

WESTMINSTER

INTERNATIONAL UNIVERSITY IN TASHKENT

An Accredited Institution of the University of Westminster (UK)

# **Project Management**

## **Lecture 7**

### **Project Planning: Critical Path Management**

**by**

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- Bar Charts – Gantt Chart
- Network Diagram
- Activity on Node

# What have we done so far?

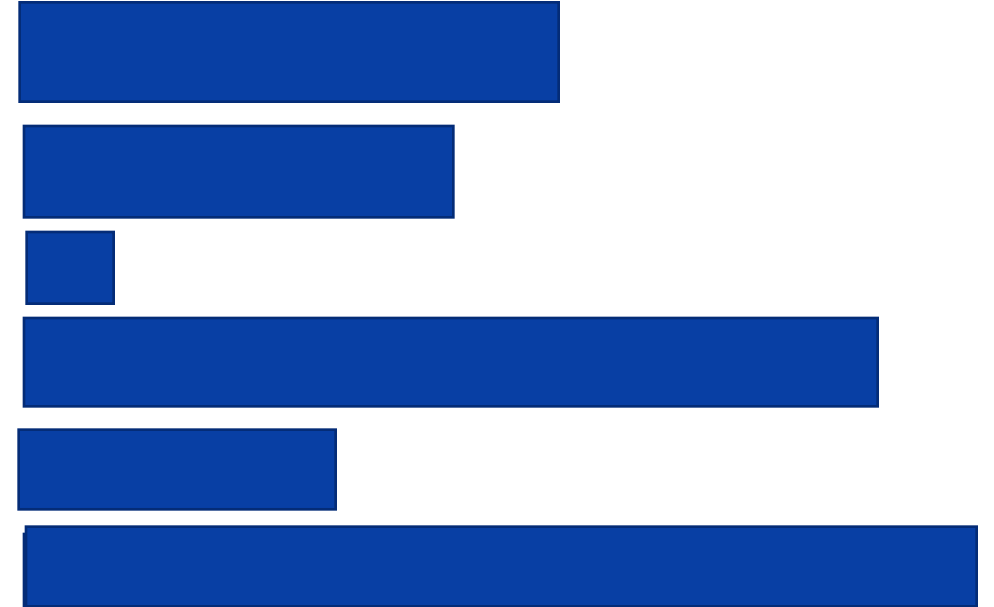
- Identified project scope
- Created Project Charter
- Got approval of the Project Sponsor
- Broken-down the project into workpackages (WBS)
- Assigned the responsible people for each workpackage (Responsibility matrix)

- With WBS we identified all the work packages and activities and worked out the responsibility matrix.
- In order to plan properly – we will need to know also the duration of the WPs.
- We also need to know what dependencies are there within work packages or activities

## What is next?

# Duration of WPs

<b>1.1.1</b>	<b>5 days</b>
<b>1.2.2</b>	<b>4 days</b>
<b>1.2.3</b>	<b>1 day</b>
<b>1.4.2</b>	<b>8 days</b>
<b>1.4.5</b>	<b>3 days</b>
<b>1.5.1</b>	<b>9 days</b>



# Bar chart – Gantt Chart



It is a reflection of tasks,  
activities in form of the bars.

There can always be some  
relationship between WPs.

# Bar chart – Gantt Chart



1.2.3 for example could start only after 1.2.2 is over

At the same time 1.2.2 can start only after 1.1.1 is over

And the list goes on



Project network is an effective tool for scheduling of the activities

## Terminology used:

**Activity** – an element of project that requires time. It may or may not require resources. It can be one or more tasks from WP – or time of waiting.

**Path** – sequence of connected, dependent activities

**Critical path** – path(s) with the longest duration through the network, if there is a delay on this path, there is delay of same amount in the project.

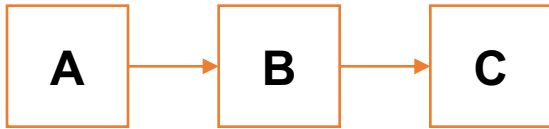
**Parallel activities** – those which can be executed simultaneously.

**Burst activity** – the activity that has more than one activity following it

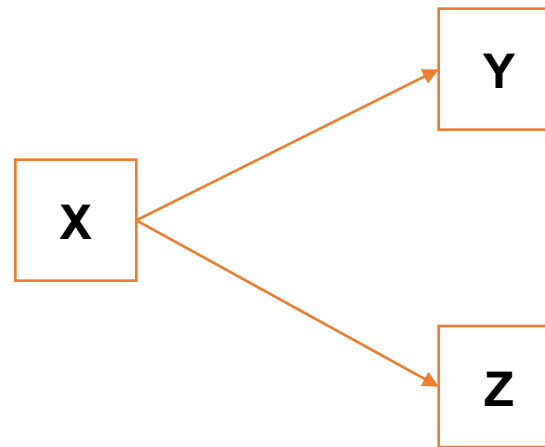
**Merge activity** - the activity that has more than one activity preceding it.

# Activity on Node network

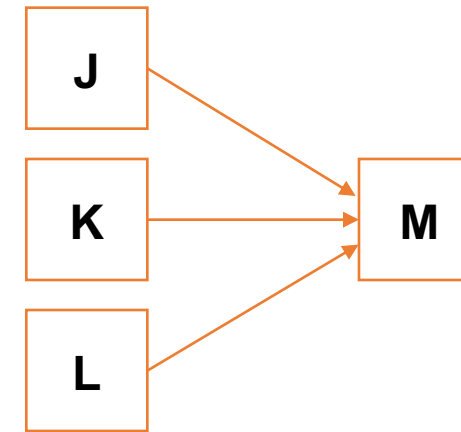
- Activities are represented in boxes (nodes).
- Dependencies between the activities are shown via arrows.



