```
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=22215

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_8.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: 0x2429db9c
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, 5e+06]
Presolve removed 205598 rows and 3147 columns
Presolve time: 0.46s
Presolved: 55284 rows, 77423 columns, 163227 nonzeros
Variable types: 0 continuous, 77423 integer (64763 binary)
Root relaxation presolved: 55239 rows, 77468 columns, 163108 nonzeros

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

Concurrent spin time: 0.00s

Solved with dual simplex

Root relaxation: objective 3.111060e+02, 4073 iterations, 0.44 seconds (0.66 work units)

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

     0     0  311.10600    0 2799          -  311.10600      -     -    1s
H    0     0                1028.0000000  311.10600  69.7%     -    1s
H    0     0                532.0000000  311.10600  41.5%     -    2s
     0     0  319.46149    0 2793  532.00000  319.46149  40.0%     -    4s
     0     0  337.00000    0 2739  532.00000  337.00000  36.7%     -   18s
     0     0  337.00000    0 2809  532.00000  337.00000  36.7%     -   18s
     0     0  337.00000    0 2047  532.00000  337.00000  36.7%     -   19s
     0     0  337.00000    0 2738  532.00000  337.00000  36.7%     -   21s
     0     0  337.00000    0 2736  532.00000  337.00000  36.7%     -   21s
     0     0  338.00000    0 1858  532.00000  338.00000  36.5%     -   24s
     0     0  338.00000    0 2288  532.00000  338.00000  36.5%     -   25s
     0     0  338.00000    0 2236  532.00000  338.00000  36.5%     -   25s
     0     0  338.00000    0 2361  532.00000  338.00000  36.5%     -   25s
     0     0  338.00000    0 2362  532.00000  338.00000  36.5%     -   26s
     0     0  338.00000    0 2143  532.00000  338.00000  36.5%     -   27s
     0     0  338.00000    0 1633  532.00000  338.00000  36.5%     -   28s
     0     2  338.00000    0 1555  532.00000  338.00000  36.5%     -   30s
   369   389  338.00000   78 1858  532.00000  338.00000  36.5% 39.2   35s
  1319  1360  348.07741  291 1654  532.00000  338.00000  36.5% 13.1   40s
  1773  1759 infeasible  337       532.00000  338.00000  36.5% 16.8   54s
  1834  1928  403.74252  349 1601  532.00000  338.00000  36.5% 18.7   55s
  2971  3102  407.35197  652 1244  532.00000  338.00000  36.5% 15.3   60s
  3484  3434  440.08664  579 1633  532.00000  338.00000  36.5% 14.7   69s
  3486  3435  406.91800  620 1755  532.00000  338.00000  36.5% 14.7   75s
H 3486  3263                531.0000000  522.05096  1.69%  14.7   77s
  3497  3271  526.05555  134  201  531.00000  526.05555  0.93%  14.6   80s
H 3501  2953                530.0000000  526.15847  0.72%  14.6   82s
H 3512  2538                529.0000000  529.00000  0.00%  14.6   85s

Optimal solution found at node 3513 - now completing solution pool...
```

```
  3514  2412  529.00000  252    4  530.00000  529.00000  0.19%  14.6   85s

Cutting planes:
  Learned: 583
  Gomory: 12
  Cover: 4
  Implied bound: 12
  Projected implied bound: 8
  Clique: 3
  MIR: 102
  StrongCG: 82
  Flow cover: 97
  RLT: 45
  Relax-and-lift: 1167
  BQP: 127

Explored 3514 nodes (93309 simplex iterations) in 85.53 seconds (105.37 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 529 529 529
No other solutions better than 529

Optimal solution found (tolerance 1.00e-04)
Best objective 5.290000000000e+02, best bound 5.290000000000e+02, gap 0.0000%

Output optimal solution and the Optimal Obj:  529.0


Obj = 529.0

Solutions:
    The total pi =  142.0
    The total duration time in berth stage =  93.0
    The total duration time in quay crane scheduling stage =  18.0
    The total departure time in berth stage=  302.0
    The total departure time in quay crane scheduling stage =  227.0
    The total wasted crane work hour according QC0=  3.7348242326773984
    The last depature time in quay crane scheduling stage =  46.0

The specific solution are as follows:
    Vessel i: 0     li: 5,          pi: 22-27,              ai-di: 30-49,           taoi-deltai: 30-49,             periodi: 19,            taoPi_SP-deltaPi_SP: 30-33,             periodPi: 3,            c_i: 4837105,           dowork: 4877414,        fa_i: 5
    Vessel i: 1     li: 5,          pi: 29-34,              ai-di: 15-43,           taoi-deltai: 15-22,             periodi: 7,             taoPi_SP-deltaPi_SP: 15-17,             periodPi: 2,            c_i: 1597761,           dowork: 1713686,        fa_i: 4
    Vessel i: 2     li: 5,          pi: 0-5,                ai-di: 30-60,           taoi-deltai: 30-34,             periodi: 4,             taoPi_SP-deltaPi_SP: 30-31,             periodPi: 1,            c_i: 1028378,           dowork: 1054576,        fa_i: 4
    Vessel i: 3     li: 5,          pi: 13-18,              ai-di: 6-21,            taoi-deltai: 6-11,              periodi: 5,             taoPi_SP-deltaPi_SP: 6-7,               periodPi: 1,            c_i: 1166688,           dowork: 1318220,        fa_i: 4
    Vessel i: 4     li: 6,          pi: 23-29,              ai-di: 12-44,           taoi-deltai: 12-24,             periodi: 12,            taoPi_SP-deltaPi_SP: 12-14,             periodPi: 2,            c_i: 3027891,           dowork: 3163728,        fa_i: 4
    Vessel i: 5     li: 5,          pi: 13-18,              ai-di: 21-60,           taoi-deltai: 21-33,             periodi: 12,            taoPi_SP-deltaPi_SP: 21-23,             periodPi: 2,            c_i: 2951581,           dowork: 3163728,        fa_i: 4
    Vessel i: 6     li: 5,          pi: 8-13,               ai-di: 29-59,           taoi-deltai: 29-34,             periodi: 5,             taoPi_SP-deltaPi_SP: 29-30,             periodPi: 1,            c_i: 1294224,           dowork: 1318220,        fa_i: 4
    Vessel i: 7     li: 6,          pi: 8-14,               ai-di: 45-82,           taoi-deltai: 45-50,             periodi: 5,             taoPi_SP-deltaPi_SP: 45-46,             periodPi: 1,            c_i: 1221349,           dowork: 1450042,        fa_i: 4
    Vessel i: 8     li: 5,          pi: 8-13,               ai-di: 8-55,            taoi-deltai: 8-23,              periodi: 15,            taoPi_SP-deltaPi_SP: 8-11,              periodPi: 3,            c_i: 3796097,           dowork: 3822838,        fa_i: 4
    Vessel i: 9     li: 5,          pi: 18-23,              ai-di: 13-43,           taoi-deltai: 13-22,             periodi: 9,             taoPi_SP-deltaPi_SP: 13-15,             periodPi: 2,            c_i: 2349510,           dowork: 2372796,        fa_i: 4
TimeSolveModel: 96.000000

TimeAll: 99.000000
```