

FlyingCloud: A Mobile Agent Service Network

by

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Abstract

To make information ubiquitously available to the people in the world requires not only the Information Superhighway, but also a non-traditional computing paradigm, such as the intelligent messaging, to overcome the intermittent connection problem inherent in a mobile environment. This paper describes the development of a mobile agent service network prototype currently undergoing in the National Chengchi University, the FlyingCloud. The main objective of this prototype is to simulate a real operational mobile agent service network, to analyze the network behavior and to exercise our solutions. The system will be developed according to the previously proposed open architecture and hybrid mobility management infrastructure [15,16,17].

Keywords: mobile computing, mobile agent.

1. Introduction

1.1 Agent and Agent Mobility

Because of the advance of computer and communication technologies as well as the promotion of National Information Infrastructure (NII), the progress of mobile computing is accelerating into a revolutionary speed making the dream of ubiquitous information service a reality [2,3,15,22,23,24]. The goal of a ubiquitous information service network is to provide information to the users anytime anywhere. To accomplish this goal, the service network must be supported by some ubiquitously available communication networks and be able to conveniently access to various information resources. Currently, wireless communications networks such as AMPS or GSM cellular networks will be able to support the ubiquitous communication requirement [1,18,20,26,27]. As for the convenient information services, distributed computing technology seems to be an ideal computing paradigm. In a distributed system, all servers in a network are integrated into a single logical

server such that clients, which can be programs or users, can access the network resources transparently by interacting with a single server. Unfortunately, applying distributed computing technology in such a scale and heterogeneity will have to take a much longer time to realize in the real world.

Thus, clients will have to access network resources in a prescriptive fashion by interacting with individual servers probe by probe to accomplish a complicated task. However, in most mobile computing environments, the nature of communications is intermittent and the battery energy is limited. Thus, it is very difficult to accomplish a complicated task that requires its client to interact with multiple servers intensively. A non-traditional computing paradigm, the intelligent messaging, that allows clients to interact with multiple servers in a dynamic fashion has been brought up to cope with this problem [4,5,6,8,9,10,12,13,19,21,25].

Simply speaking, an intelligent message is an electronic message that carries a computer program, whether procedural or declarative, that can be executed by the receiving servers on behalf of the originating client. The program in the message can also instruct a receiving server to forward automatically the message itself to another server, on which the program is executed continuously in a pipeline fashion. Such a message is also known as an intelligent agent in other fields [8,11]. For simplicity, it is called an agent in the rest of this paper. Good examples can be found in [15,16].

Since an agent may be traveling in a service network, the originating client may not be able to trace or control its operation directly. A service network must provide some mechanisms allowing its clients to trace and control these agents. This problem is referred to as the agent mobility management.

1.2 Mobility Management

To make a service network commercially viable, it is essential to have a high quality and cost effective operation, administration, and maintenance system (OA&M) in place to guarantee a certain QoS (Quality of

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