

Implementing Mobile Agents in Genome Information Processing

Hiroshi Matsuno¹

matsuno@sci.yamaguchi-u.ac.jp

Tatsumi Fukuyama¹

fukuyama@webbies.sci.yamaguchi-u.ac.jp

Misako Ichimura²

ichimura@i.oshima-k.ac.jp

Miyako Tanaka³

miyako@ics.nara-wu.ac.jp

¹ Faculty of Science, Yamaguchi University
1677-1 Yoshida, Yamaguchi, 753, Japan

² Oshima National College of Maritime Technology
1091-1, Komatsu, Oshima-cho, Yamaguchi-ken, 742-21, Japan

³ Graduate School of Science, Nara Women's University
Kitauoyanishimachi, Nara, 630, Japan

1 Introduction

Today, for biologists of genome analysis, actions to access web servers occupy an important part of their researches. But, the actions usually spend a lot of time, because the biologist must visit many web servers in order to perform his aim. Furthermore, biologists are sometimes embarrassed by very slow response of Internet.

Kanehisa had implied the possibilities of “mobile agent” in a field of genome information analysis in [3]. We are interested in applying mobile agent technology to the genome information analysis, and then trying to construct the system gathering gene relations distributed in databases all over the world for a software agent for a gene regulation network of *Saccharomyces cerevisiae* in [4].

With the release of Java Development Kit (JDK) 1.1, a number of companies have developed Java class libraries for mobile agents [1, 6]. On the other hand, Telescript by General Magic [5] had been the most widely used mobile agent technology before the release of JDK 1.1. Thus we naturally decide to use Odyssey by General Magic as our developing environment.

2 Odyssey – Java Libraries for Mobile Agent–

Odyssey is developed as a set of Java class libraries which adds support for developing distributed, mobile applications to original Java class libraries [2]. The paradigm Odyssey supports for distributed, mobile applications includes agents, agent systems, and places. An agent is a process that acts autonomously on behalf of a person or organization. It has the unique ability to transport itself from one system in a network to another. An agent system is a platform that can create, manage, interpret, execute, transfer, and terminate agents. A place is a context within an agent system in which agents execute. A mobile agent travels between places. Odyssey requires version 1.1 of the JDK, or a third-party development environment based upon JDK 1.1.

3 Gathering Data for Gene Regulatory Networks

The mobile agent technology would be widely applicable to the field of genome information processing. We will focus our attention on the project to construct gene regulatory networks of *Saccharomyces cerevisiae* [4]. Genome databases operating now have been completely established, so we can not

modify the mechanisms of these to be suitable for our purpose. Then, we will construct an interface system between the databases and the places on which agents visit and work. On developing stages, the interface and the place are at a local LAN segment of us, and if they are completed, both of these will be moved at a local LAN segment of the site of genome database.

An agent goes the rounds at genome databases, and gets data of newly recorded relation of genomes, then come backs to its home site. If there is no aimed data, a new agent is created by 'budding off from' the rounding agent. This new agent stays at the place until a new data is recorded.

4 Conclusions

We are now studying about Odyssey through making a demonstration of which an agent goes the rounds a number of computers representing genome databases.

Specialists of network systems who have been researching mobile agents say "what is a killer application of mobile agents" [7]. This implies that they have found no advantages of mobile agents in contrast with 'centralized agents' which run on one computer and can get informations by communicating with servers through a network. In parallel with developing a mobile agent for genome information processing, we should investigate differences between mobile agents and centralized agents from aspects of theoretical sense.

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