There is no preceding activity for A, for B it is A and for C it is B



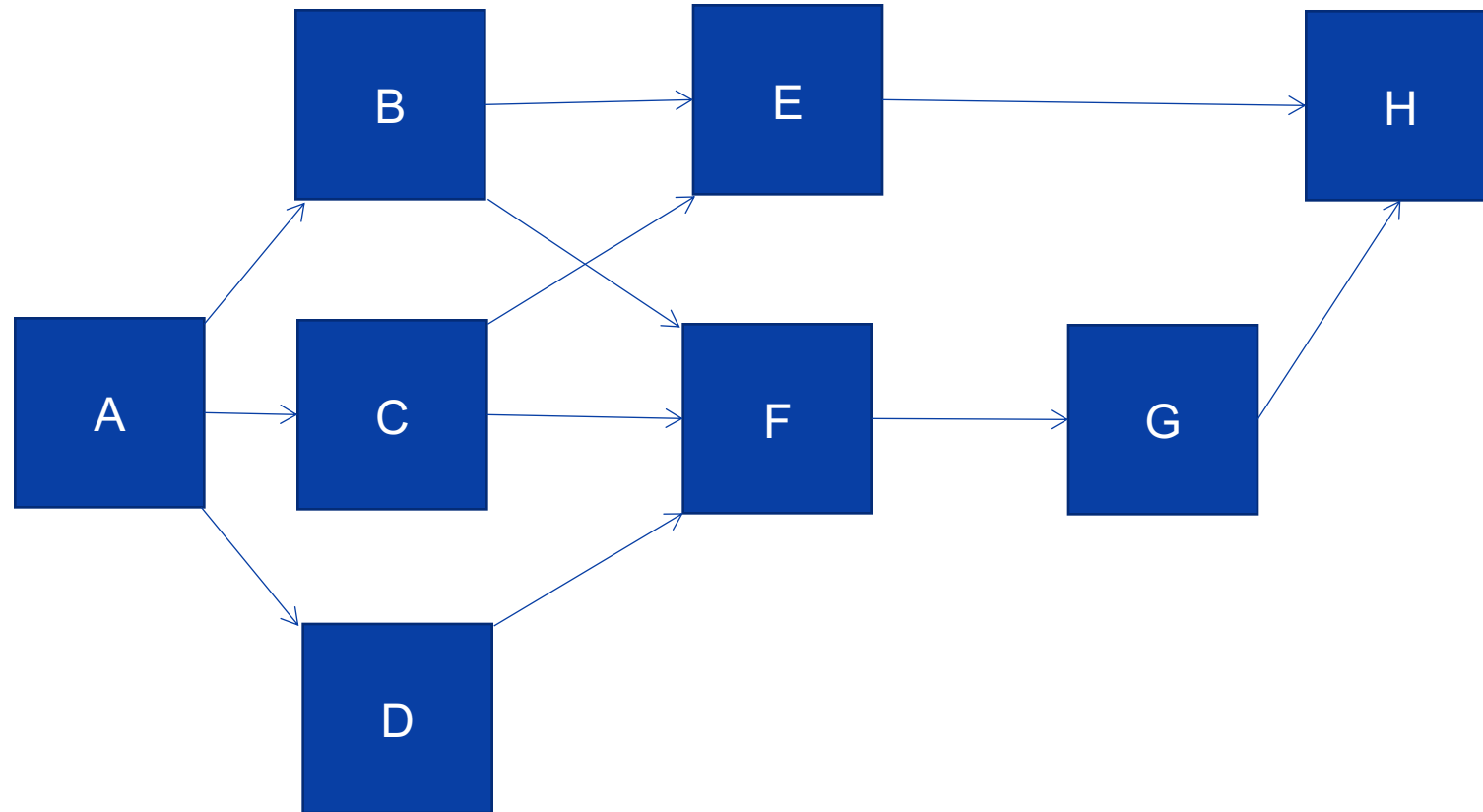
X is bursting activity, Y and Z can run in parallel



