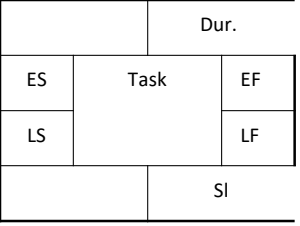
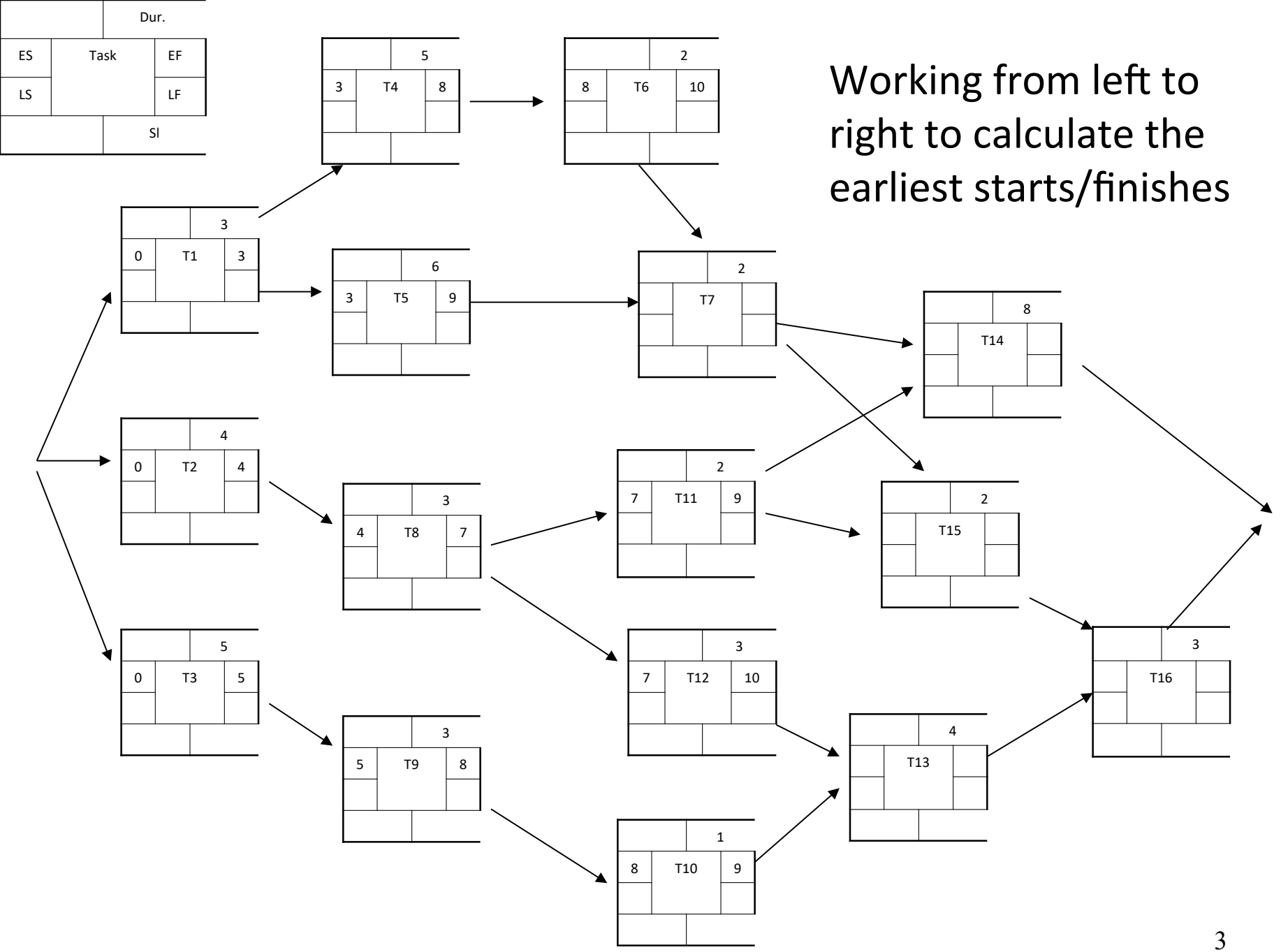
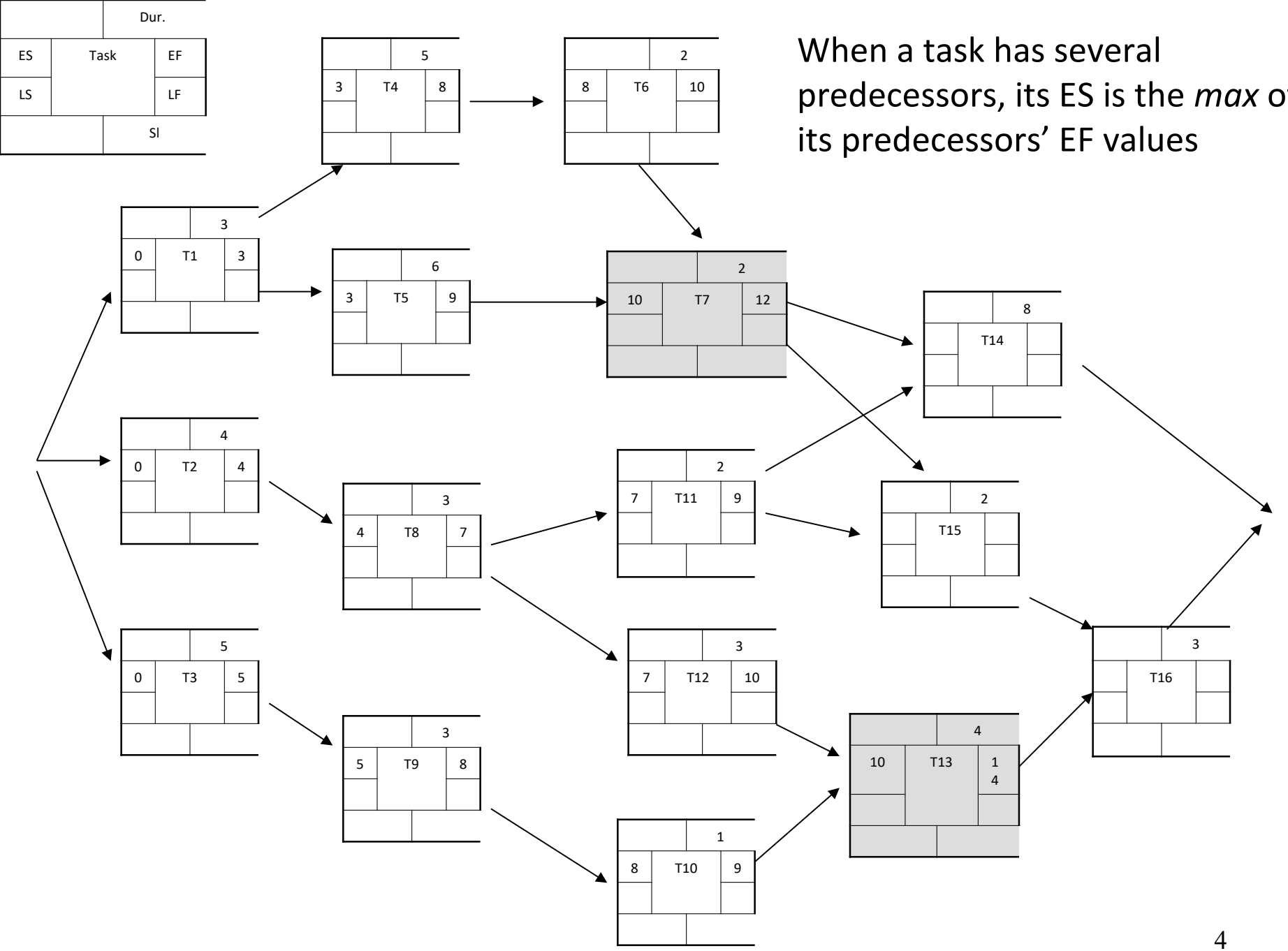
Worksheet1 – Planning Solutions

