Exposing agents as web services: a case study using JADE and SPADE

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Goals

In the present work:

- Expose agents as Web Services
  - Focused on interoperability and protocols
  - Use of MAS platforms in conjunction of Web paradigms

In future work:

- Explore scalability and performance of MAS platforms

Agents and Web Services

- Enabling different applications to interact between themselves
  Interoperability (REST, SOA)
- A service can be discoverable and described
- Applications using agents in conjunction with Web Services

MAS Platforms

- Criteria:
  - 1st - MAS Platforms currently active (used and supported by the community)
  - 2nd - BDI support
- Evaluated Platforms:
  - 1st - JIAC V, JaCaMo, SPADE, JADE and SARL
  - 2st - JaCaMo, SPADE and JADE
- Selected Platforms:
  - JADE and SPADE

Comparison Criteria

- BDI support
- FIPA-compliant:
  - Directory Facilitator (DF), Agent Management System (AMS).
- Agent Communication Language
  - (Ex: FIPA-ACL and KQML)
- Multiplatform
- Explicit organization representation
  - (roles, hierarchy, norms,…)
- Ontologies
  - (share, reuse and consume information)

JADE and SPADE Platforms

	JADE	SPADE
BDI support	✗	✗
FIPA-compliant	✗	✗
Multiplatform	✗	✗
Explicit organization representation		
Ontologies	✗	

Case study

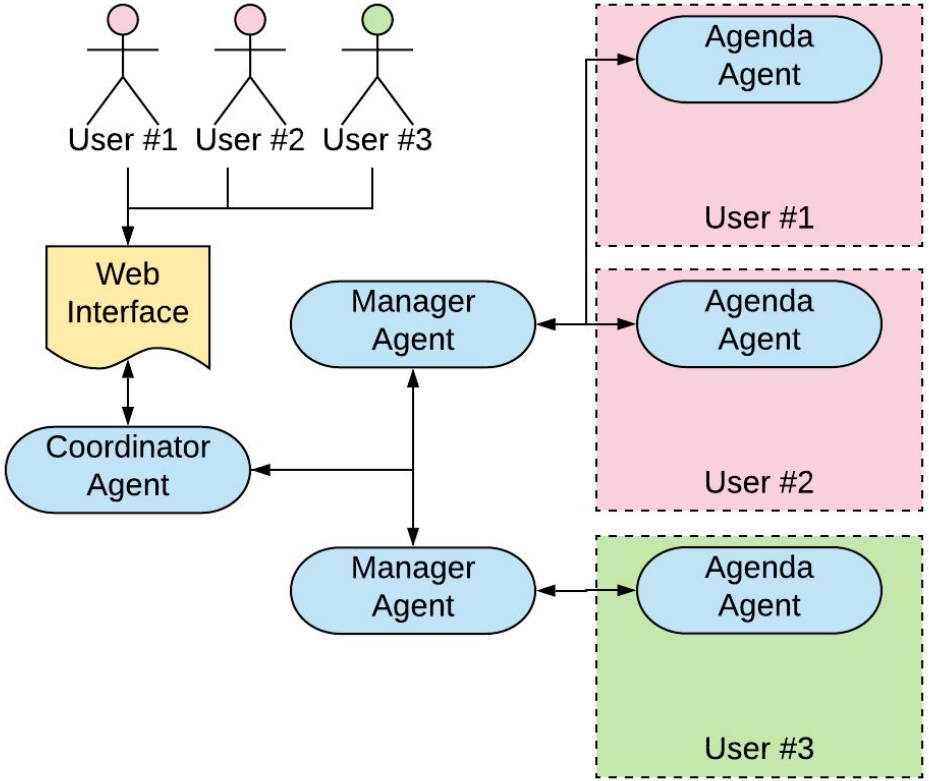
Smart Agenda MAS[1]

- Idea:
  - simple MAS to expose agents as Web Services
  - agent-based personal assistant
  - scalable MAS
- Goal:
  - mapping the requirements to expose agents as Web Services considering: interoperability, technologies and scalability

[1] Casals et al. 2018 in “Exposing Agents as Web Services in Jade”, Engineering Multi-Agent Systems, 2018

