Applying Broadcasting/Multicasting/Secured Communication to agentMom in Multi-Agent Systems

MSE Presentation 1
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Overview

- Proposal – background, problems and goals
- Requirements – use cases, requirements
- Cost Estimation – COCOMO
- Project Plan
- Software Quality Assurance
- Architecture Elaboration Plan
- Demonstration
Background

- What is unicast?
- What is Multicast?
- What is Broadcast?
- What is agentMom?
Multicast

Who want this?

Got it

Broadcast

Who want this?

Got it
agentMom

- Communication framework for multi-agent systems
- Provides basic building blocks for building agents, conversation between agents and message that are passed in conversation.
- Implemented in Java
- Using TCP/IP
Motivation

- Large number of agents
- Finding agent on service
- Bidding/Marketing
- Group Message
- Security

Tired...
Goals

- Integrate Multicast feature to agentMom
- Integrate Broadcast feature to agentMom
- Integrate Security feature to agentMom

Use Cases

- Leave and Join group
- Unicast
- Multicast
- Broadcast
Use Case 1: Leave and Join

1. Message is encrypted or Message is not encrypted.
2. An agent sends notify to join/leave a team
3. Message is decrypted only if Message is encrypted.

Use Case 2: Unicast

1. Message is encrypted or Message is not encrypted
2. An agent sends unicast message to another agent
3. Another agent receives message
4. Message is decrypted only if Message is encrypted
Use Case 3: Multicast

1. Message is encrypted or Message is not encrypted
2. An agent sends multicast message to the Group
3. Other agents in the Group receive message
4. Message is decrypted only if Message is encrypted

Use Case 4: Broadcast

1. An agent sends message to everyone under the same local network
2. Other agents in the same local network receive message
Requirements

- **Unicast Comm.**
  1. *Sending/Receiving unicast message*
  2. *Message is received by only specified address*
  3. Message only be received by the specified address
  4. Messages arrive at the specified address and in order

- **Multicast Comm.**
  1. *Sending/Receiving multicast message*
  2. *Sending join/leave multicast group*
  3. Not allow receiving multicast message from a group before joining that multicast group
  4. Not allow receiving multicast message from a group after leaving that multicast group
  5. Provide ability to set time-to-live, multicast address and port
  6. Receiving multicast message from multiple groups

Requirements (cont.)

- **Broadcast**
  1. *Sending/Receiving broadcast message*
  2. *Message is sent to all possible hosts under the same local network*

- **Security**
  1. *Encrypting/Decrypting unicast message*
  2. *Allowing choice of encrypted or not encrypted message*
  3. Allow agent to decide whether or not to encrypt a message
  4. Message is automatically decrypted upon received
  5. Encrypting/Decrypting multicast message.
Cost Estimation

- Pre-Design
- COCOMO I model

There are 3 classes with approximately 400 SLOC in the first implementation
- Average 130 SLOC
- Max 200 SLOC
- Approximate 1200-1800
- Estimation 1500 SLOC
COCOMO I model

- Effort = 3.2*(1.500)^1.05 = 4.9 person-months
- Time = 2.5*(4.9)^0.38 = 4.6 months
- Productivity = 1500/8 = 350 LOC-month
- Staff = 4.9/4.6 = 1 person

As in Organic mode,
- C1 = 3.2
- C2 = 2.5
- P1 = 1.05
- P2 = 0.38

Project Plan

- Phase 1: March - April
  - Vision Doc, Project Plan, SQA Plan, Prototype
  - First Presentation – before end of April
- Phase 2: April - June
  - Second Presentation – mid of June
- Phase 3: June - August
  - Final Presentation – beginning of August
Software Quality Assurance

- Formal Technical Inspection
- Presentation – three phases
- Unit Test
- Integration Test
- System test

Software Elaboration Plan

- Updating Vision Doc. and Project Plan
- Architecture Design
  - Class diagram
  - Use Cases
- Formal Requirement Specification
  - UML/OCL methodology
  - Architecture Design
- Test Plan
Software Elaboration Plan (Cont)

- Formal Technical Inspection
  - Class Diagram
  - Acharaporn Pattaravanichanon
  - Ravikanth Athipatla
- Executable Prototype
  - Demonstrate driving requirements

Demonstration

- Prototype I
- Sending/Receiving unicast message
- Sending/Receiving multicast message
Conclusion

- Background, problems and goals
- Requirements
- Cost Estimation – COCOMO
- Project Plan
- Software Quality Assurance
- Architecture Elaboration Plan
- Demonstration