M is merging activity, J, K and L can start at the same time

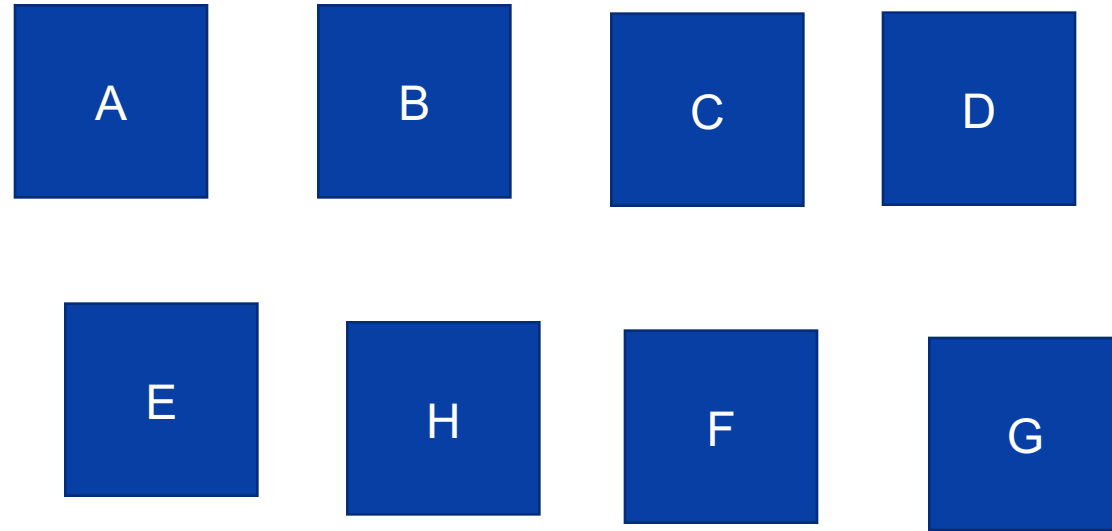
# Example

Activity	Predecessor
A	None
B	A
C	A
D	A
E	B,C
F	B,C,D
G	F
H	E,G

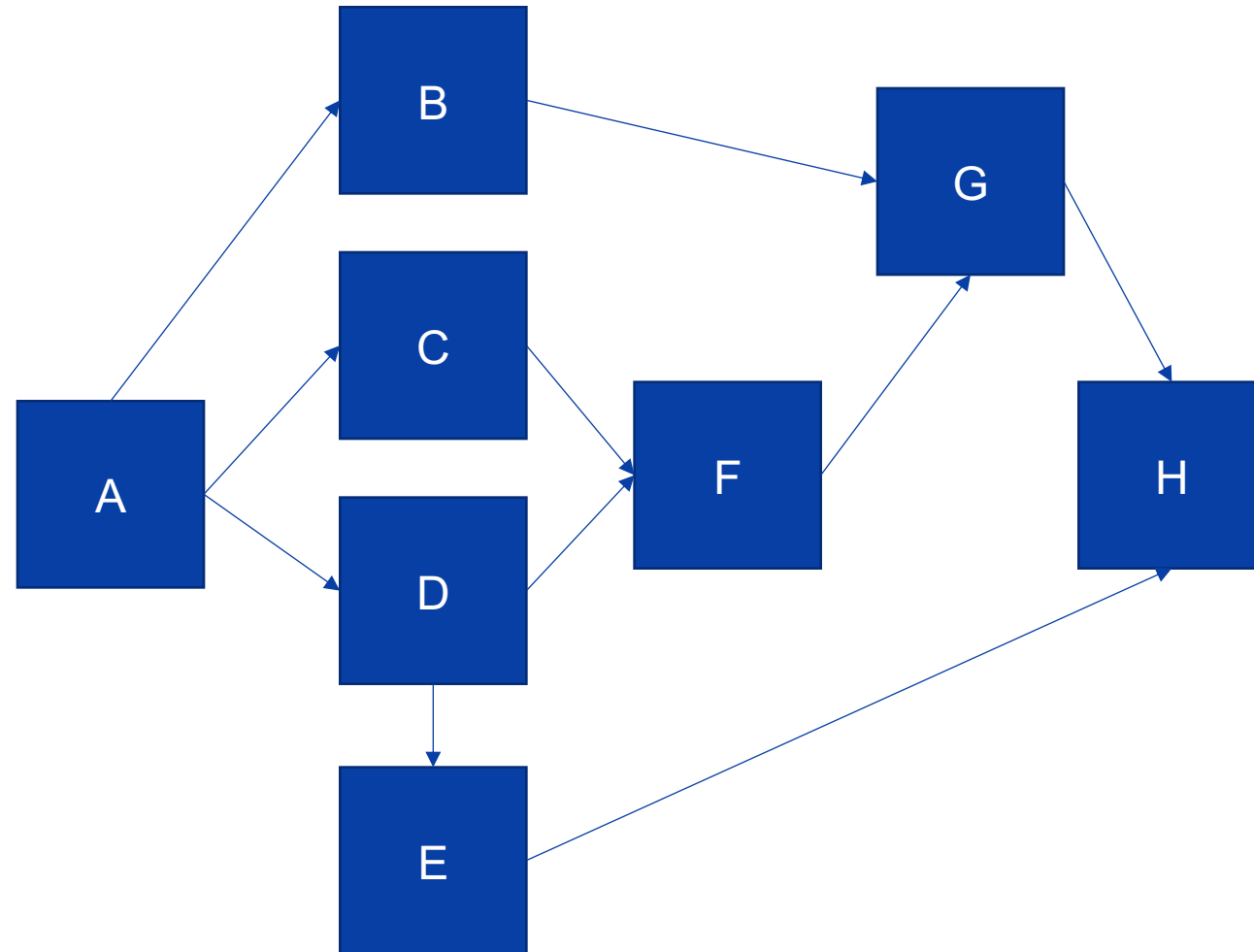


# In class activity

Activity	Predecessor
A	None
B	A
C	A
D	A
E	D
F	C,D
G	B,F
H	E,G



Activity	Predecessor
A	None
B	A
C	A
D	A
E	D
F	C,D
G	B,F
H	E,G



# Activity on Node

We have identified the relationship among the activities.

