

```

1 "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=23018
2
3 import sys; print('Python %s on %s' % (sys.version, sys.platform))
4 sys.path.extend(['E:\1 \ \ \ \ \ \3 \ \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \ \4 \ \ \ \ \ \3 python_code\9 Code for this
  paper', 'E:/1 \ \ \ \ \ \3 \ \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \ \4 \ \ \ \ \ \3 python_code/9 Code for this paper'])
5
6 PyDev console: starting.
7
8 Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
9 >>> runfile('E:/1 \ \ \ \ \ \3 \ \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \ \4 \ \ \ \ \ \3 python_code/9 Code for this paper/
  main_RO_CCG.py', wdir='E:/1 \ \ \ \ \ \3 \ \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \ \4 \ \ \ \ \ \3 python_code/9 Code for
  this paper')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
11 Waiting 5s.....
12 Set parameter MIPGap to value 1e-10
13 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
14
15 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
16 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
17
18 Optimize a model with 546361 rows, 52642 columns and 1529305 nonzeros
19 Model fingerprint: 0x080f55c9
20 Variable types: 1 continuous, 52641 integer (52605 binary)
21 Coefficient statistics:
22 Matrix range [1e+00, 1e+10]
23 Objective range [1e+00, 2e+01]
24 Bounds range [1e+00, 1e+00]
25 RHS range [1e+00, 2e+10]
26 Warning: Model contains large matrix coefficients
27 Warning: Model contains large rhs
28 Consider reformulating model or setting NumericFocus parameter
29 to avoid numerical issues.
30 Presolve removed 323914 rows and 24616 columns (presolve time = 5s) ...
31 Presolve removed 462566 rows and 35488 columns
32 Presolve time: 8.63s
33 Presolved: 83795 rows, 17154 columns, 258615 nonzeros
34 Variable types: 0 continuous, 17154 integer (17127 binary)
35
36 Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
37 Showing first log only...
38
39 Root relaxation presolved: 17154 rows, 100949 columns, 275769 nonzeros
40
41
42 Root simplex log...
43
44 Iteration Objective Primal Inf. Dual Inf. Time
45 0 7.8000000e+02 0.000000e+00 1.001000e+03 9s
46 Concurrent spin time: 0.00s
47
48 Solved with dual simplex (primal model)
49
50 Root relaxation: objective 7.800000e+02, 2393 iterations, 0.35 seconds (0.38 work units)
51
52 Nodes | Current Node | Objective Bounds | Work
53 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
54
55 0 0 780.00000 0 14 - 780.00000 - - 9s
56 0 0 780.00000 0 38 - 780.00000 - - 10s
57 H 0 0 1740.000000 780.00000 55.2% - 10s
58 0 0 780.00000 0 6 1740.00000 780.00000 55.2% - 11s
59 0 0 780.00000 0 36 1740.00000 780.00000 55.2% - 12s
60 0 0 780.00000 0 33 1740.00000 780.00000 55.2% - 13s
61 0 0 780.00000 0 51 1740.00000 780.00000 55.2% - 13s
62 0 0 780.00000 0 88 1740.00000 780.00000 55.2% - 14s
63 0 0 780.00000 0 86 1740.00000 780.00000 55.2% - 14s
64 H 0 0 780.000000 780.00000 0.00% - 14s
65 0 0 780.00000 0 2 780.00000 780.00000 0.00% - 14s
66
67 Cutting planes:
68 Cover: 113
69 Implied bound: 1178
70 Clique: 21
71 MIR: 117
72 StrongCG: 84
73 GUB cover: 6
74 Zero half: 7
75 Mod-K: 15
76 RLT: 18
77 Relax-and-lift: 16
78 BQP: 3
79

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80 Explored 1 nodes (24632 simplex iterations) in 14.91 seconds (27.90 work units)
81 Thread count was 8 (of 8 available processors)
82
83 Solution count 2: 780 1740
84
85 Optimal solution found (tolerance 1.00e-10)
86 Best objective 7.8000000000000e+02, best bound 7.8000000000000e+02, gap 0.0000%
87 Set parameter MIPGap to value 1e-08
88 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
89
90 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
91 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
92
93 Optimize a model with 2481516 rows, 1955335 columns and 17235685 nonzeros
94 Model fingerprint: 0xb0da9aa6
95 Variable types: 963295 continuous, 992040 integer (985965 binary)
96 Coefficient statistics:
97   Matrix range    [1e-01, 1e+10]
98   Objective range [6e-05, 5e+01]
99   Bounds range    [1e+00, 8e+01]
100  RHS range       [8e-01, 1e+10]
101 Warning: Model contains large matrix coefficients
102 Warning: Model contains large rhs
103   Consider reformulating model or setting NumericFocus parameter
104   to avoid numerical issues.
