



1. El problema del puzzle 8 también puede ser resuelto como un problema de planificación.

1	2	3
4	5	6
7	8	

Figura 1. Estado Inicial

1	2	3
4	5	
7	8	6

Figura 2. Estado Final

a) Podemos definir el problema con una única acción que sería:

```
operator slide(T,S1,S2)
pre: on(T,S1), tile(T), blank(S2), adjacent(S1,S2)
post: on(T,S2), blank(S1), ~on(T,S1), ~blank(S2)
```

Para tal caso debes hacer lo siguiente:

- 1) Incluir la acción *slide* en el fichero **domainPuzzle8.txt**
- 2) Escribir la descripción del estado inicial y final según las figuras 1 y 2 en el fichero **problemPuzzle8Facil.txt**.

```
start(
tile(t1), tile(t2), tile(t3),
tile(t4), tile(t5), tile(t6),
tile(t7), tile(t8), blank(s9),

on(t1,s1), on(t2,s2), on(t3,s3), on(t4,s4), on(t5,s5), on(t6,s6), on(t7,s7), on(t8,s8),
adjacent(s1,s2), adjacent(s1,s4), adjacent(s2,s3), adjacent(s2,s5), adjacent(s3,s6), adjacent(s4,s7),
adjacent(s4,s5), adjacent(s5,s8), adjacent(s5,s6), adjacent(s7,s8), adjacent(s6,s9), adjacent(s8,s9),
adjacent(s2,s1), adjacent(s4,s1), adjacent(s3,s2), adjacent(s5,s2), adjacent(s6,s3), adjacent(s7,s4),
adjacent(s5,s4), adjacent(s8,s5), adjacent(s6,s5), adjacent(s8,s7), adjacent(s9,s6), adjacent(s9,s8))

goal(
blank(s6))
```

3) Ejecuta el planificador

java -jar javagp.jar -nopddl -d domainPuzzle8.txt -p problemPuzzle8Facil.txt

y escribe el resultado:

INFORMACIÖN: Running planner, maximum memory: 247,5MB

INFORMACIÖN: Expanding graph

INFORMACIÖN: Extracting solution

INFORMACIÖN: Plan found with 1 steps

INFORMACIÖN: Planning took 280ms (0s)

INFORMACIÖN: Total memory used: 15,5MB

INFORMACIÖN: Plan found:

slide(t6,s6,s9)

INFORMACIÖN: Plan length: 1

```
C:\Users\marta\Desktop\planif>java -jar javagp.jar -nopddl -d ../puzzle/domainPuzzle8.txt -p ../puzzle/problemPuzzle8Facil.txt
INFORMACIÖN: Running planner, maximum memory: 247,5MB
INFORMACIÖN: Expanding graph
INFORMACIÖN: Extracting solution
INFORMACIÖN: Plan found with 1 steps
INFORMACIÖN: Planning took 280ms ( 0s )
INFORMACIÖN: Total memory used: 15,5MB
INFORMACIÖN: Plan found:
slide(t6,s6,s9)

INFORMACIÖN: Plan length: 1
```

4) Modifique la configuración inicial y final según las figuras 3, 4. y almacena en el fichero ***problemPuzzle8.txt***.

1	2	3
4	5	6
7	8	

Figura 3. Estado Inicial Propuesto

	1	2
3	4	5
6	7	8

Figura 4. Estado Final Propuesto

Inicial

```
start(
tile(t1), tile(t2), tile(t3),
tile(t4), tile(t5), tile(t6),
tile(t7), tile(t8), blank(s9),

on(t1,s1), on(t2,s2), on(t3,s3), on(t4,s4), on(t5,s5), on(t6,s6), on(t7,s7), on(t8,s8),
adjacent(s1,s2), adjacent(s1,s4), adjacent(s2,s3), adjacent(s2,s5), adjacent(s3,s6),
adjacent(s4,s7), adjacent(s4,s5), adjacent(s5,s8), adjacent(s5,s6), adjacent(s7,s8),
adjacent(s6,s9), adjacent(s8,s9), adjacent(s2,s1), adjacent(s4,s1), adjacent(s3,s2),
adjacent(s5,s2), adjacent(s6,s3), adjacent(s7,s4), adjacent(s5,s4), adjacent(s8,s5),
adjacent(s6,s5), adjacent(s8,s7), adjacent(s9,s6), adjacent(s9,s8))
```

4.1. Establezca el objetivo en base al espacio en blanco (blank(p1)), almacena en el fichero **problemPuzzle8Sec4.1.txt**. y vuelve a ejecutar el planificador
java -jar javagp.jar -nopddl -d domainPuzzle8.txt -p problemPuzzle8Sec4.1.txt

Objetivo

goal(blank(s1))

y escribe el resultado:

```
INFORMACIÖN: Running planner, maximum memory: 247,5MB
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 1 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 2 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 3 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Extracting solution
INFORMACIÖN: Plan found with 4 steps
INFORMACIÖN: Planning took 336ms ( 0s )
INFORMACIÖN: Total memory used: 15,5MB
INFORMACIÖN: Plan found:
slide(t8,s8,s9)
slide(t7,s7,s8)
slide(t4,s4,s7)
slide(t1,s1,s4)
```

