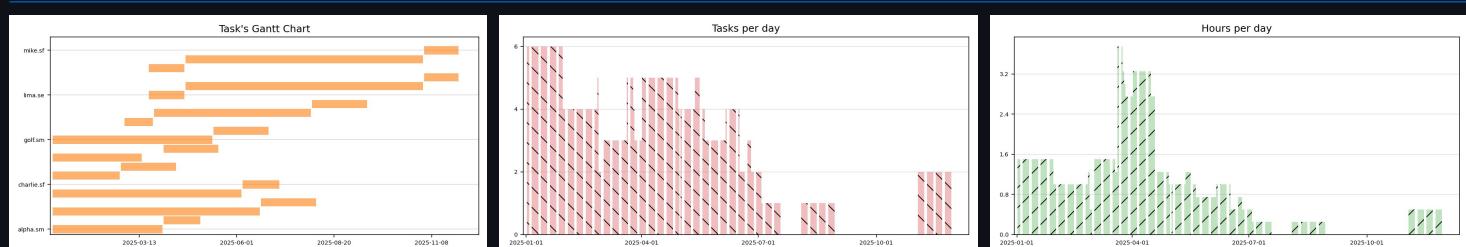
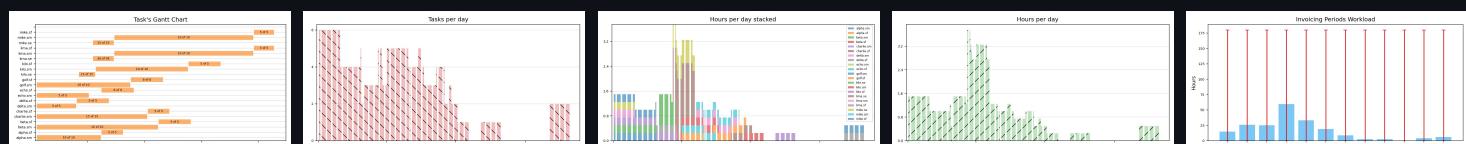


