

Weekly Homework 12

Yevgeniy Terentyev, Miriam Gaetano
Softwaretechnik

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We have engaged with tasks

Task 12-3: Project planning

a) Create a network plan that makes the logical dependencies between the tasks visible. Represent each of the above tasks as a rectangle and enter the ID, the task duration and the earliest possible start date.

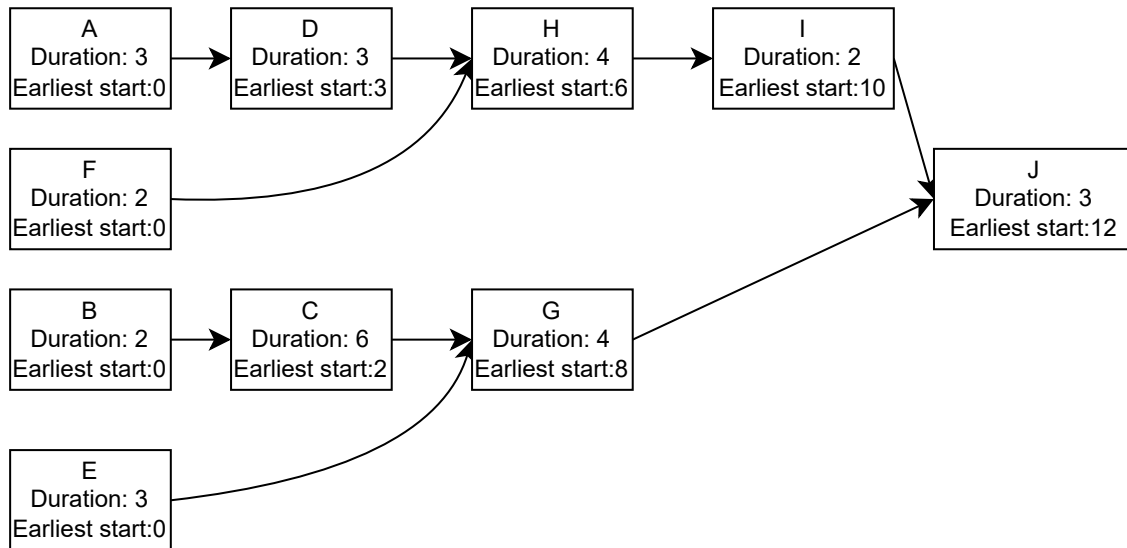


Figure 1: Network plan

b) Create a Gantt chart that visualizes the time dependencies of the tasks.