Smart Agenda MAS

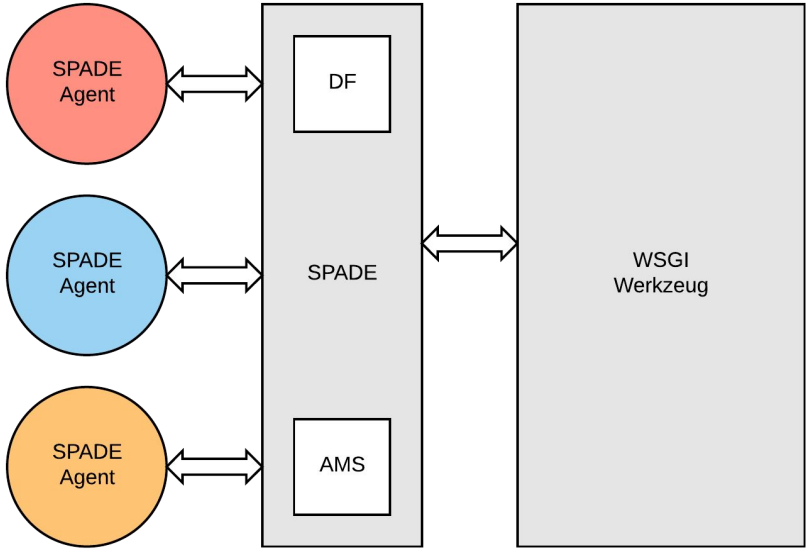
- Events: Individual and in group
    - users have preferences: accommodation, transportation means, and periods of the day
    - events have degree of priority
    - groups: events mandatory or not
- Coordinator agent: handler all requests between the user and the system
- Manager agent: responsible for a number of Agenda agents and intermediate group communication
- Agenda agent: schedule events and handler conflicts



Implementation architecture for the Smart Agenda agents - adapted from [Casals et al. 2018]

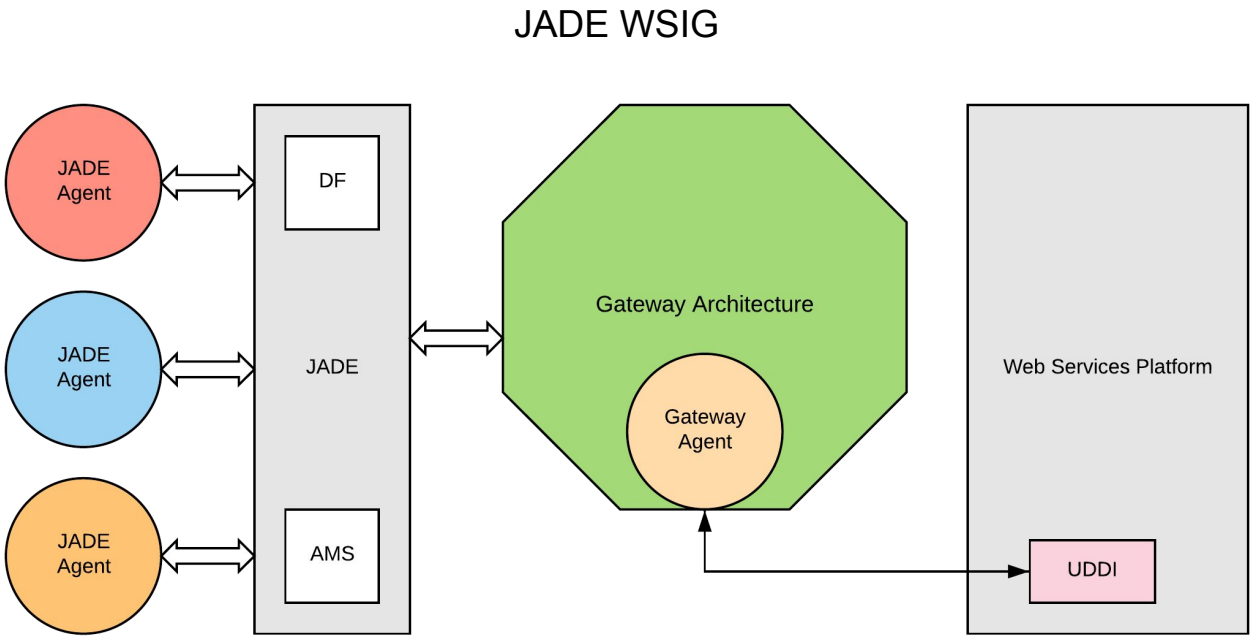
Implementation - SPADE 2.*

SPADE with Werkzeug



Werkzeug: https://werkzeug.palletsprojects.com/en/0.15.x/

Implementation - JADE



Conclusion

- Lack of documentation in JADE
- Absence of an intermediary between web and agents in SPADE

Acknowledgements

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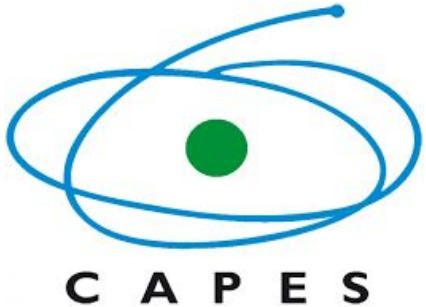

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Thank you!

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