SE202
Introduction to Software Engineering

Lecture 3-2
Project Schedule

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Last Lecture

Project Management

Vision and Scope document

Project plan document

Project estimation

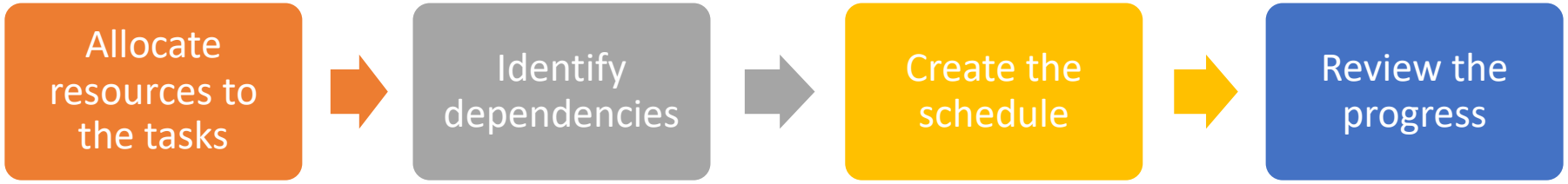
Today’s Topics

- Project scheduling
- Risk plan

Project schedule

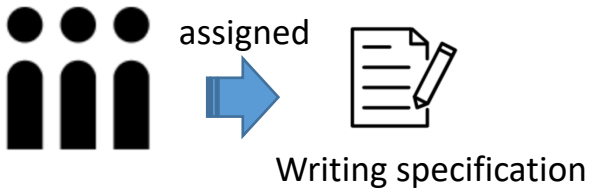
- The project schedule is a calendar that links the project tasks to be done with the resources that will do them
- In order to create the project schedule, the PM must work on
  - A work breakdown structure (WBS)
  - An effort estimate for each task
  - A resource list with availability for each resource

Project scheduling



Allocate resources to the tasks

- Identify the resources required to perform each of the tasks.
- A resource is any person, item, tool, or service that is needed by the project.
- One or more resources must be allocated to each task
- Effort vs Duration
  - Duration is the amount of time that elapses between the time the task is started and the time it is completed.
  - Effort is measured in person-hours (or person-days, person-weeks, etc.), and represents the total number of hours that each person spent working on the task.
  - E.g.



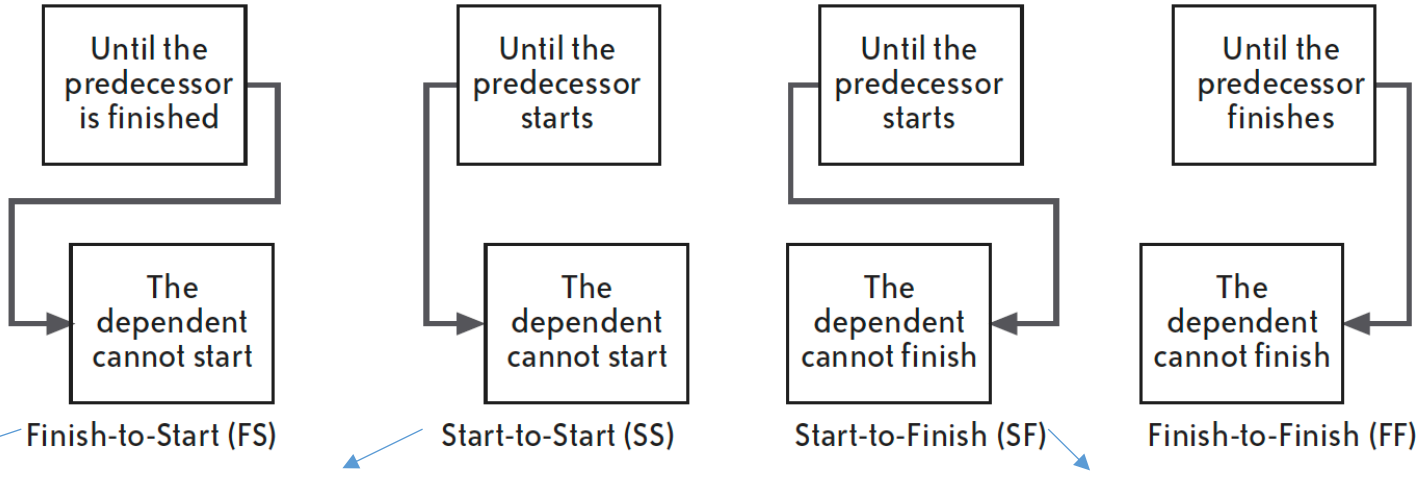
The duration required to complete the task was 16 hours (= 2 working days).
Suppose that each each of the 3 people spent 16 hours on the task.

