

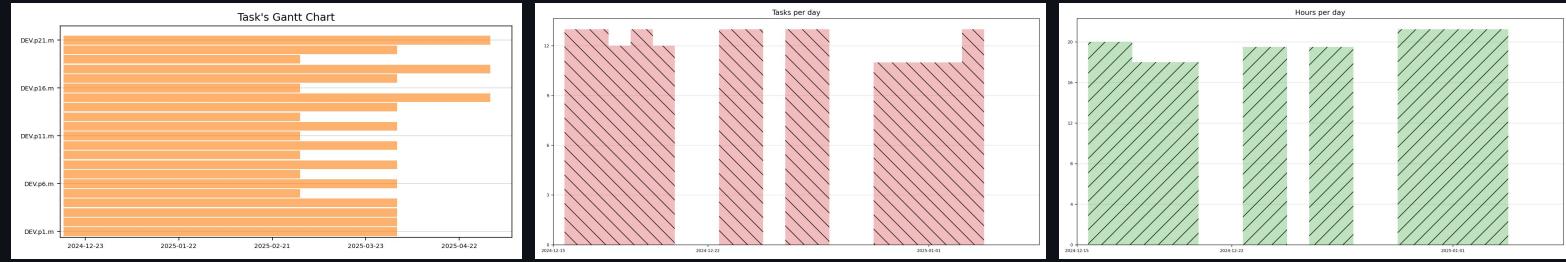
Yumbo. Scheduling, Planning and Resource Allocation

Zbigniew Romanowski, Paweł Koczyk

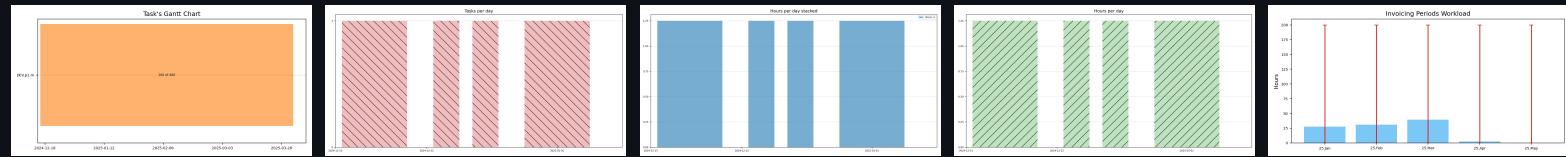
Source code, documentation and sample Excel input files can be found on [Yumbo's GitHub repository](#).

