**Artificial Intelligence for Robotics 2**

**Assignment 1**

**Output problem 3**

**Problem 3 – standard configuration:**

Domain parsed  
Problem parsed  
Grounding..  
Light Validation Completed  
Simplification..  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
Grounding and Simplification finished  
|A|:54  
|P|:25  
|E|:25  
Size(X):18  
Size(F):47  
Delta time heuristic model:1.0  
Delta time planning model:1.0  
Delta time search-execution model:1.0  
Delta time validation model:1  
Setting horizon to:NaN  
Running WA-STAR  
Reachable actions and processes: |A U P U E|:104  
h(n = s\_0)=1940.0  
f(n) = 1940.0 (Expanded Nodes: 0, Evaluated States: 0, Time: 0.01)  
f(n) = 2429.0 (Expanded Nodes: 1, Evaluated States: 6, Time: 0.054)  
Starting Validation  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
Epsilon set to be:0.0  
Resolution for validation:1.0  
(Pddl+ semantics) Plan is valid:true  
Problem Solved  
0.00000: (m-move\_to\_crate-A crate3 m1 )  
0.00000: (m-move\_to\_crate-A crate3 m2 )  
(0.00000,3.00000)------>waiting  
3.00000: (m-at\_crates-A crate3 m1 )  
3.00000: (m-at\_crates-A crate3 m2 )  
3.00000: (m-load\_H-A crate3 m1 m2 )  
3.00000: (m-move\_create\_to\_loading\_bay-H crate3 m1 m2 )  
(3.00000,22.00000)------>waiting  
22.00000: (crate\_at\_loading\_bay-H crate3 m1 m2 )  
22.00000: (m-download-H crate3 m1 m2 )  
22.00000: (l-load crate3 l )  
(22.00000,26.00000)------>waiting  
26.00000: (crate\_on\_conveyor\_belt crate3 l )  
26.00000: (m-charging m1 )  
26.00000: (m-charging m2 )  
26.00000: (m-move\_to\_crate-A crate2 m1 )  
26.00000: (m-move\_to\_crate-A crate2 m2 )  
(26.00000,28.00000)------>waiting  
28.00000: (m-at\_crates-A crate2 m1 )  
28.00000: (m-at\_crates-A crate2 m2 )  
28.00000: (m-load-F\_A crate2 m1 m2 )  
28.00000: (m-move\_create\_to\_loading\_bay-H crate2 m1 m2 )  
(28.00000,36.00000)------>waiting  
36.00000: (crate\_at\_loading\_bay-H crate2 m1 m2 )  
36.00000: (m-download-F crate2 m1 m2 )  
36.00000: (l-load-F crate2 l )  
36.00000: (m-charging m1 )  
36.00000: (m-move\_to\_crate-A crate1 m1 )  
36.00000: (m-charging m2 )  
36.00000: (m-move\_to\_crate-A crate1 m2 )  
(36.00000,38.00000)------>waiting  
38.00000: (m-at\_crates-A crate1 m1 )  
38.00000: (m-at\_crates-A crate1 m2 )  
38.00000: (m-load\_H-A crate1 m1 m2 )  
38.00000: (m-move\_create\_to\_loading\_bay-H crate1 m1 m2 )  
(38.00000,42.00000)------>waiting  
42.00000: (crate\_on\_conveyor\_belt\_fragile-F crate2 l )  
(42.00000,52.00000)------>waiting  
52.00000: (crate\_at\_loading\_bay-H crate1 m1 m2 )  
52.00000: (m-download-H crate1 m1 m2 )  
52.00000: (m-charging m1 )  
52.00000: (m-move\_to\_crate crate4 m1 )  
(52.00000,53.00000)------>waiting  
53.00000: (m-at\_crates crate4 m1 )  
53.00000: (m-charging m2 )  
53.00000: (m-load crate4 m1 )  
53.00000: (l-load crate1 l )  
53.00000: (m-move\_create\_to\_loading\_bay crate4 m1 )  
(53.00000,57.00000)------>waiting  
57.00000: (crate\_at\_loading\_bay crate4 m1 )  
57.00000: (crate\_on\_conveyor\_belt crate1 l )  
57.00000: (m-download crate4 m1 )  
57.00000: (l-load crate4 l )  
57.00000: (m-charging m1 )  
(57.00000,61.00000)------>waiting  
61.00000: (crate\_on\_conveyor\_belt crate4 l )  
  
Plan-Length:106  
Duration:61.0  
Metric (Plan):0.0  
Metric (Search):91.0  
Planning Time:547  
Heuristic Time:322  
Search Time:349  
Expanded Nodes:111  
States Evaluated:200  
Fixed constraint violations during search (zero-crossing):0  
Number of Dead-Ends detected:9  
Number of Duplicates detected:50

**Problem 3 – opt-hmax configuration:**

Domain parsed  
Problem parsed  
Grounding..  
