Project Scheduling & Tracking

SPM Charts

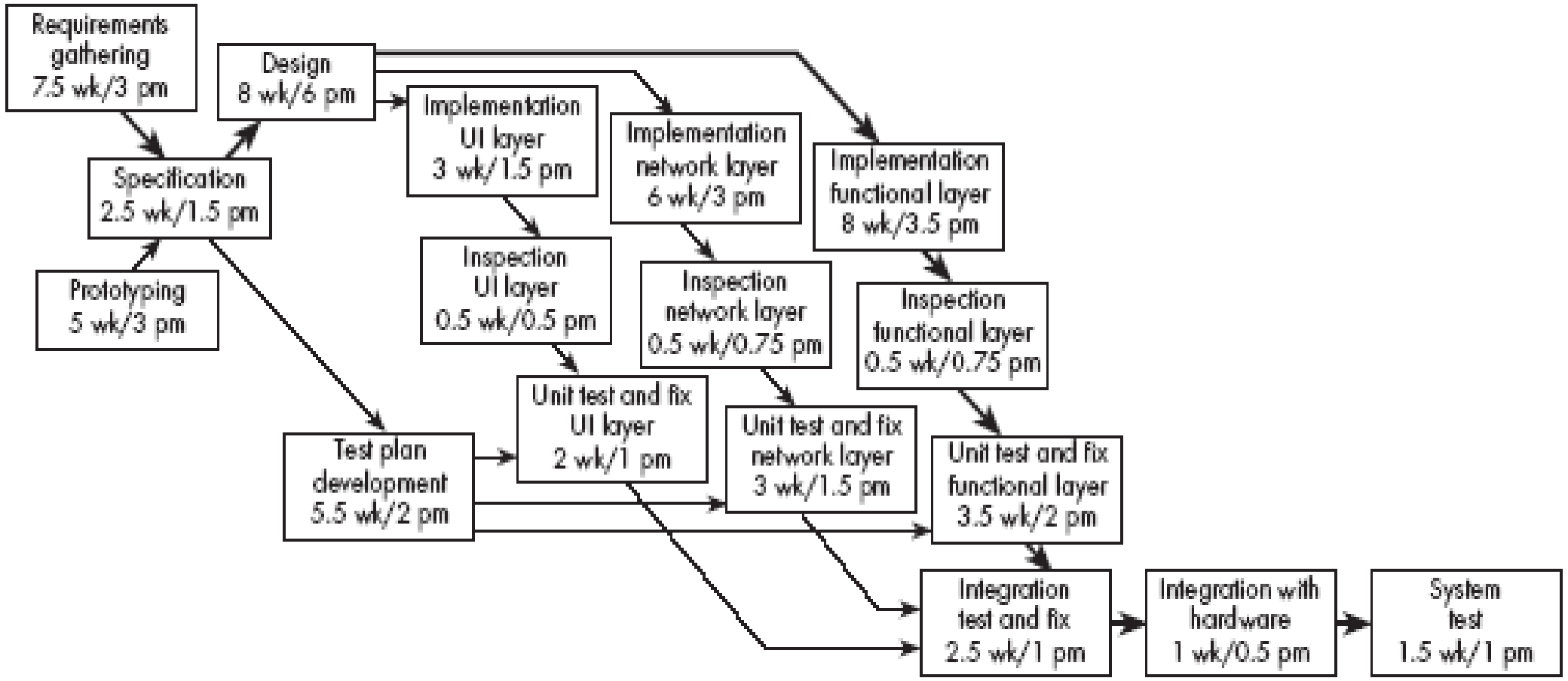
Project Scheduling and Tracking

- *Scheduling* is the process of deciding:
  - In what sequence a set of activities will be performed.
  - When they should start and be completed.
- *Tracking* is the process of determining how well you are sticking to the cost estimate and schedule.

PERT charts

- A PERT chart shows the sequence in which tasks must be completed.
  - **PERT =** Program Evaluation and Review Technique
  - In each node of a PERT chart, you typically show the elapsed time and effort estimates.
  - The *critical path* indicates the minimum time in which it is possible to complete the project.

