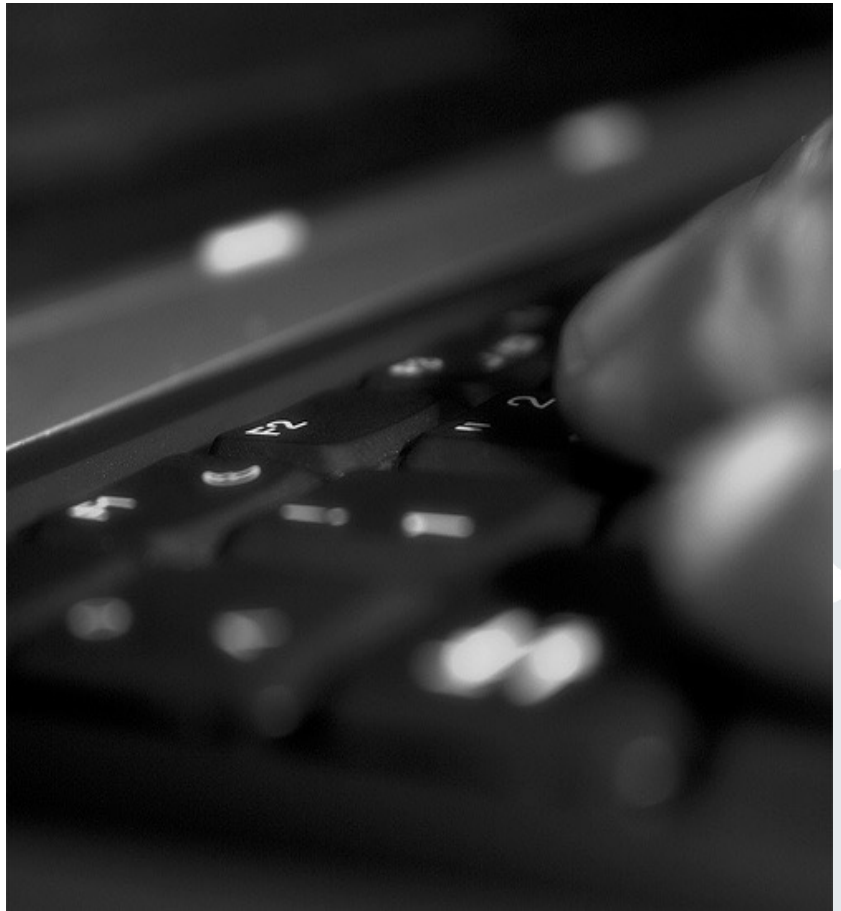


Mentorium 4  
Business Informatics 2 (PWIN)

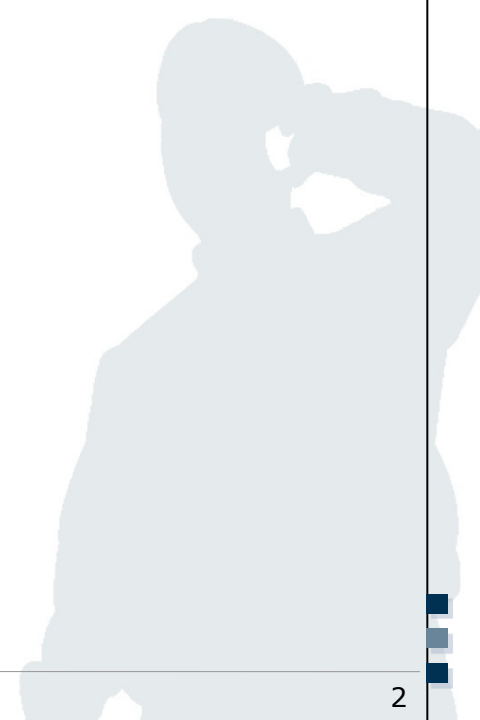
Management of IT Projects &  
Software Engineering

Sascha Löbner, M.Sc.  
[www.m-chair.de](http://www.m-chair.de)



Jenser (Flickr.com)

- Network Plan
- Work Breakdown Structure
- Structure of Project Teams



## 1.1 Describe the terms critical path and critical activity.

- An **activity** is called **critical** if its slack time is 0 (earliest start time = latest start time).
- The **critical path** is the longest path or paths that leads from the initial to the terminal activity. It describes the set of all critical activities.

## 1.2 Which information is needed to determine the critical path?

- To calculate the critical path, all **activities**, their **durations** and **dependencies** are needed.

1.3 Determine the project duration and the critical path for the following situation. Use the known schema (see below) to represent the activity times.

Activity	Duration (days)	Preceding Activities
Activity A	2	-
Activity B	4	{Activity A}
Activity C	12	{Activity B}
Activity D	1	{Activity C, Activity E}
Activity E	5	{Activity B}
Activity F	4	{Activity E}
Activity G	3	{Activity D, Activity F}

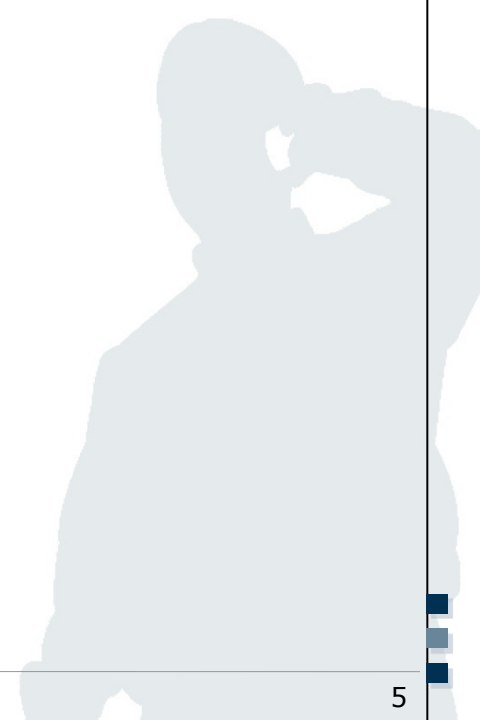
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

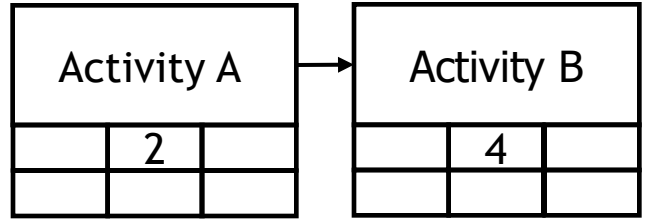
Activity A		
	2	

Act.	Dur.	Req.
A	2	-
B	4	A
C	12	B
D	1	C, E
E	5	B
F	4	E
G	3	D,F

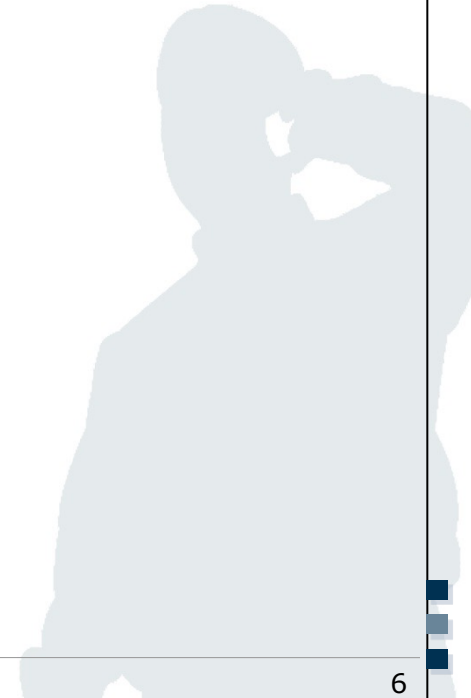


# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

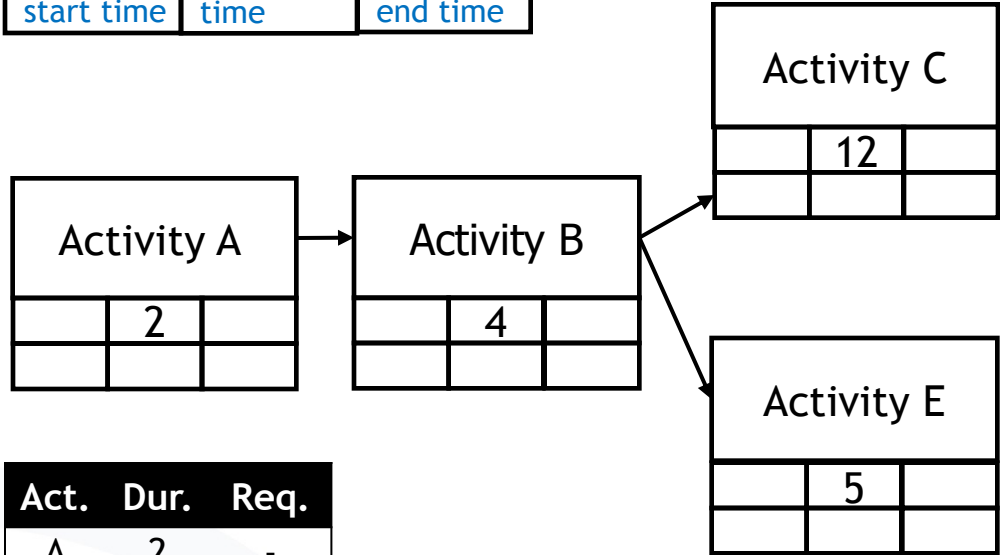


Act.	Dur.	Req.
A	2	-
B	4	A
C	12	B
D	1	C, E
E	5	B
F	4	E
G	3	D,F



# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

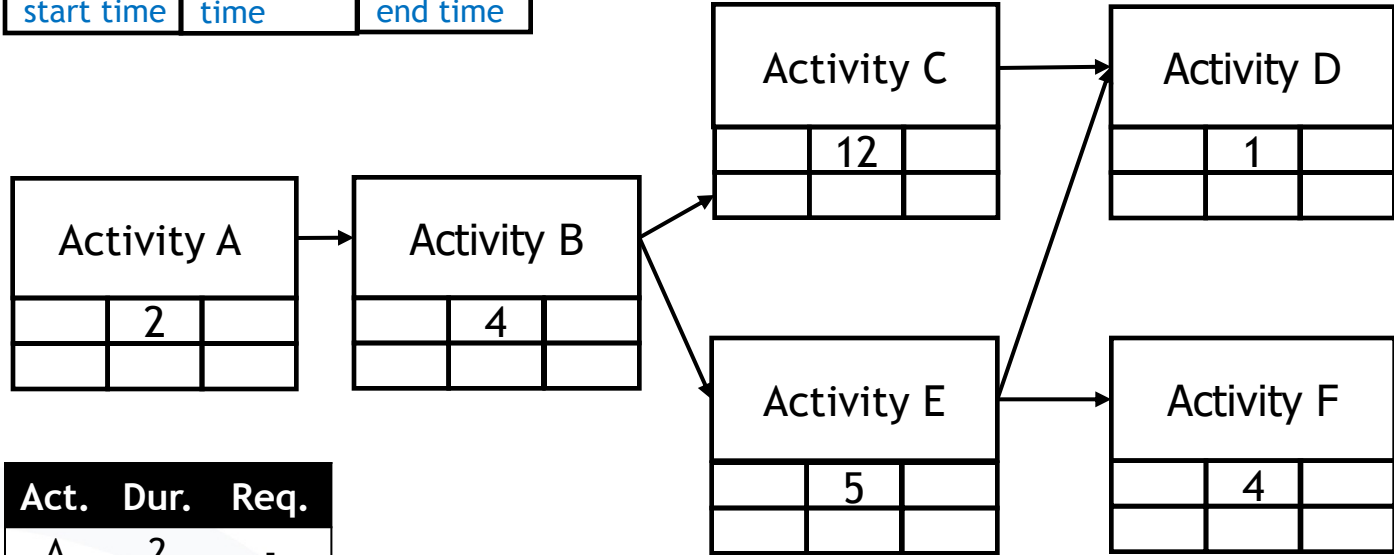


Act.	Dur.	Req.
A	2	-
B	4	A
C	12	B
D	1	C, E
E	5	B
F	4	E
G	3	D, F

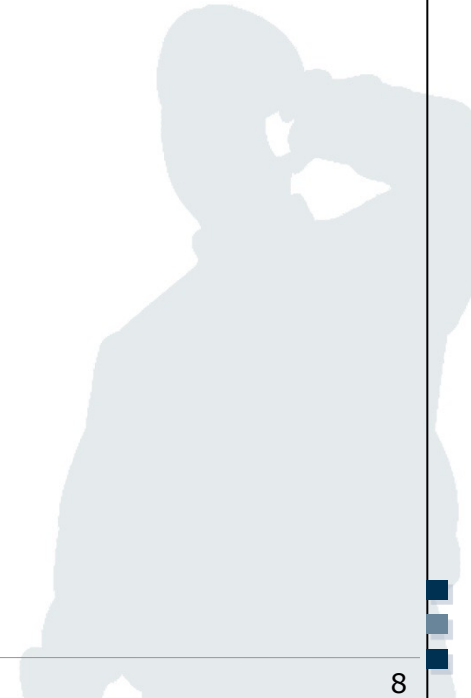


# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



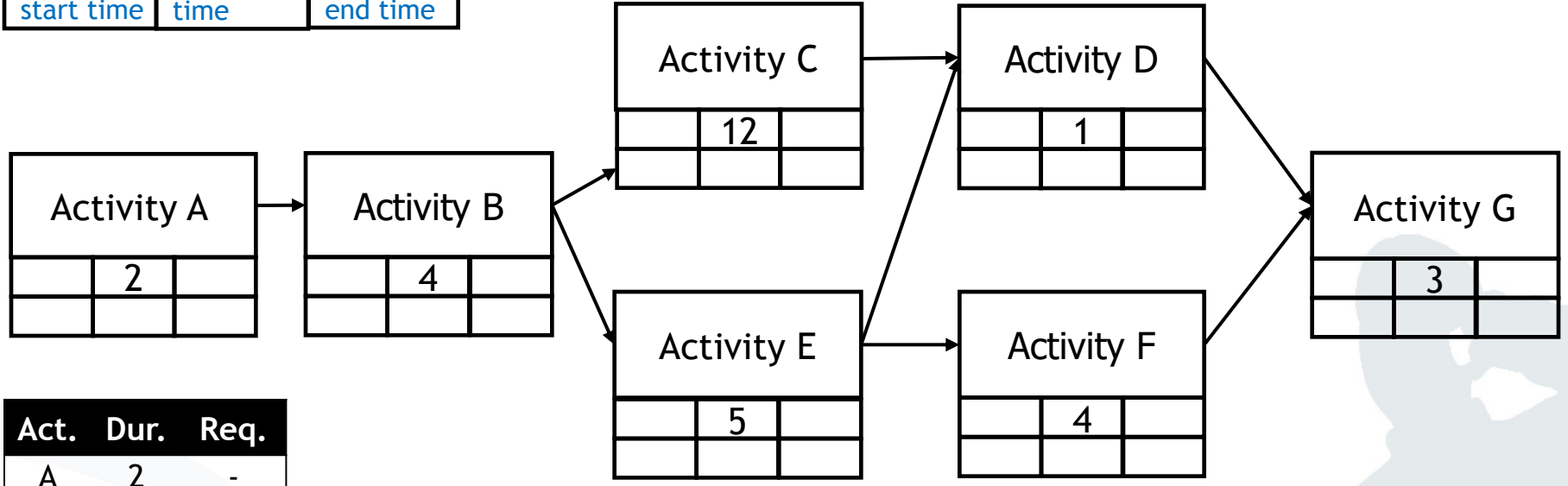
Act.	Dur.	Req.
A	2	-
B	4	A
C	12	B
D	1	C, E
E	5	B
F	4	E
G	3	D, F





# Network Plan: 1<sup>st</sup> Example

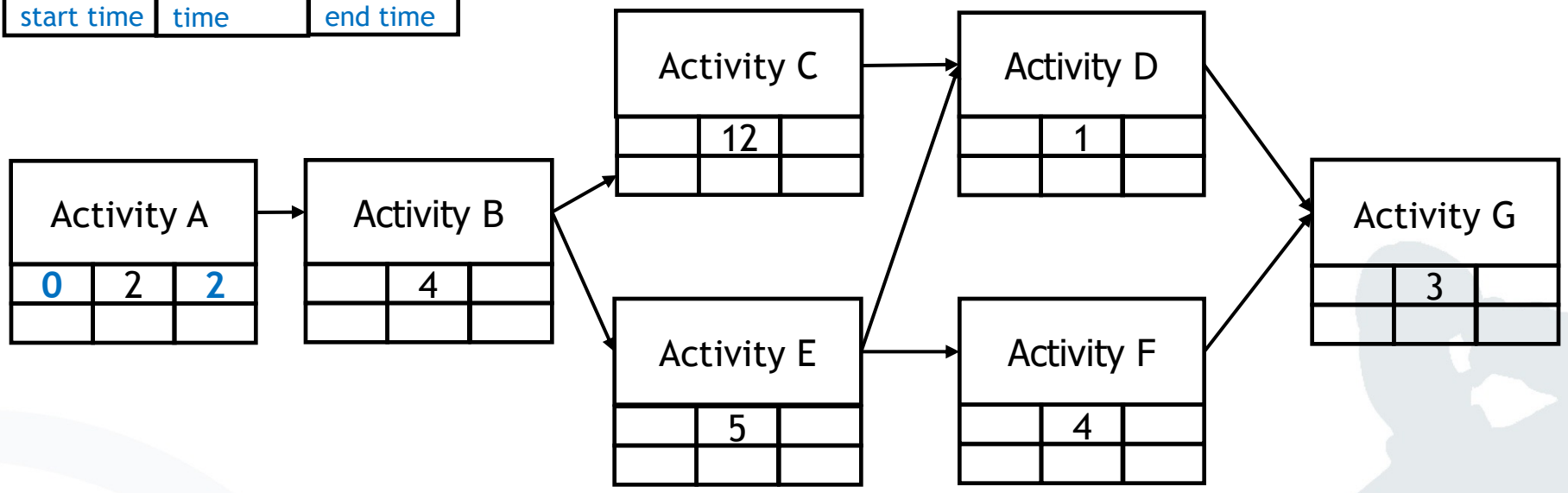
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