Light Validation Completed  
A\* with numeric hrmax  
Simplification..  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
Grounding and Simplification finished  
|A|:54  
|P|:25  
|E|:25  
Size(X):18  
Size(F):47  
Delta time heuristic model:1.0  
Delta time planning model:1.0  
Delta time search-execution model:1.0  
Delta time validation model:1  
w\_h set to be 1  
g\_h set to be 1  
Setting horizon to:NaN  
Running WA-STAR  
Hard Conditions: 8  
Simple Conditions: 67  
Reachable actions and processes: |A U P U E|:104  
h(n = s\_0)=28.0  
f(n) = 28.0 (Expanded Nodes: 0, Evaluated States: 0, Time: 0.016)  
f(n) = 45.0 (Expanded Nodes: 1, Evaluated States: 6, Time: 0.019)  
f(n) = 46.0 (Expanded Nodes: 3, Evaluated States: 13, Time: 0.021)  
f(n) = 47.0 (Expanded Nodes: 4, Evaluated States: 14, Time: 0.022)  
f(n) = 48.0 (Expanded Nodes: 8, Evaluated States: 29, Time: 0.025)  
f(n) = 49.0 (Expanded Nodes: 13, Evaluated States: 36, Time: 0.027)  
f(n) = 50.0 (Expanded Nodes: 59, Evaluated States: 157, Time: 0.041)  
f(n) = 51.0 (Expanded Nodes: 67, Evaluated States: 167, Time: 0.041)  
f(n) = 52.0 (Expanded Nodes: 92, Evaluated States: 214, Time: 0.046)  
f(n) = 53.0 (Expanded Nodes: 101, Evaluated States: 231, Time: 0.047)  
f(n) = 54.0 (Expanded Nodes: 107, Evaluated States: 251, Time: 0.049)  
f(n) = 55.0 (Expanded Nodes: 116, Evaluated States: 274, Time: 0.051)  
f(n) = 56.0 (Expanded Nodes: 126, Evaluated States: 293, Time: 0.052)  
f(n) = 57.0 (Expanded Nodes: 136, Evaluated States: 314, Time: 0.054)  
f(n) = 58.0 (Expanded Nodes: 163, Evaluated States: 352, Time: 0.058)  
f(n) = 59.0 (Expanded Nodes: 167, Evaluated States: 364, Time: 0.059)  
f(n) = 60.0 (Expanded Nodes: 171, Evaluated States: 376, Time: 0.06)  
f(n) = 61.0 (Expanded Nodes: 183, Evaluated States: 402, Time: 0.062)  
f(n) = 62.0 (Expanded Nodes: 197, Evaluated States: 429, Time: 0.064)  
f(n) = 63.0 (Expanded Nodes: 218, Evaluated States: 477, Time: 0.067)  
f(n) = 64.0 (Expanded Nodes: 255, Evaluated States: 549, Time: 0.072)  
f(n) = 65.0 (Expanded Nodes: 333, Evaluated States: 702, Time: 0.081)  
f(n) = 66.0 (Expanded Nodes: 551, Evaluated States: 1020, Time: 0.101)  
f(n) = 67.0 (Expanded Nodes: 727, Evaluated States: 1288, Time: 0.115)  
f(n) = 68.0 (Expanded Nodes: 1016, Evaluated States: 1675, Time: 0.136)  
f(n) = 69.0 (Expanded Nodes: 1183, Evaluated States: 1909, Time: 0.149)  
f(n) = 70.0 (Expanded Nodes: 1317, Evaluated States: 2100, Time: 0.159)  
f(n) = 71.0 (Expanded Nodes: 1447, Evaluated States: 2307, Time: 0.169)  
f(n) = 72.0 (Expanded Nodes: 1581, Evaluated States: 2512, Time: 0.179)  
f(n) = 73.0 (Expanded Nodes: 2086, Evaluated States: 3261, Time: 0.216)  
f(n) = 74.0 (Expanded Nodes: 2208, Evaluated States: 3425, Time: 0.224)  
