

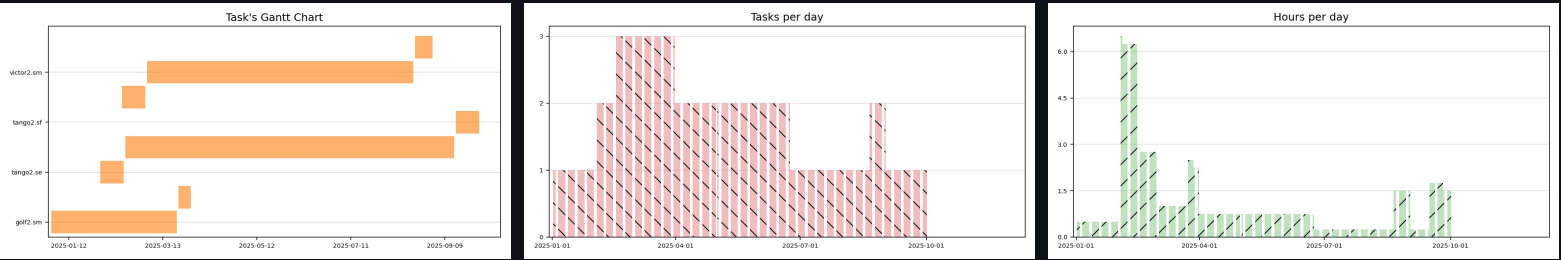
# Yumbo. Scheduling, Planning and Resource Allocation

Zbigniew Romanowski, Paweł Koczyk

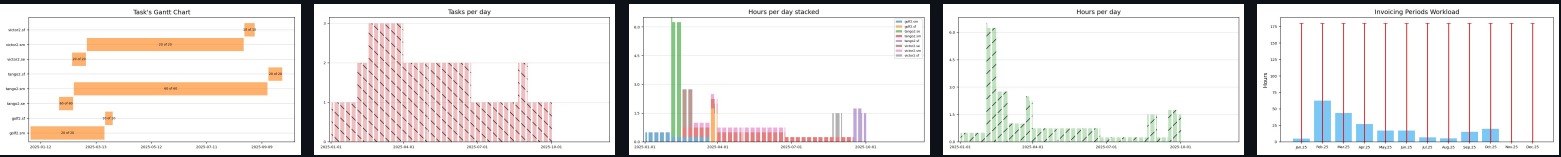
Source code, documentation and sample Excel input files can be found on [Yumbo's](#) GitHub repository.

28 January 2025, 14:08:32 PM

## Experts overview



## SA.Peter the 2nd unit



	Weekdays	golf2.sm	golf2.sf	tango2.se	tango2.sm	tango2.sf	victor2.se	victor2.sm	victor2.sf
2025-01-01	Wednesday								
2025-01-02	Thursday	0.50							
2025-01-03	Friday	0.50							
2025-01-04	Saturday								
2025-01-05	Sunday								
2025-01-06	Monday	0.50							
2025-01-07	Tuesday	0.50							
2025-01-08	Wednesday	0.50							
2025-01-09	Thursday	0.50							
2025-01-10	Friday	0.50							
2025-01-11	Saturday								
2025-01-12	Sunday								
2025-01-13	Monday	0.50							
2025-01-14	Tuesday	0.50							
2025-01-15	Wednesday	0.50							
2025-01-16	Thursday	0.50							
2025-01-17	Friday	0.50							
2025-01-18	Saturday								
2025-01-19	Sunday								
2025-01-20	Monday	0.50							
2025-01-21	Tuesday	0.50							
2025-01-22	Wednesday	0.50							
2025-01-23	Thursday	0.50							
2025-01-24	Friday	0.50							
2025-01-25	Saturday								
2025-01-26	Sunday								
2025-01-27	Monday	0.50							
2025-01-28	Tuesday	0.50							
2025-01-29	Wednesday	0.50							
2025-01-30	Thursday	0.50							
2025-01-31	Friday	0.50							
2025-02-01	Saturday								
2025-02-02	Sunday								
2025-02-03	Monday	0.50		6.00					
2025-02-04	Tuesday	0.25		6.00					
2025-02-05	Wednesday	0.25		6.00					
2025-02-06	Thursday	0.25		6.00					
2025-02-07	Friday	0.25		6.00					
2025-02-08	Saturday								
2025-02-09	Sunday								
2025-02-10	Monday	0.25		6.00					
2025-02-11	Tuesday	0.25		6.00					

