

CCD Research Group on Mobile Agent Systems

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Outline

1. Group Description
2. Current Work
3. Undergraduate Students Projects

Group Description

Our research group:

- ▶ 3 PhD / Lecturers
- ▶ 5 PhD Students
- ▶ 10 Undergraduate Students

Funded by projects:

- ▶ 1 European Project
- ▶ 3 Spanish Government Projects
- ▶ 1 Catalan Government Project

Research Lines

Main research topics are:

- ▶ Agent Mobility
- ▶ Mobile Agent Security
 - ▷ Itinerary, data and code protection
 - ▷ Resource Access Control
- ▶ Fault tolerance of MAS
- ▶ Secure applications for Mobile Agents

Current Work

- ▶ Mobility
 - ▷ Implementation of FIPA00087 specification
 - ▷ Designing new Mobility Spec proposal for FIPA
- ▶ Security
 - ▷ Itinerary Protection Schemes
 - ▷ Collaborating with FIPA Security TC

ACL-based Mobility

FIPA00087 Mobility Specification:

- ▶ Deprecated Specification: No running implementations.
- ▶ It is based on moving agents using ACL Messages.

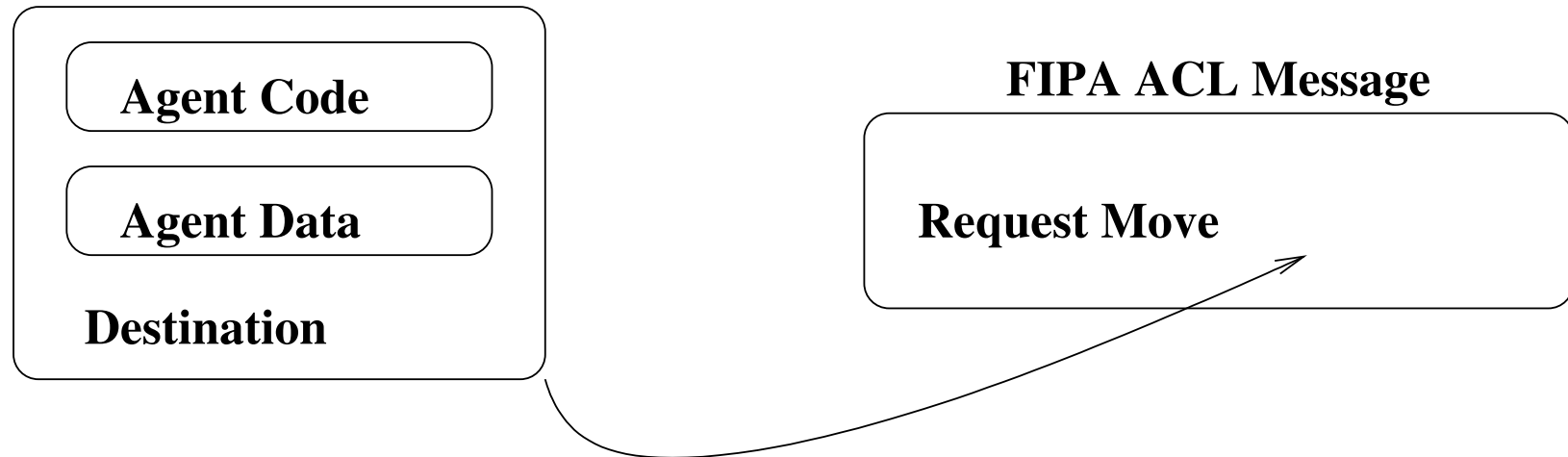
Advantages of an ACL-Based Mobility:

- ▶ Minimum degree of interoperability with FIPA-compliant platforms guaranteed
- ▶ Possibility of using several transport protocols (ACL/IIOP, ACL/HTTP, ACL/SMTP) transparently

