2. PROJECT SCHEDULING

Topics:

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Objectives:

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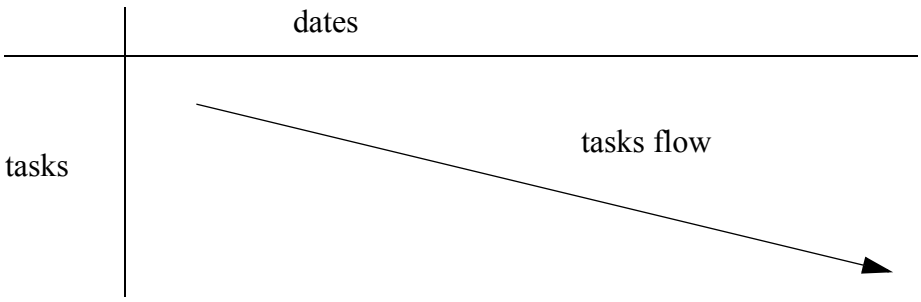
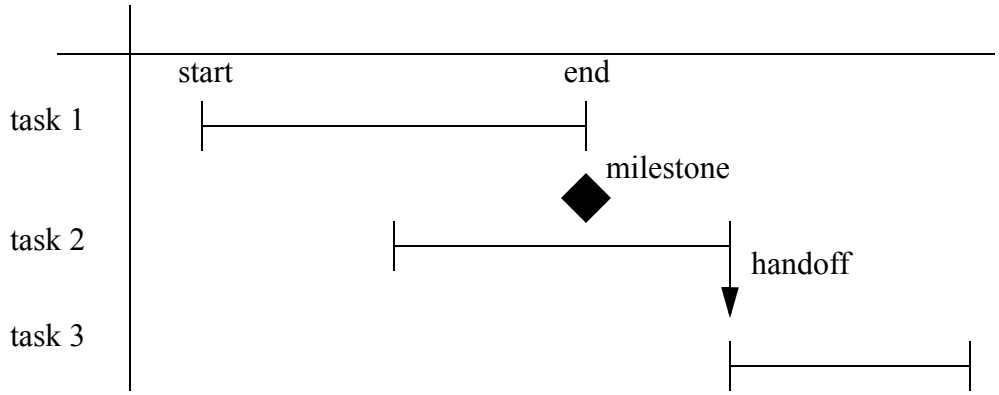
2.1 Introduction

2.2 Gantt Charts

• General form,



• tasks



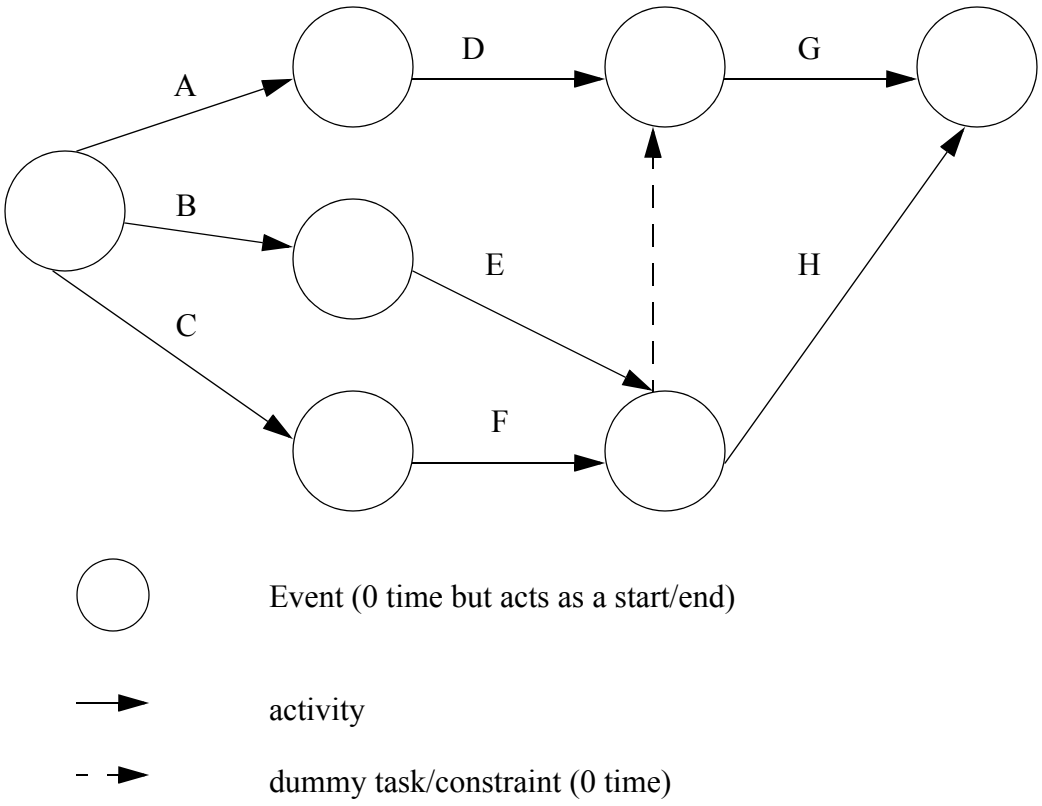
• These charts should be updated on a regular basis to track the progess and completion of each task.