How much is the total effort?

Key to success is PM must know the team.

Identify Dependencies

- Once resources are allocated, the next step in creating a project schedule is to identify dependencies between tasks.
- Types of dependencies



A test plan cannot be completed until after the design is done.

A test plan can't be executed until a build of the software is delivered

A team of software testers might all be expected to start their test executions at the same time

The wiring contractor starting work and the server installer finishing his server installation and testing.

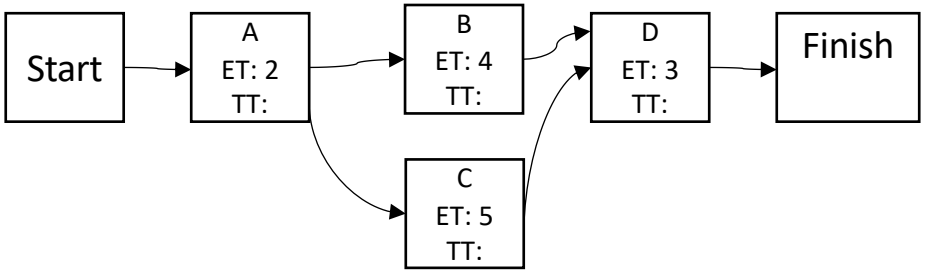
PERT Chart

- A PERT chart is a project management tool used to schedule, organize, and coordinate tasks within a project.
- PERT is a method of analyzing the tasks involved in completing a given project, especially the time needed to complete each task, and to identify the minimum time needed to complete the total project (the critical path).

PERT Chart steps

1. Identify the specific activities, estimates and milestones.
2. Determine the proper sequence of the activities.
3. Construct a PERT diagram.
4. Calculate the paths' times

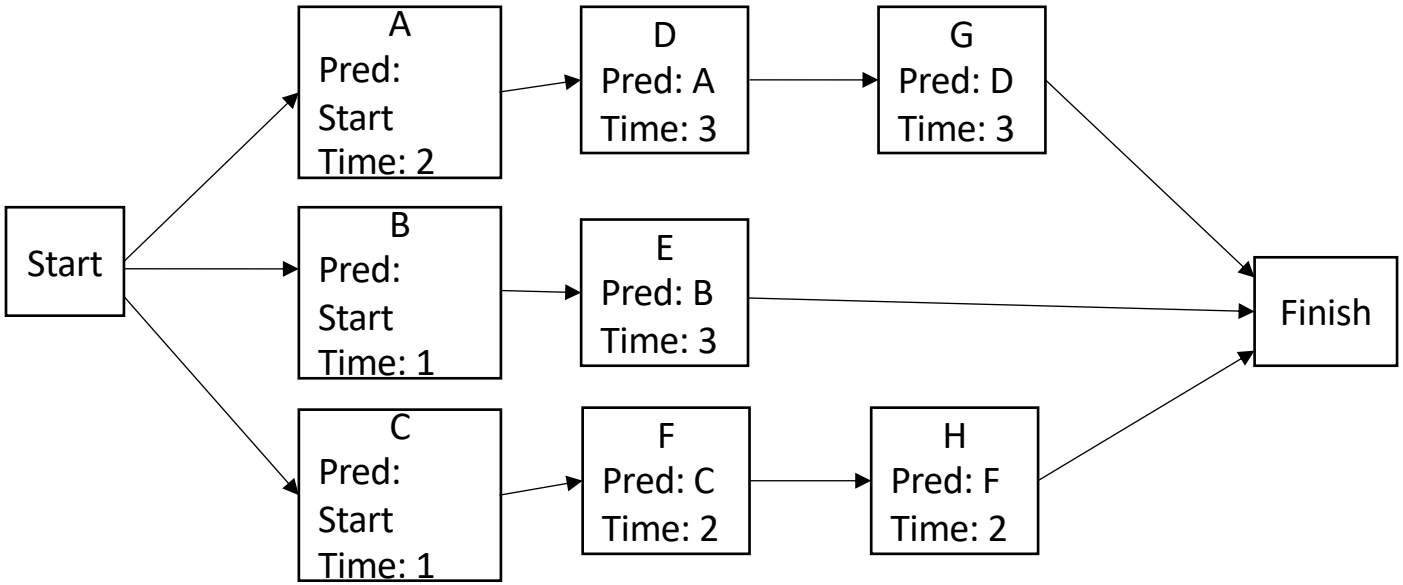
   The total time for each task is its expected time plus the largest of its predecessors' total times.



