```
"E:\1 □□□□\3 □□□□□\1 □□□□□□\1 □□□□□□□□\1_□□□□□□_□□□□\1_LW _□□□□\4 □□□□\3 python_code\1 exzample\2 □□□□□□\9 Code for this paper\Scripts\python.exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=5067

import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['E:\\1 □□□□\\3 □□□□□\\1 □□□□□□\\1 □□□□□□□□\\1_□□□□□□_□□□□\\1_LW _□□□□\\4 □□□□\\3 python_code\\9 Code for this paper', 'E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□/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 _□□□□/4 □□□□/3 python_code/9 Code for this paper/main_DM.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper')
Backend TkAgg is interactive backend. Turning interactive mode on.
Waiting 5s.....

Optimize the  ./R_5_1.xlsx  instance

Set parameter TimeLimit to value 600
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 71827 rows, 39860 columns and 208375 nonzeros
Model fingerprint: 0xc2d2cd64
Variable types: 0 continuous, 39860 integer (33525 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 55511 rows and 1325 columns
Presolve time: 0.10s
Presolved: 16316 rows, 38535 columns, 46615 nonzeros
Variable types: 0 continuous, 38535 integer (32205 binary)
Found heuristic solution: objective 526.0000000

Root relaxation: objective 2.009944e+02, 2074 iterations, 0.10 seconds (0.26 work units)

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

     0     0  200.99438    0 1648  526.00000  200.99438  61.8%     -    0s
H    0     0                       299.0000000  200.99438  32.8%     -    1s
H    0     0                       298.0000000  200.99438  32.6%     -    1s
     0     0  208.25016    0 1481  298.00000  208.25016  30.1%     -    2s
     0     0  208.51128    0 1415  298.00000  208.51128  30.0%     -    2s
     0     0  224.00000    0 1579  298.00000  224.00000  24.8%     -    7s
     0     0  224.00000    0 1454  298.00000  224.00000  24.8%     -    7s
     0     0  224.00000    0 1382  298.00000  224.00000  24.8%     -    7s
     0     0  224.00000    0  957  298.00000  224.00000  24.8%     -    9s
     0     0  224.00000    0  954  298.00000  224.00000  24.8%     -    9s
     0     0  225.47649    0  984  298.00000  225.47649  24.3%     -   11s
     0     0  225.61776    0  979  298.00000  225.61776  24.3%     -   11s
     0     0  234.53552    0 1018  298.00000  234.53552  21.3%     -   11s
     0     0  235.06540    0 1018  298.00000  235.06540  21.1%     -   12s
     0     0  235.06695    0 1018  298.00000  235.06695  21.1%     -   13s
     0     0  236.01252    0  884  298.00000  236.01252  20.8%     -   13s
     0     0  236.13971    0  936  298.00000  236.13971  20.8%     -   14s
     0     0  236.16810    0  951  298.00000  236.16810  20.7%     -   14s
     0     0  236.51586    0  973  298.00000  236.51586  20.6%     -   15s
     0     0  236.68639    0  985  298.00000  236.68639  20.6%     -   16s
     0     0  236.71343    0  986  298.00000  236.71343  20.6%     -   16s
     0     0  236.80575    0  966  298.00000  236.80575  20.5%     -   17s
     0     0  236.82812    0  860  298.00000  236.82812  20.5%     -   17s
     0     2  236.84774    0  860  298.00000  236.84774  20.5%     -   18s
    30    34  237.06025    8  853  298.00000  237.06025  20.4%  30.7   20s
  1904  1768  266.90156   20 1579  298.00000  237.11895  20.4%  16.7   26s
  1915  1777  292.64840   80  114  298.00000  292.64840  1.80%  20.6   30s

Cutting planes:
  Gomory: 26
  MIR: 20
  StrongCG: 7
  Flow cover: 63
  Zero half: 10
  RLT: 1
  Relax-and-lift: 25
```

```
Explored 1927 nodes (56138 simplex iterations) in 31.47 seconds (34.26 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 298 298 298
No other solutions better than 298

Optimal solution found (tolerance 1.00e-04)
Best objective 2.980000000000e+02, best bound 2.980000000000e+02, gap 0.0000%

Output optimal solution and the Optimal Obj:  298.0


Obj = 298.0

Solutions:
    The total pi =  86.0
    The total duration time in berth stage =  108.0
    The total duration time in quay crane scheduling stage =  22.0
    The total departure time in berth stage=  192.0
    The total departure time in quay crane scheduling stage =  106.0
    The total wasted crane work hour according QC0=  8.954275462365917
    The last depature time in quay crane scheduling stage =  35.0

The specific solution are as follows:
    Vessel i: 0:        li: 6,        pi: 18-24,        ai-di: 7-27,        taoi-deltai: 7-27,        periodi: 20,        taoPi_SP-deltaPi_SP: 7-11,        periodPi: 4,        c_i: 5270879,        dowork: 6327456,        fa_i: 4
    Vessel i: 1:        li: 7,        pi: 24-31,        ai-di: 2-15,        taoi-deltai: 2-15,        periodi: 13,        taoPi_SP-deltaPi_SP: 2-5,        periodPi: 3,        c_i: 3408100,        dowork: 3954660,        fa_i: 3
    Vessel i: 2:        li: 4,        pi: 14-18,        ai-di: 22-50,        taoi-deltai: 22-50,        periodi: 28,        taoPi_SP-deltaPi_SP: 22-27,        periodPi: 5,        c_i: 7366651,        dowork: 7382032,        fa_i: 4
    Vessel i: 3:        li: 5,        pi: 9-14,        ai-di: 23-62,        taoi-deltai: 23-42,        periodi: 19,        taoPi_SP-deltaPi_SP: 23-28,        periodPi: 5,        c_i: 4857867,        dowork: 5009236,        fa_i: 4
    Vessel i: 4:        li: 6,        pi: 21-27,        ai-di: 30-70,        taoi-deltai: 30-58,        periodi: 28,        taoPi_SP-deltaPi_SP: 30-35,        periodPi: 5,        c_i: 7318466,        dowork: 7909320,        fa_i: 4
TimeSolveModel: 38.000000

TimeAll: 41.000000
```