

A new algorithm for the Generalised Flexible Resource Constrained Project Scheduling Problem (GFRCPSP)

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What is a PSP?

- The **P**roject **S**cheduling **P**roblem

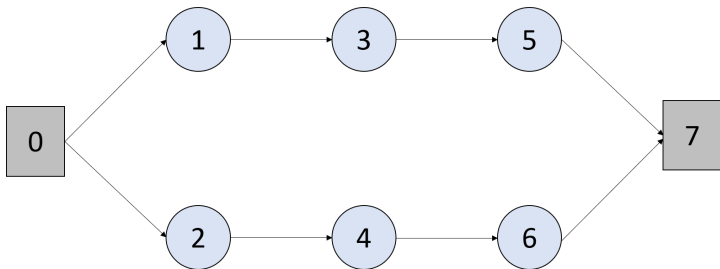


Figure: Network representing the relationships between activities in a typical project with 0 and 7 as dummy start and end activities.

What is a PSP?

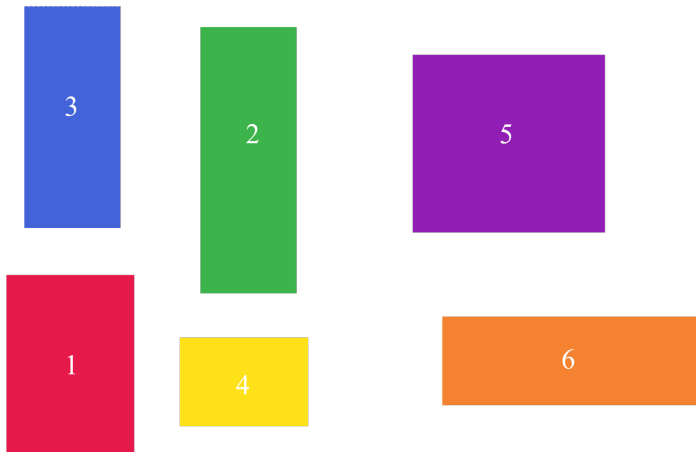
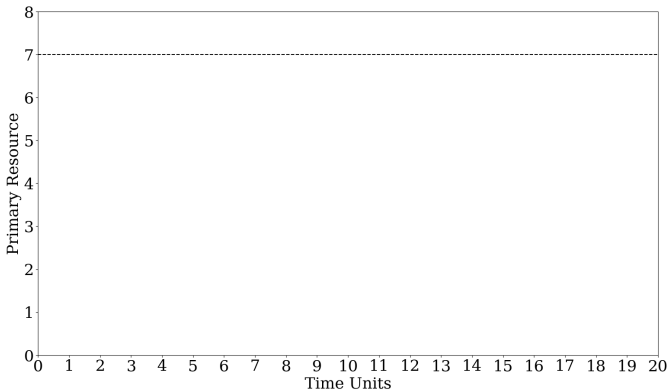


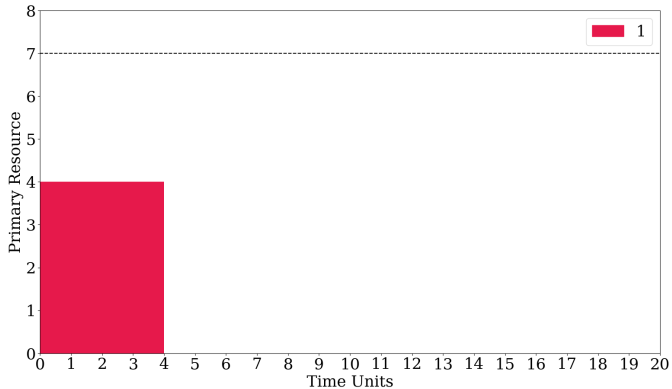
Figure: Typical activities in the basic PSP, all have fixed durations and resource allocations.

What is a RCPSP?

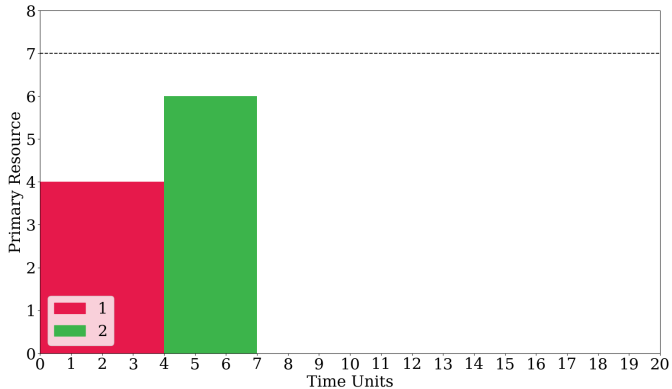
- The **R**esource **C**onstrained **P**roject **S**cheduling **P**roblem