105 Presolve removed 2478485 rows and 1954208 columns (presolve time = 5s) ...
106 Presolve removed 2478485 rows and 1954207 columns
107 Presolve time: 5.21s
108 Presolved: 3031 rows, 1128 columns, 8112 nonzeros
109 Variable types: 6 continuous, 1122 integer (664 binary)
110 Found heuristic solution: objective 3035.0500186
111 Found heuristic solution: objective 3411.0500186
112
113 Root simplex log...
114
115 Iteration   Objective      Primal Inf.   Dual Inf.    Time
116      0  8.9062796e+03  4.419845e+03  0.000000e+00  7s
117     900  4.8910500e+03  0.000000e+00  0.000000e+00  7s
118
119 Root relaxation: objective 4.891050e+03, 900 iterations, 0.02 seconds (0.01 work units)
120
121   Nodes | Current Node | Objective Bounds | Work
122 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
123
124   0  0 4891.05002  0 24 3411.05002 4891.05002 43.4% - 6s
125 H  0  0          4825.0500186 4891.05002 1.37% - 6s
126 *  0  0          0 4891.0500186 4891.05002 0.00% - 6s
127
128 Cutting planes:
129   Learned: 1
130   Gomory: 3
131   Cover: 2
132   Implied bound: 7
133   Clique: 3
134   MIR: 4
135   Flow cover: 7
136   Zero half: 1
137   RLT: 2
138   Relax-and-lift: 1
139
140 Explored 1 nodes (1364 simplex iterations) in 6.85 seconds (7.31 work units)
141 Thread count was 8 (of 8 available processors)
142
143 Solution count 4: 4891.05 4825.05 3411.05 3035.05
144
145 Optimal solution found (tolerance 1.00e-08)
146 Best objective 4.891050018628e+03, best bound 4.891050018628e+03, gap 0.0000%
147 SP is solved
148 SP's optimal solution is'□4891
149
150   Itr = 0
151   Collect_LB = [780.0]
152   Collect_UB = [10562.10003725563]
153   Collect_Hua = [0.0]
154   Collect_SPObjVal = [4891.050018627815]
155   Collect_MPObjValNHua = [780.0]
156
157
158 Set parameter MIPGap to value 0.05
159 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
160
161 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
162 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
163

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164 Optimize a model with 1090262 rows, 303661 columns and 3235440 nonzeros
165 Model fingerprint: 0xbe15e602
166 Variable types: 1 continuous, 303660 integer (292257 binary)
167 Coefficient statistics:
168   Matrix range   [1e-01, 1e+10]
169   Objective range [1e+00, 2e+01]
170   Bounds range   [1e+00, 1e+00]
171   RHS range      [1e+00, 2e+10]
172 Warning: Model contains large matrix coefficients
173 Warning: Model contains large rhs
174   Consider reformulating model or setting NumericFocus parameter
175   to avoid numerical issues.
