

Weekly Notebook

PM

Second
Semester
2024



lec1: 27.2.2024.

- Management: the capability to (Design, implement and control) a project
- Project management (PM) will give tools to design, implement and control (the most important is controlling).

? Project: a complex one time effort limited by time, cost and specification, and the main objective of it is to satisfy customer needs

* the main difference between an operation and a project is that the operation is not one time while the project is, also the project has limited life span (start and end)

→ you have to deliver the end result.

? end results types:

1) actual tangible product artifact.

2) development of existing or new one.

→ applying the development is an operation.

3) study result (conclusion).

4) capability to perform a service or produce a project.

? Operation: effort needed to sustain an organization.

types of organizations.

1) Functional:

tasks - mostly operations.

e.g. - .../المبيعات/التسويق/الخدمات/...

frequent work - projects: like a new venue (2)

needs - operation management tools and techniques.

2) Projectized:

- mostly projects.

- consulting/marketing / استشارات/ تسويق/ startup...

- operations: Finance / مالية/ cleaning.

- pm tools.

→ 4 phases of projects management:

1) Defining.

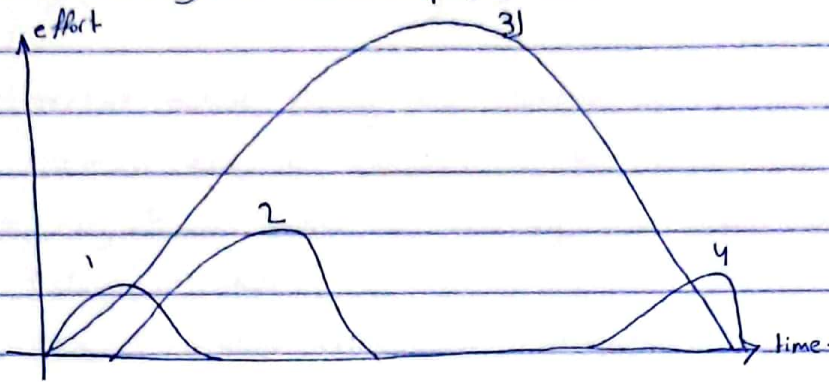
2) Planning.

3) Executing.

4) Delivering.

⇒ each project spends time in each phase depending on its complexity.

*general life cycle model of projects:



- phases are overlapping not sequential.
- usually least time is needed for 1: defining.
- most time is needed for 3: executing.

lec 2: 29.2.2024:

we will skip chapters 2 and 3 and start with chapter 4.

Chapter 4:

Defining phase:

*We will study the phases in sequence but actually they are overlapping.

? Steps of defining a project:

step 1: define the project scope.

step 2: define the project priorities.

step 3: define the project tasks.

step 4: define the project responsibilities.

step 5: define closing system.

⇒ scope: *Schulung*

↳ it is an actual document that describes end results in a tangible, measurable specific way.

*useful tool: project scope checklist (project charter)

includes:

1- objective

2- deliverable

3- milestones

4- technical requirements.

5- limits and exclusions.

6- customer's review.

→ not done by project manager but by customer and sponsor.

1- What / When / How much?] rough estimation (macro estimation)

2- expected output during the duration of the project.

* each step is essential for the next one.

3- a significant event of starting or completing the deliverables.
(delay or date).

→ not always related to deliverables.

→ helps ordering the steps.

4- specifications of ensuring proper functioning of the end result.

5- [exclusions: things that are not included, it is some times more important than limits]. Why? لا بد من التوضيح

6- signing the project and assigning the project manager and so on

* project manager: one giving authorities to use the sources.

* sponsor: accountable to provide resources to the project.

lec 3: 3.3.2024

⇒ priorities:

Three main constraints (ultimate objectives):

1- Time.

2- Cost.

3- Performance.



* changing one of them will affect at least one of the other or maybe both others.

⇒ Project manager should decide which of the three above is the priority; so he can be able to take the trade off

? Who can determine the priority?

The sponsor and the customer.

* Every project has a baseline plan which is considered as a reference.
↳ plan in normal cases.

* When updating plan is required: Knowing the priority and the changes in (time/cost/performance) are very important in decision making.

company should not to spend resources if not needed.

customer should not to have false expectations.

* Constrain: most important

* Enhance: less important than the constrain but still important.

* Accept: accepted in any case

→ dependent on project, customer, sponsor and the project team.