Yumbo. Scheduling, Planning and Resource Allocation

Zbigniew Romanowski, Paweł Koczyk



SA.Adrian the 1st unit



	Weekdays	alpha.sm	alpha.sf	beta.sm	beta.sf	charlie.sm	charlie.sf	delta.sm	delta.sf	echo.sm	echo.sf	golf.sm	golf.sf	kilo.se	kilo.sm	kilo.sf	lima.se	lima.sm	lima.sf	mike.se	mike.sm	mike.sf
2025-02-16	Sunday																					
2025-02-17	Monday	0.25		0.25		0.25						0.25										
2025-02-18	Tuesday	0.25		0.25		0.25						0.25										
2025-02-19	Wednesday	0.25		0.25		0.25						0.25										
2025-02-20	Thursday	0.25		0.25		0.25						0.25										
2025-02-21	Friday	0.25		0.25		0.25						0.25										
2025-02-22	Saturday																					
2025-02-23	Sunday																					
2025-02-24	Monday	0.25		0.25		0.25						0.25										
2025-02-25	Tuesday	0.25		0.25		0.25						0.25										
2025-02-26	Wednesday	0.25		0.25		0.25				0.25		0.25										
2025-02-27	Thursday					0.25				0.25												
2025-02-28	Friday					0.25				0.25												
2025-03-01	Saturday																					
2025-03-02	Sunday																					
2025-03-03	Monday					0.25				0.25				1.00								
2025-03-04	Tuesday							0.25		0.25				1.00								
2025-03-05	Wednesday							0.25		0.25				1.00								
2025-03-06	Thursday							0.25		0.25				1.00								
2025-03-07	Friday							0.25		0.25				1.00								
2025-03-08	Saturday																					
2025-03-09	Sunday																					
2025-03-10	Monday							0.25		0.25				1.00								
2025-03-11	Tuesday							0.25		0.25				1.00								
2025-03-12	Wednesday							0.25		0.25				1.00								
2025-03-13	Thursday							0.25		0.25				1.00								
2025-03-14	Friday							0.25		0.25				1.00								
2025-03-15	Saturday																					
2025-03-16	Sunday																					
2025-03-17	Monday							0.25		0.25				1.00								
2025-03-18	Tuesday							0.25		0.25				1.00								
2025-03-19	Wednesday							0.25		0.25				0.75								
2025-03-20	Thursday							0.25		0.25				0.75								
2025-03-21	Friday							0.25		0.25				0.75			1.75			0.75		
2025-03-22	Saturday																					
2025-03-23	Sunday																					
2025-03-24	Monday							0.25		0.25				0.75			1.75			0.75		
2025-03-25	Tuesday							0.25		0.25				0.25			1.75			0.75		
2025-03-26	Wednesday							0.25						0.25			1.75			0.75		
2025-03-27	Thursday													0.25			1.75			0.75		
2025-03-28	Friday													0.25			1.75			0.75		
2025-03-29	Saturday																					
2025-03-30	Sunday																					
2025-03-31	Monday													0.25			1.75			0.75		
2025-04-01	Tuesday													0.25			1.75			0.75		
2025-04-02	Wednesday	0.25									0.25			0.25			1.75			0.75		
2025-04-03	Thursday	0.25									0.25			0.25			1.75			0.75		
2025-04-04	Friday	0.25									0.25			0.25			1.75			0.75		
2025-04-05	Saturday																					
2025-04-06	Sunday																					
2025-04-07	Monday	0.25								0.25				0.25			1.75			0.75		
2025-04-08	Tuesday	0.25								0.25				0.25			1.75			0.75		
2025-04-09	Wednesday	0.25								0.25				0.25			1.75			0.75		
2025-04-10	Thursday	0.25								0.25				0.25			1.75			0.75		
2025-04-11	Friday	0.25								0.25				0.25			1.75			0.75		
2025-04-12	Saturday																					
2025-04-13	Sunday																					
2025-04-14	Monday	0.25								0.25				0.25			1.75			0.75		
2025-04-15	Tuesday	0.25								0.25				0.25			1.75			0.75		
2025-04-16	Wednesday	0.25								0.25				0.25			1.50			0.50		
2025-04-17	Thursday	0.25								0.25				0.25			1.50			0.50		
2025-04-18	Friday	0.25								0.25				0.25			1.50			0.50		
2025-04-19	Saturday																					
2025-04-20	Sunday																					
2025-04-21	Monday	0.25								0.25				0.25			0.25			0.25		
2025-04-22	Tuesday	0.25								0.25				0.25			0.25			0.25		
2025-04-23	Wednesday	0.25								0.25				0.25			0.25			0.25		
2025-04-24	Thursday	0.25								0.25				0.25			0.25			0.25		
2025-04-25	Friday	0.25								0.25				0.25			0.25			0.25		

	Weekdays	alpha.sm	alpha.sf	beta.sm	beta.sf	charlie.sm	charlie.sf	delta.sm	delta.sf	echo.sm	echo.sf	golf.sm	golf.sf	kilo.se	kilo.sm	kilo.sf	lima.se	lima.sm	lima.sf	mike.se	mike.sm	mike.sf
2025-09-11	Thursday																					
2025-09-12	Friday																					
2025-09-13	Saturday																					
2025-09-14	Sunday																					
2025-09-15	Monday																					
2025-09-16	Tuesday																					
2025-09-17	Wednesday																					
2025-09-18	Thursday																					
2025-09-19	Friday																					
2025-09-20	Saturday																					
2025-09-21	Sunday																					
2025-09-22	Monday																					
2025-09-23	Tuesday																					
2025-09-24	Wednesday																					
2025-09-25	Thursday																					
2025-09-26	Friday																					
2025-09-27	Saturday																					
2025-09-28	Sunday																					
2025-09-29	Monday																					
2025-09-30	Tuesday																					
2025-10-01	Wednesday																					
2025-10-02	Thursday																					
2025-10-03	Friday																					
2025-10-04	Saturday																					
2025-10-05	Sunday																					
2025-10-06	Monday																					
2025-10-07	Tuesday																					
2025-10-08	Wednesday																					
2025-10-09	Thursday																					
2025-10-10	Friday																					
2025-10-11	Saturday																					
2025-10-12	Sunday																					
2025-10-13	Monday																					
2025-10-14	Tuesday																					
2025-10-15	Wednesday																					
2025-10-16	Thursday																					
2025-10-17	Friday																					
2025-10-18	Saturday																					
2025-10-19	Sunday																					
2025-10-20	Monday																					
2025-10-21	Tuesday																					
2025-10-22	Wednesday																					
2025-10-23	Thursday																					
2025-10-24	Friday																					
2025-10-25	Saturday																					
2025-10-26	Sunday																					
2025-10-27	Monday																					
2025-10-28	Tuesday																					
2025-10-29	Wednesday																					
2025-10-30	Thursday																					
2025-10-31	Friday																					
2025-11-01	Saturday																					
2025-11-02	Sunday																					
2025-11-03	Monday																	0.25			0.25	
2025-11-04	Tuesday																	0.25			0.25	
2025-11-05	Wednesday																	0.25			0.25	
2025-11-06	Thursday																	0.25			0.25	
2025-11-07	Friday																	0.25			0.25	
2025-11-08	Saturday																					
2025-11-09	Sunday																					
2025-11-10	Monday																	0.25			0.25	
2025-11-11	Tuesday																	0.25			0.25	
2025-11-12	Wednesday																	0.25			0.25	
2025-11-13	Thursday																	0.25			0.25	
2025-11-14	Friday																	0.25			0.25	
2025-11-15	Saturday																					
2025-11-16	Sunday																					
2025-11-17	Monday																	0.25			0.25	
2025-11-18	Tuesday																	0.25			0.25	

