Recitation 4, Part 2 : PERT

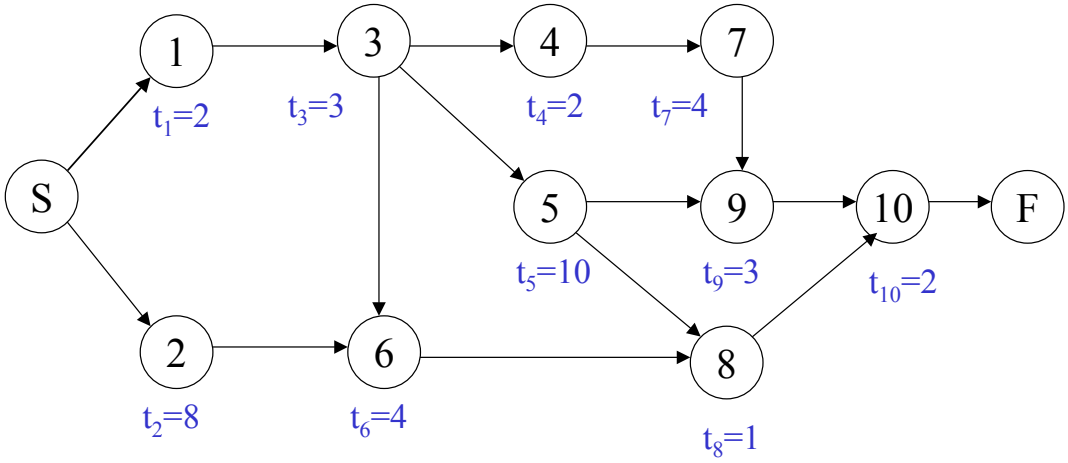
Example 1:

Project Management: Example of Classical Approach

Tennis Tournament Activities (Fitzsimmons, pp 391–392)

Task Description	Code	Immediate Predecessors
Negotiate for location	1	—
Contact seeded players	2	—
Plan promotion	3	1
Locate officials	4	3
Send invitations	5	3
Sign player contracts	6	2,3
Purchase balls and trophies	7	4
Negotiate catering	8	5,6
Prepare location	9	5,7
Tournament	10	8,9

PERT Chart



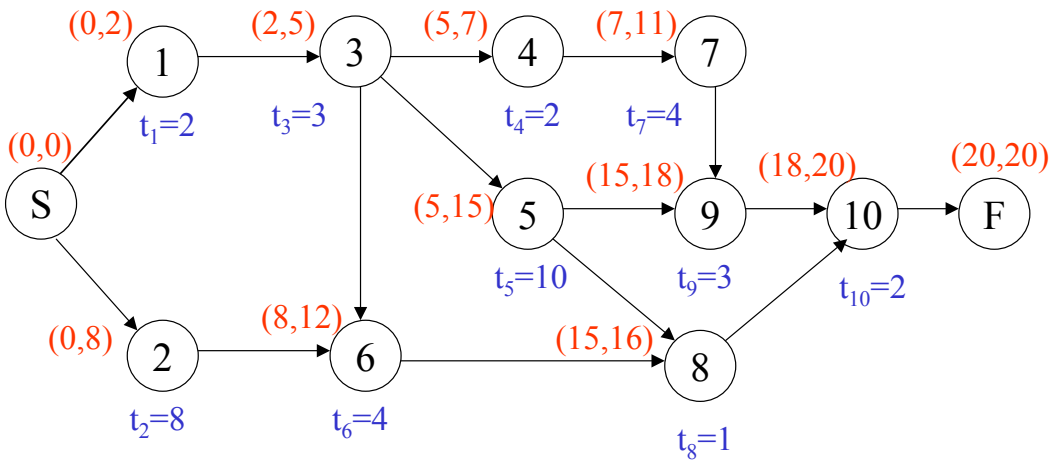
PERT = **P**rogram **E**valuation and **R**eview **T**echnique.

t_i – **completion times** of tasks.

Assume that t_i are **deterministic**.

How to calculate project completion time?

Critical Path Method: Forward Pass

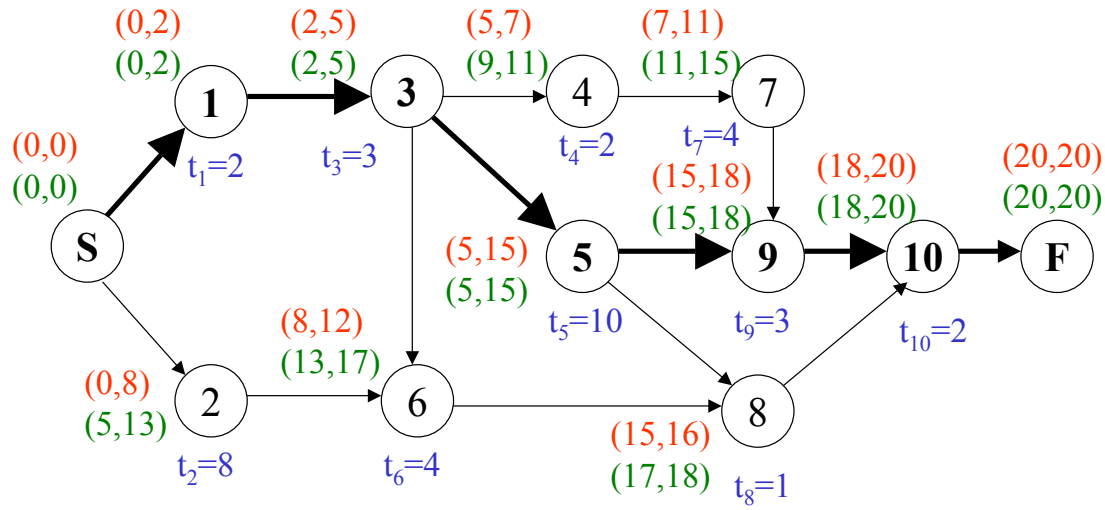


Initialization: $(\mathrm{ES})_i = (\mathrm{EF})_i = 0$ for Start node.

Early Start: $(\mathrm{ES})_i = \max\{\mathrm{EF} \text{ of all predecessors}\}$.

Early Finish: $(\mathrm{EF})_i = (\mathrm{ES})_i + t_i$.

Critical Path Method: Backward Pass



Initialization: $(\mathrm{LS})_i = (\mathrm{ES})_i$ for Finish node.

Late Finish: $(\mathrm{LF})_i = \min\{\text{LS of all successors}\}$.

Late Start: $(\mathrm{LS})_i = (\mathrm{LF})_i - t_i$.

Critical Path(s): $(\mathrm{ES})_i = (\mathrm{LS})_i$ and $(\mathrm{EF})_i = (\mathrm{LF})_i$.

Slack: $(\mathrm{TS})_i = (\mathrm{LS})_i - (\mathrm{ES})_i = (\mathrm{LF})_i - (\mathrm{EF})_i$.
Start time of task i can be delayed by $(\mathrm{TS})_i$ without affecting project completion time.