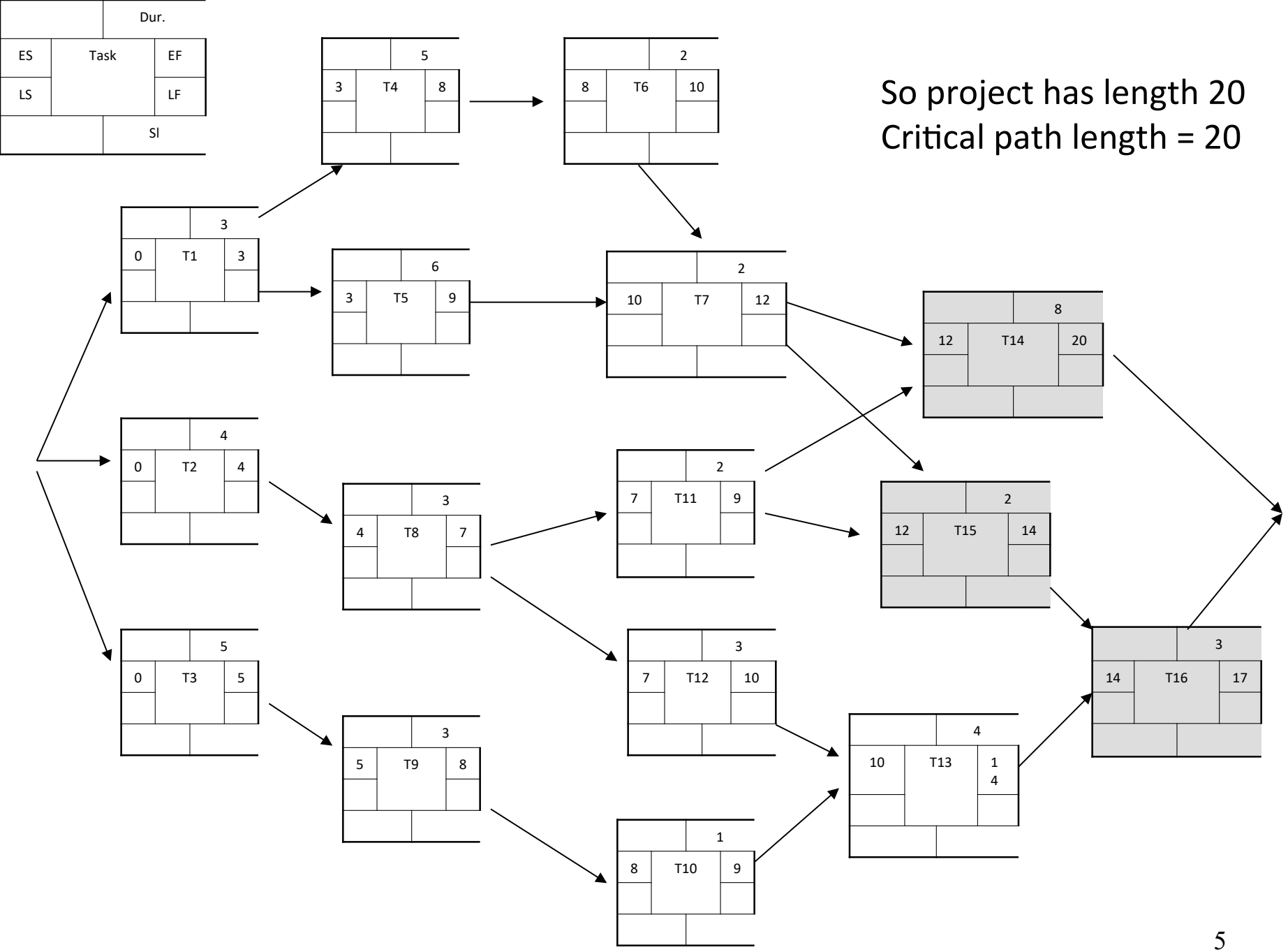
Please study these solutions carefully: if you have any queries, please do ask in the workshop

