```
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=22558

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_5.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: 0xae3e64fd
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 149111 rows and 3306 columns
Presolve time: 0.07s
Presolved: 22001 rows, 60830 columns, 65393 nonzeros
Variable types: 0 continuous, 60830 integer (50694 binary)

Root relaxation: objective 5.463546e+02, 1826 iterations, 0.10 seconds (0.17 work units)

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

     0     0  546.35456    0 1458          -  546.35456      -     -    0s
H    0     0                947.0000000  546.35456  42.3%     -    1s
H    0     0                929.0000000  584.10707  37.1%     -    1s
H    0     0                921.0000000  584.10707  36.6%     -    2s
     0     0  584.10707    0 1462  921.00000  584.10707  36.6%     -    2s
H    0     0                920.0000000  584.17498  36.5%     -    2s
H    0     0                918.0000000  584.17498  36.4%     -    4s
     0     0  596.01900    0 1462  918.00000  596.01900  35.1%     -    4s
     0     0  596.10075    0 1462  918.00000  596.10075  35.1%     -    4s
     0     0  596.72054    0 1358  918.00000  596.72054  35.0%     -    4s
H    0     0                917.0000000  597.11490  34.9%     -    5s
     0     0  597.11490    0 1428  917.00000  597.11490  34.9%     -    5s
     0     0  597.11890    0 1427  917.00000  597.11890  34.9%     -    5s
     0     0  597.11890    0 1429  917.00000  597.11890  34.9%     -    5s
     0     0  599.27089    0 1243  917.00000  599.27089  34.6%     -    6s
     0     0  599.49040    0 1236  917.00000  599.49040  34.6%     -    7s
     0     0  599.53244    0 1289  917.00000  599.53244  34.6%     -    7s
     0     0  599.53885    0 1289  917.00000  599.53885  34.6%     -    7s
     0     0  605.12701    0 1140  917.00000  605.12701  34.0%     -    7s
     0     0  605.56382    0 1071  917.00000  605.56382  34.0%     -    8s
     0     0  606.02696    0 1188  917.00000  606.02696  33.9%     -    8s
     0     0  606.15471    0 1234  917.00000  606.15471  33.9%     -    9s
     0     0  606.17410    0 1258  917.00000  606.17410  33.9%     -    9s
     0     0  607.87526    0 1293  917.00000  607.87526  33.7%     -    9s
     0     0  609.17050    0 1306  917.00000  609.17050  33.6%     -   10s
     0     0  609.24106    0 1270  917.00000  609.24106  33.6%     -   10s
     0     0  609.26152    0 1318  917.00000  609.26152  33.6%     -   10s
     0     0  611.84001    0 1283  917.00000  611.84001  33.3%     -   10s
     0     0  612.26354    0 1327  917.00000  612.26354  33.2%     -   11s
H    0     0                911.0000000  612.33015  32.8%     -   11s
     0     0  612.33015    0 1325  911.00000  612.33015  32.8%     -   11s
     0     0  612.44048    0 1327  911.00000  612.44048  32.8%     -   11s
     0     0  612.52395    0 1326  911.00000  612.52395  32.8%     -   11s
     0     0  612.55517    0 1324  911.00000  612.55517  32.8%     -   11s
     0     0  613.18472    0 1315  911.00000  613.18472  32.7%     -   11s
     0     0  613.21680    0 1338  911.00000  613.21680  32.7%     -   12s
     0     0  613.46089    0 1293  911.00000  613.46089  32.7%     -   13s
     0     0  613.54055    0 1216  911.00000  613.54055  32.7%     -   13s
