```
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=52139

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_9_4.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 213639 rows, 72324 columns and 629811 nonzeros
Model fingerprint: 0x10fbbad9
Variable types: 0 continuous, 72324 integer (60921 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 182654 rows and 3343 columns
Presolve time: 0.09s
Presolved: 30985 rows, 68981 columns, 92116 nonzeros
Variable types: 0 continuous, 68981 integer (57578 binary)

Root relaxation: objective 4.348658e+02, 2742 iterations, 0.13 seconds (0.22 work units)

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

     0     0  434.86578    0 2022          -  434.86578      -     -    0s
H    0     0                     716.0000000  434.86578  39.3%     -    1s
     0     0  456.45886    0 1983  716.00000  456.45886  36.2%     -    2s
H    0     0                     715.0000000  456.48810  36.2%     -    5s
     0     0  464.34791    0 1949  715.00000  464.34791  35.1%     -    6s
     0     0  464.35589    0 2018  715.00000  464.35589  35.1%     -    6s
     0     0  470.70239    0 1680  715.00000  470.70239  34.2%     -    6s
     0     0  470.92158    0 1962  715.00000  470.92158  34.1%     -    8s
     0     0  470.92615    0 1961  715.00000  470.92615  34.1%     -    8s
     0     0  473.31232    0 1741  715.00000  473.31232  33.8%     -    9s
     0     0  473.76628    0 1630  715.00000  473.76628  33.7%     -   11s
     0     0  473.90809    0 1775  715.00000  473.90809  33.7%     -   11s
     0     0  474.09158    0 1774  715.00000  474.09158  33.7%     -   11s
     0     0  474.10825    0 1774  715.00000  474.10825  33.7%     -   11s
     0     0  475.53229    0 1459  715.00000  475.53229  33.5%     -   12s
     0     0  476.91556    0 1610  715.00000  476.91556  33.3%     -   14s
     0     0  477.32453    0 1716  715.00000  477.32453  33.2%     -   14s
     0     0  477.39988    0 1712  715.00000  477.39988  33.2%     -   14s
     0     0  477.42914    0 1714  715.00000  477.42914  33.2%     -   14s
     0     0  478.19458    0 1529  715.00000  478.19458  33.1%     -   14s
     0     0  478.26944    0 1677  715.00000  478.26944  33.1%     -   16s
     0     0  478.29979    0 1717  715.00000  478.29979  33.1%     -   16s
     0     0  478.82808    0 1537  715.00000  478.82808  33.0%     -   17s
     0     0  478.87765    0 1675  715.00000  478.87765  33.0%     -   18s
     0     0  478.89752    0 1674  715.00000  478.89752  33.0%     -   18s
     0     0  479.24197    0 1527  715.00000  479.24197  33.0%     -   19s
     0     0  479.25827    0 1525  715.00000  479.25827  33.0%     -   19s
     0     2  479.27088    0 1520  715.00000  479.27088  33.0%     -   23s
    27    32  479.66107    7 1624  715.00000  479.50026  32.9%   104   43s
   182   182  484.41280   43 1519  715.00000  479.50026  32.9%  52.7   45s
  1289  1325  502.96514  366 1124  715.00000  479.50026  32.9%  22.2   50s
  2659  2727  568.54779  580  858  715.00000  479.50026  32.9%  26.5   55s
  3709  3551  561.00000  164 12390  715.00000  479.50026  32.9%  34.6   67s
  3711  3552  693.00000  661 1359  715.00000  693.00000  3.08%  34.6   71s