Act.	Dur.	Req.
A	2	-
B	4	A
C	12	B
D	1	C, E
E	5	B
F	4	E
G	3	D, F

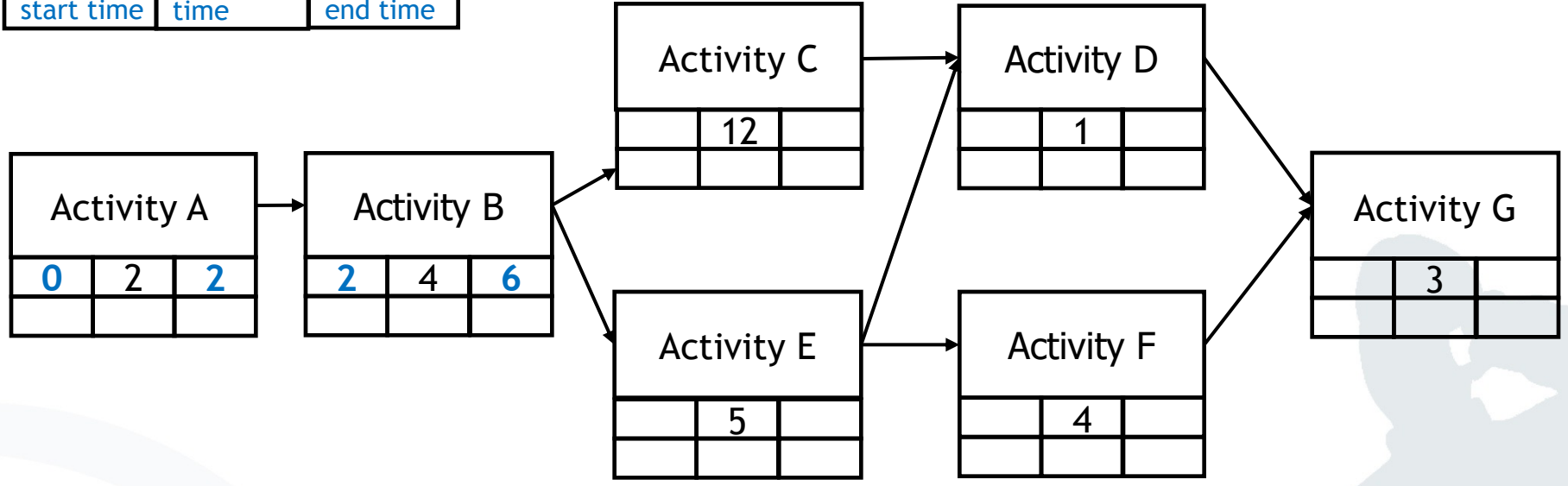
# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 1<sup>st</sup> Example

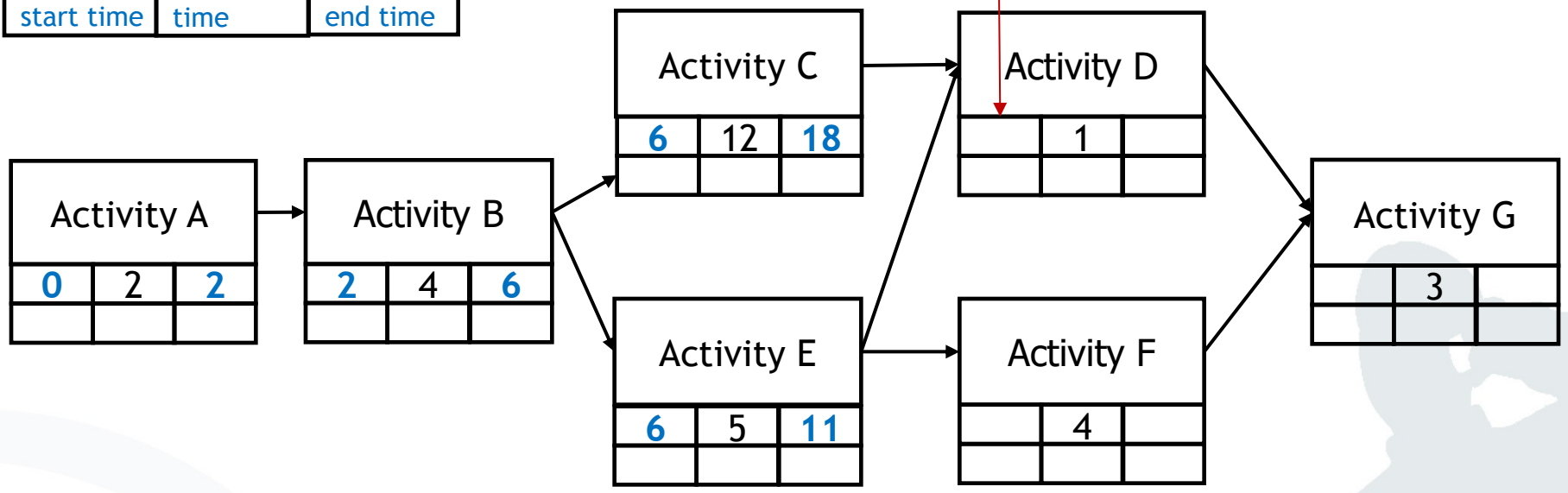
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 1<sup>st</sup> Example

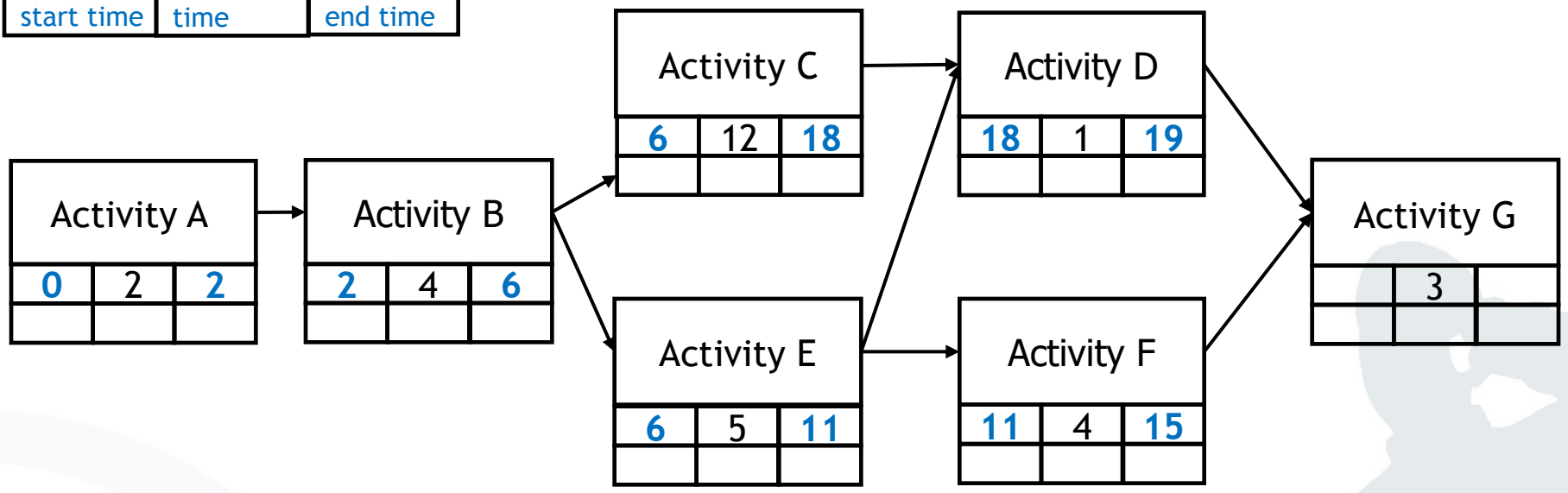
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

max(earliest end time [C], earliest end time [E])  
 max(11, 18) = ...



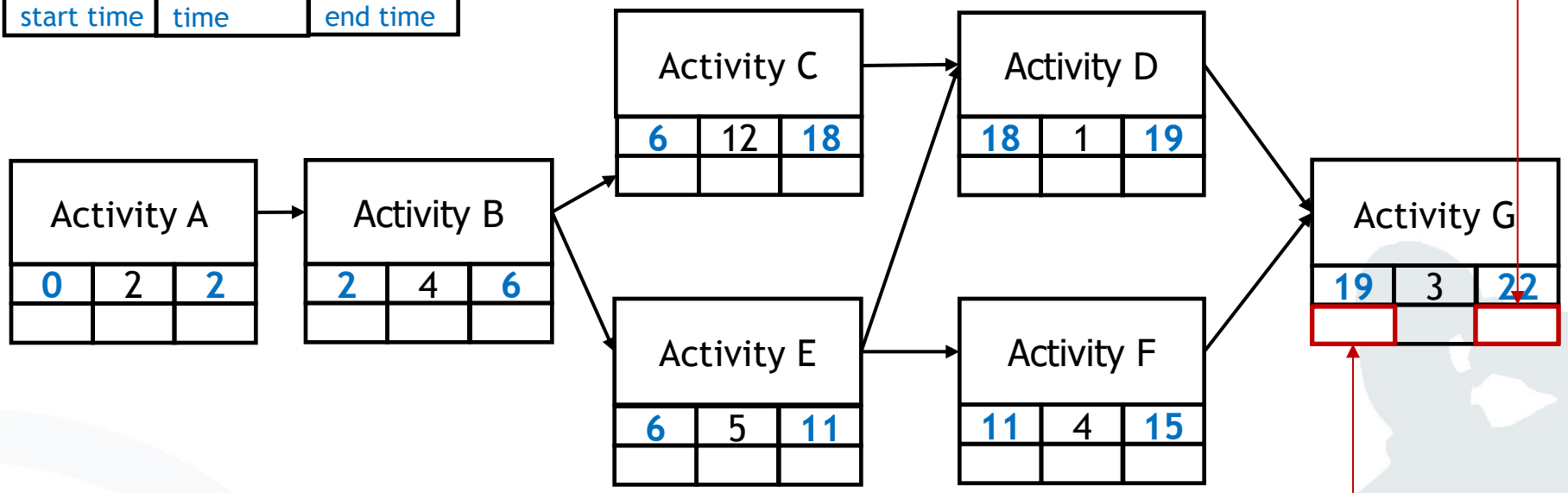
# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

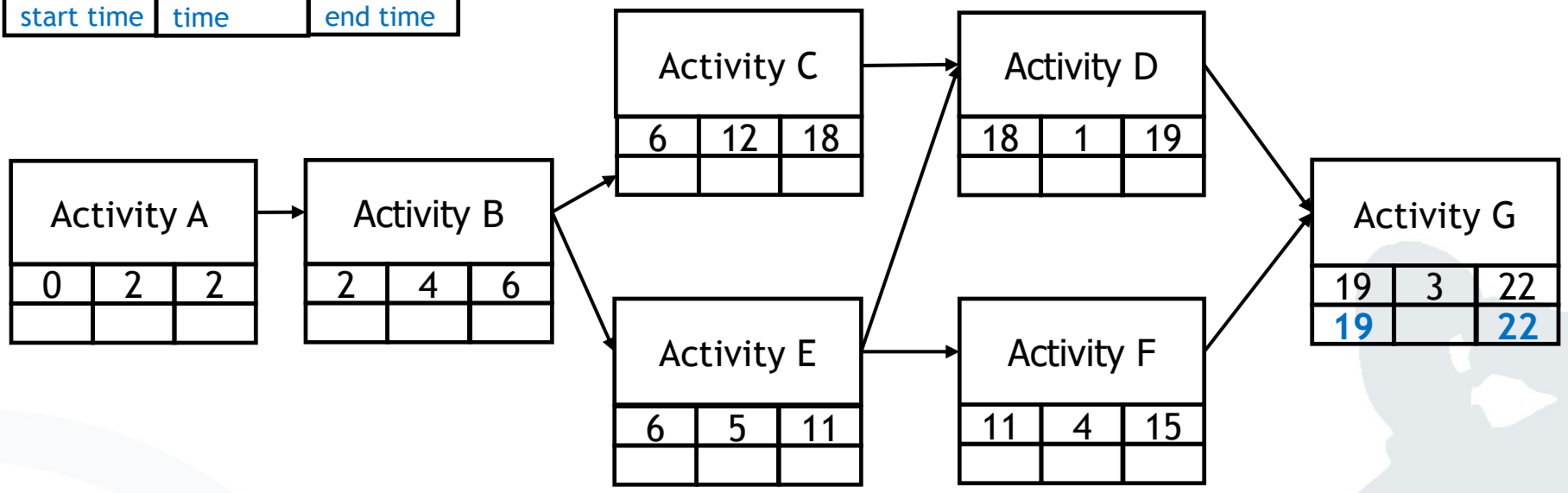


If |subsequent| == 0:  
 latest end time = earliest end time  
 else:  
 min(latest start time [subsequent])

Latest end time [G]- Duration [G]

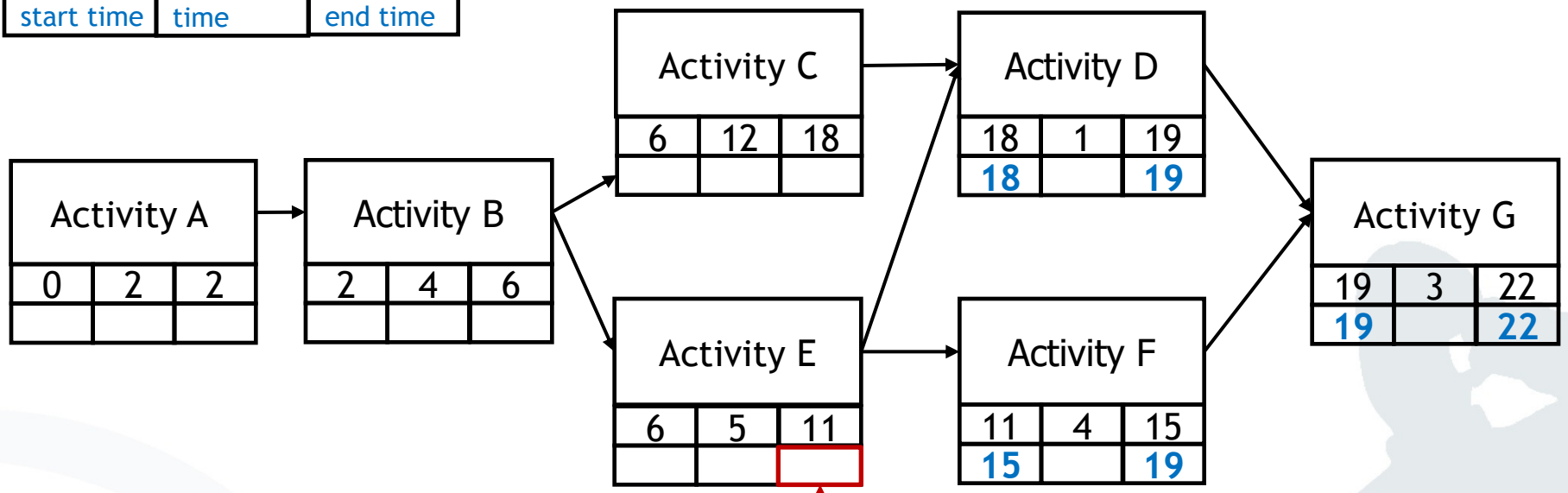
# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

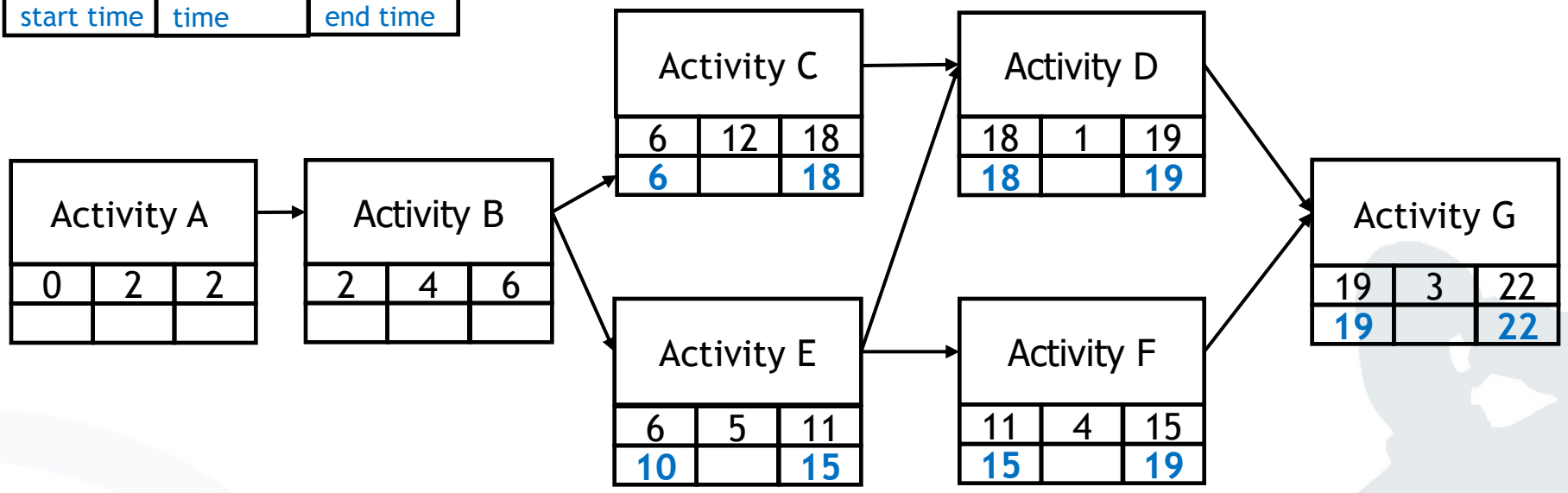


min(latest start time [D], latest start time [F])  
 min(15, 18) = ...