⇒ Used tool: Priority Matrix.

P1: International conference.

P2: Local conference.

	Time	Cost	Performance
Constrain	✓✓		
Enhance		✓	✓
Accept		✓	✓

* to draw a priority matrix for a project you have to understand it well and to understand the customer's point of view.

* لو كس مطلوب منا نرسم (priority matrix) لازم نوجه للسؤال، ما مثال
ويفهمنا لعلنا نعرف الأسباب ^{مثال} التي أوردنا ال Enhance وال Constrain وال Accept

← على حسب المثال:

فدأما في قوفنا ليعني بيت (Cost: constrain of project) و... كذا ...

kc 4: 5.3.2024:

Step 3: defining the project task

* What do we need to do in order to get the end result?

→ any project need many step to complet it. but thinking randomly is inefficient so a tool is needed.

action is the task.

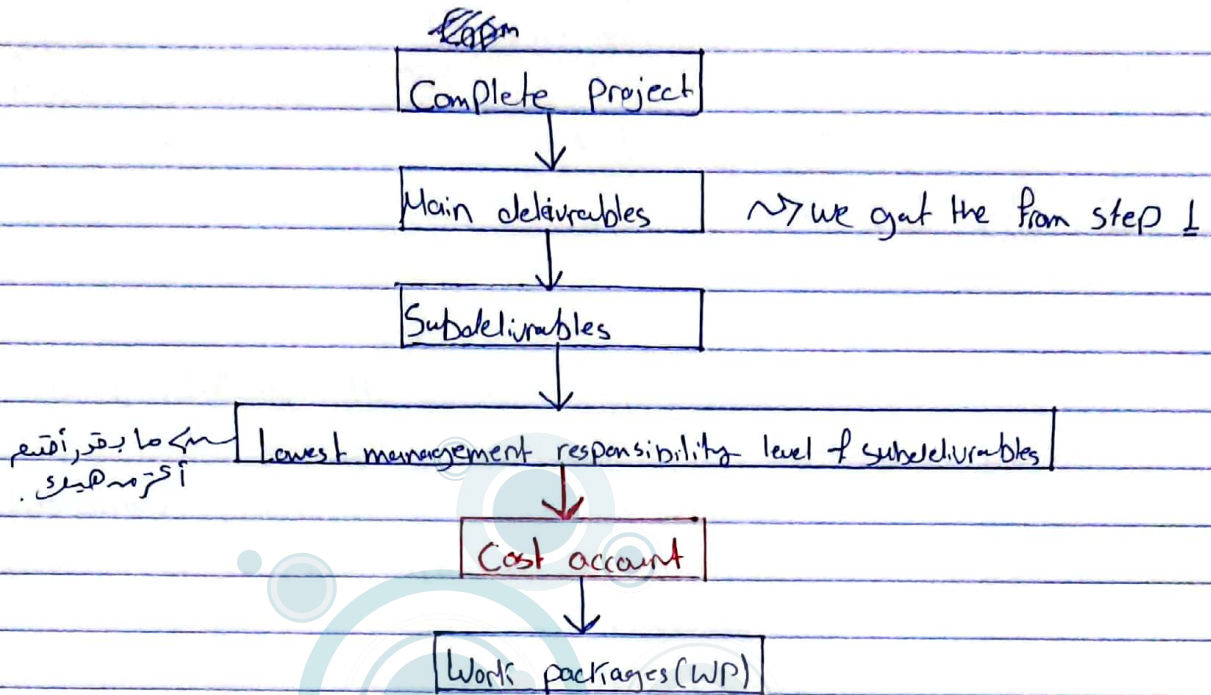
example:

⇒ used tool: Work Breakdown Structure (WBS) - 

بداية من طريقة ورقيّة

deviding the project to deliverables and the deliverables to sub-deliverables and so on until reaching the lowest management responsibility level of sub-deliverables.