Q1
The activity network

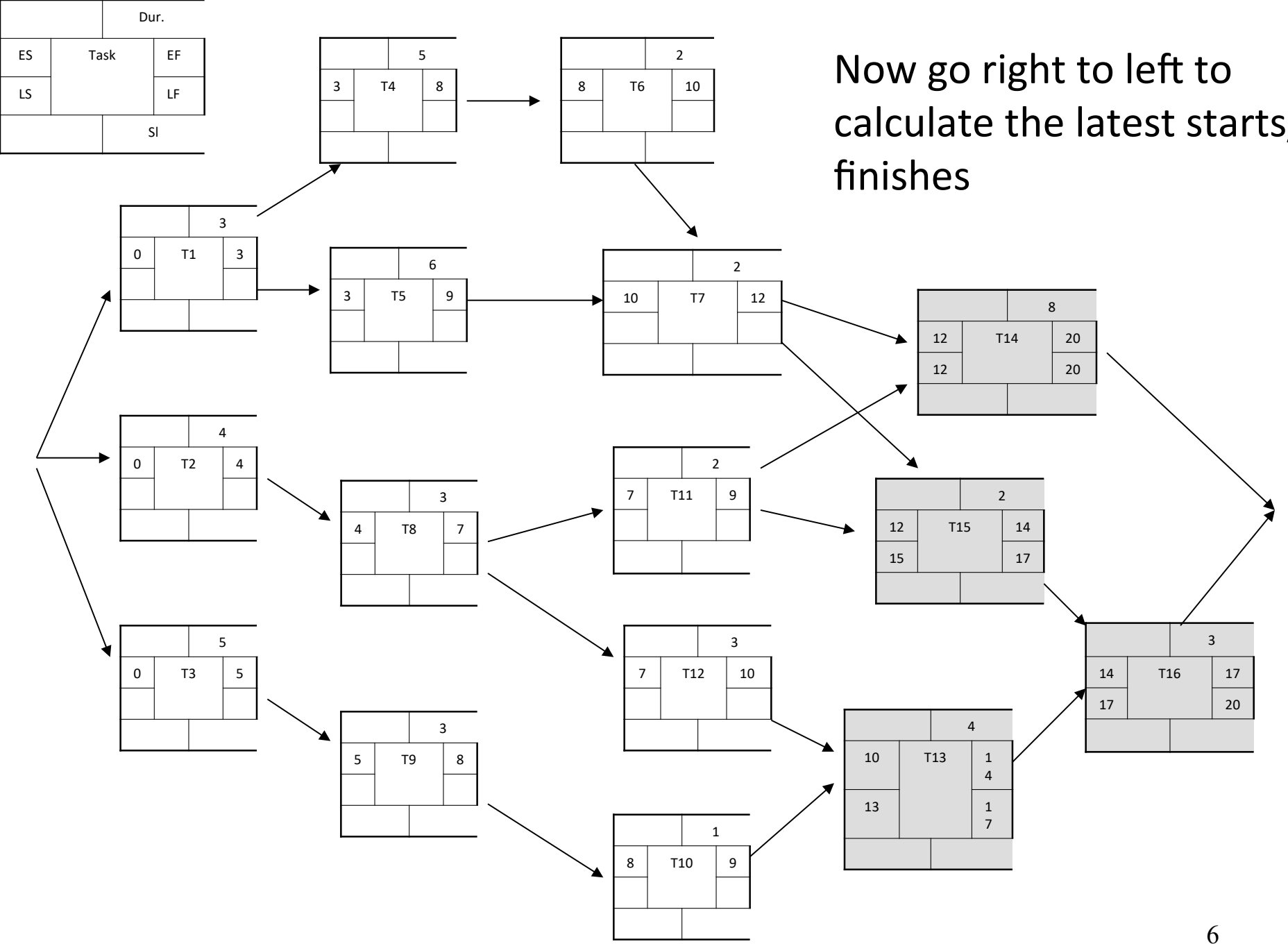


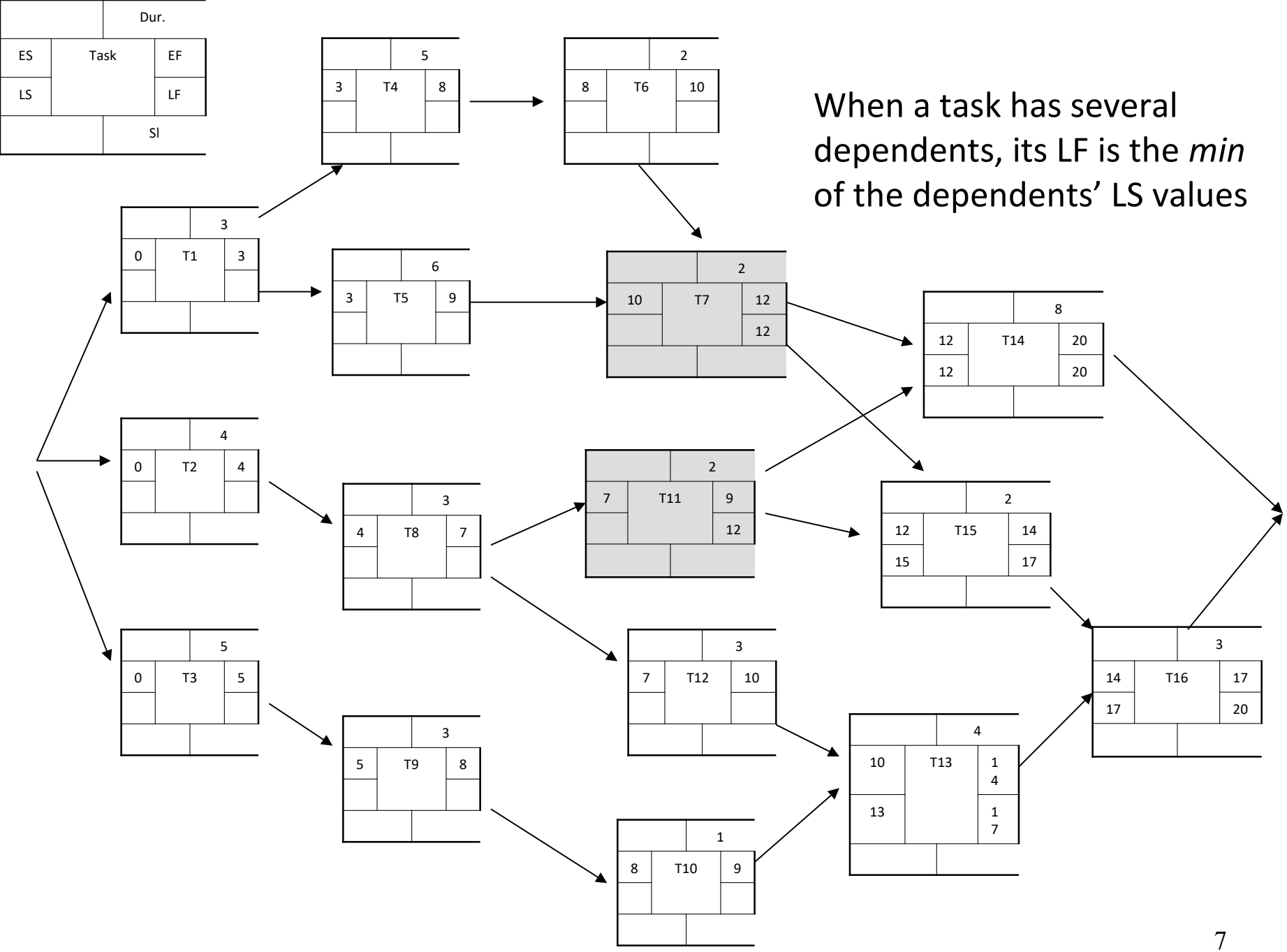

Dur.
ES
Task
EF
LS
LF
Sl
Working from left to right to calculate the earliest starts/finishes
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16


Dur.
ES
Task
EF
LS
LF
Sl
When a task has several predecessors, its ES is the *max* of its predecessors' EF values
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16