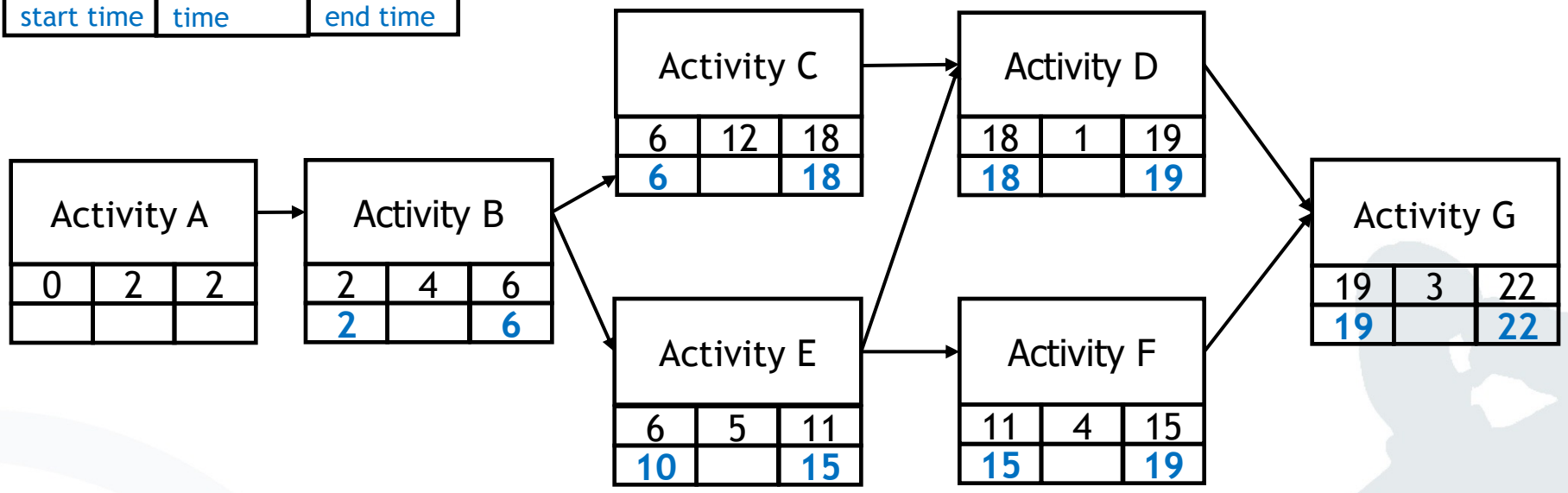
# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



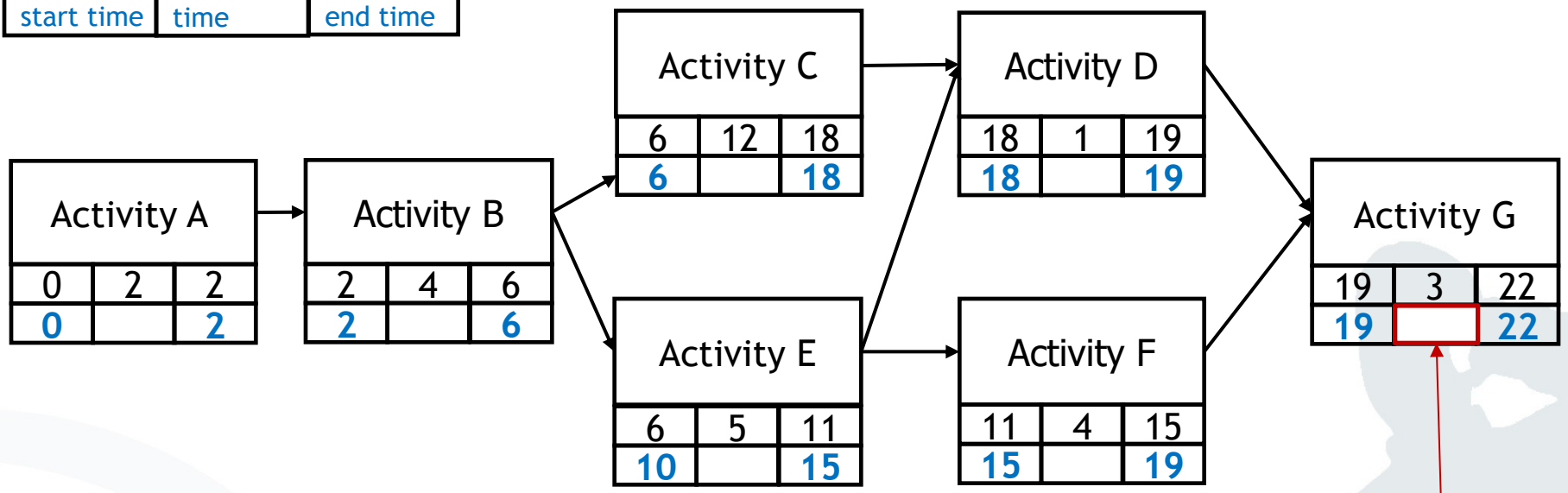
# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 1<sup>st</sup> Example

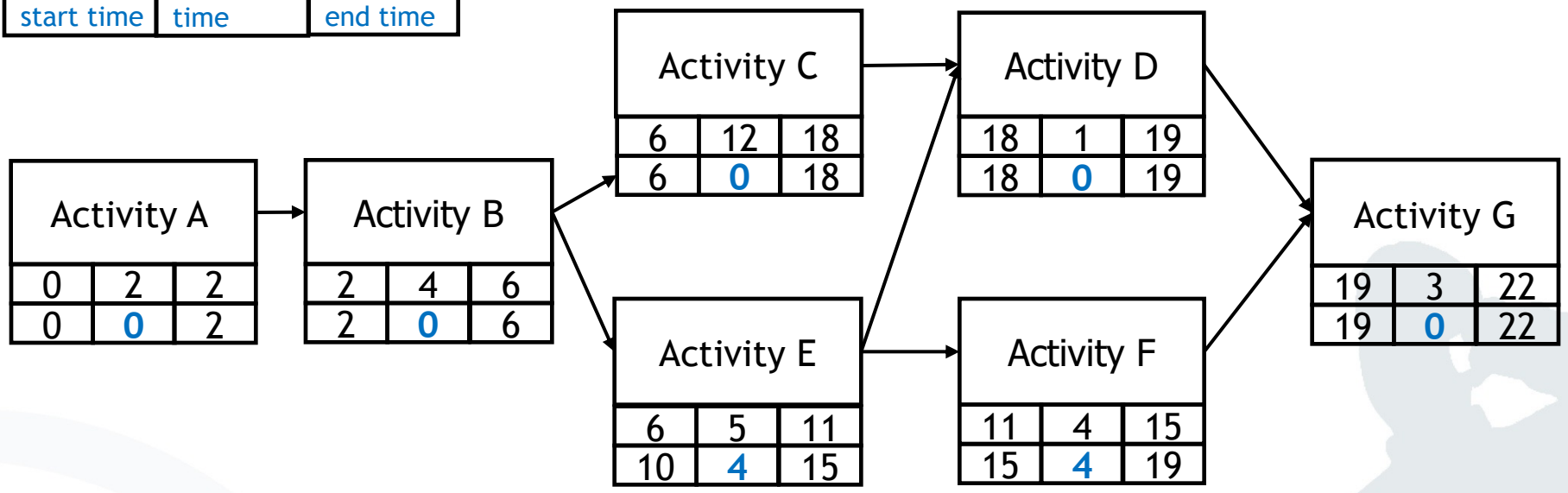
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



latest end time [G] - earliest end time [G]

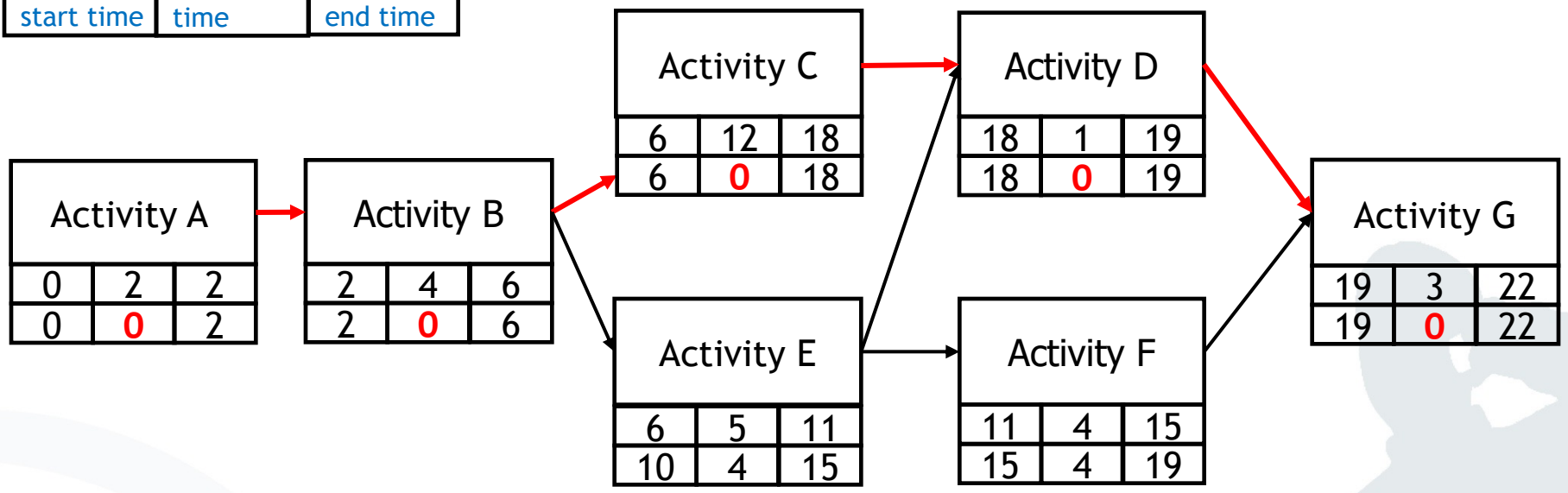
# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 1<sup>st</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



1.4 Determine the critical path based on the following activities.

Activity ID	Duration (days)	Preceding Activities
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

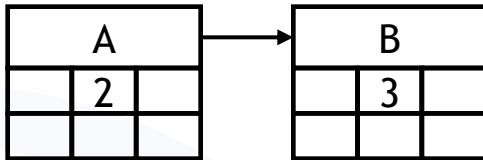
Act.	Dur.	Req.
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}

A		
	2	

# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

Act.	Dur.	Req.
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}

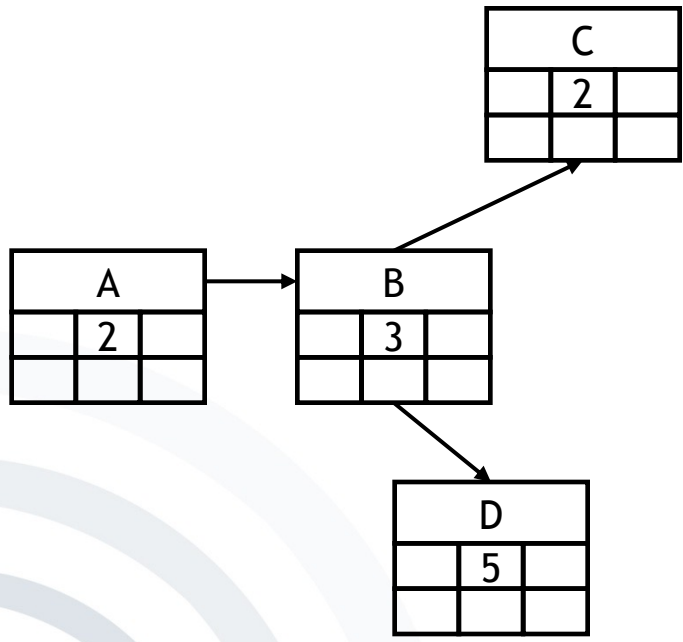




# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

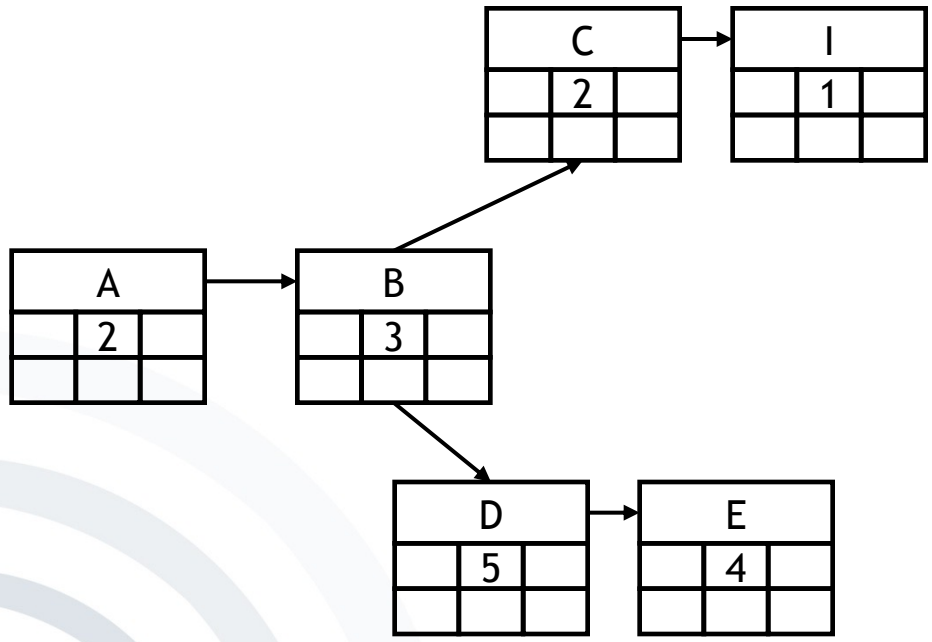
Act.	Dur.	Req.
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}



# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

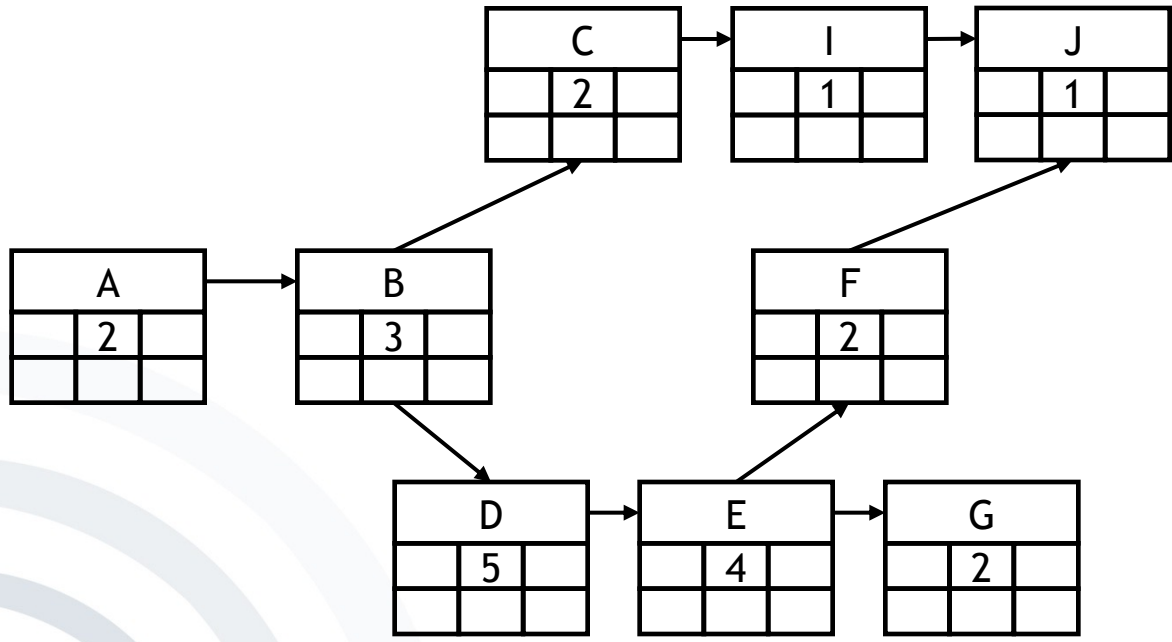
Act.	Dur.	Req.
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}



# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

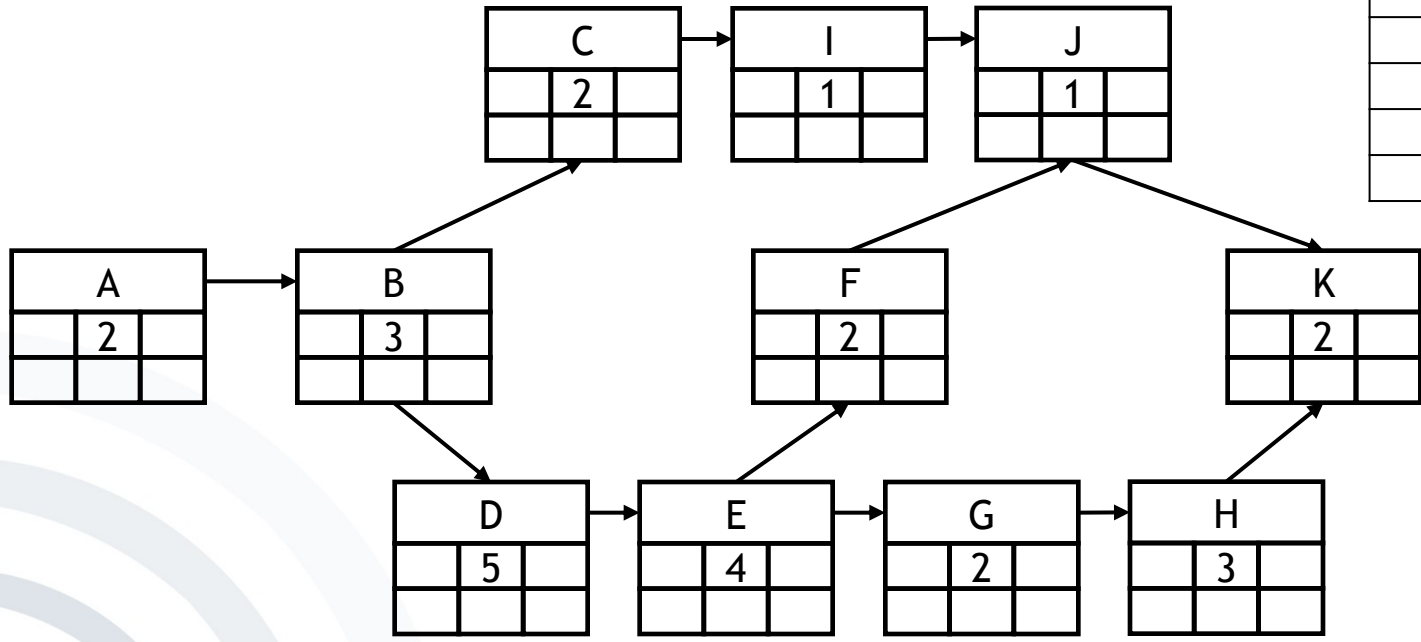
Act.	Dur.	Req.
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}



# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

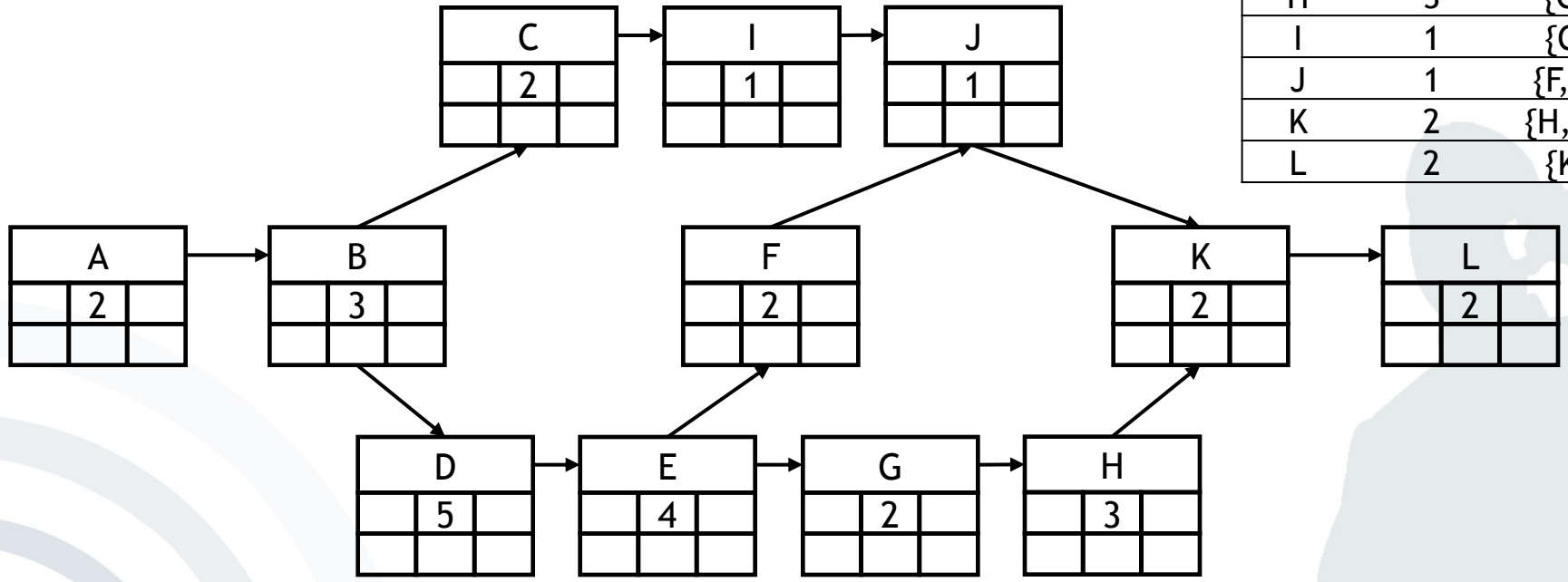
Act.	Dur.	Req.
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}



# Network Plan: 2<sup>nd</sup> Example

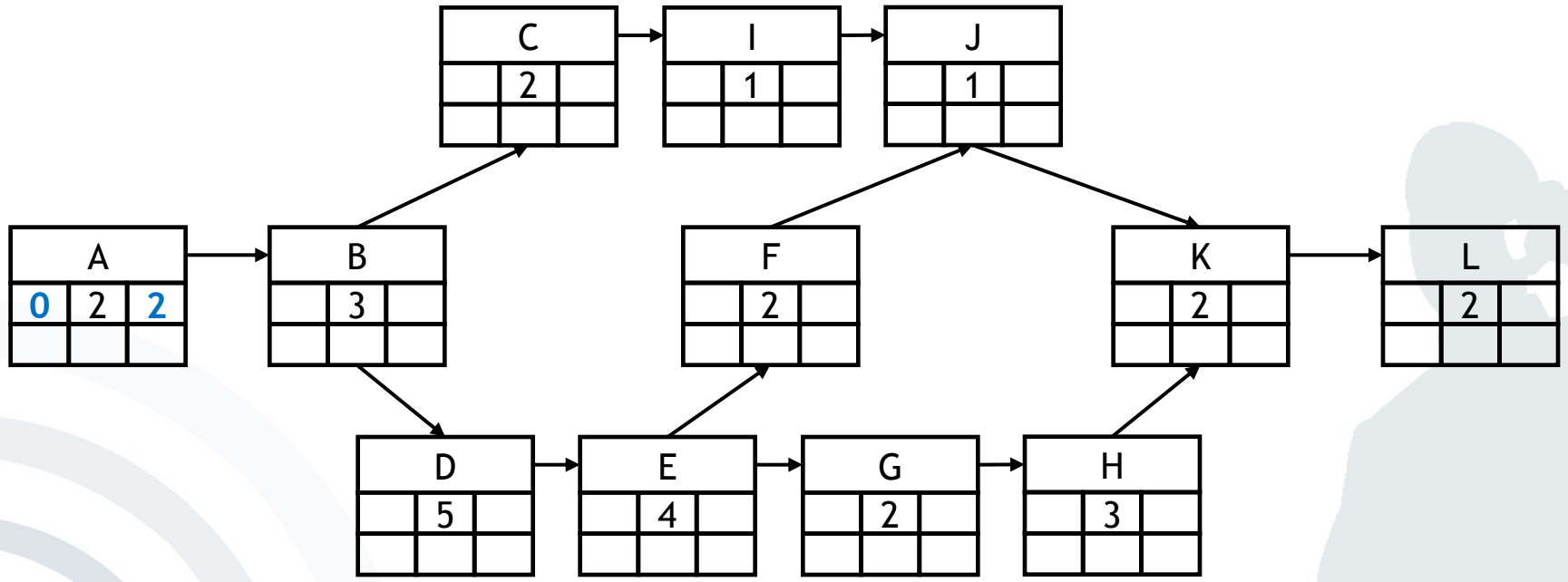
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

Act.	Dur.	Req.
A	2	-
B	3	{A}
C	2	{B}
D	5	{B}
E	4	{D}
F	2	{E}
G	2	{E}
H	3	{G}
I	1	{C}
J	1	{F, I}
K	2	{H, J}
L	2	{K}



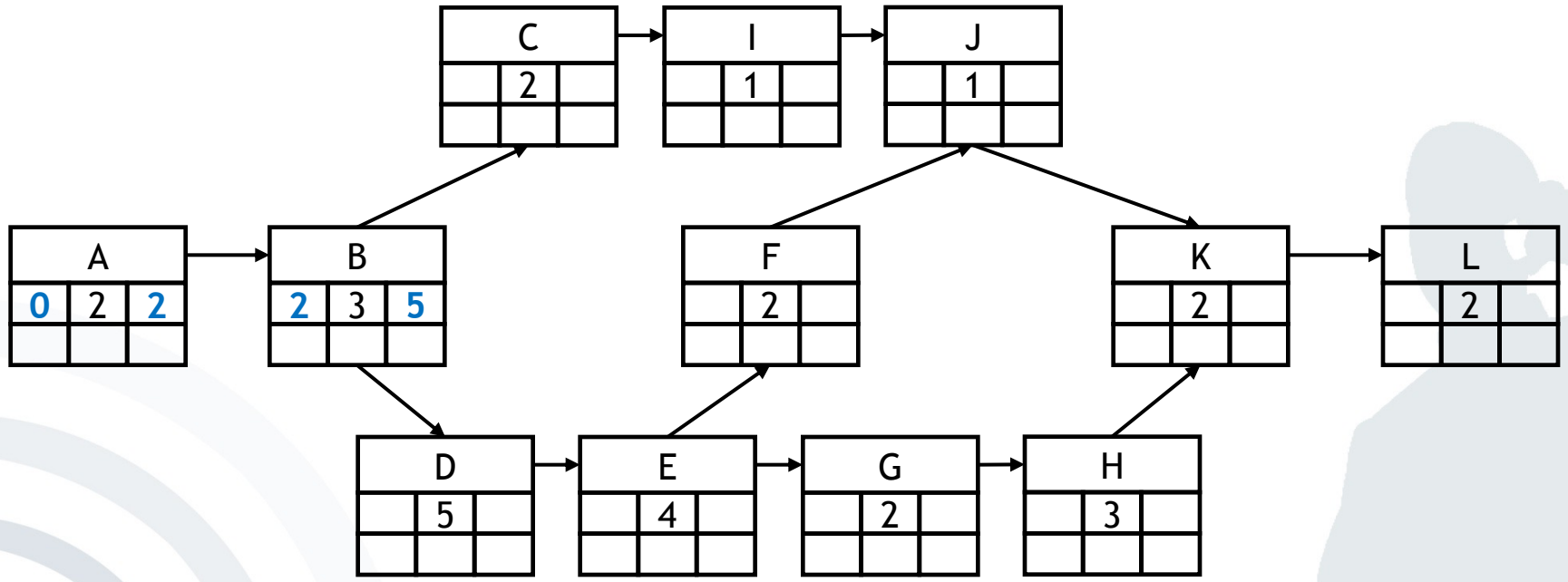
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



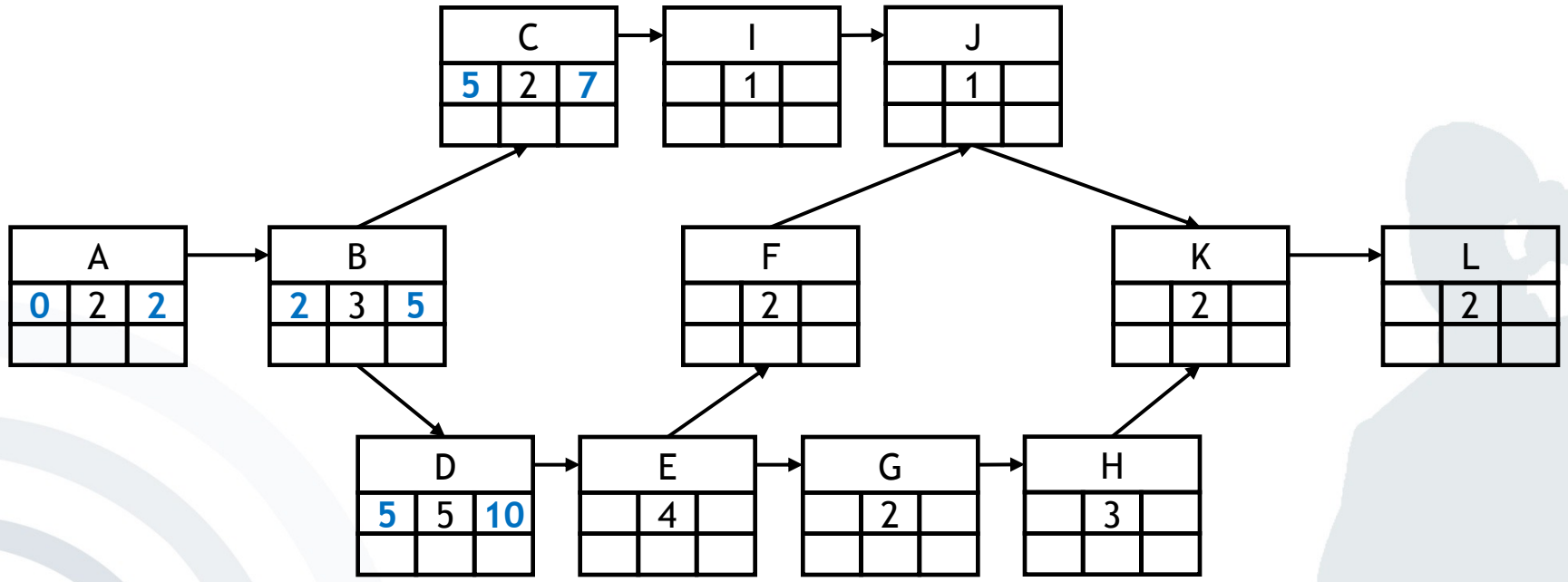
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 2<sup>nd</sup> Example

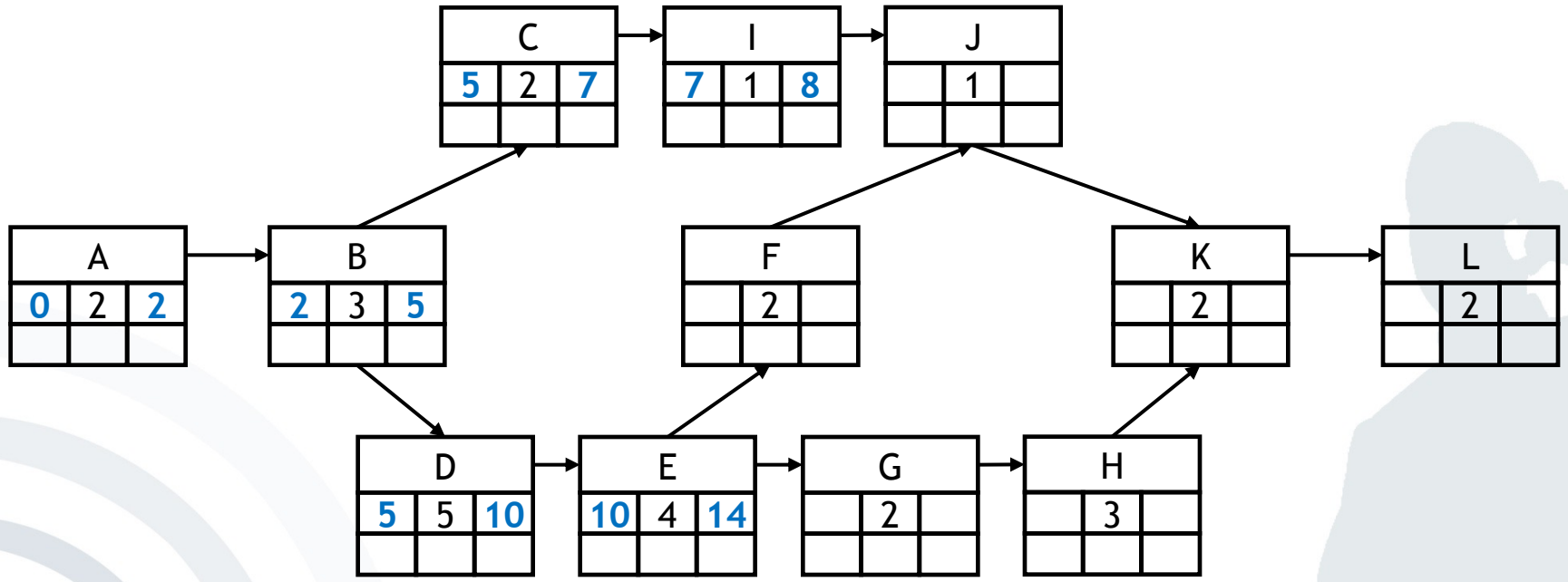
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time





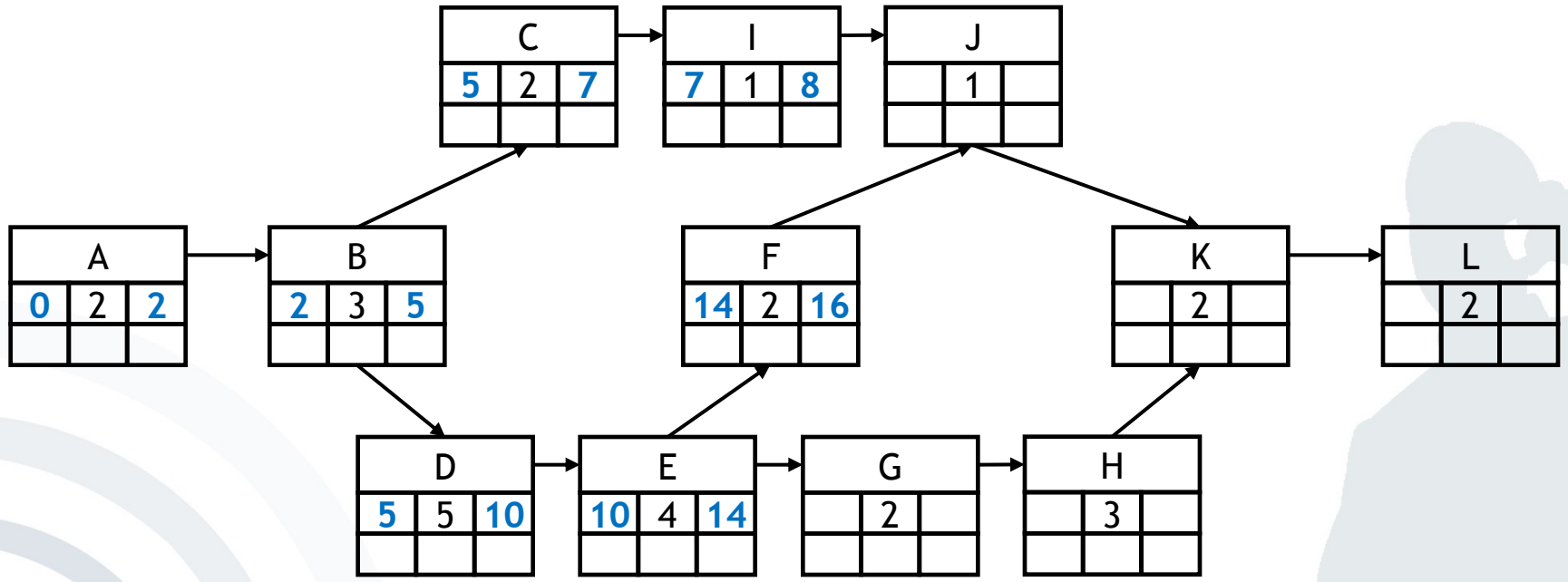
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