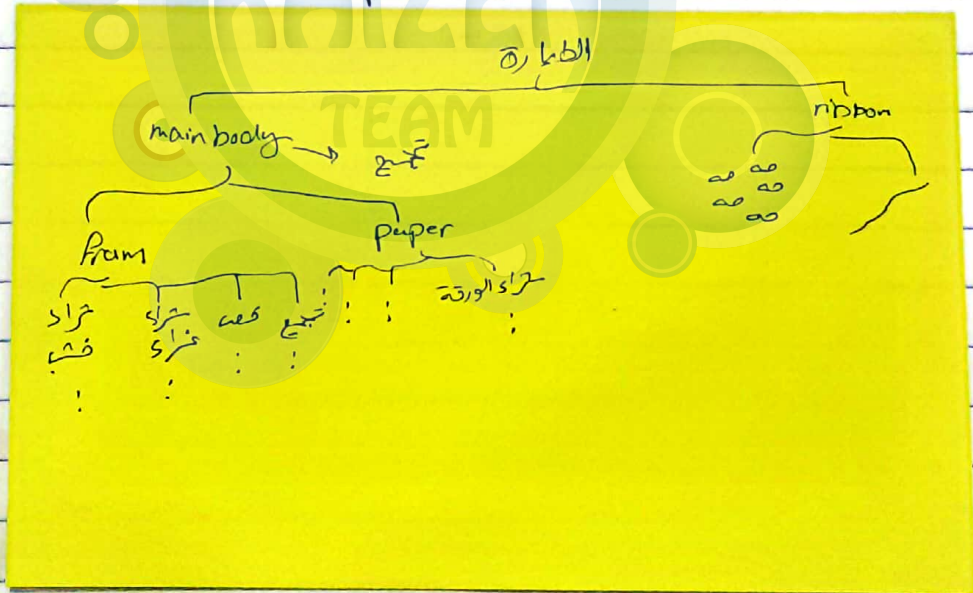
WBS:



* PMI call the WP activities:

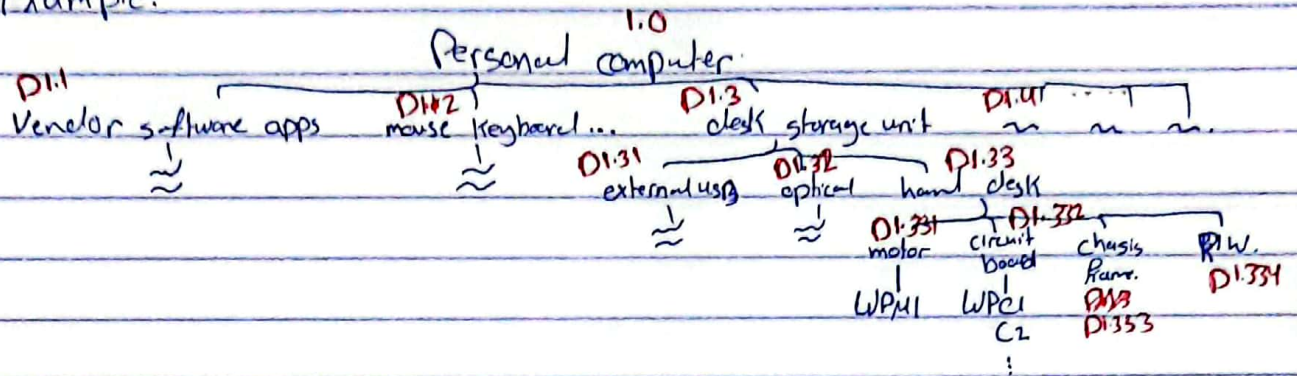
* WP: short duration task with start and end which needs budget and consumes resources.

$\rightarrow$ back again to the example:



* مرتبط كل شيء بتقسيم لنفس ال level يعني ممكن بتفلس ال project مرتين أو وقت
عن deliverables أو tasks وهكذا

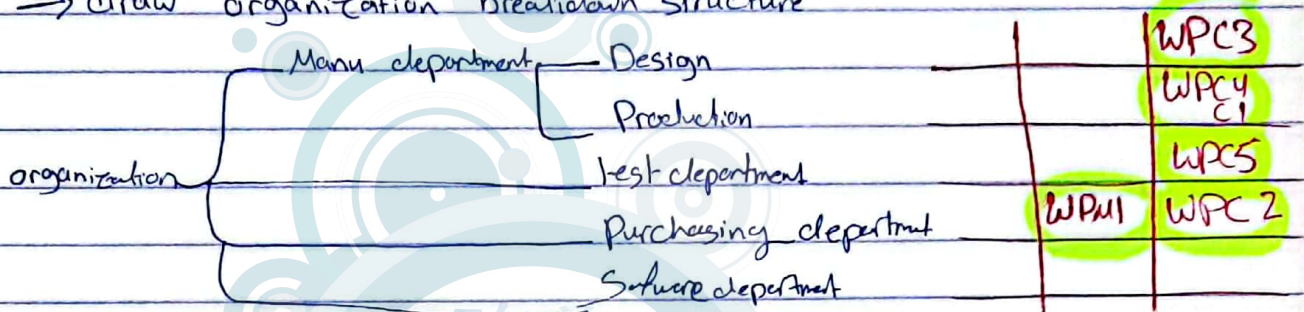
Example:



Step 4: defining the project responsibilities

* assigning each WP to a department or worker

→ draw organization breakdown structure



⇒ each WP or group of WP circled in yellow represent a cost account (CA)

CA: assesment of progress of the project and controls in terms of cost and each WP is assigned to department or worker (control points)

Step 5: defining the project coding system

→ makes management easier as it is easy way of communication.

→ # and letters that are predefined in WBS dictionary.

and letters in the above example.

⇒ We can use WBS list instead of chart (as some softwares do), example:

1 PC
1.1 Vendor
1.1.1
1.1.2
1.2 Mouse
1.2.1 ~
1.2.2 ~
1.2.2.1
1.2.2.2

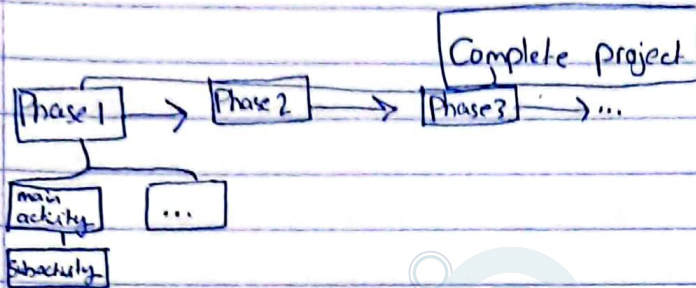
both are available
(for product or organization)

lec 5: 10.9.2024.

* Other tools to define the tasks:

⇒ PBS: process breakdown structure

it is available only for phase oriented projects.



and so on until we reach WP

at the end of each phase:

list of deliverables

—
—
—
—

PBS is a consistent tool in defining the ~~phases~~ tasks

↳ phase are done subsequently.

* Assigning the responsibilities:

→ responsibility matrix

Task	Ahmed	Amal	Ali
1	R	S	
2		R	S
3	R		R
4			
⋮			

⇒ RACI: Responsible / Accountable / Consulted / Informed.

⇒ R: responsible

S: support

C: consult

I: notified

A: approved.

RACI matrix example:

WP	Production	Design	Test	Purchasing	Quality
WP1				R	A
WP2	S	R	A		
⋮					

Chapter 5: estimating time and cost

type one: macro estimation

↳ needed in the defining phase in the step of defining the project objective (What? / When? / How much?)

type two: micro estimation

↳ needed in the planning phase, where we need to develop project schedule and budget

* Factors affecting the quality of estimation.

- duration of project (error $\uparrow$ quality $\downarrow$)
- experience of people who do the estimation (experience $\downarrow$ error $\uparrow$ (accuracy + quality) $\downarrow$)
- padding estimation: increasing time and cost to reduce the risk of being late or under budget due to uncertain event
↳ risk, stress

* organization's culture plays a role in padding estimation where some organizations $\rightarrow$ encourage padding and some $\rightarrow$ discourage padding

* in estimation we assume normal conditions.

lec 6: 12.3.2024:

* Macro estimator tools:

- 1) Consensus method
- 2) Ratio method.
- 3) Apportion method.
- 4) Function point method (software projects)
- 5) Learning curve.

1) Top managers meeting to make arguments of estimation until they reach the consensus based on their previous experiences.

delphi method $\rightarrow$ estimation (WBS) $\rightarrow$ estimates experience project $\rightarrow$ estimate

2) Estimators use a ratio from previous projects to give the estimate.