f(n) = 75.0 (Expanded Nodes: 2679, Evaluated States: 4102, Time: 0.266)  
f(n) = 76.0 (Expanded Nodes: 2817, Evaluated States: 4260, Time: 0.273)  
f(n) = 77.0 (Expanded Nodes: 2962, Evaluated States: 4416, Time: 0.282)  
f(n) = 78.0 (Expanded Nodes: 3125, Evaluated States: 4644, Time: 0.291)  
f(n) = 79.0 (Expanded Nodes: 3402, Evaluated States: 5122, Time: 0.31)  
f(n) = 80.0 (Expanded Nodes: 4160, Evaluated States: 6161, Time: 0.347)  
f(n) = 81.0 (Expanded Nodes: 4987, Evaluated States: 7285, Time: 0.38)  
f(n) = 82.0 (Expanded Nodes: 5631, Evaluated States: 8154, Time: 0.409)  
f(n) = 83.0 (Expanded Nodes: 6163, Evaluated States: 8835, Time: 0.432)  
f(n) = 84.0 (Expanded Nodes: 6735, Evaluated States: 9580, Time: 0.452)  
f(n) = 85.0 (Expanded Nodes: 7317, Evaluated States: 10281, Time: 0.469)  
f(n) = 86.0 (Expanded Nodes: 8011, Evaluated States: 11154, Time: 0.487)  
Starting Validation  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
Epsilon set to be:0.0  
Resolution for validation:1.0  
(Pddl+ semantics) Plan is valid:true  
Problem Solved  
0.00000: (m-move\_to\_crate-A crate2 m1 )  
0.00000: (m-move\_to\_crate-A crate2 m2 )  
(0.00000,2.00000)------>waiting  
2.00000: (m-at\_crates-A crate2 m1 )  
2.00000: (m-at\_crates-A crate2 m2 )  
2.00000: (m-load-F\_A crate2 m1 m2 )  
2.00000: (m-move\_create\_to\_loading\_bay-H crate2 m1 m2 )  
(2.00000,10.00000)------>waiting  
10.00000: (crate\_at\_loading\_bay-H crate2 m1 m2 )  
10.00000: (m-download-F crate2 m1 m2 )  
10.00000: (m-charging m2 )  
10.00000: (m-charging m1 )  
10.00000: (m-move\_to\_crate-A crate1 m2 )  
10.00000: (m-move\_to\_crate-A crate1 m1 )  
(10.00000,12.00000)------>waiting  
12.00000: (m-at\_crates-A crate1 m1 )  
12.00000: (m-at\_crates-A crate1 m2 )  
12.00000: (m-load\_H-A crate1 m1 m2 )  
12.00000: (m-move\_create\_to\_loading\_bay-H crate1 m1 m2 )  
(12.00000,26.00000)------>waiting  
26.00000: (crate\_at\_loading\_bay-H crate1 m1 m2 )  
26.00000: (m-download-H crate1 m1 m2 )  
26.00000: (m-charging m2 )  
26.00000: (m-charging m1 )  
26.00000: (m-move\_to\_crate-A crate3 m1 )  
26.00000: (m-move\_to\_crate-A crate3 m2 )  
(26.00000,29.00000)------>waiting  
29.00000: (m-at\_crates-A crate3 m1 )  
29.00000: (m-at\_crates-A crate3 m2 )  
29.00000: (m-load\_H-A crate3 m1 m2 )  
29.00000: (m-move\_create\_to\_loading\_bay-H crate3 m1 m2 )  
(29.00000,41.00000)------>waiting  
41.00000: (l-load-F crate2 l )  
(41.00000,47.00000)------>waiting  
47.00000: (crate\_on\_conveyor\_belt\_fragile-F crate2 l )  
47.00000: (l-load crate1 l )  
(47.00000,48.00000)------>waiting  
48.00000: (crate\_at\_loading\_bay-H crate3 m1 m2 )  
48.00000: (m-download-H crate3 m1 m2 )  
48.00000: (m-charging m2 )  
48.00000: (m-move\_to\_crate crate4 m2 )  
