Talent Academy
Empowering future leaders
An initiative of excelencia

excelencia
People First IT Services Ecosystem

EPIC

Effective Professional Inspiring Competent

Project Management

Fundamentals

Schedule Planning

Agenda

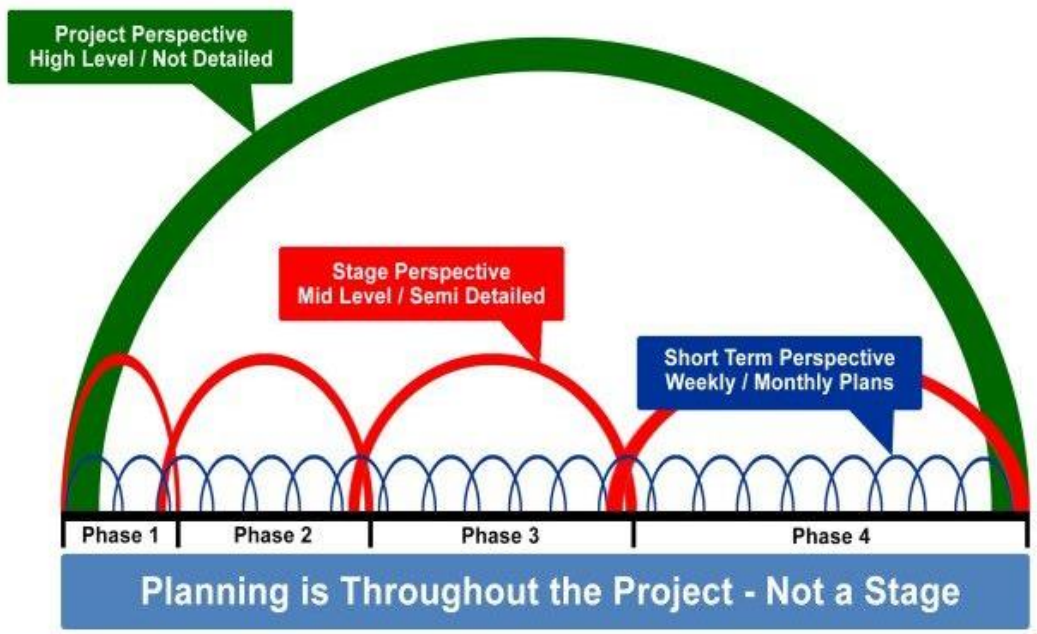
- Schedule Planning Process
- Activity Relationships & Dependencies
- Basic Estimation Techniques
- Critical Path
- Resource Optimization
- Schedule Compression

Schedule Planning Process

Planning for Life

How will we plan for a child to become a successful professional?

Rolling Wave Planning



Plan at a **higher level initially**
& prepare **more detailed plans** just before the work is to be done,
when you have more clarity on what exactly needs to be done

Progressive Elaboration:
Clarifying & refining plans **as the project progresses**

Scheduling Process

Activity Definition

- Identify the list of activities to be included in the project
- Estimate duration for each of the identified activities

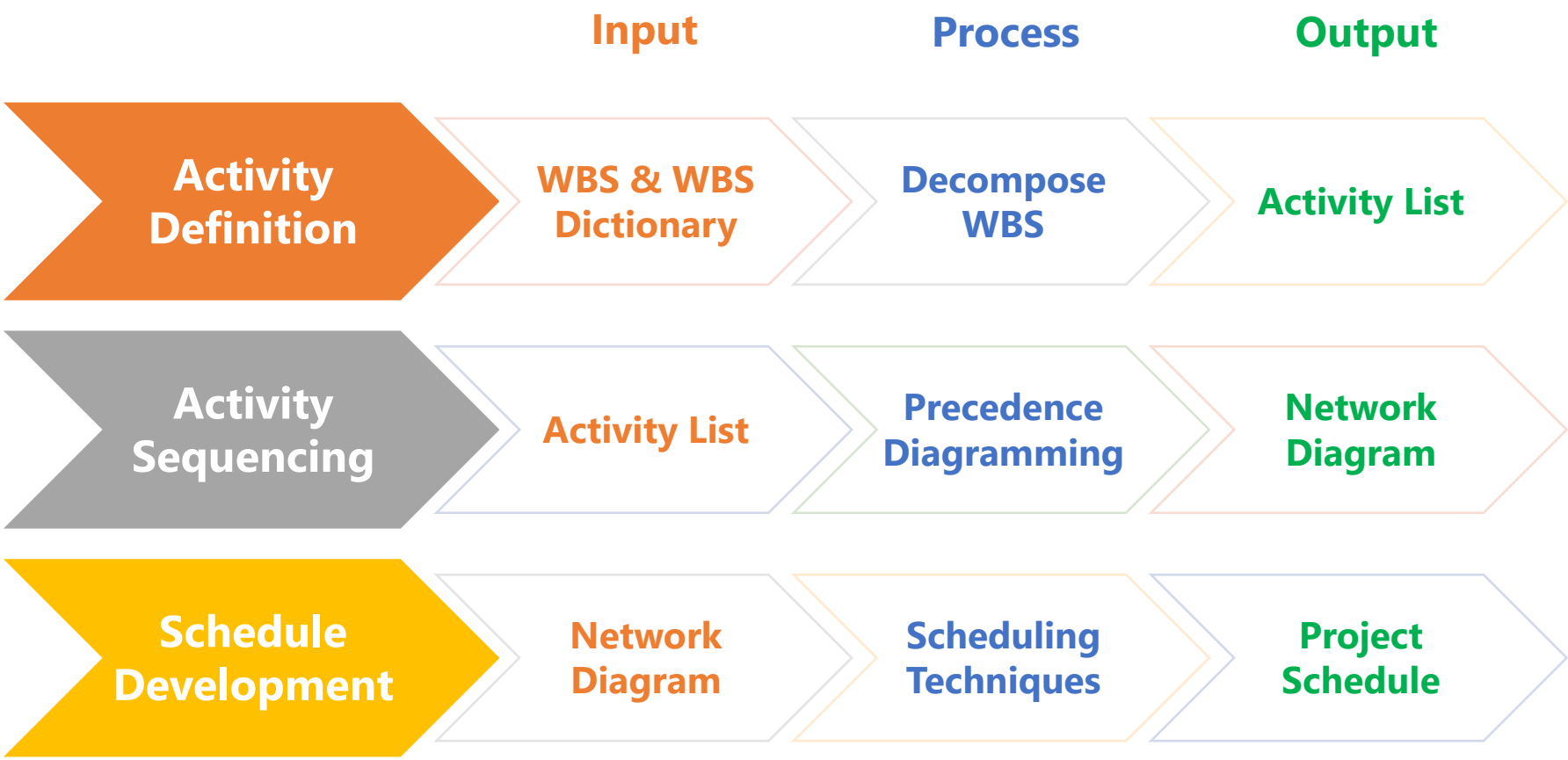
Activity Sequencing

- Sequence the activities as per the dependencies
- Identify the dependencies between the activities

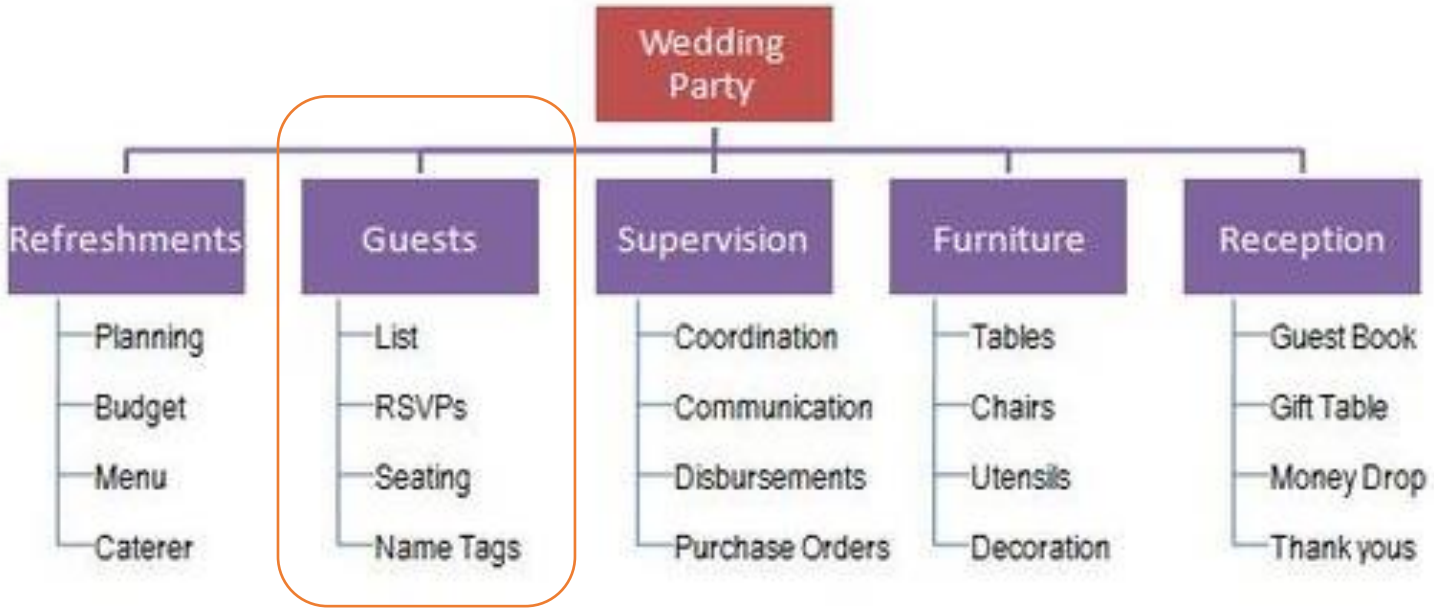
Schedule Development

- Identify the Critical Path
- Optimize Resources
- Compress the schedule

Scheduling Process

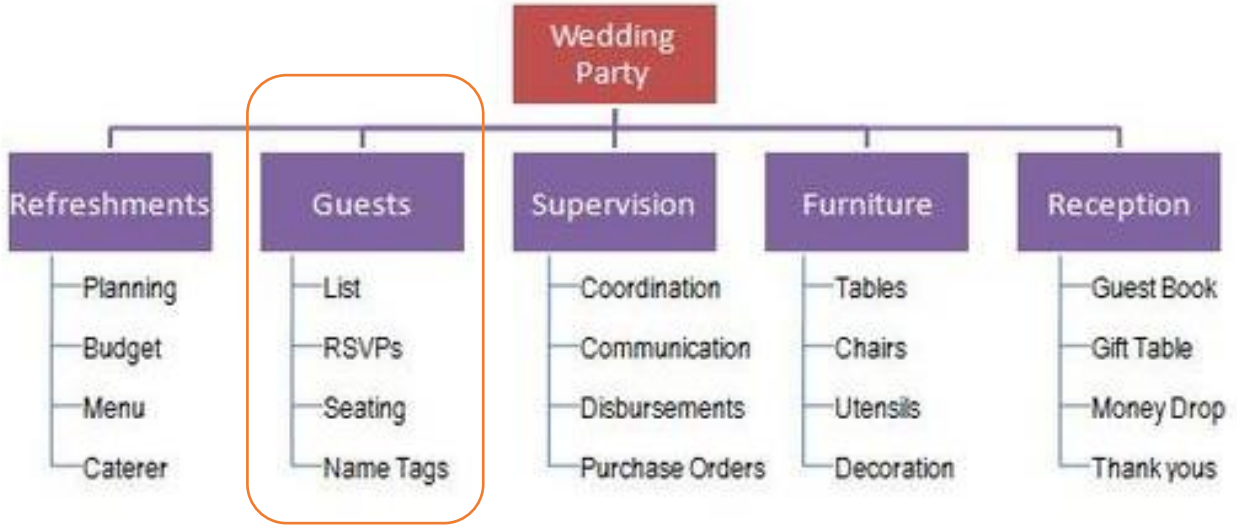


Schedule for Wedding Party



Let us decompose the "Guests" WBS into the list of activities

1. Activity Definition

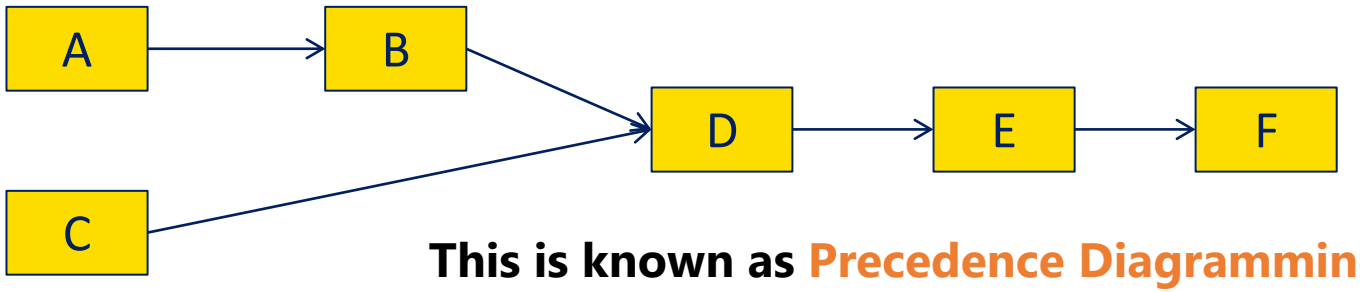


Task Name	Activity
A	Discuss with family scope of guest list – family, friends, neighbours, co-workers, etc
B	Prepare guest list
C	Prepare card online
D	Send card to guests
E	Follow up for confirmations
F	Place order & name tags for chairs based on confirmations

