

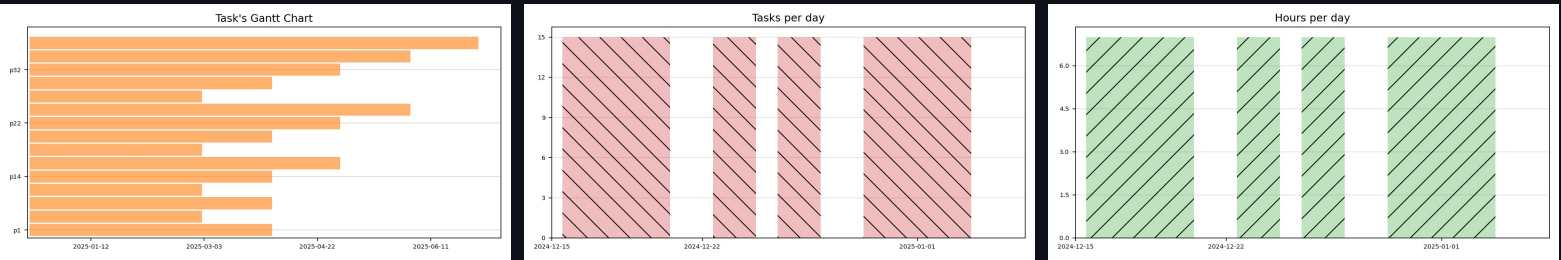
# Yumbo. Scheduling, Planning and Resource Allocation

Zbigniew Romanowski, Paweł Koczyk

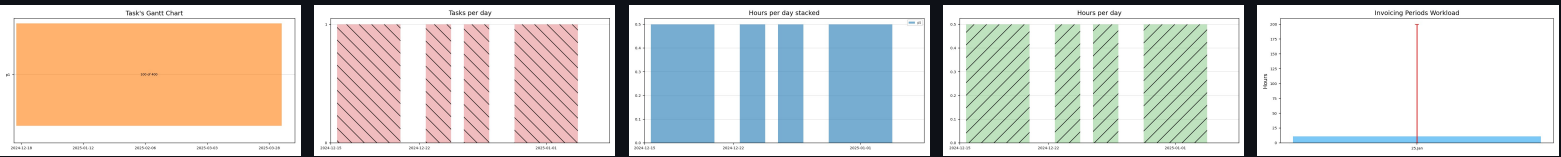
Source code, documentation and sample Excel input files can be found on [Yumbo's](#) GitHub repository.

29 January 2025, 18:58:27 PM

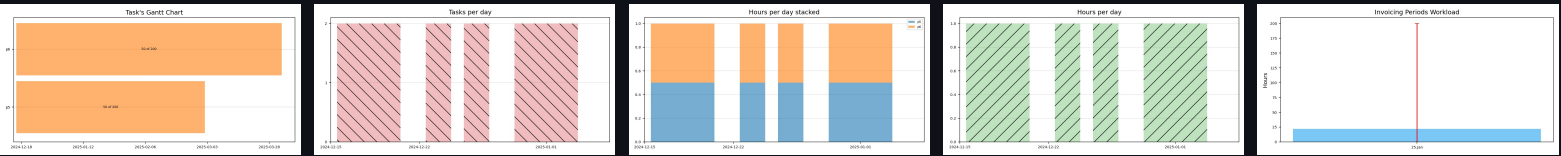
## Experts overview



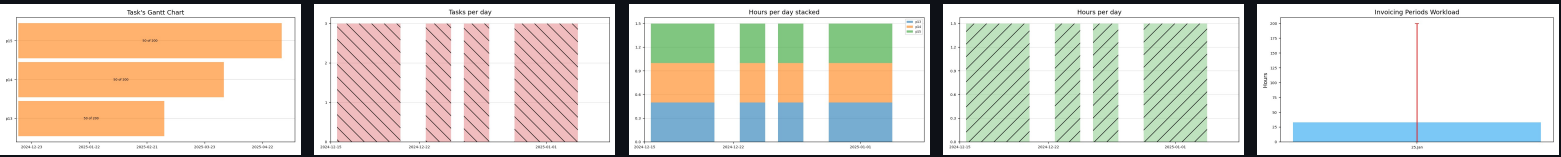
## Alojzy 1 task per day



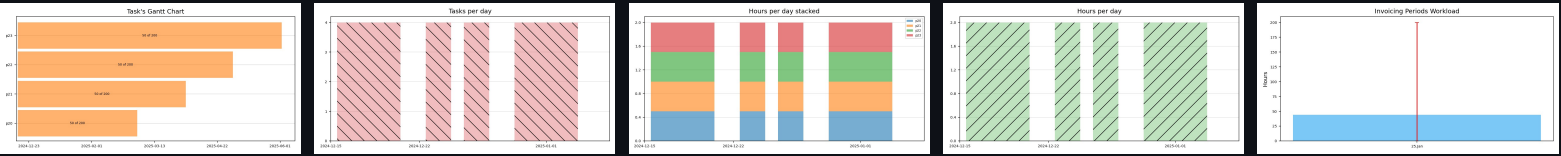
## Eugeniusz 2 tasks per day



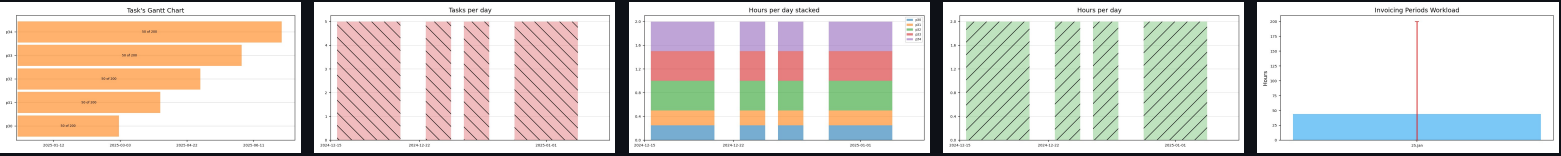
## Ignacy 3 tasks per day



## Pafnucy 4 tasks per day



## Romuald 5 tasks per day



## Solver output at 29 January 2025, 18:58:27 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
29925 variables, 41490 constraints, 1 objectives
84569 nonzeros

