U.PORTO
FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

Agents and Multi-Agent Systems

M.EIC
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Course Webpage

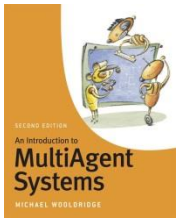
- Course webpage in *Moodle*
  - Slides
  - Lesson planning
  - Assignments
  - Resources (software and others)
  - Discussion forum
  - Information

Syllabus

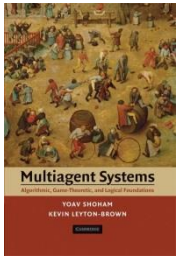
- Agent-based computing: Motivation and goals; Tools for MAS development
- Intelligent agents: Definitions; Agents and environments; Agent architectures; Deductive reasoning agents; Practical reasoning: BDI agents; Reactive agents: the subsumption architecture
- Introduction to agent-based simulation: Agent-based modeling and simulation (ABMS); Elements of an ABMS tool
- Multi-agent systems: Definitions; Communication; ACL; FIPA standards; Interaction protocols; JADE; Agent-Oriented Software Engineering
- Multi-agent decision making: Game theory; Cooperative game theory; Mechanism design; Social choice theory; Auctions; Negotiation
- Reinforcement Learning: Policies, rewards, and value functions; Bandit problems; Markov decision processes; Temporal-difference learning; Sarsa and Q-learning; Policy gradient methods; Deep reinforcement learning

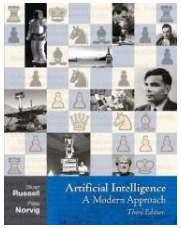
Bibliography

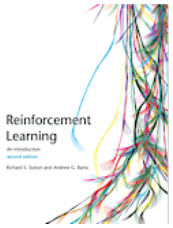
- Main
  - M. Wooldridge: ***An Introduction to MultiAgent Systems***, 2nd ed., John Wiley & Sons, 2009.
    http://www.cs.ox.ac.uk/people/michael.wooldridge/pubs/imas/IMAS2e.html



- Complementary
  - Y. Shoham, K. Leyton-Brown: ***Multiagent systems: Algorithmic, Game-Theoretic, and Logical Foundations***, Cambridge University Press, 2008.
    http://www.masfoundations.org/
  - S. Russel, P. Norvig: ***Artificial Intelligence: A Modern Approach***, 3rd ed., Prentice Hall, 2009.
    http://aima.cs.berkeley.edu/
  - R. S. Sutton, A. G. Barto: ***Reinforcement Learning: An Introduction***, 2nd ed., MIT Press, 2018.







Evaluation

- 2 practical group assignments (70%)
  - Assignment 1 (70%)
    - Multi-Agent System
  - Assignment 2 (30%)
    - Agent/Multi-Agent Learning

- Exam (30%)
  - Moodle

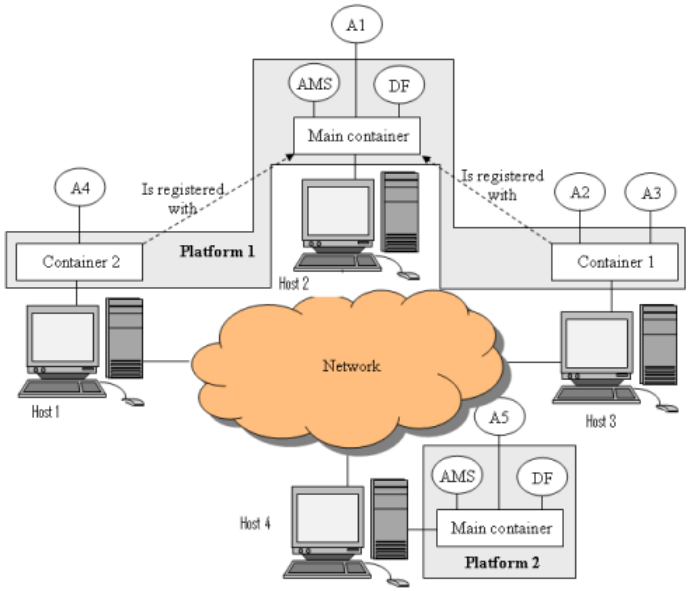
Important Dates

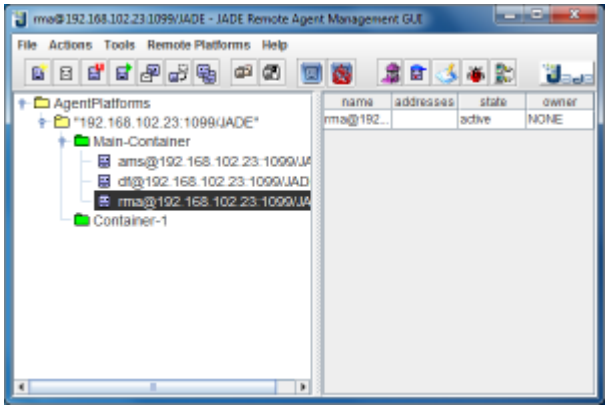
- Assignment 1
  - Delivery: April 05
  - Presentation: April 08
- Assignment 2
  - Delivery: May 17
  - Presentation: May 20
- Exam
  - June

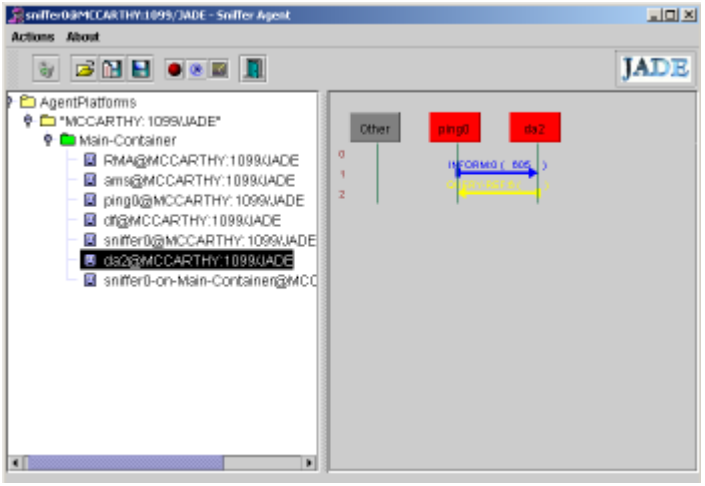
Software

JADE

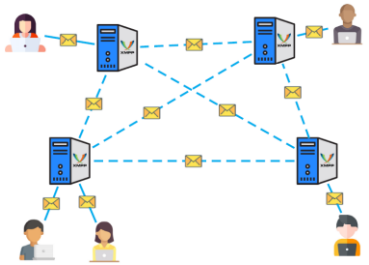
Java Agent Development Environment







Software



SPADE

Smart Python Agent Development Environment