```
 1  D:\Python\Python\setroute\python.exe "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --
    mode=client --port=12482
 2
 3  import sys; print('Python %s on %s' % (sys.version, sys.platform))
 4  sys.path.extend(['E:\\1 □□□□\\3 □□□□□\\1 □□□□□□□\\1 □□□□□□□□\\1_□□□□□□_□□□□\\1_LW _□□□□1\\4 □□□□□\\3 python_code\\9 Code for this
    paper', 'E:/1 □□□□/3 □□□□□/1 □□□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□1/4 □□□□□/3 python_code/9 Code for this paper'])
 5
 6  PyDev console: starting.
 7
 8  Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
 9  >>> runfile('E:/1 □□□□/3 □□□□□/1 □□□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□1/4 □□□□□/3 python_code/9 Code for this paper/
    main_DM.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□1/4 □□□□□/3 python_code/9 Code for this
    paper')
10  Backend TkAgg is interactive backend. Turning interactive mode on.
11  Waiting 5s......
12
13  Optimize the ./R_7_9.xlsx instance
14
15  Set parameter TimeLimit to value 1200
16
17  Set parameter PoolSolutions to value 3
18  Set parameter PoolGap to value 0.05
19  Set parameter PoolSearchMode to value 2
20  Gurobi Optimizer version 11.0.0 build v11.0.0rc2 (win64 - Windows 10.0 (19045.2))
21
22  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
23  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
24
25  Optimize a model with 133301 rows, 56000 columns and 390789 nonzeros
26  Model fingerprint: 0x0d5c9582
27  Variable types: 0 continuous, 56000 integer (47131 binary)
28  Coefficient statistics:
29    Matrix range     [1e+00, 5e+05]
30    Objective range  [1e+00, 1e+00]
31    Bounds range     [1e+00, 1e+00]
32    RHS range        [1e+00, 7e+06]
33  Presolve removed 107418 rows and 2156 columns
34  Presolve time: 0.18s
35  Presolved: 25883 rows, 53844 columns, 75146 nonzeros
36  Variable types: 0 continuous, 53844 integer (44982 binary)
37
38  Root relaxation: objective 4.014593e+02, 2633 iterations, 0.12 seconds (0.29 work units)
39
40      Nodes    |    Current Node    |     Objective Bounds      |     Work
41   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
42
43      0     0  401.45930    0 2016          -  401.45930      -     -    0s
44  H   0     0                    629.0000000  401.45930  36.2%     -    2s
45      0     0  426.34770    0 1788  629.00000  426.34770  32.2%     -    3s
46      0     0  446.97403    0 2012  629.00000  446.97403  28.9%     -   10s
47      0     0  446.98260    0 2012  629.00000  446.98260  28.9%     -   10s
48      0     0  447.03145    0 1807  629.00000  447.03145  28.9%     -   11s
49      0     0  449.00000    0 1652  629.00000  449.00000  28.6%     -   18s
50      0     0  449.00000    0 1965  629.00000  449.00000  28.6%     -   18s
51      0     0  449.00000    0 1967  629.00000  449.00000  28.6%     -   18s
52      0     0  449.00000    0 1453  629.00000  449.00000  28.6%     -   19s
53      0     0  449.03651    0 1651  629.00000  449.03651  28.6%     -   20s
54      0     0  449.04204    0 1428  629.00000  449.04204  28.6%     -   20s
55      0     0  449.05046    0 1361  629.00000  449.05046  28.6%     -   20s
56      0     0  449.08168    0 1565  629.00000  449.08168  28.6%     -   21s
57      0     0  449.08168    0 1345  629.00000  449.08168  28.6%     -   22s
58      0     2  449.08168    0 1322  629.00000  449.08168  28.6%     -   25s
59   1624  1619  509.67999  394  925  629.00000  449.08168  28.6%   9.4   30s
60   2316  2255  539.06329  499  915  629.00000  449.08168  28.6%  17.7   36s