5. Identify the critical path (the longest path through the network)

Example 1

Activity	Required Predecessor	Time (weeks)
A	-	2
B	-	1
C	-	1
D	A	3
E	B	3
F	C	2
G	D	3
H	F	2



Path 1: Start → A → D → G → Finish = 2+3+3 = 8 ← The longest path

Path 2: Start →B → E → Finish = 1+3 = 4

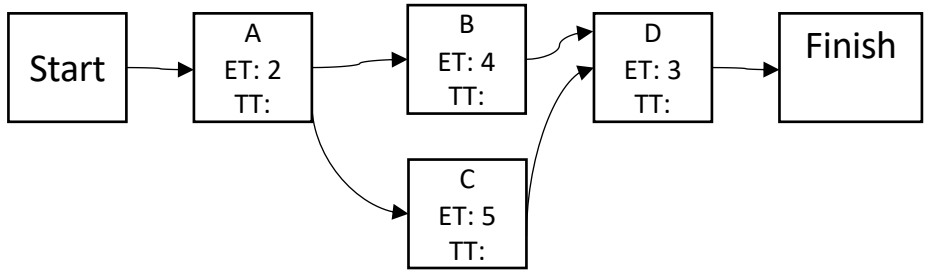
Path 3: Start → C → F → H → Finish = 1+2+2 = 5

Example 2

Tasks	Time (day)	Predecessor
Requirements (Reg)	5	-
Design UI (D. UI)	5	Requirements
Design report (D. Re)	6	Requirements
Design Database (D. DB)	2	Design UI, Design report
Document (Doc)	5.5	Design Database
Coding	5	Design Database
Testing	3	Coding
Deployment (Dep)	1	Testing, Document

