```
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=22512

import sys; print('Python %s on %s' % (sys.version, sys.platform))
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'])

PyDev console: starting.

Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
>>> 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')
Backend TkAgg is interactive backend. Turning interactive mode on.
Waiting 5s.....

Optimize the  ./R_10_9.xlsx  instance

Set parameter TimeLimit to value 1200

Set parameter PoolSolutions to value 3
Set parameter PoolGap to value 0.05
Set parameter PoolSearchMode to value 2
Gurobi Optimizer version 11.0.0 build v11.0.0rc2 (win64 - Windows 10.0 (19045.2))

CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
Thread count: 4 physical cores, 8 logical processors, using up to 8 threads

Optimize a model with 260882 rows, 80570 columns and 770550 nonzeros
Model fingerprint: 0x9ac737bd
Variable types: 0 continuous, 80570 integer (67900 binary)
Coefficient statistics:
  Matrix range     [1e+00, 5e+05]
  Objective range  [1e+00, 1e+00]
  Bounds range     [1e+00, 1e+00]
  RHS range        [1e+00, 9e+06]
Presolve removed 190721 rows and 2516 columns
Presolve time: 1.43s
Presolved: 70161 rows, 78054 columns, 207408 nonzeros
Variable types: 0 continuous, 78054 integer (65394 binary)
Root relaxation presolved: 70116 rows, 78099 columns, 207288 nonzeros

Deterministic concurrent LP optimizer: primal and dual simplex
Showing primal log only...

Concurrent spin time: 0.08s

Solved with dual simplex

Root relaxation: objective 2.990736e+02, 4723 iterations, 1.62 seconds (1.13 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

     0     0  299.07362    0 3429          -  299.07362      -     -    4s
H    0     0                497.0000000  299.07362  39.8%     -    6s
H    0     0                492.0000000  299.07362  39.2%     -    8s
H    0     0                491.0000000  305.05616  37.9%     -    9s
     0     0  305.05616    0 3402  491.00000  305.05616  37.9%     -    9s
H    0     0                490.0000000  305.22796  37.7%     -   25s
     0     0  314.00000    0 3156  490.00000  314.00000  35.9%     -   26s
     0     0  314.00000    0 3429  490.00000  314.00000  35.9%     -   27s
     0     0  314.86827    0 2653  490.00000  314.86827  35.7%     -   28s
H    0     0                489.0000000  315.00000  35.6%     -   32s
     0     0  315.00000    0 3366  489.00000  315.00000  35.6%     -   32s
     0     0  315.00000    0 3367  489.00000  315.00000  35.6%     -   32s
     0     0  316.69671    0 2654  489.00000  316.69671  35.2%     -   34s
     0     0  316.75241    0 2813  489.00000  316.75241  35.2%     -   38s
     0     0  316.76329    0 2719  489.00000  316.76329  35.2%     -   38s
     0     0  316.79034    0 3028  489.00000  316.79034  35.2%     -   39s
     0     0  316.83522    0 2915  489.00000  316.83522  35.2%     -   39s
     0     0  316.83862    0 3032  489.00000  316.83862  35.2%     -   39s
     0     0  317.07519    0 2472  489.00000  317.07519  35.2%     -   40s
     0     0  317.11355    0 2870  489.00000  317.11355  35.2%     -   45s
     0     0  317.12738    0 2661  489.00000  317.12738  35.1%     -   45s
     0     0  317.14411    0 2868  489.00000  317.14411  35.1%     -   46s
     0     0  317.14745    0 2843  489.00000  317.14745  35.1%     -   46s