	Weekdays	alpha.sm	alpha.sf	beta.sm	beta.sf	charlie.sm	charlie.sf	delta.sm	delta.sf	echo.sm	echo.sf	golf.sm	golf.sf	kilo.se	kilo.sm	kilo.sf	lima.se	lima.sm	lima.sf	mike.se	mike.sm	mike.sf
2025-11-19	Wednesday																		0.25			0.25
2025-11-20	Thursday																		0.25			0.25
2025-11-21	Friday																		0.25			0.25
2025-11-22	Saturday																					
2025-11-23	Sunday																					
2025-11-24	Monday																		0.25			0.25
2025-11-25	Tuesday																		0.25			0.25
2025-11-26	Wednesday																		0.25			0.25
2025-11-27	Thursday																		0.25			0.25
2025-11-28	Friday																		0.25			0.25
2025-11-29	Saturday																					
2025-11-30	Sunday																					

Show schedule as Streamlit table



```

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, 8e+01]
  RHS [2e+01, 1e+02]
Presolving model
2064 rows, 2164 cols, 5173 nonzeros 0s
18 rows, 1081 cols, 1081 nonzeros 0s
17 rows, 1060 cols, 1060 nonzeros 0s

Solving MIP model with:
  17 rows
  1060 cols (1002 binary, 58 integer, 0 implied int., 0 continuous)
  1060 nonzeros
MIP-Timing: 0.015 - 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



| Src | Proc. | Nodes   |        | B&B Tree |           | Objective Bounds |             | Dynamic Constraints |      | Work   |         | Time    |
|-----|-------|---------|--------|----------|-----------|------------------|-------------|---------------------|------|--------|---------|---------|
|     |       | InQueue | Leaves | Expl.    | BestBound | BestSol          | Gap         | Cuts                | InLp | Confl. | LpIters |         |
| T   |       | 0       | 0      | 0        | 0.00%     | 707.3531659      | inf         | inf                 | 0    | 0      | 0       | 0.0s    |
|     |       | 0       | 0      | 0        | 0.00%     | 707.3531659      | 2056.023239 | 65.60%              | 0    | 0      | 0       | 17 0.0s |
|     |       | 1       | 0      | 1        | 100.00%   | 2056.023239      | 2056.023239 | 0.00%               | 0    | 0      | 0       | 17 0.0s |



Solving report
Status          Optimal
Primal bound    2056.02323925
Dual bound     2056.02323925
Gap            0% (tolerance: 0.01%)
P-D integral   6.13061246572e-05
Solution status feasible
  2056.02323925 (objective)
  0 (bound viol.)
  0 (int. viol.)
  0 (row viol.)
Timing         0.02 (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   17 (total)
  0 (strong br.)
  0 (separation)
  0 (heuristics)
HiGHS 1.8.1: optimal solution; objective 2056.023239
1 simplex iterations
1 branching nodes

"option abs_boundtol 7.105427357601002e-15;"*
or "option rel_boundtol 1.57386024397762919e-16;"*
will change deduced dual values.

```

Elapsed time for chart creation

Chart title	Chart short name	Number of calls	Elapsed time [s]	Average time per chart [s]
Hours per day stacked	simg	1	3.590	3.590
Plot task with its constrains	bing	21	2.232	0.106
Tasks per day	timg	1	0.317	0.317
Hours per day	himg	1	0.285	0.285
Task's Gantt Chart	ging	1	0.176	0.176
Invoicing Periods Workload	wimg	1	0.110	0.110