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=28971
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_10_4.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 260882 rows, 80570 columns and 770550 nonzeros
26. Model fingerprint: 0x08217990
27. Variable types: 0 continuous, 80570 integer (67900 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 218804 rows and 3620 columns
34. Presolve time: 0.13s
35. Presolved: 42078 rows, 76950 columns, 125309 nonzeros
36. Variable types: 0 continuous, 76950 integer (64280 binary)
37.
38. Root relaxation: objective 4.334019e+02, 3356 iterations, 0.19 seconds (0.33 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   0 433.40186 0 2344   - 433.40186   - - 1s
44. H 0   0   696.0000000 433.40186 37.7%   - 2s
45. H 0   0   694.0000000 451.74519 34.9%   - 3s
46.   0   0 451.74519 0 2350 694.00000 451.74519 34.9%   - 3s
47. H 0   0   692.0000000 451.74942 34.7%   - 7s
48.   0   0 462.08248 0 2211 692.00000 462.08248 33.2%   - 8s
49.   0   0 462.08523 0 2354 692.00000 462.08523 33.2%   - 8s
50.   0   0 464.75202 0 2033 692.00000 464.75202 32.8%   - 9s
51.   0   0 465.17110 0 2285 692.00000 465.17110 32.8%   - 11s
52.   0   0 465.19282 0 2283 692.00000 465.19282 32.8%   - 11s
53.   0   0 466.73186 0 2018 692.00000 466.73186 32.6%   - 12s
54.   0   0 467.12244 0 2072 692.00000 467.12244 32.5%   - 13s
55.   0   0 467.18756 0 2174 692.00000 467.18756 32.5%   - 13s
56.   0   0 467.20366 0 2165 692.00000 467.20366 32.5%   - 13s
57.   0   0 468.51074 0 1940 692.00000 468.51074 32.3%   - 14s
58.   0   0 468.63143 0 1740 692.00000 468.63143 32.3%   - 16s
59.   0   0 468.69445 0 1921 692.00000 468.69445 32.3%   - 16s
60.   0   0 468.69645 0 1895 692.00000 468.69645 32.3%   - 16s
61.   0   0 469.06361 0 1654 692.00000 469.06361 32.2%   - 16s
62.   0   0 469.13069 0 1857 692.00000 469.13069 32.2%   - 18s
63.   0   0 469.13250 0 1857 692.00000 469.13250 32.2%   - 18s
64.   0   0 469.64585 0 1558 692.00000 469.64585 32.1%   - 18s
65.   0   0 469.69155 0 1804 692.00000 469.69155 32.1%   - 20s
66.   0   0 470.19418 0 1775 692.00000 470.19418 32.1%   - 21s
67.   0   0 470.23179 0 1774 692.00000 470.23179 32.0%   - 22s
68.   0   0 470.44843 0 1558 692.00000 470.44843 32.0%   - 23s
69.   0   0 470.48428 0 1622 692.00000 470.48428 32.0%   - 24s
70.   0   0 470.80036 0 1557 692.00000 470.80036 32.0%   - 25s
71.   0   0 470.82420 0 1553 692.00000 470.82420 32.0%   - 25s
72.   0   2 472.00000 0 1553 692.00000 472.00000 31.8%   - 27s
73.   27 20 472.30313 8 1514 692.00000 472.00000 31.8% 122 36s
74.   512 528 474.32093 118 1461 692.00000 472.00000 31.8% 12.7 40s
75. 1362 1409 533.66260 312 1102 692.00000 472.00000 31.8% 22.4 45s
76. 2094 2110 549.00000 460 915 692.00000 472.00000 31.8% 44.5 50s
77. 2618 2631 564.00000 632 822 692.00000 472.00000 31.8% 73.9 55s
78. 3351 3316 580.00000 755 729 692.00000 472.00000 31.8% 78.6 60s
79. 3710 3531 626.00000 597 16691 692.00000 472.00000 31.8% 76.1 69s
80. 3712 3532 669.00000 67 1506 692.00000 669.00000 3.32% 76.1 75s

```
 81    3720  3538  672.73197  517  816  692.00000  672.73197  2.78%  75.9   80s
 82  H 3724  3362             691.0000000  674.45314  2.39%  75.9   81s
 83    3726  3364  676.20683  365  623  691.00000  676.20683  2.14%  75.8   86s
 84    3736  3370  679.42828  735  712  691.00000  679.42828  1.67%  75.6   90s
 85    3745  3207  681.21692  233  512  691.00000  681.21692  1.42%  75.4   95s
 86    3754  3213  681.47016  285  546  691.00000  681.47016  1.38%  75.2  100s
 87    3766  3059  681.66657  482  385  691.00000  681.66657  1.35%  75.0  105s
 88    3776  3066  681.81002  541  393  691.00000  681.81002  1.33%  74.8  110s
 89    3791  3076  682.25513  439  293  691.00000  682.25513  1.27%  74.5  115s
 90    3817  3093  682.59619  699  476  691.00000  682.59619  1.22%  74.0  121s
 91    3834  3105  682.68635  566  545  691.00000  682.68635  1.20%  73.7  125s
 92    3843  3111  682.79088  379  524  691.00000  682.79088  1.19%  73.5  130s
 93    3860  3122  682.88025   28  525  691.00000  682.88025  1.18%  73.2  135s
 94    3869  3128  682.92322  707  496  691.00000  682.92322  1.17%  73.0  140s