     0     0  317.27788    0 2098  489.00000  317.27788  35.1%     -   47s
     0     0  317.30434    0 2819  489.00000  317.30434  35.1%     -   48s
     0     0  317.31041    0 2873  489.00000  317.31041  35.1%     -   48s
     0     0  317.50544    0 2656  489.00000  317.50544  35.1%     -   49s
     0     0  317.54352    0 2958  489.00000  317.54352  35.1%     -   54s
     0     0  317.54409    0 2958  489.00000  317.54409  35.1%     -   54s
     0     0  317.62772    0 2314  489.00000  317.62772  35.0%     -   56s
```

```
 81      0    0  317.65511    0 2890  489.00000  317.65511  35.0%    -   57s
 82      0    0  317.65818    0 2910  489.00000  317.65818  35.0%    -   57s
 83      0    0  317.77494    0 2195  489.00000  317.77494  35.0%    -   58s
 84      0    0  317.78467    0 2003  489.00000  317.78467  35.0%    -   59s
 85      0    2  317.79443    0 1983  489.00000  317.79443  35.0%    -   64s
 86      3    2  318.77876    2 2282  489.00000  318.23752  34.9%   223   65s
 87    209  219  324.39540   54 1807  489.00000  319.60603  34.6%  74.7   70s
 88    637  667  345.03982  158 1695  489.00000  319.60603  34.6%  34.6   75s
 89    698  699  345.10301  178 1678  489.00000  319.60603  34.6%  35.0   86s
 90  H  699   699                     487.0000000  319.60603  34.4%  35.0   86s
 91   1181 1304  346.13456  332 1532  487.00000  319.60603  34.4%  26.5   90s
 92   2080 2212  367.54487  467 1439  487.00000  319.60603  34.4%  20.8   95s
 93   3072 3245  407.08810  767 1140  487.00000  319.60603  34.4%  18.2  100s
 94   3726 3766  330.62012    9 1992  487.00000  319.61585  34.4%  19.1  105s
 95   4369 4511  332.43863  127 1704  487.00000  319.61585  34.4%  20.4  110s
 96   5136 4474  323.99742  431 2003  487.00000  319.61585  34.4%  20.0  127s
 97   5138 4475  350.26719  500 1960  487.00000  319.61585  34.4%  20.0  140s
 98   5139 4476  475.00000 1025 2069  487.00000  475.00000  2.46%  20.0  150s
 99   5140 4477  475.86340   51 2363  487.00000  475.86340  2.29%  20.0  155s
100  H 5141  4253                     486.0000000  476.17696  2.02%  20.0  158s
101   5143  4255  477.27477  316  178  486.00000  477.27477  1.80%  20.0  162s
102   5144  4255  477.27477  957  125  486.00000  477.27477  1.80%  19.9  166s
103   5146  4257  477.41075  298  199  486.00000  477.41075  1.77%  19.9  171s
104   5148  4258  477.62290  454  261  486.00000  477.62290  1.72%  19.9  175s
105   5154  4262  477.94665  190  282  486.00000  477.94665  1.66%  19.9  181s
106   5158  4265  479.12771  748  260  486.00000  479.12771  1.41%  19.9  187s
107   5161  4267  479.17095  834  266  486.00000  479.17095  1.41%  19.9  190s
108   5165  4269  479.70851  340  253  486.00000  479.70851  1.29%  19.9  196s
109   5166  4056  480.07169  366  262  486.00000  480.07169  1.22%  19.9  205s
110   5171  4059  480.41780  329  282  486.00000  480.41780  1.15%  19.8  212s
111   5175  4062  480.56546  691  307  486.00000  480.56546  1.12%  19.8  217s
112   5179  4065  480.66961  662  286  486.00000  480.66961  1.10%  19.8  222s
113   5182  4067  480.72479  579  312  486.00000  480.72479  1.09%  19.8  226s
114   5185  4069  480.78439  793  324  486.00000  480.78439  1.07%  19.8  234s
115   5187  4070  480.80663  441  285  486.00000  480.80663  1.07%  19.8  235s
116   5189  4071  480.83599  353  236  486.00000  480.83599  1.06%  19.8  241s