176 Presolve removed 882742 rows and 279312 columns (presolve time = 5s) ...
177 Presolve removed 910058 rows and 281966 columns (presolve time = 10s) ...
178 Presolve removed 989696 rows and 289734 columns
179 Presolve time: 13.95s
180 Presolved: 100566 rows, 13927 columns, 312209 nonzeros
181 Variable types: 1 continuous, 13926 integer (11631 binary)
182
183 Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
184 Showing first log only...
185
186 Root relaxation presolved: 13927 rows, 114493 columns, 326136 nonzeros
187
188
189 Root simplex log...
190
191 Iteration   Objective    Primal Inf.   Dual Inf.    Time
192      0  5.6710500e+03  0.000000e+00  1.498109e+04  15s
193    4120  5.6734311e+03  0.000000e+00  1.168913e+06  15s
194 Concurrent spin time: 0.47s
195
196 Solved with dual simplex (primal model)
197
198 Root relaxation: objective 5.671050e+03, 6500 iterations, 1.48 seconds (1.78 work units)
199
200   Nodes | Current Node | Objective Bounds | Work
201 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
202
203   0   0 5671.05002   0 328      -5671.05002   -   - 18s
204   0   0 5671.05002   0 803      -5671.05002   -   - 22s
205   0   0 5671.05002   0 738      -5671.05002   -   - 22s
206   0   0 5671.05002   0 735      -5671.05002   -   - 22s
207   0   0 5671.05002   0 988      -5671.05002   -   - 25s
208   0   0 5671.05002   0 975      -5671.05002   -   - 25s
209   0   0 5671.05002   0 298      -5671.05002   -   - 32s
210   0   0 5671.05002   0 291      -5671.05002   -   - 32s
211   0   0 5671.05002   0 366      -5671.05002   -   - 33s
212   0   0 5671.05002   0 289      -5671.05002   -   - 41s
213   0   0 5671.05002   0 271      -5671.05002   -   - 41s
214   0   0 5671.05002   0 308      -5671.05002   -   - 41s
215   0   0 5671.05002   0 180      -5671.05002   -   - 46s
216   0   0 5671.05002   0 185      -5671.05002   -   - 46s
217   0   0 5671.05002   0 154      -5671.05002   -   - 49s
218   0   0 5671.05002   0 228      -5671.05002   -   - 49s
219   0   0 5671.05002   0 180      -5671.05002   -   - 54s
220   0   0 5671.05002   0 176      -5671.05002   -   - 55s
221 H   0   0           5671.0500186 5671.05002 0.00%   - 63s
222   0   0 5671.05002   0 176 5671.05002 5671.05002 0.00%   - 63s
223
224 Cutting planes:
225 Gomory: 5
226 Lift-and-project: 1
227 Cover: 399
228 Implied bound: 359
229 Clique: 5276
230 MIR: 267
231 StrongCG: 127
232 Flow cover: 5
233 GUB cover: 34
234 Zero half: 17
235 RLT: 74
236 Relax-and-lift: 340
237 BQP: 39
238
239 Explored 1 nodes (131018 simplex iterations) in 63.41 seconds (168.50 work units)
240 Thread count was 8 (of 8 available processors)
241
242 Solution count 1: 5671.05
243
244 Optimal solution found (tolerance 5.00e-02)
245 Best objective 5.671050018628e+03, best bound 5.671050018628e+03, gap 0.0000%
246 Set parameter MIPGap to value 1e-08
247 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)

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248
249 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
250 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
251
252 Optimize a model with 2481516 rows, 1955335 columns and 17235685 nonzeros
253 Model fingerprint: 0x45240a06
254 Variable types: 963295 continuous, 992040 integer (985965 binary)
255 Coefficient statistics:
256   Matrix range   [1e-01, 1e+10]
257   Objective range [6e-05, 5e+01]
258   Bounds range   [1e+00, 8e+01]
259   RHS range      [8e-01, 1e+10]
260 Warning: Model contains large matrix coefficients
261 Warning: Model contains large rhs
262   Consider reformulating model or setting NumericFocus parameter
263   to avoid numerical issues.
