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MSC Artificial intelligence & applications

CS814

COURSEWORK #3

Plan  
  
(move a a1 a4 g)

(move a a4 a5 g)

(move a a5 a6 g)

(move a a6 b4 g)

(move a b4 b7 g)

(pickup\_key k a b7 g2)

(move a b7 b8 g)

(move a b8 b9 g)

(pickup\_cookie c a b9 g1)

(move a b9 b8 g)

(move a b8 b7 g)

(move a b7 b4 g)

(move a b4 a6 g)

(move a a6 a5 g)

(drop\_cookie c a a5 g1)

(move a a5 a6 g)

(lock k a g g2 b4 a6)

(drop\_key k a a6 g2)

(move a a6 a5 g)

(move a a5 a4 g)

(move a a4 a1 g)

# Domain

(define (domain CookieMonster-Domain)

(:requirements :typing)

(:types agent location object monster gate grip1 grip2)

(:predicates

(ADJACENT ?l1 ?l2 - location)

(at\_agent ?a - agent ?l - location)

(at\_cookies ?c - object ?l - location)

(at\_keys ?k - object ?l - location)

(at\_mons ?m - monster ?l - location)

(holding\_cookies ?c - object ?g - grip1)

(holding\_keys ?k - object ?g - grip2)

(free\_1 ?g - grip1)

(free\_2 ?g - grip2)

(gat ?l1 ?l2 - location)

(open ?g - gate)

)

(:action move

:parameters (?a - agent ?from ?to - location ?g - gate)

:precondition (and (at\_agent ?a ?from)

(ADJACENT ?from ?to)

(or (and (gat ?from ?to) (open ?g))

(not (gat ?from ?to)))

)

:effect (and (at\_agent ?a ?to)

(not (at\_agent ?a ?from)))

)

(:action pickup\_cookie

:parameters (?o - object ?a - agent ?l - location ?g - grip1)

:precondition (and (at\_agent ?a ?l)

(at\_cookies ?o ?l)

(free\_1 ?g))

:effect (and (holding\_cookies ?o ?g)

(not (at\_cookies ?o ?l))

(not (free\_1 ?g))

)

)

(:action pickup\_key

:parameters (?o - object ?a - agent ?l - location ?g - grip2)

:precondition (and (at\_agent ?a ?l)

(at\_keys ?o ?l)

(free\_2 ?g))

:effect (and (holding\_keys ?o ?g)

(not (at\_keys ?o ?l))

(not (free\_2 ?g))

)

)

(:action drop\_cookie

:parameters (?c - object ?a - agent ?l - location ?g - grip1)

:precondition (and (holding\_cookies ?c ?g)

(not(free\_1 ?g))

(at\_agent ?a ?l))

:effect (and (at\_cookies ?c ?l)

(not (holding\_cookies ?c ?g))

(free\_1 ?g)) ;(not (empty ?location)

)

(:action drop\_key

:parameters (?c - object ?a - agent ?l - location ?g - grip2)

:precondition (and (holding\_keys ?c ?g)

(not(free\_2 ?g))

(at\_agent ?a ?l))

:effect (and (at\_keys ?c ?l)

(not (holding\_keys ?c ?g))

(free\_2 ?g))

)

(:action lock

:parameters (?k - object ?a - agent ?g - gate ?g2 - grip2 ?l1 ?l2 - location)

:precondition (and (holding\_keys ?k ?g2) ;the robot is holding keys

(or (at\_agent ?a ?l1) (at\_agent ?a ?l2));the agent is in the room he wants to leave

(open ?g)

(gat ?l1 ?l2)) ;(open ?gate)) ;the gate is open)

:effect (and (not (open ?g))) ;the gate will be closed

)

(:action unlock

:parameters (?k - object ?a - agent ?g - gate ?g2 - grip2 ?l1 ?l2 - location) ;the opposite as above

:precondition (and (holding\_keys ?k ?g2)

(or (at\_agent ?a ?l1) (at\_agent ?a ?l2))

(gat ?l1 ?l2)

(not (open ?g)))

:effect (and (open ?g))

)

)

Problem\*

(define (problem CookieMonster-Problem)

(:domain CookieMonster-Domain)

(:objects A1 A2 A3 A4 A5 A6 A7 A8 A9 B1 B2 B3 B4 B5 B6 B7 B8 B9 - location

l - location

;room1 room2 - location

a - agent

;room1 room2 - room

c k - object

g - gate

m - monster

g1 - grip1

g2 - grip2

)

(:init

(at\_agent a A1) (at\_cookies c B9) (at\_keys k B7) (at\_mons m B3) (open g) (free\_1 g1) (free\_2 g2)

(ADJACENT A6 B4) (ADJACENT B4 A6) (gat A6 B4) (gat B4 A6)

(ADJACENT A1 A2) (ADJACENT A2 A1) (ADJACENT A2 A3) (ADJACENT A3 A2)

(ADJACENT A4 A5) (ADJACENT A5 A4) (ADJACENT A5 A6) (ADJACENT A6 A5)

(ADJACENT A7 A8) (ADJACENT A8 A7) (ADJACENT A8 A9) (ADJACENT A9 A8)

(ADJACENT A1 A4) (ADJACENT A4 A1) (ADJACENT A4 A7) (ADJACENT A7 A4)

(ADJACENT A2 A5) (ADJACENT A5 A2) (ADJACENT A5 A8) (ADJACENT A8 A5)

(ADJACENT A3 A6) (ADJACENT A6 A3) (ADJACENT A6 A9) (ADJACENT A9 A6)

(ADJACENT B1 B2) (ADJACENT B2 B1) (ADJACENT B2 B3) (ADJACENT B3 B2)

(ADJACENT B4 B5) (ADJACENT B5 B4) (ADJACENT B5 B6) (ADJACENT B6 B5)

(ADJACENT B7 B8) (ADJACENT B8 B7) (ADJACENT B8 B9) (ADJACENT B9 B8)

(ADJACENT B1 B4) (ADJACENT B4 B1) (ADJACENT B4 B7) (ADJACENT B7 B4)

(ADJACENT B2 B5) (ADJACENT B5 B2) (ADJACENT B5 B8) (ADJACENT B8 B5)

(ADJACENT B3 B6) (ADJACENT B6 B3) (ADJACENT B6 B9) (ADJACENT B9 B6)

)

(:goal (and (at\_agent a A1) (at\_cookies c A5) (at\_keys k A6) (not (open g)) (free\_1 g1) (free\_2 g2)

))

)