super highend $\rightarrow 500 \text{ JD/m}^2$

super $\rightarrow 400 \text{ JD/m}^2$

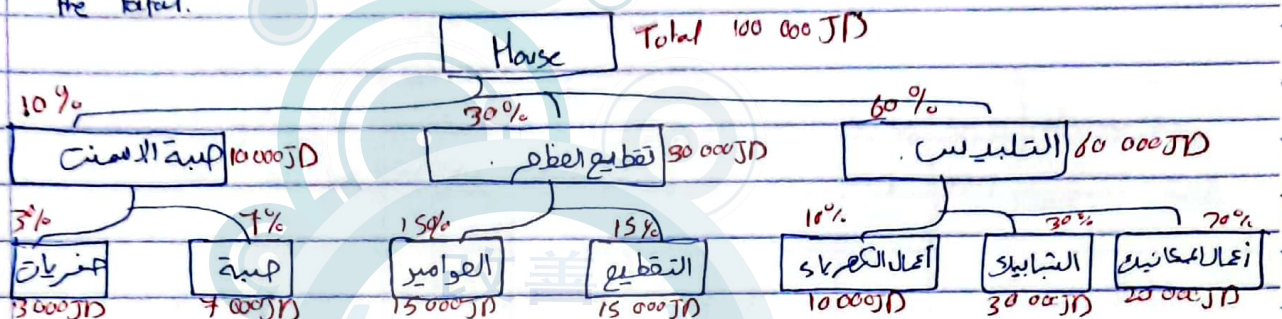
عادي $\rightarrow 250 \text{ JD/m}^2$

3 stores each 200 m^2 highend

estimated cost $= 3 \times 200 \times 500$

$= 300,000 \text{ JD}$

3) Devide the total cost on main deliverables as a percent from the total.



النسب اجبت من previous experiences $\leftarrow$

4) Self study from the book and assignment 2

5) It is not a tool to estimate time and cost it is a tool to make the estimation better.

$\rightarrow \text{improvement ratio} = \frac{\text{new time}}{\text{all time}} \times 100\%$

$\rightarrow 100\% \text{ or } > \rightarrow \text{no improvement}$

$< 100\% \rightarrow \text{improvement (new time } < \text{all time)}$

*needed for labour based activities and for complex tasks.

*macro estimation is a rough initial estimation.

*macro $\rightarrow$ WBS $\rightarrow$ micro.

X-micro estimation:

Work packages

→ detailed estimation of time and cost for each work package.

→ ask people responsible for conducting the work package.

↳ their judgment based on experience.

- some may use parametric method (ratio method)

- some may use template based on previous projects.

Why ask ?

to tick them off the estimation so they be accountable later on.

we may ask more than one person in each field to assist the risk in the work package.

used tool:

task 1	Estimator 1			Estimator 2			Estimator 3						ratio: range / Avg
	L	Avg	H	L	Avg	H	L	Avg	H	Avg L	Avg Avg	Avg H	
	95	100	105	97	100	103	93	96	100	95	98.7	102.7	$\frac{102.7 - 95}{98.7} = 0.08$
													0.24

Avg: based on normal condition

H: pessimistic

L: optimistic

no risk case: (H, L, Avg) for all estimators are very close to each other.

ratio: is the potential of risk

↑ range ↑ ratio

0.08 lower risk than 0.24

↳ the higher the ratio the higher the risk.

lec 7: 17.3.2024

3 types of costs:

- 1) Directed cost: directly related to specific WP of the project.
(labour/material/equipment)
- 2) Directed overhead cost: directly related to the project but not to a specific WP (for several WPs maybe).
(labour/material/equipment)
- 3) (General) general and administration overhead cost

example:

direct = \$ 80 000 (for 5 WPs, WP 5 needs full equipment)

direct overhead = ~~25%~~ 20% of direct cost = \$ 20 000

Total direct = \$ 100 000

General A = 20% of total direct = \$ 20 000

Total cost = \$ 120 000

Profit = 20% total cost = \$ 24 000

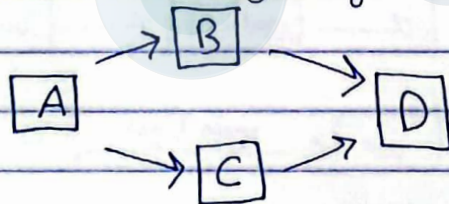
Total bid = total cost + profit = \$ 144 000

Chapter : Developing project networks:

* WPS can't show the sequence (interchangeability) of WP

→ a tool is needed:

visual flow diagram that shows the sequence of the activities and the interchangeability relationship between them.



2 techniques to develop project networks and will use the first.