 95    3879  3135  682.96573  202  540  691.00000  682.96573  1.16%  72.8  145s
 96    3895  3145  683.04740  450  553  691.00000  683.04740  1.15%  72.5  150s
 97    3906  3153  683.35681  688  522  691.00000  683.35681  1.11%  72.3  155s
 98    3916  3159  683.54850  513  555  691.00000  683.54850  1.08%  72.1  161s
 99    3924  3165  683.56662  152  568  691.00000  683.56662  1.08%  72.0  167s
100    3931  3169  683.59601  773  586  691.00000  683.59601  1.07%  71.9  172s
101    3934  3171  683.75544  566  507  691.00000  683.75544  1.05%  71.8  175s
102    3939  3175  683.81540  230  480  691.00000  683.81540  1.04%  71.7  183s
103    3943  3177  683.84731  379  546  691.00000  683.84731  1.04%  71.6  185s
104    3948  3181  683.85053   61  574  691.00000  683.85053  1.03%  71.6  190s
105    3949  3181  683.88802  556  515  691.00000  683.88802  1.03%  71.5  200s
106    3953  3184  683.92269  311  555  691.00000  683.92269  1.02%  71.5  205s
107    3957  3187  683.93993  517  437  691.00000  683.93993  1.02%  71.4  219s
108    3958  3187  683.97659  642  462  691.00000  683.97659  1.02%  71.4  220s
109    3963  3191  683.99346  487  501  691.00000  683.99346  1.01%  71.3  225s
110    3966  3193  684.03334  482  439  691.00000  684.03334  1.01%  71.2  230s
111    3967  3193  684.03386  101  396  691.00000  684.03386  1.01%  71.2  241s
112    3974  3198  684.09123   10  546  691.00000  684.09123  1.00%  71.1  245s
113    3978  3201  684.14990  183  497  691.00000  684.14990  0.99%  71.0  255s
114    3984  3205  684.18059   42  482  691.00000  684.18059  0.99%  70.9  260s
115    3988  3207  684.18214  196  529  691.00000  684.18214  0.99%  70.8  267s
116    3989  3208  684.19176  314  436  691.00000  684.19176  0.99%  70.8  273s
117    3990  3209  684.20406   49  441  691.00000  684.20406  0.98%  70.8  275s
118    3996  3213  684.20938  210  466  691.00000  684.20938  0.98%  70.7  283s
119    3997  3213  684.26137   59  466  691.00000  684.26137  0.98%  70.7  287s
120    4002  3217  684.27256  525  475  691.00000  684.27256  0.97%  70.6  290s
121    4005  3219  684.27341  680  487  691.00000  684.27341  0.97%  70.5  297s
122    4006  3219  684.30016  688  526  691.00000  684.30016  0.97%  70.5  308s
123    4007  3220  684.31584  282  471  691.00000  684.31584  0.97%  70.5  310s
124    4012  3223  684.32405   67  552  691.00000  684.32405  0.97%  70.4  315s
125    4013  3224  684.34220  105  452  691.00000  684.34220  0.96%  70.4  320s
126    4020  3229  684.35226  517  552  691.00000  684.35226  0.96%  70.3  326s
127    4027  3233  684.40778  647  550  691.00000  684.40778  0.95%  70.1  330s
128    4031  3236  684.46014  773  528  691.00000  684.46014  0.95%  70.1  335s
129    4043  3244  684.48337  379  477  691.00000  684.48337  0.94%  69.9  340s
130    4053  3251  684.49981  311  478  691.00000  684.49981  0.94%  69.7  345s
131    4067  3260  684.51094  101  504  691.00000  684.51094  0.94%  69.5  350s
132    4078  3267  684.52003  183  477  691.00000  684.52003  0.94%  69.3  356s
133    4084  3271  684.52835   42  419  691.00000  684.52835  0.94%  69.2  360s
134    4096  3279  684.54648  210  479  691.00000  684.54648  0.93%  69.0  365s
135    4106  3286  684.55231  688  420  691.00000  684.55231  0.93%  68.8  370s
136    4117  3293  684.56098  699  456  691.00000  684.56098  0.93%  68.6  375s
137    4125  3299  684.57305  223  469  691.00000  684.57305  0.93%  68.5  381s
138    4137  3307  684.57970  287  496  691.00000  684.57970  0.93%  68.3  386s
139    4143  3311  684.58569  379  464  691.00000  684.58569  0.93%  68.2  391s
140    4157  3320  684.59590  517  460  691.00000  684.59590  0.93%  68.0  395s
141    4172  3330  684.60817  562  512  691.00000  684.60817  0.93%  67.7  400s
142    4179  3335  684.61406  202  415  691.00000  684.61406  0.92%  67.6  405s
143    4190  3342  684.62128   49  395  691.00000  684.62128  0.92%  67.4  410s
144    4203  3351  684.63159  270  460  691.00000  684.63159  0.92%  67.2  415s
145    4214  3358  684.63793   94  503  691.00000  684.63793  0.92%  67.0  420s
146    4222  3363  684.64331   92  451  691.00000  684.64331  0.92%  66.9  425s
