Homework 3 - 4 (16-11-2007)

Submission Deadline (05-12-2007)

Question 1: Agent Percept to Action mapping, reasoning in Uncertainty

Download and install Wumpus and develop a behavior of the Wumpus Hunter Agent.
For assistance consult Hamid Reza Mezani's presentation from last year.

Goal of Agent Behavior: Agent would be able to fetch gold and avoid the Wumpus and pits.

Question 2: Ontologies for Communication and Auction Protocols

Extend the example given in "Appendix A" of JADE Programmer's Guide to the following scenario

1. Develop a Simple Ontology for Mobile-Phones in JADE, which will be used for Auctioning (i.e. Ontology should consider basic/necessary concepts for such process).
2. Consider
   a. FIPA Dutch Auction Interaction Protocol
      i. http://www.fipa.org/specs/fipa00031/XC00031F.html
   b. FIPA English Auction Interaction Protocol
      i. http://www.fipa.org/specs/fipa00032/XC00032F.html

   Develop the protocols in JADE and use the Ontology developed in '1' for Communication between Initiator and participant.

A simple example of Ontology in JADE
http://www.ryerson.ca/~dgrimsha/courses/cps720/Resources/JADE/Jade24Appendix.pdf

Question 3: Develop utility functions and establish Nash equilibrium

Consider your P2P file-sharing application. The application depends upon voluntary participation. We need to avoid free-riders and benefit those who benefit others.

We consider the following definitions
"Agents/Peers that contribute more in system, should get better Quality of Service" &
"Agents reward other Agents in proportion of their contribution in System"

Consider the following parameters

N'	Number of blocks in file
N	Number of Peers/Agents in System
A_1, A_2 … A_N	N Peers/Agents in System
$Utility_i$	Utility of A_i
$Cost_i$	Cost incurred by A_i to sending 01 block of file
$Benifit_{i,j}$	Benefit caused by A_i to A_j (i /= j i.e. benefit is not to oneself but only to others) $Benifit_{i,j}$ = 0 (if no connection or '0' blocks transferred by A_i to A_j)
$Benefit\_Average_i$	Average benefit/contribution caused by A_i
$Request\_Accept\_Function_i$ ($Request_j$)	Function for A_i using which A_i will either accept or reject request from A_j **Hint:** KaZaA uses Participation_Level = (Upload in MB)/(Download in MB*100)

1. Develop a Utility Function for Agents given the above parameters.
2. Incorporate the Utility Function in your File Sharing Application (just incorporation of few conditions before sending a block)
3. Establish Nash Equilibrium in your File Sharing Application.
   a. You should be able to show Convergence of System to Nash Equilibrium for 03 – 04 Agent System, but your utility function should be general for N Agents/Peers.

Question 4: AOSE and Mobility

Extend Q1-HW2 (Iterated Contract Net Protocol) for intra-platform mobility.

Consider a Manager agent in a Manager-Agent-Container and two separate containers for two separate/different contractor types (e.g. Contractors from Gothenburg and Contractors from Stockholm).

Manager agent clones 02 agents; each of which moves to a different 'contractor agent container' and executes Iterated Contract Net Protocol with the contractor agents in that container. (I.e. one clone for contractors from Gothenburg and one for Stockholm contractors)

For sake of simplicity considers only two contractors in each 'contractor agent container'. One being the actual contractor agent and other being its clone.

Upon the end of execution the clones migrate back to their home container, share best price obtained among them and announce the best price offered from any of the contractors. (I.e. Contractor X from XYZ is offering best price XYZ)

1. Model the above using GAIA AOSE Methodology (slides 14–40 from AOSE Lecture Notes). Produce all models
    a. Analysis Models: Role model, Interaction model.
    b. Design Models: Agent Model, Service Model and Acquaintance model.
2. Develop the above scenario in JADE. http://www.iro.umontreal.ca/~vaucher/Agents/Jade/Mobility.html
3. Using the example (slides 45–46 from AOSE Lecture Notes). Draw a complete protocol diagram. You can find a number of tools for AUML from http://www.auml.org/

Deliverables

Documented Source Code (with instructions for execution) and Report for Q3, Q4 (part 1, 3) emailed by deadline (5th December) to ahaseeb@kth.se with Subject "DAIIA07 HW3-4"

Time Slots for Demo:
Friday 7th December: 10 am. – 5 pm. Slots sheet will be on 8th Floor elevator C.