  3714  3554  694.00000  442  229  715.00000  694.00000  2.94%  34.6   75s
  3718  3557  695.31299  165  575  715.00000  695.31299  2.75%  34.5   80s
  3725  3562  698.64324  146  736  715.00000  698.64324  2.29%  34.5   85s
  3728  3564  701.00000  147  599  715.00000  701.00000  1.96%  34.4   92s
```

81	3730	3565	703.00000	38	527	715.00000	703.00000	1.68%	34.4	97s
82	3732	3566	703.00000	494	553	715.00000	703.00000	1.68%	34.4	101s
83	3734	3568	703.00000	117	535	715.00000	703.00000	1.68%	34.4	106s
84	3736	3569	703.00000	387	502	715.00000	703.00000	1.68%	34.4	113s
85	3737	3570	703.00000	186	491	715.00000	703.00000	1.68%	34.4	115s
86	3741	3572	703.00000	347	465	715.00000	703.00000	1.68%	34.3	120s
87	3745	3575	703.00000	259	421	715.00000	703.00000	1.68%	34.3	125s
88	3748	3577	703.00000	91	449	715.00000	703.00000	1.68%	34.3	135s
89	3750	3578	703.06563	7	428	715.00000	703.06563	1.67%	34.2	140s
90	3755	3582	703.55391	385	424	715.00000	703.55391	1.60%	34.2	145s
91	3758	3584	703.79295	651	419	715.00000	703.79295	1.57%	34.2	152s
92	3760	3585	703.87135	203	425	715.00000	703.87135	1.56%	34.2	162s
93	3764	3588	704.00000	792	441	715.00000	704.00000	1.54%	34.1	165s
94	3766	3589	704.00000	65	560	715.00000	704.00000	1.54%	34.1	171s
95	3768	3590	704.00000	292	565	715.00000	704.00000	1.54%	34.1	179s
96	3769	3591	704.00000	691	551	715.00000	704.00000	1.54%	34.1	180s
97	3770	3592	704.00000	103	547	715.00000	704.00000	1.54%	34.1	187s
98	3772	3593	704.12241	26	527	715.00000	704.12241	1.52%	34.0	196s
99	3774	3594	704.83018	826	532	715.00000	704.83018	1.42%	34.0	201s
100	3779	3598	705.00000	4	418	715.00000	705.00000	1.40%	34.0	205s
101	3784	3601	705.00000	398	508	715.00000	705.00000	1.40%	33.9	218s
102	3786	3602	705.00176	651	507	715.00000	705.00176	1.40%	33.9	224s
103	3787	3603	705.22663	64	521	715.00000	705.22663	1.37%	33.9	225s
104	3788	3604	705.25814	97	502	715.00000	705.25814	1.36%	33.9	230s
105	3791	3606	705.55131	444	529	715.00000	705.55131	1.32%	33.9	235s
106	3793	3607	705.61561	81	512	715.00000	705.61561	1.31%	33.9	240s
107	3794	3608	705.63526	379	458	715.00000	705.63526	1.31%	33.8	249s
108	3795	3608	705.85268	536	477	715.00000	705.85268	1.28%	33.8	250s
109	3796	3609	705.86019	512	528	715.00000	705.86019	1.28%	33.8	256s
110	3798	3610	706.00000	278	523	715.00000	706.00000	1.26%	33.8	266s
111	3800	3612	706.00000	340	508	715.00000	706.00000	1.26%	33.8	292s
112	3802	3613	706.47282	595	498	715.00000	706.47282	1.19%	33.8	298s
113	3804	3614	706.47282	329	473	715.00000	706.47282	1.19%	33.8	300s
114	3807	3616	706.50516	355	556	715.00000	706.50516	1.19%	33.7	305s
115	3808	3617	706.50913	162	481	715.00000	706.50913	1.19%	33.7	310s
116	3810	3618	706.67544	32	504	715.00000	706.67544	1.16%	33.7	319s
117	3811	3619	706.87710	661	514	715.00000	706.87710	1.14%	33.7	320s
118	3812	3620	706.90450	297	469	715.00000	706.90450	1.13%	33.7	326s
119	3814	3621	707.00000	442	506	715.00000	707.00000	1.12%	33.7	336s
120	3816	3622	707.00000	242	474	715.00000	707.00000	1.12%	33.7	341s
121	3818	3624	707.01961	165	475	715.00000	707.01961	1.12%	33.6	350s
122	3820	3625	707.09470	71	505	715.00000	707.09470	1.11%	33.6	356s
123	3822	3626	707.17575	422	457	715.00000	707.17575	1.09%	33.6	365s
124	3824	3628	707.20731	58	514	715.00000	707.20731	1.09%	33.6	372s
