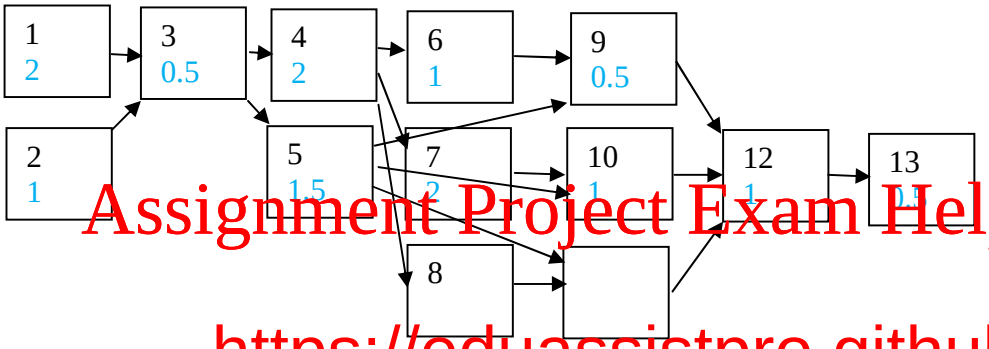
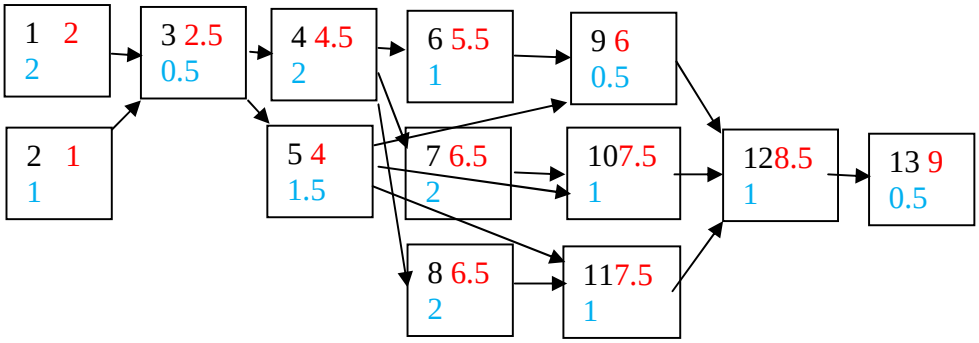
Tutorial 4 Solution

Each task will be represented as a node on the PERT chart, with the following structure:

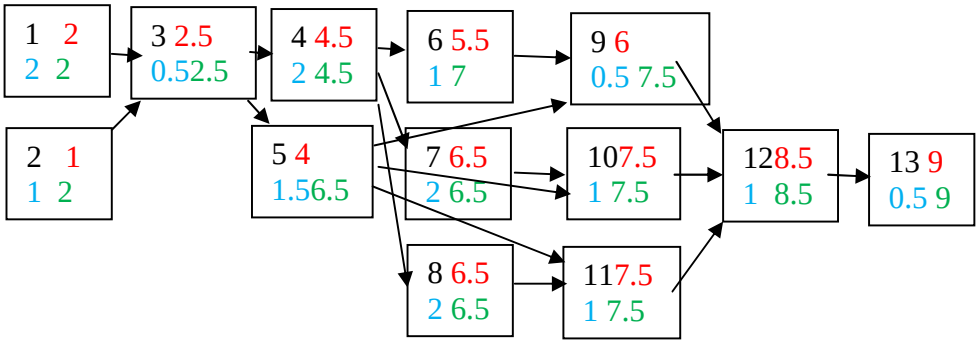
The first step is to put in the dependency lines. The earliest tasks go on the left and we move to the right.



The next step is to work out the earliest completio e earliest time that each task can start and then add the elapsed t arrive at the earliest time it can finish. A task cannot start u nds on have finished. We look at the earliest completion times ows leading into the task and take the largest of these. All tasks without dependencies can start right away.

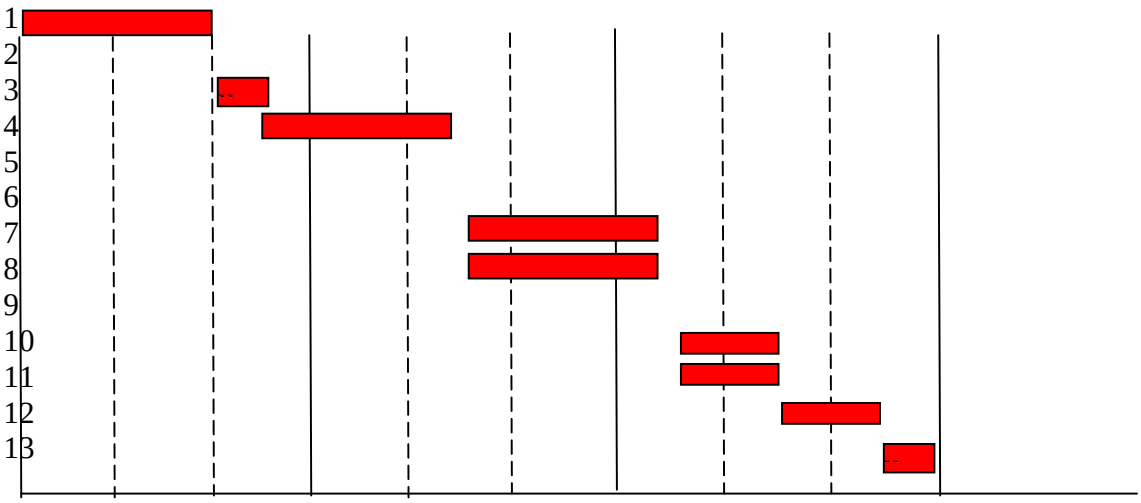


This shows us that the earliest the project can finish is 9 months after the start. The next step is to work backwards from the end of the project and calculate the latest time each task can finish. For each task, we look at all the tasks that follow on from it and calculate the latest time they can start. This is their latest finishing time minus their elapsed time. The latest finishing time of the last task is the length of the project.