FIPA00087 Implementation

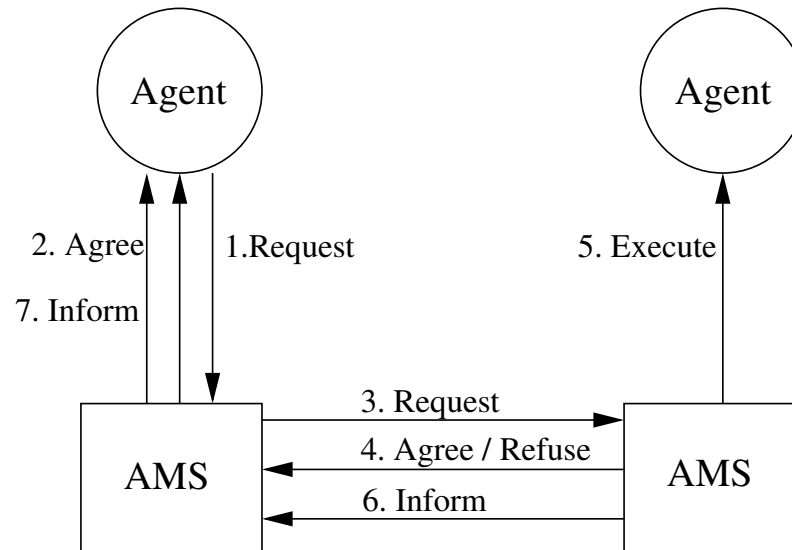
- ▶ A prototype of this migration has been implemented over JADE platform
- ▶ We use a Migration Ontology and the FIPA-Request interaction protocol

MobileAgentDescription



Protocol

Mobility Protocol:



- ▶ First Request contains only the destination
- ▶ Agent AMS is responsible of completing the request with agent code and data.

Mobility Proposal

Current specification has some problems/lacks:

- ▶ The agent is sent inside the first message of the protocol (Problems with mobile devices)
- ▶ Fault tolerance issues are not addressed
- ▶ Different kinds of code migration can be specified

We are working in a Mobility spec proposal:

- ▶ Early stage (designing protocols)
- ▶ Different levels of migration protocols
- ▶ Combination of several FIPA IPs.

Security

Our Case of study:

- ▶ Mobile Agents following an itinerary of platforms
- ▶ Agents carry pieces of code and data intended to be used on each platform

Protecting this pieces usually implies:

- ▶ Use public key schemes
- ▶ Creating cryptographic envelopes
- ▶ Platform code is used to extract, decrypt and verify data from envelopes

Security

Main problems of this schemes:

- ▶ A rigid agent structure is imposed
- ▶ Only agents with known structures are supported

We try with a different approach:

- ▶ Moving control code from platform to agent
- ▶ Platform code does not need to deal with agent internals
- ▶ Multiple agent structures supported

Security

This approach has some security challenges:

- ▶ Agent platform does not know how agents protect their internals
- ▶ Agents need to access platform private key!
- ▶ This security issue has been solved

The Advantages of this approach:

- ▶ Protected and non protected agents can coexist
- ▶ Adding new protection schemes does not implies to update platform code.

3. Undergraduate Projects

Undergraduate Students

Undergraduate Students:

- ▶ About 8 per year
- ▶ Projects related to our research lines
- ▶ Usually working over JADE Platform

More relevant projects:

- ▶ HTTP-MTP with persistent connections
- ▶ SMTP-MTP and TFTP-MTP
- ▶ Platform discovery protocol

3. Undergraduate Projects

Undergraduate Projects

SMTP-MTP:

- ▶ SMTP is slow but provides fault-tolerance.
- ▶ Possibility of sending ACL Messages to human parties.

TFTP-MTP:

- ▶ UDP protocol based
- ▶ We are trying to achieve a high performance in LAN networks

Undergraduate Projects

Platform Discovery Protocol:

- ▶ Based on using ACL Messages and a Gnutella-like protocol (P2P)

Other Projects:

- ▶ Agent Launcher
- ▶ Secure Agents Creation tool
- ▶ Data Mining application
- ▶ JADE-LEAP Platform fault tolerance
- ▶ Platform Remote administration