```
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=40679

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_8_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 171112 rows, 64136 columns and 503224 nonzeros
Model fingerprint: 0xa3c2f6d8
Variable types: 0 continuous, 64136 integer (54000 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 144298 rows and 2865 columns
Presolve time: 0.25s
Presolved: 26814 rows, 61271 columns, 78194 nonzeros
Variable types: 0 continuous, 61271 integer (51143 binary)

Root relaxation: objective 5.500089e+02, 2655 iterations, 0.13 seconds (0.27 work units)

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

     0     0  550.00891    0 1906          -  550.00891      -     -    0s
H    0     0                       881.0000000  550.00891  37.6%     -    2s
     0     0  590.33344    0 1906  881.00000  590.33344  33.0%     -    3s
     0     0  590.33344    0 1895  881.00000  590.33344  33.0%     -    3s
H    0     0                       879.0000000  590.33344  32.8%     -   10s
     0     0  606.16669    0 1895  879.00000  606.16669  31.0%     -   10s
     0     0  606.37963    0 1668  879.00000  606.37963  31.0%     -   11s
     0     0  607.61548    0 1859  879.00000  607.61548  30.9%     -   14s
     0     0  607.62040    0 1862  879.00000  607.62040  30.9%     -   14s
     0     0  610.75241    0 1621  879.00000  610.75241  30.5%     -   15s
     0     0  611.00503    0 1731  879.00000  611.00503  30.5%     -   17s
     0     0  611.02830    0 1656  879.00000  611.02830  30.5%     -   17s
     0     0  612.93512    0 1446  879.00000  612.93512  30.3%     -   18s
     0     0  614.80065    0 1665  879.00000  614.80065  30.1%     -   20s
     0     0  615.32386    0 1578  879.00000  615.32386  30.0%     -   20s
     0     0  615.36875    0 1642  879.00000  615.36875  30.0%     -   20s
     0     0  616.09682    0 1445  879.00000  616.09682  29.9%     -   20s
     0     0  616.46024    0 1399  879.00000  616.46024  29.9%     -   21s
     0     0  616.64747    0 1636  879.00000  616.64747  29.8%     -   23s
     0     0  616.83437    0 1561  879.00000  616.83437  29.8%     -   23s
     0     0  616.83735    0 1622  879.00000  616.83735  29.8%     -   23s
     0     0  619.72914    0 1547  879.00000  619.72914  29.5%     -   24s
     0     0  621.23027    0 1535  879.00000  621.23027  29.3%     -   32s
     0     0  621.23350    0 1518  879.00000  621.23350  29.3%     -   32s
     0     0  626.29759    0 1547  879.00000  626.29759  28.7%     -   33s
     0     0  627.23697    0 1542  879.00000  627.23697  28.6%     -   34s
     0     0  627.25254    0 1543  879.00000  627.25254  28.6%     -   34s
     0     0  627.86492    0 1465  879.00000  627.86492  28.6%     -   35s
     0     0  627.94975    0 1541  879.00000  627.94975  28.6%     -   39s
     0     0  627.95431    0 1538  879.00000  627.95431  28.6%     -   39s
     0     0  628.52923    0 1612  879.00000  628.52923  28.5%     -   39s
     0     0  628.53700    0 1612  879.00000  628.53700  28.5%     -   39s
     0     1  628.53700    0 1605  879.00000  628.53700  28.5%     -   56s
   715   751  637.78349  170 1455  879.00000  629.80203  28.4%   4.1   60s
  1817  1894  702.39441  369 1174  879.00000  629.80203  28.4%  32.2   65s
  2912  2922  766.34987  656  779  879.00000  629.80203  28.4%  55.9   70s
  3911  3889  706.37834  323  841  879.00000  630.10490  28.3%  71.2   75s
  4412  4275  793.71160  395 1612  879.00000  630.10490  28.3%  76.7   86s
```

```
  4414  4276  852.22631  228 1496  879.00000  852.22631  3.05%  76.7   91s
