Lab Activity #04 - Cognitive Agents and MAS for Pervasive Systems

Concepts

[*References (available in Selected Papers & Material / Agents folder, course web site):*
- *AOP and MAP - brief tutorial.pdf*
- *Agent Communication*]

Engineering Perspective on Agents and MAS
- Agents and MAS as a paradigm for designing and developing complex software systems
  - Agent-Oriented Software Engineering
  - Agent-Oriented Programming
- Models, Architectures and Programming Languages for Designing and Developing Agents and Multi-Agent Systems

Focus

- Cognitive Agents - as based on Cognitive Architectures
  - main case: BDI Architecture / agents
    - AgentSpeak(L) abstract language
    - Jason concrete implementation

- Multi-Agent Oriented Programming
  - agent, environment, organisation as first-class modeling, design and programming dimensions
    - environment as first-class modeling, design, programming dimension
      - A&A conceptual model
    - modeling agent organisation
      - Moise model

- Integration with the other architectural styles / mainstream technology (e.g. integration with service-oriented architectures & IoT)
  - exploiting the environment first-class abstractions

[Further reference: *Multi-Agent Oriented Programming* (O. Boissier, R. Bordini, J. Hubner, A. Ricci). MIT Press – digital copy on the shared repo (in papers & materials)]

Practice

Seeing some concepts in practice using the JaCaMo Technology

- JaCaMo Technology
  - https://jacamo.sourceforge.net

    - https://github.com/jacamo-lang/jacamo
- Getting started
    - https://github.com/jacamo-lang/jacamo/blob/master/doc/install.adoc
        - suggested options: either Gradle or Docker
- Suggested editor / development approach
    - Visual Studio Code + plugin: https://github.com/TabajaraKrausburg/JaCaMo4Code
    - Eclipse plugin was nice but it is no more maintained

Smart Room case study

First step – Designing and implementing the smart room agent as a Jason agent in a JaCaMo MAS

- using artifacts to implement proxies to interact with thing services

Second step – Extending the view (only discussed)

- Designing and implementing a smart building as a JaCaMo MAS
    - using different workspaces to distribute the MAS
        - a workspace for each room
        - multiple smart room agents each running on a different workspace
- Adding a semantic layer – ref. Prof. Ciortea's seminar / lecture
- Exploiting MAS organisations to model agents playing different roles & different missions

Deliverable

- Brief description about how the smart room has been designed and implemented using agents
- Source code

The deliverable can be a zipped file containing a folder organised as follows

```
activity-04
      smart-room-with-agents
            src
                  <sources>
            doc
                  report.pdf | report.md
      smart-building-with-dt
            src
                  <sources>
            doc
                  report.pdf | report.md
```

The deliverable can be submitted using the link `Activity-04 deliverable` on the course web site.

Deadline: No deadlines