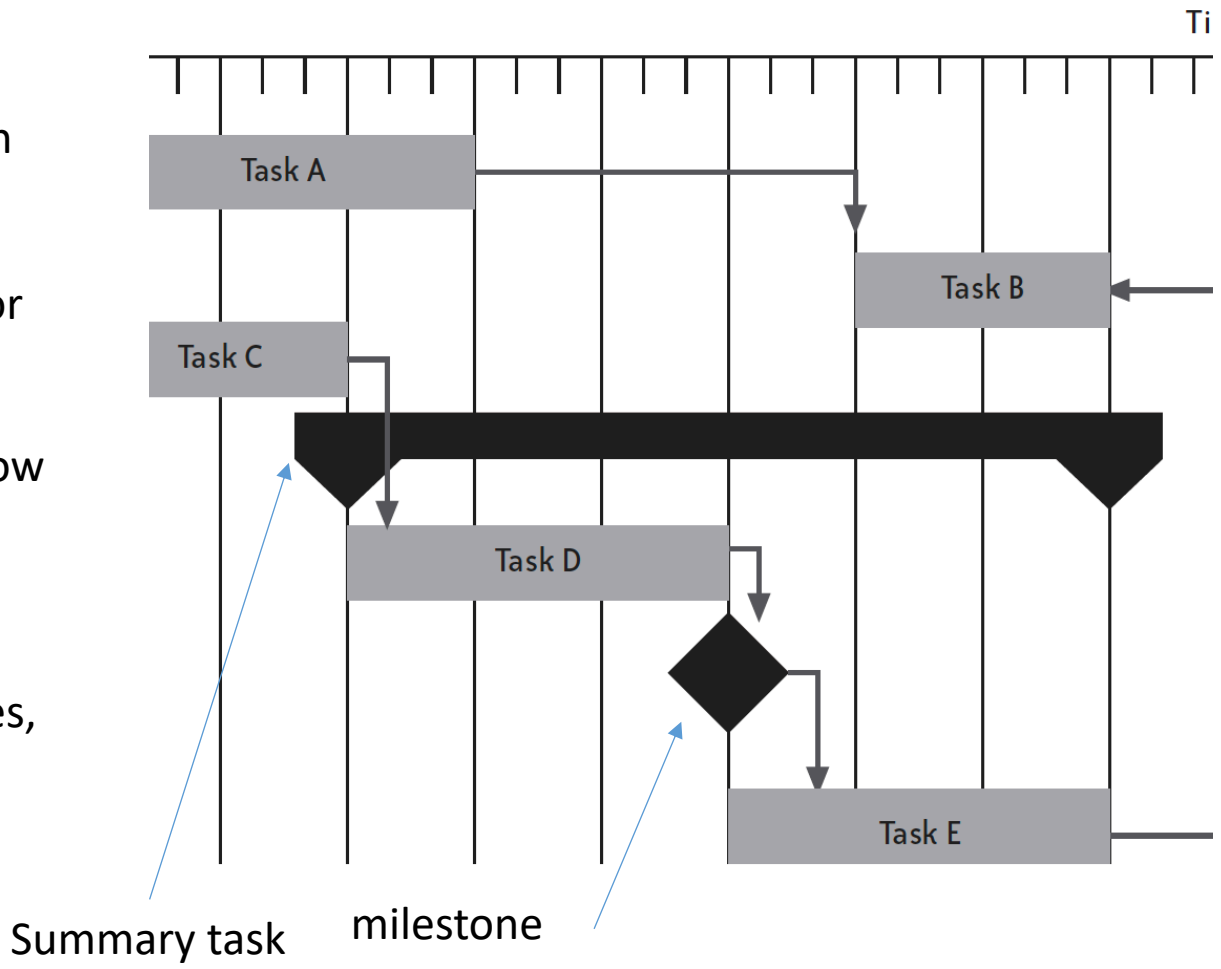
More analysis on PERT chart

- Identify tasks that can be carried out concurrently.
- Identify tasks that need to be compressed if the overall project time needs to be reduced.
- Identify slack time which the amount of time that any of the tasks can be delayed without causing the due date of the final task.



Create the schedule

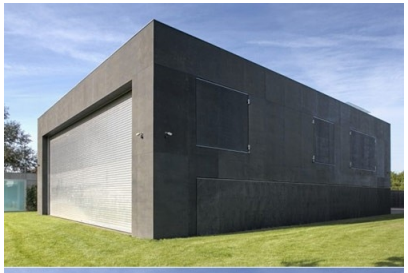
- PM creates the schedule after knowing all the information (a task list, effort and duration of each task and task dependencies).
- The most common form for the schedule to take is a **Gantt chart**.
- Milestones are used to show important events in the schedule (a task with no duration)
  - E.g. signing contract, completing prototypes, the handover of the system for testing.



Gantt Charts

- A bar chart to show a schedule for a collection of related
- A Gantt chart uses horizontal bars to represent task activities.
  - The bars' lengths indicate the tasks' durations.
  - The bars are placed horizontally on a calendar to show their start and stop times.
- Use project management software tools
- Basic Gantt chart on excel
  - https://templates.office.com/en-us/simple-gantt-chart-tm16400962
  - https://www.smartsheet.com/blog/gantt-chart-excel
  - https://www.youtube.com/watch?v=_u_jm1211D4
  - https://www.youtube.com/watch?v=BJkiOV5oYv4

