Artificial Intelligence

Port Planning

Field analysis

Entities:

- Dock
- Crane
- Container

Relations:

- **at:** connects a crane with a dock
  Indicates which dock a crane is located at
- **located:** connects a container with a dock
  Indicates which dock a container is located at
- **loaded:** συνδέει έναν γερανό με ένα container
  Indicates that a crane is loaded with a container
- **free:** refers to a crane
  Indicates that a crane is not loaded with a container
- **clear:** refers to a container
  Indicates that a container has no containers stacked on top of it
- **on:** connects a container with another
  Indicates that a container has another container stacked on top of it
  ondock: connects a container with a dock
  Indicates that a container is located on a dock and is not stacked on top of another container
- **road:** connects a dock with another
  Indicates that a dock is connected with another dock

Operands

Stack (A, B, C, D)

Stacks container A on top of B

container (A)	- clear (B)
container (B)	- ondock (A)
crane (C)	
dock (D)	+ on (A, B)
clear (A)	
clear (B)	
ondock (A)	
located (A,D)	
located (B, D)	
at (C, D)	

Unstack (A, B, C, D)

Places container A, which is stacked on top of B, on the dock

container (A)	- on (A, B)
container (B)	
clear (A)	+ clear (B)
on (A, B)	+ ondock (A)
located (A, D)	
located (B, D)	
at (C, D)	

ChangeStack (A, B, C, D, E)

Stacks container A, which is stacked on top of B, on top of C

container (A)	- on (A, B)
container (B)	- clear (C)
container (C)	
crane (C)	+ on (A, C)
dock (D	+ clear (B)
on (A, B)	
clear (A)	
clear (C)	
located (A, E)	
located (B, E)	
located (C, E)	
at (D, E)	

LoadFromDock (A, B, C)

Loads container A, from the dock, on crane B

container (A)	- free (B)
crane (B)	- ondock (A)
dock (C)	- located (A, C)
at (B, C)	
clear (A)	+ loaded (B, A)
free (B)	
located (A, C)	
ondock (A)	

LoadFromStack (A, B, C, D)

Loads container A, which is stacked on top of B, on crane C

container (A)	- free (C)
container (B)	- on (A, B)
crane (C)	- located (A, D)
dock (D)	
at (C, D)	+ loaded (C, A)
clear (A)	+ clear (B)
free (C)	
located (A, D)	
located (B, D)	
on (A, B)	

UnloadToDock (A, B, C)

Unloads container B from crane A on the dock

crane (A)	- loaded (A, B)
container (B)	
dock (C)	+ ondock (B)
loaded (A, B)	+ located (B, C)
at (A, C)	+ free (A)

UnloadToStock (A, B, C, D)

Unloads container B from crane A and stacks it on top of C

crane (A)	- loaded (A, B)
container (B)	- clear (C)
container (C)	
dock (D)	+ on (B, C)
loaded (A, B)	+ located (B, D)
at (A, D)	+ free (A)
clear (C)	
located (C, D)	

Goto (A, B, C)

Moves crane A from dock B to C

crane (A)	- at (A, B)
dock (B)	
dock (C)	+ at (A, C)
at (A, B)	
road (B, C)	

Problem analysis

Items:

1 crane (r1), 3 docks (d1, d2, d3), 3 containers (c1, c2, c3)

Initial state:

crane r1

dock d1, dock d2, dock d3

container c1, container c2, container c3

at(r1, d2)

located(c1, d1), located(c2, d2), located(c3, d1)

on(c3, c1), ondock(c1), ondock(c2)

free(r1)

clear(c2), clear(c3)

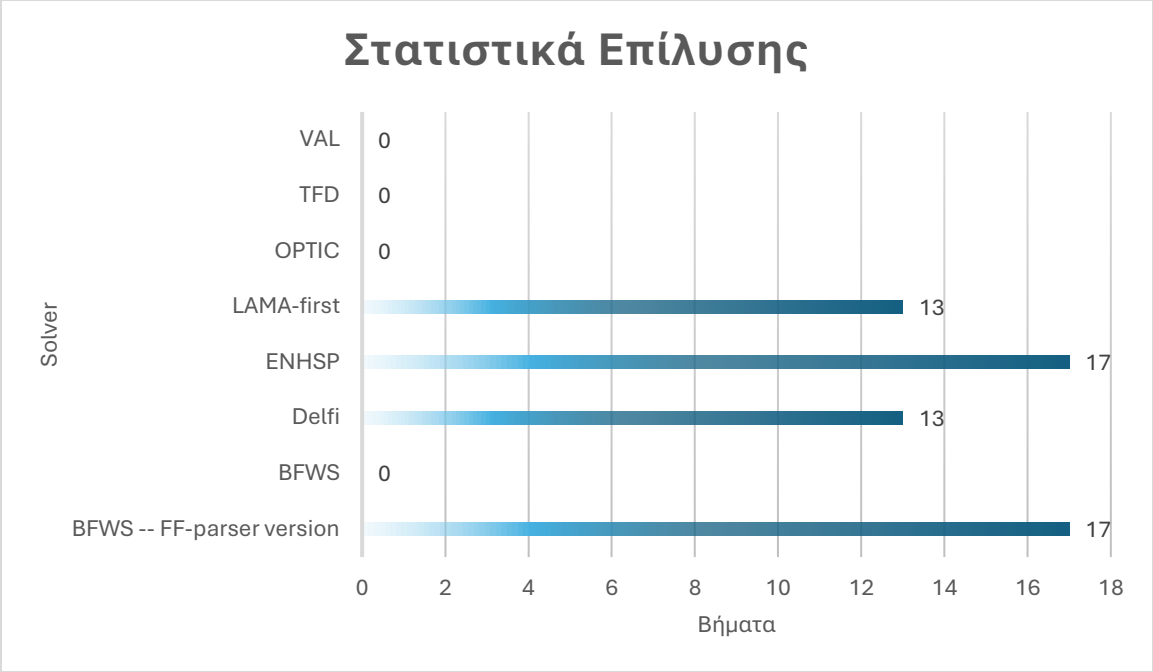
road(d1, d3), road(d3, d1), road(d1, d2), road(d2, d1)

Goals:

at(r1, d1)

located(c1, d3). Located(c2, d3), located(c3, d3)

ondock(c2), ondock(c3), on(c1, c2)



Algoriths with 0 steps, failed during execution and did not come up with a solution.