```
D:\Python\Python\setroute\python.exe "D:\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Pyt
       mode=client --port=5767
  3
       import sys; print('Python %s on %s' % (sys.version, sys.platform))
       paper', 'E:/1 | 0 | 0/3 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0/1 | 0 | 0/1 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 
  6
       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
  8
       main_DM.py', wdir='E:/1 000/3 00000/1 000000/1 000000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1
10
       Backend TkAgg is interactive backend. Turning interactive mode on.
11
       Waiting 5s.....
13
       Optimize the ./R 6 6.xlsx instance
14
15
       Set parameter TimeLimit to value 1200
16
       Set parameter PoolSolutions to value 3
17
18
       Set parameter PoolGap to value 0.05
19
        Set parameter PoolSearchMode to value 2
       Gurobi Optimizer version 11.0.0 build v11.0.0rc2 (win64 - Windows 10.0 (19045.2))
20
21
22 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
24
       Optimize a model with 100206 rows, 47910 columns and 292506 nonzeros
25
26
       Model fingerprint: 0x93cafb69
        Variable types: 0 continuous, 47910 integer (40308 binary)
28
       Coefficient statistics:
29
          Matrix range [1e+00, 5e+05]
30
          Objective range [1e+00, 1e+00]
          Bounds range [1e+00, 1e+00]
31
32
          RHS range
                                        [1e+00, 6e+06]
33
       Presolve removed 84565 rows and 2216 columns
       Presolve time: 0.21s
       Presolved: 15641 rows, 45694 columns, 47664 nonzeros
35
36
        Variable types: 0 continuous, 45694 integer (38098 binary)
38
       Root relaxation: objective 3.904167e+02, 1419 iterations, 0.06 seconds (0.14 work units)
39
40
            Nodes | Current Node | Objective Bounds
41
        Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
42
43
                     0 390.41666 0 1072
                                                                             - 390.41666
                                                   716.0000000 390.41666 45.5% -
44
       Η
             0
                        0
45
      Η
             0
                                                   628.0000000 390.41666 37.8%
                       0
                                                                                                                             1s
                     0 430.94731  0 1114 628.00000 430.94731 31.4%
46
47
                     0 432.85456
                                                 0 1119 628.00000 432.85456 31.1%
                     0\ 432.85456\quad 0\ 1120\ 628.00000\ 432.85456\ 31.1\%
48
49
             0
                     0 438.23289
                                                 0 838 628.00000 438.23289 30.2%
                                                                                                                                       5s
50
             0
                     0 439.00776
                                                 0 1054 628.00000 439.00776 30.1%
51
                     0 447.49637
                                                   0 920 628.00000 447.49637 28.7%
52
                     0 448.31264
                                                 0 904 628.00000 448.31264 28.6%
53
                     0 448.42559
                                                 0 927 628.00000 448.42559 28.6%
             0
54
                     0\ 448.44827
                                                   0 1025 628.00000 448.44827 28.6%
                                                                                                                                       98
55
                      0 457.18976
                                                   0\ 889\ 628.00000\ 457.18976\ 27.2\%
56
                     0 458.59780 0 969 628.00000 458.59780 27.0%
             0
                                                                                                                                  - 12s
57
             0
                     0 458 61781
                                                  0 973 628.00000 458.61781 27.0%
                                                                                                                                 - 12s
58
             0
                     0 459.06645
                                                   0 752 628.00000 459.06645 26.9%
                                                                                                                                 - 12s
                     0 459.20289
                                                 0 973 628.00000 459.20289 26.9%
60
                     0 459.22670 0 977 628.00000 459.22670 26.9%
             0
                                                                                                                                 - 13s
                                                                                                                                 - 13s
61
             0
                     0 459.86844
                                                 0 749 628.00000 459.86844 26.8%
                     0 459.98271
                                                   0 943 628.00000 459.98271 26.8%
63
             0
                     0 459.98366
                                                 0 946 628.00000 459.98366 26.8%
                                                                                                                                 - 14s
                     0 460 38904
                                                 0 951 628.00000 460.38904 26.7%
64
             0

    15s

65
                     0.460.39092
                                                 0 942 628.00000 460.39092 26.7%
                                                                                                                                 - 15s
66
                      2 460.42046
                                                 0 940 628.00000 460.42046 26.7%
                     33 461.17965 9 926 628.00000 460.95533 26.6% 41.4 24s
67
            28
68
                     67 461.92613 20 919 628.00000 460.95533 26.6% 23.7 25s
69
          1518 1519 479.70436 415 674 628.00000 460.95533 26.6% 34.3 30s
70
          2478 2517 510.06818 249 634 628.00000 461.92414 26.4% 64.4 35s
          3482 3517 538 00000 611 362 628 00000 461 92414 26 4% 80 4 40s
          4166 4047 487.71137 226 942 628.00000 461.92414 26.4% 79.0 47s
          4168 4048 603.09270 618 762 628.00000 603.09270 3.97% 79.0 50s
74
          4180 4056 620.34087 571 119 628.00000 620.34087 1.22% 78.7 55s
75
       Cutting planes:
76
          Learned: 142
          Gomory: 1
78
79
          Implied bound: 9
80
          MIR: 19
```

```
unknown
       StrongCG: 7
  82
       Flow cover: 42
       Zero half: 2
  83
  84
       RLT: 42
  85
       Relax-and-lift: 635
  86
       BOP: 53
  87
  88 Explored 4183 nodes (352634 simplex iterations) in 56.41 seconds (77.19 work units)
