A Policy-based Infrastructure for the Dynamic Control of Agent Mobility

Gianluca Tonti, Rebecca Montanari
{gtonti, rmontanari}@deis.unibo.it
D.E.I.S. Department
University of Bologna - Italy
Outline

- Motivations
- A policy-controlled Mobile Agent Framework: POEMA
- Conclusions
Motivations

Mobility adds complexity to the design and development of applications

- Programmers have to explicitly deal with the allocation of agents
- **Mobility specifications embedded into the agent code** are not adequate to cope with the frequent changes of the environment state
  
  need of flexibility

**Question**… **HOW** to allow dynamic changes in the mobility behaviour of agents without reengineering the agent code?

...**Solution**  

 ✓ Separation of concerns: mobility and application logic
Policy-based approach to Control Mobility

IDEA  Policies for governing the mobility behaviour of Mobile Agents

*Mobility policies specify:*
when, where and which unit of mobility must migrate

Advantages of policy-controlled mobility

- Clean separation between mobility concerns and the application logic
- Possibility to facilitate dynamic reconfiguration of mobility strategies
- Possibility to specify mobility behaviour at a higher level of abstraction
Case Study

Ambulance

Explorer Agent

UserInterface Agent

Client Stub

Emergency Server

Computing Equipment

PDA

911

Ambulances set

Hospital networks

Explorer Agent

Explorer Agent

Explorer Agent
# Mobility Policies

Event-triggered declarative policies for controlled mobility

## Obligation Ponder Policies

### Examples

<table>
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<tr>
<th>inst oblig MobPol1 { on Login(User, PDA); subject s = agents/UserInterfaceAgent; do s.go(PDA, “run”); when MonitoringSystem.isReachable(PDA); }</th>
<th>inst oblig MobPol2 { on PDA_Battery_Low(); subject s = agents/UserInterfaceAgent; do s.go(Ambulance12, “run”); when MonitoringSystem.isReachable(Ambulance12); }</th>
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## Facilities for lifecycle management
POEMA Policy-Based Architecture

Mobile Agent
- Code
- Data
- Policies

Mobile Agent
- Code
- Data
- Policies

Computational Environment
- Policy Specification Service
- Policy Enforcement Service
- Repository Service
- Policy Coordinator Service

Event Service
- Monitoring Service

Naming
- Migration
- Communication

Operating System

Host
Policy Enforcement Service

Policy Enforcement is composed of a set of specialized tasks:
Policy-controlled Mobile Agents (1.)

If an agent is the policy subject, it has to actively enforce the policy.
null
Conclusions

- Policy-based approach to control mobility can simplify application design and maintenance

- Dynamic modification of agent mobility behaviour via changes in policy specifications