125	3826	3629	707.31012	631	494	715.00000	707.31012	1.08%	33.6	379s
126	3827	3630	707.40379	695	483	715.00000	707.40379	1.06%	33.6	381s
127	3828	3630	707.41879	147	534	715.00000	707.41879	1.06%	33.5	406s
128	3829	3631	707.73249	14	491	715.00000	707.73249	1.02%	33.5	415s
129	3830	3632	707.73516	38	514	715.00000	707.73516	1.02%	33.5	423s
130	3831	3632	707.87605	174	494	715.00000	707.87605	1.00%	33.5	428s
131	3832	3633	707.88103	494	547	715.00000	707.88103	1.00%	33.5	437s
132	3833	3634	708.00000	124	549	715.00000	708.00000	0.98%	33.5	443s
133	3835	3635	708.00000	287	514	715.00000	708.00000	0.98%	33.5	446s
134	3837	3636	708.00000	186	513	715.00000	708.00000	0.98%	33.5	451s
135	3840	3638	708.00000	607	511	715.00000	708.00000	0.98%	33.4	469s
136	3841	3639	708.03454	347	543	715.00000	708.03454	0.97%	33.4	475s
137	3842	3640	708.03770	403	494	715.00000	708.03770	0.97%	33.4	483s
138	3843	3640	708.03972	165	555	715.00000	708.03972	0.97%	33.4	485s
139	3846	3642	708.06357	296	528	715.00000	708.06357	0.97%	33.4	497s
140	3847	3643	708.13799	181	496	715.00000	708.13799	0.96%	33.4	502s
141	3848	3644	708.15303	91	499	715.00000	708.15303	0.96%	33.4	510s
142	3850	3645	708.18930	7	485	715.00000	708.18930	0.95%	33.4	519s
143	3851	3646	708.18930	436	494	715.00000	708.18930	0.95%	33.3	522s
144	3852	3646	708.19121	716	527	715.00000	708.19121	0.95%	33.3	530s
145	3855	3648	708.19547	385	515	715.00000	708.19547	0.95%	33.3	537s
146	H 3855	3463				714.0000000	708.19547	0.81%	33.3	562s
147	3857	3465	708.28011	555	545	714.00000	708.28011	0.80%	33.3	568s
148	3859	3466	708.30925	399	555	714.00000	708.30925	0.80%	33.3	574s
149	3860	3467	708.31685	203	540	714.00000	708.31685	0.80%	33.3	583s
150	3861	3467	708.39526	665	557	714.00000	708.39526	0.78%	33.3	589s
151	3862	3468	708.40197	550	540	714.00000	708.40197	0.78%	33.3	602s
152	3863	3469	708.48053	198	549	714.00000	708.48053	0.77%	33.2	608s
153	3864	3469	708.50213	792	552	714.00000	708.50213	0.77%	33.2	619s
154	3865	3470	708.55094	146	525	714.00000	708.55094	0.76%	33.2	624s
155	3866	3471	708.56253	65	534	714.00000	708.56253	0.76%	33.2	633s
156	3867	3471	708.59420	266	539	714.00000	708.59420	0.76%	33.2	638s
157	3868	3472	708.59652	292	533	714.00000	708.59652	0.76%	33.2	651s
158	3869	3473	708.61561	691	535	714.00000	708.61561	0.75%	33.2	655s
159	3870	3473	708.62286	103	536	714.00000	708.62286	0.75%	33.2	664s
160	3871	3474	708.68519	288	537	714.00000	708.68519	0.74%	33.2	669s
161	3872	3475	708.68930	26	533	714.00000	708.68930	0.74%	33.2	680s
162	3873	3475	708.72600	35	526	714.00000	708.72600	0.74%	33.2	686s
163	3874	3476	708.73348	826	540	714.00000	708.73348	0.74%	33.1	693s
164	3875	3477	708.80477	470	507	714.00000	708.80477	0.73%	33.1	698s

```
165    3876  3300  708.80561  301  540  714.00000  708.80561  0.73%  33.1  734s
166    3877  3301  709.00000  689  567  714.00000  709.00000  0.70%  33.1  746s
167    3878  3302  709.00000  753  568  714.00000  709.00000  0.70%  33.1  761s
168    3880  3303  709.00000   84  550  714.00000  709.00000  0.70%  33.1  783s
169    3881  3304  709.00815  223  497  714.00000  709.00815  0.70%  33.1  786s
170    3884  3306  709.03190  398  502  714.00000  709.03190  0.70%  33.1  795s
171    3886  3307  709.03784  651  538  714.00000  709.03784  0.69%  33.0  808s