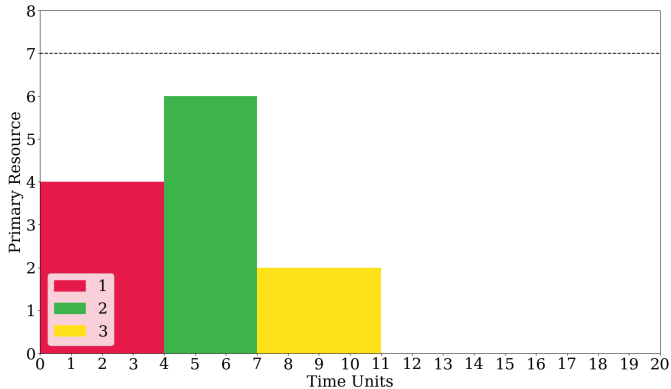
What is a RCPSP?



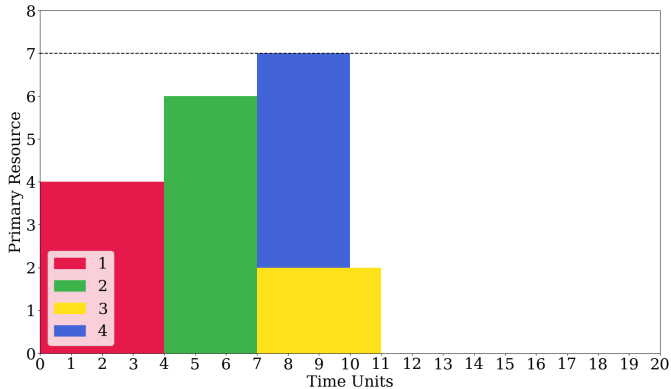
What is a RCPSP?



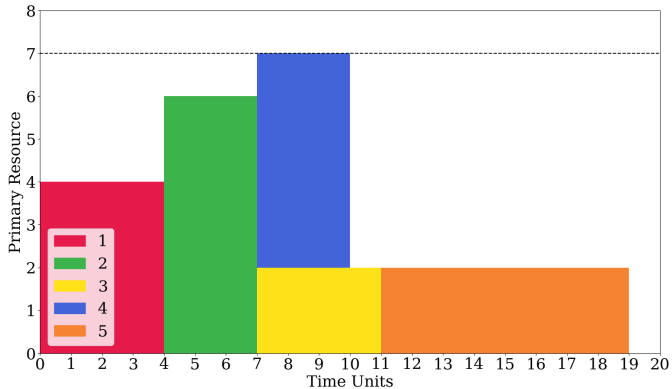
What is a RCPSP?



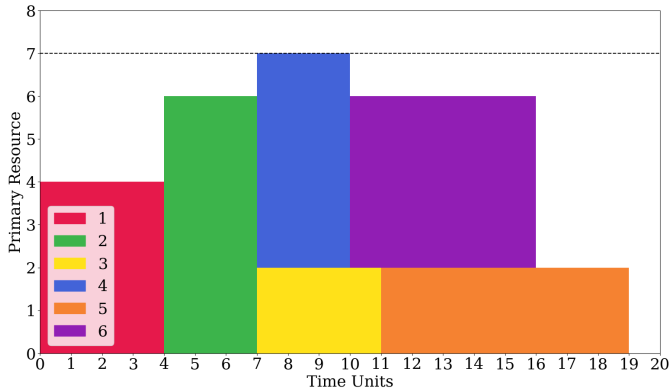
What is a RCPSP?



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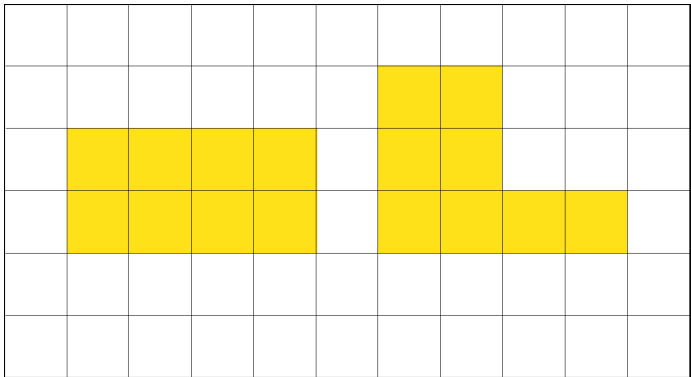


What is a RCPSP?

