in a timely fashion. Examples of this agent would be the windows update agent which will notify the user when new update is detected.

Proactive
Proactive refers to the ability to determine the action and decision on behalf of the owners or users. This type of agent will not wait for instruction from the users but will respond immediately to the act.

Adaptive (Learning)
Learning abilities gives the agent the ability to adapt and learn from the environment, habits, preferences and working methods of its users. This is possible by embedding Artificial Intelligence (AI) methods into the agent.

Collaboration
Collaboration refers to the ability to collaborate with other agents and the owners. Upon collaboration, an agent will consider the feasibility execution instruction before proceeding with further action. Therefore, mistakes and harmful instructions could be omitted.

PROTOTYPE
Abstract
A small scale network management system will be developed by implementing the agent technology to provide a mobile solution via the Internet Environment. By implementing this method, the network administrators will be able to manage and audit the hardware configuration of each networked computer remotely without the need of physical contact to the particular computer system as long as internet access is available. Additionally, any changes of the hardware configuration occurring on an audited computer system will be reported immediately to the network administrators via SMS (Short Message Service) or electronic mail with just a single click of configuration. Thus, studies on issues such as access to hardware configuration as well as data manipulation by the agent will be carried out.

Architecture

Figure 1. Architecture of network monitoring and management via web-based system.

Description
This version of prototype system is designed in order to help the network and system administrator to monitor their network environment remotely without being physically present at where the server is located.

Basically the system will functions as follow:
1. A Domain Controller would need to be set up in order to gather the hardware profile of each connected clients.
2. The Particular Domain Controller will need to be promoted as a Web Server by installing the Internet Information
Services 5.0 or above as well as the .NET framework.
3. The ASP.NET page would then need to be hosted by the Web Server and be processed if the authorized user triggers the particular process such as view capacity of hard disk or memory.

Agent Model

There are two core agents embedded in the prototype system to perform the management, creation, and disposal of the agent. These two agents are the Daemon Agent and the Web Agent. As for the Daemon Agent, it will manage, create and dispose an agent based on the agent list created by the administrator through a web-based interface which is saved in the SQL database. This transaction will be carried out by the “Daemon Agent” by sending request to the SQL database periodically in order to retrieve the attributes of agent(s) needed to be created.

Besides, the Daemon Agent will also report the status of the active agent(s) to update the Administrator. In addition, reporting through email or SMS (Short Message Service) can also be customized. As for the “Web Agent”, it is responsible to display the system information of specific client that is connected to the web server.

CONCLUSION
Web solution has become increasing popular and important because of its accessibilities, user-friendly interface and lower implementation and development cost. More importantly, it also provides the portability and mobility features which allow us to view the web content regardless of where we are and what operating system we use provided the internet browser is installed.

With these features, users will not have to
be physically located where the server is placed. In contrast, tasks could be performed in any location provided the internet access is available. In addition, the worry of specific service port being blocked by firewall or proxy will no longer exist.

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Text Reference

General References