29 January 2025, 19:05:07 PM

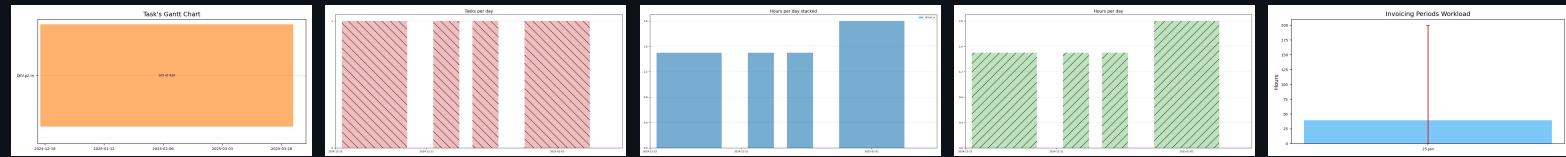
Experts overview



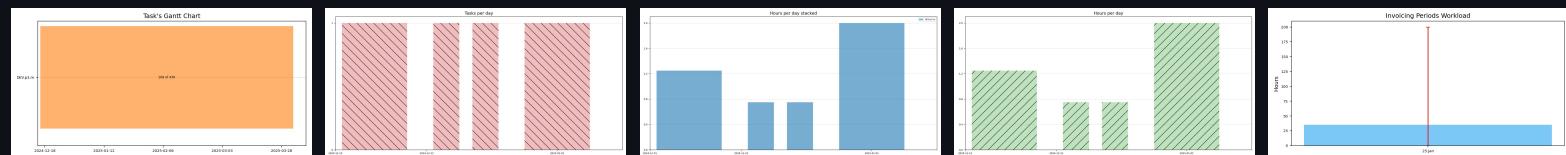
DEV.Alojzy 1 task, no bounds



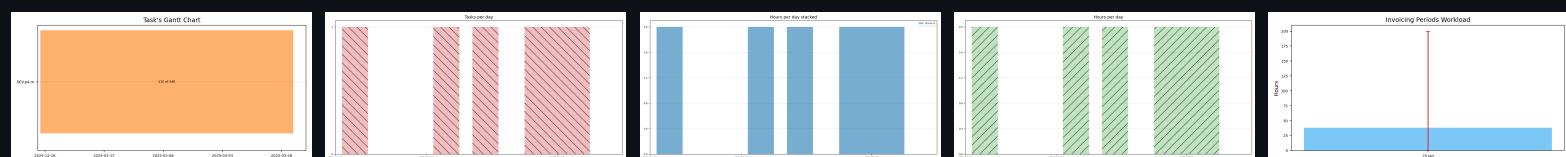
DEV.Barłomiej 1 task, 1 xbdays



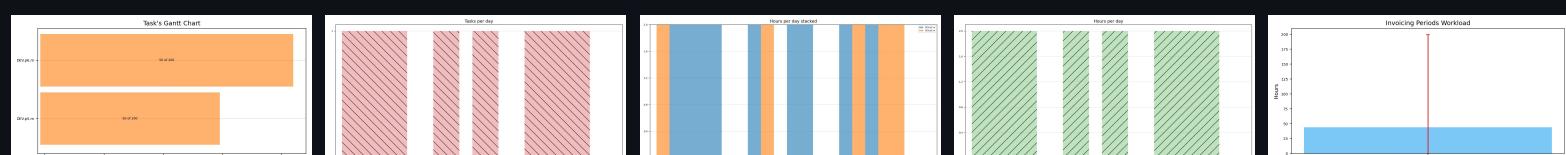
DEV.Cezary 1 task, 2 xbdays



DEV.Dariusz 1 task, 1 xbsum



DEV.Eugenius 2 tasks, no bounds



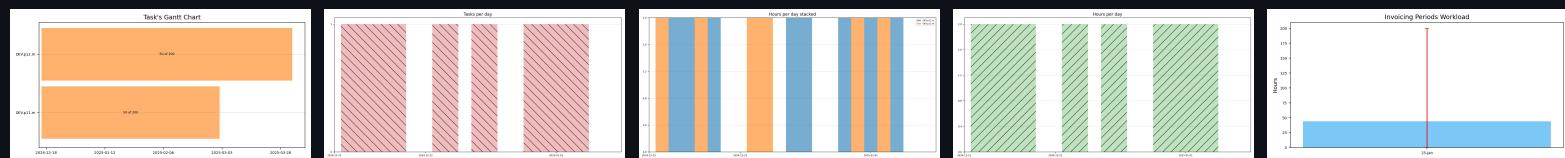
DEV.Franciszek 2 tasks, 1 ubday



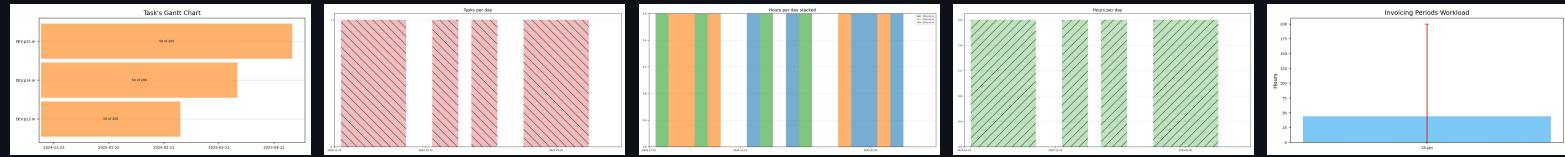
DEV.Gustaw 2 tasks, 1 ubsum



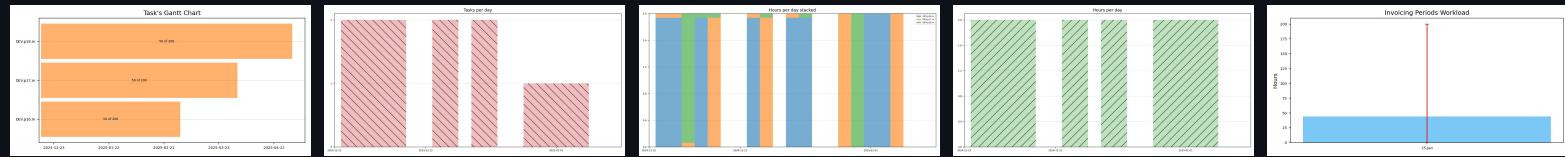
DEV.Hubert 2 tasks, 1 ubday, 1 ubsum



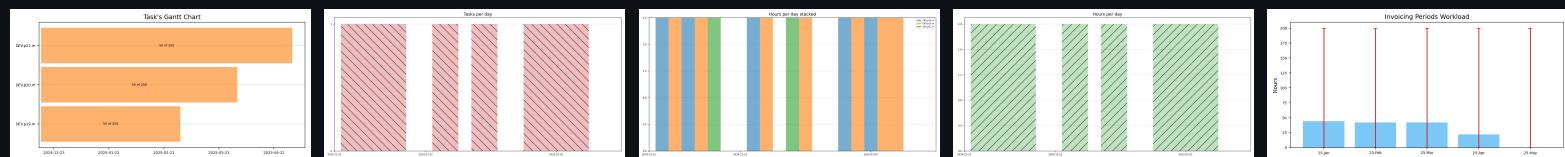
DEV.Ignacy 3 tasks, no bounds



DEV.Jarosław 3 tasks, 1 ubday(2), 2 ubsum



DEV.Pawel 3 tasks, 1 ubday(1), 2 ubsum



Solver output at 29 January 2025, 19:05:08 PM

```

max_context = 2
tva cells: 0 at level 0
           26 at levels above 0
tva_hcl = 7, tva_len = 128
rewrites: m = 0, o = 26
0 variables, 0 constraints, 0 objectives
max_context = 3
tva cells: 0 at level 0
           42 at levels above 0
tva_hcl = 8, tva_len = 256
rewrites: m = 20, o = 41
71379 variables, 94281 constraints, 1 objectives
193842 nonzeros

Presolve eliminates 60127 constraints and 37718 variables.
"option presolve 10;" is used, but "option presolve 2;" would suffice.
Adjusted problem:
33661 variables:
  16706 binary variables
  16724 integer variables
  231 linear variables
34154 constraints, all linear; 86736 nonzeros
  54 equality constraints
  34100 inequality constraints
1 linear objective; 231 nonzeros.

presolve results:
  variables omitted: 37718
  constraints omitted: 60127
  ranges relaxed: 33885
  bounds improved: 37812
  constraint_drop_tol breakpoints: 0, 0, 18
  nba cycles: 1
  bound row scans: 34171
  row-scan updates: 40
HiGHS 1.8.1: tech:outlev = 1
Running HiGHS 1.8.1 (git hash: 4a7f24a): Copyright (c) 2024 HiGHS under MIT licence terms
Coefficient ranges:
  Matrix [1e+00, 3e+01]
  Cost [1e+00, 1e+00]
  Bound [1e+00, 3e+01]
  RHS [1e+00, 2e+03]
Presolving model
33914 rows, 33421 cols, 69992 nonzeros 0s
3463 rows, 18190 cols, 9106 nonzeros 0s
3462 rows, 2969 cols, 9113 nonzeros 0s

```

```

Solving MIP model with:
  3462 rows
  2969 cols (1466 binary, 1503 integer, 0 implied int., 0 continuous)
  9113 nonzeros
MIP-Timing: 0.12 - starting analytic centre calculation

Src: B => Branching; C => Central rounding; F => Feasibility pump; H => Heuristic; L => Sub-MIP;
P => Empty MIP; R => Randomized rounding; S => Solve LP; T => Evaluate node; U => Unbounded;
z => Trivial zero; l => Trivial lower; u => Trivial upper; p => Trivial point