2. Activity Sequencing

Task Name	Activity	Predecessor (Dependency On)
A	Discuss with family scope of guest list – family, friends, neighbours, co-workers, etc	-
B	Prepare guest list	A
C	Prepare online card	-
D	Send card to guests	B & C
E	Follow up for confirmations	D
F	Place order & name tags for chairs based on confirmations	E

Network Diagram

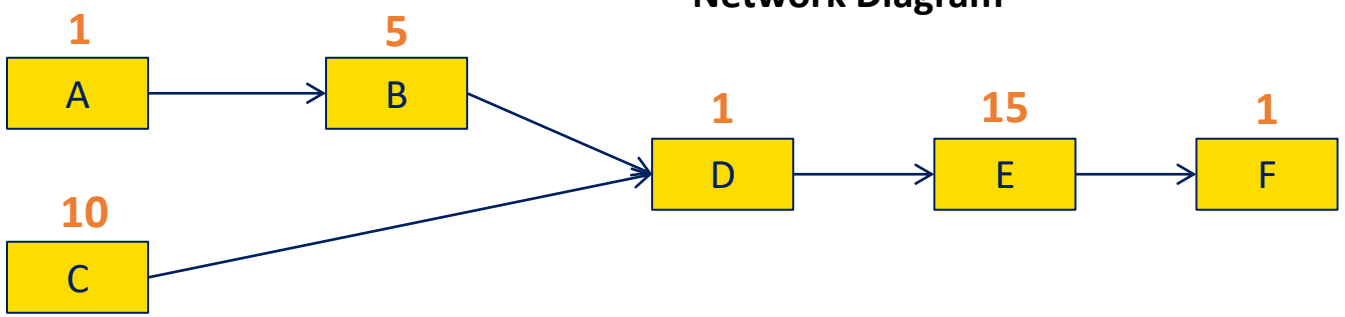


This is known as Precedence Diagramming Method

3. Schedule Development

Task Name	Activity	Predecessor	Duration	Resources
A	Discuss with family scope of guest list	-	1	BG
B	Prepare guest list	A	5	BG, DD, MM
C	Prepare online card	-	10	BR
D	Send card to guests	B & C	1	BR
E	Follow up for confirmations	D	15	BG, DD, MM
F	Place order & name tags for chairs	F	1	BG

Network Diagram



Schedule: ? days

27 days

Schedule Format

Schedule must be shared with the team in the format shown below

Task	Activity	Predecessor	Duration	Resources	Planned Start Date	Planned End Date
A	Discuss with family scope of guest list	-	1	BG	01-Oct	01-Oct
B	Prepare guest list	A	5	BG, DD, MM	02-Oct	06-Oct
C	Prepare online card	-	10	BR	01-Oct	09-Oct
D	Send card to guests	B & C	1	BR	09-Oct	09-Oct
E	Follow up for confirmations	D	15	BG, DD, MM	10-Oct	24-Oct
F	Place order & name tags for chairs	F	1	BG	25-Oct	25-Oct

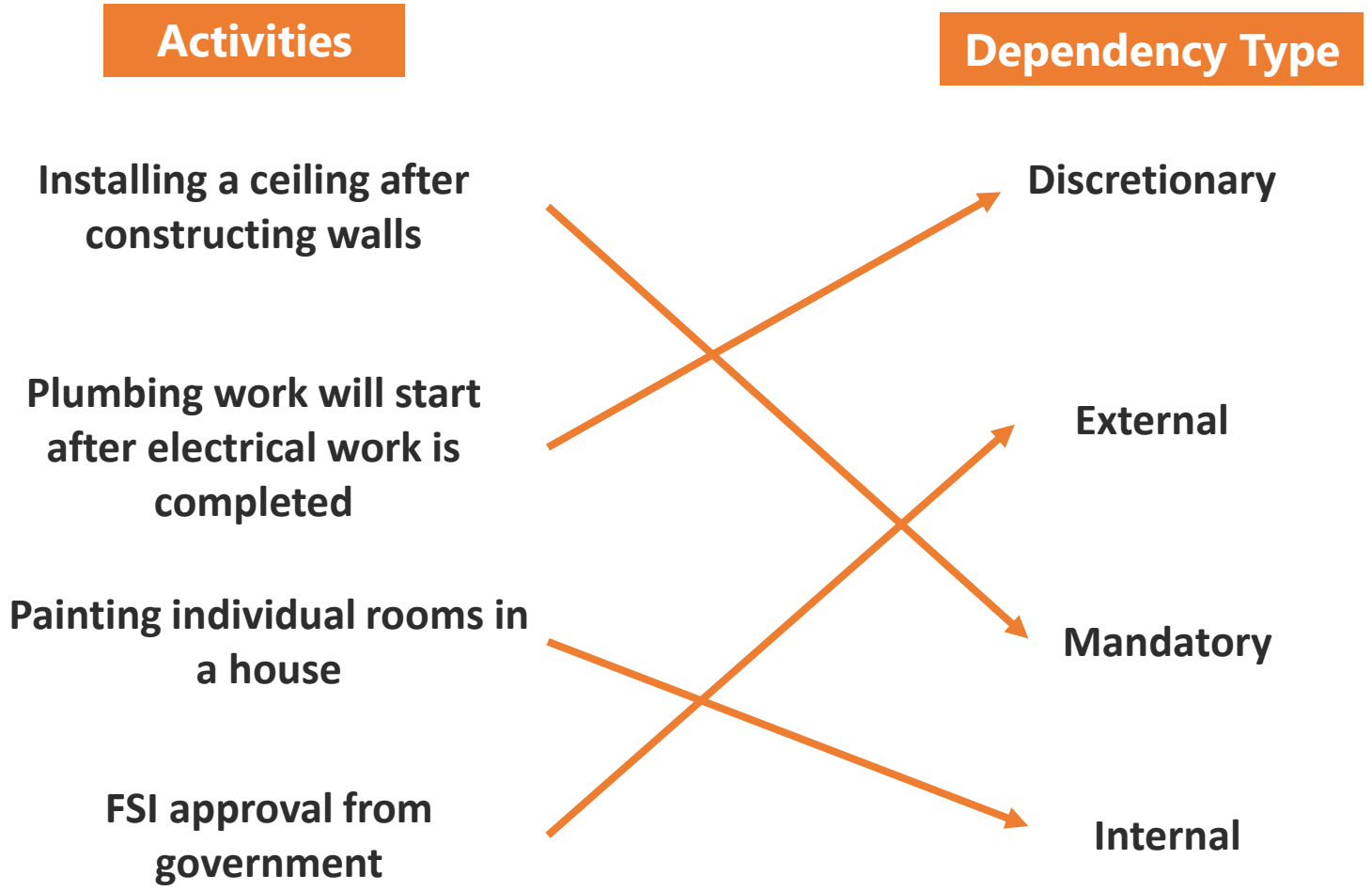
Best Practices

- Ensure that the task duration is max 2 days – it gives better control while tracking
- Consider the following as non-working days:
  - Holidays
  - Planned leaves (informed by the team)
  - Unplanned leaves (assumed by PM)
- Use a planning tool like Microsoft project (MSP)
- Share the schedule with the team WITHOUT adding buffer
- Share the schedule with the customer WITH Effort & Schedule Buffer

Activity Relationships & Dependencies

Activity Dependency Types

Which dependency type is this?

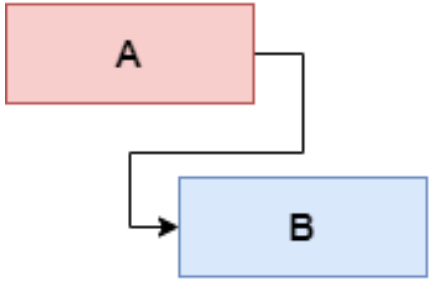


Activity Dependency Types

	Meaning	Project Manager's Control / Action
Mandatory	Contractually required or inherent in the nature of the work	Must schedule it — No way around this sequence
Discretionary	Established because of best practices or a specific sequence is desired	Can be modified as needed, if replaceable with a better sequence, or if schedule compression is required
External	Activities performed outside the project team's work	Limited or no control
Internal	In project work, contingent on inputs	Has control

Types of Precedence Relationships

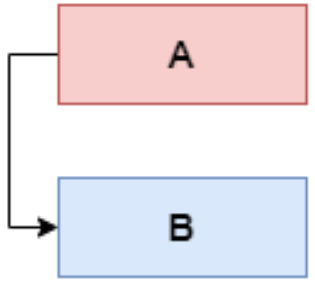
Finish-to-Start



An activity that cannot be started until its predecessor is completed.

For example, the foundation for a building cannot be poured until it has been excavated.

Start-to-Start



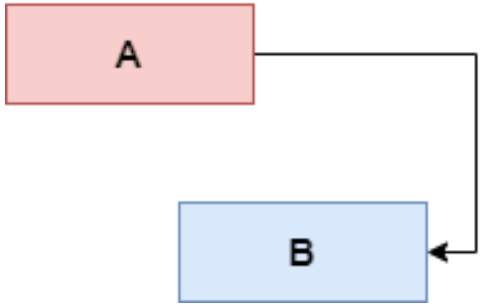
An activity must start before the next activity can start.

For example, the project request must be submitted before work can start on the project charter.

Finish-to-Finish

An activity must finish before the next activity can finish.

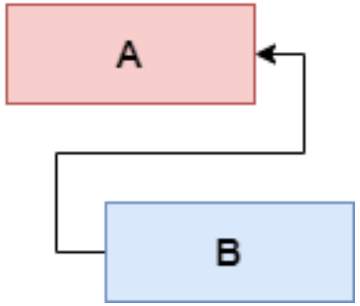
For example, an old system must be retired before a new system can go into production.



Start-to-Finish

An activity must start before the next activity can finish.

For example, billing for a service must be started until the service task can be finished.



Types of Precedence Relationships

Predecessors define the Finish to Start relationship between tasks. If A is the predecessor for B, then A must Finish before B can Start.

