Agent-Oriented Software Engineering

Question 1 (40%)

In the MaSE methodology, *Communication Class Diagrams* (CCD) are a set of finite state machine (FSM) diagrams that define the conversation states that each agent may be in (one FSM for each participating role). FSMs are like statecharts with only START, END and BASIC nodes. BASIC nodes can have *entry* and *do* actions.

The transition expressions are in the form e $[c]$ ^ a where all e, $[c]$ and ^a are optional Events e are incoming messages, while actions a are outgoing messages. A message (incoming outgoing) is defined by its performative and optional arguments (variables) in parenthesis. E.g. *acknowledge* or *reportingStatus(status)*. A condition is either a unary expression with a variable name optionally preceded by the negation operator (!) or a binary expression of variables and numeric values connected with the operators <, >, <=, >=, ==, !=, e.g. *isValid, e > 23, ! valid, a != b*. Variables start with a letter and can contain letters, digits or the underscore (-).

   a. Define the meta-model for MaSE *Communication Class Diagrams (CCD)* (25%).
   b. Define the EBNF grammar for the CCD transition expressions (15%)

Question 2 (60%)

I want to design a system where agents serve users, and, based on their profiles (and learnt preferences), they make investment choices, based on the competitive products that are offered by the agents representing banks at the time of the investment. The user agents need to be able to locate bank representatives and their products available worldwide for them. They also need a confirmation by their user for making a purchase. Banks representatives sell their investment products and want to maximize their profit by up-selling when a user selects a product (e.g. propose a better gain by investing more money or support an investment with insurance). Bank associations have information about registered banks and about the countries to which their products are available.

   a. What stakeholders are in this system? Define the ASEME SAG model or the Tropos Actor diagram for these requirements. (15%)
   b. What types of agents do you see in this system? (5%)
   c. What are their suggested intrinsic and extrinsic properties (Weiss 2013)? (5%)
      Suggestion: Make a table with the properties in rows and agent types in columns
   d. How many interaction protocols do you need for this system? Name them. (5%)
   e. Define the protocols in the analysis phase using the ASEME AIP or AUML AIP model. (15%)
   f. Define **one** of the above protocols in the design phase using the ASEME EAC or MaSE CCD model (15%)