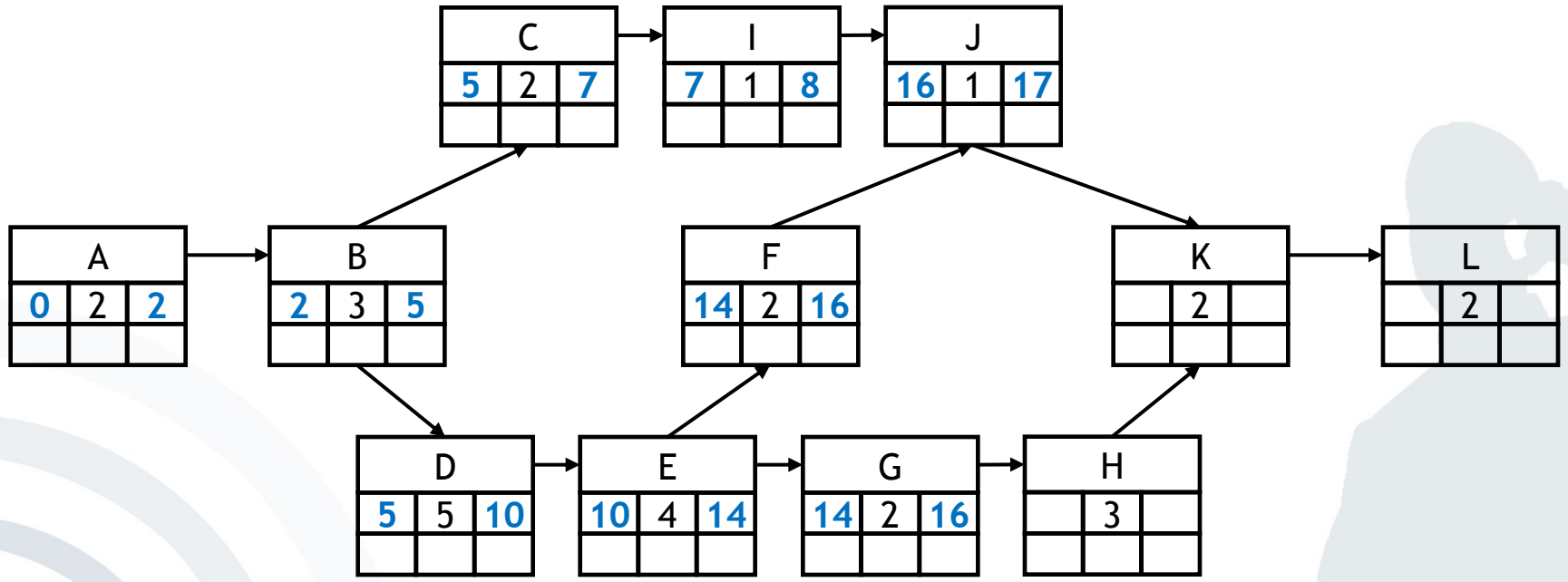
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



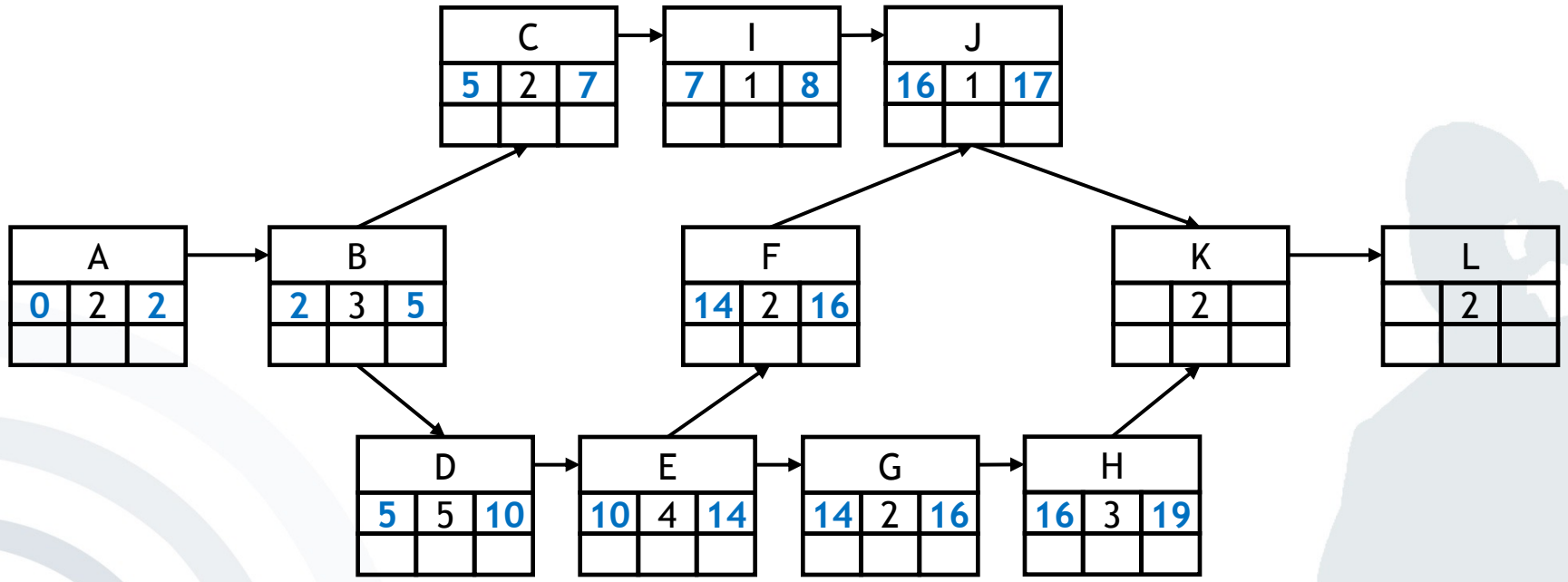
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



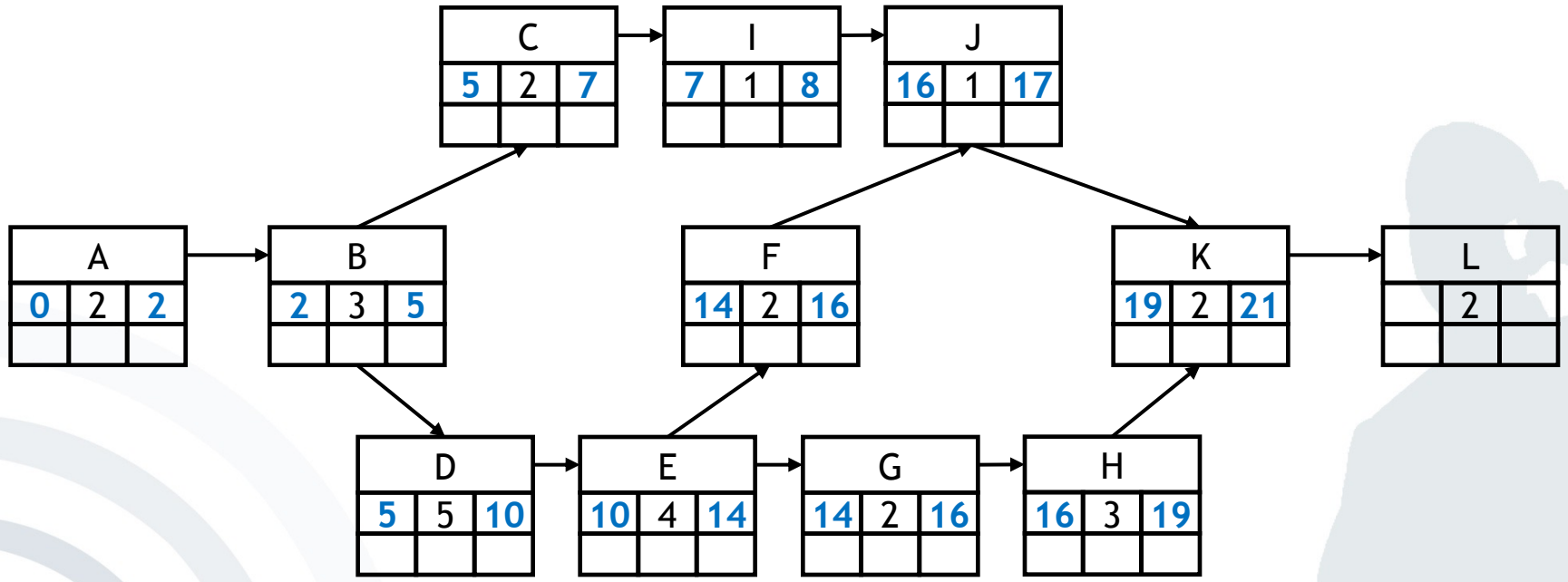
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



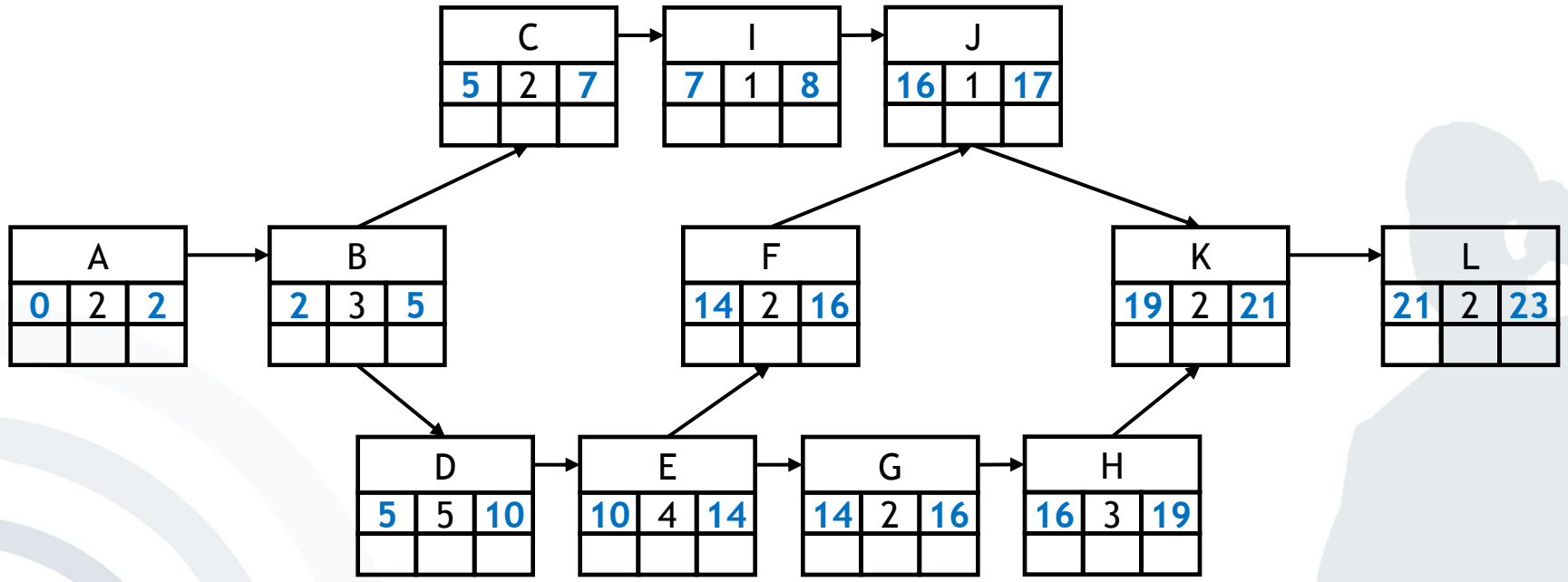
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



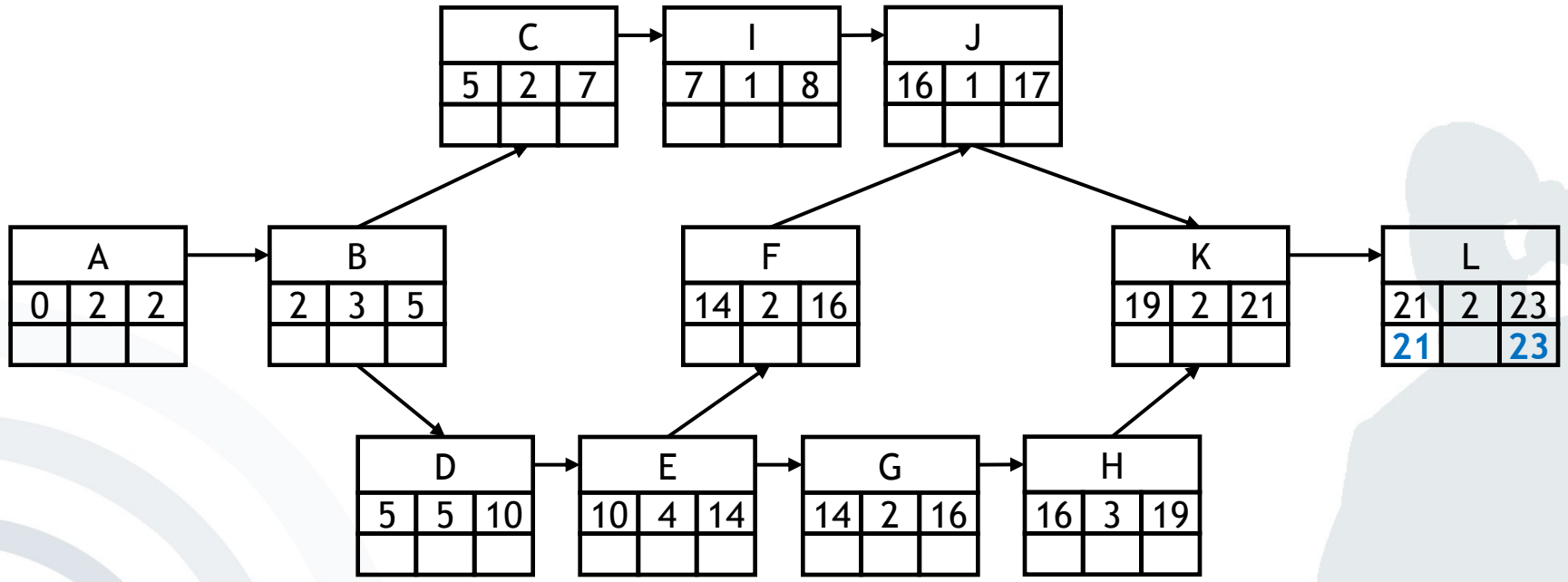
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



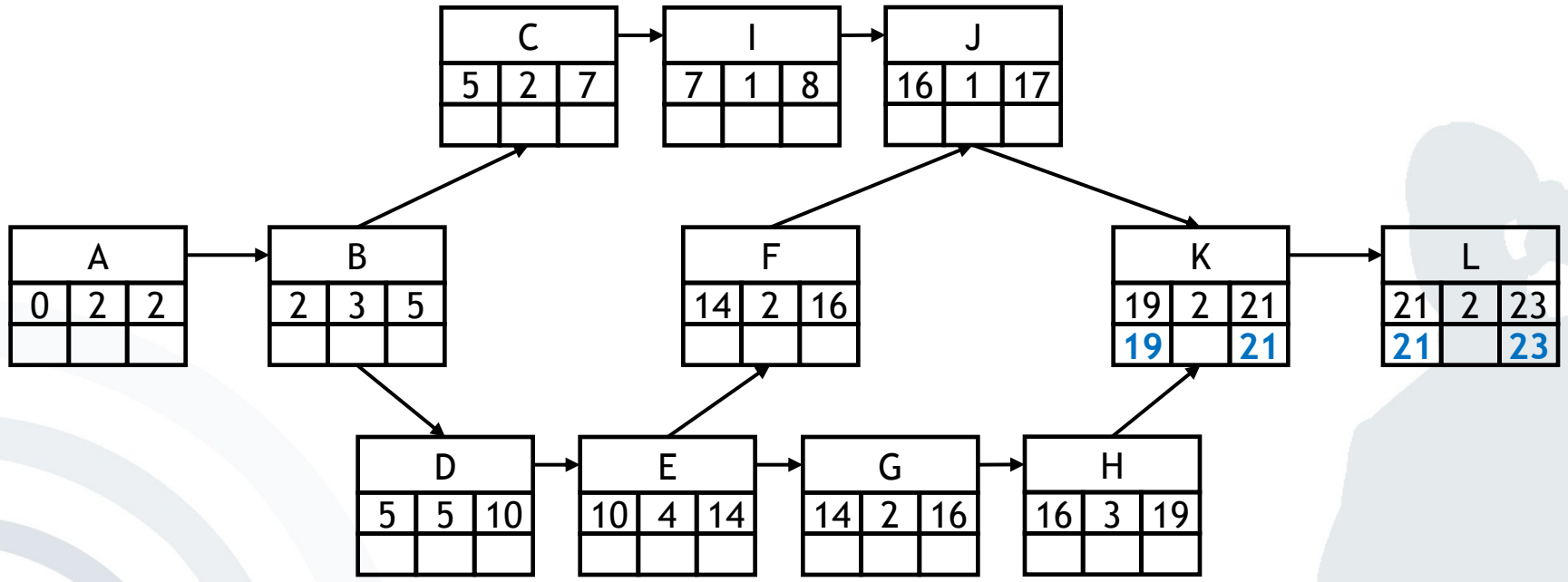
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



# Network Plan: 2<sup>nd</sup> Example

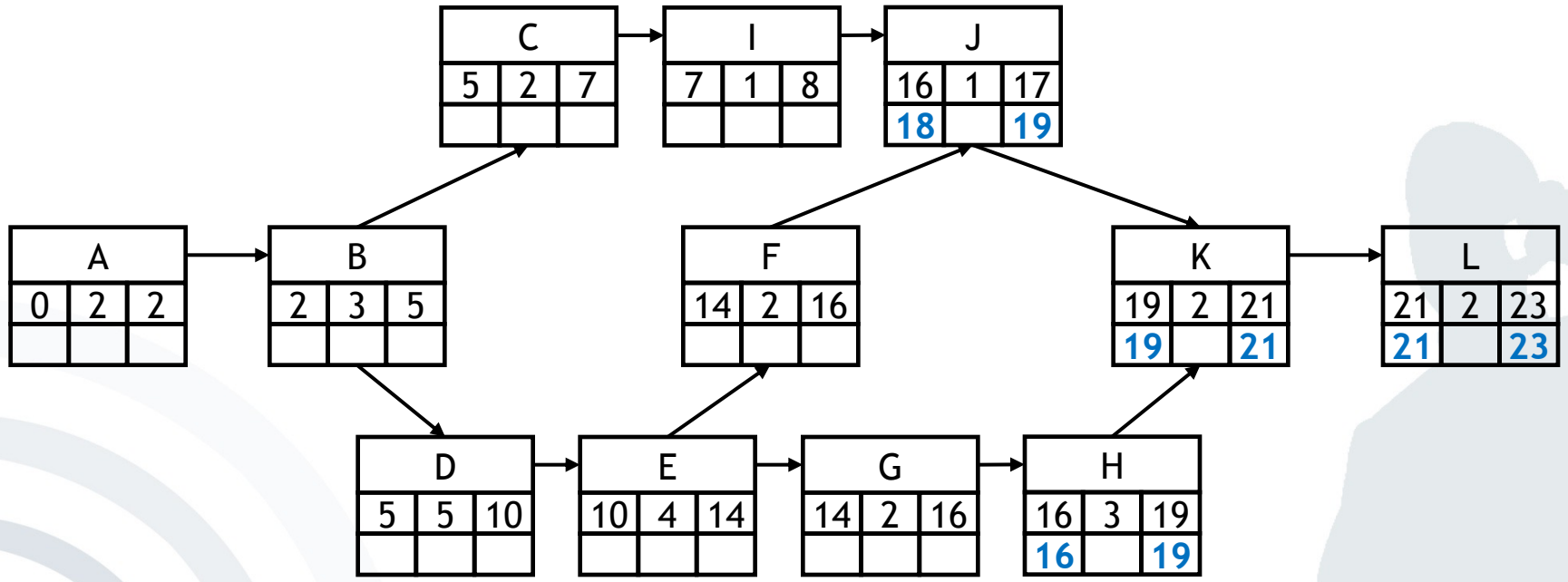
Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time