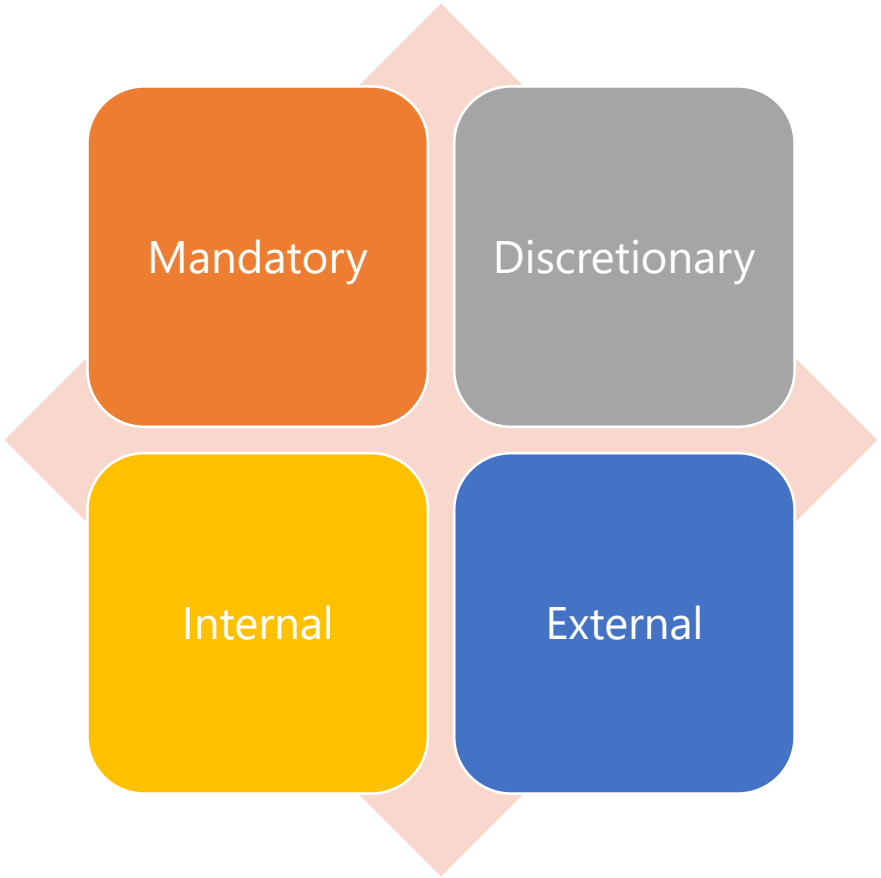
Lead

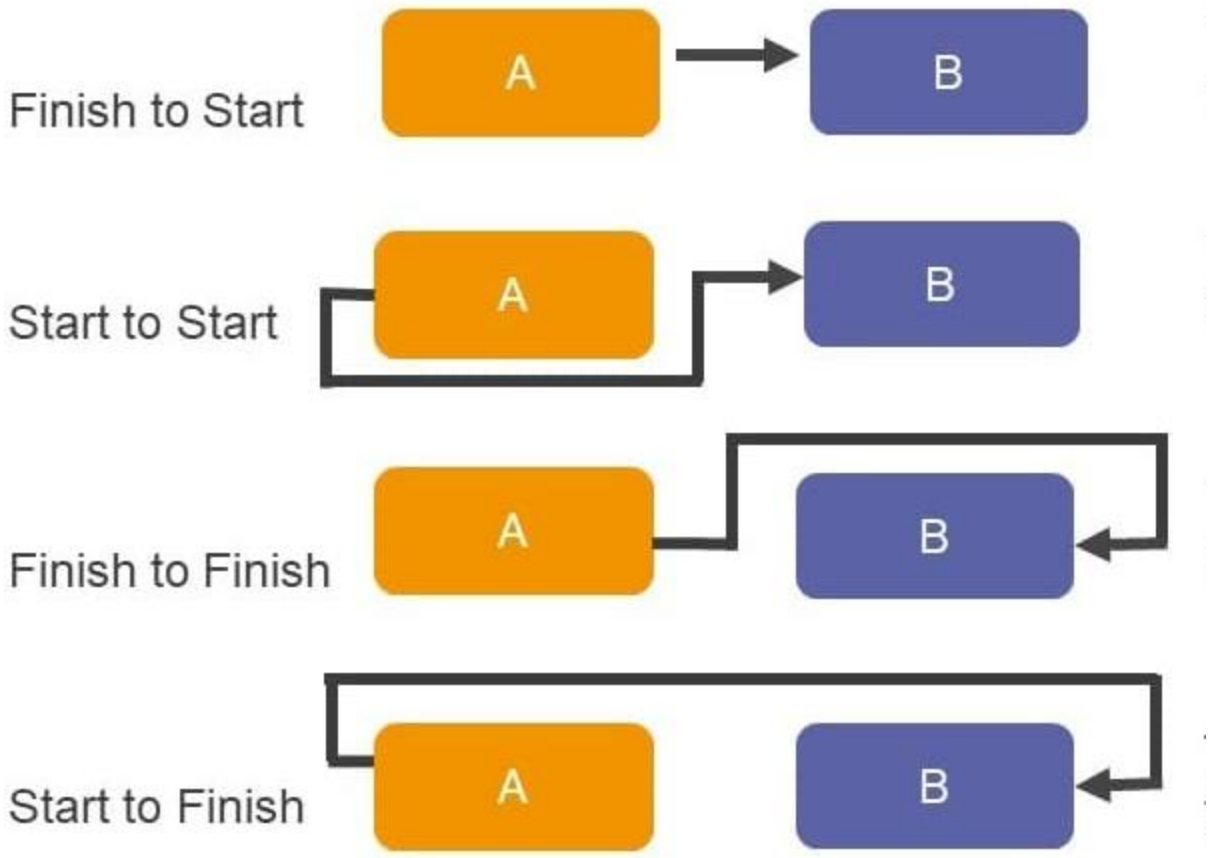
- Sometimes, an activity can start before its predecessor activity has finished completely. This is called “Lead”.
- For example, web page design (task B) can start 2 days before database design (task A) is finished. Hence, we would define the task relationship between A and B as FS minus 2d, that is, Finish to Start with 2 days Lead.

Lag

- Similarly, sometimes the successor activity can start only after some wait time. This is called “Lag”.
- For example, constructing the frame of the house (task B) can start only 3 days after pouring of concrete (task A) is finished. Hence, we would define the task relationship between A and B as, FS plus 3d, that is, Finish to Start with 3 days Lag.

Summary – Dependencies & Relationships





Scavenger Hunt

Make groups of four participants & select your Project Manager

Project: Collect the following items

1. Hair Clip
2. Cup
3. Stone
4. Pen
5. Stapler
6. Leaf
7. Bottle
8. String
9. Flower
10. Spoon

Customer Timeline: 5 mins
Project Manager commit to timeline & meet it.

Scavenger Hunt

Were you able to meet your commitments?

What were your Assumptions & Dependencies?

How could you have done better?

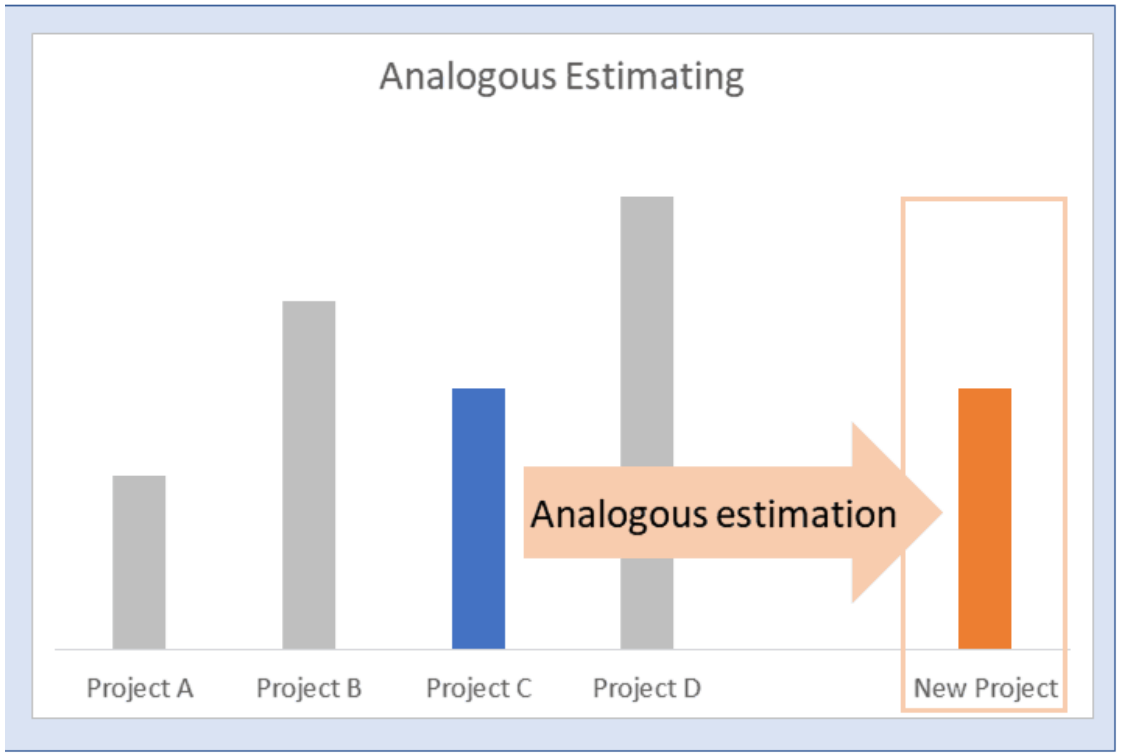
Basic Estimation Techniques

Analogous Estimation

High level estimation which uses **historical data from a similar activity or project** to estimate duration (or cost), aka "**top-down estimating**."

E.g. Similar projects A & B took 6 months, so this project will also take 6 months

- Less costly and time consuming
- Used when project information is limited



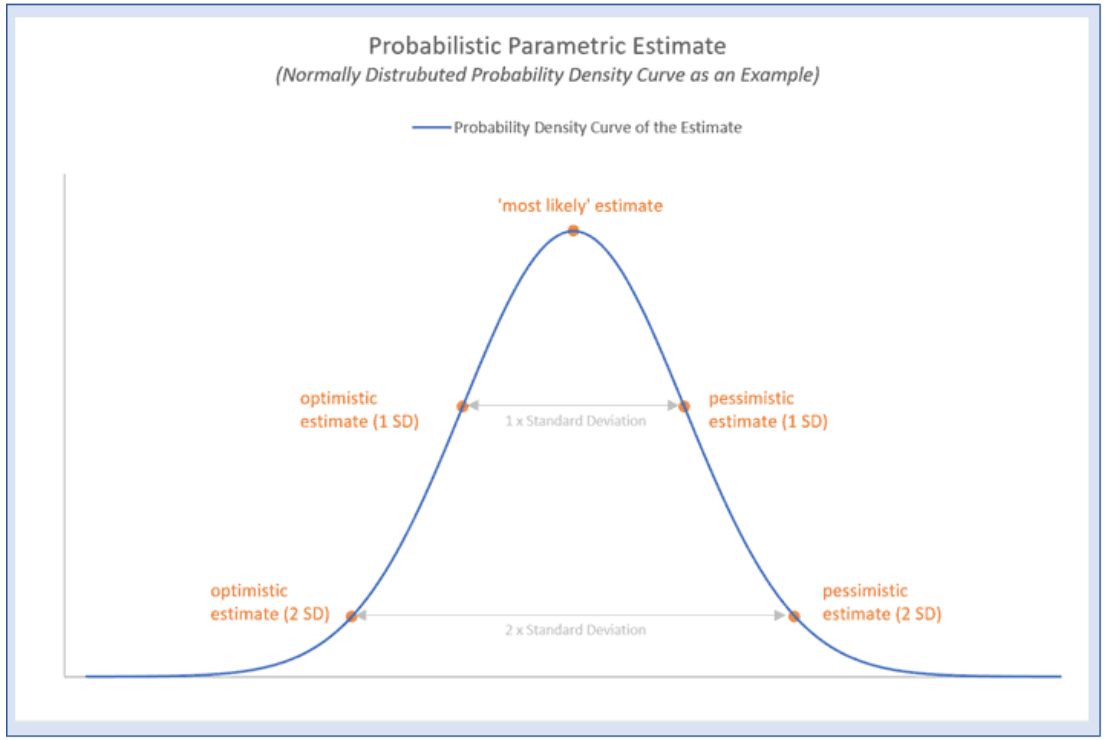
May be inaccurate, depending on quality of historical information

Parametric Estimation

Uses an algorithm to calculate duration (or cost) based on historical data and project parameters.