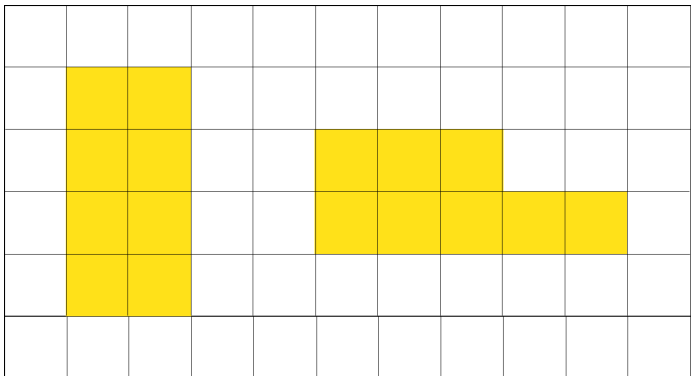


What is a FRCPSP?

- The **F**lexible **R**esource **C**onstrained **P**roject **S**cheduling **P**roblem



What is a FRCPSP?



- $q_{min} = 1, q_{max} = 4, l_{min} = 2$

Precedence Constraints

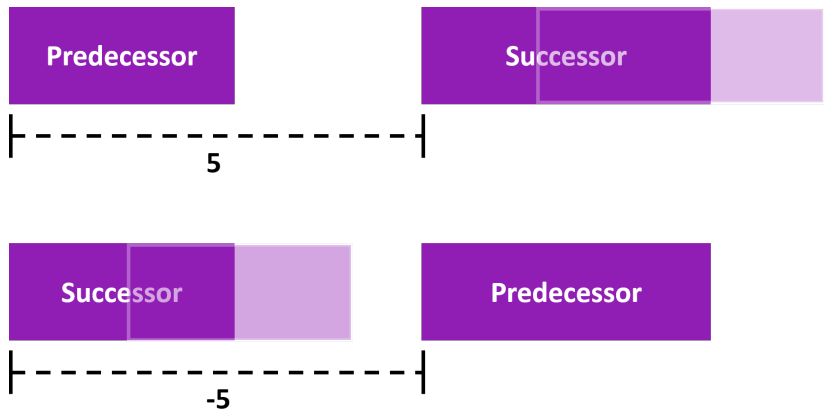


Figure: A diagram showing an example of a minimum time lag (Top) and a maximum time lead (Bottom)

Precedence Constraints

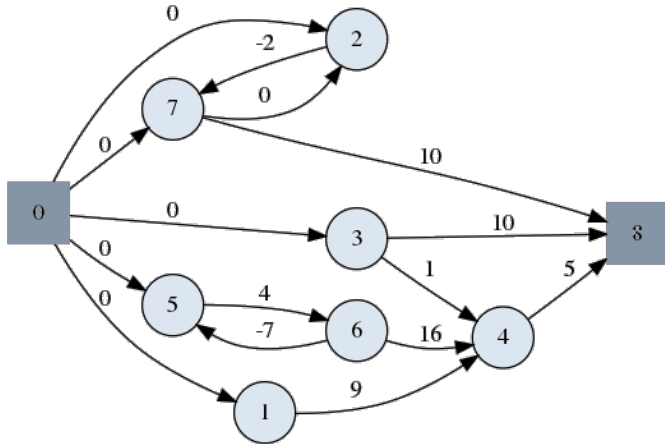
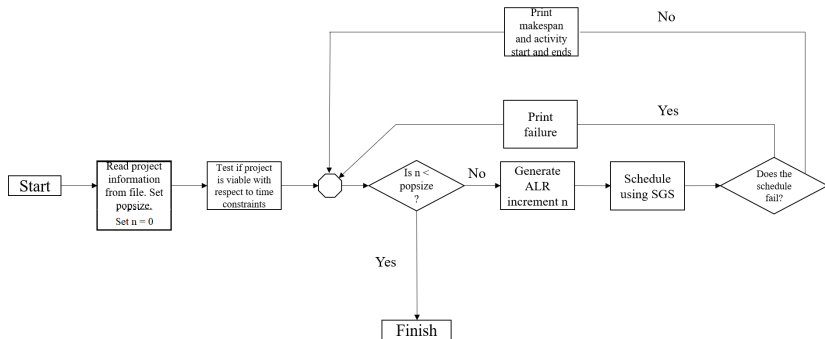


Figure: A network for a project showing time constraints between activities and a dummy start and end activity. Negative numbers correspond to maximum time leads and positive numbers to minimum time lags.