Presolve eliminates 29032 constraints and 17740 variables.
"option presolve 10;" used, but "option presolve 2;" would suffice.
Adjusted problem:
12185 variables:
    6055 binary variables
    6055 integer variables
    75 linear variables
12458 constraints, all linear; 32018 nonzeros
    15 equality constraints
    12443 inequality constraints
```

```
linear objective; 75 nonzeros.

presolve results:
  variables omitted: 17740
  constraints omitted: 29032
  ranges relaxed: 12368
  bounds improved: 18131
  nba cycles: 1
  bound row scans: 12458
  row scan updates: 15
SCIP 9.0.1: tech:outlev-native = 5
LP Solver <Soplex 7.0.1>: barrier convergence tolerance cannot be set -- tolerance of SCIP and LP solver may differ
LP Solver <Soplex 7.0.1>: fastmp setting not available -- SCIP parameter has no effect
LP Solver <Soplex 7.0.1>: number of threads settings not available -- SCIP parameter has no effect
transformed problem has 12185 variables (6055 bin, 6055 int, 0 impl, 75 cont) and 12458 constraints
12458 constraints of type <linear>

original problem has 32018 active (0.0210921%) nonzeros and 32018 (0.0210921%) check nonzeros

presolving:
(round 1, fast) 5195 del vars, 10315 del conss, 0 add conss, 15 chg bounds, 0 chg sides, 0 chg coeffs, 0 upgd conss, 0 impls, 0 clqs
(round 2, fast) 10315 del vars, 10315 del conss, 0 add conss, 15 chg bounds, 0 chg sides, 0 chg coeffs, 0 upgd conss, 0 impls, 0 clqs
(round 3, exhaustive) 10315 del vars, 10315 del conss, 0 add conss, 15 chg bounds, 0 chg sides, 0 chg coeffs, 1032 upgd conss, 0 impls, 0 clqs
(round 4, exhaustive) 10315 del vars, 10315 del conss, 0 add conss, 15 chg bounds, 0 chg sides, 0 chg coeffs, 1967 upgd conss, 993 impls, 0 clqs
(0.1s) probing: 51/935 (5.5%) - 0 fixings, 0 aggregations, 0 implications, 0 bound changes
(0.1s) probing aborted: 50/50 successive totally useless probings
(0.1s) symmetry computation started: requiring (bin +, int +, cont +), (fixed: bin -, int -, cont -)
(0.1s) no symmetry present (symcode time: 0.00)
cons components found 5 undirected components at node 1, depth 0 (0)
clique table cleanup detected 0 bound changes

presolved problem has 3767 active (0.20428%) nonzeros and 3767 (0.20428%) check nonzeros

presolving (5 rounds: 5 fast, 3 medium, 3 exhaustive):
10915 deleted vars, 11006 deleted constraints, 0 added constraints, 15 tightened bounds, 0 added holes, 0 changed sides, 0 changed coefficients
2054 implications, 0 cliques
presolved problem has 1270 variables (635 bin, 635 int, 0 impl, 0 cont) and 1452 constraints
1313 constraints of type <varbound>
139 constraints of type <linear>
Presolving Time: 0.08

time | node | left | LP iter | LP it/n | mem/heur | mdpt | vars | cons | rows | cuts | sepa | confs | strbr | dualbound | primalbound | gap | compl.
p 0.1s | 1 | 0 | 0 | - | vbounds | 0 | 1270 | 1452 | 1452 | 0 | 0 | 0 | 0 | 2.386024e+04 | 5.132988e+04 | 115.13% | unknown
p 0.1s | 1 | 0 | 0 | - | vbounds | 0 | 1270 | 1452 | 1452 | 0 | 0 | 0 | 0 | 2.386024e+04 | 4.958007e+04 | 107.79% | unknown
0.1s | 1 | 0 | 564 | - | 54M | 0 | 1270 | 1452 | 1452 | 0 | 0 | 0 | 0 | 4.958007e+04 | 4.958007e+04 | 0.00% | unknown

SCIP Status : problem is solved [optimal solution found]
Solving Time (sec) : 0.12
Solving Nodes : 1
Primal Bound : +4.95800673636744e+04 (2 solutions)
Dual Bound : +4.95800673636744e+04
Gap : 0.00 %
WARNING: No dual information available when presolving was performed.
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
SCIP 9.0.1: optimal solution; objective 49580.06736
564 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
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tva cells: 0 at level 0
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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
Tasks per day	timg	5	0.254	0.051	28916	5783
Hours per day	himg	5	0.213	0.043	34874	6975
Task's Gantt Chart	gimg	5	0.181	0.036	20368	4074
Hours per day stacked	simg	5	0.168	0.034	23640	4728
Invoicing Periods Workload	wimg	5	0.158	0.032	22242	4448
Task's Gantt Chart (Summary)	gimgsum	1	0.057	0.057	3286	3286
Hours per day (Summary)	himgsum	1	0.043	0.043	7014	7014
Tasks per day (Summary)	timgsum	1	0.043	0.043	6922	6922
Plot task with its constraints	bing	0	0.000	0.000	0	0

Statistics on AMPL solution

Total elapsed time: 0.302 [s]

