

STRIPS Representation

- State-based view of time.
- The actions are external to the logic.
- Given a state and an action, the STRIPS representation is used to determine
 - whether the action can be carried out in the state
 - what is true in the resulting state

STRIPS Representation: Idea

- Predicates are **primitive** or **derived**.
- Use normal rules for derived predicates.
- The STRIPS representation is used to determine the truth values of primitive predicates based on the previous state and the action.
- Based on the idea that most predicates are unaffected by a single action.
- **STRIPS assumption:** Primitive relations not mentioned in the description of the action stay unchanged.

STRIPS Representation of an action

The **STRIPS representation** for an action consists of:

preconditions A list of atoms that need to be true for the action to occur

delete list A list of those primitive relations no longer true after the action

add list A list of the primitive relations made true by the action

Qualification Problem in Planning

What preconditions must be fulfilled for an action to be carried out?

Example: Planning a trip

Operator "go_by_your_own_car" is applicable if

- you have an own car
- the car is operational
- the car has not been stolen
- a car key is available
- you are able to drive
- going by car is not prohibited
- there is no earth-quake
- the car is not going to explode

...

Frame Problem in Planning

What are the effects of an action?

Example: Planning a trip

Operator "go_by_your_own_car" has the following effects:

- change of location of car and its load
- fuel consumption
- production of exhaust fumes
- wear of moving car parts
- wear of road
- impediment of other traffic
- noise generation
- setting off a landslide

...

STRIPS Representation of “pickup”

The action *pickup*(*Ag*, *Obj*) can be defined by:

preconditions [*autonomous*(*Ag*), $Ag \neq Obj$, *at*(*Ag*, *Pos*),
sitting_at(*Obj*, *Pos*)]

delete list [*sitting_at*(*Obj*, *Pos*)]

add list [*carrying*(*Ag*, *Obj*)]

STRIPS Representation of “move”

The action $move(Ag, Pos_1, Pos_2)$ can be defined by:

preconditions [$autonomous(Ag)$, $adjacent(Pos_1, Pos_2, S)$,
 $sitting_at(Ag, Pos_1)$]

delete list [$sitting_at(Ag, Pos_1)$]

add list [$sitting_at(Ag, Pos_2)$]

Example Transitions

sitting_at(rob, o109).
sitting_at(parcel, storage).
sitting_at(k1, mail).

move(rob, o109, storage) \longrightarrow *sitting_at(rob, storage).*
sitting_at(parcel, storage).
sitting_at(k1, mail).

pickup(rob, parcel) \longrightarrow *sitting_at(rob, storage).*
carrying(rob, parcel).
sitting_at(k1, mail).