264 Presolve removed 2476261 rows and 1953584 columns
265 Presolve time: 4.73s
266 Presolved: 5255 rows, 1751 columns, 13911 nonzeros
267 Variable types: 8 continuous, 1743 integer (1002 binary)
268 Found heuristic solution: objective 3514.0500186
269
270 Root simplex log...
271
272 Iteration   Objective      Primal Inf.   Dual Inf.    Time
273      0    1.1657452e+04  5.988458e+03  0.000000e+00   6s
274    1579  5.3506703e+03  0.000000e+00  0.000000e+00   6s
275
276 Root relaxation: objective 5.350670e+03, 1579 iterations, 0.01 seconds (0.02 work units)
277
278   Nodes | Current Node | Objective Bounds | Work
279 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
280
281    0    0 5350.67026    0 18 3514.05002 5350.67026 52.3%   -   6s
282 H    0    0          5325.6702574 5350.67026 0.47%   -   6s
283 H    0    0          5345.6702574 5350.67026 0.09%   -   6s
284 *    0    0          0 5350.6702574 5350.67026 0.00%   -   6s
285
286 Cutting planes:
287   Learned: 2
288   Gomory: 1
289   Implied bound: 7
290   MIR: 6
291   Flow cover: 4
292   Zero half: 1
293   RLT: 1
294   Relax-and-lift: 2
295   BQP: 1
296
297 Explored 1 nodes (2407 simplex iterations) in 6.35 seconds (6.91 work units)
298 Thread count was 8 (of 8 available processors)
299
300 Solution count 4: 5350.67 5345.67 5325.67 3514.05
301
302 Optimal solution found (tolerance 1.00e-08)
303 Best objective 5.350670257367e+03, best bound 5.350670257367e+03, gap 0.0000%
304 SP is solved
305 SP's optimal solution is'□5350
306
307   Itr = 1
308 Collect_LB = [780.0, 5671.050018627815]
309 Collect_UB = [10562.10003725563, 6130.670257367259]
310 Collect_Hua = [0.0, 4891.050018627815]
311 Collect_SPObjVal = [4891.050018627815, 5350.670257367259]
312 Collect_MPObjValNHua = [780.0, 780.0]
313
314
315 Set parameter MIPGap to value 0.05
316 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
317
318 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
319 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
320
321 Optimize a model with 1626434 rows, 323344 columns and 4933810 nonzeros
322 Model fingerprint: 0xd9d0d6a5
323 Variable types: 1 continuous, 323343 integer (300573 binary)
324 Coefficient statistics:
325   Matrix range   [1e-01, 1e+10]
326   Objective range [1e+00, 2e+01]
327   Bounds range   [1e+00, 1e+00]
328   RHS range      [1e+00, 2e+10]
329 Warning: Model contains large matrix coefficients
330 Warning: Model contains large rhs
331   Consider reformulating model or setting NumericFocus parameter

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332     to avoid numerical issues.
333 Presolve removed 1361413 rows and 293461 columns (presolve time = 5s) ...
334 Presolve removed 1403783 rows and 296603 columns (presolve time = 10s) ...
335 Presolve removed 1403783 rows and 296603 columns (presolve time = 15s) ...
336 Presolve removed 1481581 rows and 304349 columns
337 Presolve time: 19.36s
338 Presolved: 144853 rows, 18995 columns, 478549 nonzeros
339 Variable types: 1 continuous, 18994 integer (14511 binary)
340
341 Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
342 Showing first log only...
343
344 Root relaxation presolved: 18995 rows, 163848 columns, 497544 nonzeros
345
346
347 Root simplex log...
348
349 Iteration   Objective    Primal Inf.   Dual Inf.    Time
350      0   6.1306703e+03  0.000000e+00  2.636725e+04  21s
351  20012   6.1306703e+03  0.000000e+00  0.000000e+00  23s
352  20012   6.1306703e+03  0.000000e+00  0.000000e+00  23s
353 Concurrent spin time: 1.14s
354
355 Solved with primal simplex
356
357 Root relaxation: objective 6.130670e+03, 20012 iterations, 3.72 seconds (5.34 work units)
358 Total elapsed time = 27.10s
359
