Untraceability I Add-on for JADE

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1 Introduction

This is the first public release of *Untraceability I Add-on for JADE* – a *JADE* add-on developed at *European Commission Joint Research Centre* as a part of the author's PhD Project.

The add-on introduces a new service to the *JADE* environment, which aims at making migration of mobile agents untraceable.

This is the first step towards underpinning privacy of *JADE* users.

2 Feedback

We are looking forward to seeing any practical applications of the service, so if you have successfully applied the service into your project, please, send us an e-mail including a short description of the application, to `Rafal.Leszczyna@jrc.it`.

If you have suggestions or if you encountered bugs in this software, please send an email to `Rafal.Leszczyna@jrc.it`.

3 Contact

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4 License

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Although this is not an obligation, we would like to warmly encourage you to send us any information of successful applications of the service into your projects to `Rafal.Leszczyna@jrc.it`. This add-on was developed as a part of the author's PhD project and for the author, having such an information might positively influence quality of his PhD thesis, giving a description of case studies.

5 System requirements

In order to use *Untraceability I Service* you need *JADE 3.2* or later and *Sun Java SDK 1.4* or later. The file `untraceability.jar`, which contains the service's distribution (the *JADE* add-on), needs to be in your `CLASSPATH` variable.

6 Description

A typical scenario of employing a mobile agent is composed of the following steps:

1. an agent's goal is described,
2. the agent is dispatched from a container (called a base container/station or a source container/station) and it roams until the goal is achieved,
3. the agent returns to the base station with results.

To allow such scenario, a mobile agent must store somewhere the address of its base container. Usually it saves it explicitly in its state.

This makes the address available to all. Anyone interested may learn the agent's place of origin which gives a strong indication of the agent's owner.

Such feature is undesirable in many agent applications where privacy of agents' owners should be respected [1].

Untraceability I Service allows an implementation of the above scenario while the address of the base station is kept secret.

Untraceable I Service complies with the specification of *Untraceability Protocol I* presented in [2, 3].

The general idea of the protocol is the following: an agent, while migrating, encrypts the identifier of the last visited platform (using the public key of the present platform) and puts it to the LIFO queue stored in its state. After achieving the goal, when the agent wishes to come back to its base platform, it uses the queue to find its way back. Down the route back the identifiers are subsequently decrypted using each platform's private key.

For further details, an interested reader may refer to [2, 3, 1, 4]

7 Installation

Unpack the file `untraceability-X.X.XX.zip` (where the „`X.X.XX`" part indicates the version of the release) into the location of your current *JADE* installation. All needed files will be created into the directory `jade/add-ons/untraceability`. In addition to all *JADE* jar files, you also need to add `jade/add-ons/untraceability/lib/untraceability.jar` to your Java `CLASSPATH`.

8 Using the service

We made an attempt to make using of the service straightforward.

The process of developing untraceable agents involves employing the `UntraceableAgent` class combined with the predetermined migration behaviours – the `GoAheadBehaviour` and `ComeBackBehaviour` – available in the `behaviours` subpackage).

It is important to have the agent route stored in the `myUnprotectedRoute` field of the agent's class.

To allow the Untraceability Service must be registered at each container participating in agent's untraceable migration. So if started from a command line, the alike string should be added: `-services jade.core.security.UntraceabilityService;jade.core.mobility.AgentMobilityService;jade.core.event.NotificationService`.

For further details, follow the example in `jade/add-ons/untraceability/src/examples/untraceability/` (see the description in the next section).

9 Examples

A working example is available in the directory: `jade/add-ons/untraceability/src/examples/untraceability/`.

In the example an agent obtains a list of locations (containers) available in the agent platform, chooses one of the locations as a destination of its migration and moves towards it passing intermediate locations. After reaching the destination it comes back to the source location.

If you have *Apache Ant* installed in your system, you can take advantage of the Ant's `build.xml` file (available in the already mentioned `jade/add-ons/untraceability/src/examples/untraceability/` directory), and start the example by simply typing '`ant`'.

Additionally, *Windows* users can also use the `run.bat` file present in the `jade/add-ons/untraceability/src/examples/untraceability/` directory.

References

[1] Rafał Leszczyna. The solution for anonymous access of it services and its application to e-health counselling. *Proceedings of the 1st 2005 IEEE International Conference on Technologies for Homeland Security and Safety (TEHOSS '05)*, May 2005. Accepted for the 1st 2005 IEEE International Conference on Technologies for Homeland Security and Safety, Gdansk, Poland. September 28-30, 2005.

[2] Rafał Leszczyna and Janusz Górski. Untraceability of mobile agents. *Proceedings of the 4th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS '05)*, 3:1233–1234, July 2005.

[3] Rafał Leszczyna and Janusz Górski. Untraceability of mobile agents. Technical report, European Commission, Joint Research Centre, Institute for the Protection and security of the Citizen, December 2004.

[4] Rafał Leszczyna and Janusz Górski. Performance analysis of untraceability protocols for mobile agents. Technical report, European Commission, Joint Research Centre, Institute for the Protection and security of the Citizen, March 2005.