Example of a PERT chart



Gurbakash Phonsa ::: Basics of SPM

Software Project Management

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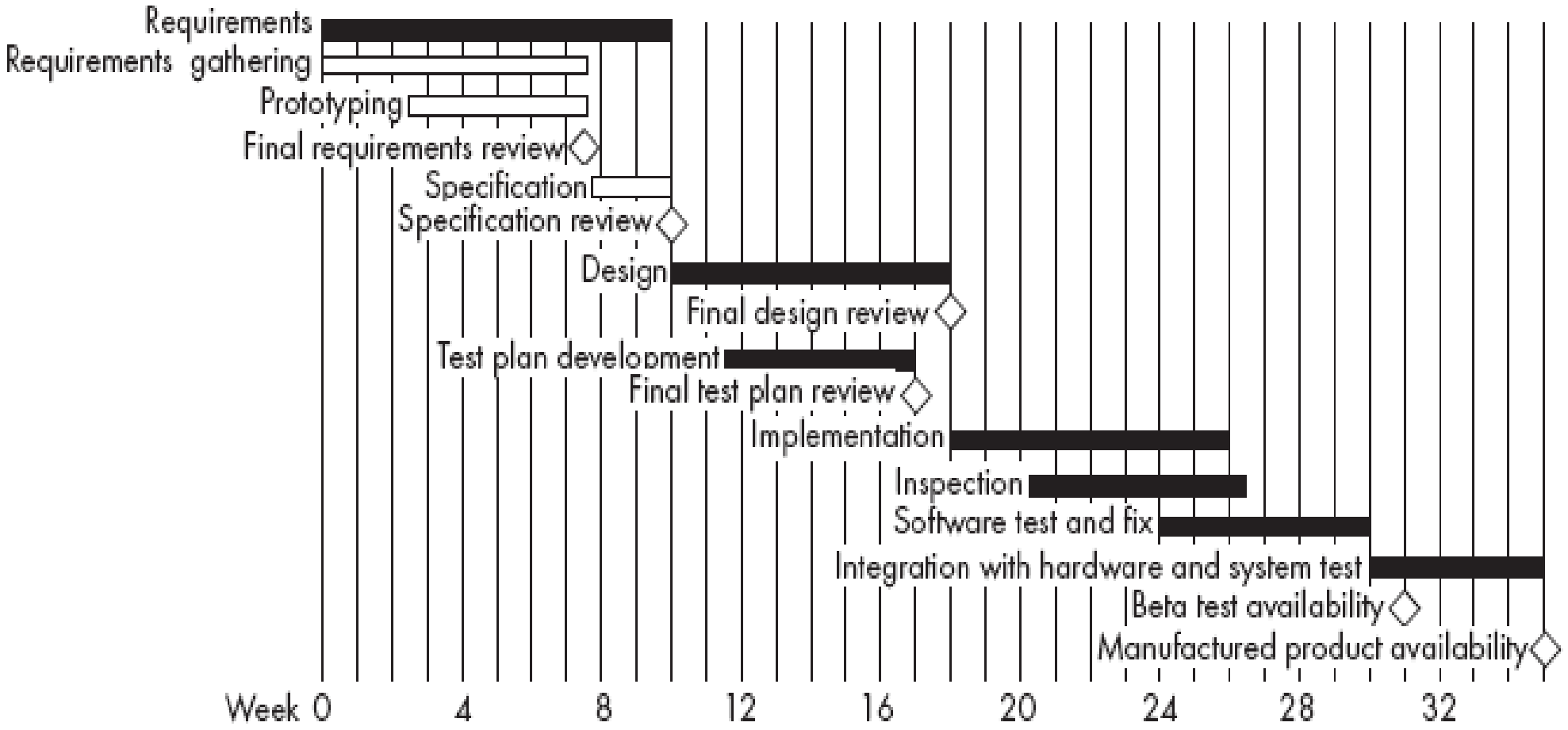
Gantt Chart

Gantt charts

- **A Gantt chart is used to graphically present the start and end dates of each software engineering task**
  - One axis shows time.
  - The other axis shows the activities that will be performed.
  - The black bars are the top-level tasks.
  - The white bars are subtasks
  - The diamonds are *milestones:*
    - **Important deadline dates, at which specific events may occur**