360 Nodes | Current Node | Objective Bounds | Work
361 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
362
363  0  0 6130.67026  0 600    - 6130.67026  -  - 30s
364  0  0 6130.67026  0 837    - 6130.67026  -  - 34s
365  0  0 6130.67026  0 813    - 6130.67026  -  - 34s
366  0  0 6130.67026  0 850    - 6130.67026  -  - 37s
367  0  0 6130.67026  0 440    - 6130.67026  -  - 47s
368  0  0 6130.67026  0 447    - 6130.67026  -  - 47s
369  0  0 6130.67026  0 490    - 6130.67026  -  - 48s
370  0  0 6130.67026  0 366    - 6130.67026  -  - 59s
371  0  0 6130.67026  0 419    - 6130.67026  -  - 61s
372  0  0 6130.67026  0 410    - 6130.67026  -  - 61s
373  0  0 6130.67026  0 290    - 6130.67026  -  - 66s
374  0  0 6130.67026  0 289    - 6130.67026  -  - 66s
375  0  0 6130.67026  0 446    - 6130.67026  -  - 68s
376  0  0 6130.67026  0 451    - 6130.67026  -  - 68s
377  0  0 6130.67026  0 320    - 6130.67026  -  - 74s
378  0  0 6130.67026  0 288    - 6130.67026  -  - 74s
379  0  0 6130.67026  0 508    - 6130.67026  -  - 77s
380  0  0 6130.67026  0 470    - 6130.67026  -  - 77s
381  0  0 6130.67026  0 277    - 6130.67026  -  - 83s
382  0  0 6130.67026  0 276    - 6130.67026  -  - 83s
383  0  0 6130.67026  0 683    - 6130.67026  -  - 85s
384  0  0 6130.67026  0 99     - 6130.67026  -  - 90s
385  0  0 6130.67026  0 192    - 6130.67026  -  - 91s
386  0  0 6130.67026  0 123    - 6130.67026  -  - 91s
387  0  0 6130.67026  0 167    - 6130.67026  -  - 95s
388  0  0 6130.67026  0 161    - 6130.67026  -  - 95s
389  0  0 6130.67026  0 113    - 6130.67026  -  - 98s
390  0  2 6130.67026  0 65     - 6130.67026  -  - 106s
391  7 12 6130.67026  3 230    - 6130.67026  - 2587 111s
392 19 20 6130.67026  5 84     - 6130.67026  - 1874 117s
393 33 27 6130.67026 10 56     - 6130.67026  - 1701 121s
394 42 32 6130.67026 13 36     - 6130.67026  - 1803 125s
395 66 40 6130.67026 21 77     - 6130.67026  - 1471 131s
396 86 45 6130.67026 26 227    - 6130.67026  - 1192 135s
397 132 61 infeasible 35      - 6130.67026  - 953 140s
398 201 103 infeasible 52      - 6130.67026  - 771 147s
399 * 217 103      61 6130.6702574 6130.67026 0.00% 717 147s
400
401 Cutting planes:
402   Learned: 14
403   Gomory: 5
404   Cover: 530
405   Implied bound: 914
406   Clique: 8878
407   MIR: 533
408   StrongCG: 44
409   Flow cover: 19
410   GUB cover: 481
411   Zero half: 27
412   Network: 3
413   RLT: 144
414   Relax-and-lift: 925
415   BQP: 90

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416 PSD: 1
417
418 Explored 275 nodes (383790 simplex iterations) in 147.79 seconds (414.25 work units)
419 Thread count was 8 (of 8 available processors)
420
421 Solution count 1: 6130.67
422
423 Optimal solution found (tolerance 5.00e-02)
424 Best objective 6.130670257367e+03, best bound 6.130670257367e+03, gap 0.00000%
425 Warning: linear constraint 554091 and linear constraint 1090263 have the same name "ConSP25_1[0,0]"
426 Set parameter MIPGap to value 1e-08
427 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
428
429 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
430 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
431
432 Optimize a model with 2481516 rows, 1955335 columns and 17235685 nonzeros
433 Model fingerprint: 0x0c9b99c3
434 Variable types: 963295 continuous, 992040 integer (985965 binary)
435 Coefficient statistics:
436   Matrix range    [1e-01, 1e+10]
437   Objective range [6e-05, 5e+01]
438   Bounds range    [1e+00, 8e+01]
439   RHS range       [8e-01, 1e+10]
440 Warning: Model contains large matrix coefficients
441 Warning: Model contains large rhs
442   Consider reformulating model or setting NumericFocus parameter
443       to avoid numerical issues.
