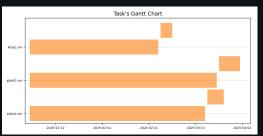
Yumbo. Scheduling, Planning and Resource Allocation

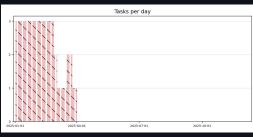
Zbigniew Romanowski, Paweł Koczyk

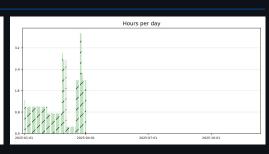
Source code, documentation and sample Excel input files can be found on Yumbo's GitHub repositors

28 January 2025, 14:02:44 PM

Experts overview

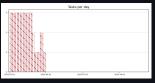




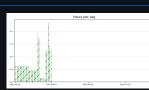


SA.Justin the 2nd unit











2025-01-32	2054041 205403	885-0-35	2825-61-6	3005-84-83	20254744	2025-18-00	2025-41-41
	Weekdays	india2.sm	india2.sf	juliet2.sm	juliet2.sf	lima2.sm	lima2.sf
2025-01-01	Wednesday						
2025-01-02	Thursday	0.25		0.50		0.50	
2025-01-03	Friday	0.25		0.50		0.25	
2025-01-04	Saturday						
2025-01-05	Sunday						
2025-01-06	Monday	0.25		0.50		0.25	
2025-01-07	Tuesday	0.25		0.50		0.25	
2025-01-08	Wednesday	0.25		0.50		0.25	
2025-01-09	Thursday	0.25		0.50		0.25	
2025-01-10	Friday	0.25		0.50		0.25	
2025-01-11	Saturday						
2025-01-12	Sunday						
2025-01-13	Monday	0.25		0.50		0.25	
2025-01-14	Tuesday	0.25		0.50		0.25	
2025-01-15	Wednesday	0.25		0.50		0.25	
2025-01-16	Thursday	0.25		0.50		0.25	
2025-01-17	Friday	0.25		0.50		0.25	
2025-01-18	Saturday						
2025-01-19	Sunday						
2025-01-20	Monday	0.25		0.50		0.25	
2025-01-21	Tuesday	0.25		0.50		0.25	
2025-01-22	Wednesday	0.25		0.50		0.25	
2025-01-23	Thursday	0.25		0.50		0.25	
2025-01-24	Friday	0.25		0.50		0.25	
2025-01-25	Saturday						
2025-01-26	Sunday						
2025-01-27	Monday	0.25		0.50		0.25	
2025-01-28	Tuesday	0.25		0.50		0.25	
2025-01-29	Wednesday	0.25		0.50		0.25	
2025-01-30	Thursday	0.25		0.50		0.25	
2025-01-31	Friday	0.25		0.50		0.25	
2025-02-01	Saturday						
2025-02-02	Sunday						
2025-02-03	Monday	0.25		0.50		0.25	
2025-02-04	Tuesday	0.25		0.25		0.25	
2025-02-05	Wednesday	0.25		0.25		0.25	
2025-02-06	Thursday	0.25		0.25		0.25	
2025-02-07	Friday	0.25		0.25		0.25	
2025-02-08	Saturday						
2025-02-09	Sunday						
2025-02-10	Monday	0.25		0.25		0.25	
2025-02-11	Tuesday	0.25		0.25		0.25	