```

81	0	1	613.54055	0	1208	911.00000	613.54055	32.7%	-	15s
82	28	32	614.86411	9	1192	911.00000	614.86411	32.5%	115	21s
83	813	839	643.96496	185	903	911.00000	615.56329	32.4%	73.6	25s
84	2176	2109	785.59929	606	522	911.00000	615.56329	32.4%	83.8	30s
85	3774	3651	720.63697	180	708	911.00000	615.68446	32.4%	78.3	35s
86	5130	4655	707.00000	375	8795	911.00000	615.68446	32.4%	71.8	41s
87	5132	4656	883.03332	913	1243	911.00000	883.03332	3.07%	71.8	45s
88	5141	4662	888.20565	116	685	911.00000	888.20565	2.50%	71.7	50s
89	5148	4667	891.77488	142	812	911.00000	891.77488	2.11%	71.6	57s
90	5161	4676	895.08825	320	649	911.00000	895.08825	1.75%	71.4	60s
91	5187	4693	898.20452	711	594	911.00000	898.20452	1.40%	71.0	67s
92	5191	4696	899.20367	152	543	911.00000	899.20367	1.29%	71.0	74s
93	5193	4697	899.22088	808	533	911.00000	899.22088	1.29%	70.9	75s
94	5203	4704	899.35502	331	478	911.00000	899.35502	1.28%	70.8	80s
95	5212	4710	899.47115	94	488	911.00000	899.47115	1.27%	70.7	85s
96	5220	4715	899.70073	394	431	911.00000	899.70073	1.24%	70.6	90s
97	5231	4722	900.26212	428	399	911.00000	900.26212	1.18%	70.4	95s
98	5238	4727	900.35353	774	370	911.00000	900.35353	1.17%	70.3	100s
99	5245	4732	900.42542	287	390	911.00000	900.42542	1.16%	70.2	107s
100	5248	4734	900.46588	142	385	911.00000	900.46588	1.16%	70.2	121s
101	5255	4738	900.52492	463	441	911.00000	900.52492	1.15%	70.1	198s
102	5260	4742	900.55352	349	372	911.00000	900.55352	1.15%	70.0	200s
103	5261	4742	900.60761	320	484	911.00000	900.60761	1.14%	70.0	223s
104	5266	4746	900.63286	528	405	911.00000	900.63286	1.14%	70.0	226s
105	5267	4746	900.68444	815	499	911.00000	900.68444	1.13%	69.9	243s
106	5273	4750	900.71355	421	479	911.00000	900.71355	1.13%	69.9	245s
107	5276	4752	900.73662	124	446	911.00000	900.73662	1.13%	69.8	272s
108	5280	4755	900.75041	364	454	911.00000	900.75041	1.13%	69.8	275s
109	5281	4756	900.79795	456	463	911.00000	900.79795	1.12%	69.8	303s
110	5285	4758	900.81633	284	499	911.00000	900.81633	1.12%	69.7	305s
111	5288	4760	900.84468	291	465	911.00000	900.84468	1.11%	69.7	335s
112	5295	4765	900.90504	39	443	911.00000	900.90504	1.11%	69.6	358s
113	5300	4768	900.92284	592	455	911.00000	900.92284	1.11%	69.5	360s
114	5301	4769	900.95460	372	497	911.00000	900.95460	1.10%	69.5	372s
115	5310	4775	901.01282	457	505	911.00000	901.01282	1.10%	69.4	382s
116	5317	4780	901.04298	894	476	911.00000	901.04298	1.09%	69.3	393s
117	5320	4782	901.08189	394	559	911.00000	901.08189	1.09%	69.2	395s
118	5326	4786	901.11370	488	530	911.00000	901.11370	1.09%	69.2	405s
119	5335	4792	901.18798	283	527	911.00000	901.18798	1.08%	69.1	419s
120	5336	4792	901.20062	338	459	911.00000	901.20062	1.08%	69.0	421s
121	5346	4799	901.23062	224	506	911.00000	901.23062	1.07%	68.9	442s
122	5353	4804	901.26133	32	517	911.00000	901.26133	1.07%	68.8	445s
123	5354	4804	901.29446	197	488	911.00000	901.29446	1.07%	68.8	454s
124	5355	4805	901.31557	463	531	911.00000	901.31557	1.06%	68.8	456s
125	5364	4811	901.36387	100	494	911.00000	901.36387	1.06%	68.7	468s
126	5366	4812	901.38646	528	504	911.00000	901.38646	1.06%	68.7	470s
127	5373	4817	901.40787	421	512	911.00000	901.40787	1.05%	68.6	487s
128	5382	4823	901.44106	329	512	911.00000	901.44106	1.05%	68.4	490s
129	5383	4824	901.45971	169	499	911.00000	901.45971	1.05%	68.4	497s
