Planning Techniques and Action Languages

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Research topics

- Temporal Planning
- Integration of Action Languages and Planning

Example

```
(:durative-action load truck
  :parameters (?t - truck ?l - location
                  ?o - cargo ?c - crane)
  :duration (= ?duration 5)
  :condition (and (at start (at ?t ?l))
                  (at start (at ?o ?l))
                  (at start (empty ?c))
                  (over all (at ?t ?l))
                  (at end (holding ?c ?o)))
  :effect (and
              (at start (holding ?c ?o))
              (at start (not (at ?o ?l)))
              (at end (in ?o ?t))
              (at end (not (holding ?c ?o)))))
```

Temporal Fast Downward

Fast Downward

- By Malte Helmert and Silvia Richter
- Sequential planning

Temporal Fast Downward

- Extension for temporal planning
- Joint work with Patrick Eyerich and Robert Mattmüller
- Runner up in last year's planning competition

Theses and Projects

Bachelor/Master/Diploma Theses, Projects and Practicals

Improvement of certain aspects

- e.g. complete implementation of invariant synthesis (Bachelor project or Master practical)

Contact persons: Patrick and Gabi

Necessary skills:

- Action Planning Course
- Programmings skills
  - Python or
  - C++

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The Action Language Golog

- Logic programming language
- One can constrain a system's (e.g. a robot's) behaviour on a high level, e.g. with
  - Nondeterministic choice of actions
  - Nondeterministic choice of arguments
  - Nondeterministic iteration (execute a command zero or more times)
  - if and while statements
  - Procedures

Advantage: As Golog is based on the situation calculus (using macros), there is a formal theory.

Theses

Bachelor/Master/Diploma theses

Several topics e.g.,

- Find a better translation from Golog to PDDL
- Integrate the concept of proper knowledge bases

Contact Person: Gabi

Necessary skills:

- Courses:
  - Logic for computer scientists
  - Theoretical computer science (Informatik III)
- Programming skills
- Interest in complexity issues