     Thread count was 8 (of 8 available processors)
  90
      Solution count 3: 628 628 628
  91
  92
      No other solutions better than 628
  94 Optimal solution found (tolerance 1.00e-04)
 95
     Best objective 6.280000000000e+02, best bound 6.28000000000e+02, gap 0.0000%
  97
      Output optimal solution and the Optimal Obj: 628.0
 98
 99
100 Obj = 628.0
101
102 Solutions:
103
         The total pi = 112.0
104
         The total duration time in berth stage = 93.0
105
         The total duration time in quay crane scheduling stage = 27.0
106
         The total departure time in berth stage= 347.0
107
         The total departure time in quay crane scheduling stage = 281.0
108
         The total wasted crane work hour according QC0= 3.7041882235135257
109
         The last depature time in quay crane scheduling stage = 63.0
110
111 The specific solution are as follows:
        Vessel i: 0:
                                   pi: 28-34,
                                                            ai-di: 45-54,
                                                                                                                     periodi: 9,
                                                                                                                                                taoPi SP-deltaPi SP
112
                                                                                     taoi-deltai: 45-54,
                      li: 6,
       45-50,
                                 periodPi: 5,
                                                                   c_i: 2351588,
                                                                                                         dowork: 2636440,
                                                                                                                                                     fa_i: 1
        Vessel i: 1:
                       li: 7,
                                   pi: 7-14,
                                                                                  taoi-deltai: 51-61,
                                                                                                                  periodi: 10,
                                                                                                                                                taoPi_SP-deltaPi_SP
                                                          ai-di: 51-61,
                                                                   c i: 2568806,
                                                                                                         dowork: 2636440,
       51-53,
                                 periodPi: 2,
                                                                                                                                                     fa i: 5
        Vessel i: 2:
                                                                                                                     periodi: 14,
114
                       li: 5,
                                                            ai-di: 53-67,
                                                                                     taoi-deltai: 53-67,
                                                                                                                                                   taoPi_SP-
                                   pi: 14-19,
                                                                                                                  dowork: 3559194,
      deltaPi_SP: 53-56,
                                           periodPi: 3,
                                                                             c i: 3516800,
                                                                                                                                                               fa_i: 4
        Vessel i: 3:
                                                            ai-di: 55-71,
                                                                                    taoi-deltai: 55-71,
                                                                                                                     periodi: 16,
                                                                                                                                                   taoPi SP-
                      li: 4,
                                   pi: 30-34,
      deltaPi_SP: 55-63,
                                           periodPi: 8,
                                                                             c i: 3965516,
                                                                                                                  dowork: 4218304,
                                                                                                                                                               fa_i: 1
116
        Vessel i: 4: li: 5,
                                   pi: 19-24,
                                                            ai-di: 22-46,
                                                                                     taoi-deltai: 22-43,
                                                                                                                     periodi: 21,
                                                                                                                                                   taoPi_SP-
      deltaPi_SP: 22-26,
                                           periodPi: 4,
                                                                             c_i: 5464079,
                                                                                                                   dowork: 5536524,
                                                                                                                                                               fa_i: 4
117
        Vessel i: 5:
                      li: 5,
                                   pi: 14-19,
                                                            ai-di: 28-57,
                                                                                    taoi-deltai: 28-51,
                                                                                                                     periodi: 23,
                                                                                                                                                   taoPi SP-
      deltaPi SP: 28-33,
                                                                             c_i: 5807338,
                                                                                                                  dowork: 6063812,
                                           periodPi: 5,
                                                                                                                                                               fa_i: 3
118
     TimeSolveModel: 63.000000
119
120 TimeAll: 67.000000
121
122
```