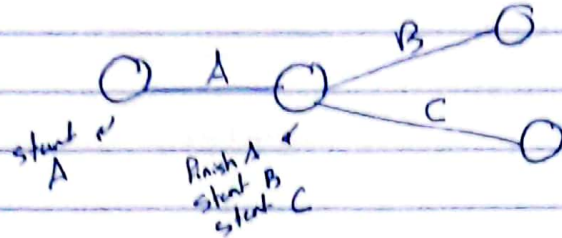
- 1) Activity on node (AON): the activity is represented by a box or a node and relationships are represented by arrows (Finish to start)



Finish A to start B

2) Activity on arrow (AOA)

activity represented by arrow and boxes are events or points of time.



lec 8: 19.3.2024:

* WP and activity both do represent work.

2 types of activities:

1) represents actual work

2) represents waiting time.

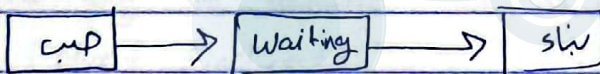
example:



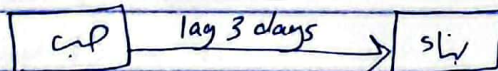
↳ Finish to start relationship

من أجل أن نتمكن من فهم العلاقة بين الأحداث في الشبكة، يجب أن نستخدم رموزاً واضحة.

∴ When we draw an activity network, it should represent reality.



or

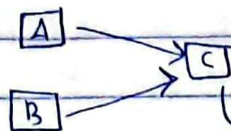


? Why should waiting time and actual work ~~be~~ be separated?

→ avoid wrong estimation that increase cost

actual time: has cost waiting: no cost

⇒ Merge:



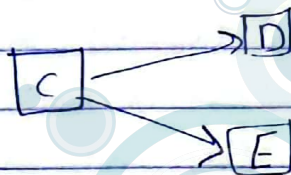
Successor: has more than one predecessor (A, B)



P, S relationship (FBS) relationship

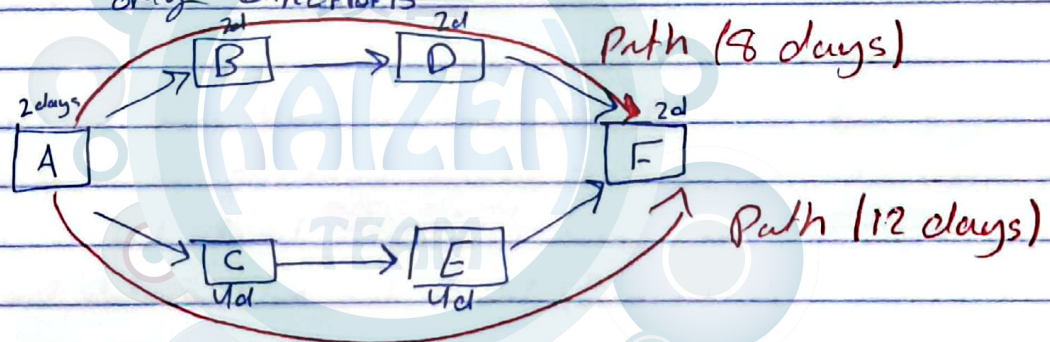
↳ doesn't start unless predecessor done

⇒ Burst: has more than one successor



*we may have merge and burst in the same project.

*think of arrows as if they are constraints not only directions



⇒ Parallel: any two activities have no dependency relationship between them (direct / indirect)

B and C → parallel

C and D → "

B and E → "

E and D → "

⇒ Path: sequence of connected dependent activities

*to complete the project we should end all paths.

A B E F → not path (not dependent)

⇒ Minimum path is the longest duration from activity network
8 days or 12 days

↳ critical path

الطول القصير هو المسار الحرج

critical v critical path

⇒ Event: a specific point in time.

- start time or finish time.

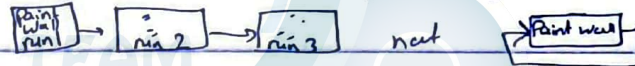
lec 9: 21.3.2024 (recorded lectures).

Basic rules to follow in developing project networks:

- 1) Network is flow from left to right (predecessor is on left from successor)
- 2) An activity can't begin until all preceding connected activities have been completed.
- 3) Arrow or network indicates ~~predecessor~~ precedence and flow and can cross over each other.

