```
"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=6915

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_10_1.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: 0xe3c00439
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, 8e+06]
Presolve removed 221196 rows and 3711 columns
Presolve time: 0.16s
Presolved: 39686 rows, 76859 columns, 118420 nonzeros
Variable types: 0 continuous, 76859 integer (64189 binary)

Root relaxation: objective 4.500616e+02, 3005 iterations, 0.16 seconds (0.24 work units)

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

     0     0  450.06159    0 2253          -  450.06159      -     -    1s
H    0     0                1190.0000000  450.06159  62.2%     -    1s
H    0     0                1058.0000000  450.06159  57.5%     -    1s
H    0     0                 738.0000000  450.06159  39.0%     -    2s
     0     0  469.28188    0 2143  738.00000  469.28188  36.4%     -    3s
H    0     0                 736.0000000  469.29079  36.2%     -    8s
     0     0  477.87143    0 2079  736.00000  477.87143  35.1%     -    8s
     0     0  478.03198    0 2254  736.00000  478.03198  35.1%     -    8s
     0     0  480.66455    0 1887  736.00000  480.66455  34.7%     -    9s
H    0     0                 735.0000000  480.68289  34.6%     -   10s
     0     0  495.18006    0 2189  735.00000  495.18006  32.6%     -   10s
     0     0  495.18006    0 2188  735.00000  495.18006  32.6%     -   10s
     0     0  496.19640    0 1732  735.00000  496.19640  32.5%     -   11s
     0     0  496.19640    0 1650  735.00000  496.19640  32.5%     -   12s
     0     2  496.19640    0 1642  735.00000  496.19640  32.5%     -   14s
   101   104  496.19640   26 1942  735.00000  496.19640  32.5%  37.2   15s
  1176  1244  530.39748  273 1705  735.00000  496.19640  32.5%   8.8   20s
  2766  2800  529.46072  214 1399  735.00000  496.19640  32.5%  14.1   25s
H 3316  3191                 734.0000000  496.19640  32.4%  17.4   29s
  3317  2880  567.74071  248 15725  734.00000  496.19640  32.4%  17.4   30s
  3319  2881  705.00000  465 1470  734.00000  705.00000  3.95%  17.4   35s
  3320  2882  705.00000   77 1757  734.00000  705.00000  3.95%  17.3   45s
  3328  2887  716.00000  581 1797  734.00000  716.00000  2.45%  17.3   51s
  3332  2890  718.30212  290 1691  734.00000  718.30212  2.14%  17.3   58s
H 3334  2746                 732.0000000  718.34625  1.87%  17.3   59s
  3336  2748  718.36943  513 1606  732.00000  718.36943  1.86%  17.3   63s
  3340  2750  718.49647  631 1505  732.00000  718.49647  1.84%  17.2   67s
  3349  2756  718.56982   37 1672  732.00000  718.56982  1.83%  17.2   70s
  3354  2760  718.71213  322 1674  732.00000  718.71213  1.82%  17.2   75s
  3367  2630  719.29057  487  633  732.00000  719.29057  1.74%  17.1   81s
  3378  2638  720.18149  168  743  732.00000  720.18149  1.61%  17.0   87s
  3386  2267  721.24992  169  377  732.00000  721.24992  1.47%  30.0   90s

Cutting planes:
  Learned: 29
  Gomory: 23
  Lift-and-project: 3
```

```
  Cover: 3
  Implied bound: 21
  Clique: 9
  MIR: 182
  StrongCG: 21
  Flow cover: 525
  Zero half: 48
  RLT: 26
  Relax-and-lift: 797

Explored 3400 nodes (121339 simplex iterations) in 93.09 seconds (100.43 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 732 732 732
No other solutions better than 732

Optimal solution found (tolerance 1.00e-04)
Best objective 7.320000000000e+02, best bound 7.320000000000e+02, gap 0.0000%

Output optimal solution and the Optimal Obj:  732.0


Obj = 732.0

Solutions:
    The total pi =  147.0
    The total duration time in berth stage =  160.0
    The total duration time in quay crane scheduling stage =  36.0
    The total departure time in berth stage=  428.0
    The total departure time in quay crane scheduling stage =  304.0
    The total wasted crane work hour according QC0=  7.735897649861176
    The last depature time in quay crane scheduling stage =  55.0

The specific solution are as follows:
    Vessel i: 0:     li: 6,          pi: 24-30,          ai-di: 2-15,          taoi-deltai: 2-15,          periodi: 13,          taoPi_SP-deltaPi_SP: 2-5,          periodPi: 3,          c_i: 3325804,          dowork: 3822838,          fa_i: 4
    Vessel i: 1:     li: 6,          pi: 8-14,          ai-di: 14-36,          taoi-deltai: 14-37,          periodi: 23,          taoPi_SP-deltaPi_SP: 14-18,          periodPi: 4,          c_i: 6030336,          dowork: 6063812,          fa_i: 4
    Vessel i: 2:     li: 7,          pi: 0-7,          ai-di: 14-25,          taoi-deltai: 14-21,          periodi: 7,          taoPi_SP-deltaPi_SP: 14-16,          periodPi: 2,          c_i: 1637737,          dowork: 1845508,          fa_i: 4
    Vessel i: 3:     li: 5,          pi: 14-19,          ai-di: 20-44,          taoi-deltai: 20-41,          periodi: 21,          taoPi_SP-deltaPi_SP: 20-25,          periodPi: 5,          c_i: 5351141,          dowork: 5931990,          fa_i: 3
    Vessel i: 4:     li: 7,          pi: 21-28,          ai-di: 24-30,          taoi-deltai: 24-29,          periodi: 5,          taoPi_SP-deltaPi_SP: 24-26,          periodPi: 2,          c_i: 1201427,          dowork: 1318220,          fa_i: 2
    Vessel i: 5:     li: 6,          pi: 28-34,          ai-di: 29-48,          taoi-deltai: 29-47,          periodi: 18,          taoPi_SP-deltaPi_SP: 29-33,          periodPi: 4,          c_i: 4500077,          dowork: 4745592,          fa_i: 3
    Vessel i: 6:     li: 6,          pi: 19-25,          ai-di: 34-63,          taoi-deltai: 34-63,          periodi: 29,          taoPi_SP-deltaPi_SP: 34-39,          periodPi: 5,          c_i: 7630244,          dowork: 7645676,          fa_i: 4
    Vessel i: 7:     li: 6,          pi: 0-6,          ai-di: 34-43,          taoi-deltai: 34-41,          periodi: 7,          taoPi_SP-deltaPi_SP: 34-36,          periodPi: 2,          c_i: 1705681,          dowork: 1845508,          fa_i: 4
    Vessel i: 8:     li: 6,          pi: 8-14,          ai-di: 47-66,          taoi-deltai: 47-67,          periodi: 20,          taoPi_SP-deltaPi_SP: 47-51,          periodPi: 4,          c_i: 5229391,          dowork: 5272880,          fa_i: 4
    Vessel i: 9:     li: 6,          pi: 25-31,          ai-di: 50-68,          taoi-deltai: 50-67,          periodi: 17,          taoPi_SP-deltaPi_SP: 50-55,          periodPi: 5,          c_i: 4322611,          dowork: 4481948,          fa_i: 2
TimeSolveModel: 111.000000

TimeAll: 114.000000
```