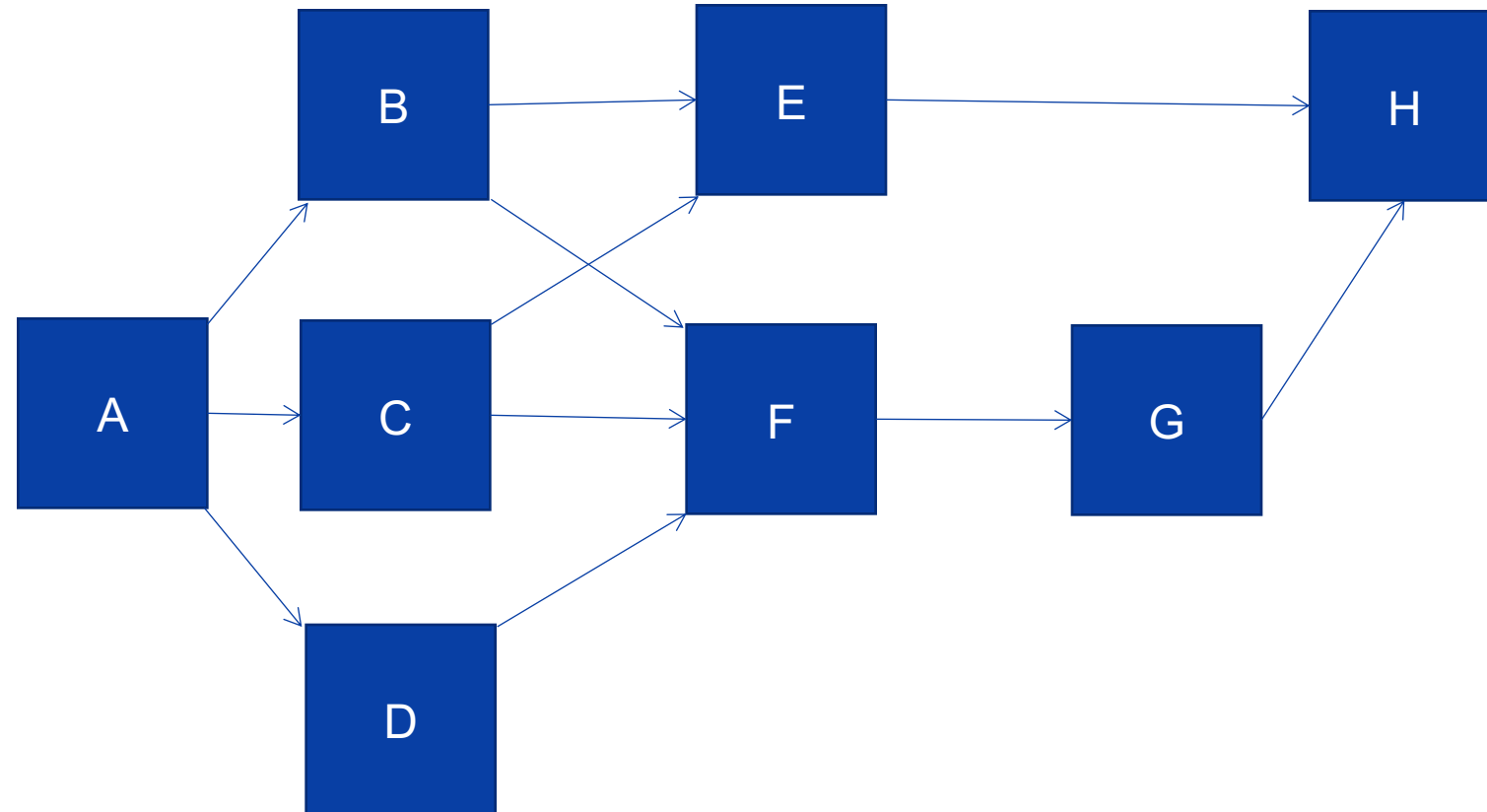
Now, we should not neglect the duration of the activities.

The node includes following information:

Earliest Start	ES	ID	EF	Earliest Finish
	SL	Description		
Latest Start	LS	Duration	LF	Latest Finish

