



Exam in SIF8072

Distributed Artificial Intelligence and
Intelligent Agents

10 May 2003

NO printed or hand-written material is allowed.
Duration of Exam: 4hrs

1. Mobile Agents (4%, 3%, 8%)

(i) Describe the differences between “Remote Programming” and “Remote Procedure Calls” with the help of diagrams.

(ii) Below is a conceptual design of a mobile agent for buying pizzas. The agent visits different pizza sellers, e.g. Dolly Dimples and Milano. The terms “Clone”, “Dispatch” and “Retract” are concepts used by Aglets to define the behaviour of the mobile agent. Describe the meanings of these terms with respect to the scenario shown in Figure 1.

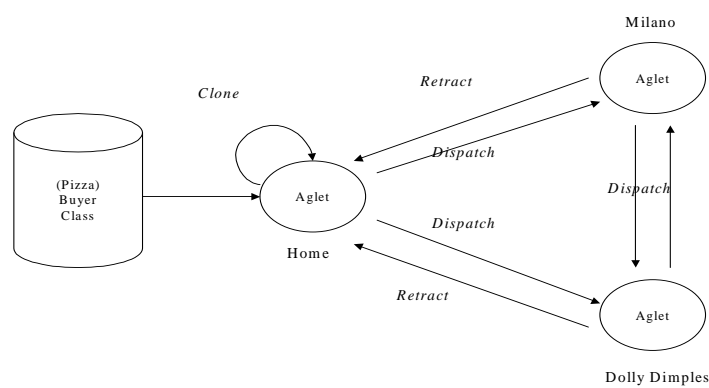


Figure 1: Mobile Agent Scenario

(iii) What are the concepts that implement mobility in Telescript? Describe these concepts with the help of diagrams.

2. Agent-Oriented Software Engineering (6%, 1%, 3%)

(i) Describe the steps in the AAIL Methodology and the output of each step.

(ii) What is the main difference between the AAIL Methodology and the Gaia methodology?

(iii) If we consider the agent systems development process as consisting of the following subprocesses, which subprocesses does the Gaia methodology cover? Explain your answer.

Requirement specification → Analysis → Design → Detailed Design → Implementation

3. Agent and Multi-agent Architectures (6%, 9%)

(i) What are the main types of agent architectures? Give an example of each type.

(ii) Describe a layered, hybrid architecture that can support collaboration among agents as well as mobility of agents. Distinguish between the layers that are designed for the operation of the single

agent and the ones that are designed for collaboration within a multi-agent architecture. Explain with the help of a diagram.

4. Negotiation (5%, 6%, 4%)

(i) What is the difference between a cooperative and a self-interested agent? Explain using an example from a negotiation scenario and the set of attributes that are considered under negotiation.

(ii) What is the main idea of the Zeuthen strategy? How does the Zeuthen strategy satisfy the following criteria for the design of negotiation protocols: guarantee success, ensure termination, maximise social welfare, pareto optimal and individually rational.

(iii) INSPIRE provides support for the negotiation of a contract between two companies, Company A. and Company B. Company A wants to sell a boat which Company B is considering to purchase. Two INSPIRE users, A and B, negotiate on behalf of companies A and B, respectively. In this example, two *issues* are considered during the negotiation process: the *price* of the boat and the terms of the *warranty*.

The prices considered vary from \$300 000 to \$320 000.

The warranties considered are “No warranty”, “6 months” and “12 months”.

The options evaluated by A and B are shown below:

	Price	Warranty	B's (Buyer) rating	A's (Seller) rating
1	320	No	0	100
2	310	6 months	50	40
3	310	12 months	75	50
4	300	12 months	100	0

What can you infer about A and B's issue ratings?

What is a post settlement and when can it be initiated?

5. Communication (6%, 6%, 3%)

(i) Describe the English Auction using FIPA ACL performatives.

(ii) Show the English Auction as an agent-interaction protocol diagram. Describe your answer.

(iii) What are Facilitators? How can the performative “recruit” be implemented using a Facilitator? Explain your answer using a diagram.

6. Coordination (4%, 6%)

- (i) Distinguish between coordinated action that is cooperative and not cooperative, using an example from driving in traffic.
- (ii) What is the main difference between individual intentions and that of being a part of a team? Describe Jennings' Joint Intentions model of coordination, using the concepts "Commitment" and "Conventions".

7. Theory (10%)

- (i) Using the modal operator for belief B, formalise the following statement:
"Per does not believe that Ole believes that it is not raining, but Per believes that he believes that Ole believes that it is not Sunday."

8. E-Commerce (6%, 4%)

- (i) What are recommender systems? Describe 2 methods used by them.
- (ii) What is the difference between e-commerce and e-business?