130	5391	4829	901.49582	152	496	911.00000	901.49582	1.04%	68.3	511s
131	5397	4833	901.52915	305	483	911.00000	901.52915	1.04%	68.3	578s
132	5399	4834	901.54317	874	510	911.00000	901.54317	1.04%	68.2	580s
133	5405	4838	901.55929	703	431	911.00000	901.55929	1.04%	68.2	614s
134	5406	4839	901.56640	523	534	911.00000	901.56640	1.04%	68.1	615s
135	5414	4844	901.57487	205	549	911.00000	901.57487	1.03%	68.0	620s
136	5415	4845	901.58351	104	515	911.00000	901.58351	1.03%	68.0	650s
137	5420	4848	901.60156	394	563	911.00000	901.60156	1.03%	68.0	655s
138	5421	4849	901.61340	454	552	911.00000	901.61340	1.03%	68.0	690s
139	5428	4854	901.63651	472	578	911.00000	901.63651	1.03%	67.9	695s
140	5429	4854	901.64761	232	506	911.00000	901.64761	1.03%	67.9	725s
141	5435	4858	901.66789	283	533	911.00000	901.66789	1.02%	67.8	730s
142	5436	4859	901.67330	338	493	911.00000	901.67330	1.02%	67.8	762s
143	5444	4864	901.69789	161	536	911.00000	901.69789	1.02%	67.7	773s
144	5449	4868	901.71572	302	558	911.00000	901.71572	1.02%	67.6	775s
145	5450	4868	901.72160	101	535	911.00000	901.72160	1.02%	67.6	788s
146	5459	4874	901.74236	666	525	911.00000	901.74236	1.02%	67.5	816s
147	5465	4878	901.75941	183	512	911.00000	901.75941	1.01%	67.4	826s
148	5470	4882	901.77249	71	512	911.00000	901.77249	1.01%	67.3	832s
149	5474	4884	901.79002	369	508	911.00000	901.79002	1.01%	67.3	840s
150	5481	4889	901.80310	456	473	911.00000	901.80310	1.01%	67.2	849s
151	5486	4892	901.81699	214	533	911.00000	901.81699	1.01%	67.2	850s
152	5488	4894	901.82426	291	521	911.00000	901.82426	1.01%	67.1	863s
153	5493	4897	901.84489	808	548	911.00000	901.84489	1.00%	67.1	865s
154	5496	4899	901.85351	689	486	911.00000	901.85351	1.00%	67.0	878s
155	5502	4903	901.86223	198	504	911.00000	901.86223	1.00%	67.0	880s
156	5503	4904	901.86989	331	487	911.00000	901.86989	1.00%	66.9	891s
157	5511	4909	901.89002	331	554	911.00000	901.89002	1.00%	66.8	910s
158	5514	4911	901.95928	205	525	911.00000	901.95928	0.99%	66.8	915s
159	5520	4915	902.10346	394	483	911.00000	902.10346	0.98%	66.7	926s
160	5524	4918	902.17666	103	605	911.00000	902.17666	0.97%	66.7	930s
161	5529	4921	902.20063	232	525	911.00000	902.20063	0.97%	66.6	952s
162	5536	4926	902.21641	338	605	911.00000	902.21641	0.96%	66.5	956s
163	5537	4926	902.22157	283	545	911.00000	902.22157	0.96%	66.5	980s
164	5543	4930	902.23152	37	604	911.00000	902.23152	0.96%	66.5	985s

```
  5544  4931  902.23560  161  566  911.00000  902.23560  0.96%  66.4 1058s
  5547  4933  902.24035   51  584  911.00000  902.24035  0.96%  66.4 1060s
  5550  4935  902.24574  101  560  911.00000  902.24574  0.96%  66.4 1086s
  5554  4938  902.25407  197  564  911.00000  902.25407  0.96%  66.3 1120s
  5561  4942  902.26574  320  462  911.00000  902.26574  0.96%  66.2 1158s
  5565  4945  902.26846  183  561  911.00000  902.26846  0.96%  66.2 1161s
  5566  4946  902.27404  528  486  911.00000  902.27404  0.96%  66.2 1176s
  5571  4949  902.28539  193  459  911.00000  902.28539  0.96%  66.1 1181s
  5576  4952  902.29873  124  518  911.00000  902.29873  0.96%  66.1 1188s
  5578  4954  902.30678  293  520  911.00000  902.30678  0.95%  66.0 1190s
  5582  4956  902.32154  329  522  911.00000  902.32154  0.95%  66.0 1197s

Cutting planes:
  Learned: 42
  Gomory: 2
  Lift-and-project: 1
  Cover: 9
  Implied bound: 24
  MIR: 23
  StrongCG: 2
  Flow cover: 314