  4415  4277  855.00000  613  118  879.00000  855.00000  2.73%  76.6   96s
  4419  4280  860.18519  330  261  879.00000  860.18519  2.14%  76.6  100s
  4421  4281  866.13604   83  358  879.00000  866.13604  1.46%  76.5  105s
  4430  4287  872.37825  510  143  879.00000  872.37825  0.75%  76.4  111s
  4443  4296  873.80062  295  220  879.00000  873.80062  0.59%  76.2  115s
H 4446  4082                       878.0000000  876.33882  0.19%  76.1  117s
  4453  3686  877.00000  370   38  878.00000  877.00000  0.11%  76.0  121s

Cutting planes:
  Learned: 135
  Gomory: 7
  Lift-and-project: 1
  Cover: 3
  Implied bound: 25
  Clique: 3
  MIR: 43
  StrongCG: 5
  Flow cover: 74
  Zero half: 27
  RLT: 33
  Relax-and-lift: 742

Explored 4453 nodes (417238 simplex iterations) in 121.77 seconds (149.58 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 878 878 878
No other solutions better than 878

Optimal solution found (tolerance 1.00e-04)
Best objective 8.780000000000e+02, best bound 8.780000000000e+02, gap 0.0000%

Output optimal solution and the Optimal Obj:  878.0


Obj = 878.0

Solutions:
    The total pi =  130.0
    The total duration time in berth stage =  178.0
    The total duration time in quay crane scheduling stage =  34.0
    The total departure time in berth stage=  511.0
    The total departure time in quay crane scheduling stage =  367.0
    The total wasted crane work hour according QC0=  11.745584955470255
    The last depature time in quay crane scheduling stage =  69.0

The specific solution are as follows:
   Vessel i: 0     li: 5,          pi: 14-19,              ai-di: 56-78,           taoi-deltai: 56-78,           periodi: 22,          taoPi_SP-deltaPi_SP: 56-60,           periodPi: 4,          c_i: 5626540,          dowork: 7382032,          fa_i: 5
   Vessel i: 1     li: 5,          pi: 19-24,              ai-di: 62-89,           taoi-deltai: 62-89,           periodi: 27,          taoPi_SP-deltaPi_SP: 62-69,           periodPi: 7,          c_i: 6928556,          dowork: 6986566,          fa_i: 4
   Vessel i: 2     li: 4,          pi: 23-27,              ai-di: 40-58,           taoi-deltai: 40-58,           periodi: 18,          taoPi_SP-deltaPi_SP: 40-43,           periodPi: 3,          c_i: 4655308,          dowork: 4745592,          fa_i: 4
   Vessel i: 3     li: 4,          pi: 14-18,              ai-di: 23-47,           taoi-deltai: 23-47,           periodi: 24,          taoPi_SP-deltaPi_SP: 23-27,           periodPi: 4,          c_i: 6101342,          dowork: 6327456,          fa_i: 4
   Vessel i: 4     li: 4,          pi: 19-23,              ai-di: 37-57,           taoi-deltai: 37-57,           periodi: 20,          taoPi_SP-deltaPi_SP: 37-41,           periodPi: 4,          c_i: 5075529,          dowork: 5272880,          fa_i: 4
   Vessel i: 5     li: 5,          pi: 24-29,              ai-di: 62-91,           taoi-deltai: 62-86,           periodi: 24,          taoPi_SP-deltaPi_SP: 62-66,           periodPi: 4,          c_i: 6274930,          dowork: 6327456,          fa_i: 5
   Vessel i: 6     li: 6,          pi: 8-14,               ai-di: 6-27,            taoi-deltai: 6-22,            periodi: 16,          taoPi_SP-deltaPi_SP: 6-10,            periodPi: 4,          c_i: 3976906,          dowork: 4218304,          fa_i: 3
   Vessel i: 7     li: 5,          pi: 9-14,               ai-di: 47-78,           taoi-deltai: 47-74,           periodi: 27,          taoPi_SP-deltaPi_SP: 47-51,           periodPi: 4,          c_i: 6906554,          dowork: 7382032,          fa_i: 5
TimeSolveModel: 130.000000

TimeAll: 135.000000
```