• Things to look for when doing Gannt charts include,
- gaps when no tasks are boing done
- too many concurrent tasks
- too much/too little detail (charts can be broken into subcharts to isolate detail)
- associate people and resources to tasks

• Good ideas when constructing Gantt Charts,
- identify critical paths and move forware to create slack time
- delay costly components to reduce WIP

2.3 Critical Path Method (CPM)

• Tasks (possibly from a Gannt chart) can be put in a network diagram.



• Earliest Start (ES) the earliest time a task can start.

• Minimum Project Duration - the shortest time to complete the project based upon the longest path.

• Desired Project Duration - the planned time for completing the project.

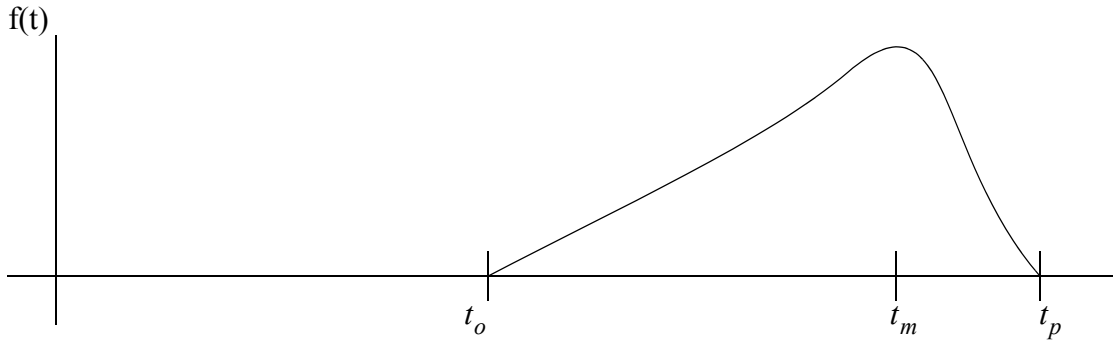
• Latest Start (LS) - the latest a task can start for a Desired Project Duration.

• Total Float (TF) = LS - ES

• Critical Path - the sequence of tasks that take the longest, and dictate the Minimum Project Duration.

2.4 Program Evaluation and Review Technique (PERT)

• In CPM we assume that each activity has a fixed time, in practice the task lengths vary. This variation can be shown with the Beta distribution.



where,

t_o = optimistic time estimate

t_m = most likely time estimate

t_p = pessimistic time estimate

• task times are expressed with three numbers separated by dashes to-tm-tp to represent task times.