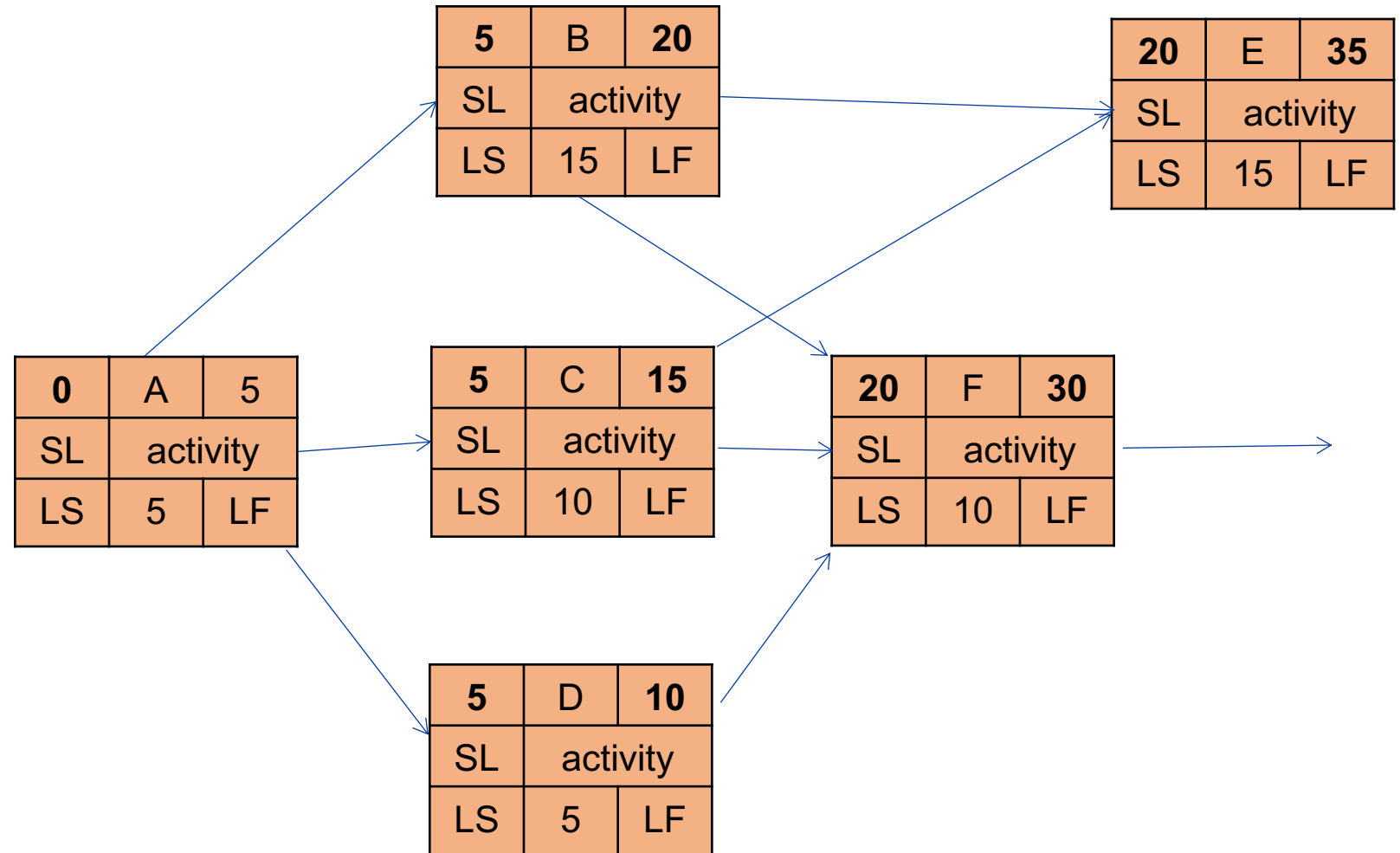
# Example

Activity	Predecessor	Duration
A	None	5
B	A	15
C	A	10
D	A	5
E	B,C	15
F	B,C,D	10
G	F	170
H	E,G	35