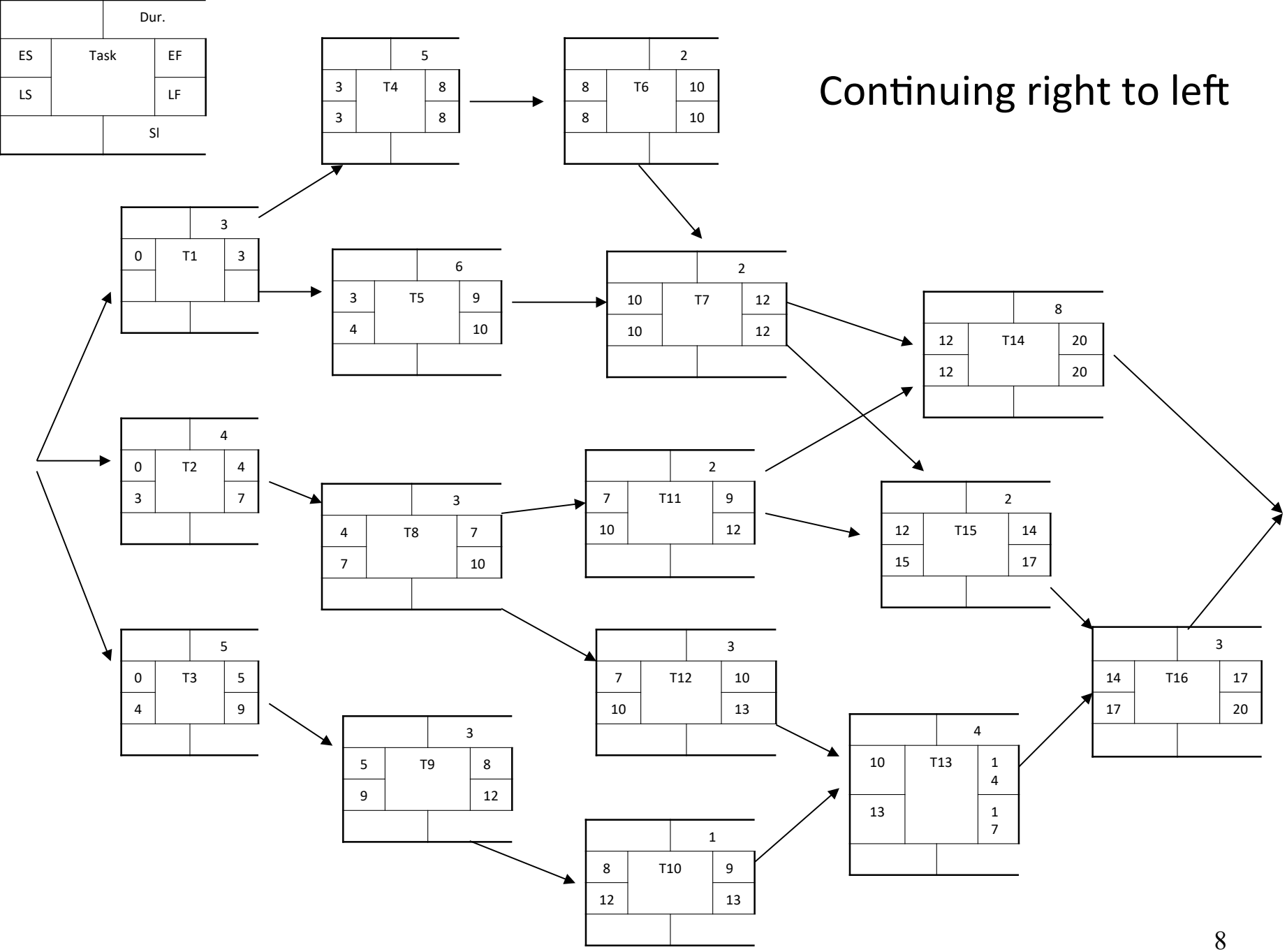


So project has length 20
Critical path length = 20

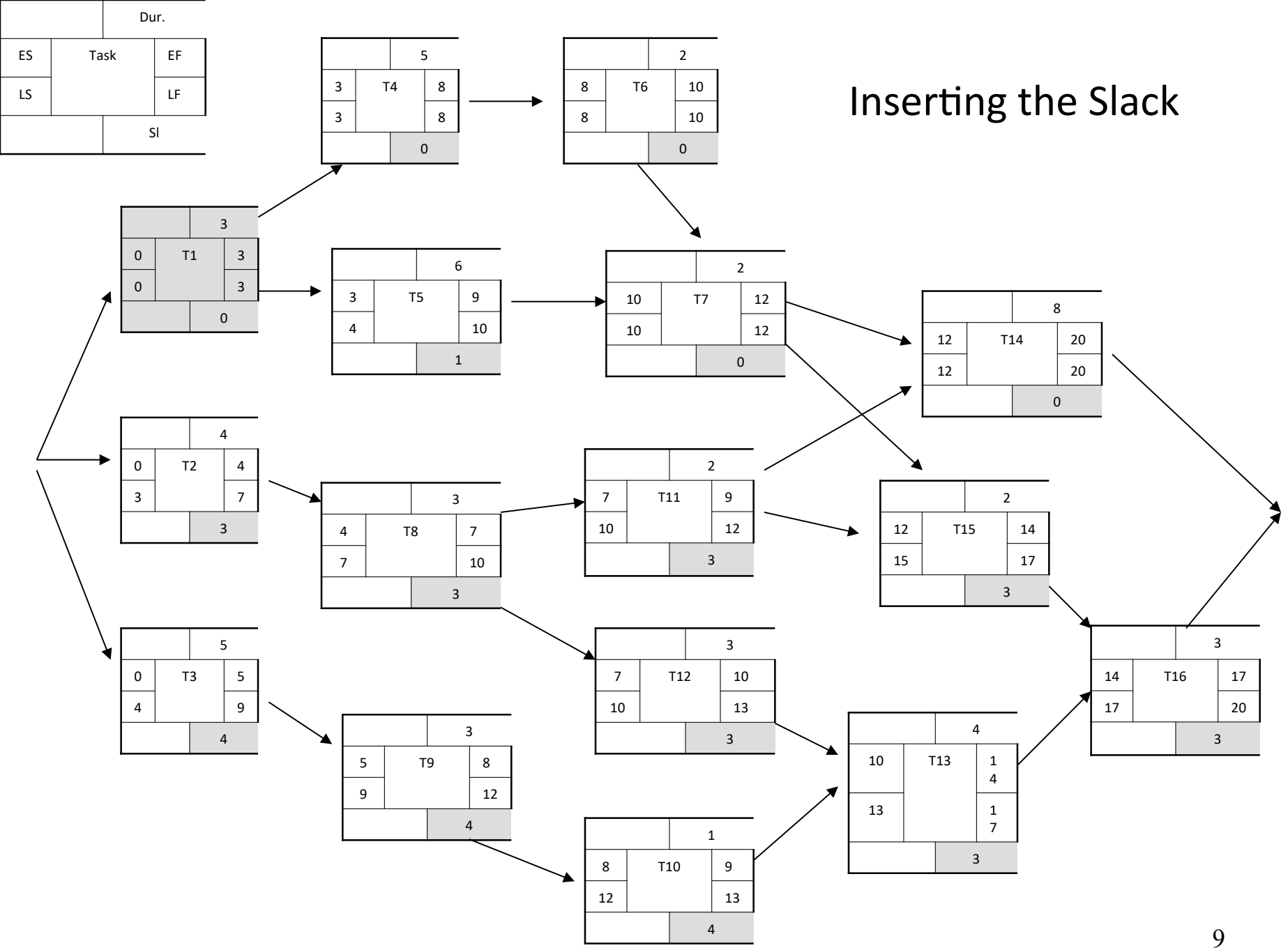

Dur.
ES
Task
EF
LS
LF
Sl
Now go right to left to calculate the latest starts/ finishes
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16