Marcial Marc		Weekdays	india2.sm	india2.sf	juliet2.sm	juliet2.sf	lima2.sm	lima2.sf		
1995 1995	2025-02-12	Wednesday	0.25		0.25		0.25			
March Marc	2025-02-13	Thursday	0.25		0.25		0.25			
2015-01-10 Sunday	2025-02-14	Friday	0.25		0.25		0.25			
Marcian	2025-02-15	Saturday								
Marcial Marc	2025-02-16	Sunday								
100 100		Monday	0.25		0.25		0.25			
100 100										
1015-02-12 Findley 0.25										
2015-02-23 Sunday			0.25		0.25		0.25			
2015-03-24 Mendedy 0.25 0.05 0.05 0.05 0.05 0.05 0.05 0.05										
2025-02-25			0.25		0.25		0.25			
2025-02-26 Vedreeday 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25										
2025-02-28 Findsy								2.50		
2025-03-01 Saturday 2025-03-02 Simeday 2025-03-05 Vedensclay 2025-03-05 Vedensclay 2025-03-06 Thursday 2025-03-06 Shutday 2025-03-07 Friday 2025-03-09 Sunday 2025-03-09 Sunday 2025-03-09 Sunday 2025-03-09 Sunday 2025-03-10 Monday 2025-03-11 Thursday 2025-03-12 Thursday 2025-03-13 Thursday 2025-03-13 Saturday 2025-03-14 Friday 2025-03-15 Sunday 2025-03-16 Sunday 2025-03-17 Monday 2025-03-18 Thursday 2025-03-18 Sunday 2025-03-19 Vedensclay 2025-03-19 Vedensclay 2025-03-10 Sunday 2025-03-10 Sunda	2025-02-27	Thursday			0.25			2.50		
2025-03-02 Monday 0.25 0.25 0.20 0.25 0.20 0.25 0.20 0.25 0	2025-02-28	Friday			0.25			2.50		
2025-03-03 Monday	2025-03-01	Saturday								
2025-03-05 Vecdoesday 2025-03-05 Vecdoesday 2025-03-07 Friday 2025-03-07 Friday 2025-03-07 Friday 2025-03-07 Saturday 2025-03-10 Monday 2025-03-10 Monday 2025-03-10 Vecdoesday 2025-03-11 Tuesday 2025-03-11 Tuesday 2025-03-12 Saturday 2025-03-13 Saturday 2025-03-15 Saturday 2025-03-16 Sunday 2025-03-16 Sunday 2025-03-16 Sunday 2025-03-17 Tuesday 2025-03-18 Tuesday 2025-03-18 Tuesday 2025-03-19 Vecdoesday 2025-03-19 Vecdoesday 2025-03-19 Vecdoesday 2025-03-19 Vecdoesday 2025-03-20 Tuesday 2025-03-21 Friday 2025-03-22 Saturday 2025-03-22 Saturday 2025-03-23 Sunday 2025-03-24 Monday 2025-03-25 Tuesday 2025-03-26 Vecdoesday 2025-03-27 Thurday 2025-03-28 Friday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-20 Thurday 2025-03-21 Thurday 2025-03-22 Thurday 2025-03-23 Friday 2025-03-23 Saturday 2025-03-24 Monday 2025-03-25 Tuesday 2025-03-26 Vecdoesday 2025-03-27 Thurday 2025-03-28 Friday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-20 Saturday 2025-03-21 Thurday 2025-03-22 Friday 2025-03-23 Friday 2025-03-24 Friday 2025-03-25 Tuesday 2025-03-26 Vecdoesday 2025-03-27 Thurday 2025-03-28 Friday 2025-03-29 Saturday 2025-03-20 Tuesday 2025-	2025-03-02	Sunday								
2025-03-05	2025-03-03	Monday			0.25			2.50		
2025-03-06 Thursday 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	2025-03-04	Tuesday			0.25					
2025-03-07 Friday 2025-03-09 Sunday 2025-03-10 Monday 2025-03-11 Toesday 2025-03-13 Thursday 2025-03-13 Thursday 2025-03-14 Friday 2025-03-15 Saturday 2025-03-16 Sunday 2025-03-16 Sunday 2025-03-17 Monday 2025-03-18 Tuesday 2025-03-18 Tuesday 2025-03-19 Thursday 2025-03-19 Thursday 2025-03-10 Thursday 2025-03-12 Friday 2025-03-12 Friday 2025-03-12 Friday 2025-03-12 Friday 2025-03-12 Thursday 2025-03-13 Sunday 2025-03-15 Tuesday 2025-03-16 Tuesday 2025-03-17 Thursday 2025-03-18 Friday 2025-03-18 Friday 2025-03-19 Saturday 2025-03-10 Sunday 2025-03-10 Tuesday 2025-03-11 Monday 2025-03-11 Monday 2025-03-11 Tuesday 2025-03-11 Monday 2025-03-11 Tuesday 2025-03-11 Monday	2025-03-05	Wednesday			0.25					