172    3887  3308  709.03784   64  566  714.00000  709.03784  0.69%  33.0  811s
173    3888  3308  709.03784   97  511  714.00000  709.03784  0.69%  33.0  829s
174    3889  3309  709.06355  145  541  714.00000  709.06355  0.69%  33.0  832s
175    3890  3310  709.07296  336  501  714.00000  709.07296  0.69%  33.0  839s
176    3891  3310  709.08261  444  477  714.00000  709.08261  0.69%  33.0  842s
177    3892  3311  709.08358  275  531  714.00000  709.08358  0.69%  33.0  854s
178    3893  3312  709.10662   81  527  714.00000  709.10662  0.69%  33.0  857s
179    3894  3312  709.11123  379  514  714.00000  709.11123  0.68%  33.0  871s
180    3895  3313  709.14510  536  556  714.00000  709.14510  0.68%  33.0  875s
181    3896  3314  709.14725  512  552  714.00000  709.14725  0.68%  33.0  888s
182    3897  3314  709.17797  113  574  714.00000  709.17797  0.68%  33.0  892s
183    3898  3315  709.17952  278  571  714.00000  709.17952  0.68%  32.9  910s
184    3900  3147  709.18930  340  498  714.00000  709.18930  0.67%  32.9  925s
185    3902  3149  709.18930  595  450  714.00000  709.18930  0.67%  32.9  938s
186    3903  3149  709.18930  149  458  714.00000  709.18930  0.67%  32.9  941s
187    3904  3150  709.18930  329  460  714.00000  709.18930  0.67%  32.9  951s
188    3906  3151  709.18962  633  454  714.00000  709.18962  0.67%  32.9  965s
189    3909  3153  709.19359  164  435  714.00000  709.19359  0.67%  32.9  974s
190    3914  3158  709.19359  442  289  714.00000  709.19359  0.67%   136  975s
191    3933  3174  710.49749  124  107  714.00000  710.49749  0.49%   137  980s
192    3955  3189  711.04349  385  101  714.00000  711.04349  0.41%   136  985s
193    3980  3206  711.12079   84  108  714.00000  711.12079  0.40%   135  990s
194    4010  3226  711.22680   32  105  714.00000  711.22680  0.39%   134  995s
195    4030  3239  711.32020   38  137  714.00000  711.32020  0.38%   134 1000s
196    4064  3263  712.00000  792  101  714.00000  712.00000  0.28%   135 1005s
197    4094  3284  712.30952  379   80  714.00000  712.30952  0.24%   135 1010s
198    4119  3302  713.00000  116   39  714.00000  713.00000  0.14%   135 1015s
199
200  Cutting planes:
201    Gomory: 6
202    Cover: 1
203    Implied bound: 1
204    MIR: 2
205    StrongCG: 3
206    Flow cover: 11
207    Zero half: 15
208    RLT: 5
209    BQP: 2
210
211  Explored 4120 nodes (568812 simplex iterations) in 1015.60 seconds (951.74 work units)
212  Thread count was 8 (of 8 available processors)
213
214  Solution count 3: 714 714 714
215  No other solutions better than 714
216
217  Optimal solution found (tolerance 1.00e-04)
218  Best objective 7.140000000000e+02, best bound 7.140000000000e+02, gap 0.0000%
219
220  Output optimal solution and the Optimal Obj:  714.0
221
222
223  Obj = 714.0
224
225  Solutions:
226      The total pi =  141.0
227      The total duration time in berth stage =  145.0
228      The total duration time in quay crane scheduling stage =  35.0
229      The total departure time in berth stage=  412.0
230      The total departure time in quay crane scheduling stage =  302.0
231      The total wasted crane work hour according QC0=  8.294924215988226
