Tema 2: Planificación inteligente

Ejercicio causal links, amenazas y construcción del plan

Dadas las siguientes acciones de un dominio:

WALK
Parameters: ?p:person, ?i:location, ?d:location
Conditions:
    at(?p)=?i
Effects:
    at(?p)=?d

LOAD_LUGGAGE
Parameters: ?t:taxi,?i:location, ?l:luggage
Conditions:
    at(?t)=?i   at(?l)=?i
Effects:
    at(?l)=?t

UNLOAD_LUGGAGE
Parameters: ?t:taxi, ?i:location, ?l:luggage,
Conditions:
    at(?t)=?i   at(?l)=?t
Effects:
    at(?l)=?i

CALL_TAXI
Parameters: ?t:taxi, ?d:location
Conditions:
Effects:
    at(?t)=?d

DRIVE_TAXI
Parameters: ?t:taxi, ?i:location, ?d:location
Conditions:
    at(?t)=?i
Effects:
    at(?t)=?d
    owe(?t)=taxi_rate(?i,?d)

GET_OUT_TAXI
Parameters: ?p:person, ?t:taxi, ?i:location
Conditions:
    at(?t)=?i   at(?p)=?t
    owe(?t)= 0
Effects:
    at(?p)=?i

GET_INTO_TAXI
Parameters: ?p:person, ?t:taxi, ?i:location
Conditions:
    at(?t)=?i   at(?p)=?i
Effects:
    at(?p)=?t

PAY_DRIVER
Parameters: ?p:person, ?t:taxi
Conditions:
    owe(?t)<=cash(?p)
Effects:
    cash(?p)-=owe(?t)
    owe(?t)=0

Function TAXI_RATE
Parameters: ?i:location, ?d:location
Return:
    $1.5 + 0.5*distance[?i][?d]$

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Dado el siguiente problema y el siguiente plan solución al problema:

ESTADO INICIAL

state1.location = {'me':'home', 'taxi':'center', 'bag':'home'}
state1.cash = {'me':20}
state1.owe = {taxi':0}
state1.luggage = {'me':'bag'}
state1.distance = {'home':{'airport':15, 'center':5, 'park':2},
                   'airport':{'home':15, 'center':9, 'park':17},
                   'center':{'home':5, 'airport':9, 'park':4},
                   'park':{'home':2, 'airport':17, 'center':4}}

PLAN:

CALL_TAXI ('taxi', 'home')
LOAD_LUGGAGE ('taxi', 'home', 'bag')
GET_INTO_TAXI ('me', 'taxi', 'home')
DRIVE_TAXI ('taxi', 'home', 'airport')
PAY_DRIVER ('me', 'taxi')
GET_OUT_TAXI ('me', 'taxi', 'airport')
UNLOAD_LUGGAGE ('taxi', 'airport', 'bag')

GOAL

goal1.location={'me':'airport'}

Indicar, para cada acción del plan, la acción que soporta cada una de sus condiciones y si existen amenazas que determinan un orden entre las acciones