AgentSpeak(L)

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AgentSpeak(L)

- Programming language for agents
  - Based on the BDI model
  - Based on first-order logic
- Originally developed by Rao (1996)
- AgentSpeak(L) programs can be executed by the Jason interpreter

AgentSpeak(L)

- Main language constructs:
  - Beliefs
  - Goals
  - Plans
- Main components of the architecture of an agent:
  - Belief Base
  - Plan Library
  - Set of Events
  - Set of Intentions

Control Loop

- Receive events
  - Internal and external
- Handle events
  - Look for matching plans (= options/desires)
  - Chose a plan to execute (= intention)
  - Execute plan
    - Might generate new events thereby

Beliefs and Goals

- Beliefs: information about the environment
  - `at(X)`

- Goals: states that an agent wants to effect
  - Achievement goals
    - `!at(`**`x`**`)`
    - Wanted state: atom is a true belief
  - Test goals
    - `?at(`**`x`**`)`
    - Wanted state: test if the atom is a true belief

Events

- Agent needs to react to changes
- Events happen as a consequence to changes
  - External event: belief update (envt. changes)
  - Internal event: goals change
- 6 Types: addition / deletion of beliefs / goals
  - `± b(t)`
  - `± !g(t)`
  - `± ?g(t)`
- Agent reacts to events by executing plans

Plans

- Event-invoked
  - Specify how to react to an event
  - Specify how to achieve goals
- *Plan library* available to the agent

- Plan structure:
  - Triggering event
  - Context
  - Body

Plan Structure

- Syntax: `TriggerEvent : context <- body .`

- Triggering Event
  - The event that the plan can handle
- Context
  - Beliefs that must hold for the plan to be applicable
- Body
  - A sequence of actions or goals

Examples

- Example 1:

```
+need(It) :
price(It,P) & bank_balance(B) & B>P
<- !buy(It).
```

- Example 2:

```
+!location(X)
:    not location(X) & safe_path (X)
<-   move_towards(X);
     !location(X).
```

Summary

- Agent = a set of initial beliefs (& possibly a set of initial goals) & a set of plans
- Agent architecture:
  - Belief Base
  - Plan Library
  - Set of Events
  - Set of Intentions
    - Chosen applicable plan is added to the set of intentions for execution

Summary

- Perceive the environment
- Update belief base
- Select an event
- Retrieve all relevant plans
- Retrieve all applicable plans
- Select one applicable plan
- Select an intention
- Execute first step of an intention