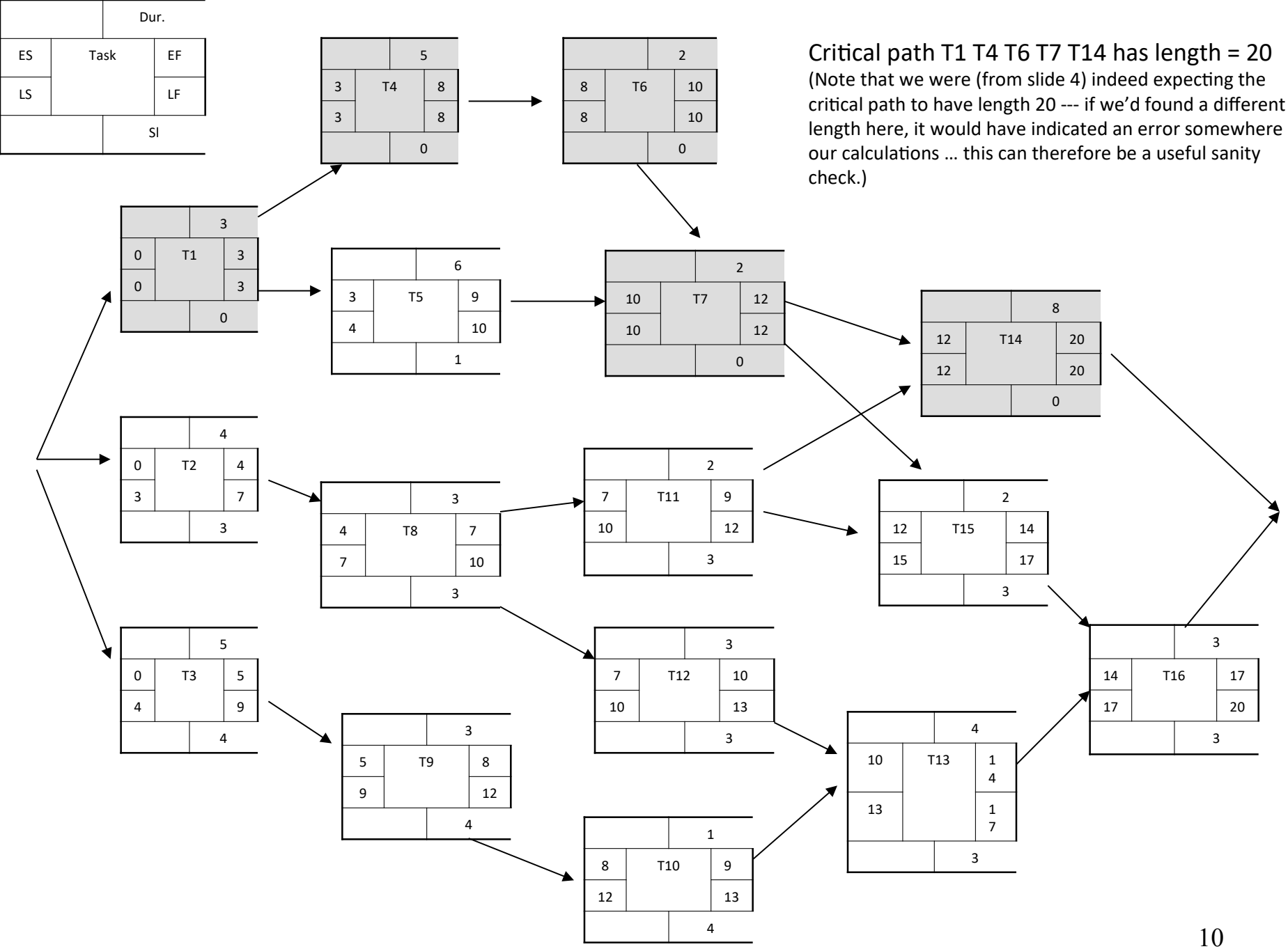

Dur.
ES
Task
EF
LS
LF
Sl
When a task has several dependents, its LF is the *min* of the dependents' LS values
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16

Continuing right to left



Inserting the Slack




Dur.
ES
Task
EF
LS
LF
Sl
Critical path T1 T4 T6 T7 T14 has length = 20
(Note that we were (from slide 4) indeed expecting the critical path to have length 20 --- if we'd found a different length here, it would have indicated an error somewhere in our calculations … this can therefore be a useful sanity check.)
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16