147    4231  3369  684.64679  773  504  691.00000  684.64679  0.92%  66.8  430s
148    4239  3375  684.65293  230  475  691.00000  684.65293  0.92%  66.6  437s
149    4249  3381  684.66268  556  495  691.00000  684.66268  0.92%  66.5  440s
150    4261  3389  684.66754  429  457  691.00000  684.66754  0.92%  66.3  445s
151    4272  3398  685.38299  562  124  691.00000  685.38299  0.81%  100   450s
152    4312  3428  690.00000   67   22  691.00000  690.00000  0.14%  100   455s

Cutting planes:
  Gomory: 15
  Cover: 7
  MIR: 1
  Flow cover: 18
  RLT: 1
  Relax-and-lift: 2

Explored 4326 nodes (444602 simplex iterations) in 456.58 seconds (293.28 work units)
Thread count was 8 (of 8 available processors)
```

```
165  Solution count 3: 691 691 691
166  No other solutions better than 691
167
168  Optimal solution found (tolerance 1.00e-04)
169  Best objective 6.910000000000e+02, best bound 6.910000000000e+02, gap 0.0000%
170
171  Output optimal solution and the Optimal Obj: 691.0
172
173
174  Obj = 691.0
175
176  Solutions:
177      The total pi =  142.0
178      The total duration time in berth stage =  166.0
179      The total duration time in quay crane scheduling stage =  33.0
180      The total departure time in berth stage=  412.0
181      The total departure time in quay crane scheduling stage =  279.0
182      The total wasted crane work hour according QC0=  3.413440093459362
183      The last depature time in quay crane scheduling stage =  60.0
184
185  The specific solution are as follows:
186      Vessel i: 0:    li: 6,       pi: 13-19,        ai-di: 21-36,        taoi-deltai: 21-36,       periodi: 15,        taoPi_SP-
         deltaPi_SP: 21-23,            periodPi: 2,           c_i: 3826582,        dowork: 3954660,                 fa_i: 6
187      Vessel i: 1:    li: 7,       pi: 14-21,        ai-di: 39-49,        taoi-deltai: 39-49,       periodi: 10,        taoPi_SP-
         deltaPi_SP: 39-41,            periodPi: 2,           c_i: 2443825,        dowork: 2504618,                 fa_i: 5
188      Vessel i: 2:    li: 4,       pi: 2-6,        ai-di: 10-19,        taoi-deltai: 10-19,       periodi: 9,        taoPi_SP-deltaPi_SP:
         10-13,            periodPi: 3,           c_i: 2253819,        dowork: 2372796,             fa_i: 3
189      Vessel i: 3:    li: 6,       pi: 19-25,        ai-di: 10-36,        taoi-deltai: 10-36,       periodi: 26,        taoPi_SP-
         deltaPi_SP: 10-14,            periodPi: 4,           c_i: 6632614,        dowork: 6854744,                 fa_i: 6
190      Vessel i: 4:    li: 7,       pi: 27-34,        ai-di: 8-18,        taoi-deltai: 8-18,       periodi: 10,        taoPi_SP-deltaPi_SP
         : 8-10,            periodPi: 2,           c_i: 2539421,        dowork: 2636440,             fa_i: 4
191      Vessel i: 5:    li: 7,       pi: 6-13,        ai-di: 4-23,        taoi-deltai: 4-18,       periodi: 14,        taoPi_SP-deltaPi_SP: 4
         -6,            periodPi: 2,           c_i: 3672683,        dowork: 3691016,             fa_i: 7
192      Vessel i: 6:    li: 7,       pi: 25-32,        ai-di: 27-51,        taoi-deltai: 27-49,       periodi: 22,        taoPi_SP-
         deltaPi_SP: 27-31,            periodPi: 4,           c_i: 5785684,        dowork: 5800168,                 fa_i: 7
193      Vessel i: 7:    li: 6,       pi: 7-13,        ai-di: 23-48,        taoi-deltai: 23-47,       periodi: 24,        taoPi_SP-deltaPi_SP
         : 23-27,            periodPi: 4,           c_i: 6213808,        dowork: 6327456,             fa_i: 5
194      Vessel i: 8:    li: 6,       pi: 8-14,        ai-di: 58-73,        taoi-deltai: 58-69,       periodi: 11,        taoPi_SP-deltaPi_SP
         : 58-60,            periodPi: 2,           c_i: 2682121,        dowork: 2768262,             fa_i: 5
195      Vessel i: 9:    li: 4,       pi: 21-25,        ai-di: 46-77,        taoi-deltai: 46-71,       periodi: 25,        taoPi_SP-
         deltaPi_SP: 46-54,            periodPi: 8,           c_i: 6550770,        dowork: 6591100,                 fa_i: 2
196  TimeSolveModel: 466.000000
197
198  TimeAll: 470.000000
199
200
```