2025-03-00 Saturday 2025-03-10 Monday 2025-03-10 Monday 2025-03-11 Tueoday 2025-03-13 Thuroday 2025-03-14 Friday 2025-03-15 Saturday 2025-03-15 Saturday 2025-03-15 Sunday 2025-03-16 Sunday 2025-03-17 Monday 2025-03-18 Tueoday 2025-03-18 Tueoday 2025-03-18 Tueoday 2025-03-18 Tueoday 2025-03-19 Wedneaday 2025-03-18 Tueoday 2025-03-19 Wedneaday 2025-03-20 Thuroday 2025-03-20 Thuroday 2025-03-21 Friday 2025-03-22 Saturday 2025-03-23 Sunday 2025-03-24 Monday 2025-03-26 Wedneaday 2025-03-26 Wedneaday 2025-03-26 Thuroday 2025-03-28 Friday 2025-03-28 Friday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-20 Monday 2025-03-	2025-03-06	Thursday			0.25					
2025-03-09 Sunday 2025-03-10 Monday 2025-03-11 Tuesday 2025-03-12 Wednesday 2025-03-14 Friday 2025-03-15 Saturday 2025-03-15 Sunday 2025-03-16 Sunday 2025-03-16 Sunday 2025-03-16 Sunday 2025-03-17 Monday 2025-03-18 Tuesday 2025-03-18 Tuesday 2025-03-18 Tuesday 2025-03-18 Tuesday 2025-03-19 Wednesday 2025-03-12 Friday 2025-03-12 Friday 2025-03-12 Friday 2025-03-12 Friday 2025-03-13 Sunday 2025-03-12 Friday 2025-03-13 Sunday 2025-03-14 Friday 2025-03-15 Friday 2025-03-16 Friday 2025-03-17 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-18 Wednesday 2025-03-18 Wednesday 2025-03-18 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-19 Friday 2025-03-10					0.25					
2025-03-10 Monday 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25										
2025-03-11 Tuesday 0.25 2025-03-11 Thursday 0.25 2025-03-13 Thursday 0.25 2025-03-14 Friday 0.25 2025-03-16 Sunday 0.25 2025-03-17 Monday 0.25 2025-03-18 Tuesday 0.25 2025-03-18 Tuesday 0.25 2025-03-19 Wednesday 0.25 2025-03-19 Wednesday 0.175 0.25 2025-03-21 Friday 0.175 0.25 2025-03-22 Saturday 0.25 2025-03-23 Friday 0.175 0.25 2025-03-25 Tuesday 0.150 0.255 2025-03-26 Wednesday 0.150 0.255 2025-03-27 Thursday 0.255 2025-03-28 Friday 0.255 2025-03-28 Friday 0.255 2025-03-29 Saturday 0.205 2025-03-10 Thursday 0.206 2025-03-10 Thurs										
2025-03-12 Wednesday 2025-03-14 Friday 2025-03-15 Saturday 2025-03-16 Sunday 2025-03-17 Monday 2025-03-18 Tuesday 2025-03-18 Tuesday 2025-03-19 Wednesday 2025-03-19 Wednesday 2025-03-12 Friday 2025-03-12 Friday 2025-03-12 Saturday 2025-03-12 Friday 2025-03-12 Friday 2025-03-13 Friday 2025-03-13 Sunday 2025-03-13 Sunday 2025-03-14 Monday 2025-03-15 Friday 2025-03-16 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-18 Friday 2025-03-28 Friday 2025-03-28 Saturday 2025-03-29 Saturday 2025-03-29 Saturday 2025-03-10 Tuesday 2025-03-10 Tuesday 2025-03-10 Friday 2025-03-20 Friday 2025-03										
2025-03-13 Thursday 0.25										
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2025-03-15 Saturday 2025-03-17 Monday 2025-03-17 Monday 2025-03-18 Tuesday 1.75 0.25 2015-03-19 Wednesday 1.75 0.25 2025-03-21 Friday 1.75 0.25 2025-03-22 Saturday 2025-03-23 Sunday 2025-03-24 Monday 1.50 2.25 2025-03-25 Tuesday 2025-03-26 Wednesday 2025-03-27 Thursday 2025-03-28 Friday 2025-03-20 Saturday 2025-03-10 Sunday 2025-03-11 Monday 2025-03-11 Monday 2025-03-11 Tuesday 2025-03-11 Monday 2025-03-11 Monday 2025-03-11 Monday 2025-03-11 Tuesday 2025-03-11 Tuesday 2025-03-11 Tuesday 2025-03-11 Tuesday 2025-03-11 Monday 2025-03-11 Tuesday 2025-03-11 Tuesday 2025-03-10 Sunday 2025-04-10 Tuesday 2025-04-10 Tuesda										
2025-03-15 Sunday 0.25 Sunday					0.23					
2025-03-17 Monday										
2025-03-19 Wednesday 1.75 0.25 2025-03-20 Thursday 1.75 0.25 2025-03-21 Friday 1.75 0.25 2025-03-22 Saturday 2025-03-23 Sunday 2025-03-24 Monday 1.50 2.25 2025-03-25 Tuesday 1.50 2.25 2025-03-26 Wednesday 2.25 2025-03-26 Friday 2.20 2025-03-27 Thursday 2.25 2025-03-30 Sunday 2025-03-31 Monday 2.00 2025-03-31 Monday 2.00 2025-04-01 Tuesday 2					0.25					
2025-03-21 Friday 1.75 0.25 2025-03-22 Saturday 2025-03-23 Sunday 2025-03-24 Monday 1.50 2.25 2025-03-25 Tuesday 1.50 2.25 2025-03-26 Wednesday 2.25 2025-03-27 Thursday 2.20 2025-03-28 Friday 2.00 2025-03-30 Sunday 2025-03-31 Monday 2.00 Show schedule as Streamlit table	2025-03-18	Tuesday		1.75	0.25					