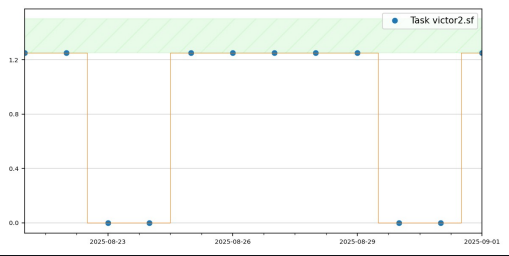
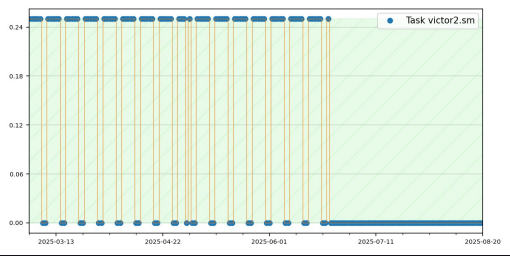
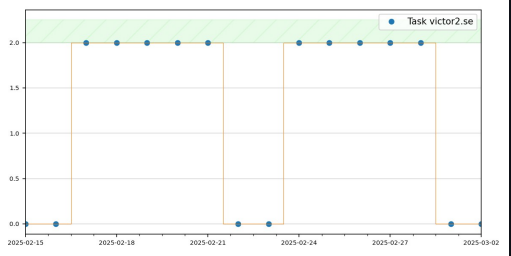
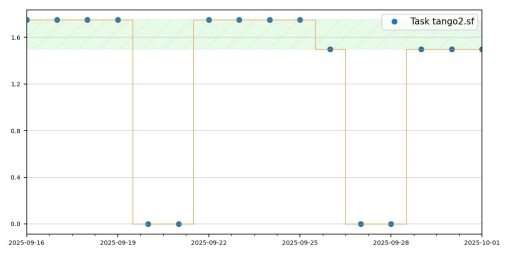
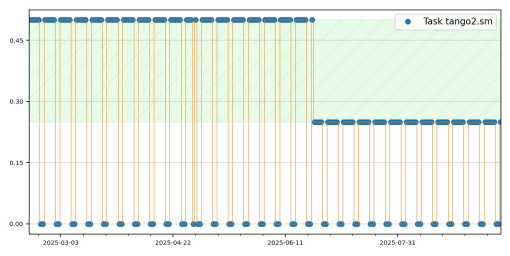
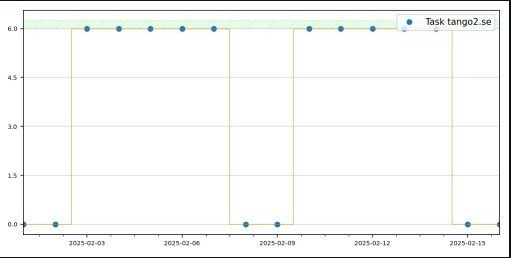
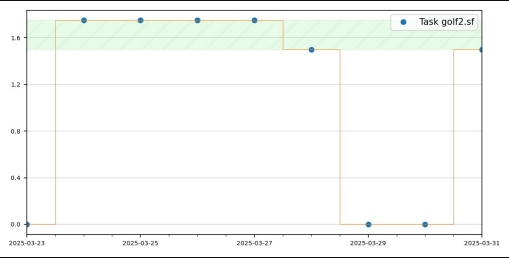
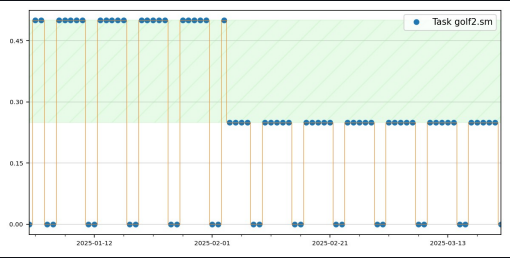
	Weekdays	golf2.sm	golf2.sf	tango2.se	tango2.sm	tango2.sf	victor2.se	victor2.sm	victor2.sf
2025-02-12	Wednesday	0.25		6.00					
2025-02-13	Thursday	0.25		6.00					
2025-02-14	Friday	0.25		6.00					
2025-02-15	Saturday								
2025-02-16	Sunday								
2025-02-17	Monday	0.25			0.50		2.00		
2025-02-18	Tuesday	0.25			0.50		2.00		
2025-02-19	Wednesday	0.25			0.50		2.00		
2025-02-20	Thursday	0.25			0.50		2.00		
2025-02-21	Friday	0.25			0.50		2.00		
2025-02-22	Saturday								
2025-02-23	Sunday								
2025-02-24	Monday	0.25			0.50		2.00		
2025-02-25	Tuesday	0.25			0.50		2.00		
2025-02-26	Wednesday	0.25			0.50		2.00		
2025-02-27	Thursday	0.25			0.50		2.00		
2025-02-28	Friday	0.25			0.50		2.00		
2025-03-01	Saturday								
2025-03-02	Sunday								
2025-03-03	Monday	0.25			0.50			0.25	
2025-03-04	Tuesday	0.25			0.50			0.25	
2025-03-05	Wednesday	0.25			0.50			0.25	
2025-03-06	Thursday	0.25			0.50			0.25	
2025-03-07	Friday	0.25			0.50			0.25	
2025-03-08	Saturday								
2025-03-09	Sunday								
2025-03-10	Monday	0.25			0.50			0.25	
2025-03-11	Tuesday	0.25			0.50			0.25	
2025-03-12	Wednesday	0.25			0.50			0.25	
2025-03-13	Thursday	0.25			0.50			0.25	
2025-03-14	Friday	0.25			0.50			0.25	
2025-03-15	Saturday								
2025-03-16	Sunday								
2025-03-17	Monday	0.25			0.50			0.25	
2025-03-18	Tuesday	0.25			0.50			0.25	
2025-03-19	Wednesday	0.25			0.50			0.25	
2025-03-20	Thursday	0.25			0.50			0.25	
2025-03-21	Friday	0.25			0.50			0.25	
2025-03-22	Saturday								
2025-03-23	Sunday								
2025-03-24	Monday		1.75		0.50			0.25	
2025-03-25	Tuesday		1.75		0.50			0.25	
2025-03-26	Wednesday		1.75		0.50			0.25	
2025-03-27	Thursday		1.75		0.50			0.25	
2025-03-28	Friday		1.50		0.50			0.25	
2025-03-29	Saturday								
2025-03-30	Sunday								
2025-03-31	Monday		1.50		0.50			0.25	
2025-04-01	Tuesday				0.50			0.25	
2025-04-02	Wednesday				0.50			0.25	
2025-04-03	Thursday				0.50			0.25	
2025-04-04	Friday				0.50			0.25	
2025-04-05	Saturday								
2025-04-06	Sunday								
2025-04-07	Monday				0.50			0.25	
2025-04-08	Tuesday				0.50			0.25	
2025-04-09	Wednesday				0.50			0.25	
2025-04-10	Thursday				0.50			0.25	
2025-04-11	Friday				0.50			0.25	
2025-04-12	Saturday								
2025-04-13	Sunday								
2025-04-14	Monday				0.50			0.25	
2025-04-15	Tuesday				0.50			0.25	
2025-04-16	Wednesday				0.50			0.25	
2025-04-17	Thursday				0.50			0.25	