Example of a Gantt chart

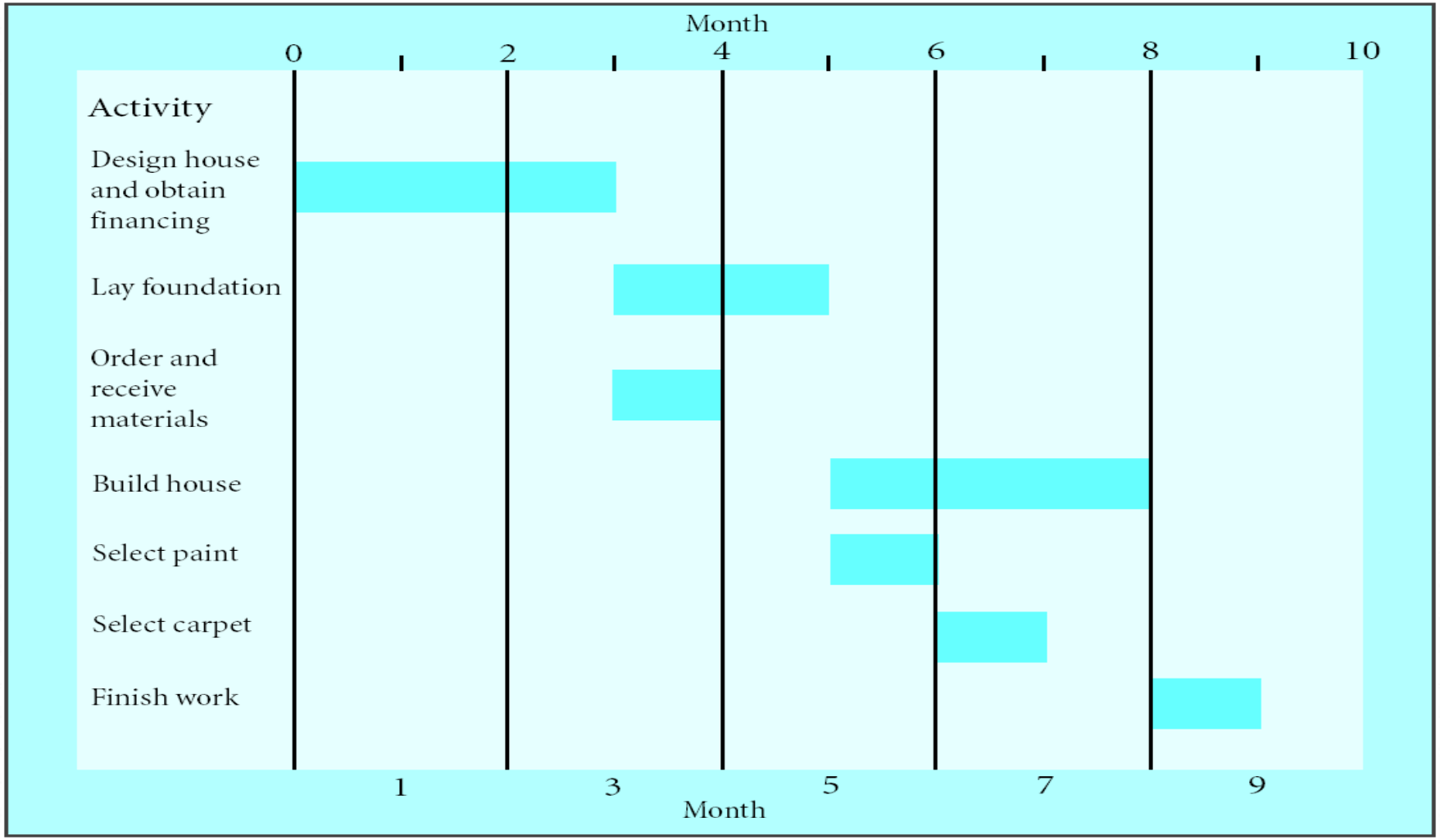


Sequence of Activities of The Project - House Building

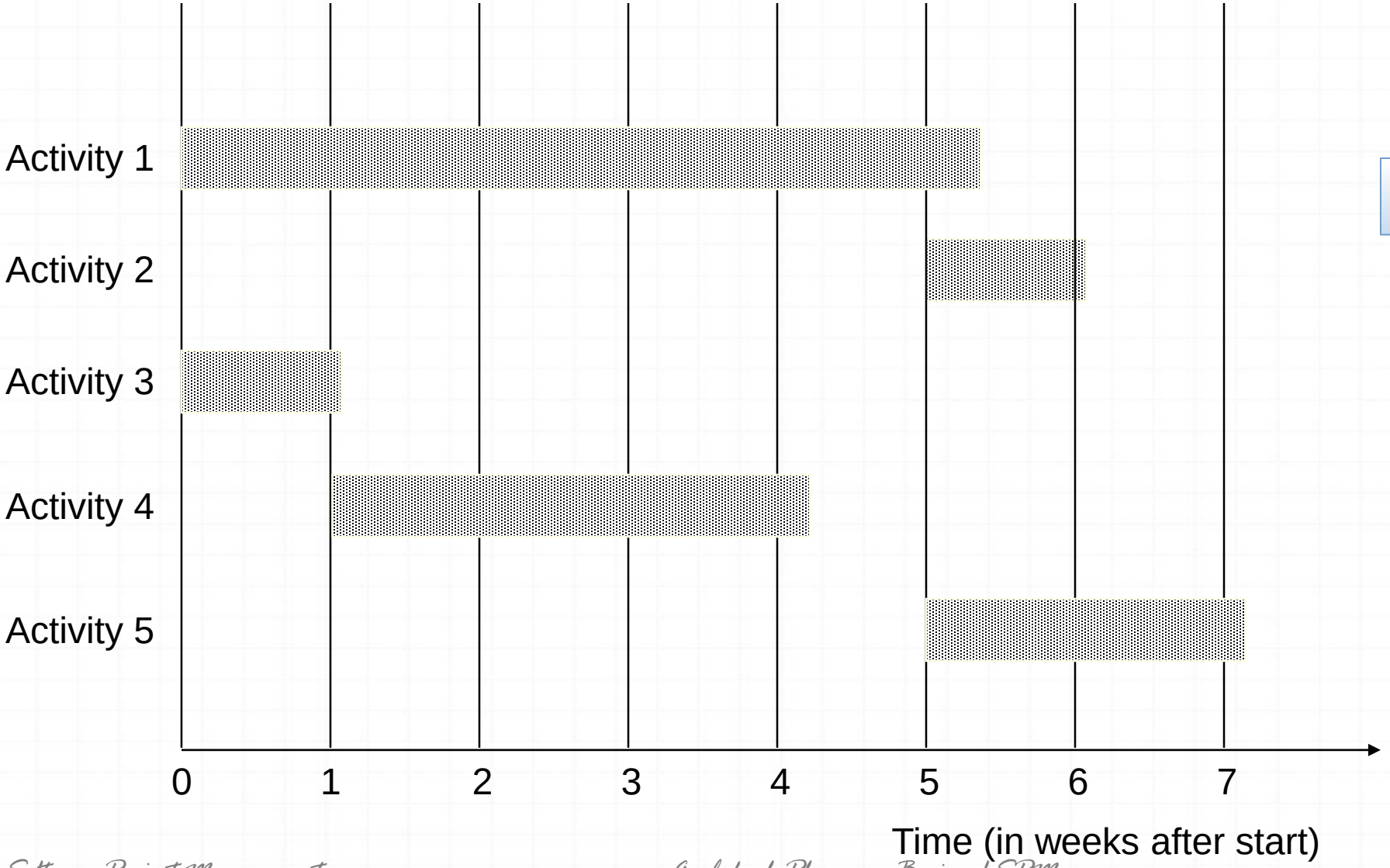
Number	Activity	Predecessor	Duration
1	Design house and obtain financing	--	3 months
2	Lay foundation	1	2 months
3	Order and receive materials	1	1 month
4	Build house	2,3	3 months
5	Select paint	2, 3	1 month
6	Select carper	5	1 month
7	Finish work	4, 6	1 month

