A Note on Mobile Agency

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ABSTRACT

With respect to mobile agents technology, given some flexible, safe and secure context similar to some described in this paper, there are some conclusions to which the present author arrived, in particular, in terms of software engineering and use of free software.

Keywords: mobile agents technology, free software.

THE CONTEXT

Recently, it has been set from relevant discussions [9, 6] that mobile agents technologies (MAT) consist of programming languages (which have particular features presented in [3]) and their implementations, which in turn have two main layers of software: mobile agents and operating systems. One of the main problems (if that is not the main problem) while implementing a mobile agents technology is to protect mobile agents from malicious hosts[8].

Since 1999, but published in [2] also in [3], it has been shown that, in order to solve the problem to protect mobile agents from malicious hosts, there seem to be at least two main approaches:

1) The first suggestion consists in implementing some virtual machine (or some interpreter) atop any operating systems. In this case, there can be an implementation of the virtual machine for each version or model of operating system. The security service may be reasonable but perhaps not for critical applications, hence, the approach does not seem reasonable in the general sense of mobile computation.
2) The second suggestion consists in writing a single software that plays the rôle of an operating system in addition to provision of the service of virtual machines for agents. Here, the concept of *visitor process* enters the scenario, and this is the safest and most secure approach.

Besides minor improvements, the area of mobile agents has not been revolutionary though. Whenever an agent arrives at a host, a well-defined contract is established for that agent, which in its turn starts running in the form of a visitor process. The notion of visitor process is ideally defined in terms of analogy between mobile agents and human beings regardless of the conceptual and philosophical[4] differences between the two. Therefore, a visitor process does not belong to any local user, and yet it has not only some constraints previously set by hosts but also some rights (based on human rights[1]) and, normally, cannot be killed or punished by prejudice or any other reason. In order to provide a general and symmetric solution, visitor processes must be protected against attacks from hosts. The developers of mobile agents technology can be those who establish the general laws of the system, and those laws are technically respected by every user, while constraints are set in the general fashion by the hosts before agents come in. That is, that can be technically done on the fly, but the rules apply only to the agents who arrive afterwards, not those who are already running in the system.

A FEW CONSEQUENCES

Given a flexible, safe and secure context similar to that one described above, there are some conclusions to which the present author arrived.

Taking a typical situation of a client entering a book shop, both the client and the owner are agents[7], in the most general sense of the word. The personality of the client cannot be seen by the owner of the book shop, although the latter are expected to draw some conclusions about the former and vice-versa. Similarly, the personality of the owner cannot be seen by clients.

In addition, the personality of the client is not seen by any other client, although some aspects of their personalities can be transmitted between people.

From this context, it follows that the idea of open source becomes infeasible on the most general environment that supports mobile computation. The observation is that since not any mobile agent can be an open-sourced program, the mobile agents programming language and system cannot reasonably be open-sourced either. An obvious reason is the expected uniformity of such a technology.

It is known that, given a situation, mobile agents are expected to carry many personal or critical data of their owners and others, including the representation of the corresponding users' personalities, in order to represent them in some efficient and proper way.

Notoriously, the observation of the author above is technical, that is, he aims at describing the world as it is and, from the full description, technical constraints to the system emerge.

Moreover, individuals, in particular those educated in the western culture, love their own privacy[5] (which means a state of not being bothered by others) and they want respect with respect to

privacy. In contrast with the above technical reason, this view is philosophical. As it is known, as logics, ethics is a branch of philosophy. □

REFERENCES

[1] Simon Blackburn, **The Oxford Dictionary of Philosophy**. Oxford University Press, 1994.

[2] Ulisses Ferreira, **Chiron: a Framework for Mobile Agent Systems**. In George E. Lasker, Jana Dospisil, and Elisabeth Kendall, editors, Advances in Mobile Agents Systems Research. Proceedings of the 12th International Conference on System Research, Informatics & Cybernetics, Vol. 1: Theory and Applications, 2000, pp. 12–22.

[3] Ulisses Ferreira, **Programming Languages Features for Some Global Computer**. In Veljko Milutinovic, editor, Proceedings of SSGRR 2003s International Conference on Advances in Infrastructure for e-Business, e-Education, e-Science, e-Medicine, and Mobile Technologies on the Internet. IPSI-BgD and Telecom Italia Learning Services S.p.A., 2003.

[4] Ulisses Ferreira, **On the Foundations of Computing Science**. In David L. Hicks, editor, Proceedings of the Metainformatics Symposium MIS'03, No. 3002 in Lecture Notes in Computer Science, Springer, 2003, pp. 46–65, (published in 2004).

[5] Ducan Langford, editor, **Internet Ethics**. MacMillan Press Ltd, Printed and Bound in Great Britain by Antony Rowe Ltd, Chippenham, Wiltshire, 2000.

[6] Gian Pietro Picco, **Mobile Agents: an Introduction**. Microprocessors and Microsystems, Vol. 25, No. 2, 2001, pp. 65–74.

[7] Stuart Russel and Peter Norvig, **Artificial Intelligence**. Prentice Hall, second edition, 2003.

[8] Jan Vitek, **Secure Object Spaces**. In 2nd ECOOP Workshop on Mobile Object Systems, Linz, Austria, 1996, pp. 41–48.

[9] Jan Vitek, editor, **Mobile Object Systems: Towards the Programmable Internet**. No. 1222 in Lecture Notes in Computer Science, Springer-Verlag, 1997.