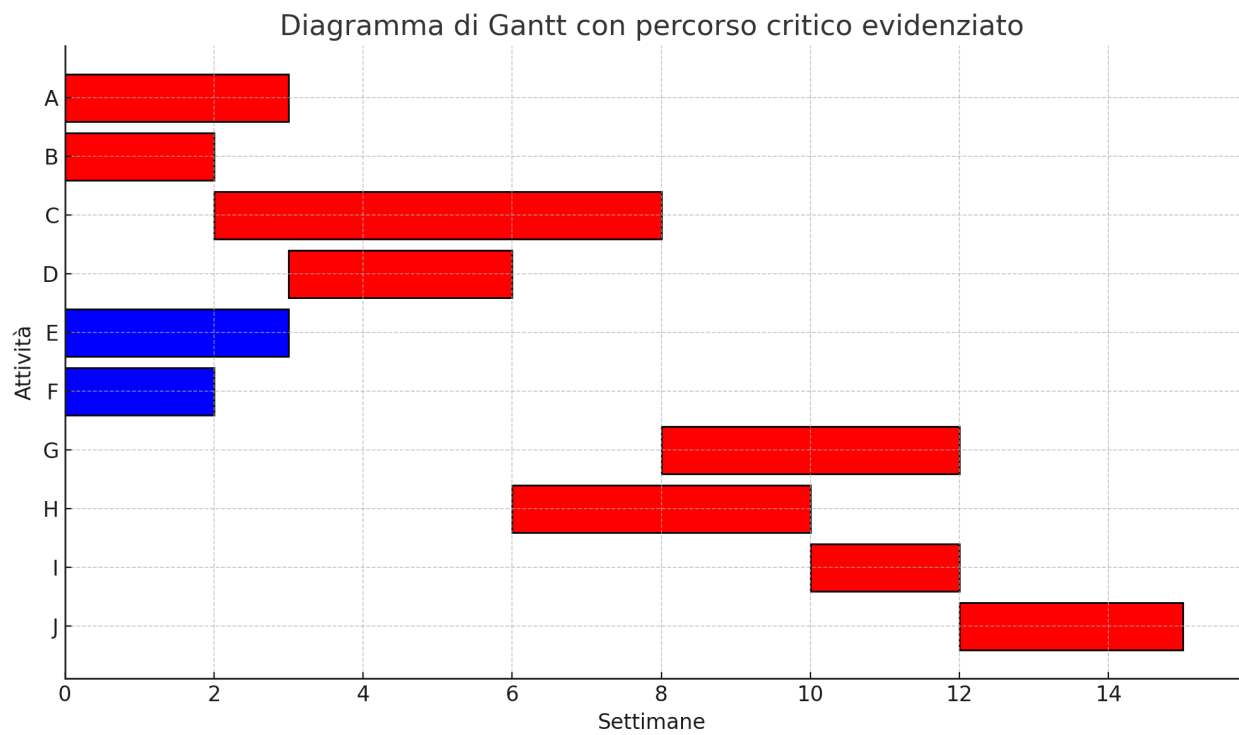


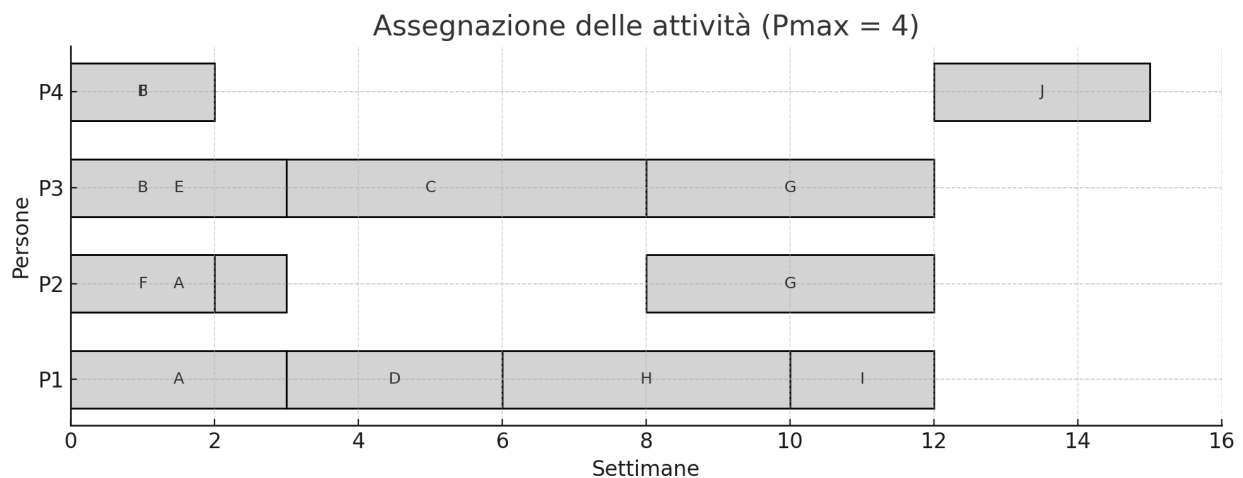
Figure 2: Gantt chart

c) Determine the critical path(s), the shortest project duration and the slack time for all activities.