232      The last depature time in quay crane scheduling stage =  68.0
233
234  The specific solution are as follows:
235      Vessel i: 0:     li: 6,          pi: 14-20,              ai-di: 54-70,              taoi-deltai: 54-70,              periodi: 16,              taoPi_SP-
     deltaPi_SP: 54-57,                  periodPi: 3,                                c_i: 4202886,                dowork: 4218304,                                fa_i: 4
236      Vessel i: 1:     li: 6,          pi: 18-24,              ai-di: 31-46,              taoi-deltai: 31-46,              periodi: 15,              taoPi_SP-
     deltaPi_SP: 31-34,                  periodPi: 3,                                c_i: 3814820,                dowork: 3822838,                                fa_i: 4
237      Vessel i: 2:     li: 6,          pi: 12-18,              ai-di: 30-49,              taoi-deltai: 30-49,              periodi: 19,              taoPi_SP-
     deltaPi_SP: 30-37,                  periodPi: 7,                                c_i: 4748430,                dowork: 4877414,                                fa_i: 2
238      Vessel i: 3:     li: 5,          pi: 22-27,              ai-di: 3-13,               taoi-deltai: 3-13,               periodi: 10,              taoPi_SP-deltaPi_SP
     : 3-5,                        periodPi: 2,                                c_i: 2457040,                dowork: 2504618,                                fa_i: 3
239      Vessel i: 4:     li: 6,          pi: 24-30,              ai-di: 28-36,              taoi-deltai: 28-36,              periodi: 8,               taoPi_SP-deltaPi_SP
     : 28-30,                      periodPi: 2,                                c_i: 2051977,                dowork: 2240974,                                fa_i: 3
240      Vessel i: 5:     li: 6,          pi: 8-14,               ai-di: 5-19,               taoi-deltai: 5-18,               periodi: 13,              taoPi_SP-deltaPi_SP: 5
     -8,                           periodPi: 3,                                c_i: 3343960,                dowork: 4745592,                                fa_i: 4
241      Vessel i: 6:     li: 6,          pi: 8-14,               ai-di: 65-83,              taoi-deltai: 65-78,              periodi: 13,              taoPi_SP-deltaPi_SP
     : 65-68,                      periodPi: 3,                                c_i: 3237418,                dowork: 3427372,                                fa_i: 4
```

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242     Vessel i: 7:     li: 7,          pi: 5-12,                ai-di: 31-63,              taoi-deltai: 31-57,              periodi: 26,                taoPi_SP-deltaPi_SP
        : 31-38,                    periodPi: 7,                          c_i: 6664913,                    dowork: 6854744,                          fa_i: 4
243     Vessel i: 8:     li: 4,          pi: 30-34,               ai-di: 20-48,              taoi-deltai: 20-45,              periodi: 25,                taoPi_SP-
        deltaPi_SP: 20-25,                    periodPi: 5,                          c_i: 6574605,                    dowork: 6591100,                          fa_i: 3
244   TimeSolveModel: 1025.000000
245
246   TimeAll: 1028.000000
247
248
```