	Weekdays	golf2.sm	golf2.sf	tango2.se	tango2.sm	tango2.sf	victor2.se	victor2.sm	victor2.sf
2025-04-18	Friday				0.50			0.25	
2025-04-19	Saturday								
2025-04-20	Sunday								
2025-04-21	Monday				0.50			0.25	
2025-04-22	Tuesday				0.50			0.25	
2025-04-23	Wednesday				0.50			0.25	
2025-04-24	Thursday				0.50			0.25	
2025-04-25	Friday				0.50			0.25	
2025-04-26	Saturday								
2025-04-27	Sunday								
2025-04-28	Monday				0.50			0.25	
2025-04-29	Tuesday				0.50			0.25	
2025-04-30	Wednesday				0.50			0.25	
2025-05-01	Thursday								
2025-05-02	Friday				0.50			0.25	
2025-05-03	Saturday								
2025-05-04	Sunday								
2025-05-05	Monday				0.50			0.25	
2025-05-06	Tuesday				0.50			0.25	
2025-05-07	Wednesday				0.50			0.25	
2025-05-08	Thursday				0.50			0.25	
2025-05-09	Friday				0.50			0.25	
2025-05-10	Saturday								
2025-05-11	Sunday								
2025-05-12	Monday				0.50			0.25	
2025-05-13	Tuesday				0.50			0.25	
2025-05-14	Wednesday				0.50			0.25	
2025-05-15	Thursday				0.50			0.25	
2025-05-16	Friday				0.50			0.25	
2025-05-17	Saturday								
2025-05-18	Sunday								
2025-05-19	Monday				0.50			0.25	
2025-05-20	Tuesday				0.50			0.25	
2025-05-21	Wednesday				0.50			0.25	
2025-05-22	Thursday				0.50			0.25	
2025-05-23	Friday				0.50			0.25	
2025-05-24	Saturday								
2025-05-25	Sunday								
2025-05-26	Monday				0.50			0.25	
2025-05-27	Tuesday				0.50			0.25	
2025-05-28	Wednesday				0.50			0.25	
2025-05-29	Thursday				0.50			0.25	
2025-05-30	Friday				0.50			0.25	
2025-05-31	Saturday								
2025-06-01	Sunday								
2025-06-02	Monday				0.50			0.25	
2025-06-03	Tuesday				0.50			0.25	
2025-06-04	Wednesday				0.50			0.25	
2025-06-05	Thursday				0.50			0.25	
2025-06-06	Friday				0.50			0.25	
2025-06-07	Saturday								
2025-06-08	Sunday								
2025-06-09	Monday				0.50			0.25	
2025-06-10	Tuesday				0.50			0.25	
2025-06-11	Wednesday				0.50			0.25	
2025-06-12	Thursday				0.50			0.25	
2025-06-13	Friday				0.50			0.25	
2025-06-14	Saturday								
2025-06-15	Sunday								
2025-06-16	Monday				0.50			0.25	
2025-06-17	Tuesday				0.50			0.25	
2025-06-18	Wednesday				0.50			0.25	
2025-06-19	Thursday				0.50			0.25	
2025-06-20	Friday				0.50			0.25	
2025-06-21	Saturday								