Gantt Chart for House Building Project

A Gantt chart



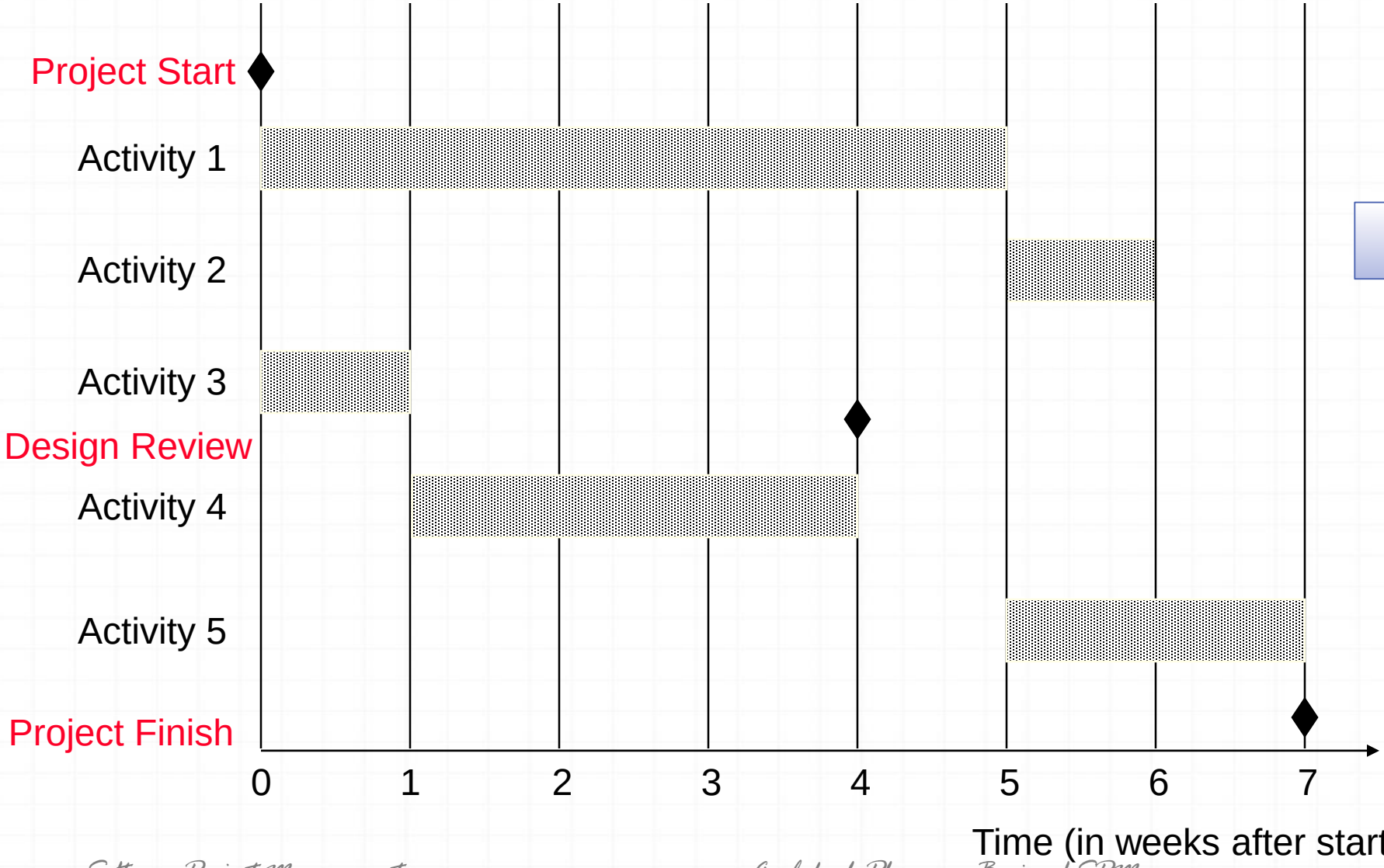
Gantt Chart



Easy to read

Gantt Chart

with milestones

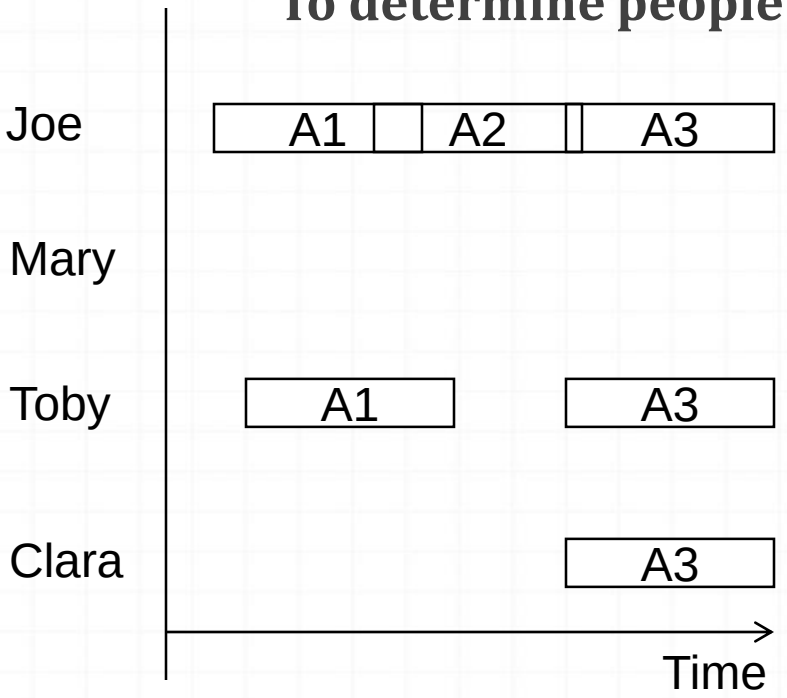


Good for reviews.