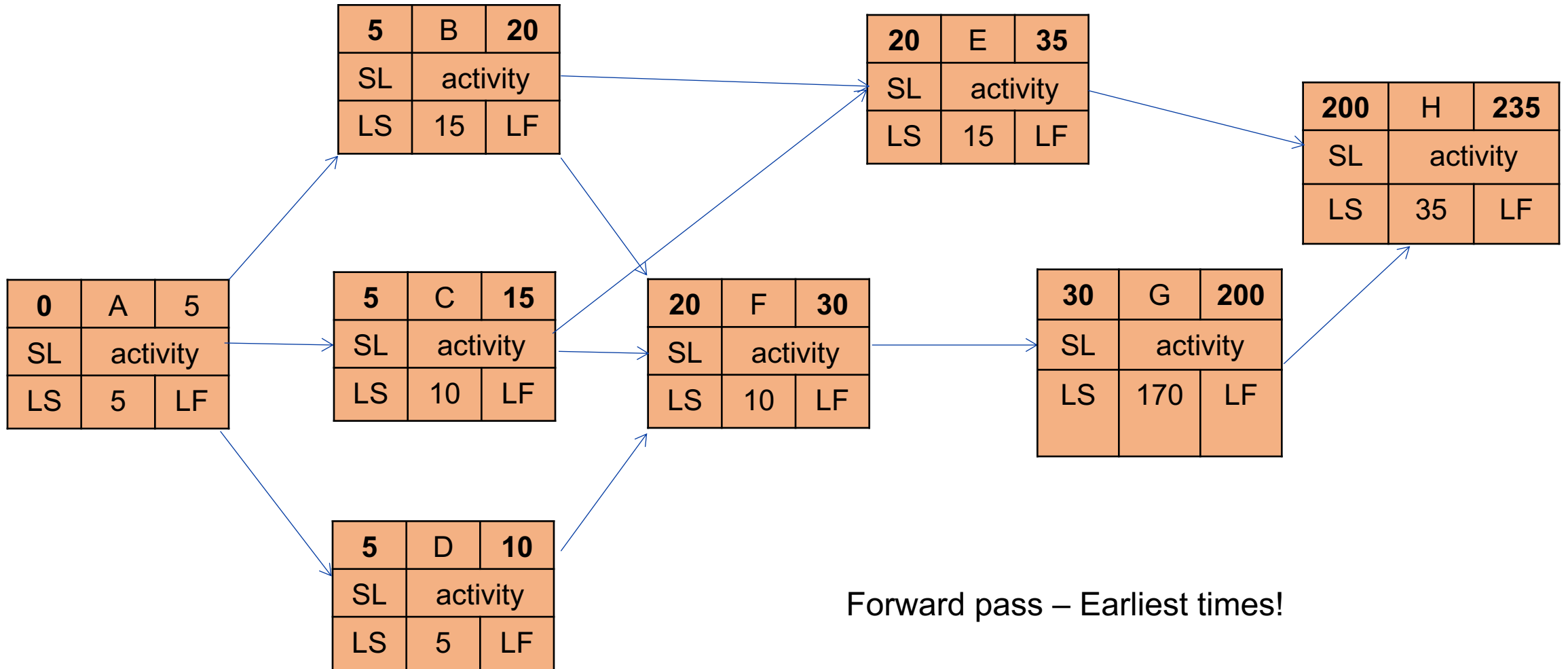


# Example

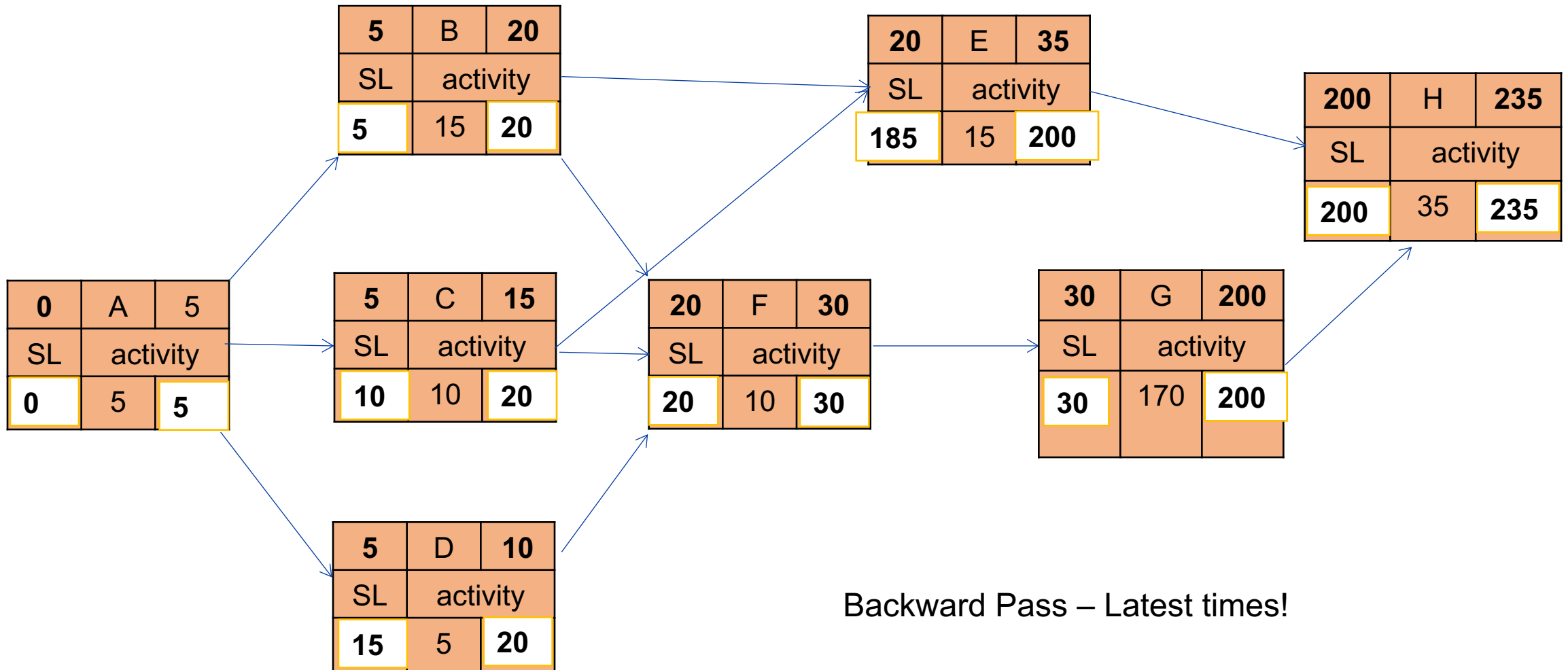
Activity	Predecessor	Duration
A	None	5
B	A	15
C	A	10
D	A	5
E	B,C	15
F	B,C,D	10
G	F	170
H	E,G	35