	Weekdays	golf2.sm	golf2.sf	tango2.se	tango2.sm	tango2.sf	victor2.se	victor2.sm	victor2.sf
2025-06-22	Sunday								
2025-06-23	Monday				0.50			0.25	
2025-06-24	Tuesday				0.25				
2025-06-25	Wednesday				0.25				
2025-06-26	Thursday				0.25				
2025-06-27	Friday				0.25				
2025-06-28	Saturday								
2025-06-29	Sunday								
2025-06-30	Monday				0.25				
2025-07-01	Tuesday				0.25				
2025-07-02	Wednesday				0.25				
2025-07-03	Thursday				0.25				
2025-07-04	Friday				0.25				
2025-07-05	Saturday								
2025-07-06	Sunday								
2025-07-07	Monday				0.25				
2025-07-08	Tuesday				0.25				
2025-07-09	Wednesday				0.25				
2025-07-10	Thursday				0.25				
2025-07-11	Friday				0.25				
2025-07-12	Saturday								
2025-07-13	Sunday								
2025-07-14	Monday				0.25				
2025-07-15	Tuesday				0.25				
2025-07-16	Wednesday				0.25				
2025-07-17	Thursday				0.25				
2025-07-18	Friday				0.25				
2025-07-19	Saturday								
2025-07-20	Sunday								
2025-07-21	Monday				0.25				
2025-07-22	Tuesday				0.25				
2025-07-23	Wednesday				0.25				
2025-07-24	Thursday				0.25				
2025-07-25	Friday				0.25				
2025-07-26	Saturday								
2025-07-27	Sunday								
2025-07-28	Monday				0.25				
2025-07-29	Tuesday				0.25				
2025-07-30	Wednesday				0.25				
2025-07-31	Thursday				0.25				
2025-08-01	Friday				0.25				
2025-08-02	Saturday								
2025-08-03	Sunday								
2025-08-04	Monday				0.25				
2025-08-05	Tuesday				0.25				
2025-08-06	Wednesday				0.25				
2025-08-07	Thursday				0.25				
2025-08-08	Friday				0.25				
2025-08-09	Saturday								
2025-08-10	Sunday								
2025-08-11	Monday				0.25				
2025-08-12	Tuesday				0.25				
2025-08-13	Wednesday				0.25				
2025-08-14	Thursday				0.25				
2025-08-15	Friday				0.25				
2025-08-16	Saturday								
2025-08-17	Sunday								
2025-08-18	Monday				0.25				
2025-08-19	Tuesday				0.25				
2025-08-20	Wednesday				0.25				
2025-08-21	Thursday				0.25				1.25
2025-08-22	Friday				0.25				1.25
2025-08-23	Saturday								
2025-08-24	Sunday								
2025-08-25	Monday				0.25				1.25