61   4262  4000  591.42744  433 1345  629.00000  449.08168  28.6%  18.0   43s
62   4264  4001  612.05356  300 1669  629.00000  612.05356  2.69%  18.0   47s
63   4265  4002  613.00000  368   71  629.00000  613.00000  2.54%  18.0   50s
64   4273  4007  620.92716  106  143  629.00000  620.92716  1.28%  18.0   55s
65
66  Cutting planes:
67    Learned: 93
68    Gomory: 72
69    Implied bound: 7
70    Projected implied bound: 23
71    MIR: 113
72    StrongCG: 89
73    Flow cover: 156
74    Zero half: 3
75    RLT: 25
76    Relax-and-lift: 634
77    BQP: 15
78
79  Explored 4277 nodes (114568 simplex iterations) in 57.21 seconds (77.53 work units)
80  Thread count was 8 (of 8 available processors)
```

```
 81
 82  Solution count 3: 629 629 629
 83  No other solutions better than 629
 84
 85  Optimal solution found (tolerance 1.00e-04)
 86  Best objective 6.290000000000e+02, best bound 6.290000000000e+02, gap 0.0000%
 87
 88  Output optimal solution and the Optimal Obj:  629.0
 89
 90
 91  Obj = 629.0
 92
 93  Solutions:
 94      The total pi =  103.0
 95      The total duration time in berth stage =  157.0
 96      The total duration time in quay crane scheduling stage =  28.0
 97      The total departure time in berth stage=  379.0
 98      The total departure time in quay crane scheduling stage =  250.0
 99      The total wasted crane work hour according QC0=  11.484145286826175
100      The last depature time in quay crane scheduling stage =  61.0
101
102  The specific solution are as follows:
103      Vessel i: 0:    li: 6,         pi: 18-24,          ai-di: 30-56,         taoi-deltai: 30-56,          periodi: 26,          taoPi_SP-
     deltaPi_SP: 30-34,            periodPi: 4,              c_i: 6796356,          dowork: 7382032,                    fa_i: 5
104      Vessel i: 1:    li: 5,         pi: 19-24,          ai-di: 57-80,         taoi-deltai: 57-80,          periodi: 23,          taoPi_SP-
     deltaPi_SP: 57-61,            periodPi: 4,              c_i: 5812654,          dowork: 7118388,                    fa_i: 5
105      Vessel i: 2:    li: 7,         pi: 7-14,          ai-di: 4-27,          taoi-deltai: 4-27,          periodi: 23,          taoPi_SP-deltaPi_SP: 4
     -7,            periodPi: 3,              c_i: 5819032,              dowork: 6327456,                fa_i: 6
106      Vessel i: 3:    li: 4,         pi: 14-18,          ai-di: 36-57,         taoi-deltai: 36-57,          periodi: 21,          taoPi_SP-
     deltaPi_SP: 36-41,            periodPi: 5,              c_i: 5350816,          dowork: 5536524,                    fa_i: 3
107      Vessel i: 4:    li: 7,         pi: 7-14,          ai-di: 46-71,          taoi-deltai: 46-71,          periodi: 25,          taoPi_SP-deltaPi_SP
     : 46-51,            periodPi: 5,              c_i: 6491389,          dowork: 6591100,                fa_i: 3
108      Vessel i: 5:    li: 4,         pi: 14-18,          ai-di: 9-29,          taoi-deltai: 9-28,          periodi: 19,          taoPi_SP-deltaPi_SP
     : 9-13,            periodPi: 4,              c_i: 4953037,          dowork: 5272880,                fa_i: 3
109      Vessel i: 6:    li: 6,         pi: 24-30,          ai-di: 40-62,         taoi-deltai: 40-60,          periodi: 20,          taoPi_SP-
     deltaPi_SP: 40-43,            periodPi: 3,              c_i: 5250250,          dowork: 5272880,                    fa_i: 6
110  TimeSolveModel: 65.000000
111
112  TimeAll: 68.000000
113
114
```