444 Presolve removed 2475218 rows and 1953375 columns
445 Presolve time: 4.85s
446 Presolved: 6298 rows, 1960 columns, 16685 nonzeros
447 Variable types: 8 continuous, 1952 integer (1110 binary)
448
449 Root simplex log...
450
451 Iteration   Objective      Primal Inf.   Dual Inf.    Time
452      0  1.2273581e+04  9.557802e+03  0.000000e+00   6s
453  1690  5.3894515e+03  0.000000e+00  0.000000e+00   6s
454
455 Root relaxation: objective 5.389451e+03, 1690 iterations, 0.02 seconds (0.02 work units)
456
457   Nodes | Current Node | Objective Bounds | Work
458 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
459
460 * 0 0 0 5389.4514539 5389.45145 0.00% - 6s
461
462 Explored 1 nodes (2418 simplex iterations) in 6.39 seconds (7.14 work units)
463 Thread count was 8 (of 8 available processors)
464
465 Solution count 1: 5389.45
466
467 Optimal solution found (tolerance 1.00e-08)
468 Best objective 5.389451453897e+03, best bound 5.389451453897e+03, gap 0.00000%
469 SP is solved
470 SP's optimal solution is'□5389
471
472 Itr = 2
473 Collect_LB = [780.0, 5671.050018627815, 6130.670257367259]
474 Collect_UB = [10562.10003725563, 6130.670257367259, 6130.670257367259]
475 Collect_Hua = [0.0, 4891.050018627815, 5350.670257367259]
476 Collect_SPObjVal = [4891.050018627815, 5350.670257367259, 5389.451453896585]
477 Collect_MPObjValNHua = [780.0, 780.0, 780.0]
478
479
480 Reach the termination conditions, stop iteration
481 Values adopted from the Itr' th iteration, and Itr = {2}, judgeCount = {2}
482
483 ~~~~~judge = 2, SPObj_SPF = 5389.451453896585
484 Vessel i: 0: pi: 14-19, ai-di: 13-26, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 13-26, taoi-delta: 13-22, taoPi_SP-deltaPi_SP: 13-22,
betaNi: 9, bi: 9
485 Vessel i: 1: pi: 8-14, ai-di: 7-21, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 7-21, taoi-delta: 7-17, taoPi_SP-deltaPi_SP: 7-17, betaNi: 10
, bi: 10
486 Vessel i: 2: pi: 9-14, ai-di: 19-34, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 19-34, taoi-delta: 19-30, taoPi_SP-deltaPi_SP: 19-30, betaNi
: 11, bi: 11
487 Vessel i: 3: pi: 7-13, ai-di: 31-42, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 31-42, taoi-delta: 31-38, taoPi_SP-deltaPi_SP: 31-38, betaNi
: 7, bi: 7
488 Vessel i: 4: pi: 7-14, ai-di: 39-78, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 39-78, taoi-delta: 39-73, taoPi_SP-deltaPi_SP: 39-73, betaNi
: 34, bi: 34
489 Vessel i: 5: pi: 28-34, ai-di: 14-42, gi_SP-gpi_SP: 0.000000-0.600000, ai_SP-di: 14-42, taoi-delta: 14-24, taoPi_SP-deltaPi_SP: 14-24,
betaNi: 10, bi: 10
490 Vessel i: 6: pi: 14-21, ai-di: 17-74, gi_SP-gpi_SP: 1.000000-0.000000, ai_SP-di: 25-74, taoi-delta: 25-55, taoPi_SP-deltaPi_SP: 25-55,
betaNi: 30, bi: 30
491 Vessel i: 7: pi: 22-27, ai-di: 35-62, gi_SP-gpi_SP: 0.800000-0.800000, ai_SP-di: 43-62, taoi-delta: 39-46, taoPi_SP-deltaPi_SP: 43-46,
betaNi: 7, bi: 7

```

unknown

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492 Vessel i: 8:    pi: 16-21,    ai-di: 51-79,    gi_SP-gpi_SP: 0.600000-1.000000,    ai_SP-di: 55-79,    taoi-deltai: 58-65,    taoPi_SP-deltaPi_SP: 58-65,
      betaNi: 7,    bi: 7
493
494 round LB = [780, 5671, 6131]
495 round UB = [10562, 6131, 6131]
496 round Hua = [0, 4891, 5351]
497 round SPObjVal = [4891, 5351, 5389]
498 round MPObjValNHua = [780, 780, 780]
499
500 Time: 693.000000
501
502
503
504

```