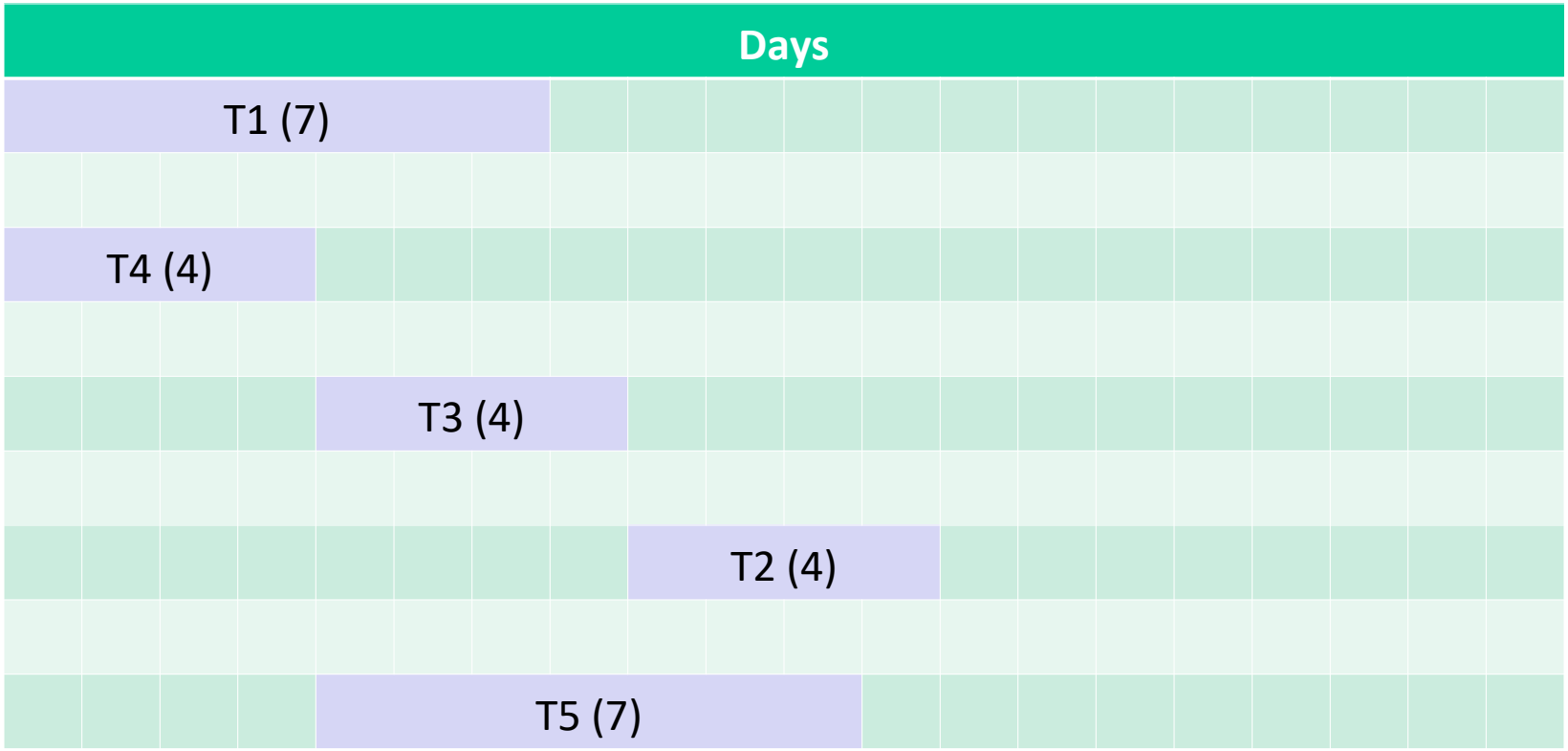
The effect of delay

- T10 has 4 weeks slack so a delay or 3 or 4 weeks would not extent the overall project
  - Alternatively: T10 lies on precisely one path which currently has length 16; a delay of 3 or 4 weeks would not extend the length of this path to more than 20, and therefore the overall project would not be extended in length

The effect of delay

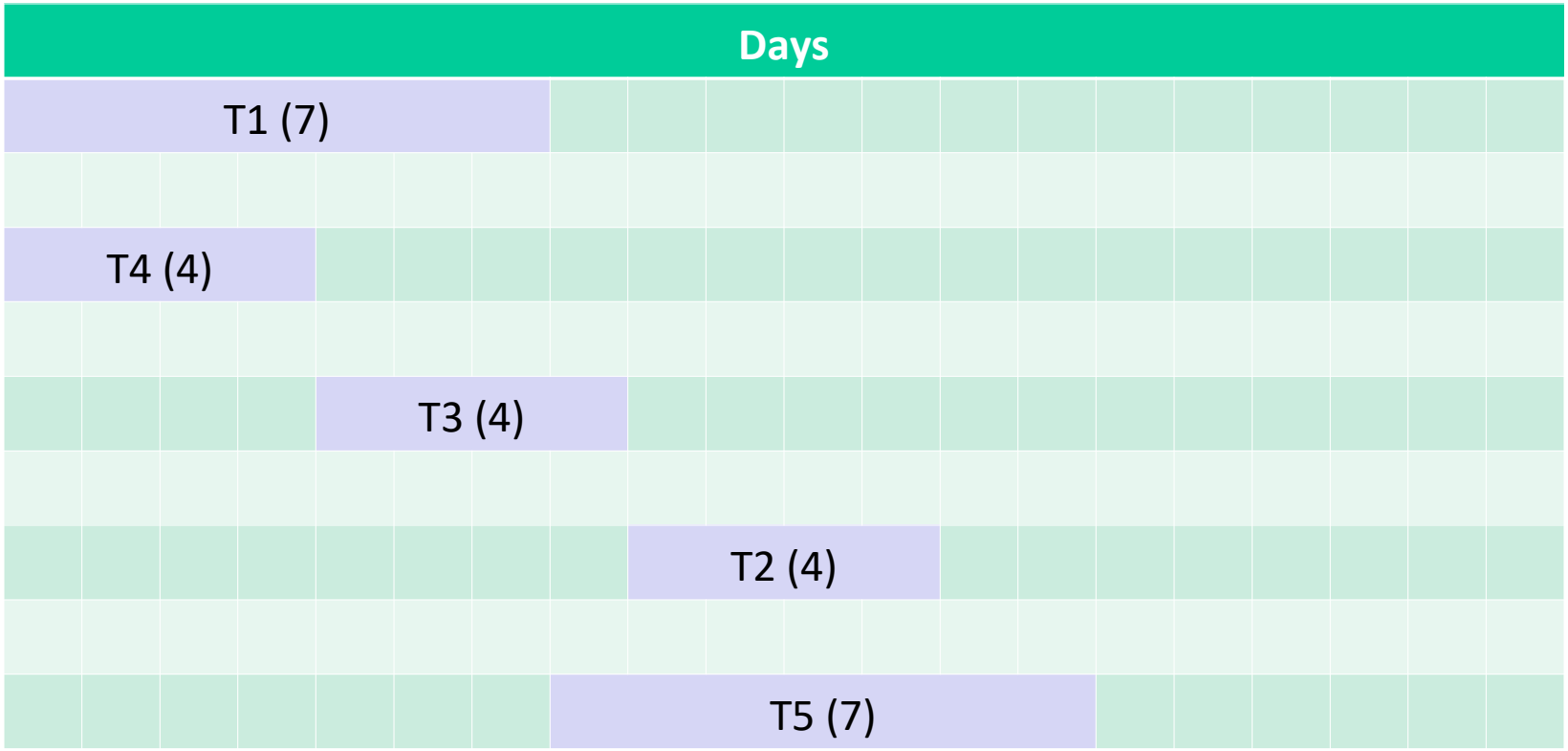
- T11 has 3 weeks slack so a delay of 3 weeks would not extend the overall project, but a delay of 4 weeks would push the project back by 1 week. Alternatively:
  - T11 lies on precisely two paths which currently have lengths 14 and 17. A delay of 3 weeks would not extend the length of either to more than 20, and therefore the overall project would not be extended in length.
  - A delay of 4 weeks would extend the length of the longer path to 21 weeks, and therefore it would delay the project by 1 week

