```
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=51929

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_9_3.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 213639 rows, 72324 columns and 629811 nonzeros
Model fingerprint: 0x7495f202
Variable types: 0 continuous, 72324 integer (60921 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, 6e+06]
Presolve removed 185639 rows and 3645 columns
Presolve time: 0.09s
Presolved: 28000 rows, 68679 columns, 83259 nonzeros
Variable types: 0 continuous, 68679 integer (57276 binary)

Root relaxation: objective 5.192795e+02, 2172 iterations, 0.11 seconds (0.23 work units)

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

     0     0  519.27949    0 1719          -  519.27949      -     -    0s
H    0     0                       891.0000000  519.27949  41.7%     -    1s
H    0     0                       889.0000000  546.87237  38.5%     -    2s
     0     0  546.87237    0 1720  889.00000  546.87237  38.5%     -    2s
     0     0  552.73665    0 1597  889.00000  552.73665  37.8%     -    6s
     0     0  552.73972    0 1712  889.00000  552.73972  37.8%     -    6s
     0     0  559.38121    0 1454  889.00000  559.38121  37.1%     -    6s
H    0     0                       886.0000000  559.90928  36.8%     -    8s
     0     0  559.90928    0 1664  886.00000  559.90928  36.8%     -    8s
     0     0  559.94446    0 1665  886.00000  559.94446  36.8%     -    8s
     0     0  559.95183    0 1666  886.00000  559.95183  36.8%     -    8s
     0     0  562.22552    0 1404  886.00000  562.22552  36.5%     -    9s
     0     0  562.93518    0 1434  886.00000  562.93518  36.5%     -   10s
     0     0  563.18767    0 1554  886.00000  563.18767  36.4%     -   10s
     0     0  563.19945    0 1553  886.00000  563.19945  36.4%     -   10s
     0     0  565.31034    0 1310  886.00000  565.31034  36.2%     -   11s
     0     0  565.88342    0 1459  886.00000  565.88342  36.1%     -   13s
     0     0  565.99279    0 1522  886.00000  565.99279  36.1%     -   13s
     0     0  566.02250    0 1522  886.00000  566.02250  36.1%     -   13s
     0     0  566.75937    0 1406  886.00000  566.75937  36.0%     -   13s
     0     0  566.92404    0 1480  886.00000  566.92404  36.0%     -   15s
     0     0  566.94770    0 1522  886.00000  566.94770  36.0%     -   15s
     0     0  567.24182    0 1364  886.00000  567.24182  36.0%     -   15s
     0     0  567.26653    0 1354  886.00000  567.26653  36.0%     -   16s
     0     2  567.26653    0 1349  886.00000  567.26653  36.0%     -   22s
    28    25  568.01504    8 1345  886.00000  567.41375  36.0%   140   39s
    32    30  568.25190    9 1355  886.00000  567.41375  36.0%   133   40s
   882   901  579.00000  140 1024  886.00000  567.41375  36.0% 41.1   45s
  1872  1887  586.00000  301  882  886.00000  567.41375  36.0% 49.8   50s
  3165  3150  606.06915  474  782  886.00000  567.41375  36.0% 47.1   55s
  4406  4159  642.00000  172 11136  886.00000  567.41375  36.0% 45.2   66s
H 4408  3951                       885.0000000  867.07807  2.03%  45.2   70s
H 4412  3569                       884.0000000  869.28779  1.66%  45.1   75s
  4420  3225  874.73931   50  295  884.00000  874.73931  1.05%  45.1   80s
  4431  3233  880.96954  128  107  884.00000  880.96954  0.34%  44.9   85s
  4451  3246  882.65311  798   60  884.00000  882.65311  0.15%  44.7   90s

Cutting planes:
```

```
  Learned: 293
  Gomory: 21
  Lift-and-project: 11
  Cover: 1
  Implied bound: 35
  Clique: 66
  MIR: 24
  Mixing: 1
  StrongCG: 16
  Flow cover: 75
  Zero half: 15
  RLT: 60
  Relax-and-lift: 915
  BQP: 2
  PSD: 1

Explored 4451 nodes (243739 simplex iterations) in 90.23 seconds (113.83 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 884 884 884
No other solutions better than 884

Optimal solution found (tolerance 1.00e-04)
Best objective 8.840000000000e+02, best bound 8.840000000000e+02, gap 0.0000%

Output optimal solution and the Optimal Obj:  884.0


Obj = 884.0

Solutions:
    The total pi =  137.0
    The total duration time in berth stage =  126.0
    The total duration time in quay crane scheduling stage =  28.0
    The total departure time in berth stage=  491.0
    The total departure time in quay crane scheduling stage =  393.0
    The total wasted crane work hour according QC0=  4.475015551273687
    The last depature time in quay crane scheduling stage =  65.0

The specific solution are as follows:
    Vessel i: 0     li: 5,      pi: 12-17,      ai-di: 58-69,       taoi-deltai: 58-69,     periodi: 11,        taoPi_SP-deltaPi_SP: 58-60,     periodPi: 2,        c_i: 2829686,       dowork: 2900084,        fa_i: 4
    Vessel i: 1     li: 5,      pi: 14-19,      ai-di: 23-32,       taoi-deltai: 23-32,     periodi: 9,         taoPi_SP-deltaPi_SP: 23-25,     periodPi: 2,        c_i: 2132972,       dowork: 2240974,        fa_i: 3
    Vessel i: 2     li: 4,      pi: 10-14,      ai-di: 30-54,       taoi-deltai: 30-54,     periodi: 24,        taoPi_SP-deltaPi_SP: 30-35,     periodPi: 5,        c_i: 6176257,       dowork: 6195634,        fa_i: 3
    Vessel i: 3     li: 5,      pi: 28-33,      ai-di: 60-69,       taoi-deltai: 60-69,     periodi: 9,         taoPi_SP-deltaPi_SP: 60-63,     periodPi: 3,        c_i: 2262216,       dowork: 2372796,        fa_i: 2
    Vessel i: 4     li: 5,      pi: 7-12,       ai-di: 57-73,       taoi-deltai: 57-73,     periodi: 16,        taoPi_SP-deltaPi_SP: 57-61,     periodPi: 4,        c_i: 4151447,       dowork: 4218304,        fa_i: 4
    Vessel i: 5     li: 6,      pi: 19-25,      ai-di: 15-27,       taoi-deltai: 15-25,     periodi: 10,        taoPi_SP-deltaPi_SP: 15-17,     periodPi: 2,        c_i: 2468720,       dowork: 2636440,        fa_i: 3
    Vessel i: 6     li: 6,      pi: 8-14,       ai-di: 6-26,        taoi-deltai: 6-22,      periodi: 16,        taoPi_SP-deltaPi_SP: 6-9,       periodPi: 3,        c_i: 4132297,       dowork: 4350126,        fa_i: 4
    Vessel i: 7     li: 5,      pi: 17-22,      ai-di: 61-83,       taoi-deltai: 61-77,     periodi: 16,        taoPi_SP-deltaPi_SP: 61-65,     periodPi: 4,        c_i: 4095642,       dowork: 4218304,        fa_i: 3
    Vessel i: 8     li: 6,      pi: 22-28,      ai-di: 55-71,       taoi-deltai: 55-70,     periodi: 15,        taoPi_SP-deltaPi_SP: 55-58,     periodPi: 3,        c_i: 3790096,       dowork: 4086482,        fa_i: 4
TimeSolveModel: 99.000000

TimeAll: 103.000000
```