University College Dublin
An Coláiste Ollscoile, Baile Átha Cliath

SEMESTER I EXAMINATIONS

ACADEMIC YEAR 2017/2018

COMP 30240 & COMP 41400

Multi-Agent Systems

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Time Allowed: 2 Hours

Instructions for Candidates

Answer any two questions. All questions carry equal marks
Total marks available 100.

Instructions for Invigilators

Q.1 (a) Explain what is meant by the term *agent*;

Differentiate between the weak notion of agenthood and the strong notion of agenthood;

[10 Marks]

(c) Describe the Contract Net Protocol.

Illustrate the various stages involved in the protocol using a UML *Sequence Diagram*.

[15 Marks]

(c) Discuss the limitations often associated with the Contract Net Protocol.

[15 Marks]

(d) Briefly outline how Norm-based Contract Net Protocol could address efficiency and effectiveness limitations of the coordination processes in a multi-agent system.

[10 Marks]

Q.2. (a) Explain the essence of Speech Act Theory and why this has been so influential within the development of Multi-Agent Systems (MAS).

[15 Marks]

(b) Enumerate and briefly describe motivations for the adoption of mobile agents.

[15 Marks]

(c) Briefly contrast *weak migration* and *strong migration* within agent mobility.

[10 Marks]

(c) Within the context of Java based agent prototyping systems explain why they offer weak migration rather than strong migration.

[10 Marks]

Q.3 (a) Explain in detail what is understood by the term *Belief Desire Intention Architecture (BDI)*.

[10 Marks]

(b) Explain the operation of an Abstract BDI Agent Interpreter.

Describe in detail the generic core cycle that underpins the operation of a Belief Desire Intention (BDI) architecture.

Support your answer with a diagram illustrating the core cycle undertaken by the interpreter.

[20 Marks]

(c) Explain and describe the specialisation of this abstract architecture that is incorporated into AgentSpeak (L).

Explain the generic data structures that need to be accessed and manipulated in the Agentspeak(L).

[20 Marks]

Q.4. (a) Briefly differentiate between *Epistemic Logic* and *Temporal Logic*.

[20 Marks]

(b) Contrast *linear time temporal logic* and *branching time temporal logics*.

[15 Marks]

(c) Within the following tree assume that S is some point in time. The arcs within the tree represent possible future worlds. For each world state those concepts that are believed by an agent to be true are depicted by the notation {x,v,g} indicating that x, v and g are all believed to be true within that particular future world state.

For State S express using branching time temporal logical formula(e) those relationship(s) that hold true at the states and paths contained within the diagram.

[15 Marks]