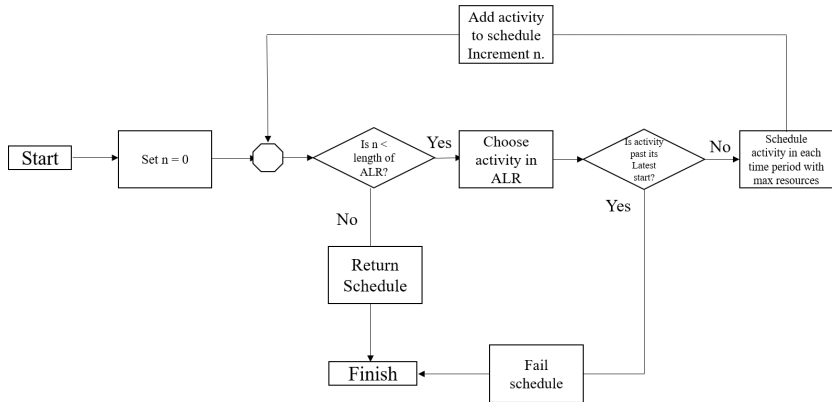
The Schedule Generation Scheme

- The main program



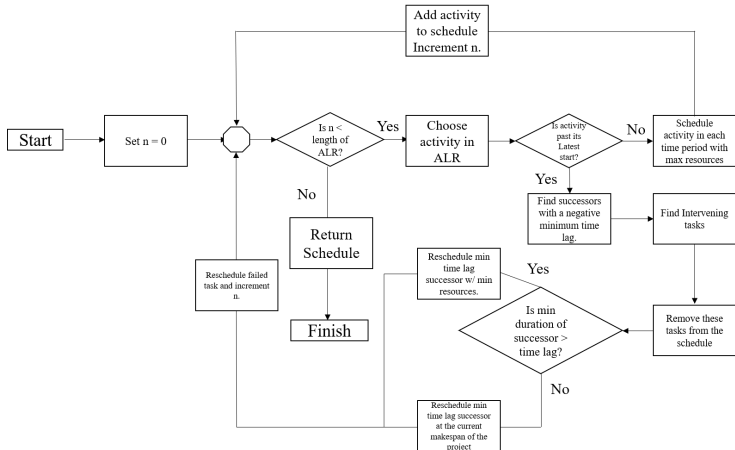
The Schedule Generation Scheme

- The greedy SGS

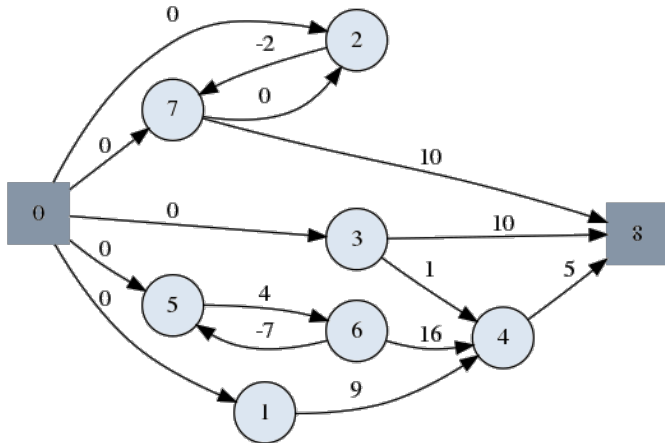


The Schedule Generation Scheme

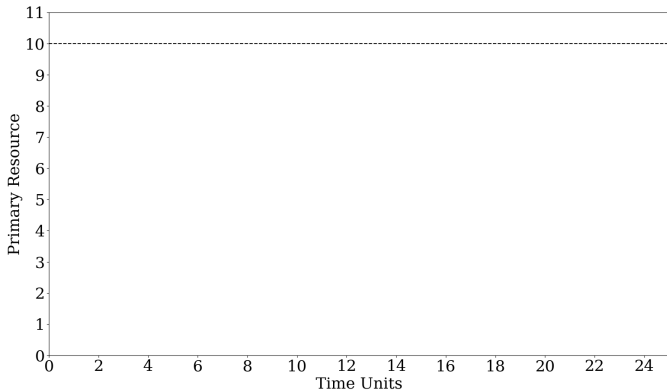
- The self improving SGS



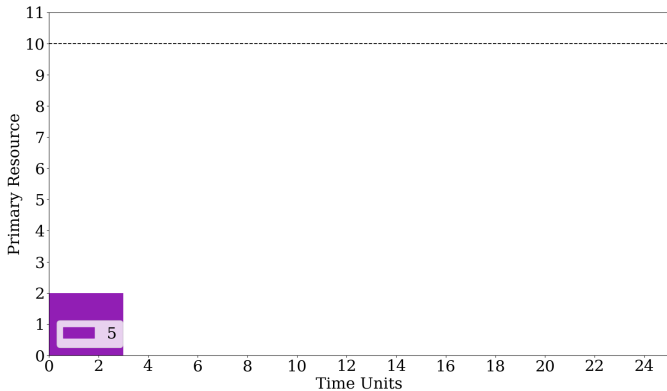
The Schedule Generation Scheme



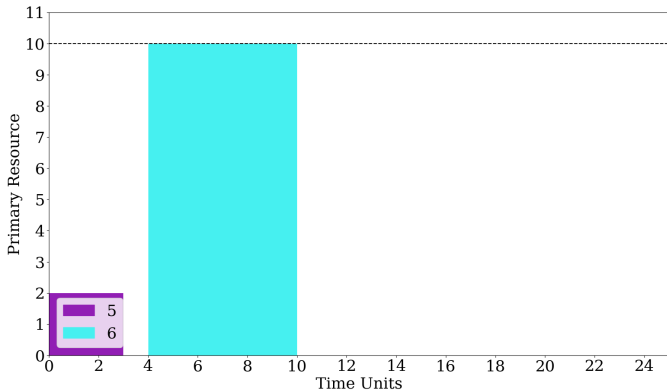
The greedy SGS



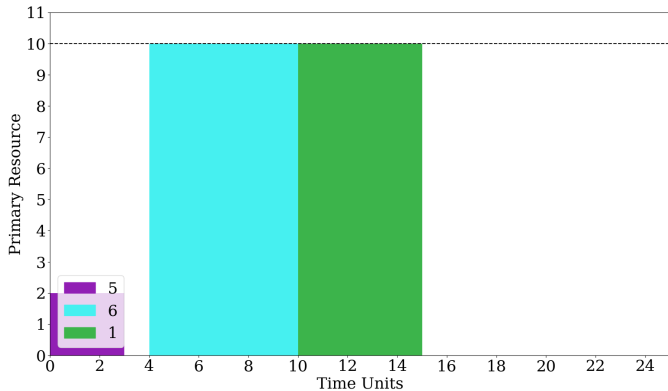