E.g. Durations can be quantitatively determined by multiplying quantity of work to be performed by the number of labor hours per unit of work

- Less costly and time consuming
- Used when project information is limited



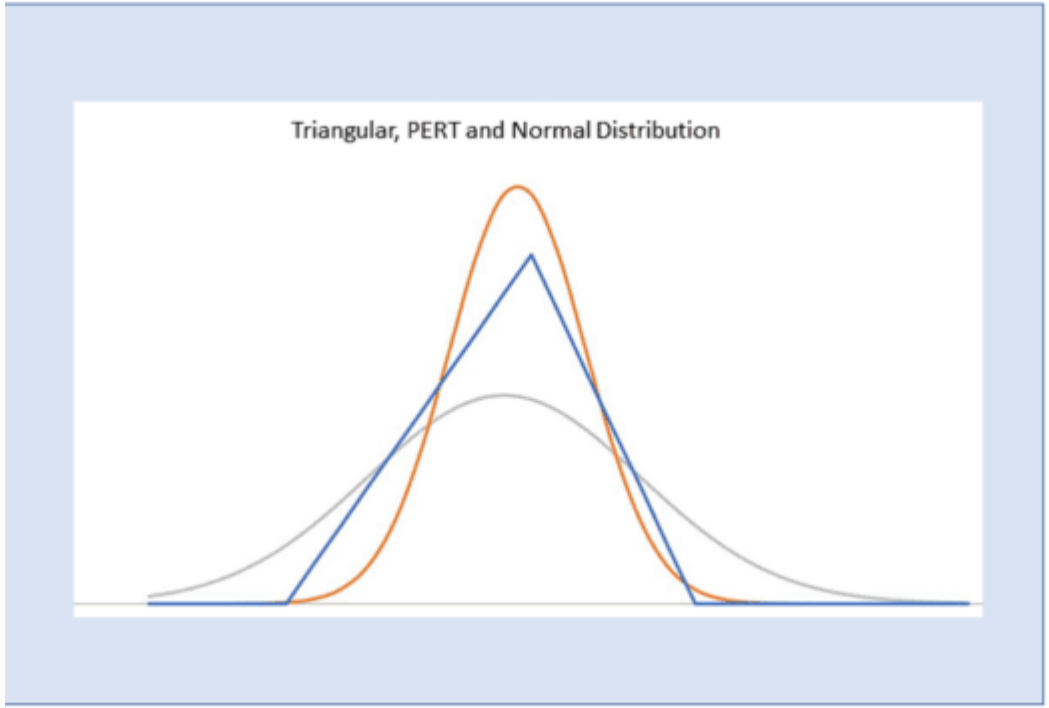
May be inaccurate, depending on quality of historical information

3 Point Estimation

Defines an approximate range of an activity's duration, using most likely, optimistic, and pessimistic estimates
Used when historical data is insufficient, or subjective

E.g. Optimistic estimate is 3 days, Pessimistic is 9 days, Most Likely is 5 days
Estimate for activity = (O + M + P) / 3

May improve accuracy of single-point estimations by including risk and uncertainty factors



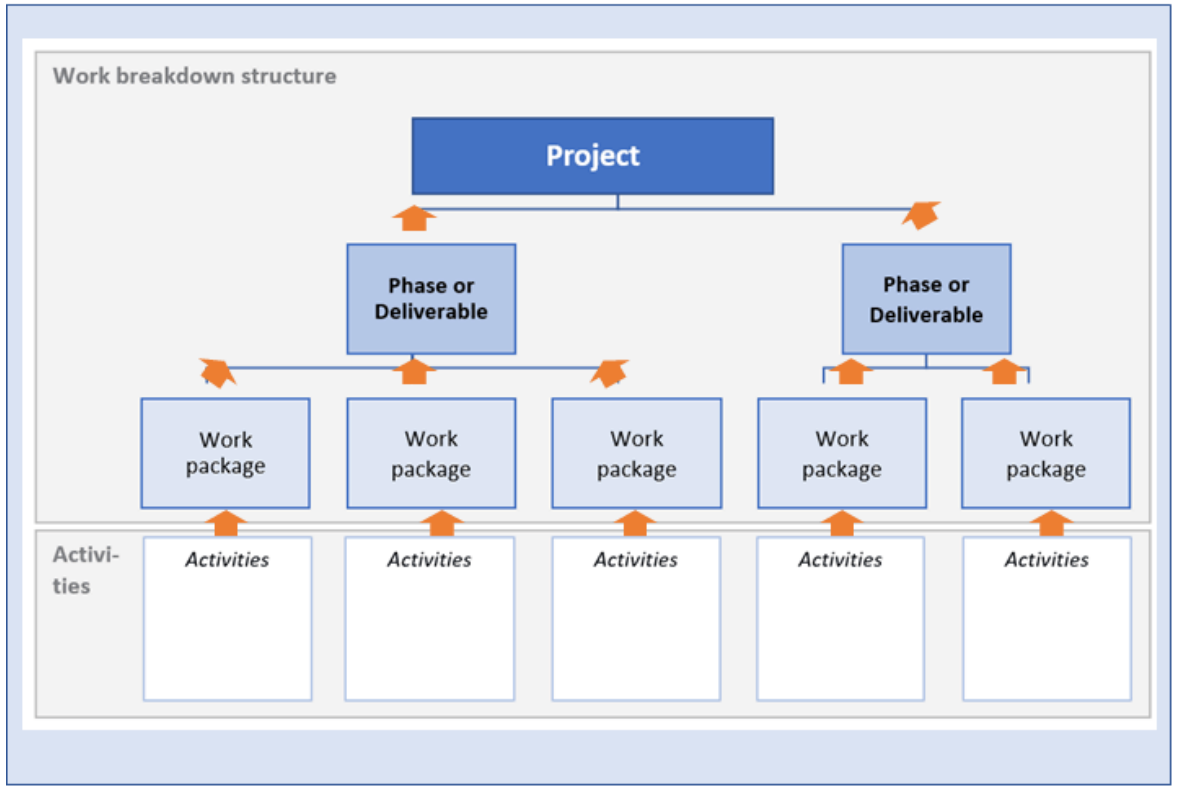
Requires detailed resource information

Requires expert knowledge to estimate tasks

Bottom Up Estimation

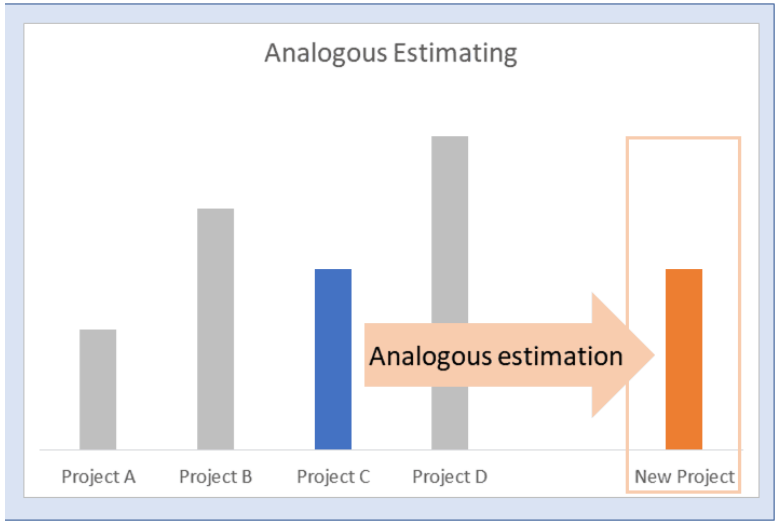
Uses aggregates of the estimates of the lower level components of the WBS

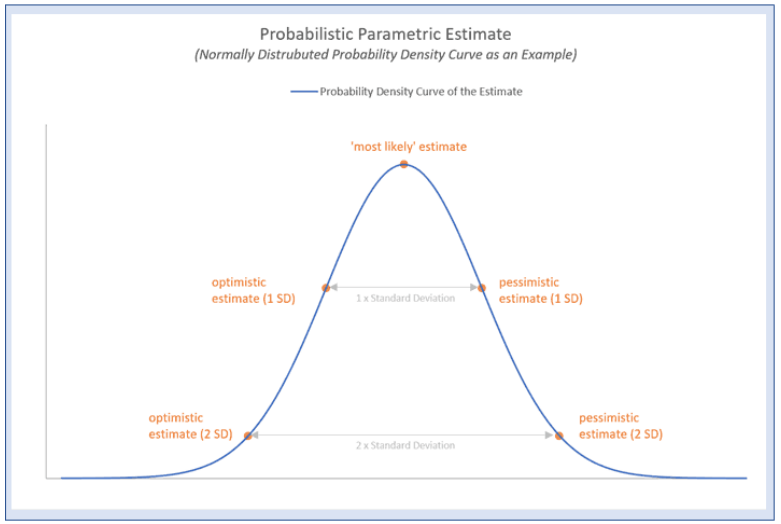
Very accurate and gives lower-level managers more responsibility

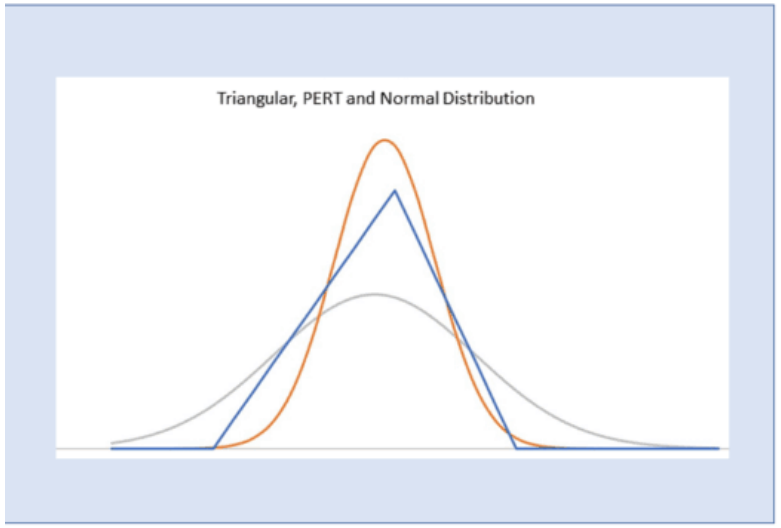


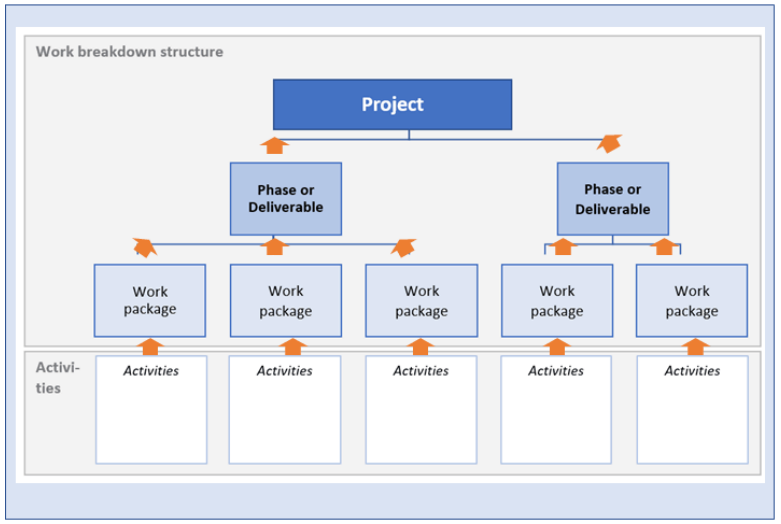
- May be very time consuming
- Can be used only after the WBS has been well defined

Summary


Analogous Estimating
Analogous estimation
Project A
Project B
Project C
Project D
New Project

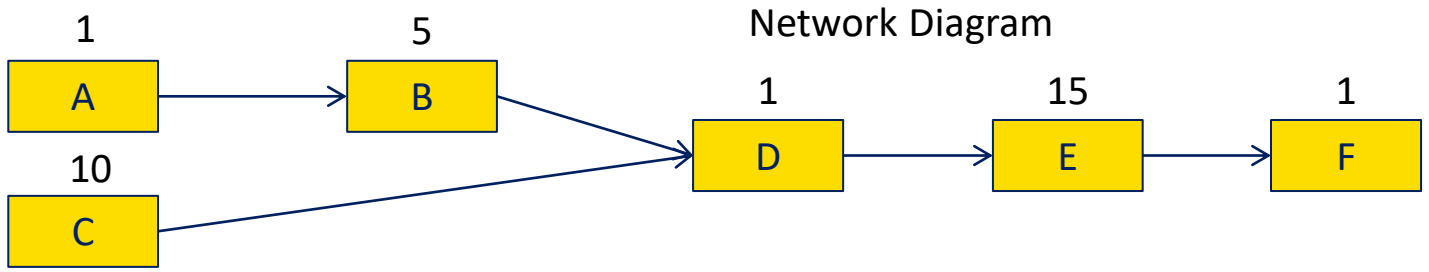

Probabilistic Parametric Estimate
(Normally Distrubuted Probability Density Curve as an Example)
Probability Density Curve of the Estimate
'most likely' estimate
optimistic estimate (1 SD)
1 x Standard Deviation
pessimistic estimate (1 SD)
optimistic estimate (2 SD)
2 x Standard Deviation
pessimistic estimate (2 SD)


Triangular, PERT and Normal Distribution


Work breakdown structure
Project
Phase or Deliverable
Phase or Deliverable
Work package
Work package
Work package
Work package
Work package
Activi-ties
Activities
Activities
Activities
Activities
Activities

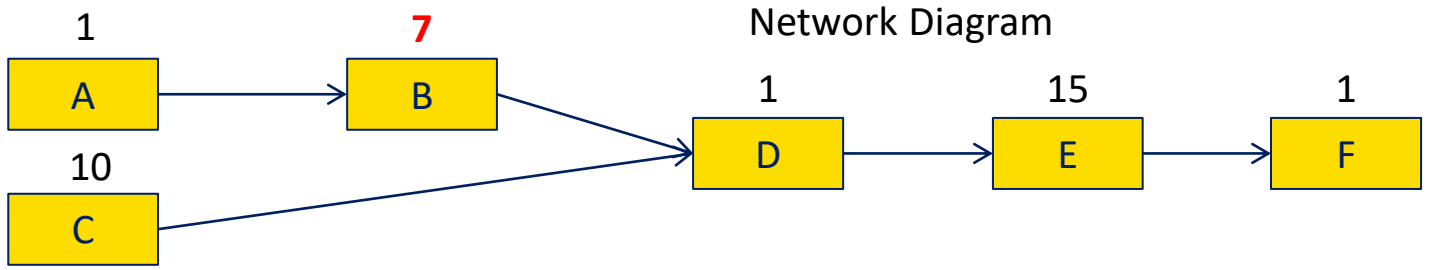
Critical Path

Network Diagram Analysis



Schedule: **27 days**

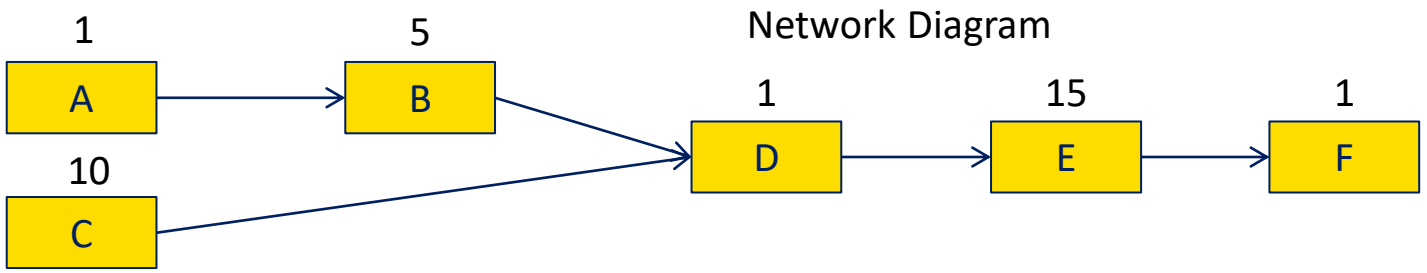
What is the impact on schedule if **Task B** gets delayed by 2 days?