  Zero half: 58
  RLT: 3
  Relax-and-lift: 1193

Explored 5587 nodes (637056 simplex iterations) in 1200.29 seconds (860.33 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 911 911 911

Time limit reached
Best objective 9.110000000000e+02, best bound 9.030000000000e+02, gap 0.8782%

Output one feasible solution with limited computation time

Optimization was stopped with status 9

Number of solution stored: 3
   911  911  911

Obj = 911.0

Solutions:
    The total pi =  106.0
    The total duration time in berth stage =  140.0
    The total duration time in quay crane scheduling stage =  33.0
    The total departure time in berth stage=  509.0
    The total departure time in quay crane scheduling stage =  402.0
    The total wasted crane work hour according QC0=  8.853840785301392
    The last depature time in quay crane scheduling stage =  67.0

The specific solution are as follows:
    Vessel i: 0:     li: 6,          pi: 8-14,               ai-di: 19-32,              taoi-deltai: 19-32,              periodi: 13,              taoPi_SP-deltaPi_SP: 19-22,              periodPi: 3,              c_i: 3341761,              dowork: 3427372,              periodi: 14,              taoPi_SP-deltaPi_SP: 60-65,              periodPi: 5,              c_i: 3563474,              dowork: 3691016,              periodi: 17,              taoPi_SP-deltaPi_SP: 39-42,              periodPi: 3,              c_i: 4403690,              dowork: 4481948,              periodi: 27,              taoPi_SP-deltaPi_SP: 56-61,              periodPi: 5,              c_i: 7022243,              dowork: 7250210,              periodi: 25,              taoPi_SP-deltaPi_SP: 56-63,              periodPi: 7,              c_i: 6458444,              dowork: 6459278,              periodi: 10,              taoPi_SP-deltaPi_SP: 40-43,              periodPi: 3,              c_i: 2378777,              dowork: 2636440,              periodi: 9,              taoPi_SP-deltaPi_SP: 37-39,              periodPi: 2,              c_i: 2172927,              dowork: 3691016,              periodi: 25,              taoPi_SP-deltaPi_SP: 62-67,              periodPi: 5,              c_i: 6552802,              dowork: 6591100,              periodi: 25,              taoPi_SP-deltaPi_SP: 62-67,              periodPi: 5,              c_i: 6552802,              dowork: 6591100,              fa_i: 4
    Vessel i: 1:     li: 5,          pi: 0-5,                ai-di: 60-74,              taoi-deltai: 60-74,              fa_i: 4
    Vessel i: 2:     li: 5,          pi: 23-28,              ai-di: 39-56,              taoi-deltai: 39-56,              fa_i: 5
    Vessel i: 3:     li: 7,          pi: 15-22,              ai-di: 56-83,              taoi-deltai: 56-83,              fa_i: 4
    Vessel i: 4:     li: 4,          pi: 11-15,              ai-di: 56-81,              taoi-deltai: 56-81,              fa_i: 3
    Vessel i: 5:     li: 4,          pi: 10-14,              ai-di: 40-50,              taoi-deltai: 40-50,              fa_i: 4
    Vessel i: 6:     li: 5,          pi: 17-22,              ai-di: 37-52,              taoi-deltai: 37-46,              fa_i: 5
    Vessel i: 7:     li: 7,          pi: 22-29,              ai-di: 62-83,              taoi-deltai: 62-87,              fa_i: 4
TimeSolveModel: 1208.000000

TimeAll: 1212.000000
```