**University of Msila**

**Faculty of Mathematics and Computer Science 16/1/2024**

**Department of Computer Science Duration : 1H 30**

 **Technology of Agents Exam (**1st year of Master's AI**)**

**First name : ………………………………….Last name :……………… ….……………………….**

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* **Course Comprehension Questions (12 pts) :** put a cross on the **correct answers**

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| **1-**  **Multi-agent systems are inspired from :**  |
| - Artificial Intelligence (AI)- Distributed Artificial Intelligence (DAI) **X**- Expert Systems |
| **2- The autonomy of an agent means:** |
| * **-** That an agent can make operational decisions  **X**
* **-** That an agent can make decisions regarding tasks execution **X**
* **-** That an agent can make decisions regarding resource utilization  **X**
 |
| **3- In a Multi-agent system (** MAS**), negotiation follows a protocol: :**  |
| * - Propose, evaluate, accept, or refuse  **X**
* - Propose, evaluate, decide
* - Propose, evaluate, respond
 |
| **4- Point-to-point message sending is preferred:**  |
| * - In MAS composed of reactive agents
* - In MAS composed of cognitive agents  **X**
* - In MAS composed of hybrid agents
 |
| **5- Negotiation allows resolving:**  |
| * - Cooperation between agents
* - Coordination between agents
* - Conflicts between agents  **X**
 |
| **6- Interaction among agents means:** |
| * - Communication between agents
* - All relations between agents  **X**
* - Sending messages between agents
 |
| **7- In the ACL language, the createreply primitive allows:** |
| * - Inserting the local name of an agent
* - Inserting the adress of an agent  **X**
* - Inserting The message language
 |
| **8- The Remote Monitoring Agent (RMA) in the JADE platform allows :** |
| * - Managing the operations of agents
* - Adding or removing agents  **X**
* - Adding or removing containers  **X**
 |
| **9-**  The method **action()** means : |
| - what the behaviour actually does  **X**- what the agent actually does - what the environnment actually does  |
| **10- The resolution of conflicts is done through:** |
| * - **Negotiation X**
* **- Task distribution**
* **- Arbitration (arbitrage) X**
 |
| **11- A cyclic behavior of an agent can be stopped by:**  |
| * - a **return()** statement  **X**
* - a **block()** statement  **X**
* - a **done()** function  **X**
 |
| **12- The DF (Directory Facilitator) in the JADE platform is an agent that:** |
| * Supervises other agents and their access to the platform.
* Provides a Yellow Pages service (cataloging available services).  **X**
* Facilitates routing for interactions between agents within and outside the platform
 |

* **Exercice 1 (4 pts) :** 1- Specify the role of each instruction.

 2- Explain the role of this code

|  |  |
| --- | --- |
| public class A1 extends Agent{ public void setup(){  this.addBehaviour(new OneShotBehaviour(){  public void action(){  System.out.println("I want to play !");  ACLMessage Msg = new ACLMessage(); Msg.setContent("Go"); Msg.setSender(this.myAgent.getAID());  Msg.addReceiver(new AID(new String("B1"),  AID.ISLOCALNAME));  this.myAgent.send(Msg); } }); } } public class B1 extends Agent{ public void setup(){  this.addBehaviour(new CyclicBehaviour (){  public void action(){  ACLMessage Msg = this.myAgent.receive();  if (Msg != null) {  System.out.println("a message is received from the agent: "+ this.myAgent.getLocalName());  if (Msg.getContent().equals("Go")) { System.out.println("the message received is: Go");  ACLMessage Msg1 = Msg.createReply();  Msg1.setContent("OK");  this.myAgent.send(Msg1);  System.out.println("a messageOK is sent "); } } else{ block(); } } } |  -Declaration of the class A1* Declaration of the method setup(tasks)
* Adding oneshotbahaviour to the agent
* Define tasks of the agent (action)

 -creating new ACL message- setting the content of the message at GO- setting the sender address at the actual agent adress- setting the receiver address at the B1 adress- sending the message- Declaration of the class B1* Declaration of the method setup(tasks)
* Adding cyclicbahaviour to the agent
* Define tasks of the agent (action)

 -receiving an ACL message-testing the contenent of the message if not empty- printing :a message is received from the agent A1-testing the contenent of the message if = Go-printing :the message is received is Go- creating a reply- setting the content of the message at OK- sending the message- printing :a message OK is sent- if the message content is not GO blocking the agent |
| * 1. This code allows two agents A1, B1 to exchange messages :

A1 send GO to B1 B1 replying according to the message received by OK or bloking |

* **Exercice 2 (4 pts) : Specify the role of the following primitives**:

|  |  |
| --- | --- |
| **takeDown**() | Called before an agent is deleted |
| **done**() | Testing Whether the behaviour is finished |
| **myAgent.getAID()** | Obtain the address of the agent actually running |
| **reply.setPerformative** | Setting the performative of a reply to a massage |

**Bon Courage**