

Software Project Management (A.Y. 2016/2017) Commented Solutions

July 4th, 2017

Preamble

The Silly Software Company (SSC) has been asked to develop a complex software system and you, as an employee of the company, have been nominated Project Manager. The management is now asking you to provide some forecasting in order to decide on how to proceed with the project.

In deriving your prediction you should consider that the **week** gross salary of the employees is as following specified:

- *Senior developer:/Analysts* 3500\$
- *Junior developer:* 2000\$

Moreover historical data show that the company generally experiments a 60% overhead

Exercise 1.

In order to derive a more reliable estimation you sketch a set of workpackages (WPs) and tasks needed in order to complete the project. WPs and tasks are detailed in Table 1. The table also includes information concerning the dependencies among the tasks.

Activity (Precedents)	Activity Durations (weeks)		
	Optimistic (a)	Most likely (m)	Pessimistic (b)
T1.1	1	2	4
T1.2	1	2	4
T1.3	4	8	13
T2.1 (T1.1)	8	12	17
T2.2 (T1.2)	3	4	4,5
T2.3 (T1.3)	2	4	6
T3.1 (T2.1,T2.2)	4	12	10
T3.2 (T1.1,T1.3,T2.2)	7	8	9
T3.3 (T2.3,T3.2)	8	12	13
T3.4 (T2.3)	5	7,5	12
T4.1 (T3.1,T3.3)	3	4	5
T4.2 (T3.1,T3.4)	3	4	5
T4.3 (T4.1,T4.2)	6	8	11

Table 1: PERT activities time estimates (in weeks)

Apply the PERT approach to:

- Compute the duration of the project
- Provide the probability of successfully terminating task T3.4 by week 20
- Provide the probability of successfully terminating task T4.2 within 30 weeks, according to the dependencies and the corresponding path ending with activity 4.2
- Provide the probability of finishing the project after 42 weeks
- Provide the ordered list of activities belonging to the critical path where the value for the time is the one specified by t_e .

14 points

Solution:

- To compute the expected duration of the project we need to build the PERT network as reported in Figure 1. Then from the data reported there we can deduce that the expected duration for the project is 39,84 weeks.
- In this case the value corresponds with the one for the path ending with activity 3.4. Therefore as it is well known the probability of successfully terminating a task as indicated in the PERT network is always 0,5
- In this case we need to calculate the formula $z = (T - t_e)/s$ for the path ending with task T4.2. In this case we should not consider the value on node 13 being related to the path ending with task T4.1. So we need to compute the value for t_e and s with respect to that path. Using the usual formula we obtain the following values $t_e = 24,67 + 4 = 28,67$ and $s = \sqrt{1,87^2 + 0,33^2} = 1,9$. Therefore $z = (30 - 28,67)/1,9 = 0,7$. Now using the table for z we obtain that the probability of finishing Task T4.2 project within the 20th week is around 0,75.
- In this case we can use the value on node 14 on Figure 1 to compute the value of z . In particular we obtain $z = (42 - 39,84)/2,34 = 0,92$. Using the table for the value of z we can deduce that the probability of finishing the project after one year is around 0,83.
- The critical path is generally computed applying the CPM technique. Nevertheless if the value to use is the one for t_e we can deduce the critical path also from a PERT network given that the number in it follows the same logics used in CPM. In particular the following one is the critical path:

1. T1.3 \rightarrow T3.2 \rightarrow T3.3 \rightarrow T4.2 \rightarrow T4.3

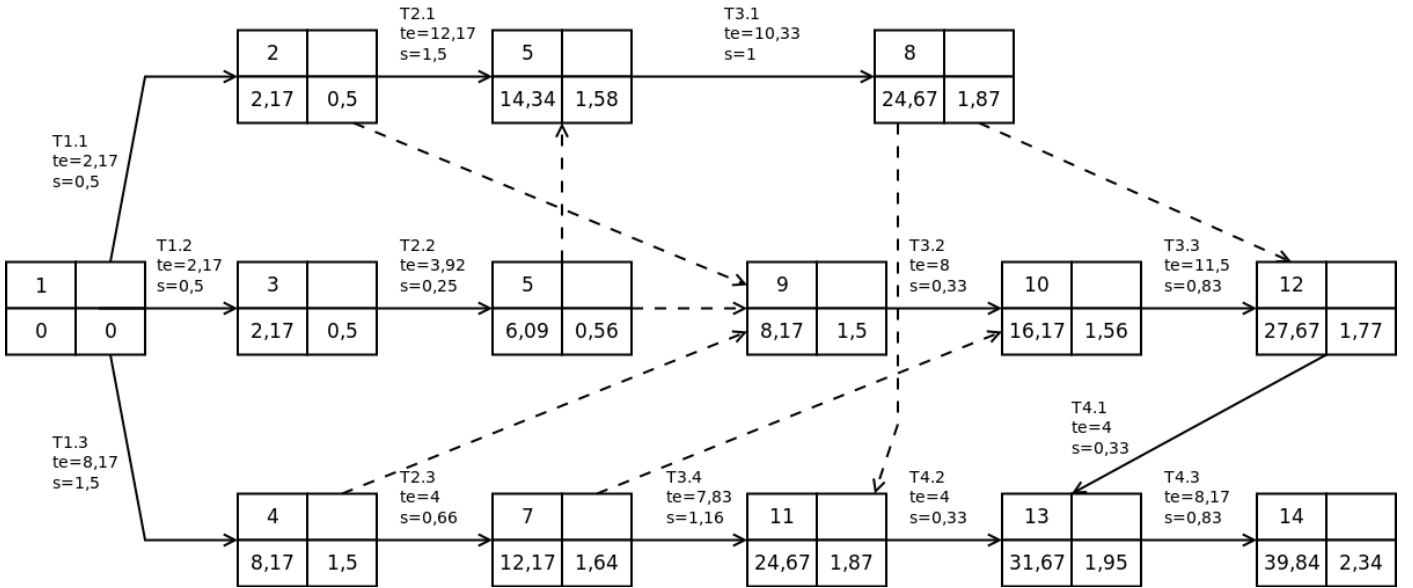


Figure 1: PERT network

Exercise 2.

Consider now a project in which the foreseen activities and dependencies are the ones specified in Table 2, where the duration is expressed in weeks, and the effort is expressed in terms of needed Senior Developers (SD) and Junior Developers (JD) respectively:

Task	Duration	Effort	Depends on
T1.1	10	20 SD/10 JD	
T1.2	12	24 SD/12 JD	
T1.3	6	6 SD/0 JD	T1.1
T1.4	2	2 SD/2 JD	
T2.1	2	4 SD/2 JD	
T2.2	6	12 SD/6 JD	T1.3,T2.3
T2.3	8	0 SD/8 JD	T2.1
T3.1	4	12 SD/8 JD	T1.2, T1.4
T3.2	16	0 SD/32 JD	T3.1
T4.1	6	12 SD/6 JD	T3.2
T4.2	4	8 SD/0 JD	T2.2

Table 2: Activities, effort and dependencies

- Report the CPM network and derive the total duration of the project, as well as the various floats for each activity
- Compute the total cost for the project
- Provide a possible allocation of resources respecting the following constraints:
 - activities cannot be split in subactivities
 - effort should be uniformly distributed over the weeks for the whole duration of the corresponding activity
 - the company does not have more than 5 Senior Developers and 4 Junior Developers.

7 points

Solution:

- The CPM network and related information can be easily derived from Figure 2 given the dependencies reported in Table 2.
- Figure 2 reports also the effort needed for each activity and the total effort for SD, and JD. As indicated the total cost of the project is 835200\$.
- In order to respect the constraints listed in the third item of the problem list, it will be necessary to move the tasks within their float. The objective will be to derive a distribution of effort that still respects tasks dependencies and the additional constraints. Figure 3 reports a possible allocation respecting all the listed constraints, but it is obviously possible to arrange the effort according to different strategies, still respecting the constraints.

Question 1.

What is a daily Scrum and which are its objectives? Provide also some general guidelines on how to organize and conduct an effective daily Scrum. **4 points**

Answer:

A daily scrum is a short meeting, often standing meeting, made by the scrum team in order to update each other on the activities that each one did since the last meeting, on the planned activities, and on the possible hurdles each one sees on his path. A set of guidelines on how to organize a daily scrum can be found at page 115 and followings.

Question 2.

Describe what is the “planning poker”, for performing which activity has been conceived? How it works? Which are its interesting characteristics in relation to the objectives of the activities in which it is generally used? **4 points**

Answer:

Planning poker is a technique used in planning the sprint in order to assign points to user stories. Details can be found at page 170 of the book “*Learning Agile - Understanding SCRUM, XP, Lean and Kanban*”.

Question 3.

Provide the list of Scrum values and a short description for each of them **4 points**

Answer:

Scrum has 5 own values. **Courage, Commitment, respect, focus, and openness.** Details can be found at page 104 and followings of the textbook.