INFORMACIÖN: Plan length: 4

```
C:\Users\marta\Desktop\planif>java -jar javagp.jar -nopddl -d ../puzzle/domainPuzzle8.txt -p ../puzzle/problemPuzzle8Sec4.1.txt
INFORMACIÖN: Running planner, maximum memory: 247,5MB
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 1 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 2 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 3 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Extracting solution
INFORMACIÖN: Plan found with 4 steps
INFORMACIÖN: Planning took 336ms ( 0s )
INFORMACIÖN: Total memory used: 15,5MB
INFORMACIÖN: Plan found:
slide(t8,s8,s9)
slide(t7,s7,s8)
slide(t4,s4,s7)
slide(t1,s1,s4)
INFORMACIÖN: Plan length: 4
```

4.2. Establezca el objetivo en base a las fichas (on(f1,p2)...), almacena en el fichero **problemPuzzle8Sec4.2.txt** y vuelve a ejecutar el planificador **java -jar javagp.jar -nopddl -d domainPuzzle8.txt -p problemPuzzle8Sec4.2.txt**

Objetivo

```
goal(on(t1,s2), on(t2,s3), on(t3,s4),on(t4,s5), on(t5,s6), on(t6,s7), on(t7,s8), on(t8,s9))
```

y escribe el resultado:

```
INFORMACIÖN: Running planner, maximum memory: 247,5MB
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 1 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 2 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 3 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 4 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 5 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Goals not possible with 6 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Extracting solution
INFORMACIÖN: Plan not found with 7 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Extracting solution
```

```
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.
.
```

```
INFORMACIÖN: Plan not found with 21 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Extracting solution
INFORMACIÖN: Plan found with 22 steps
INFORMACIÖN: Planning took 636286ms ( 636s )
INFORMACIÖN: Total memory used: 247,5MB
INFORMACIÖN: Plan found:
slide(t6,s6,s9)
slide(t5,s5,s6)
slide(t4,s4,s5)
slide(t7,s7,s4)
slide(t8,s8,s7)
slide(t6,s9,s8)
slide(t5,s6,s9)
slide(t3,s3,s6)
slide(t2,s2,s3)
slide(t4,s5,s2)
slide(t6,s8,s5)
slide(t8,s7,s8)
slide(t7,s4,s7)
slide(t6,s5,s4)
slide(t3,s6,s5)
slide(t5,s9,s6)
slide(t8,s8,s9)
slide(t7,s7,s8)
```

```
slide(t6,s4,s7)
slide(t3,s5,s4)
slide(t4,s2,s5)
slide(t1,s1,s2)
```

INFORMACIÖN: Plan length: 22

```
INFORMACIÖN: Plan not found with 21 steps
INFORMACIÖN: Expanding graph
INFORMACIÖN: Extracting solution
INFORMACIÖN: Plan found with 22 steps
INFORMACIÖN: Planning took 636286ms ( 636s )
INFORMACIÖN: Total memory used: 247,5MB
INFORMACIÖN: Plan found:
slide(t6,s6,s9)
slide(t5,s5,s6)
slide(t4,s4,s5)
slide(t7,s7,s4)
slide(t8,s8,s7)
slide(t6,s9,s8)
slide(t5,s6,s9)
slide(t3,s3,s6)
slide(t2,s2,s3)
slide(t4,s5,s2)
slide(t6,s8,s5)
slide(t8,s7,s8)
slide(t7,s4,s7)
slide(t6,s5,s4)
slide(t3,s6,s5)
slide(t5,s9,s6)
slide(t8,s8,s9)
slide(t7,s7,s8)
slide(t6,s4,s7)
slide(t3,s5,s4)
slide(t4,s2,s5)
slide(t1,s1,s2)

INFORMACIÖN: Plan length: 22
```

b) El problema puede ser definido mediante cuatro acciones (OPCIONAL)

```
operator moveUp (T,PX,PY,BY)
pre: tile(T), position(PX), position(PY), position(BY), dec (BY,PY), blank(PX,BY), at(T,PX,PY)
post: ~blank(PX,BY),~at(T,PX,PY),blank(PX,PY), at(T,PX,BY)

operator moveDown (T,PX,PY,BY)
pre: tile(T), position(PX), position(PY), position(BY), inc (BY,PY), blank(PX,BY), at(T,PX,PY)
post: ~blank(PX,BY),~at(T,PX,PY),blank(PX,PY), at(T,PX,BY)

operator moveLeft (T,PX,PY,BX)
pre: tile(T), position(PX), position(PY), position(BX), dec (BX,PX), blank(BX,PY), at(T,PX,PY)
post: ~blank(BX,PY),~at(T,PX,PY),blank(PX,PY), at(T,BX,PY)

operator moveRight (T,PX,PY,BX)
pre: tile(T), position(PX), position(PY), position(BX), inc (BX,PX), blank(BX,PY), at(T,PX,PY)
post: ~blank(BX,PY),~at(T,PX,PY),blank(PX,PY), at(T,BX,PY)
```

Para tal caso debemos repetir los puntos anteriores, observando el tiempo que toma al planificador la resolución del problema.