2025-03-21 Friday 1.75 0.25 2025-03-22 Saturday 2025-03-23 Sunday 2025-03-25 Tuesday 1.50 2.25 2025-03-26 Wednesday 2.25 2025-03-27 Thursday 2.25 2025-03-28 Friday 2.00 2025-03-30 Sunday 2025-03-31 Monday 2.00 Show schedule as Streamlit table	2025-03-19	Wednesday		1.75	0.25					
2025-03-22 Saturday 2025-03-24 Monday 1.50 2.25 2025-03-25 Tuesday 1.50 2.25 2025-03-26 Wednesday 2.25 2025-03-27 Thursday 2.25 2025-03-29 Saturday 2025-03-30 Sunday 2025-03-31 Monday 2.025-03-31 Monday 2.025-04-01 Tuesday 2.00 Show schedule as Streamlit table	2025-03-20	Thursday		1.75	0.25					
2025-03-24 Monday 1.50 2.25 2025-03-25 Tuesday 1.50 2.25 2025-03-26 Wednesday 2.25 2025-03-27 Thursday 2.25 2025-03-28 Friday 2.00 2025-03-30 Sunday 2.00 2025-03-31 Monday 2.00 Show schedule as Streamlit table 21	2025-03-21	Friday		1.75	0.25					
2025-03-24 Monday 1.50 2.25 2025-03-25 Tuesday 2.25 2025-03-26 Wednesday 2.25 2025-03-27 Thursday 2.20 2025-03-28 Friday 2.00 2025-03-29 Saturday 2.00 2025-03-30 Sunday 2.00 Show schedule as Streamlit table 214 10 10 10 10 10 10 10 10 10 10 10 10 10	2025-03-22	Saturday								
2025-03-26 Wednesday 2.25 2025-03-27 Thursday 2.25 2025-03-28 Friday 2.00 2025-03-30 Sunday 2.00 2025-03-31 Monday 2.00 Show schedule as Streamlit table	2025-03-23	Sunday								
2025-03-26 Wednesday 2.25 2025-03-27 Thursday 2.25 2025-03-28 Friday 2.00 2025-03-29 Saturday 2025-03-30 Sunday 2025-03-31 Monday 2.00 Show schedule as Streamlit table 214 225 225 225 225-03-31 Monday 2.00 Show schedule as Streamlit table	2025-03-24	Monday		1.50		2.25				
2025-03-27 Thursday 2.25 2025-03-28 Friday 2.00 2025-03-29 Saturday 2.00 2025-03-30 Sunday 2.00 2025-04-01 Tuesday 2.00 Show schedule as Streamlit table 21 225-04-01 Tuesday 2.00 Show schedule as Streamlit table	2025-03-25	Tuesday		1.50		2.25				
2025-03-28 Friday 2.00 2025-03-29 Saturday 2.00 2025-03-31 Monday 2.00 2025-04-01 Tuesday 2.00 Show schedule as Streamlit table 244										
2025-03-29 Saturday 2025-03-30 Sunday 2025-03-31 Monday 2.00 2025-04-01 Tuesday 2.00 Show schedule as Streamlit table										
2025-03-30 Sunday 2025-03-31 Monday 2.00 Show schedule as Streamlit table 234						2.00				
2025-03-31 Monday 2.00 2025-04-01 Tuesday 2.00 Show schedule as Streamlit table 324 325 325 325 325 325 325 325										
2025-04-01 Tuesday 2.00 Show schedule as Streamlit table 0.34 0.35 0.30 0.30 1.6 1.7 1.7 1.7 1.7 1.7 1.7 1.7						2.00				
Show schedule as Streamlit table 0.34										
0.34			t table							
0.34 0.35 0.37 0.39 0.39 0.39 0.30 0.30 0.30 0.30 0.30	Show sched	rate as Stréamli	r table							
0.32	0.24	*****	*****	••••	•• •••	Task india2.sm	1.6			
0.32	0.18									
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0							1.2			
0.00	0.12						0.8			
203-01-07 203-01-22 203-02-06 203-02-21 203-03-06 203-03-21 203-03-03-19 2033-03-21 2033-033-03-21 2033-033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-033-03-21 2033-033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21	0.06						0.4			
203-01-07 203-01-22 203-02-06 203-02-21 203-03-06 203-03-21 203-03-03-19 2033-03-21 2033-033-03-21 2033-033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-033-03-21 2033-033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21 2033-03-21	0.00						0.0			
23		2025-01-22	2025-02	-06 20	25-02-21			2025-03-19	2025-03-21	
23	/ /	/ /• / /	• / • /	/ / /	•	Task juliet2.sf	•	/ / / /		
0.15	2.0			•		/ / / /	0.45			
05	1.5									
0.13	1.0						0.30	•••••		•••
							0.15			
0.00	0.5									
	0.0				•		0.00			