Schedule: **27 days**

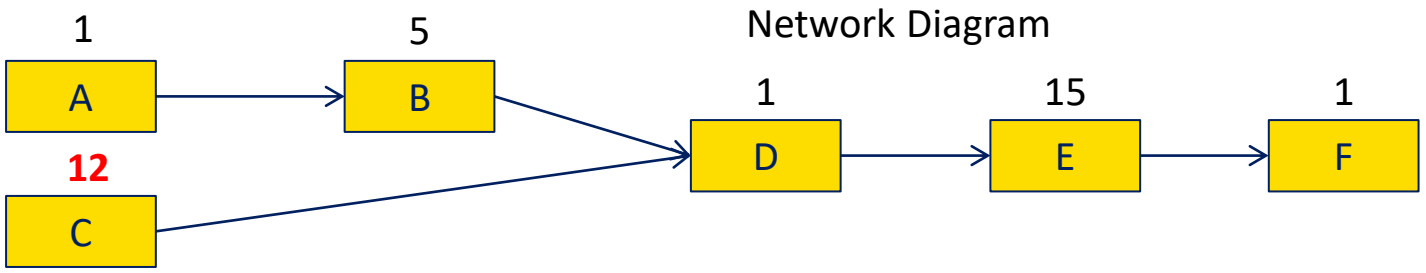
If Task B gets delayed, schedule remains unchanged

Network Diagram Analysis



Schedule: **27 days**

What is the impact on schedule if **Task C** gets delayed by 2 days?



Schedule: **29 days**

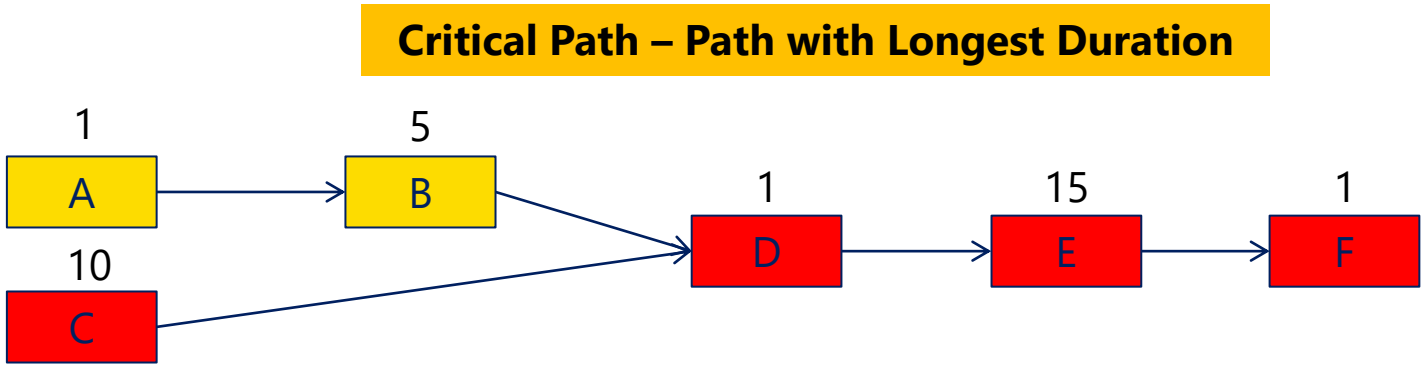
If Task C gets delayed, schedule is delayed!

Task C is on Critical Path!

Critical Path

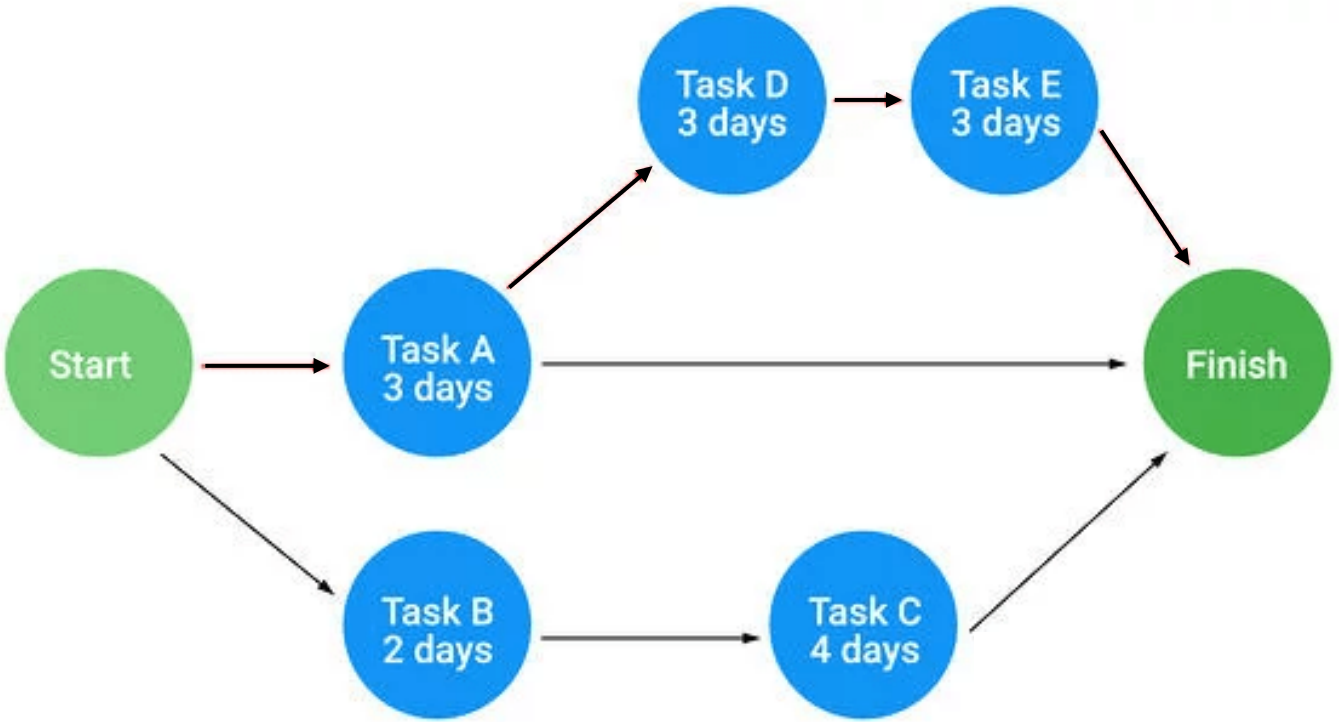
Longest sequence of activity on a project that carry **zero buffer** / free float / slack

If delay occurs on this path, it will delay the whole project schedule.



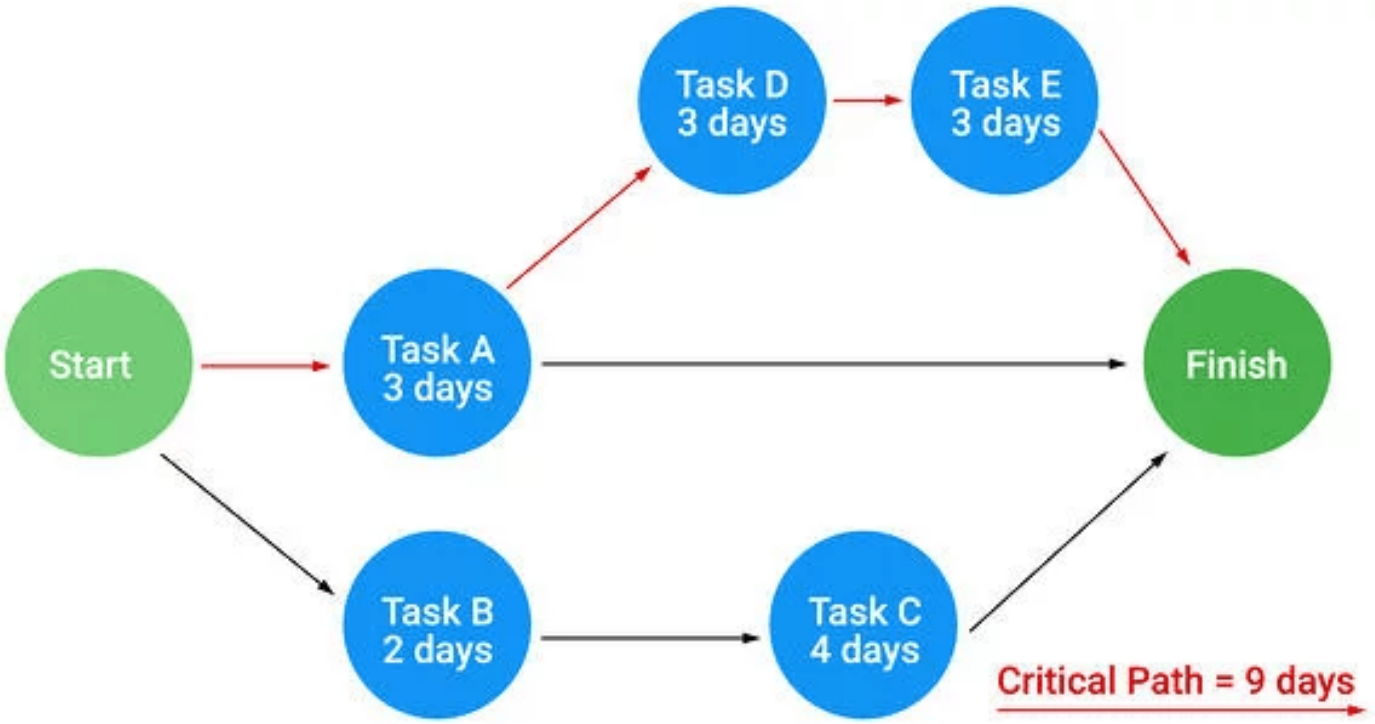
Critical Path

Find the Critical Path in the Network Diagram below



Critical Path

Find the Critical Path in the Network Diagram below



Network Diagram Analysis

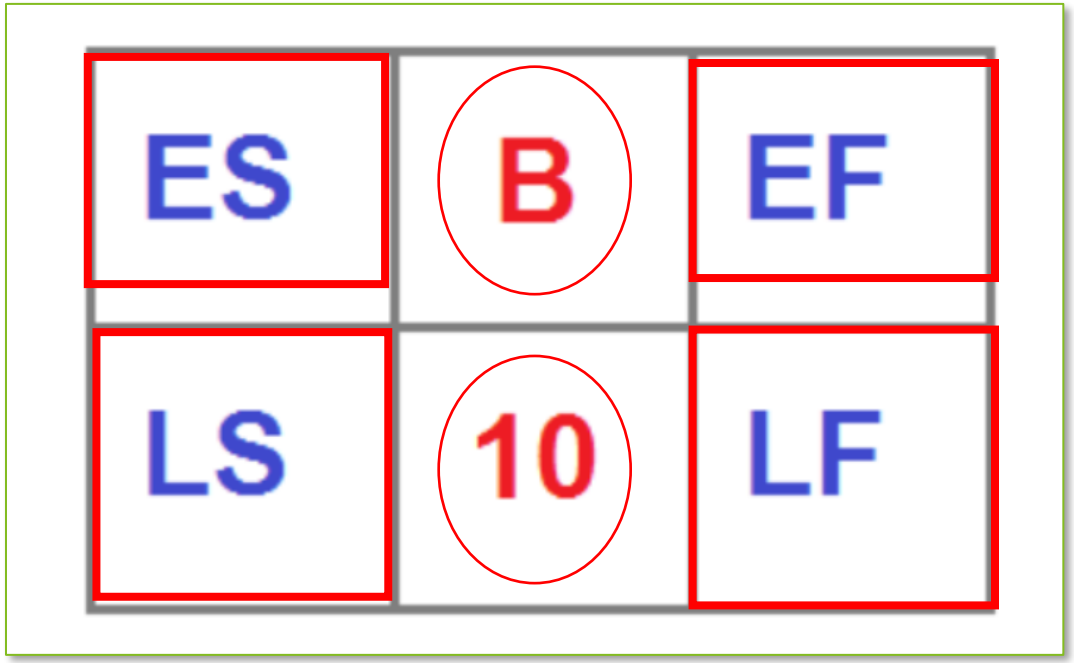
Network Diagram Analysis

How will you plot any activity in a network diagram?