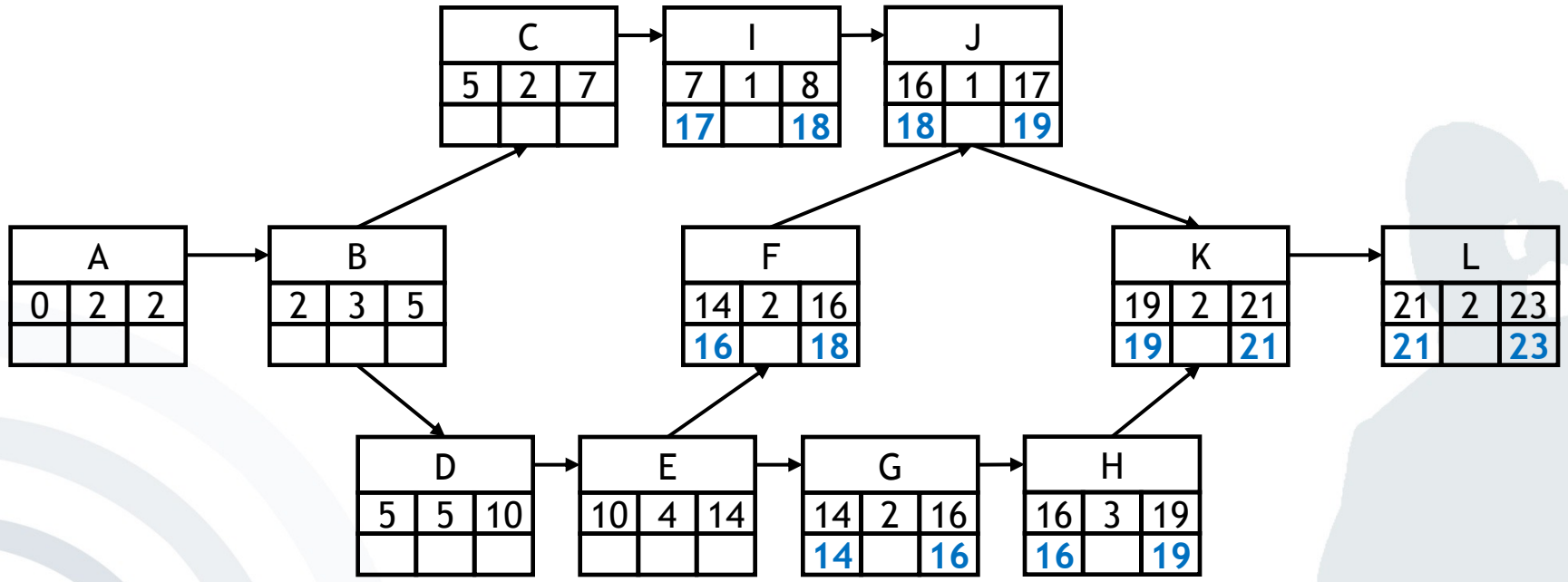
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



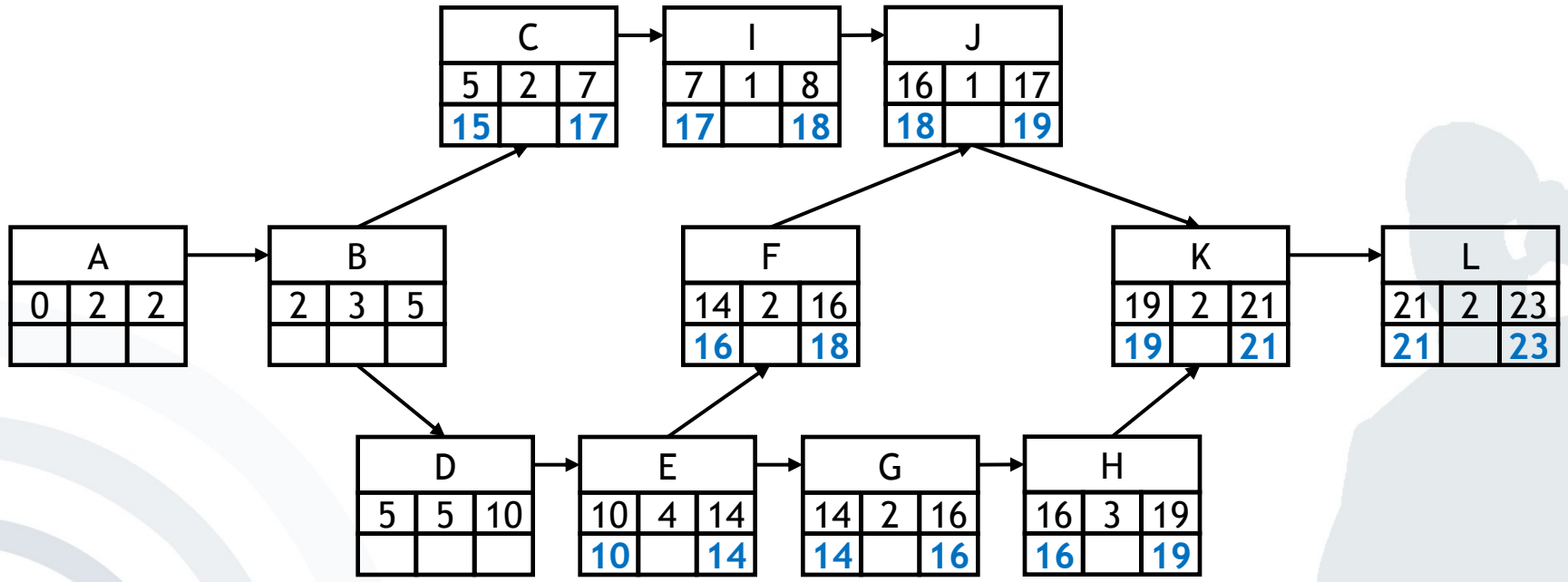
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



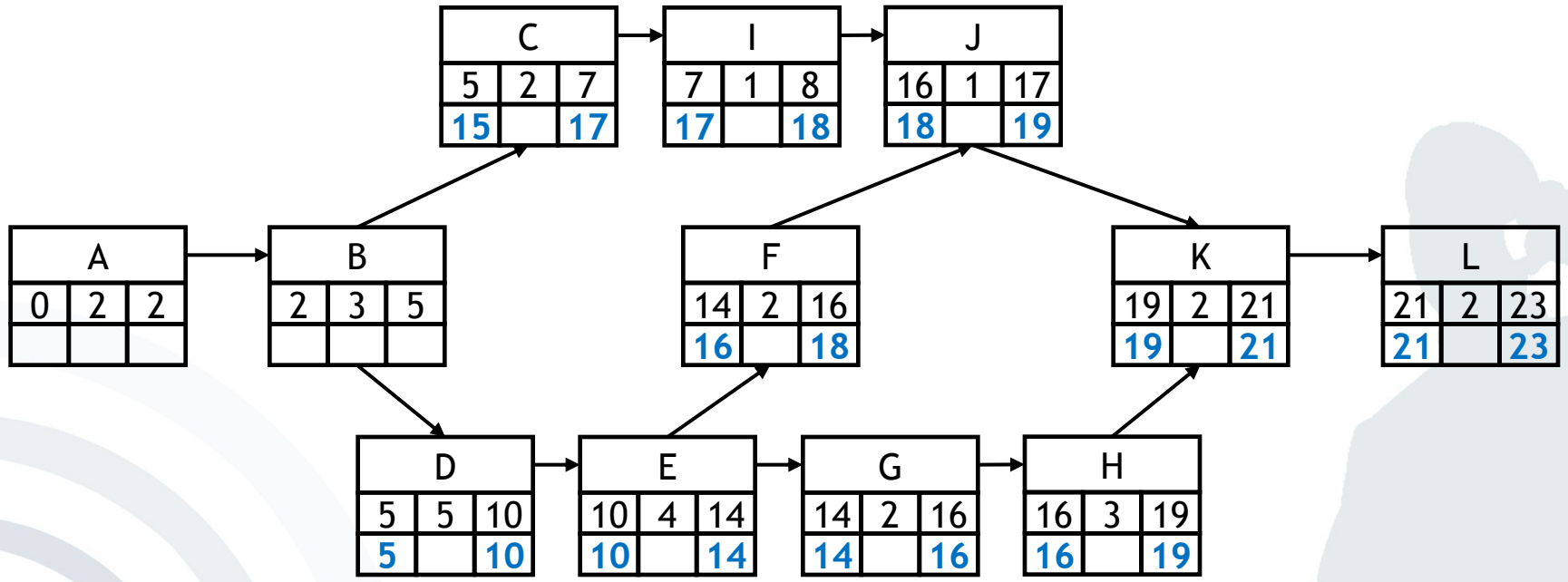
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



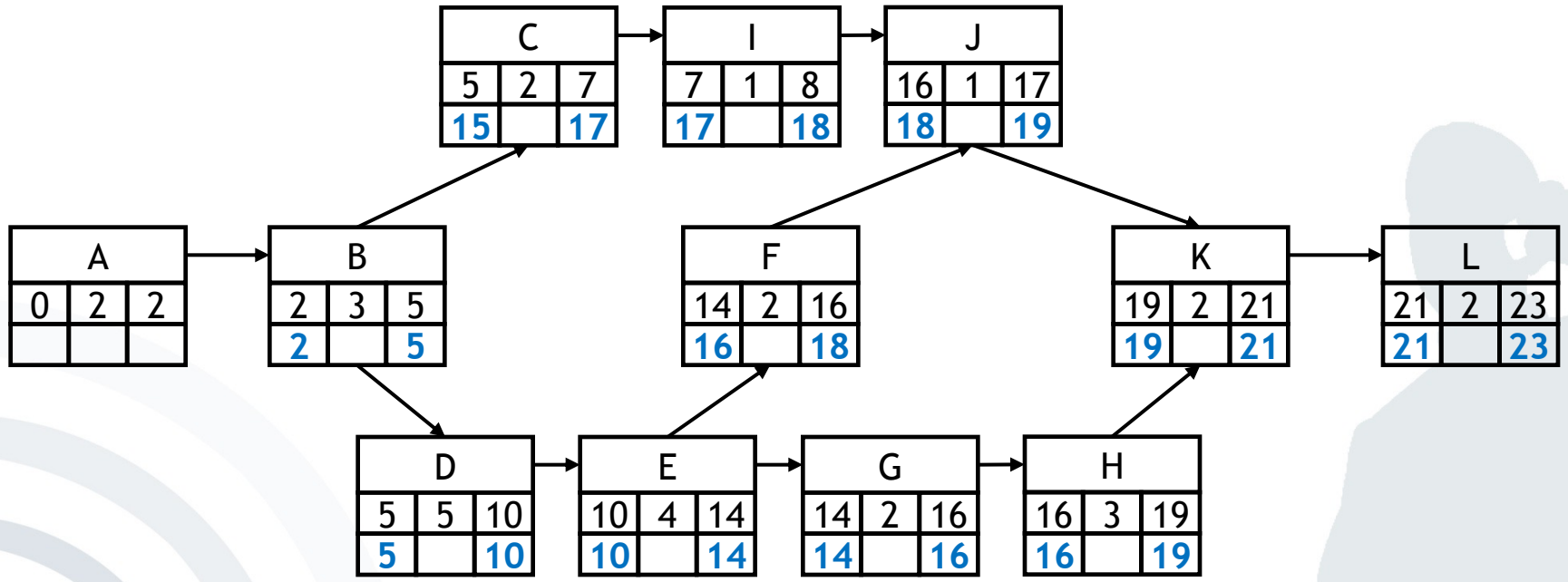
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



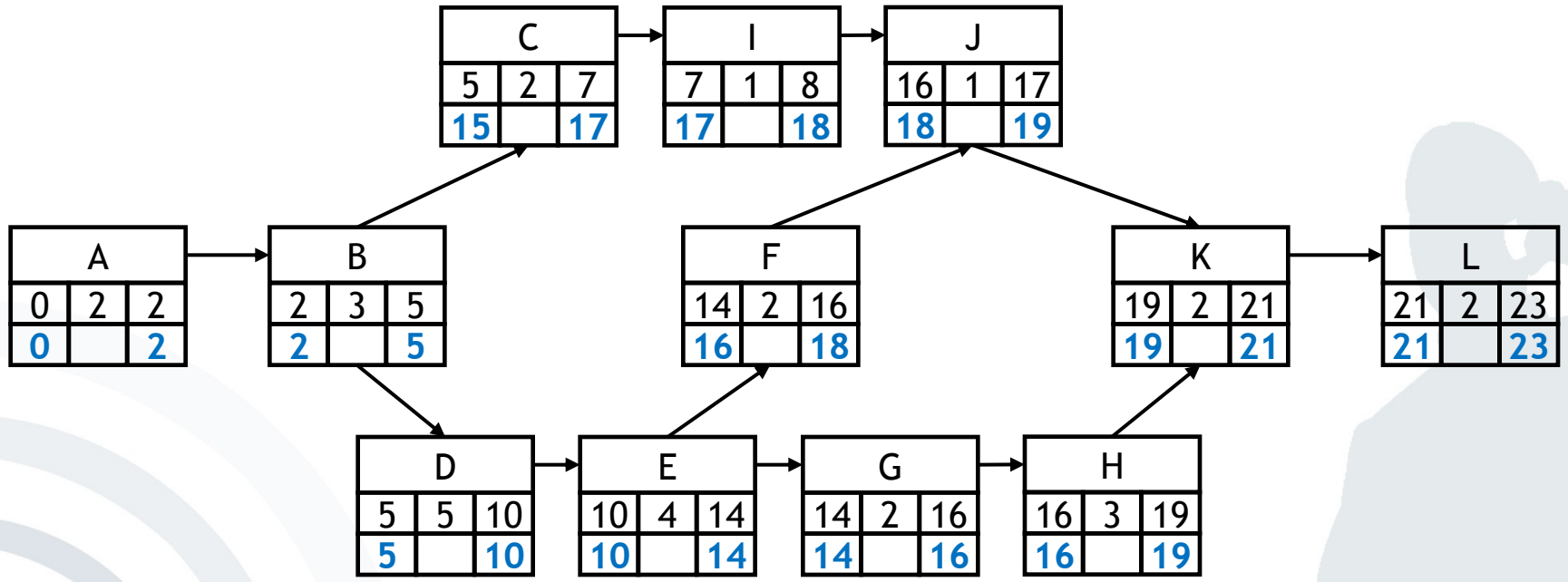
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



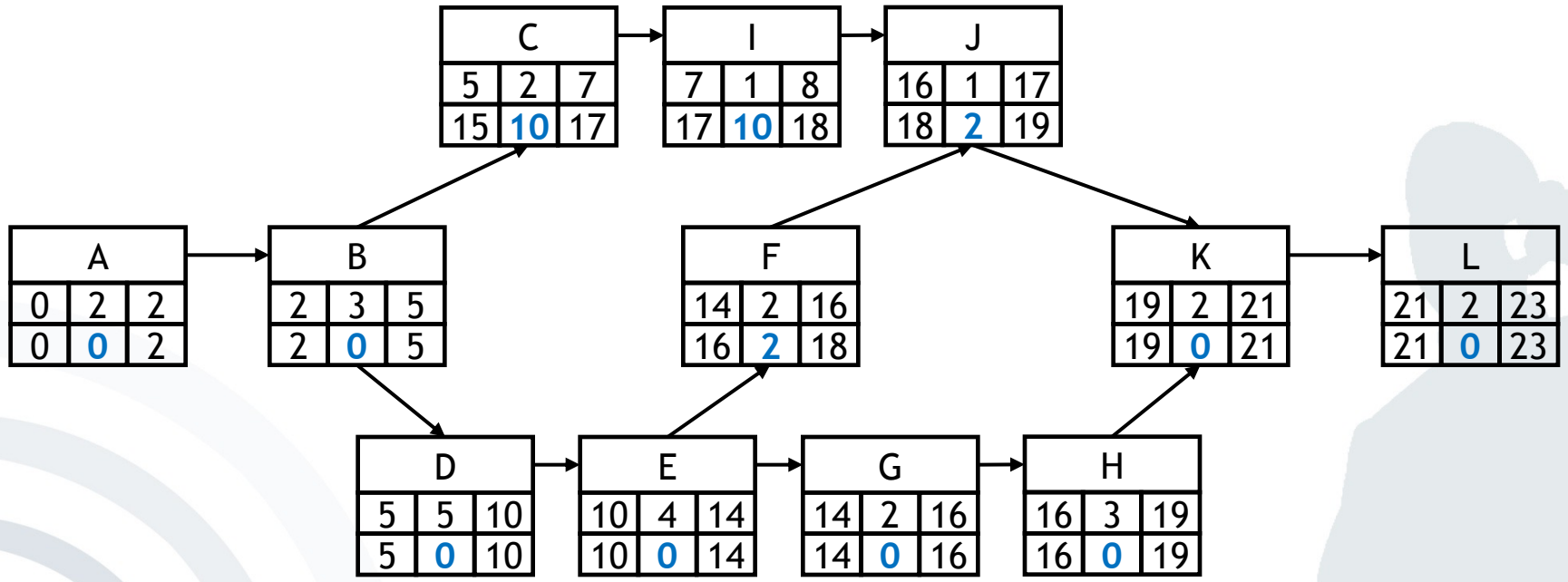
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



