Multi-agent system for usability improvement of a university administrative system.

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Abstract

The implementation of multi-agent systems is one of the specific ways to integrate heterogeneous information systems, by creating a software agent that performs specific tasks within a field of known action, as in the case of the travelling salesman problem or an agent searching clinical data of a patient. In this paper, the development of a mobile agent is proposed for the implementation of university administrative services across heterogeneous servers, interacting in turn with other intelligent agents in an heterogeneous communication environment. This will generate a single-access interface, which will serve to improve the usability of the system when the client makes an administrative request regardless of the server on which the requested procedure is processed.

Keywords: Integration, usability, agents, multi-agent systems, heterogeneous services.

1. Introduction

The portal of the University Inca Garcilaso de la Vega (http://www.uigv.edu.pe) is a web application that offers different services available in each of the offices of the institution, which is accessed through hyperlinks from Faculties, Research Units, Distance Education, etc.
An integrated system by software agents (Shiao, 2004); in which, with a single interface, a user can access different services without having to go through different pages to finish their request; will make possible to link these services regardless of the Faculty where they are and make the process requested by the user in a transparent manner, so that the usability of the system is also improved.

2. Proposed implementation

The structure of the proposed multi-agent system is shown in Figure 1.
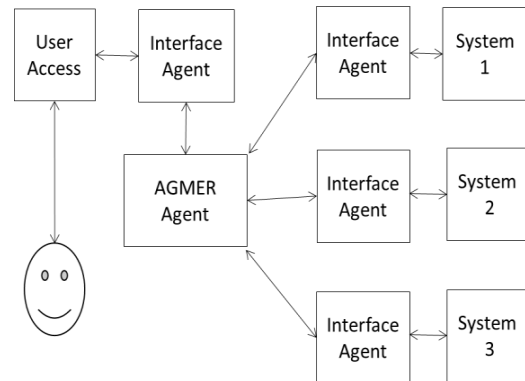

Figure 1 – Proposed multi-agent system

Using the GAIA methodology (Zambonelli et al, 2003) for modeling a system of agents, agents that will be built on the prototype are defined:

a.- Client Agent: captures requirements or service requests from users; interacts with the mobile agent to process the request and sends the response to the client system for viewing or joining the client process.

b.- Server Agent: interacts with the server of the corresponding office to transfer the request from the mobile agent, processes the requested service, and sends the response to the mobile agent.

c.- AGMER Agent: mobile agent moving through JADE middleware to interact with clients and servers, has the ability to divide received requests into subtasks performed by different servers.

One advantage of using GAIA is that it can be combined with diagrams from UML as described in Kang et al (2004), for this reason UML diagrams and GAIA models (Wooldridge et al is used., 2000) will be used for its construction.

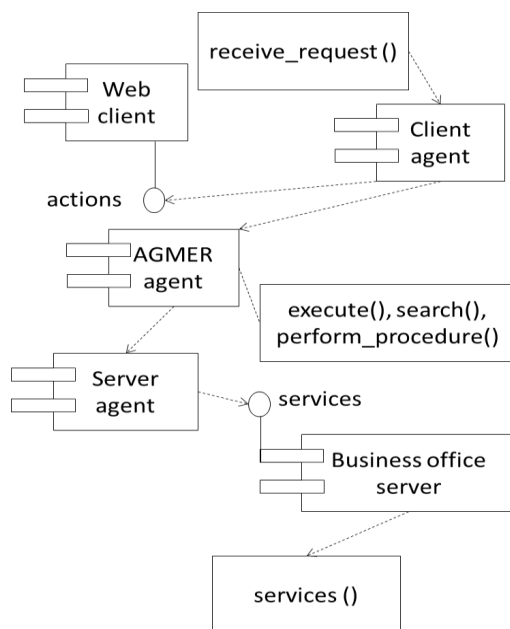Once developed, the model will be implemented as shown in Figure 2.

Figure 2. Components.

In the development process is suggested the use of Eclipse Luna, JDK 8.0_41 and JADE 4.3.2 for creating agents. In the prototype, it was initially considered the access to these basic services for a university student from the case study:

a. Specialized Library System with Struts 2, running on Google App Engine cloud, a PAAS solution.

b. PRODI (English Learning Program) registration system with Node.JS, OpenShift, a PAAS solution.

All modules will communicate via web services, with interface agents using AXIS 2.

3. Conclusions and future work

The single-interface model for administrative procedure systems is suitable to improve the usability of a web portal to reduce the number of interactions.

A multi-agent system allows an heterogeneous implementation of components as well as asynchronous communication similar to a request of a university administrative procedure.

JADE is a suitable platform for developing agents due to its ease of use, and adaptability to development methodologies of multi-agent systems.

As future work it is proposed to develop indicators to measure implemented services, the frequency of use of the services, and others, that will be collected and stored in the cloud for future analysis using Big Data tools.

4. References

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