          Nodes          B&B Tree          Objective Bounds          Dynamic Constraints          Work
Src Proc. InQueue Leaves Expl. BestBound BestSol      Gap | Cuts InLp Confl. | LpIters Time
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
      0     0      0    0.00%  558.3914435   inf      inf | 0   0   0 | 0       0.1s

```

```

R      0      0      0      0.00%   67308.738365   67308.738365   0.00%      0      0      0      1255      0.1s
1      0      1 100.00%   67308.738365   67308.738365   0.00%      0      0      0      1258      0.1s

Solving report
  Status          Optimal
  Primal bound   67308.7383648
  Dual bound    67308.7383648
  Gap            0% (tolerance: 0.01%)
  P-D integral   0
  Solution status feasible
                67308.7383648 (objective)
                0 (bound viol.)
                0 (int. viol.)
                0 (row viol.)
  Timing         0.14 (total)
                0.00 (presolve)
                0.00 (solve)
                0.00 (postsolve)
  Max sub-MIP depth 0
  Nodes          1
  Repair LPs    0 (0 feasible; 0 iterations)
  LP iterations  1258 (total)
                0 (strong br.)
                0 (separation)
                0 (heuristics)
max_context = 3
tva cells: 0 at level 0
           25 at levels above 0
tva_hcl = 7, tva_len = 128
rewrites: m = 20, o = 41
max_context = 3
tva cells: 0 at level 0
           25 at levels above 0
tva_hcl = 7, tva_len = 128
rewrites: m = 20, o = 41
HIGHS 1.8.1: optimal solution; objective 67308.73836
1258 simplex iterations
1 branching nodes
max_context = 3
tva cells: 0 at level 0
           25 at levels above 0
tva_hcl = 7, tva_len = 128
rewrites: m = 20, o = 41
max_context = 3
tva cells: 0 at level 0
           25 at levels above 0
tva_hcl = 7, tva_len = 128
rewrites: m = 20, o = 41
max_context = 3
tva cells: 0 at level 0
           25 at levels above 0
tva_hcl = 7, tva_len = 128
rewrites: m = 20, o = 41

```

Statistics on chart creation

Chart title	Chart short name	Number of calls	Total time [s]	Average time [s]	Total nbytes	Average nbytes
Hours per day	himg	11	4.658	0.423	337542	30686
Tasks per day	timg	11	4.562	0.415	370608	33692
Hours per day stacked	simg	11	4.461	0.406	127336	11576
Invoicing Periods Workload	wimg	11	1.341	0.122	50932	4630
Task's Gantt Chart	gimg	11	1.277	0.116	47150	4286
Tasks per day (Summary)	timsgsum	1	0.433	0.433	36598	36598
Hours per day (Summary)	himgsum	1	0.428	0.428	29800	29800
Task's Gantt Chart (Summary)	gimgsum	1	0.147	0.147	3926	3926
Plot task with its constrains	bimg	0	0.000	0.000	0	0

Statistics on AMPL solution

Total elapsed time: 1.099 [s]