Critical_Path_Analysis

Task ID	Early Start (ES)	Early Finish (EF)	Late Start (LS)	Late Finish (LF)	Slack Time	Critical
A	0	3	0	3	0	True
B	0	2	0	2	0	True
E	0	3	5	8	5	False
F	0	2	4	6	4	False
C	2	8	2	8	0	True
D	3	6	3	6	0	True
H	6	10	6	10	0	True
G	8	12	8	12	0	True
I	10	12	10	12	0	True
J	12	15	12	15	0	True

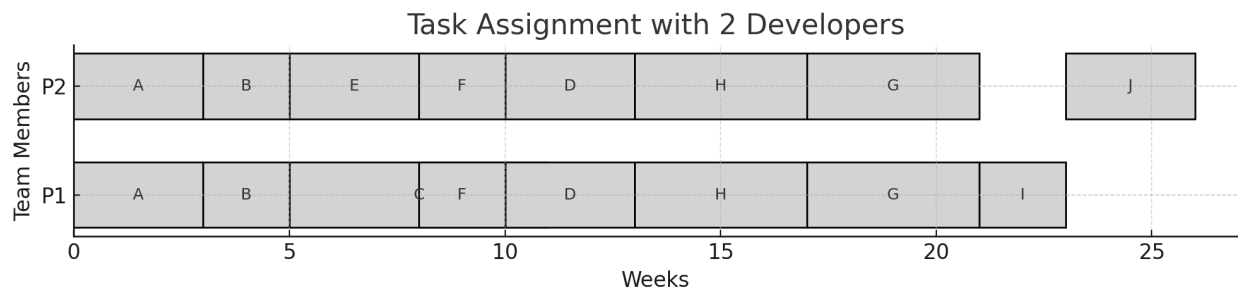
d) Suppose you aim to maximize parallelization (while respecting dependencies), in order to minimize total project duration. What is the maximum useful team size (P_{max}) — the smallest team size beyond which adding more people does not shorten the project? Show a possible task assignment for $n = P_{max}$ in graphical form. Indicate the slack time for each task and the total project duration.



Slack Time per Task (in weeks):

- A: 0 → Critical
- B: 0 → Critical
- C: 0 → Critical
- D: 0 → Critical
- E: 5
- F: 4
- G: 0 → Critical
- H: 0 → Critical
- I: 0 → Critical
- J: 0 → Critical

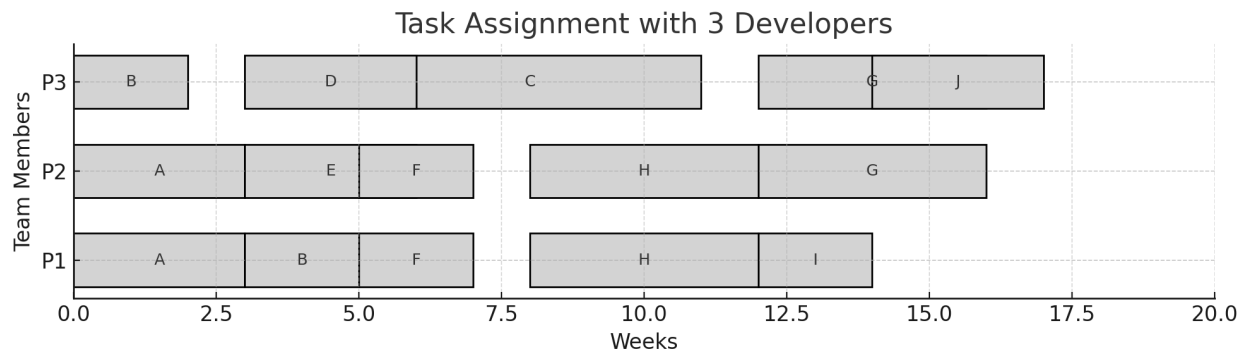
e) Suppose you only have two developers available for this project. What would be the shortest possible project duration? Show a possible task assignment for $n = 2$ in graphical form. Indicate slack time and total duration as well.



Slack Time per Task (in weeks):

- A: 0 → Critical
- B: 0 → Critical
- C: 0 → Critical
- D: 0 → Critical
- E: 5
- F: 4
- G: 0 → Critical
- H: 0 → Critical
- I: 0 → Critical
- J: 0 → Critical

f) Provide task assignments for all other possible team sizes ($2 \leq n \leq P_{\max}$) in graphical form, so that the project duration is as short as possible in each case. Indicate total duration and slack times for each assignment.



Slack Time per Task (in weeks):

- A: 0 → Critical
- B: 0 → Critical
- C: 0 → Critical
- D: 0 → Critical
- E: 5
- F: 4
- G: 0 → Critical
- H: 0 → Critical
- I: 0 → Critical
- J: 0 → Critical