(48.00000,49.00000)------>waiting  
49.00000: (m-at\_crates crate4 m2 )  
49.00000: (m-load crate4 m2 )  
49.00000: (m-move\_create\_to\_loading\_bay crate4 m2 )  
(49.00000,51.00000)------>waiting  
51.00000: (crate\_on\_conveyor\_belt crate1 l )  
51.00000: (l-load crate3 l )  
(51.00000,53.00000)------>waiting  
53.00000: (crate\_at\_loading\_bay crate4 m2 )  
53.00000: (m-download crate4 m2 )  
53.00000: (l-load\_cheap-L crate4 ll )  
(53.00000,55.00000)------>waiting  
55.00000: (crate\_on\_conveyor\_belt crate3 l )  
(55.00000,57.00000)------>waiting  
57.00000: (crate\_on\_conveyor\_belt\_cheap-L crate4 ll )

Plan-Length:100  
Duration:57.0  
Metric (Plan):0.0  
Metric (Search):85.0  
Planning Time:692  
Heuristic Time:296  
Search Time:488  
Expanded Nodes:8047  
States Evaluated:11205  
Fixed constraint violations during search (zero-crossing):0  
Number of Dead-Ends detected:1484  
Number of Duplicates detected:7127

**Problem 3 – opt-blind configuration:**

Domain parsed  
Problem parsed  
Grounding..  
Light Validation Completed  
A\* with 0-1 goal heuristic  
Simplification..  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
Grounding and Simplification finished  
|A|:54  
|P|:28  
|E|:28  
Size(X):19  
Size(F):50  
Delta time heuristic model:1.0  
Delta time planning model:1.0  
Delta time search-execution model:1.0  
Delta time validation model:1  
w\_h set to be 1  
g\_h set to be 1  
Setting horizon to:NaN  
Running WA-STAR  
Reachable actions and processes: |A U P U E|:104  
h(n = s\_0)=1.0  
f(n) = 1.0 (Expanded Nodes: 0, Evaluated States: 0, Time: 0.001)  
f(n) = 2.0 (Expanded Nodes: 1, Evaluated States: 4, Time: 0.002)  
f(n) = 3.0 (Expanded Nodes: 5, Evaluated States: 13, Time: 0.003)  
f(n) = 4.0 (Expanded Nodes: 14, Evaluated States: 31, Time: 0.005)  
f(n) = 5.0 (Expanded Nodes: 32, Evaluated States: 67, Time: 0.006)  
f(n) = 6.0 (Expanded Nodes: 68, Evaluated States: 119, Time: 0.01)  
f(n) = 7.0 (Expanded Nodes: 120, Evaluated States: 178, Time: 0.012)  
f(n) = 8.0 (Expanded Nodes: 179, Evaluated States: 207, Time: 0.013)  
f(n) = 9.0 (Expanded Nodes: 208, Evaluated States: 214, Time: 0.014)  
f(n) = 10.0 (Expanded Nodes: 215, Evaluated States: 217, Time: 0.014)  
f(n) = 11.0 (Expanded Nodes: 218, Evaluated States: 220, Time: 0.014)  
f(n) = 12.0 (Expanded Nodes: 221, Evaluated States: 223, Time: 0.014)  
f(n) = 13.0 (Expanded Nodes: 224, Evaluated States: 226, Time: 0.015)  
f(n) = 14.0 (Expanded Nodes: 227, Evaluated States: 229, Time: 0.015)  
f(n) = 15.0 (Expanded Nodes: 230, Evaluated States: 232, Time: 0.015)  
f(n) = 16.0 (Expanded Nodes: 233, Evaluated States: 235, Time: 0.015)  
f(n) = 17.0 (Expanded Nodes: 236, Evaluated States: 238, Time: 0.015)  
f(n) = 18.0 (Expanded Nodes: 239, Evaluated States: 243, Time: 0.015)  
