Agent Mobility and Practical Application

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Itinerary

- Overview of Mobile Agent Systems
- Scenarios for practical application of Mobile Agents
- Security Issues surrounding Agent Technologies
- Questions
Mobile Agent Systems

Agents are utilised in many spheres of Computer Science although for our purpose we will define an agent as an entity posessing the following properties:

- **Autonomous** - Exercises control over its actions
- **Goal Oriented** - Has an agenda within its environment.
- **Reactive** - Can respond to changes in its environment
- **Communicative** - Communicates with other agents / people
- **Mobile** - Agent or part of the agent can 'migrate'
Mobile Agent Systems (cont.)

In this essence the distinction is made between

*STATIC agents* able to perform tasks within the observable environment but are not equipped to migrate and

*MOBILE agents* designed to move from one environment to another and continue execution.
Mobile Agent Systems (cont.)

What does Mobility bring to Multi-Agent Systems:

- Reduced Bandwidth Utilisation
- Fault Tolerance
- E-Commerce
- Resource Balancing
- Network Management & Asynchronous Execution - (remote agent garages)
Mobile Agent Systems (cont.)

Jade Platform

Container A
- Mobile Agent
- Static Agent

Container B
- Service Agent

Low Bandwidth Connection
Mobile Agent Systems (cont.)

![Diagram showing Jade Platform, Container A, Container B, and Low Bandwidth Connection]
Mobile Agent Systems (cont.)

Jade Platform

Container A

Container B

Low Bandwidth Connection
Mobile Agent Systems (cont.)
Mobile Agent Systems (cont.)

Container A

Container B

Jade Platform

Low Bandwidth Connection
Mobile Agent Systems (cont.)

![Diagram showing Jade Platform with Container A and Container B connected by a low bandwidth connection.](image-url)
Mobile Agent Systems (cont.)

Jade Platform

Container A

Container B

Low Bandwidth Connection
Scenarios for practical application of Mobile Agents

- E-Auctions
- E-Commerce with autonomous purchasing
- Data – Mining
- Multi-Agent System Fault Tolerance
- Time critical - computationally intensive tasks
- Tracking Agents – (Mobile Shadow)
Agent Security

- Attacks against HOST include:
  - Denial of Service
  - Invasion of Privacy / Theft or corruption of Data
  - Snooping

- Attacks against AGENT include:
  - Unauthorised access to data
  - Modification of Code
  - Masqueraded hosts
Agent Security (cont.)

*Suggested solutions:*

- Proof-Carrying Code (Necula - 97)
- State Appraisal (Farmer et. al. - 96)
- Path Histories (Grosof et. Al – 95)
- Sandbox / Blackbox theory (Gong et. al. - 97)
- Obfuscated Code (Hohl - 97)
Agent Security
Proposed security architecture for Secure Agent Systems (SAgS) involving a policy based access control driven 'security enforcer' and 'vigilant agents'.

Policy
Authentication and Verification
Delegation of rights

Vigilant Agent Migrates
Observes

SE
Thank you,

Questions?