Two Types of Gantt Charts

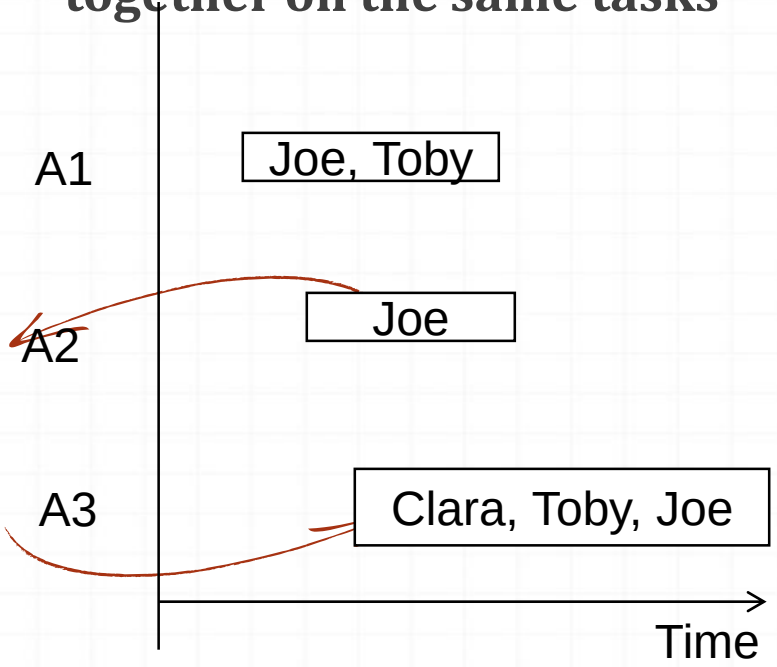
Person-Centered View

To determine people's load



Activity-Centered View

To identify teams working together on the same tasks



Choose one view, stay with it. Usually base the view on the WBS structure Managing Experienced Teams:

1. Person-centered view
2. Managing Beginners: Activity oriented view

Gurbakash Phonsa ::: Basics of SPM

Software Project Management

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CPM

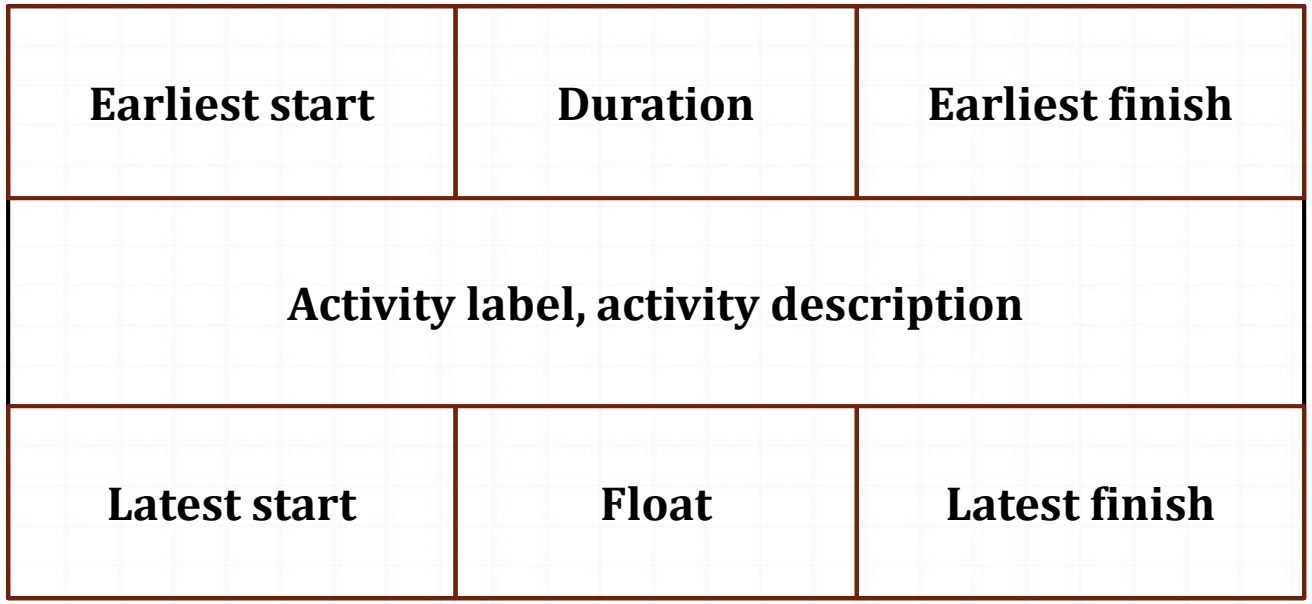
Critical Path Methos

Critical Path Method

- Definition: In **CPM** activities are shown as a network of precedence relationships using activity-on-node network construction
  - Single estimate of activity time
  - Deterministic activity times

- **Critical Path:**
  - Is that the sequence of activities and events where there is no "slack" **i.e.. Zero slack**
  - Longest path through a network
  - minimum project completion time

