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=54857

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_5_3.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 71827 rows, 39860 columns and 208375 nonzeros

26 Model fingerprint: 0x77fdb6d8

27 Variable types: 0 continuous, 39860 integer (33525 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, 6e+06]

33 Presolve removed 61951 rows and 1747 columns

34 Presolve time: 0.08s

35 Presolved: 9876 rows, 38113 columns, 27660 nonzeros

36 Variable types: 0 continuous, 38113 integer (31783 binary)

37 Found heuristic solution: objective 634.0000000

38 Found heuristic solution: objective 590.0000000

39

40 Root relaxation: objective 2.516267e+02, 1459 iterations, 0.04 seconds (0.12 work units)

41

42   Nodes | Current Node | Objective Bounds | Work

43   Expl Unexpl | Obj Depth IntInf | Incumbent   BestBd Gap | It/Node Time

44

45   0   0 251.62667   0 1228 590.00000 251.62667 57.4%   - 0s

46 H 0   0   407.0000000 251.62667 38.2%   - 0s

47   0   0 265.41916   0 1233 407.00000 265.41916 34.8%   - 1s

48   0   0 294.00000   0 1134 407.00000 294.00000 27.8%   - 4s

49   0   0 294.00000   0 1233 407.00000 294.00000 27.8%   - 4s

50   0   0 294.00000   0 1091 407.00000 294.00000 27.8%   - 4s

51   0   0 294.06769   0 1207 407.00000 294.06769 27.7%   - 6s

52   0   0 294.13072   0 1206 407.00000 294.13072 27.7%   - 6s

53   0   0 295.00000   0 1092 407.00000 295.00000 27.5%   - 6s

54   0   0 295.00000   0 920 407.00000 295.00000 27.5%   - 6s

55   0   2 295.00000   0 911 407.00000 295.00000 27.5%   - 8s

56   849   893 298.99349 213 703 407.00000 295.00000 27.5% 5.8 10s

57   2252 1920 398.00000 261 861 407.00000 398.00000 2.21% 6.0 15s

58

59 Optimal solution found at node 2252 - now completing solution pool...

60   2253 1921 407.00000 413 904 408.00000 407.00000 0.25% 6.0 15s

61   2261 1926 407.00000 78 1058 408.00000 407.00000 0.25% 6.0 21s

62

63   Nodes | Current Node | Pool Obj. Bounds | Work

64 | | Worst |

65   Expl Unexpl | Obj Depth IntInf | Incumbent   BestBd Gap | It/Node Time

66

67   3127 2387 407.00000 127 609 408.00000 407.00000 0.25% 43.8 25s

68   4271 2849 infeasible 270   408.00000 407.00000 0.25% 55.6 30s

69   5899 3296 407.00000 166 602 408.00000 407.00000 0.25% 61.1 35s

70   7370 3749 407.00000 312 503 408.00000 407.00000 0.25% 73.5 40s

71   8419 4166 infeasible 374   408.00000 407.00000 0.25% 70.7 45s

72 11507 6866 407.00000 204 451 408.00000 407.00000 0.25% 57.0 50s

73

74 Cutting planes:

75   Learned: 112

76   Gomory: 340

77   Implied bound: 15

78   MIR: 640

79   StrongCG: 118

80   Flow cover: 831

```
81    Inf proof: 5
82    Zero half: 71
83    RLT: 114
84    Relax-and-lift: 1238
85
86  Explored 12907 nodes (681307 simplex iterations) in 54.90 seconds (98.89 work units)
87  Thread count was 8 (of 8 available processors)
88
89  Solution count 3: 407 407 407
90  No other solutions better than 407
91
92  Optimal solution found (tolerance 1.00e-04)
93  Best objective 4.070000000000e+02, best bound 4.070000000000e+02, gap 0.0000%
94
95  Output optimal solution and the Optimal Obj:  407.0
96
97
98  Obj = 407.0
99
100  Solutions:
101      The total pi =  71.0
102      The total duration time in berth stage =  87.0
103      The total duration time in quay crane scheduling stage =  16.0
104      The total departure time in berth stage=  239.0
105      The total departure time in quay crane scheduling stage =  168.0
106      The total wasted crane work hour according QC0=  5.452769643913762
107      The last depature time in quay crane scheduling stage =  51.0
108
109  The specific solution are as follows:
110      Vessel i: 0:    li: 7,        pi: 7-14,        ai-di: 42-66,        taoi-deltai: 42-64,        periodi: 22,        taoPi_SP-deltaPi_SP
      : 42-45,            periodPi: 3,            c_i: 5626287,            dowork: 6327456,            fa_i: 6
111      Vessel i: 1:    li: 7,        pi: 7-14,        ai-di: 7-25,        taoi-deltai: 7-23,        periodi: 16,        taoPi_SP-deltaPi_SP: 7
      -10,            periodPi: 3,            c_i: 4082459,            dowork: 4086482,            fa_i: 4
112      Vessel i: 2:    li: 5,        pi: 14-19,        ai-di: 21-36,        taoi-deltai: 21-34,        periodi: 13,        taoPi_SP-
      deltaPi_SP: 21-23,            periodPi: 2,            c_i: 3410436,            dowork: 3691016,            fa_i: 5
113      Vessel i: 3:    li: 5,        pi: 19-24,        ai-di: 34-52,        taoi-deltai: 34-50,        periodi: 16,        taoPi_SP-
      deltaPi_SP: 34-39,            periodPi: 5,            c_i: 4072402,            dowork: 4086482,            fa_i: 2
114      Vessel i: 4:    li: 7,        pi: 24-31,        ai-di: 48-73,        taoi-deltai: 48-68,        periodi: 20,        taoPi_SP-
      deltaPi_SP: 48-51,            periodPi: 3,            c_i: 5098786,            dowork: 5536524,            fa_i: 5
115  TimeSolveModel: 61.000000
116
117  TimeAll: 64.000000
118
119
```