Task india2.sf

Task juliet2.sm

2015-01-21 2015-01-25 2015-01-27 2015-01-27 2015-01-28 2015-01-11 2015-01-07 2015-01-22 2015-02-06 2015-02-21 2015-02-26 2015-02-27 2015-02-28 2015-02-27 2015-02-28 2015-02-27 2015-02-28 2

Solver output at 28 January 2025, 14:02:45 PM

```
\label{eq:highs}  \mbox{HiGHS 1.8.1:} \quad \mbox{tech:outlev} = 1 \\ \mbox{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, 4e+01]
Presolving model
5 rows, 162 cols, 162 nonzeros 0s
4 rows, 123 cols, 123 nonzeros 0s
Solving MIP model with:
    123 cols (53 binary, 70 integer, 0 implied int., 0 continuous)
     123 nonzeros
                   0.0017 - 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
Src Proc. InQueue | Leaves Expl. | BestBound BestSol
                                                                                                      | Dynamic Constraints | Wo
Gap | Cuts InLp Confl. | LpIters
Solving report
  Primal bound
  P-D integral
   Solution status feasible
                          0 (bound viol.)
0 (int. viol.)
                          0.00 (total)
0.00 (presolve)
  Timing
                           0.00 (postsolve)
  Max sub-MIP depth 0
  Nodes
                          0 (0 feasible; 0 iterations)
4 (total)
  Repair LPs
                          0 (strong br.)
0 (separation)
HiGHS 1.8.1: optimal solution; objective 653.2268714
```

Elapsed time for chart creation

absmipgap=1.13687e-13, relmipgap=0

1 branching nodes

Hours per day stacked	simg	1.064	1.064
Plot task with its constrains	bimg	0.876	0.146
Tasks per day	timg	0.304	0.304
Hours per day	himg	0.295	0.295
Invoicing Periods Workload	wimg	0.115	0.115
Task's Gantt Chart	gimg	0.102	0.102