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=7747

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_6.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: 0x02190baa

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 107239 rows and 2107 columns

34 Presolve time: 0.18s

35 Presolved: 26062 rows, 53893 columns, 75719 nonzeros

36 Variable types: 0 continuous, 53893 integer (45031 binary)

37

38 Root relaxation: objective 3.779930e+02, 2816 iterations, 0.13 seconds (0.29 work units)

39

	Nodes		Current Node			Objective Bounds			Work	
Expl	Unexpl	Obj	Depth	IntInf	Incumbent	BestBd	Gap	It/Node	Time	
0	0	377.99297	0	2065	-	377.99297	-	-	0s	
H 0	0				608.0000000	377.99297	37.8%	-	1s	
H 0	0				607.0000000	394.51286	35.0%	-	2s	
0	0	394.51286	0	2063	607.00000	394.51286	35.0%	-	2s	
0	0	402.16814	0	1813	607.00000	402.16814	33.7%	-	10s	
0	0	402.18616	0	2063	607.00000	402.18616	33.7%	-	10s	
0	0	407.53656	0	1546	607.00000	407.53656	32.9%	-	11s	
0	0	407.86642	0	2010	607.00000	407.86642	32.8%	-	12s	
0	0	407.87643	0	2010	607.00000	407.87643	32.8%	-	12s	
0	0	409.44397	0	1467	607.00000	409.44397	32.5%	-	13s	
0	0	410.68493	0	1789	607.00000	410.68493	32.3%	-	16s	
0	0	411.47134	0	1701	607.00000	411.47134	32.2%	-	16s	
0	0	411.51881	0	1834	607.00000	411.51881	32.2%	-	16s	
0	0	411.54854	0	1839	607.00000	411.54854	32.2%	-	16s	
0	0	411.54854	0	1842	607.00000	411.54854	32.2%	-	16s	
0	0	412.35208	0	1540	607.00000	412.35208	32.1%	-	17s	
0	0	412.67045	0	1730	607.00000	412.67045	32.0%	-	20s	
0	0	412.75798	0	1775	607.00000	412.75798	32.0%	-	20s	
0	0	412.75982	0	1772	607.00000	412.75982	32.0%	-	20s	
0	0	413.02123	0	1540	607.00000	413.02123	32.0%	-	20s	
0	0	413.08036	0	1697	607.00000	413.08036	31.9%	-	25s	
0	0	413.08769	0	1734	607.00000	413.08769	31.9%	-	25s	
0	0	413.46558	0	1551	607.00000	413.46558	31.9%	-	25s	
0	0	413.51378	0	1774	607.00000	413.51378	31.9%	-	28s	
0	0	413.53205	0	1770	607.00000	413.53205	31.9%	-	28s	
0	0	413.76743	0	1415	607.00000	413.76743	31.8%	-	29s	
0	0	413.78325	0	1412	607.00000	413.78325	31.8%	-	29s	
0	2	423.00000	0	1407	607.00000	423.00000	30.3%	-	32s	
327	341	428.84486	87	1309	607.00000	423.00000	30.3%	10.5	35s	
1058	1055	473.04393	270	1098	607.00000	423.00000	30.3%	6.9	47s	
2399	2512	508.15946	547	679	607.00000	423.00000	30.3%	7.0	50s	
3805	3778	526.00000	882	469	607.00000	423.00000	30.3%	24.8	55s	
4299	4167	594.00000	883	1412	607.00000	423.00000	30.3%	41.8	64s	
4301	4168	578.00000	875	1490	607.00000	578.00000	4.78%	41.7	67s	
4304	4170	578.00000	146	125	607.00000	578.00000	4.78%	41.7	70s	
4313	4178	589.15571	122	352	607.00000	589.15571	2.94%	48.0	75s	
H 4328	3978				606.0000000	597.97268	1.32%	47.9	78s	
4332	3781	599.73321	632	138	606.00000	599.73321	1.03%	47.8	80s	

```
 81
 82  Cutting planes:
 83    Learned: 10
 84    Gomory: 20
 85    Lift-and-project: 2
 86    Cover: 1
 87    Implied bound: 15
 88    Clique: 2
 89    MIR: 6
 90    StrongCG: 1
 91    Flow cover: 144
 92    Zero half: 29
 93    RLT: 1
 94    Relax-and-lift: 83
 95
 96  Explored 4353 nodes (249123 simplex iterations) in 85.46 seconds (115.15 work units)
 97  Thread count was 8 (of 8 available processors)
 98
 99  Solution count 3: 606 606 606
100  No other solutions better than 606
101
102  Optimal solution found (tolerance 1.00e-04)
103  Best objective 6.060000000000e+02, best bound 6.060000000000e+02, gap 0.0000%
104
105  Output optimal solution and the Optimal Obj:  606.0
106
107
108  Obj = 606.0
109
110  Solutions:
111     The total pi =  121.0
112     The total duration time in berth stage =  146.0
113     The total duration time in quay crane scheduling stage =  34.0
114     The total departure time in berth stage=  359.0
115     The total departure time in quay crane scheduling stage =  247.0
116     The total wasted crane work hour according QC0=  5.4647744686015995
117     The last depature time in quay crane scheduling stage =  64.0
118
119  The specific solution are as follows:
```

120   Vessel i: 0: l_i: 4, p_i: 25-29, a_i-d_i: 8-30, tao_i-$delta_i$: 8-30, $period_i$: 22,   taoPi_SP-deltaPi_SP : 8-15,   periodPi: 7, c_i: 5762289,   dowork: 6063812, fa_i: 2

121   Vessel i: 1: l_i: 4, p_i: 10-14, a_i-d_i: 62-74, tao_i-$delta_i$: 62-74, $period_i$: 12,   taoPi_SP-deltaPi_SP: 62-64,   periodPi: 2, c_i: 3026175,   dowork: 3031906, fa_i: 4

122   Vessel i: 2: l_i: 6, p_i: 14-20, a_i-d_i: 59-74, tao_i-$delta_i$: 59-74, $period_i$: 15,   taoPi_SP-deltaPi_SP: 59-62,   periodPi: 3, c_i: 3941791,   dowork: 4350126, fa_i: 4

123   Vessel i: 3: l_i: 5, p_i: 14-19, a_i-d_i: 13-38, tao_i-$delta_i$: 13-38, $period_i$: 25,   taoPi_SP-deltaPi_SP: 13-19,   periodPi: 6, c_i: 6526466,   dowork: 6591100, fa_i: 4

124   Vessel i: 4: l_i: 6, p_i: 19-25, a_i-d_i: 11-35, tao_i-$delta_i$: 11-34, $period_i$: 23,   taoPi_SP-deltaPi_SP: 11-15,   periodPi: 4, c_i: 5908202,   dowork: 5931990, fa_i: 5

125   Vessel i: 5: l_i: 4, p_i: 10-14, a_i-d_i: 35-59, tao_i-$delta_i$: 35-57, $period_i$: 22,   taoPi_SP-deltaPi_SP: 35-39,   periodPi: 4, c_i: 5649360,   dowork: 6063812, fa_i: 4

126   Vessel i: 6: l_i: 4, p_i: 29-33, a_i-d_i: 25-60, tao_i-$delta_i$: 25-52, $period_i$: 27,   taoPi_SP-deltaPi_SP: 25-33,   periodPi: 8, c_i: 6896096,   dowork: 7118388, fa_i: 2

```
127  TimeSolveModel: 93.000000
128
129  TimeAll: 96.000000
130
131
```