# Example

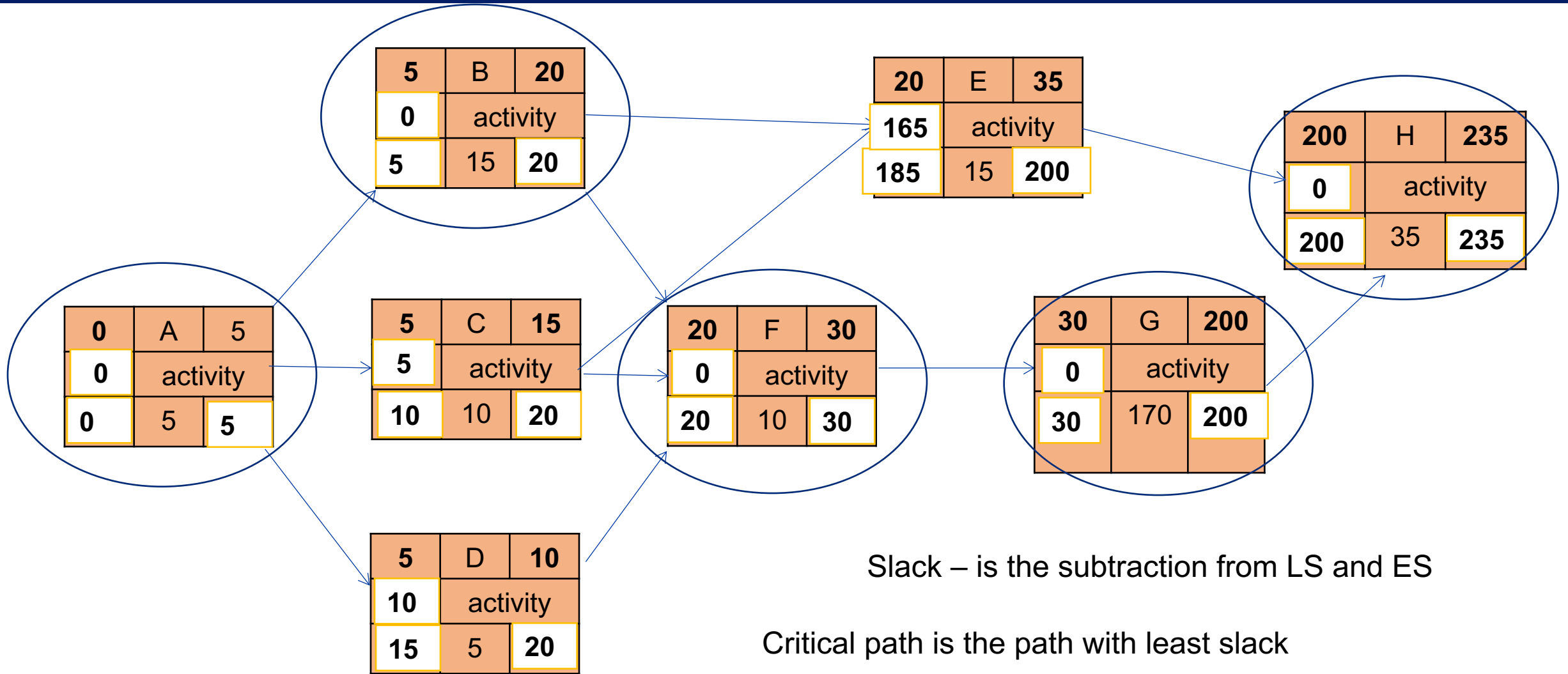


# Example



Backward Pass – Latest times!

# Example



Slack – is the subtraction from LS and ES

Critical path is the path with least slack

Critical path is **A-B-F-G-H**

# Individual task

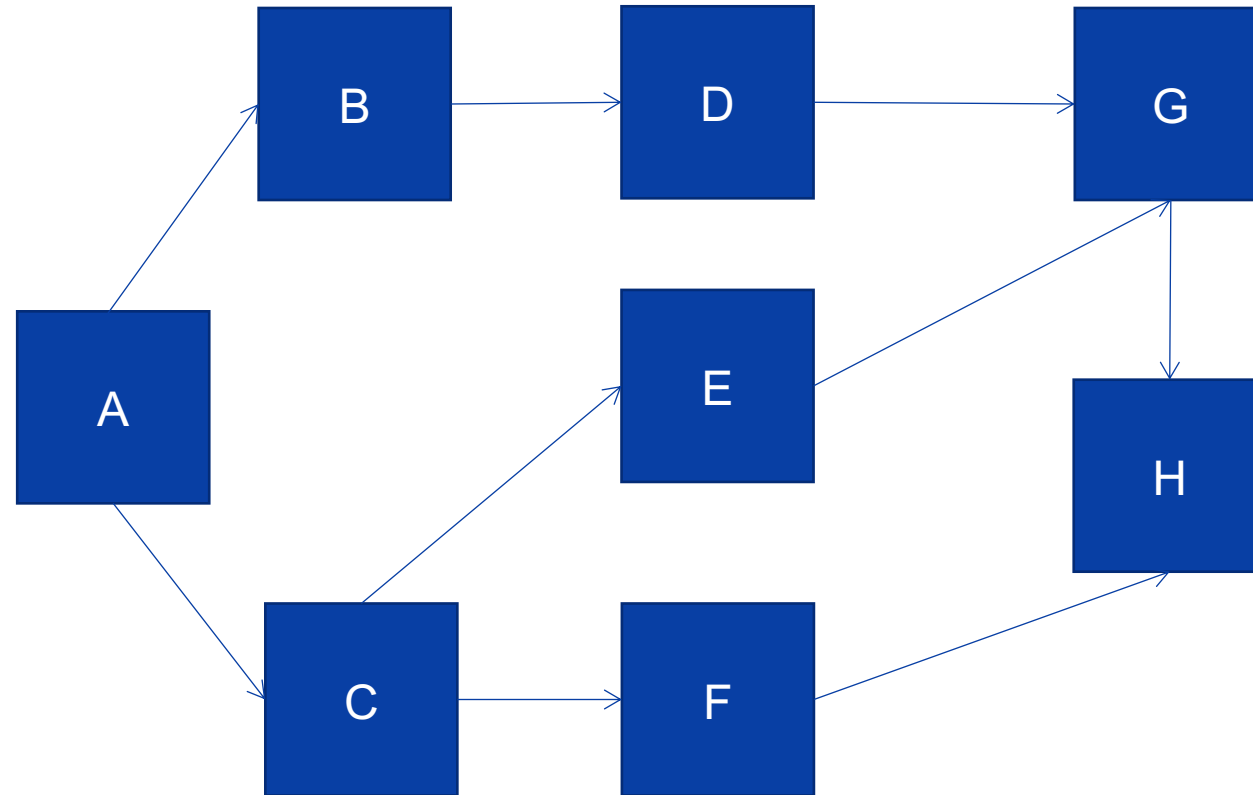
Activity	Predecessor	Duration
A	None	3
B	A	4
C	A	2
D	B	5
E	C	1
F	C	2
G	D, E	4
H	F, G	3

