

# 解决 8 数码问题

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## 解题思路：

对于 8 数码问题，为描述所有可能的状态，可以使用(`locate ?x - number ?y - position`)表示数字?`x` 是否在?`y` 位置上，使用(`neighbor ?x - position ?y - position`)表示位置?`x` 是否与位置?`y` 相邻。对于空白位置向上、下、左、右的移动操作均可以归结为一个动作：空白与其相邻数字交换位置。在描述 action 时，只需要三个参数：空白的位置、数字、该数字的位置，只有当数字与空白相邻时才能交换它们俩的位置。

对于 8 数码问题，需要声明 9 个数字对象（0 表示空白）、9 个位置对象，初始化时需要说明 9 个数字对象所处的位置，同时也要说明 9 个位置对象之间的相邻关系，说明最后的目标时，只需声明 9 个数字对象的最终位置即可。

## 代码：

domain.pddl:

```
(define (domain puzzle)
  (:requirements :strips :equality :typing)
  (:types number position)
  (:predicates (locate ?X - number ?Y - position)
                (neighbor ?X - position ?Y - position))
  (:action slide
    :parameters (?blank_pos - position ?num - number ?num_pos -
position)
    :precondition (and (locate n0 ?blank_pos) (locate ?num ?num_pos)
(neighbor ?blank_pos ?num_pos))
    :effect (and (locate n0 ?num_pos) (not (locate n0 ?blank_pos))
(locate ?num ?blank_pos) (not (locate ?num ?num_pos))))
)
```

problem.pddl:

```
(define (problem prob)
```

```
(:domain puzzle)
(:objects n0 n1 n2 n3 n4 n5 n6 n7 n8 -number
          l0 l1 l2 l3 l4 l5 l6 l7 l8 -position)
(:init (locate n7 l0) (locate n2 l1) (locate n4 l2) (locate n5 l3)
        (locate n0 l4) (locate n6 l5) (locate n8 l6) (locate n3 l7)
        (locate n1 l8) (neighbor l0, l1) (neighbor l1 l0) (neighbor l0 l3)
        (neighbor l3 l0) (neighbor l1 l2) (neighbor l2 l1) (neighbor l1 l4)
        (neighbor l4 l1) (neighbor l2 l5) (neighbor l5 l2) (neighbor l3 l4)
        (neighbor l4 l3) (neighbor l3 l6) (neighbor l6 l3) (neighbor l4 l5)
        (neighbor l5 l4) (neighbor l4 l7) (neighbor l7 l4) (neighbor l5 l8)
        (neighbor l8 l5) (neighbor l6 l7) (neighbor l7 l6) (neighbor l7 l8)
        (neighbor l8 l7))
(:goal (and (locate n1 l0) (locate n2 l1) (locate n3 l2) (locate n4 l3)
            (locate n5 l4) (locate n6 l5) (locate n7 l6) (locate n8 l7)
            (locate n0 l8)))
)
```