f(n) = 19.0 (Expanded Nodes: 244, Evaluated States: 253, Time: 0.015)  
f(n) = 20.0 (Expanded Nodes: 254, Evaluated States: 271, Time: 0.016)  
f(n) = 21.0 (Expanded Nodes: 272, Evaluated States: 305, Time: 0.016)  
f(n) = 22.0 (Expanded Nodes: 306, Evaluated States: 367, Time: 0.017)  
f(n) = 23.0 (Expanded Nodes: 368, Evaluated States: 473, Time: 0.018)  
f(n) = 24.0 (Expanded Nodes: 474, Evaluated States: 635, Time: 0.02)  
f(n) = 25.0 (Expanded Nodes: 636, Evaluated States: 834, Time: 0.023)  
f(n) = 26.0 (Expanded Nodes: 835, Evaluated States: 1025, Time: 0.026)  
f(n) = 27.0 (Expanded Nodes: 1026, Evaluated States: 1178, Time: 0.028)  
f(n) = 28.0 (Expanded Nodes: 1179, Evaluated States: 1339, Time: 0.031)  
f(n) = 29.0 (Expanded Nodes: 1340, Evaluated States: 1494, Time: 0.033)  
f(n) = 30.0 (Expanded Nodes: 1495, Evaluated States: 1677, Time: 0.035)  
f(n) = 31.0 (Expanded Nodes: 1678, Evaluated States: 1874, Time: 0.038)  
f(n) = 32.0 (Expanded Nodes: 1875, Evaluated States: 2047, Time: 0.04)  
f(n) = 33.0 (Expanded Nodes: 2048, Evaluated States: 2144, Time: 0.042)  
f(n) = 34.0 (Expanded Nodes: 2145, Evaluated States: 2237, Time: 0.044)  
f(n) = 35.0 (Expanded Nodes: 2238, Evaluated States: 2364, Time: 0.045)  
f(n) = 36.0 (Expanded Nodes: 2365, Evaluated States: 2535, Time: 0.047)  
f(n) = 37.0 (Expanded Nodes: 2536, Evaluated States: 2701, Time: 0.049)  
f(n) = 38.0 (Expanded Nodes: 2702, Evaluated States: 2809, Time: 0.052)  
f(n) = 39.0 (Expanded Nodes: 2810, Evaluated States: 2877, Time: 0.053)  
f(n) = 40.0 (Expanded Nodes: 2878, Evaluated States: 2923, Time: 0.054)  
f(n) = 41.0 (Expanded Nodes: 2924, Evaluated States: 2967, Time: 0.055)  
f(n) = 42.0 (Expanded Nodes: 2968, Evaluated States: 3030, Time: 0.056)  
f(n) = 43.0 (Expanded Nodes: 3031, Evaluated States: 3114, Time: 0.057)  
f(n) = 44.0 (Expanded Nodes: 3115, Evaluated States: 3225, Time: 0.059)  
f(n) = 45.0 (Expanded Nodes: 3226, Evaluated States: 3370, Time: 0.06)  
f(n) = 46.0 (Expanded Nodes: 3371, Evaluated States: 3567, Time: 0.062)  
f(n) = 47.0 (Expanded Nodes: 3568, Evaluated States: 3821, Time: 0.065)  
f(n) = 48.0 (Expanded Nodes: 3822, Evaluated States: 4118, Time: 0.069)  
f(n) = 49.0 (Expanded Nodes: 4119, Evaluated States: 4470, Time: 0.073)  
f(n) = 50.0 (Expanded Nodes: 4471, Evaluated States: 4774, Time: 0.078)  
f(n) = 51.0 (Expanded Nodes: 4775, Evaluated States: 5040, Time: 0.083)  
f(n) = 52.0 (Expanded Nodes: 5041, Evaluated States: 5323, Time: 0.087)  
f(n) = 53.0 (Expanded Nodes: 5324, Evaluated States: 5613, Time: 0.091)  
f(n) = 54.0 (Expanded Nodes: 5614, Evaluated States: 5940, Time: 0.096)  
f(n) = 55.0 (Expanded Nodes: 5941, Evaluated States: 6226, Time: 0.102)  
f(n) = 56.0 (Expanded Nodes: 6227, Evaluated States: 6512, Time: 0.106)  