	Weekdays	golf2.sm	golf2.sf	tango2.se	tango2.sm	tango2.sf	victor2.se	victor2.sm	victor2.sf
2025-08-26	Tuesday				0.25				1.25
2025-08-27	Wednesday				0.25				1.25
2025-08-28	Thursday				0.25				1.25
2025-08-29	Friday				0.25				1.25
2025-08-30	Saturday								
2025-08-31	Sunday								
2025-09-01	Monday				0.25				1.25
2025-09-02	Tuesday				0.25				
2025-09-03	Wednesday				0.25				
2025-09-04	Thursday				0.25				
2025-09-05	Friday				0.25				
2025-09-06	Saturday								
2025-09-07	Sunday								
2025-09-08	Monday				0.25				
2025-09-09	Tuesday				0.25				
2025-09-10	Wednesday				0.25				
2025-09-11	Thursday				0.25				
2025-09-12	Friday				0.25				
2025-09-13	Saturday								
2025-09-14	Sunday								
2025-09-15	Monday				0.25				
2025-09-16	Tuesday					1.75			
2025-09-17	Wednesday					1.75			
2025-09-18	Thursday					1.75			
2025-09-19	Friday					1.75			
2025-09-20	Saturday								
2025-09-21	Sunday								
2025-09-22	Monday					1.75			
2025-09-23	Tuesday					1.75			
2025-09-24	Wednesday					1.75			
2025-09-25	Thursday					1.75			
2025-09-26	Friday					1.50			
2025-09-27	Saturday								
2025-09-28	Sunday								
2025-09-29	Monday					1.50			
2025-09-30	Tuesday					1.50			
2025-10-01	Wednesday					1.50			

☐ Show schedule as Streamlit table



Solver output at 28 January 2025, 14:08:32 PM

Coefficient ranges:

```
Matrix [1e+00, 3e+01]
Cost    [1e+00, 1e+00]
Bound   [1e+00, 5e+02]
RHS     [4e+01, 2e+02]
```

Presolving model

```
249 rows, 469 cols, 835 nonzeros 0s
5 rows, 347 cols, 347 nonzeros 0s
5 rows, 347 cols, 347 nonzeros 0s
```

Solving MIP model with:

```
5 rows
347 cols (122 binary, 225 integer, 0 implied int., 0 continuous)
347 nonzeros
```

MIP-Timing: 0.003 - 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
T	0	0	0	0.00%	1695.891038	inf	inf	0	0	0	0	0.0s
	0	0	0	0.00%	1695.891038	2387.856554	28.98%	0	0	0	5	0.0s
	1	0	1	100.00%	2387.856554	2387.856554	0.00%	0	0	0	5	0.0s

Solving report

Status Optimal

Primal bound 2387.85655446

Dual bound 2387.85655446

Gap 0% (tolerance: 0.01%)

P-D integral 5.25085355347e-06

Solution status feasible

2387.85655446 (objective)

0 (bound viol.)

0 (int. viol.)

0 (row viol.)

Timing 0.00 (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 5 (total)

0 (strong br.)

0 (separation)

0 (heuristics)

HiGHS 1.8.1: optimal solution; objective 2387.856554

5 simplex iterations

1 branching nodes

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	1.496	1.496
Plot task with its constrains	bimg	8	0.819	0.102
Hours per day	himg	1	0.467	0.467
Tasks per day	timg	1	0.330	0.330
Task's Gantt Chart	gimg	1	0.120	0.120
Invoicing Periods Workload	wimg	1	0.115	0.115