• the mean (effective) time can be found with,

$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

• A Standard Deviation for each activity time can be approximated using,

$$\sigma_i = \left| \frac{t_{p_i} - t_{o_i}}{6} \right|$$

• The te valuaes can be used to do a CPM analysis of a network diagram. Once the Critical Path is

identified the overal task time and variance can be calculated using,

$$\sigma_T = \sqrt{\sum \sigma_i^2}$$

$$T_e = \sum t_{e_i}$$

• To find the chance that the process will be done by the time Ts, the z value can be calculated. The z value can then be used to find the probability of completion using the cummulative normal distribution function.

$$z = \frac{T_s - T_e}{\sigma_T}$$

2.5 Problems

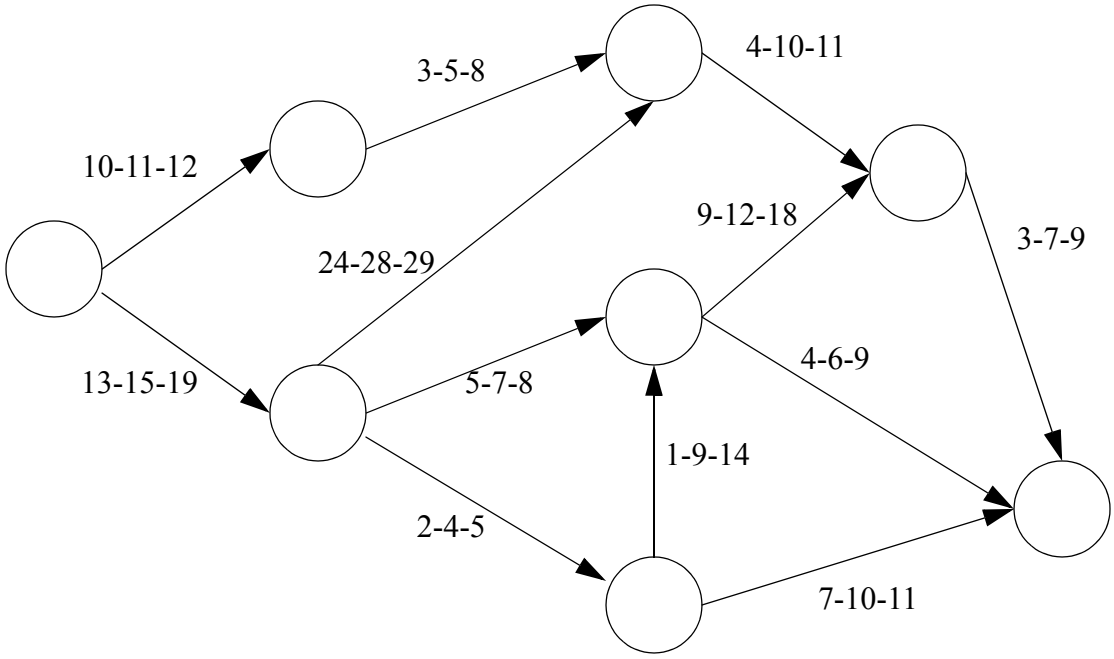
1. A new building is being constructed and the following tasks are required. The normal workdays are 7am-3pm, Monday to Friday. Overtime is possible, however the costs make it highly underiable. Write a Gantt chart for completion of the job in 3 months.
   Site Preparation - 1 month
   Foundations - 1 month - after Site Preparation
   Framing - 2 weeks - after Foundations
   Plumbing - 5 weeks - after Framing
   Electrical - 6 weeks - after Framing
   Inspection - after Plumbing and Electrical
   Drywall - 2 weeks - after Inspection
   Painting - 1 week - after Drywall
   Hardware - 1 week - after Painting
   Carpet - 3 days - after Painting

2. Develop a project activity network for problem 1.

3. Identiy the critical path for problem 2.

4. Consider the PERT network diagram below and find the likelyhood that the project will be

complete in 40 days.



5. For problem 4, find a target completion date for the project that will make it 50% likely that it will be complete.

2.6 Challenge Problems