```
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=12711

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_7_10.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 133301 rows, 56000 columns and 390789 nonzeros
Model fingerprint: 0x84e883ad
Variable types: 0 continuous, 56000 integer (47131 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, 7e+06]
Presolve removed 116281 rows and 2568 columns
Presolve time: 0.15s
Presolved: 17020 rows, 53432 columns, 48669 nonzeros
Variable types: 0 continuous, 53432 integer (44570 binary)

Root relaxation: objective 4.033257e+02, 1934 iterations, 0.08 seconds (0.21 work units)

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

     0     0  403.32567    0 1603          -  403.32567      -     -    0s
H    0     0                       654.0000000  403.32567  38.3%     -    1s
     0     0  429.26823    0 1598  654.00000  429.26823  34.4%     -    2s
     0     0  454.25632    0 1533  654.00000  454.25632  30.5%     -    7s
     0     0  454.25905    0 1603  654.00000  454.25905  30.5%     -    7s
     0     0  454.55853    0 1360  654.00000  454.55853  30.5%     -    7s
     0     0  454.82227    0 1345  654.00000  454.82227  30.5%     -    7s
     0     0  458.35847    0 1545  654.00000  458.35847  29.9%     -    9s
     0     0  458.35847    0 1545  654.00000  458.35847  29.9%     -    9s
     0     0  458.69144    0 1106  654.00000  458.69144  29.9%     -   10s
     0     0  458.96737    0 1385  654.00000  458.96737  29.8%     -   11s
     0     0  458.97212    0 1182  654.00000  458.97212  29.8%     -   11s
     0     0  458.98568    0 1377  654.00000  458.98568  29.8%     -   11s
     0     0  459.04243    0 1180  654.00000  459.04243  29.8%     -   12s
     0     0  459.04243    0 1043  654.00000  459.04243  29.8%     -   12s
     0     1  459.04243    0 1016  654.00000  459.04243  29.8%     -   15s
  1956  2061  491.40398  405  639  654.00000  459.04243  29.8%  26.7   20s
  4725  4676  614.12526  906  388  654.00000  459.04243  29.8%  20.3   25s
  5107  4869  630.08790  563 1224  654.00000  630.08790  3.66%  21.0   30s
  5128  4883  644.71776  415  227  654.00000  644.71776  1.42%  20.9   35s

Cutting planes:
  Learned: 170
  Gomory: 19
  Lift-and-project: 1
  Cover: 1
  Implied bound: 34
  MIR: 108
  StrongCG: 27
  Flow cover: 161
  Zero half: 4
  RLT: 85
  Relax-and-lift: 816

Explored 5141 nodes (143569 simplex iterations) in 38.53 seconds (56.45 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 654 654 654
```

```
No other solutions better than 654

Optimal solution found (tolerance 1.00e-04)
Best objective 6.540000000000e+02, best bound 6.540000000000e+02, gap 0.0000%

Output optimal solution and the Optimal Obj:  654.0


Obj = 654.0

Solutions:
    The total pi =  115.0
    The total duration time in berth stage =  132.0
    The total duration time in quay crane scheduling stage =  32.0
    The total departure time in berth stage=  377.0
    The total departure time in quay crane scheduling stage =  277.0
    The total wasted crane work hour according QC0=  5.080460772860373
    The last depature time in quay crane scheduling stage =  71.0

The specific solution are as follows:
    Vessel i: 0:    li: 4,    pi: 14-18,    ai-di: 14-28,    taoi-deltai: 14-28,    periodi: 14,    taoPi_SP-deltaPi_SP: 14-17,    periodPi: 3,    c_i: 3678527,    dowork: 3954660,    fa_i: 3
    Vessel i: 1:    li: 7,    pi: 20-27,    ai-di: 34-60,    taoi-deltai: 34-60,    periodi: 26,    taoPi_SP-deltaPi_SP: 34-37,    periodPi: 3,    c_i: 6717945,    dowork: 7118388,    fa_i: 7
    Vessel i: 2:    li: 6,    pi: 14-20,    ai-di: 43-66,    taoi-deltai: 43-66,    periodi: 23,    taoPi_SP-deltaPi_SP: 43-50,    periodPi: 7,    c_i: 6055023,    dowork: 6327456,    fa_i: 2
    Vessel i: 3:    li: 5,    pi: 21-26,    ai-di: 64-89,    taoi-deltai: 64-89,    periodi: 25,    taoPi_SP-deltaPi_SP: 64-71,    periodPi: 7,    c_i: 6450546,    dowork: 6459278,    fa_i: 2
    Vessel i: 4:    li: 4,    pi: 10-14,    ai-di: 49-74,    taoi-deltai: 49-74,    periodi: 25,    taoPi_SP-deltaPi_SP: 49-57,    periodPi: 8,    c_i: 6519362,    dowork: 6722922,    fa_i: 2
    Vessel i: 5:    li: 6,    pi: 27-33,    ai-di: 28-45,    taoi-deltai: 28-38,    periodi: 10,    taoPi_SP-deltaPi_SP: 28-30,    periodPi: 2,    c_i: 2530377,    dowork: 2636440,    fa_i: 6
    Vessel i: 6:    li: 5,    pi: 9-14,    ai-di: 13-30,    taoi-deltai: 13-22,    periodi: 9,    taoPi_SP-deltaPi_SP: 13-15,    periodPi: 2,    c_i: 2300727,    dowork: 2372796,    fa_i: 4
TimeSolveModel: 46.000000

TimeAll: 49.000000
```