Activity On-Node



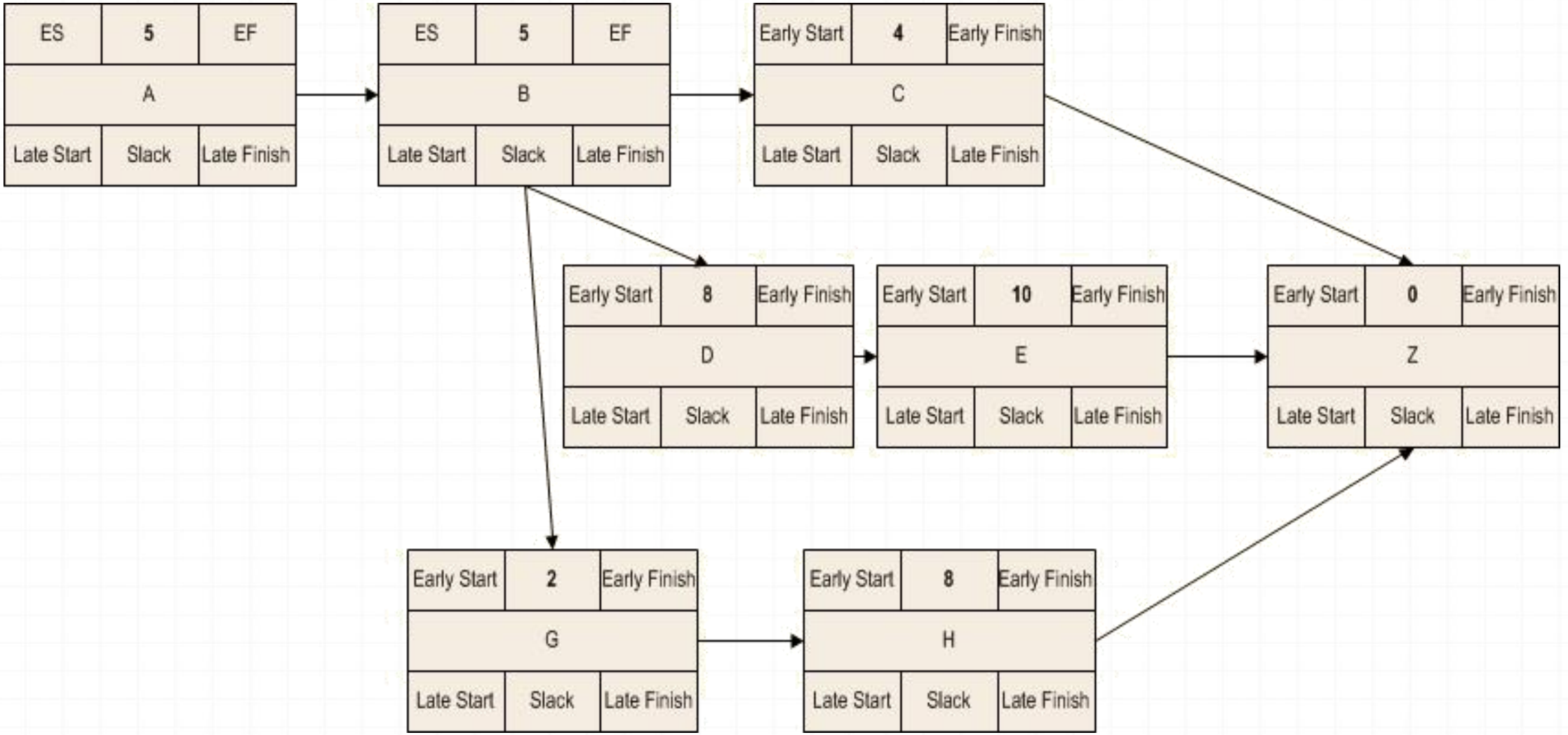
Id.	Activity Name	Duration (days)	Precedents
A	Floating the tender	5	
B	Short listing	5	A
C	Biding	4	B
D	Assigning Contract	8	B
E	Allocation of task	10	D
G	Monitoring	2	B
H	Completing	8	G
Z	System Installation	0	C,E,H

CPM

A **critical path** is the longest path in the network. Each node which falls under critical path has zero or negative float (Slack).

There are 3 steps to calculate CPM:

1. Forward Pass - To calculate the Early Start(ES) and Early Finish(EF) of node.
2. Backward Pass - To calculate Late Start (LS) and Late Finish(LF) of node.
3. Calculate Float and Thus CPM.


ES
5
EF
A
Late Start
Slack
Late Finish
ES
5
EF
B
Late Start
Slack
Late Finish
Early Start
4
Early Finish
C
Late Start
Slack
Late Finish
Early Start
8
Early Finish
D
Late Start
Slack
Late Finish
Early Start
10
Early Finish
E
Late Start
Slack
Late Finish
Early Start
0
Early Finish
Z
Late Start
Slack
Late Finish
Early Start
2
Early Finish
G
Late Start
Slack
Late Finish
Early Start
8
Early Finish
H
Late Start
Slack
Late Finish

The Forward Pass

Node A:

The activity starts on day zero, since A activity duration is for 5 days, the early finish will take Early Start and duration i.e.:

A(EF) = A(ES) + Duration

A (EF)= 0 + 5 = 5

Node B:

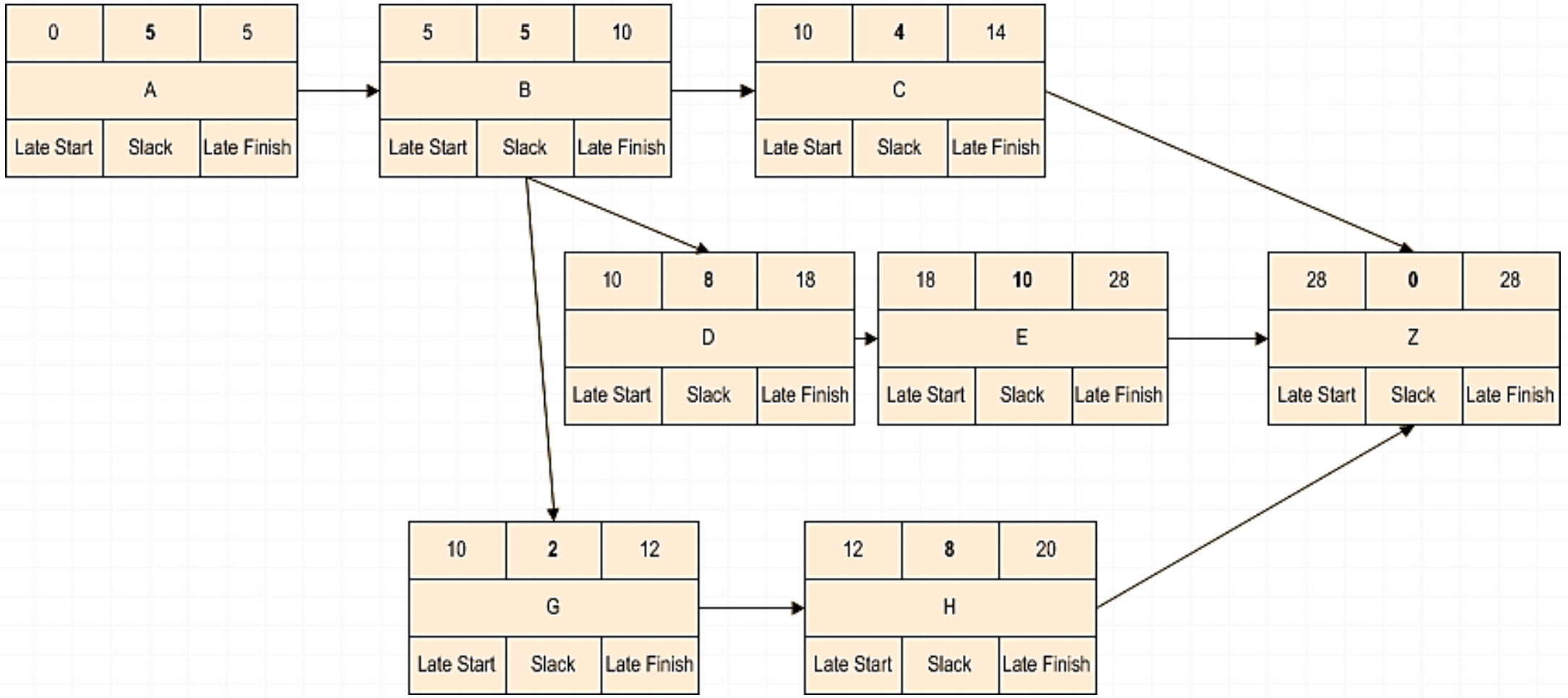
Since there is only one node which precedes activity B. The relationship is F->S. That means that activity B can start only when activity A ends. Hence