An activity is represented by a rectangle divided into 6 parts, as shown.

Task / Activity name is in the 2nd box in the top row

Early Start (ES) is plotted on the 1st left corner box at the top.



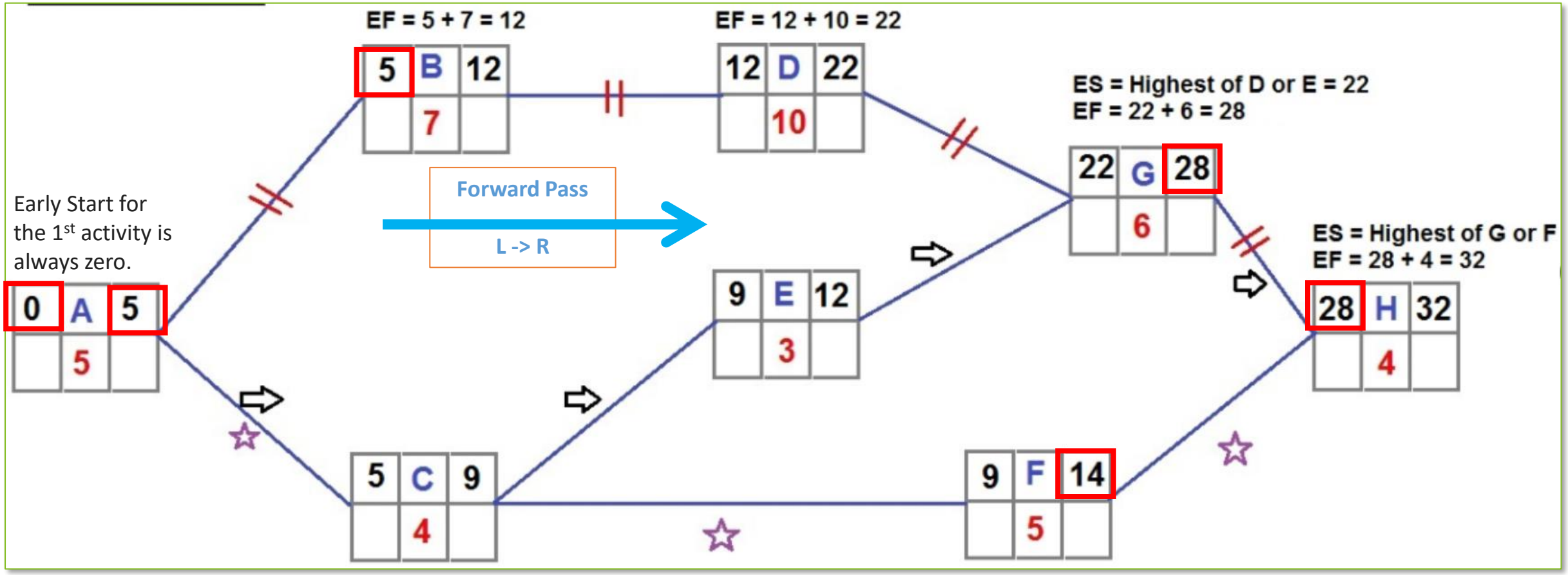
Early Finish (EF) is plotted on top right corner box.

Late Start (LS) is plotted on the left bottom corner box.

Late Finish (LF) is on the right corner box at the bottom and

Duration is written in the 2nd box in the bottom row.

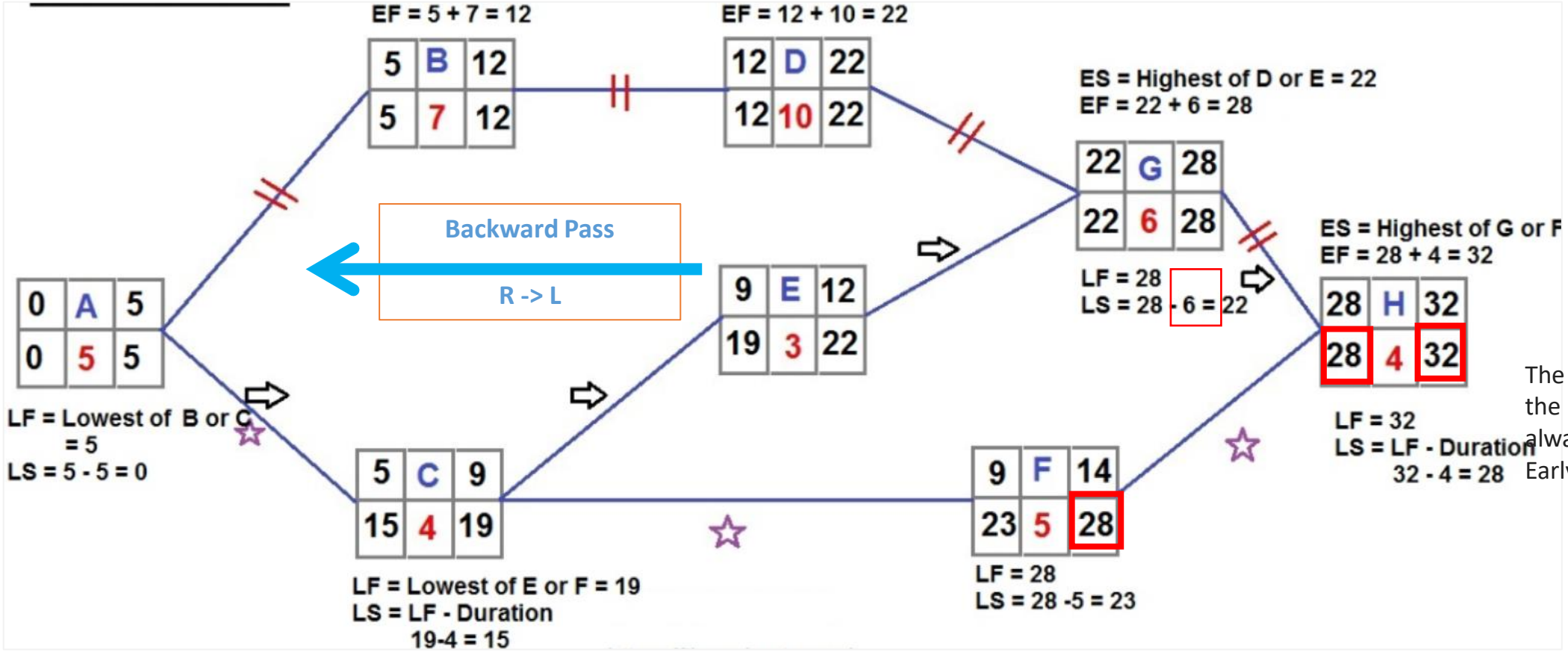
Forward Pass



Early Finish equals to Early Start plus Duration.

Early Start = Maximum (or Highest) EF value from immediate Predecessor(s)

Backward Pass

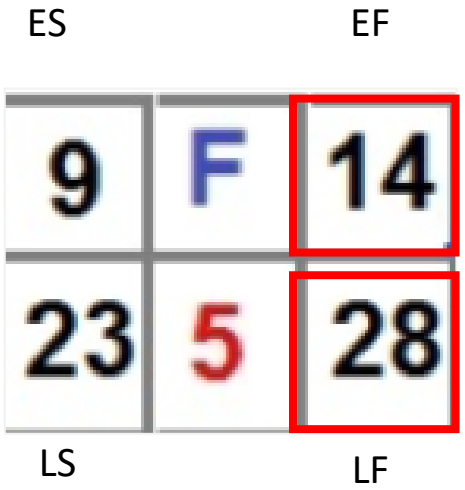


The Late Finish for the last activity is always same as it's Early Finish

Late Finish (LF) is the latest date that the activity can finish without causing a delay to the project

Late Start = Late Finish - Duration

Slack / Float

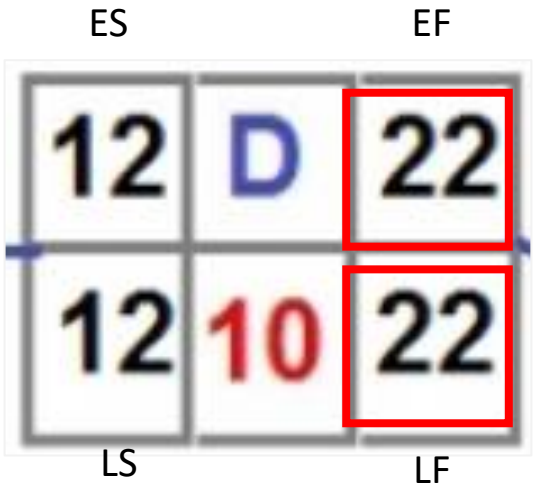


Early Finish of activity F is 14, whereas its Late Finish is 28.

- This means that activity F can finish on the 28th day instead of 14th day, and this will still not impact the project end date.
- Hence, we say that Activity F has a **Free Float of 14 days**, that is, even if activity F gets delayed by 14 days, the project schedule will not be delayed.

Float = LF – EF = LS – ES = 14

Slack / Float



Early Finish of activity D is 22, and its Late Finish is also 22.

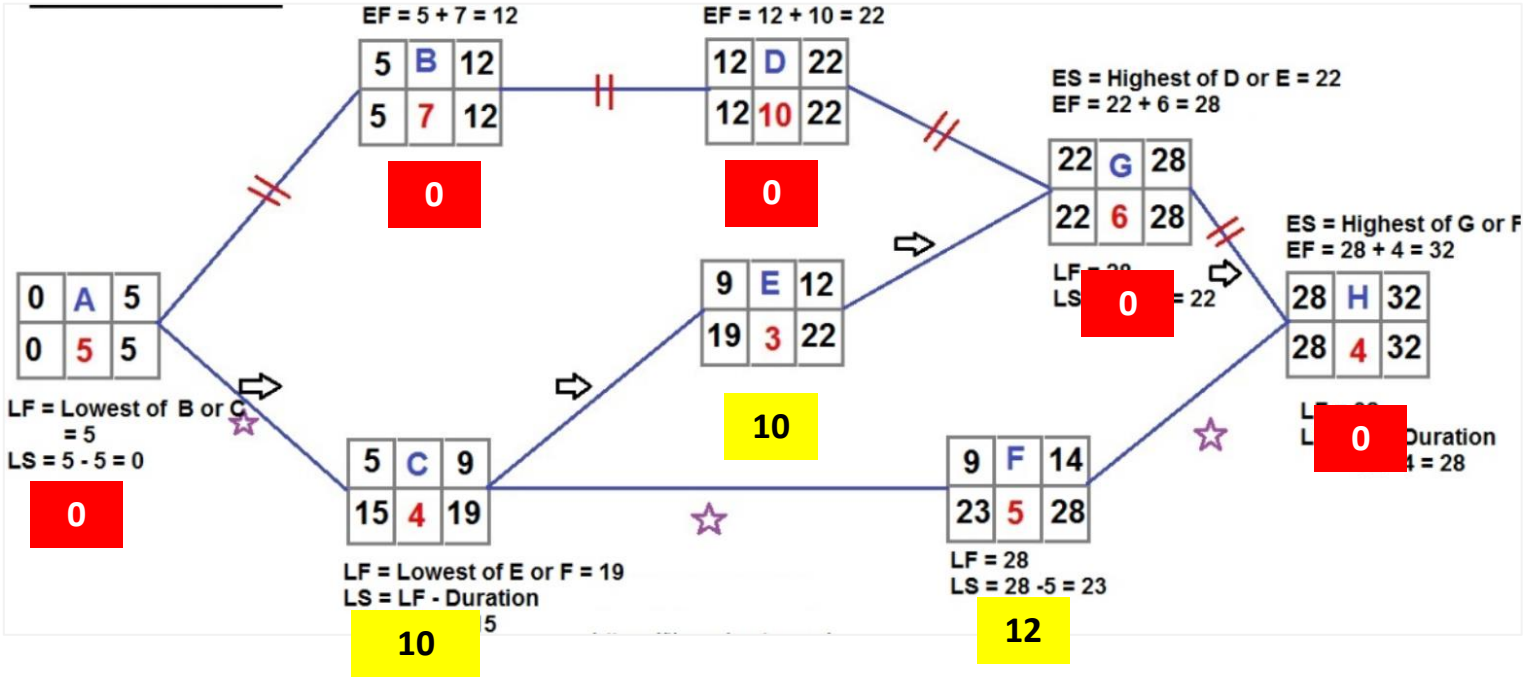
- Hence, Free Float of Activity D is Zero.
- This means that if activity D is delayed even by 1 day, project schedule will get delayed. Hence, we say that activity D is on Critical Path.