The greedy SGS



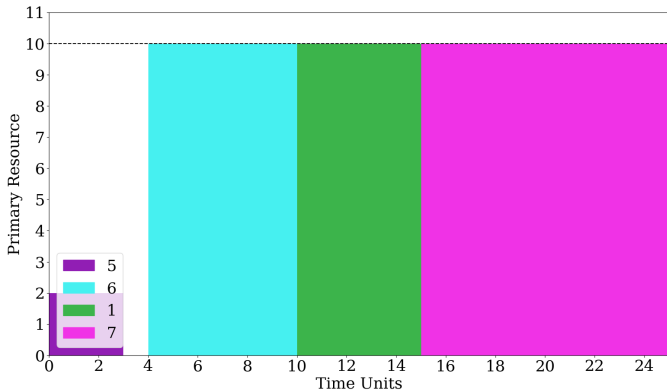
The greedy SGS



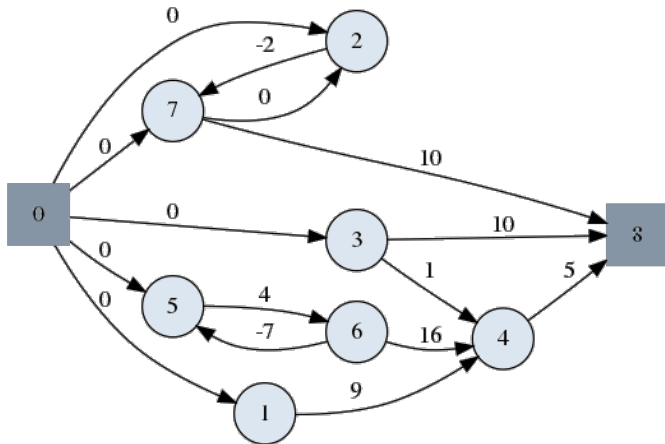
The greedy SGS



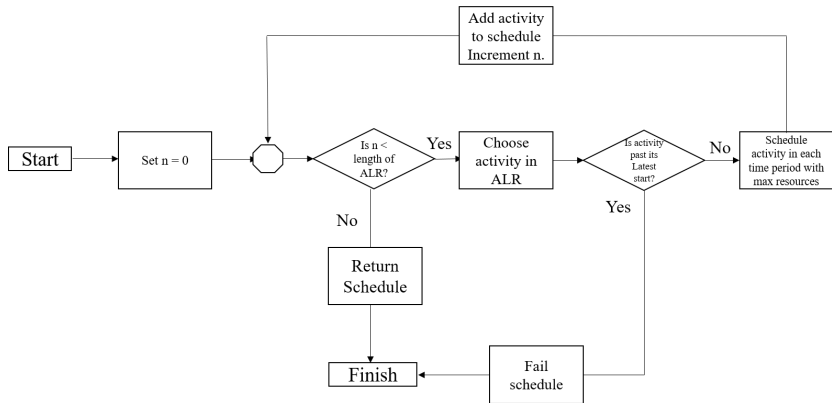
The greedy SGS



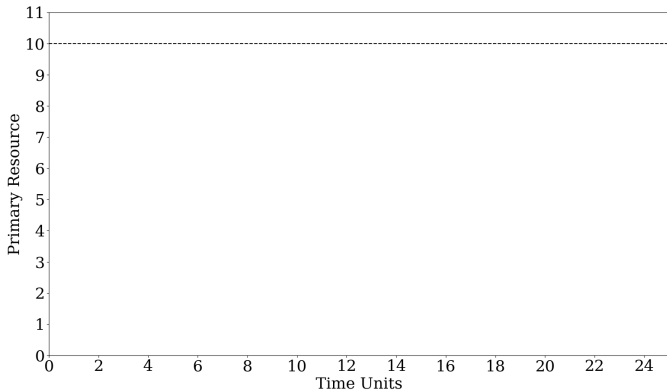
The greedy SGS



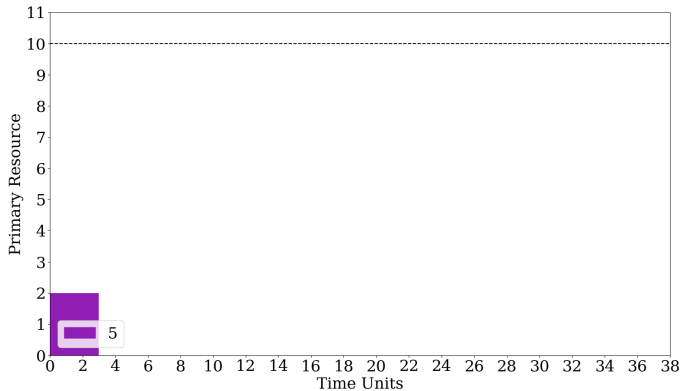
The greedy SGS



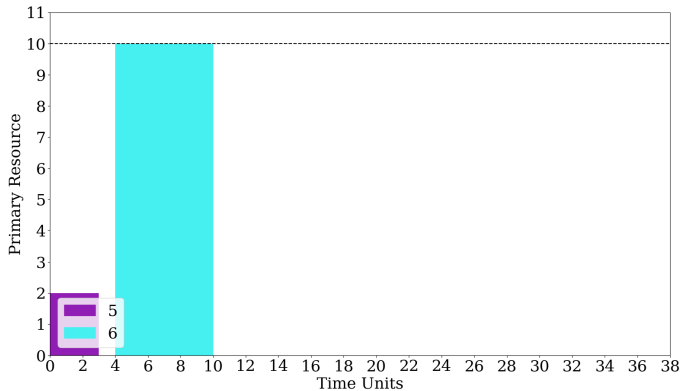
The self improving SGS



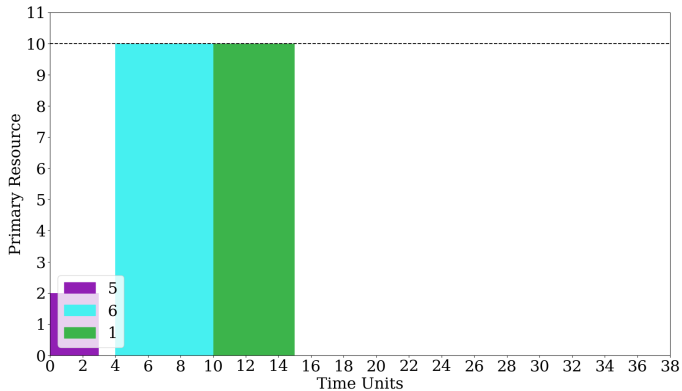
The self improving SGS



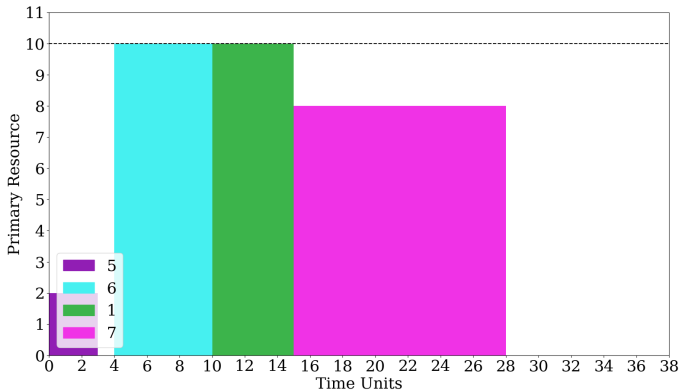