B (ES) = A (EF) = 5

B(EF) = B(ES) + Duration = 5+ 5 = 10

Activity C: C(ES) = B(EF) = 10, also C(EF) = C(ES) + Duration = 10+ 4 = 14

Forward pass calculations



Calculation for backward pass

Node H

Node H has only one node preceding it in backward pass (node Z). Hence

H(LF) = Z(LS) = 28

H(LS) = H(LF) – H(Duration) = 28 – 8 = 20

Node E

Node E has only one node preceding it in backward pass (node Z). Hence

E(LF) = Z(LS) = 28

E(LS) = E(LF) – E(Duration) = 28 – 10 = 18

Node C

Node C has only one node preceding it in backward pass (node Z). Hence

C(LF) = C(LS) = 28

C(LS) = C(LF) – C(Duration) = 28 – 4 = 24

More then one forward node

Node B

Since Node B is where most of the activities are merging in backward pass i.e. C, D and G, this is where we need to pay more attention. In backward pass the node B's Latest Finish (LF) would be earliest or all the nodes Late Start i.e.

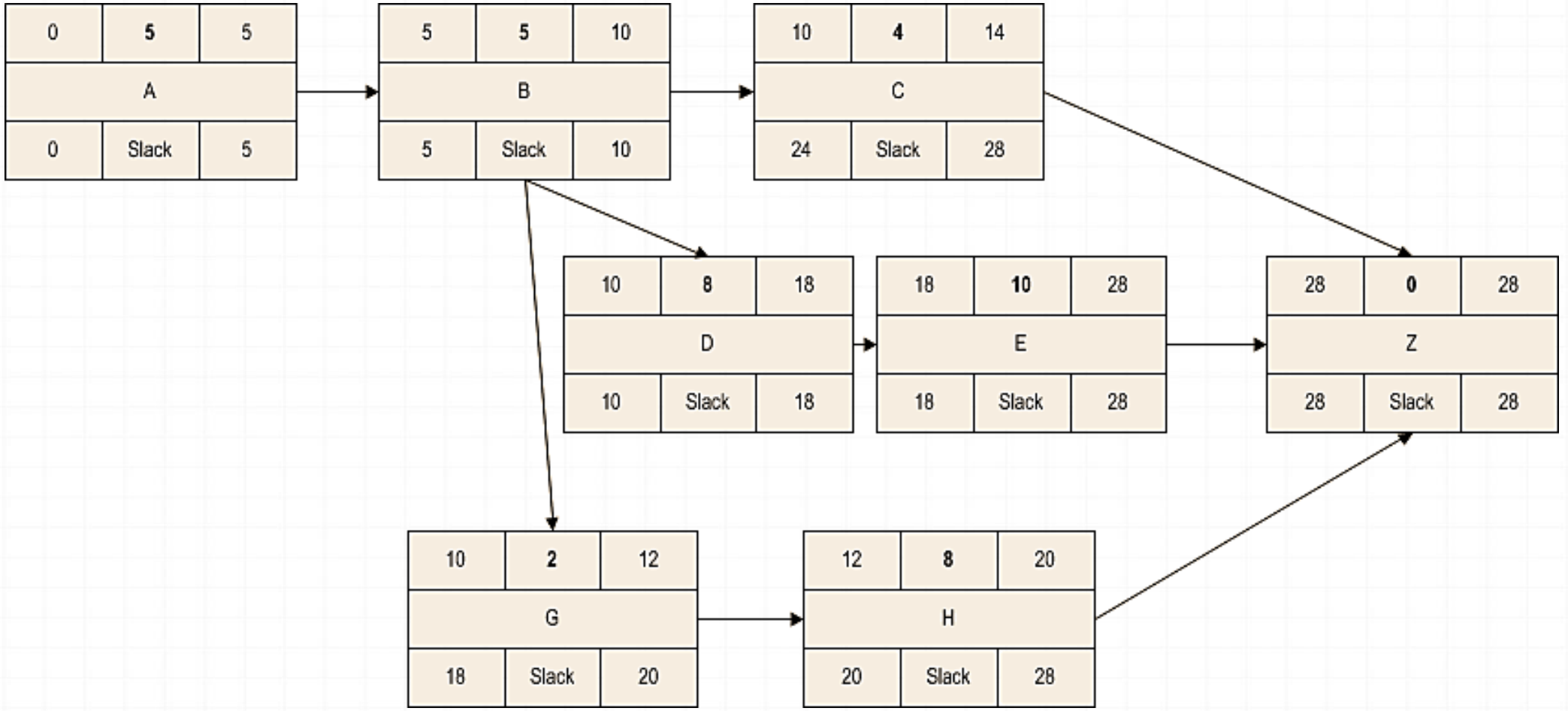
B(LF) = Least | C(LS) or D(LS) or G(LS)|