Float = LF – EF = LS – ES = 0

Activity D is on Critical Path

Critical Path

Zero Float: Tasks A, B, D, G, H

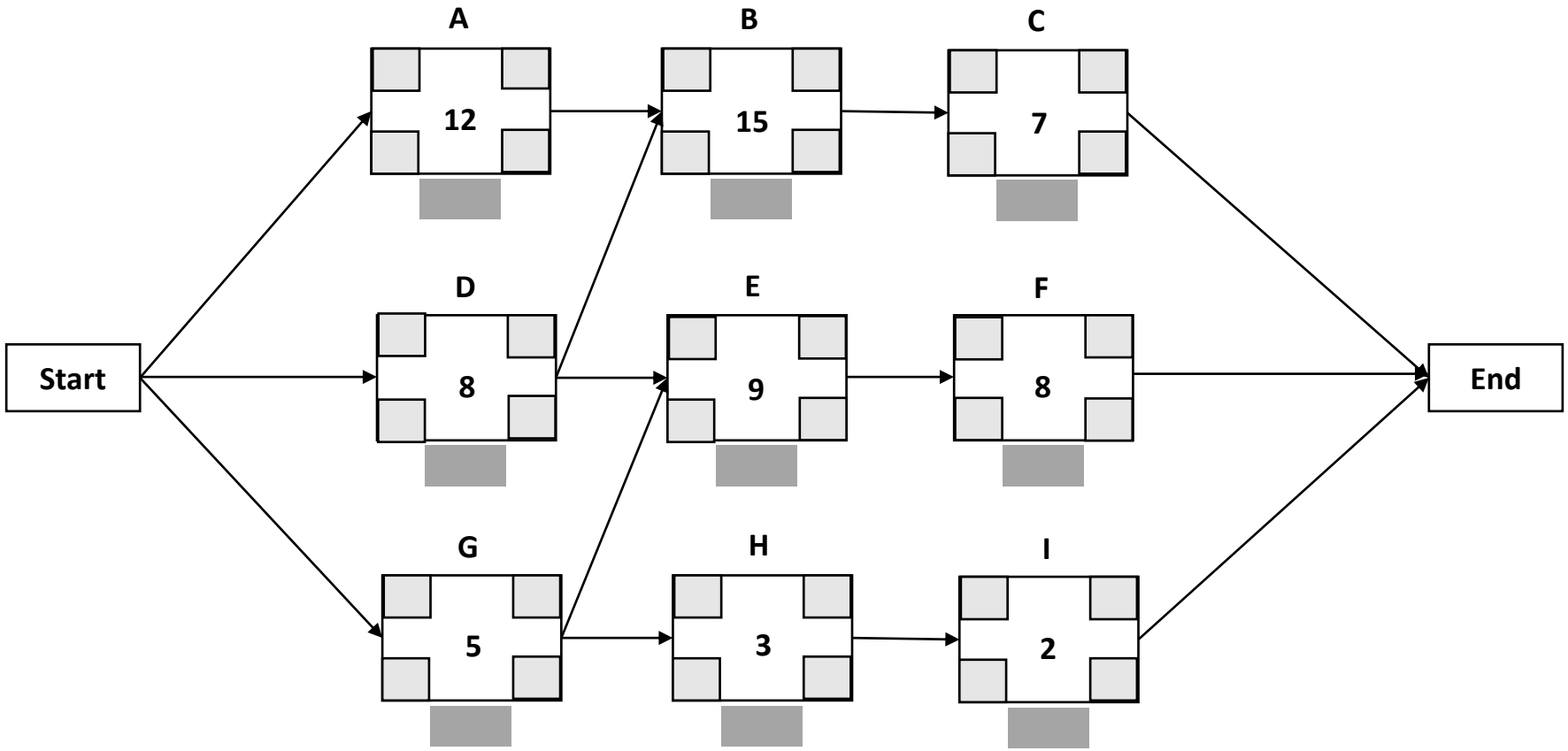


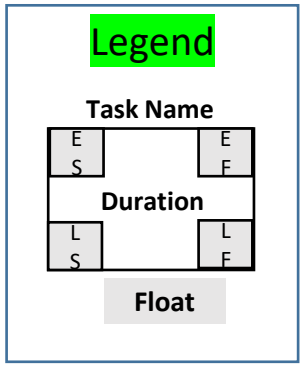
Critical Path: A-B-D-G-H

Question

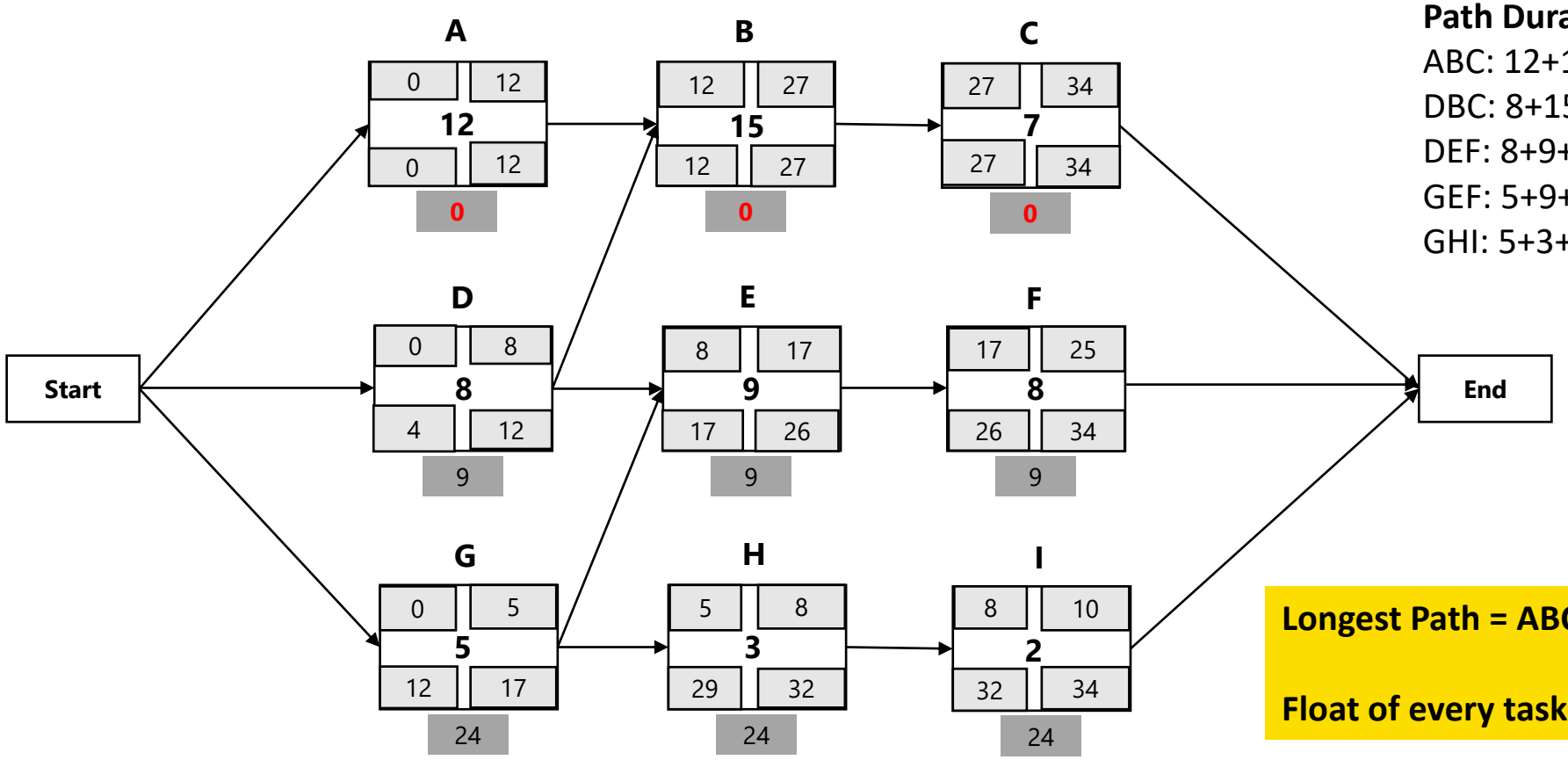
Examine the network diagram shown below carefully.

Identify no. of paths, critical path & float for every task





Answer



Path Durations:

ABC: 12+15+7 = 34

DBC: 8+15+7 = 30

DEF: 8+9+8 = 25

GEF: 5+9+8 = 22

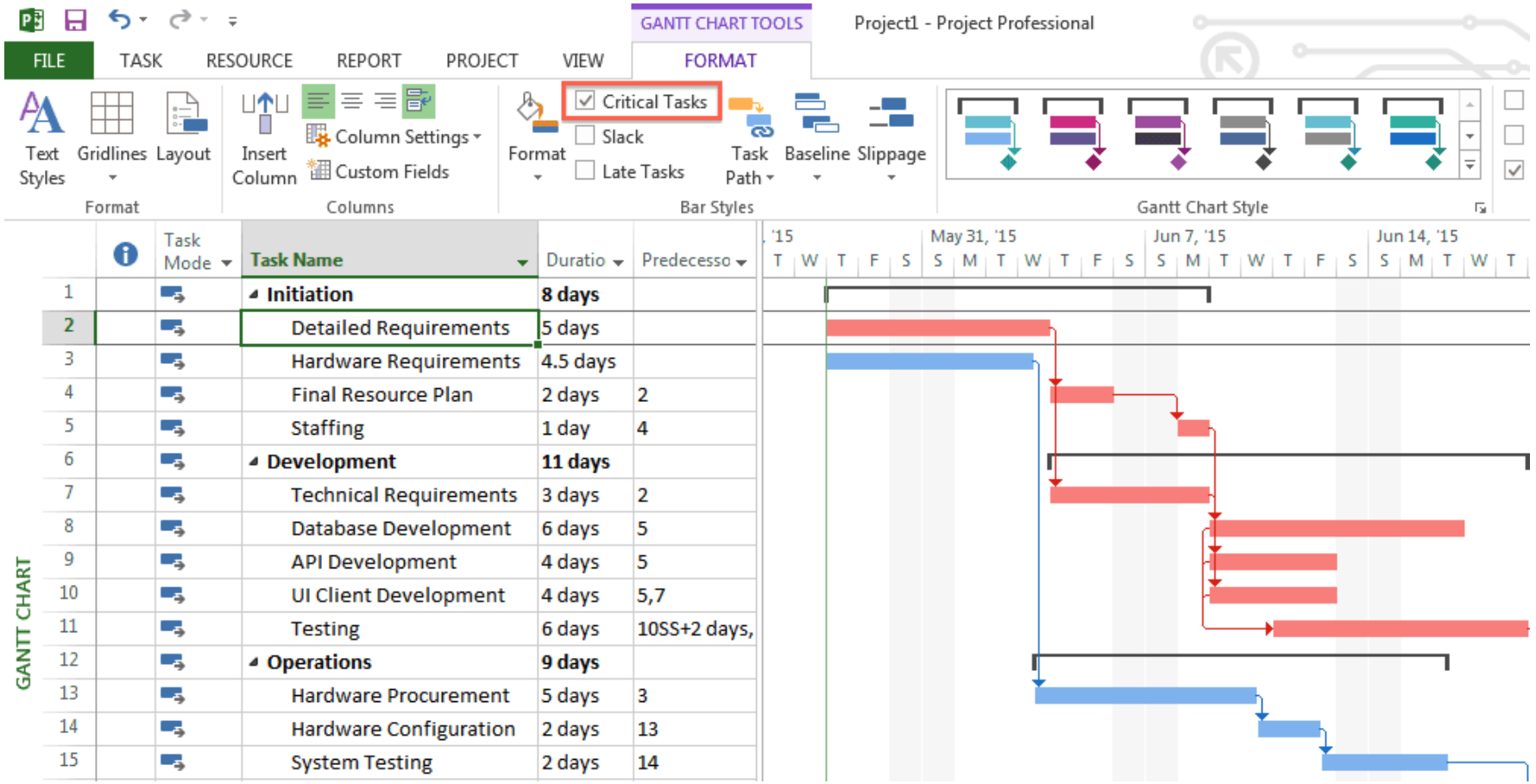
GHI: 5+3+2 = 10

Longest Path = ABC = Critical Path

Float of every task on critical path is Zero

Critical Path in Microsoft Project (MSP)