The self improving SGS



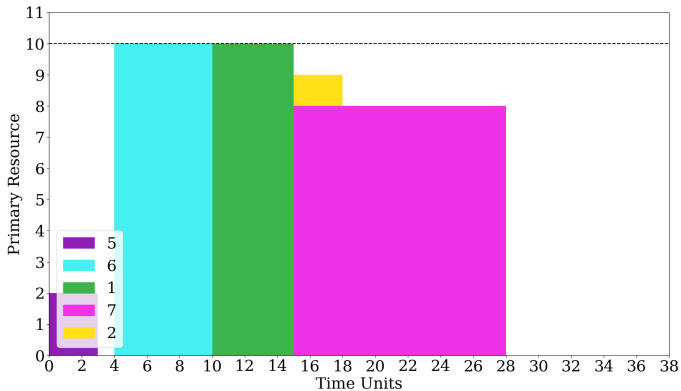
The self improving SGS



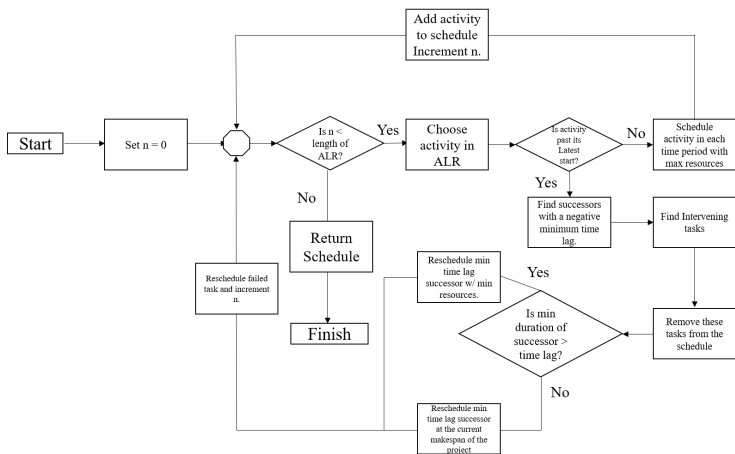
The self improving SGS



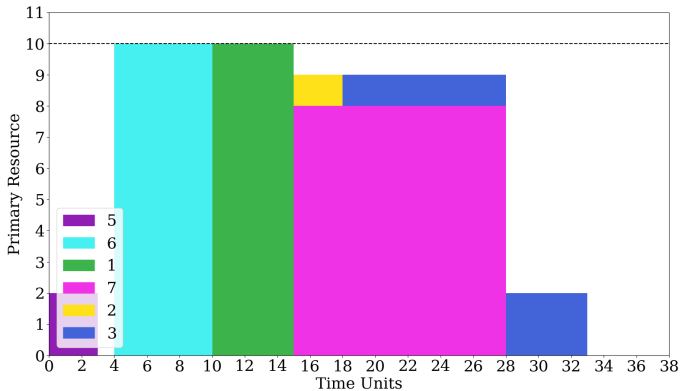
The self improving SGS



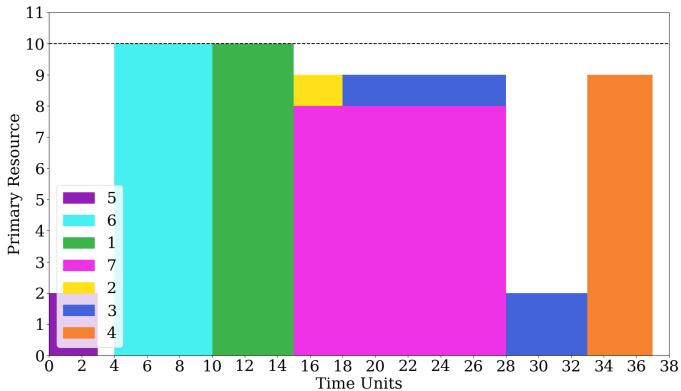
The self improving SGS



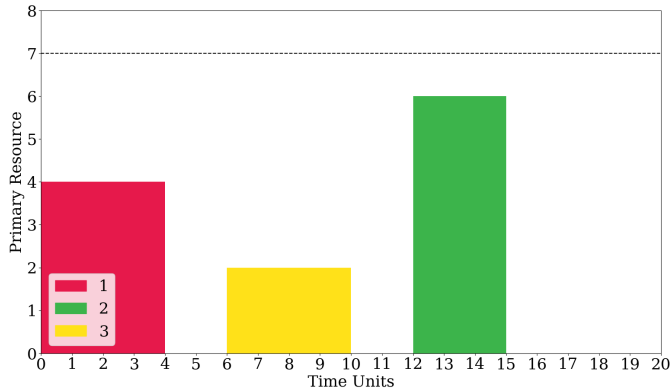
The self improving SGS



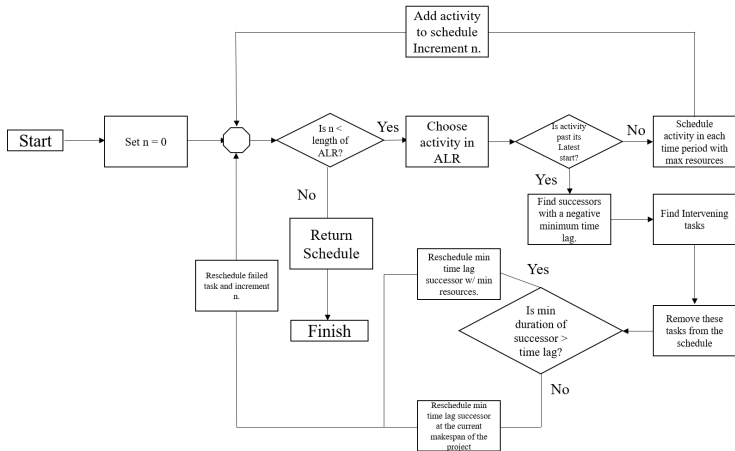
The self improving SGS



An example of another way the greedy SGS can fail



