How to create your own applications with planning

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May 8, 2019

Topic 1: solve 8-puzzle problems

- Build domain model
  - A set of predicates

```
(:predicates (on ?x ?y)
             (ontable ?x)
             (clear ?x)
             (handempty)
             (holding ?x)
             )
```

  - A set of operators

```
(:action put-down
         :parameters (?x)
         :precondition (holding ?x)
         :effect
         (and (not (holding ?x))
           (clear ?x)
           (handempty)
           (ontable ?x)))
```

Topic 1: solve 8-puzzle problems (continued)

- Build objects, initial and goal states
  - Objects: all objects involved in your problem
  - Initial state: a full set of propositions
  - Goal state: a partial set of propositions

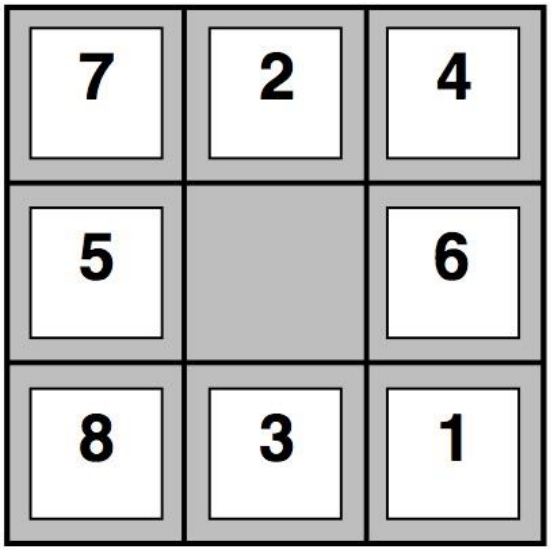
```
(:objects D A H G B J E I F C )
(:INIT (CLEAR C) (CLEAR F) (ONTABLE I) (ONTABLE F) (ON C E) (ON E J) (ON J B)
 (ON B G) (ON G H) (ON H A) (ON A D) (ON D I) (HANDEMPTY))
(:goal (AND (ON D C) (ON C F) (ON F J) (ON J E) (ON E H) (ON H B) (ON B A)
            (ON A G) (ON G I)))
)
```

Topic 1: solve 8-puzzle problems (continued)

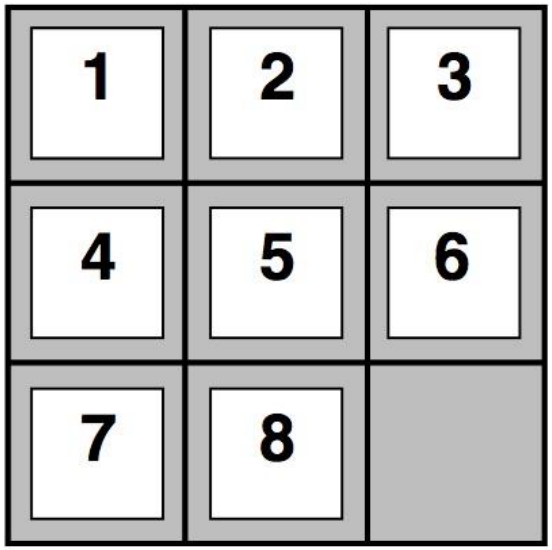
- Main issues:
  - How many predicates?
    - Specifying locations of objects
    - Specifying adjacency of locations
  - How many operators?
    - move-up, move-down, move-left, move-right
  - How many objects?
    - 8 objects: 1, 2, 3, 4, 5, 6, 7, 8
    - 9 locations: A, B, C, D, E, F, G, H, I

Topic 1: solve 8-puzzle problems (continued)

- Input your domain and problem files to:
  - http://editor.planning.domains
- Test your files via solving the following problem:



Start State

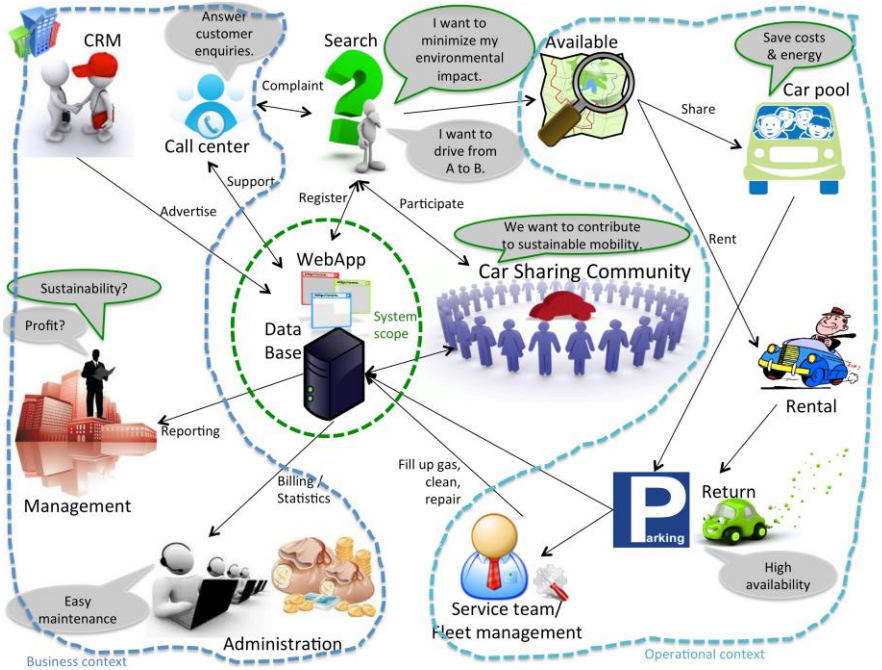


Goal State

Topic 2: car sharing system

- Predicates:
  - Locations of drivers
  - Locations of customers
  - Adjacencies of locations
  - Availability of drivers and customers
  - Cost functions – about road length?
- Operators:
  - move, pickup, dropoff
- Objects:
  - Drivers: $d_1, d_2, \ldots, d_k$
  - Customers: $c_1, c_2, \ldots, c_t$
  - Locations: $l_1, l_2, \ldots, l_h$
- Initial and goal states:
  - Status of objects

Replanning every other 5min!



Topic 3: Take-out scheduling system

- Objects ?
  - Orders
  - Runners
  - Maps
- Predicates ?
- Actions ?
- Initial and goal states ?

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The end!

Build your own applications easily!