Tasks for a Zombie Apocalypse Bunker



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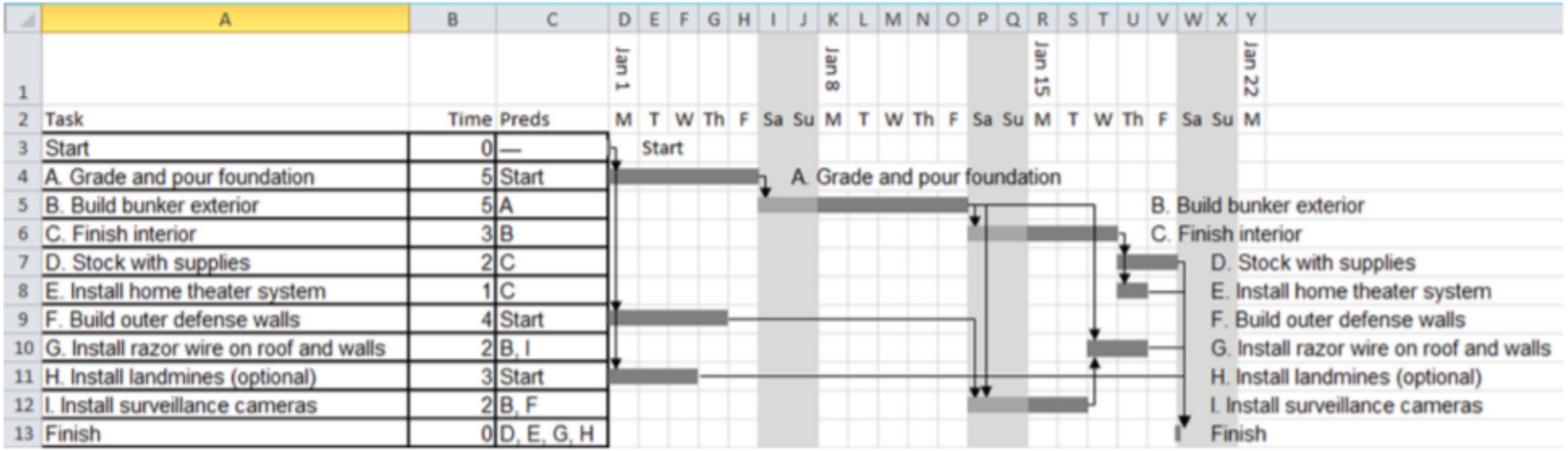
TASK	TIME (DAYS)	PREDECESSORS
A. Grade and pour foundation.	5	-
B. Build bunker exterior	5	A
C. Finish interior	3	B
D. Stock with supplies	2	C
E. Install home theater system	1	C
F. Build outer defense walls	4	-
G. Install razor wire on roof and walks	2	B, I
H. Install landmines (Optional)	3	-
I. Install surveillance cameras	2	B, F

Gantt Charts Examples



Task	Time	Preds
Start	0	—
A. Grade and pour foundation	5	Start
B. Build bunker exterior	5	A
C. Finish interior	3	B
D. Stock with supplies	2	C
E. Install home theater system	1	C
F. Build outer defense walls	4	Start
G. Install razor wire on roof and walls	2	B, I
H. Install landmines (optional)	3	Start
I. Install surveillance cameras	2	B, F
Finish	0	D, E, G, H

Add Review Meetings to the Schedule

- Progress reviews should be held regularly both to keep track of whether the schedule is accurate.
  - The project manager should go through each task that is currently in progress and work with the team to determine the status of the task.
  - During the review, if the team discovers that a task is going to be late, the project manager must find a way to deal with it in the schedule.

Scheduling problems

- Predicting how long each task will take
  - Get experience
  - Break unknown tasks into simpler pieces
  - Look for similarities
  - Expect the unexpected
  - Track progress
- Productivity is not proportional to the number of people working on a task.
- Adding people to a late project makes it later because of communication overheads.

Risk Plan

- A risk plan is a list of all risks that threaten the project, along with a plan to mitigate some or all of those risks.
- The risk plan is an insurance policy against uncertainty.
- Each of the risks in the plan must be assessed by the project manager and the team.
- The risks can be prioritized in two ways:
  - Probability - a rough estimate of the probability that the risk will occur
  - Impact - the potential impact of that risk on the project

Sample risk plan

Risk plan for project	Call center application project			
Assessment team members	Mike, Barbara, Quentin, Jill, Sophie, Dean, Kyle			
Risk	**Prob.**	**Impact**	**Priority**	**Actions**
Senior management will move call center offshore, which will require an internationalization feature to be built	3	5	15	1. Mike will add a requirements task to the schedule for Quentin to begin investigating internationalization requirements. 2. If the call cener is moved, Mike will call a team meeting to review the schedule and Barbara will inform the rest of senior management of the potential delay.
Jim will be pulled off of this project for Royalty Archive project bug fixes	4	3	12	1. Assign Kyle to work with Jill on the initial programming tasks to make sure he is cross-trained. 2. If Jill is pulled off, she will spend 10% of her time reviewing this project with Kyle.
Reporting feature will be needed	2	4	8	If this happens, Mike will work with Sophie and Kyle to reestimate the programming tasks.
Additional time will be needed to gather requirements from potential users at Boston client	5	1	5	None
Will need to support tie-in to support additional database vendors	1	3	3	None

Homework