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Comparisons between the two SGS

Old SGS	New SGS	Old SGS	New SGS	Old SGS	New SGS
NA	35	35	35	57	57
37	37	43	43	71	71
26	25	37	38	NA	NA
32	32	43	38	26	24
28	27	58	54	56	55
NA	38	23	23	42	45
36	36	46	40	51	55
31	35	33	33	43	48
34	29	86	86	57	57
NA	NA	29	29	27	27
22	21	28	28	NA	NA
28	33	40	40	47	47
31	31	34	33	33	33
28	33	40	40	40	40
25	25	NA	26	29	30
21	21	28	28	35	28
30	35	24	24	34	31
35	35	NA	NA	27	26
24	24	32	32	54	50
66	66	27	28	34	34
51	51	36	36	NA	NA
16	14	16	16	28	28
33	31	22	22	34	34
36	36	52	57	43	43
14	14	32	30	53	53
32	29	43	37	51	51
45	45	32	32	33	36
39	41	19	20	30	30
NA	49	33	30	14	14
33	33	19	22	23	23

Figure: A table with conditional formatting showing the differences between the old SGS and new SGS over 90 projects each containing 10 activities.

Other ideas to explore

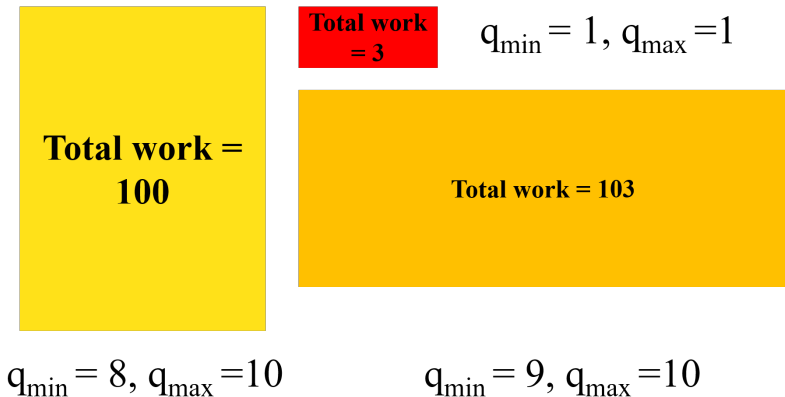


Figure: A diagram showing the idea of combining activities with maximum time leads in order to facilitate more optimised scheduling.

Any Questions?