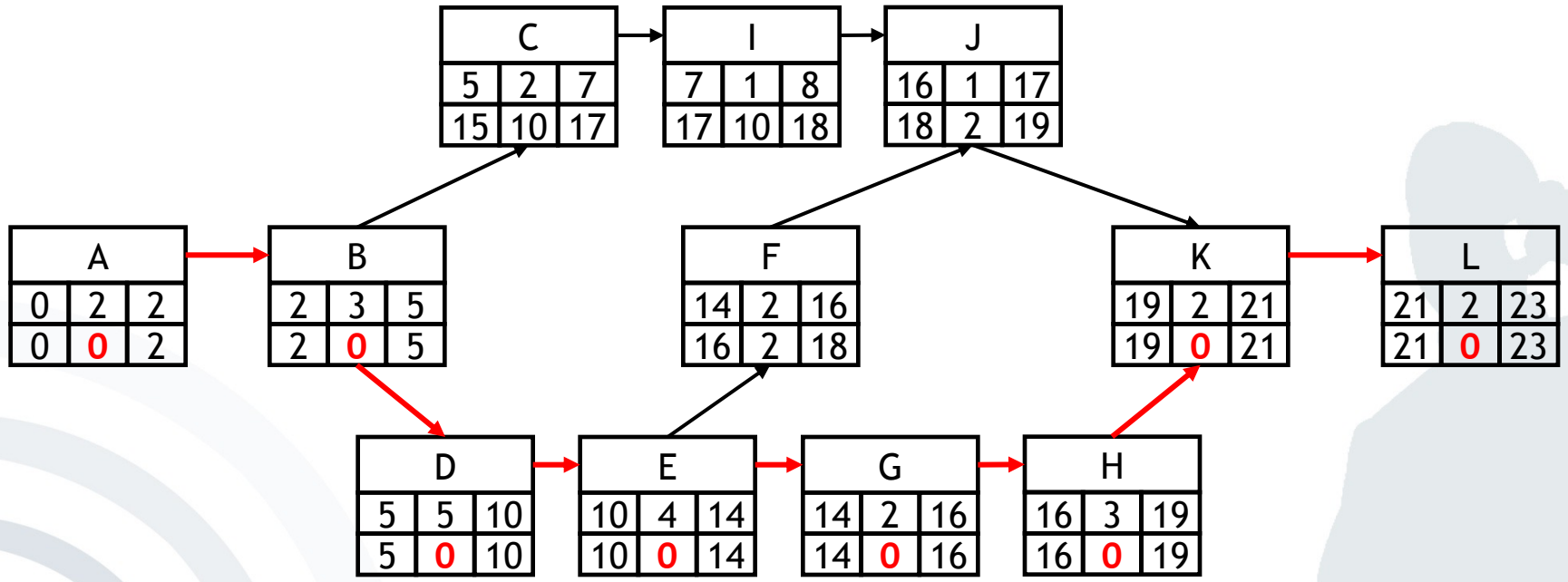
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time



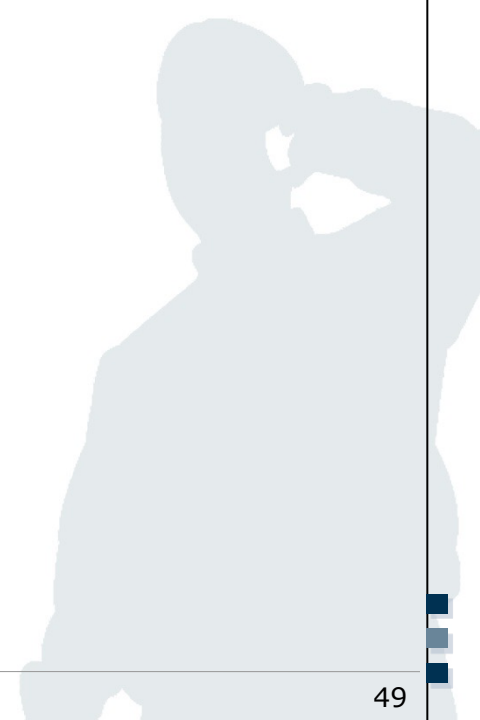
# Network Plan: 2<sup>nd</sup> Example

Activity Description		
Earliest start time	Duration	Earliest end time
Latest start time	Slack time	Latest end time

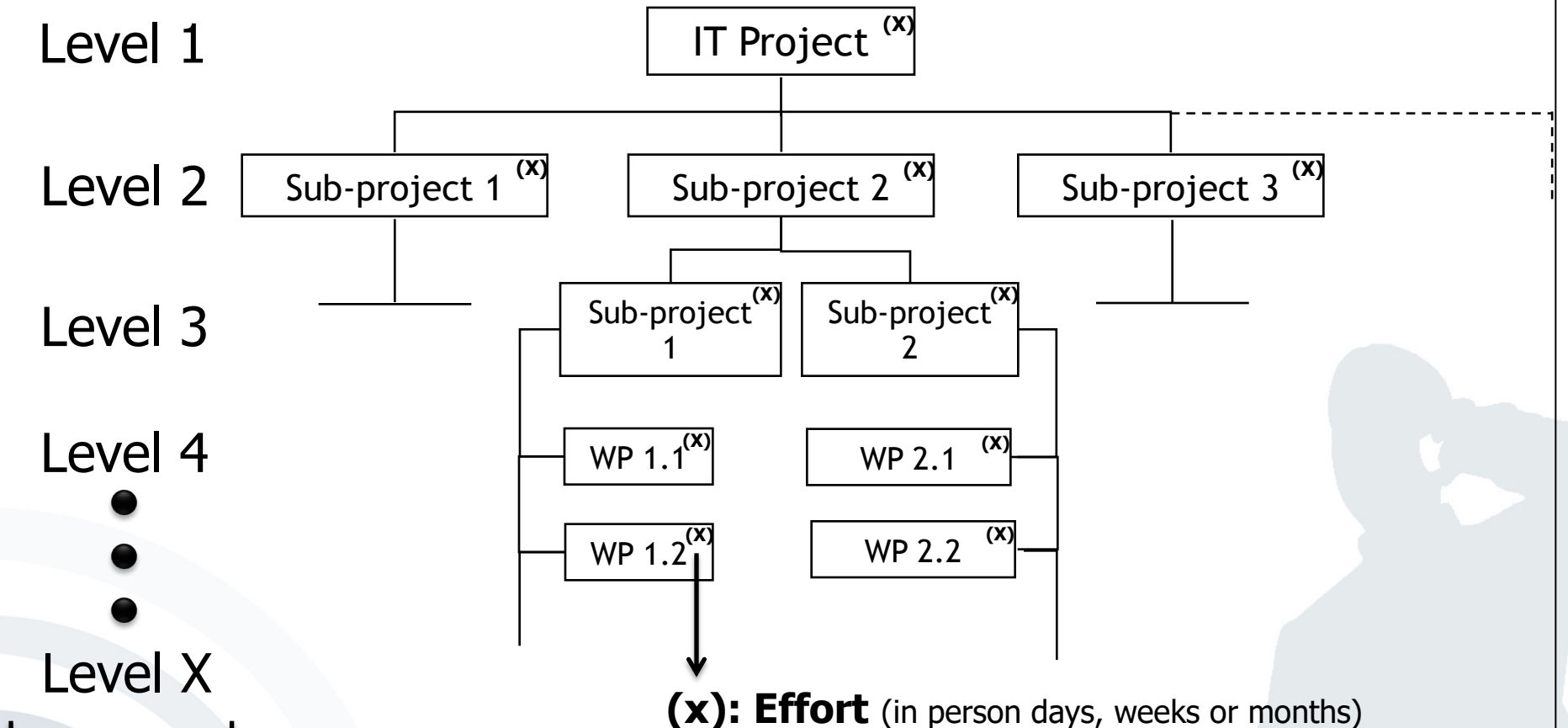




- Network Plan
- Work Breakdown Structure
- Structure of Project Teams



# Work Breakdown Structure



**(x): Effort** (in person days, weeks or months)

- Person days in small-size projects (8 working hours)
- Person weeks in medium-size projects (5 person days)
- Person months in large-size projects (20 person days)

Different level of detail

3.1 Assume you are working for the myPlace service provider and your product manager wants to allow **user-generated “places”** and to offer a **rating functionality for places**. You have been assigned as project manager for the development of the corresponding software upgrade.

Create a work breakdown structure:

1. Breakdown the project into work packages (WP)
2. Roughly estimate the necessary effort for each WP
3. Assign responsibilities/resources to each WP

Level 1

## Software Extension

- User-generated Places
- Place Ratings

Level 1

Software Extension

- User-generated Places
- Place Ratings

Level 2

Software Design

Implementation

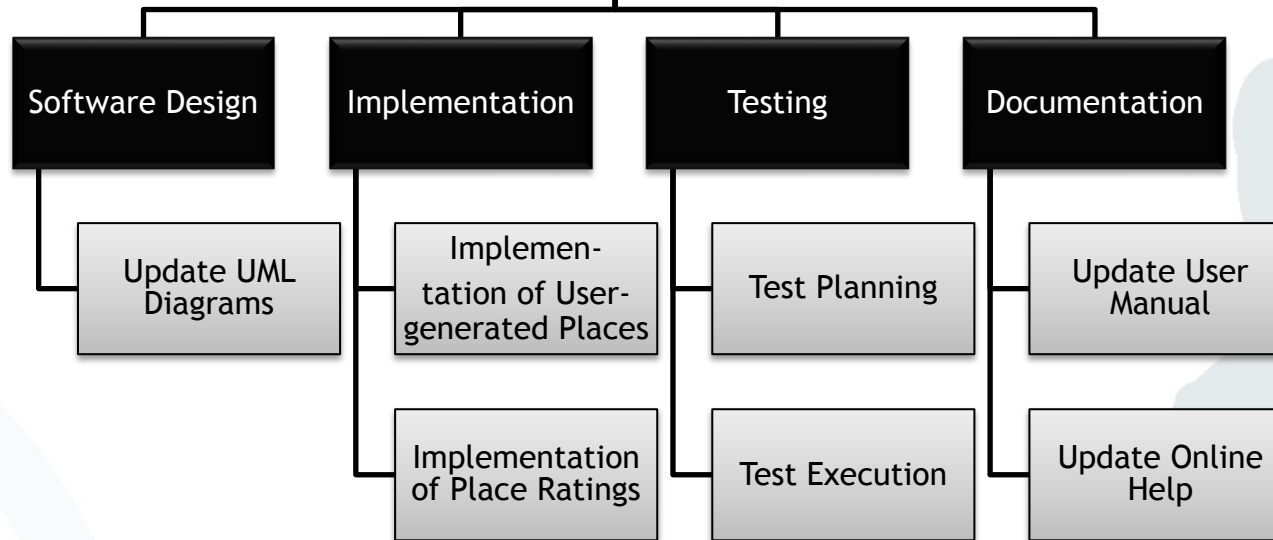
Testing

Documentation

Level 1



Level 2



Level 3

# Work Breakdown Structure

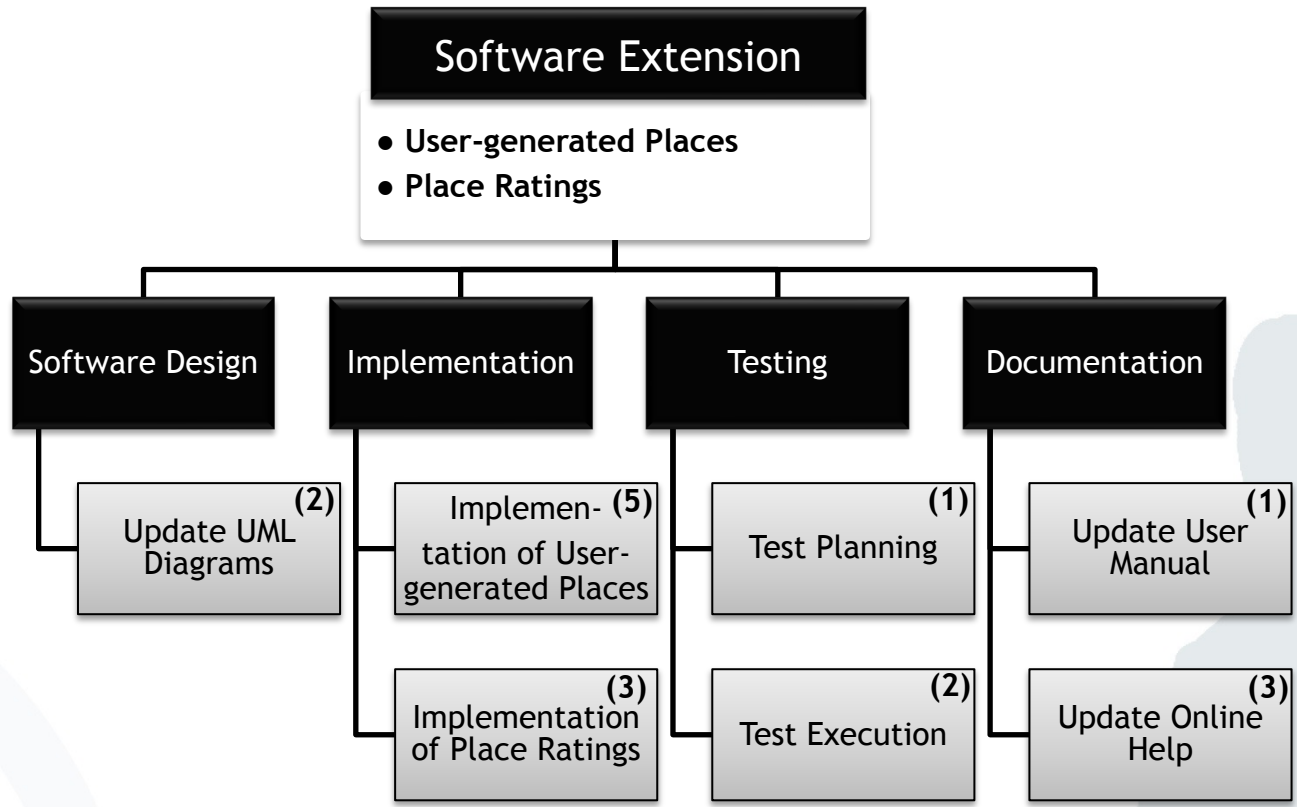
Level 1

---

Level 2

---

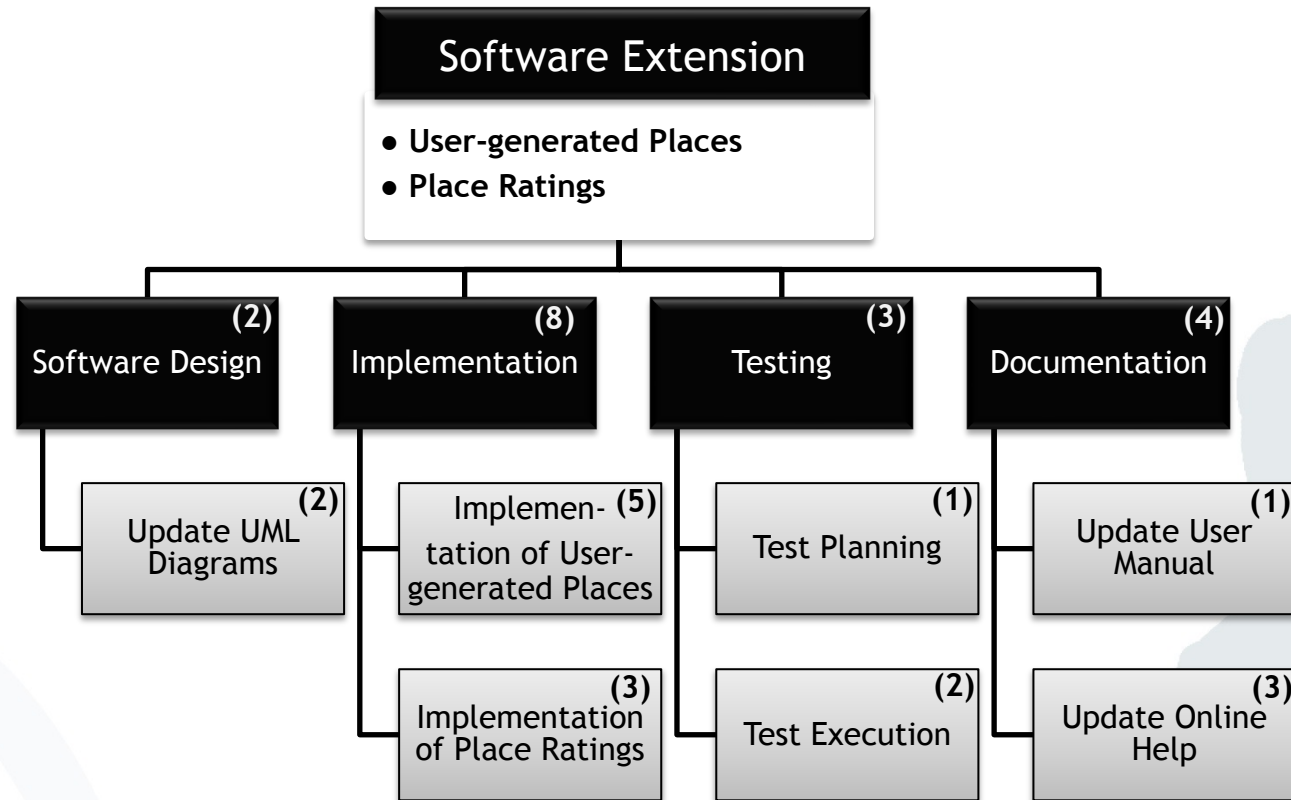
Level 3



Level 1

Level 2

Level 3





# Work Breakdown Structure

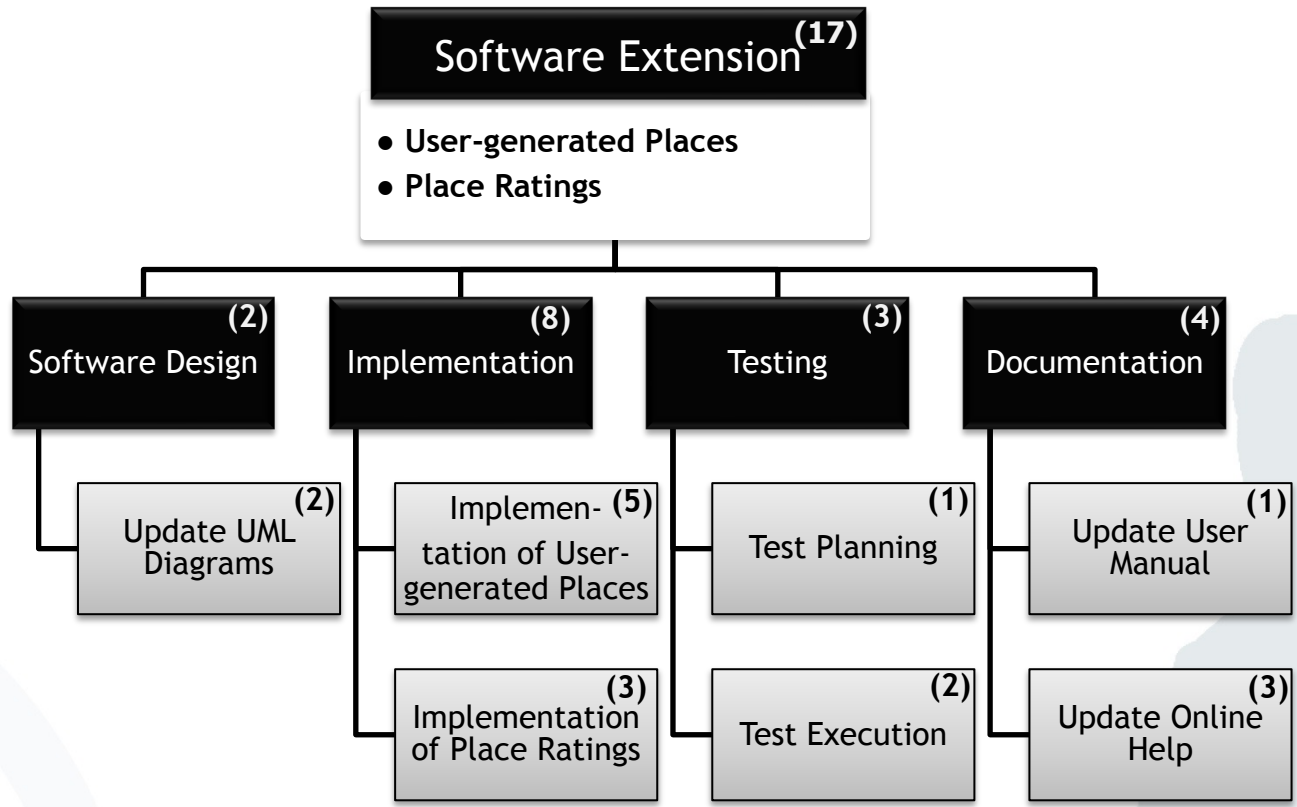
Level 1

---

Level 2

---

Level 3



# Work Breakdown Structure

## Developer



Responsible for:

- Software Design
- Implementation

$\Sigma$  10 person days

## Tester



Responsible for:

- Testing

$\Sigma$  3 person days

## Technical Editor



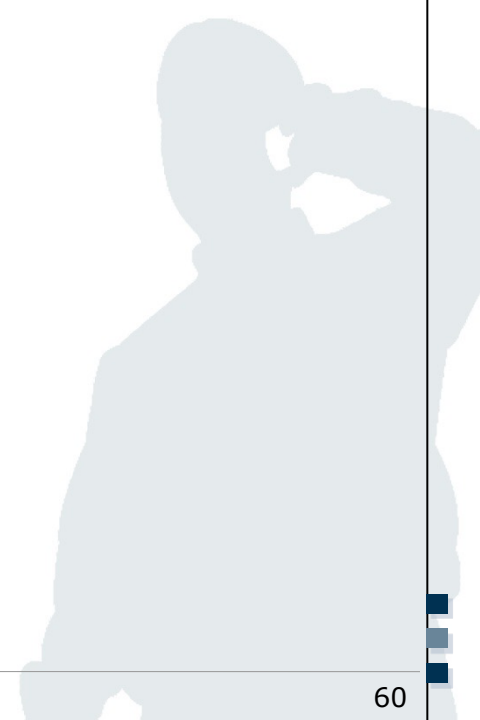
Responsible for:

- Documentation

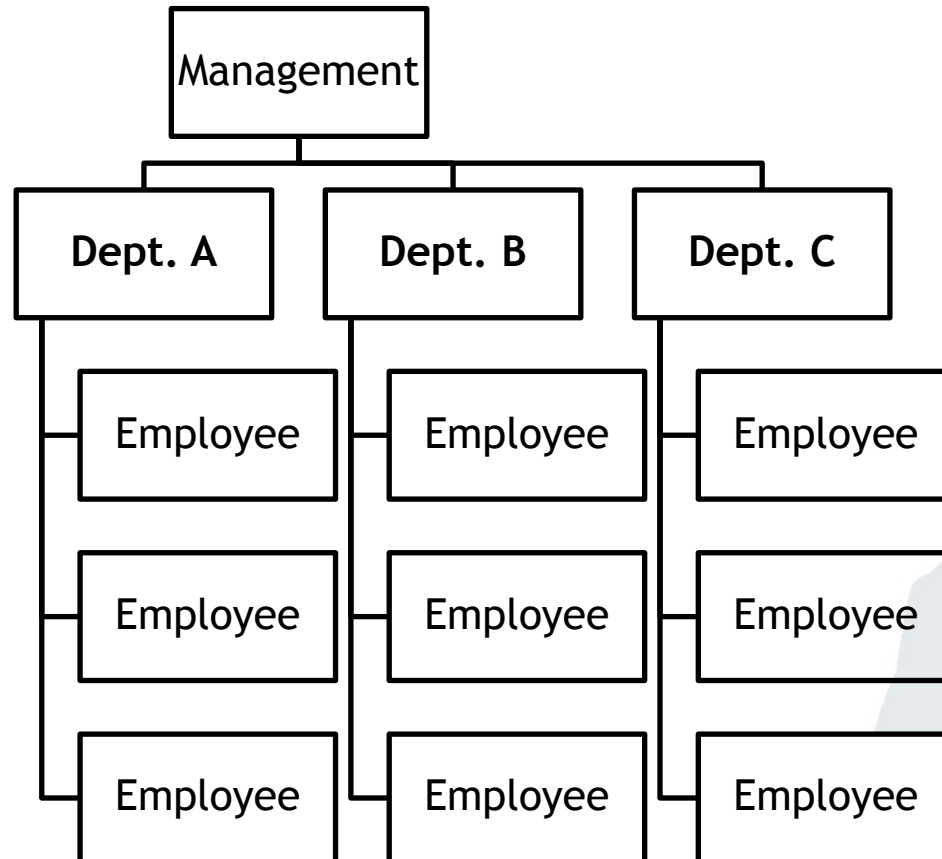
$\Sigma$  4 person days

- Network Plan
- Work Breakdown Structure
- Structure of Project Teams

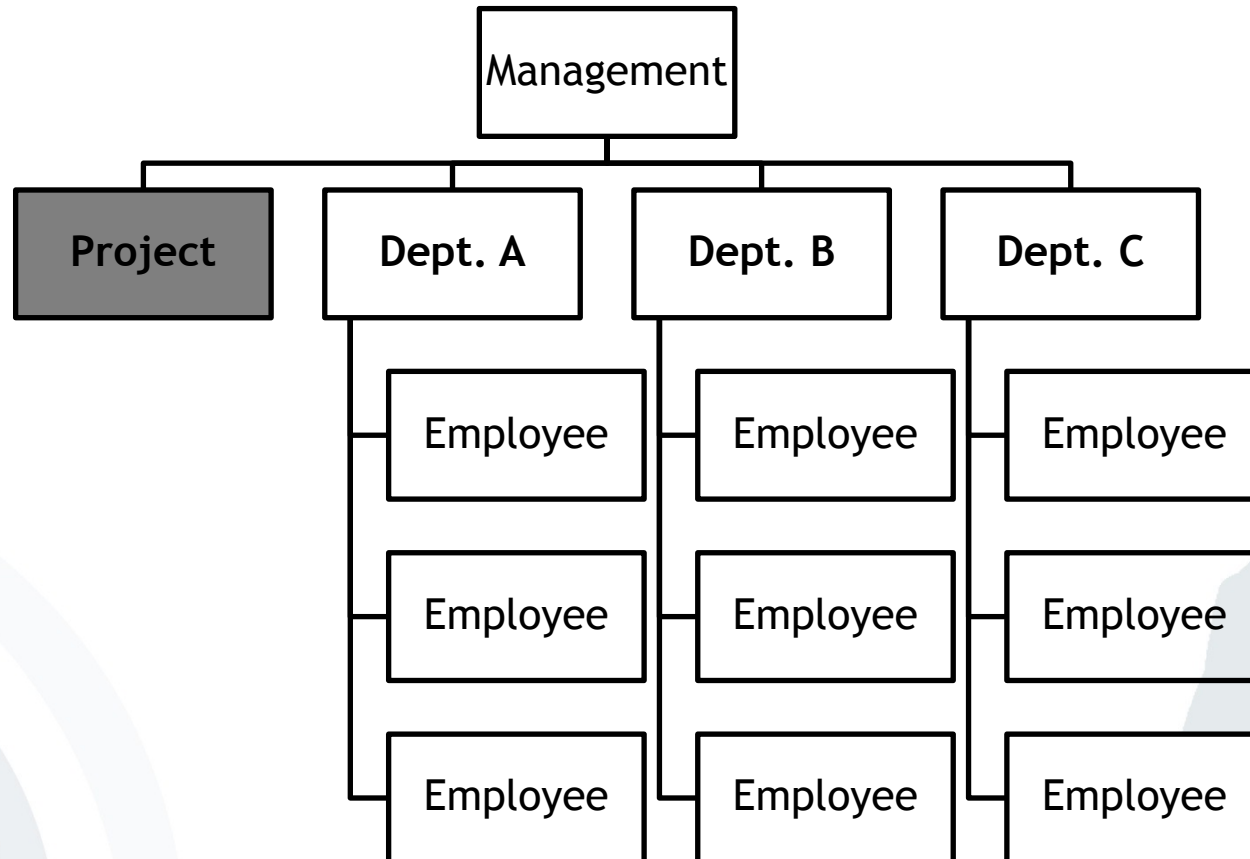
3.1 Explain the matrix project organisation and the pure project organisation. Name advantages and disadvantages of each.



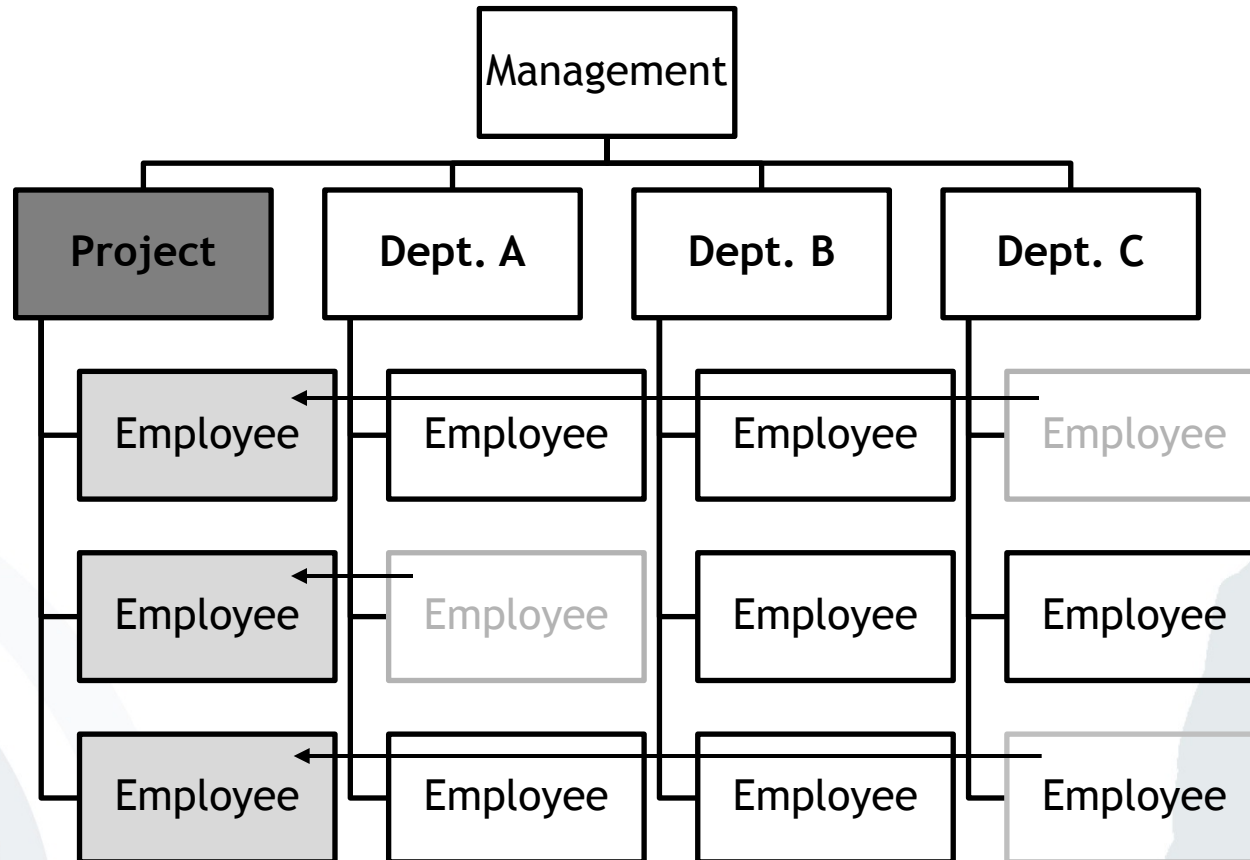
- Team members are transferred to the project team for the whole duration of the project and return to their department at the end of the project.



- Team members are transferred to the project team for the whole duration of the project and return to their department at the end of the project.



- Team members are transferred to the project team for the whole duration of the project and return to their department at the end of the project.



## Advantages

- Personnel give undivided attention to projects
- Project team develops a strong sense of project identification and ownership

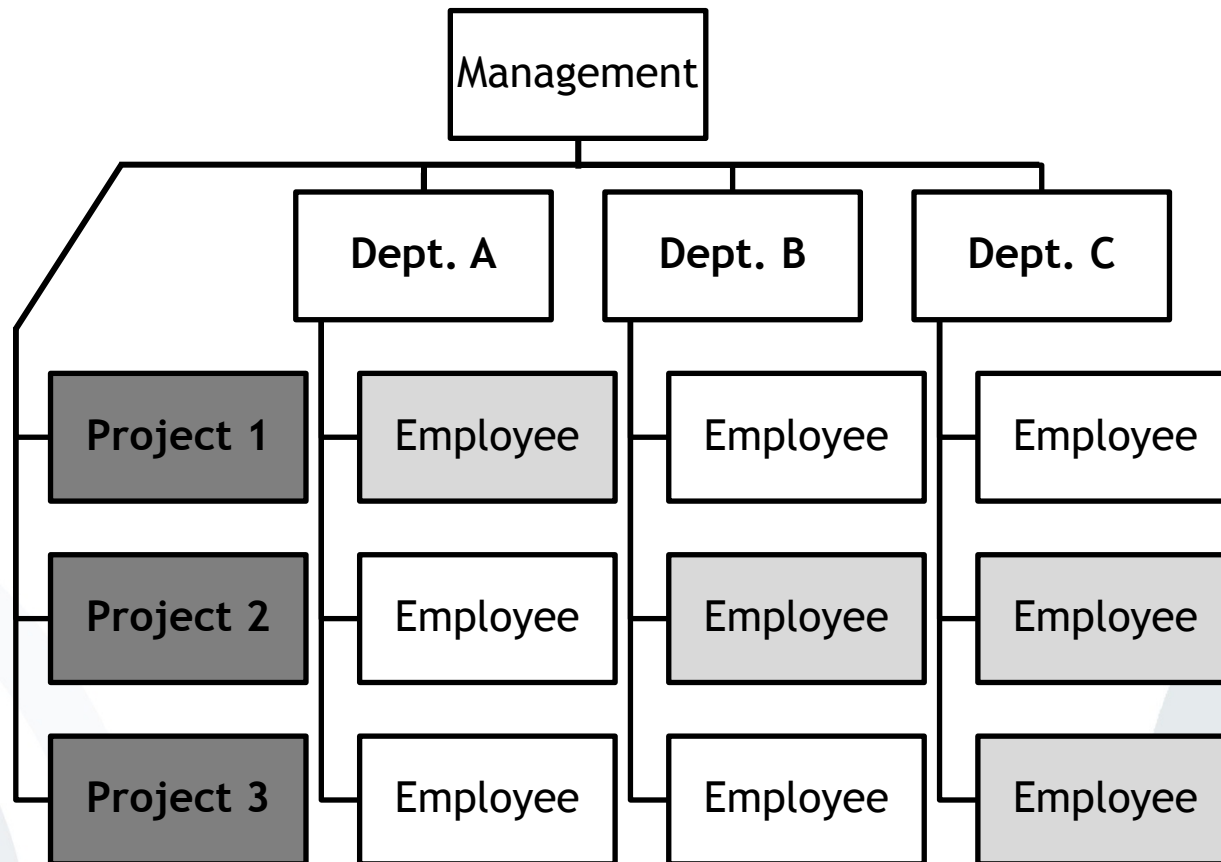
## Disadvantages

- Resources may not be needed full time for the entire length of the project
- Departments may not send their best employees to the projects



# Matrix Project Organisation

- Team members are only delegated to the project team for the time they are needed in the project.

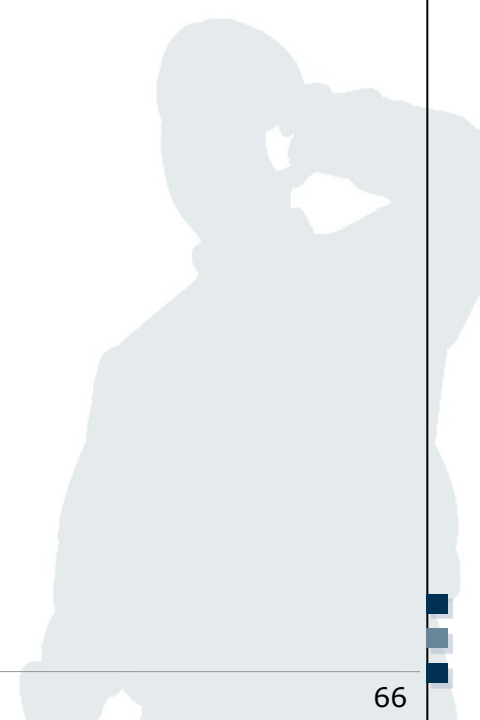


## Advantages

- Flexible utilisation of resources and expertise within the firm
- High level of technical skills
- Reduced costs due to shared resources

## Disadvantages

- Confusion over authority and responsibility
- More organisational effort (e.g. communication)



# Open Questions?