## Required:

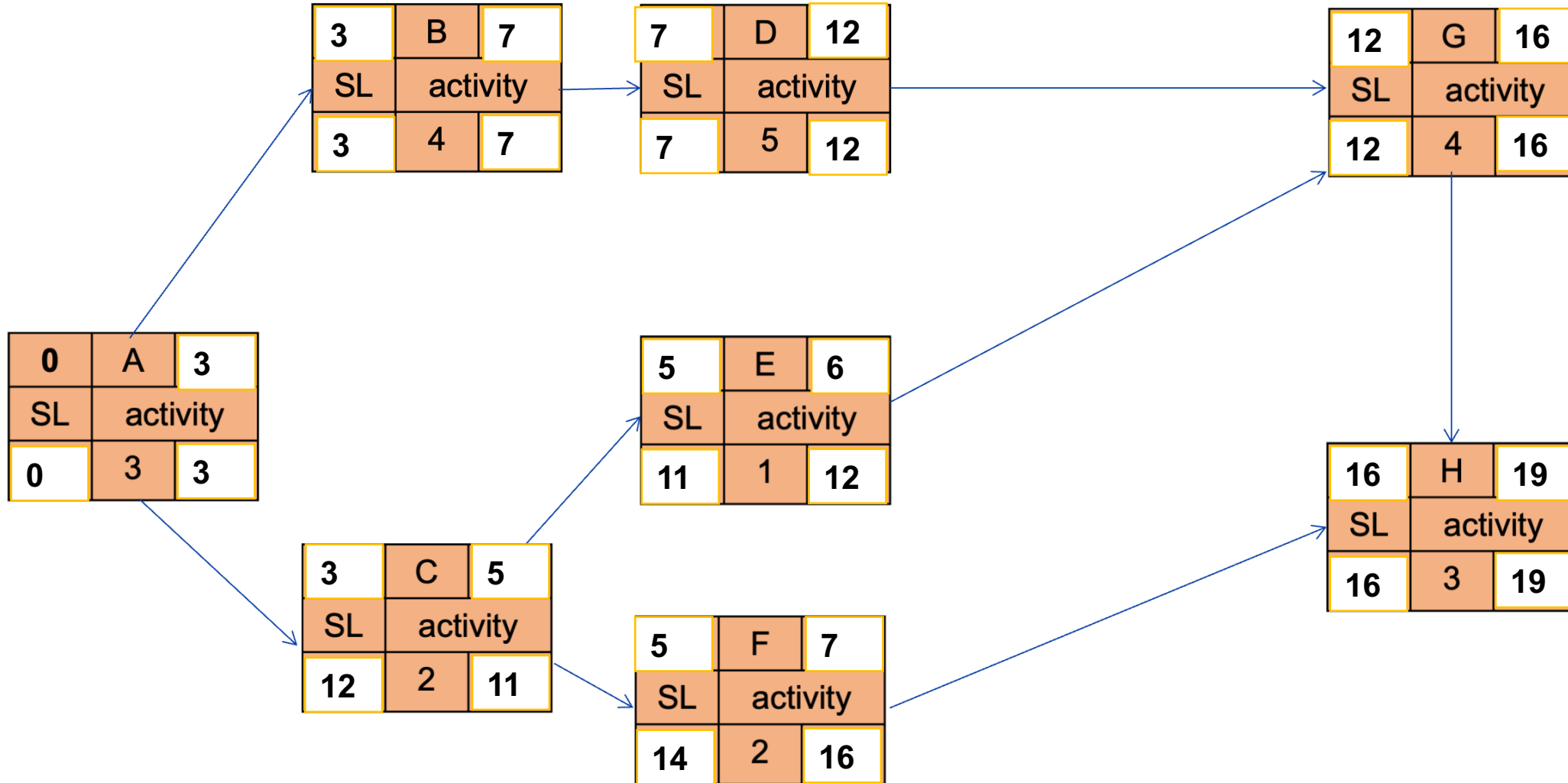
1. To create a network diagram from data given in a table
2. To complete a network diagram by filling-in ES/EF and LS/LF
3. To calculate the float time (slack) for a given activity including both forward and backward paths
4. To define a critical path.

# Step 1. Create the Network

Activity	Predecessor	Duration
A	None	3
B	A	4
C	A	2
D	B	5
E	C	1
F	C	2
G	D, E	4
H	F, G	3



# Step 2. Forward Pass and Backward



Critical path is **A-B-D-G-H**

**QUESTIONS?**



- Larson, E., & Gray, C. (2018). Project Management: The Managerial Process 7e. McGraw Hill.
- Pinto, J. K. (2007). Project management: achieving competitive advantage. Upper Saddle River, NJ, USA: Pearson/Prentice Hall.