All tasks where the earliest and latest finishing time a critical and there is no room for rescheduling. They are on the critical path. They are tasks 1, 3, 4, 7, 8, 10, 11, 12, 13. The other tasks h e can use this slack to delay their sta Brook's law does not apply when r staff. It also does not apply to plan

We use a Gantt chart to decide what to do with task their schedule. This is where we consider the effort for each task. r each task, we see that the whole project will take 32 person months. It will last 9 months and so will need 3 or 4 people working each month. We will use a Gantt chart to plan this. We can calculate the average number of people employed on a by dividing the effort by the elapsed time, for example, for task 1 it is 3 (effort) / 2 (elapsed) = 1.5. The results are:
Task 1 (1.5), 2 (3), 3 (3), 4 (3), 5 (1.33), 6 (2), 7 (2), 8 (2), 9 (2), 10 (1), 11 (2), 12 (1.5), 13 (2).
Normally I would draw this in each rectangle, but there is not enough space on the following diagram. I will first plot the tasks on the critical path in red.



We have the following slack tasks that we can adjust to provide consistent employment:
2: elapsed 1 between 0 and 2
5: elapsed 1.5 between 2.5 and 6.5
6: elapsed 1 between 4.5 and 7
9: elapsed 0.5 between 5.5 and 7.5

Employment on
1.5 persons betw
3 people betwee
4 people betwee
3 people between 6.5 and 7.5 (tasks 10 and 11 in
1.5 between 7.5 and 8.5 (task 12)
2 people between 8.5 and 9 (task 13)

If we schedule task 2 between 0 and 2, taking twice as long, we can employ 1.5 people for 2 months rather than 3 people for 1 month. This means we can employ 3 people for the first half of the project (0 to 4.5).

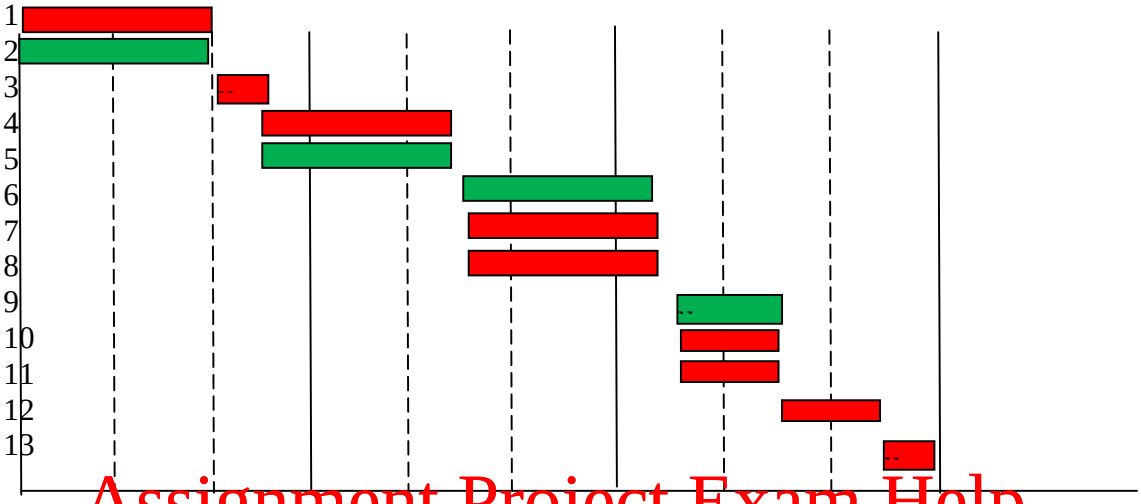
We can't do anything about the last month and a half of the project (7.5 to 9) since there are no slack tasks that can run during this period.

We need to schedule 5 additional person-months (tasks 5, 6, 9) between 2.5 and 7.5. We have already schedule 17 person-months during this period with tasks 4, 7, 8, 10, 11) and so we need to schedule 22 person-months during these 5 months. We can try and even things out by aiming for a 4 – 4 – 5 – 5 – 4 employment pattern. This means an extra person between 2.5 and 4.5, which can be achieved by spreading task 5 out over 2 months instead of 1.5.

We can add an extra person between 4.5 and 6.5 by scheduling task 6 for these two months.

We can add an extra person between 6.5 and 7.5 by spreading task 9 over one month during this period.

Here is the resulting Gantt chart:



Note that if we ar mploy 3 people for the duration of th aatt chatt can then be used with the tive tasks is 3.

An Earned Value Chart plots accumulated numbe e y-axis against time in months on the x-axis. There will be one li roject, the planned expenditure, and another one, the actual ex et progresses. Here is what the planned line looks like.