Q2



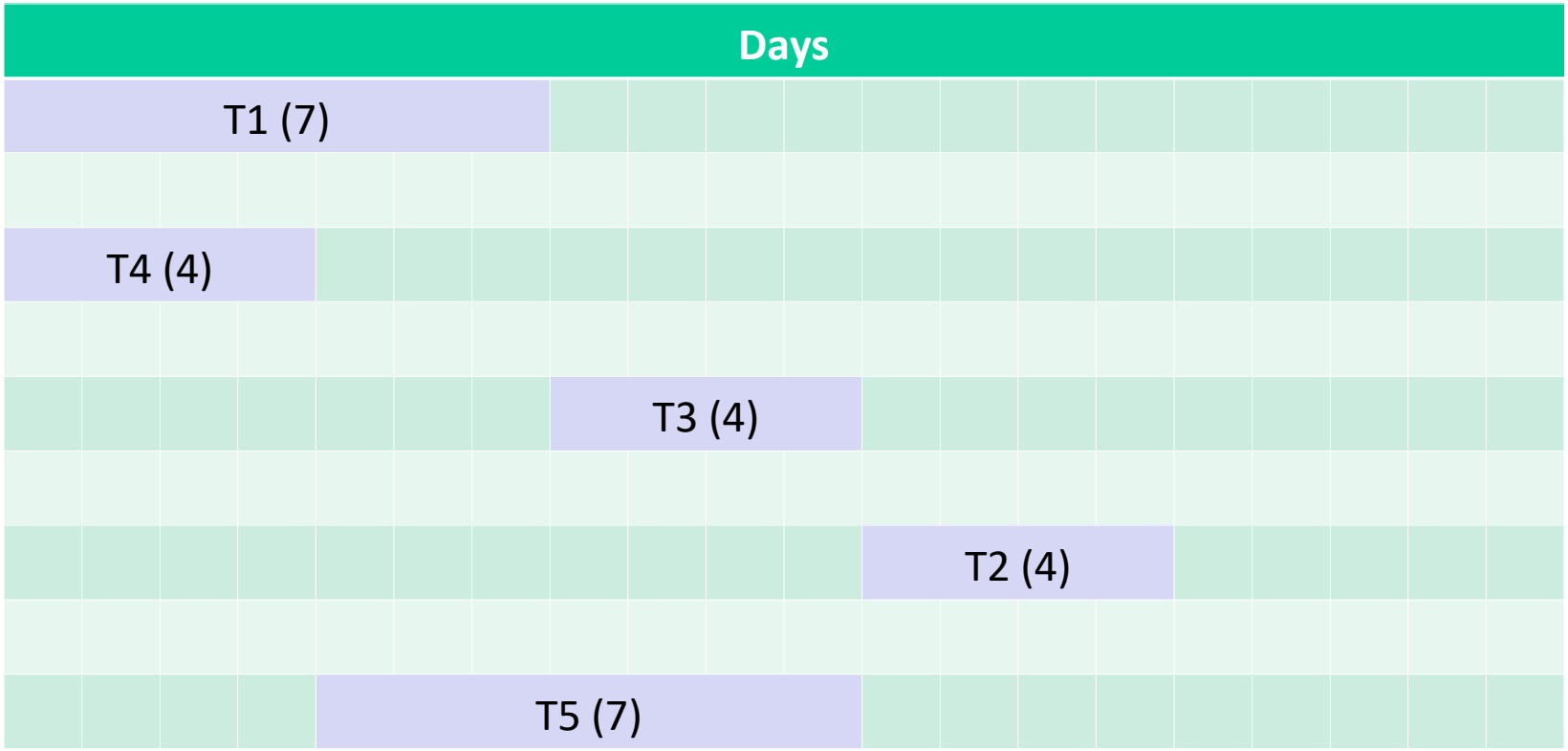
The initial Gantt chart with the tasks positioned at their earliest start dates. However we cannot start both T3 and T5 on day 5 because we only have two staff.

Q2



Giving priority to T3 (since it is on the critical path) we get the Gantt chart above and a project length of 14

Q2



If – instead - we'd given priority to T5, we see that we get the Gantt chart above and a project length of 15 days