B(LF) = Least | 24 or 10 or 18|

B(LF) = 10

B(LS) = B(LF) – B(Duration) = 10 -5 = 5

Backward pass calculation



Calculating Total Float or Slack

Total float

Total amount of time that a schedule activity may be delayed from its early start date without delaying the project finish date, or intermediary milestone. It is calculated using:

Activity (ES) – Activity (LS) or activity (EF) Activity(LF) – Both will give you same results.

Free Float

This is an amount of time that a schedule activity can be delayed without delaying the early start of any immediately following schedule activities.

E.g. – For activity C

C (Total Float) = C (LS) - C(ES) = 24 – 10 = 14

C (Free Float) = ES of next activity – C(EF)

C (Free Float) = Z(ES) – C(EF) = 28 -14 = 14

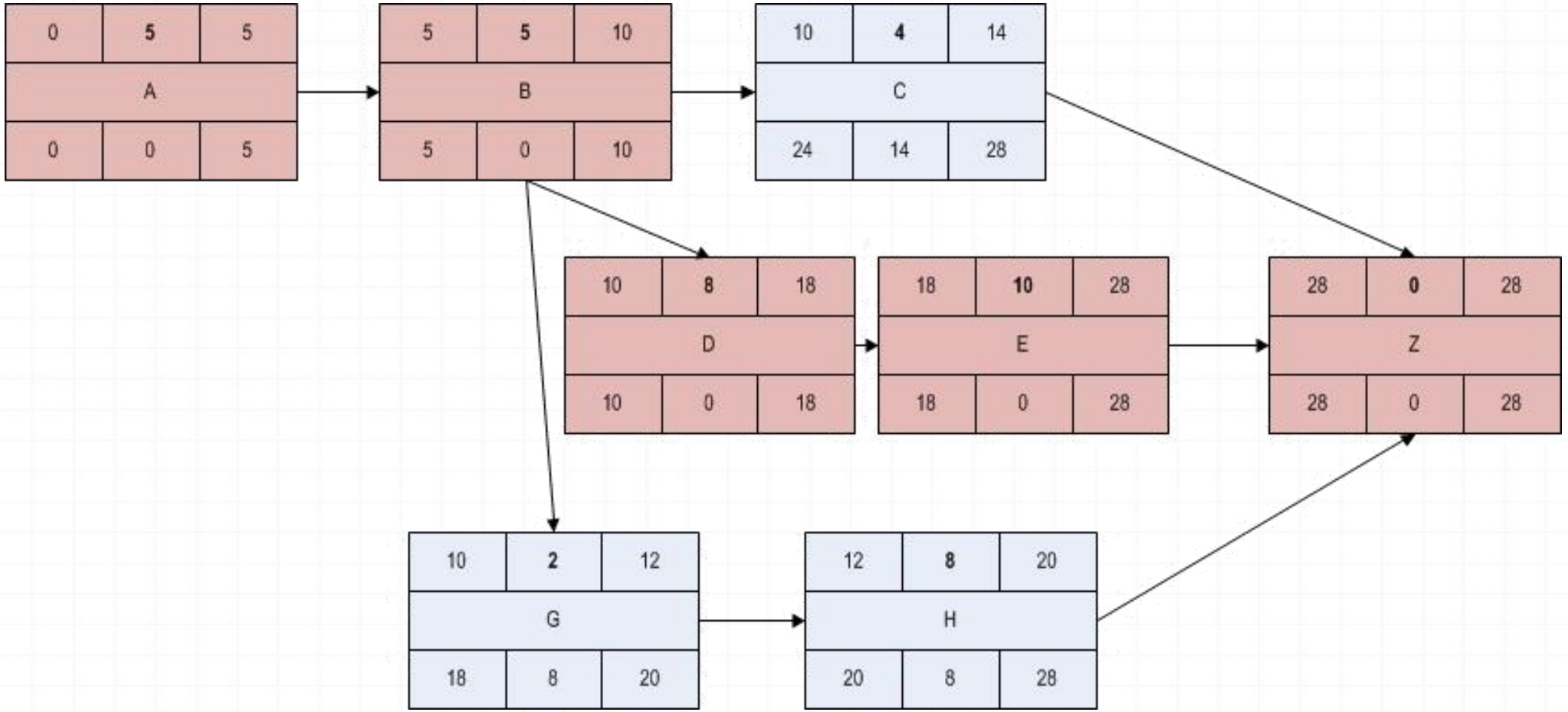
Critical Path

The Critical path

Calculate the Total float for all activities as per the formula.

All nodes which have zero or negative float/slack forms the CRITICAL PATH.

A,B,D,E and Z forms the critical path



Example to construct a CPM

Id.	Activity Name	Duration (weeks)	Precedents
A	Hardware selection	7	
B	Software design	4	
C	Hardware Installation	6	A
D	Coding	4	B
E	Data Preparation	5	B
F	User Documentation	9	
G	User Training	5	E,F
H	System Installation	3	C,D

Solution