117   5191  4073  480.85798 1264  220  486.00000  480.85798  1.06%  19.8  245s
118   5206  3502  481.40973  899  188  486.00000  481.40973  0.94%  32.1  250s
119   5218  3510  481.83796 1022  220  486.00000  481.83796  0.86%  32.1  255s
120   5221  3512  481.92435  491  179  486.00000  481.92435  0.84%  32.1  260s
121   5288  3548  484.04586   33  138  486.00000  483.00000  0.62%  39.0  265s
122   5697  3464     cutoff   44       486.00000  483.00000  0.62%  53.2  270s
123
124  Cutting planes:
125    Learned: 15
126    Gomory: 6
127    Lift-and-project: 27
128    Cover: 3
129    Implied bound: 6
130    Clique: 1
131    MIR: 61
132    Mixing: 2
133    StrongCG: 7
134    Flow cover: 232
135    Zero half: 5
136    RLT: 24
137    Relax-and-lift: 209
138    BQP: 1
139
140  Explored 6127 nodes (409996 simplex iterations) in 273.45 seconds (281.23 work units)
141  Thread count was 8 (of 8 available processors)
142
143  Solution count 3: 486 486 486
144  No other solutions better than 486
145
146  Optimal solution found (tolerance 1.00e-04)
147  Best objective 4.860000000000e+02, best bound 4.860000000000e+02, gap 0.0000%
148
149  Output optimal solution and the Optimal Obj:  486.0
150
151
152  Obj = 486.0
153
154  Solutions:
155       The total pi =  151.0
156       The total duration time in berth stage =  123.0
157       The total duration time in quay crane scheduling stage =  27.0
158       The total departure time in berth stage=  291.0
159       The total departure time in quay crane scheduling stage =  195.0
160       The total wasted crane work hour according QC0=  7.177386930861313
161       The last depature time in quay crane scheduling stage =  36.0
162
163  The specific solution are as follows:
164      Vessel i: 0:      li: 6,          pi: 7-13,              ai-di: 4-15,            taoi-deltai: 4-15,              periodi: 11,                  taoPi_SP-deltaPi_SP: 4
```

-6, periodPi: 2, c_i: 2697405, dowork: 2900084, fa_i: 5
Vessel i: 1: li: 5, pi: 24-29, ai-di: 23-75, taoi-deltai: 23-33, periodi: 10, taoPi_SP-deltaPi_SP: 23-25, periodPi: 2, c_i: 2552621, dowork: 2636440, fa_i: 4
Vessel i: 2: li: 5, pi: 24-29, ai-di: 35-82, taoi-deltai: 35-39, periodi: 4, taoPi_SP-deltaPi_SP: 35-36, periodPi: 1, c_i: 1000283, dowork: 1318220, fa_i: 4
Vessel i: 3: li: 6, pi: 13-19, ai-di: 12-66, taoi-deltai: 12-46, periodi: 34, taoPi_SP-deltaPi_SP: 12-19, periodPi: 7, c_i: 8705747, dowork: 8963896, fa_i: 4
Vessel i: 4: li: 5, pi: 29-34, ai-di: 27-69, taoi-deltai: 27-32, periodi: 5, taoPi_SP-deltaPi_SP: 27-28, periodPi: 1, c_i: 1106149, dowork: 1318220, fa_i: 4
Vessel i: 5: li: 5, pi: 0-5, ai-di: 11-32, taoi-deltai: 11-15, periodi: 4, taoPi_SP-deltaPi_SP: 11-12, periodPi: 1, c_i: 1000415, dowork: 1054576, fa_i: 4
Vessel i: 6: li: 5, pi: 19-24, ai-di: 8-72, taoi-deltai: 8-40, periodi: 32, taoPi_SP-deltaPi_SP: 8-15, periodPi: 7, c_i: 8373922, dowork: 8700252, fa_i: 4
Vessel i: 7: li: 5, pi: 8-13, ai-di: 22-67, taoi-deltai: 22-27, periodi: 5, taoPi_SP-deltaPi_SP: 22-23, periodPi: 1, c_i: 1102446, dowork: 1318220, fa_i: 4
Vessel i: 8: li: 5, pi: 24-29, ai-di: 9-41, taoi-deltai: 9-22, periodi: 13, taoPi_SP-deltaPi_SP: 9-12, periodPi: 3, c_i: 3242150, dowork: 3427372, fa_i: 4
Vessel i: 9: li: 5, pi: 3-8, ai-di: 17-52, taoi-deltai: 17-22, periodi: 5, taoPi_SP-deltaPi_SP: 17-19, periodPi: 2, c_i: 1282087, dowork: 1318220, fa_i: 4
TimeSolveModel: 285.000000

TimeAll: 289.000000