f(n) = 57.0 (Expanded Nodes: 6513, Evaluated States: 6819, Time: 0.11)  
f(n) = 58.0 (Expanded Nodes: 6820, Evaluated States: 7178, Time: 0.115)  
f(n) = 59.0 (Expanded Nodes: 7179, Evaluated States: 7572, Time: 0.12)  
f(n) = 60.0 (Expanded Nodes: 7573, Evaluated States: 7982, Time: 0.126)  
f(n) = 61.0 (Expanded Nodes: 7983, Evaluated States: 8329, Time: 0.132)  
f(n) = 62.0 (Expanded Nodes: 8330, Evaluated States: 8635, Time: 0.137)  
f(n) = 63.0 (Expanded Nodes: 8636, Evaluated States: 8921, Time: 0.141)  
f(n) = 64.0 (Expanded Nodes: 8922, Evaluated States: 9167, Time: 0.145)  
f(n) = 65.0 (Expanded Nodes: 9168, Evaluated States: 9389, Time: 0.149)  
f(n) = 66.0 (Expanded Nodes: 9390, Evaluated States: 9607, Time: 0.152)  
f(n) = 67.0 (Expanded Nodes: 9608, Evaluated States: 9817, Time: 0.155)  
f(n) = 68.0 (Expanded Nodes: 9818, Evaluated States: 9999, Time: 0.158)  
f(n) = 69.0 (Expanded Nodes: 10000, Evaluated States: 10159, Time: 0.161)  
f(n) = 70.0 (Expanded Nodes: 10160, Evaluated States: 10327, Time: 0.163)  
f(n) = 71.0 (Expanded Nodes: 10328, Evaluated States: 10544, Time: 0.165)  
f(n) = 72.0 (Expanded Nodes: 10545, Evaluated States: 10829, Time: 0.169)  
f(n) = 73.0 (Expanded Nodes: 10830, Evaluated States: 11185, Time: 0.174)  
f(n) = 74.0 (Expanded Nodes: 11186, Evaluated States: 11602, Time: 0.183)  
f(n) = 75.0 (Expanded Nodes: 11603, Evaluated States: 12083, Time: 0.19)  
f(n) = 76.0 (Expanded Nodes: 12084, Evaluated States: 12674, Time: 0.201)  
f(n) = 77.0 (Expanded Nodes: 12675, Evaluated States: 13367, Time: 0.209)  
f(n) = 78.0 (Expanded Nodes: 13368, Evaluated States: 14096, Time: 0.218)  
f(n) = 79.0 (Expanded Nodes: 14097, Evaluated States: 14835, Time: 0.227)  
f(n) = 80.0 (Expanded Nodes: 14836, Evaluated States: 15629, Time: 0.237)  
f(n) = 81.0 (Expanded Nodes: 15630, Evaluated States: 16563, Time: 0.252)  
f(n) = 82.0 (Expanded Nodes: 16564, Evaluated States: 17711, Time: 0.263)  
f(n) = 83.0 (Expanded Nodes: 17712, Evaluated States: 19031, Time: 0.277)  
f(n) = 84.0 (Expanded Nodes: 19032, Evaluated States: 20495, Time: 0.292)  
f(n) = 85.0 (Expanded Nodes: 20496, Evaluated States: 21991, Time: 0.311)  
f(n) = 86.0 (Expanded Nodes: 21992, Evaluated States: 23339, Time: 0.33)  
Starting Validation  
(Pre Simplification) - |A|+|P|+|E|: 268  
(After Easy Simplification) - |A|+|P|+|E|: 110  
(After AIBR):104  
Epsilon set to be:0.0  
Resolution for validation:1.0  
Precondition not satisfied. Action:  
Action Name:m-charging Parameters: m1 - mover   
Pre: (AND (m-at-loading\_bay m1)(> ((+ (\* -1.0 ((charge m1)))20.0)) ((+ 0.0)))(free\_m m1))  
Effetti positivi: (AND )  
Effetti negativi: (AND )  
Numeric Effects: (AND (assign (charge m1) (+ 20.0)))  
Conditional Effects:(AND )  