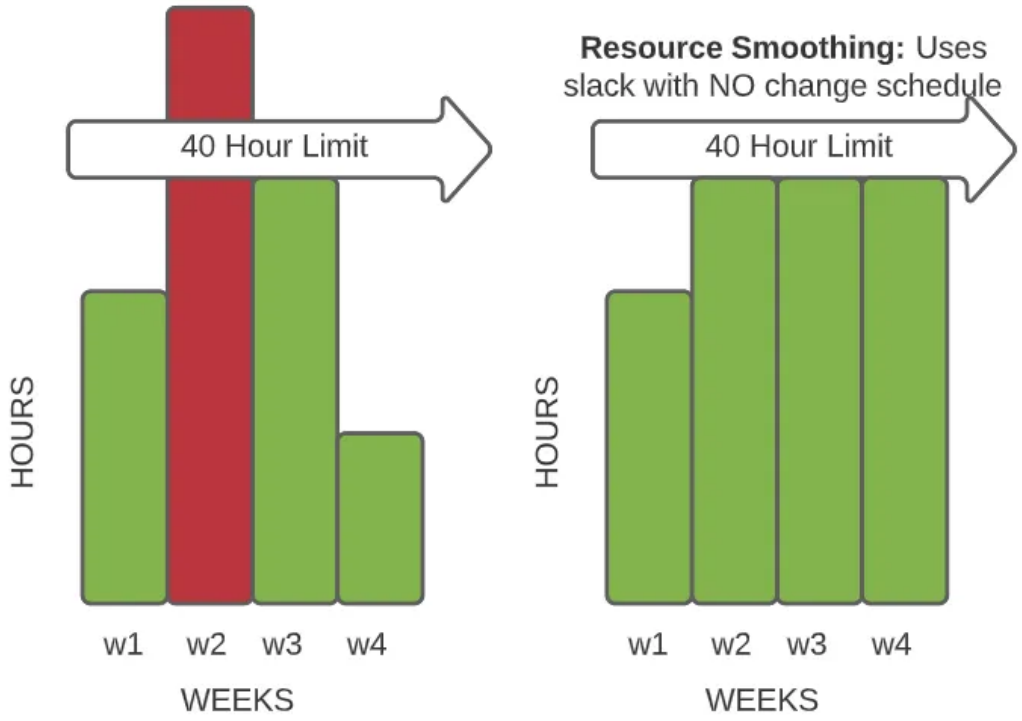
Track activities on Critical Path carefully, because if they are delayed, project will be delayed



Resource Optimization

Smoothing

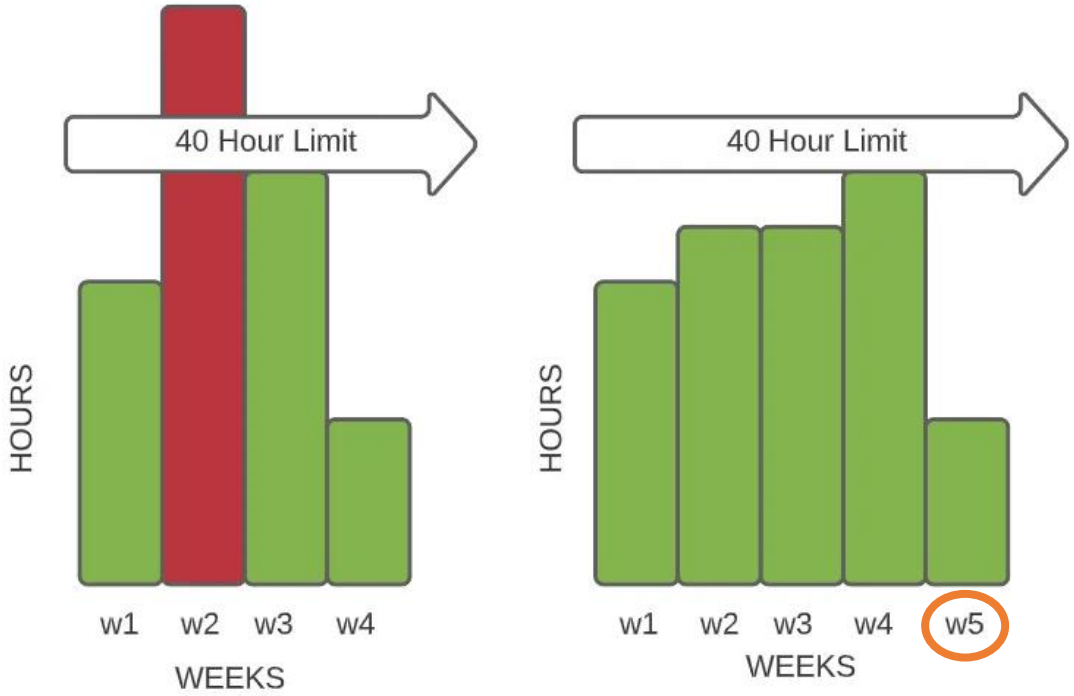
Free and total float are used without affecting the critical path.



- Adjusts the activities within predefined resource limits and **within free and total floats**
- **Does not change the critical path**
- **Does not delay the completion date**
- Method may not be able to optimize all resources

Levelling

Adjustments are made to the project schedule to optimize the allocation of resources and which may affect the critical path.



- Adjusts start and finish dates based on **resource constraints**
- Goal is to balance demand for resources with **available supply**
- Use when shared or critically required resources have **limited availability or are over-allocated**
- **Can change the critical path**
- **May delay the project**

Summary

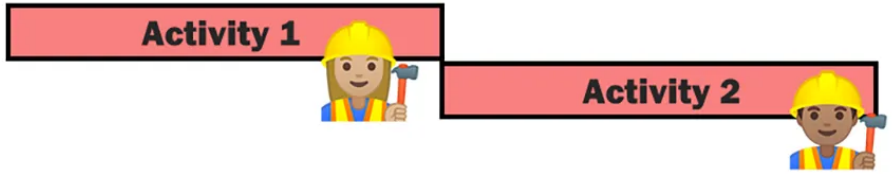
Based on **resource** constraint	Based on **time** constraint
Prevents resources from being overallocated	Balances uneven allocation of resources
A project's start and finish dates can be shifted	A project's timeline is fixed
The critical path can be changed	The critical path cannot be changed

Schedule Compression

Fast-Tracking

Activities or phases normally done in sequence are performed in parallel for at least a portion of their duration.

Normal



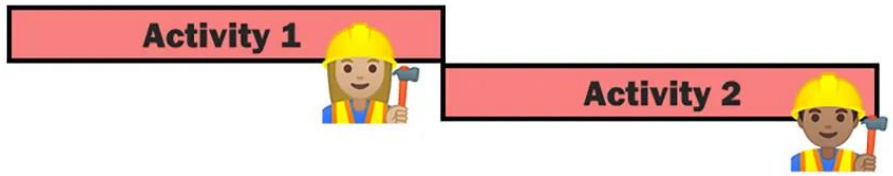
Fast Tracking

- **Perform activities in parallel to reduce time**
- **May result in Rework & increased Risk**

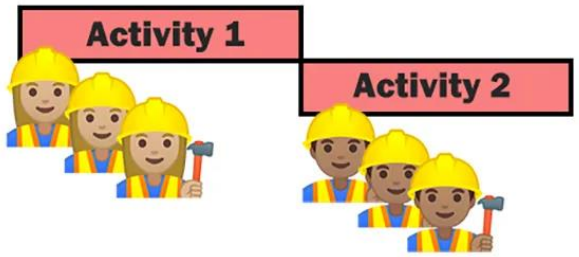
Crashing

Applying additional resources to complete the work more quickly. Crashing usually increases costs.

Normal

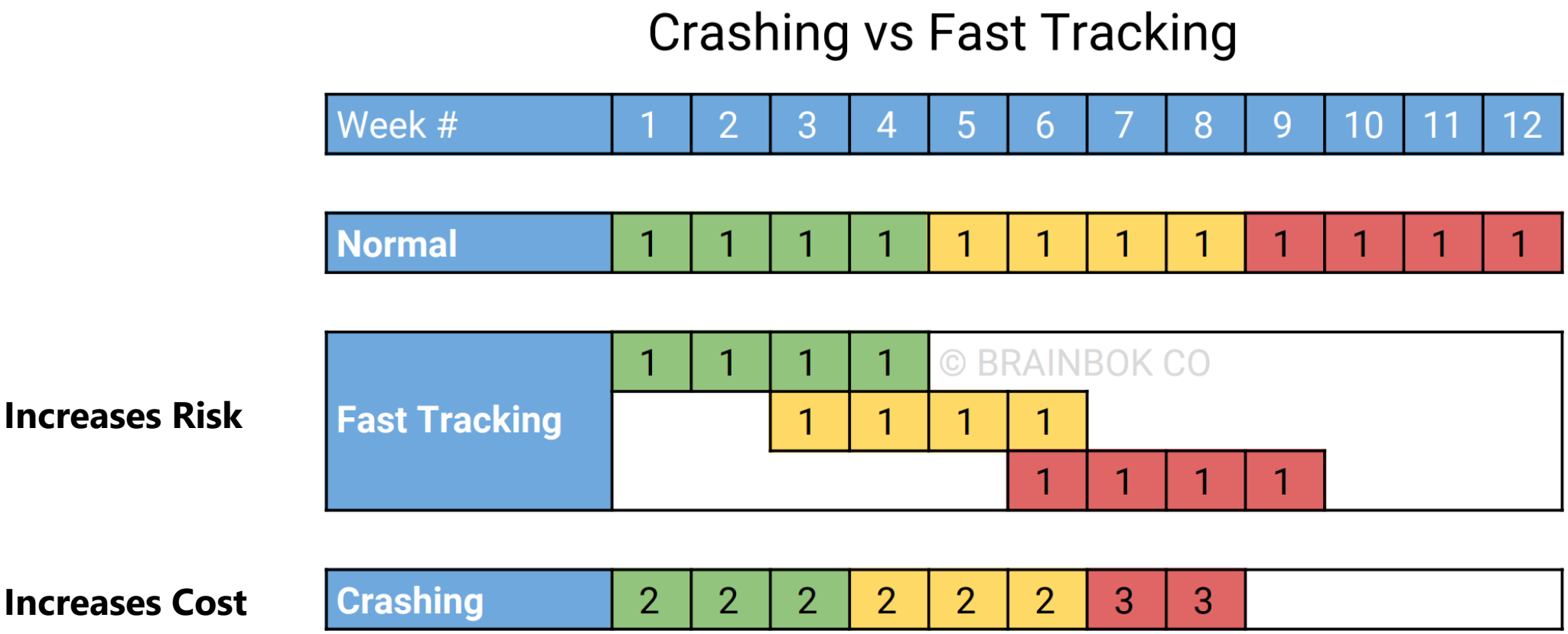


Crashing



- **Shortens schedule duration for incremental cost by adding resources – e.g., overtime, additional resources**
- **Works only for activities on the critical path**

Summary


Crashing vs Fast Tracking
Week # 1 2 3 4 5 6 7 8 9 10 11 12
Normal 1 1 1 1 1 1 1 1 1 1 1 1
Fast Tracking 1 1 1 1 1 1 1 1 1 1 1
© BRAINBOK CO
Crashing 2 2 2 2 2 2 3 3
Increases Risk
Increases Cost

Key Take-aways

Note down the top 3 Key Take-aways for you from this session

Thank You

https://www.linkedin.com/company/talent-academy-taualpha/

Collect Requirements for Planning a Trip

Discuss this topic in groups of four participants

Assign each person one of the following roles:

Writer
Documents the important points that will be presented at the end.

Presenter
Shares the group's information with the class.

Facilitator
Keeps all group members involved and generates discussion.

Timekeeper
Keeps the discussion at 5 minutes. Shares key time checkpoints.