(Pddl+ semantics) Plan is valid:false  
Problem Solved  
0.00000: (m-charging m1 )  
0.00000: (m-move\_to\_crate-A crate2 m2 )  
0.00000: (m-move\_to\_crate-A crate2 m1 )  
(0.00000,2.00000)------>waiting  
2.00000: (m-at\_crates-A crate2 m1 )  
2.00000: (m-at\_crates-A crate2 m2 )  
2.00000: (m-load-F\_A crate2 m1 m2 )  
2.00000: (m-move\_create\_to\_loading\_bay-H crate2 m1 m2 )  
(2.00000,10.00000)------>waiting  
10.00000: (crate\_at\_loading\_bay-H crate2 m1 m2 )  
10.00000: (m-download-F crate2 m1 m2 )  
10.00000: (m-charging m2 )  
10.00000: (m-charging m1 )  
10.00000: (m-move\_to\_crate-A crate1 m2 )  
10.00000: (m-move\_to\_crate-A crate1 m1 )  
(10.00000,12.00000)------>waiting  
12.00000: (m-at\_crates-A crate1 m1 )  
12.00000: (m-at\_crates-A crate1 m2 )  
12.00000: (m-load\_H-A crate1 m1 m2 )  
12.00000: (m-move\_create\_to\_loading\_bay-H crate1 m1 m2 )  
(12.00000,26.00000)------>waiting  
26.00000: (crate\_at\_loading\_bay-H crate1 m1 m2 )  
26.00000: (m-download-H crate1 m1 m2 )  
26.00000: (m-charging m1 )  
26.00000: (m-move\_to\_crate-A crate3 m1 )  
26.00000: (m-charging m2 )  
26.00000: (m-move\_to\_crate-A crate3 m2 )  
(26.00000,29.00000)------>waiting  
29.00000: (m-at\_crates-A crate3 m1 )  
29.00000: (m-at\_crates-A crate3 m2 )  
29.00000: (m-load\_H-A crate3 m1 m2 )  
29.00000: (m-move\_create\_to\_loading\_bay-H crate3 m1 m2 )  
(29.00000,38.00000)------>waiting  
38.00000: (l-load-F crate2 l )  
(38.00000,44.00000)------>waiting  
44.00000: (crate\_on\_conveyor\_belt\_fragile-F crate2 l )  
(44.00000,48.00000)------>waiting  
48.00000: (crate\_at\_loading\_bay-H crate3 m1 m2 )  
48.00000: (m-download-H crate3 m1 m2 )  
48.00000: (m-charging m2 )  
48.00000: (m-move\_to\_crate crate4 m2 )  
48.00000: (l-load crate3 l )  
(48.00000,49.00000)------>waiting  
49.00000: (m-at\_crates crate4 m2 )  
49.00000: (m-load crate4 m2 )  
49.00000: (m-move\_create\_to\_loading\_bay crate4 m2 )  
(49.00000,52.00000)------>waiting  
52.00000: (crate\_on\_conveyor\_belt crate3 l )  
52.00000: (l-load crate1 l )  
(52.00000,53.00000)------>waiting  
53.00000: (crate\_at\_loading\_bay crate4 m2 )  
53.00000: (m-download crate4 m2 )  
53.00000: (l-load\_cheap-L crate4 ll )  
(53.00000,56.00000)------>waiting  
56.00000: (crate\_on\_conveyor\_belt crate1 l )  
(56.00000,57.00000)------>waiting  
57.00000: (crate\_on\_conveyor\_belt\_cheap-L crate4 ll )

Plan-Length:101  
Duration:0.0  
Metric (Plan):0.0  
Metric (Search):86.0  
Planning Time:527  
Heuristic Time:0  
Search Time:336  
Expanded Nodes:22274  
States Evaluated:23627  
Fixed constraint violations during search (zero-crossing):0  
Number of Dead-Ends detected:0  
Number of Duplicates detected:25476

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