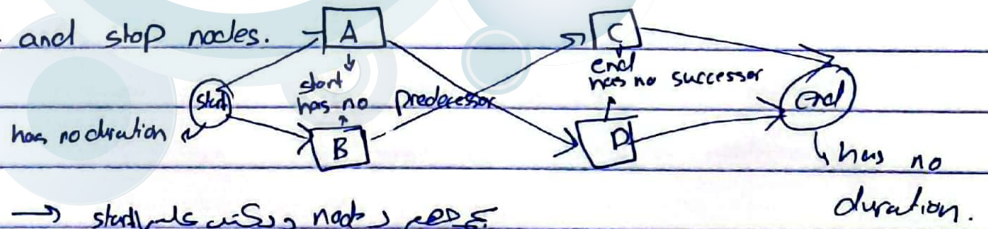
* التتابع لا يعني التسلسل

4) Each activity must have a unique identity number that is greater than any of its predecessor activities. (الترقيم من 10/5/1 في التتابع يعني التسلسل)

5) Looping is not allowed. 

6) Conditional statements are not allowed. (if / if not / ...)

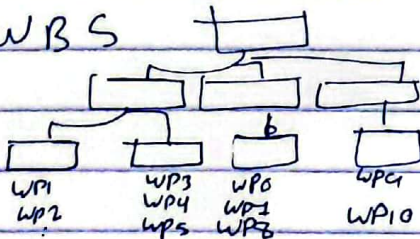
7) Use common start and stop nodes.



Part 2

How to develop a project network?

WBS



Precedence table:

Activity	Preceding activity
B	A



*The WP in WBS is the activity in the precedence table.

عمل مناقشة :

* يجب أن WP أولي فيهم يكون ما في أي constraints on starting them

activity | Preceding activity

* اختيار Successors لهم

WP6 ← A None

* يجب أن يكون ما يليه WP

WP2 ← B None

WP10 ← C A

WP1 ← D A, B

* لو متروك كالمسألة قبل رج يكون سهل نفس المناقشة بس لو اول مرة

رج تحتاج مناقشة طويلة ومعمقة نوعاً ما

*Precedence table will be given we don't have to build it

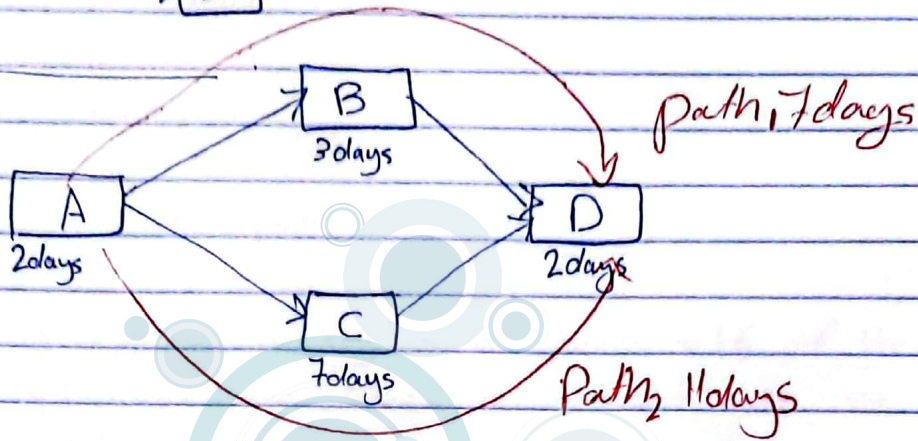
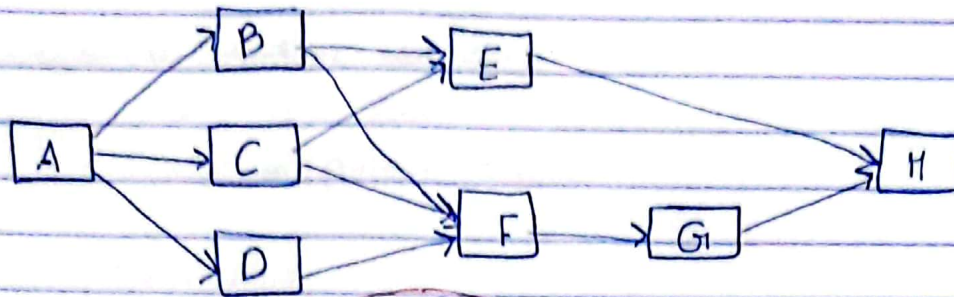
*In most cases each activity is about one WP if not

we can say $WP_3, WP_4 \rightarrow E$

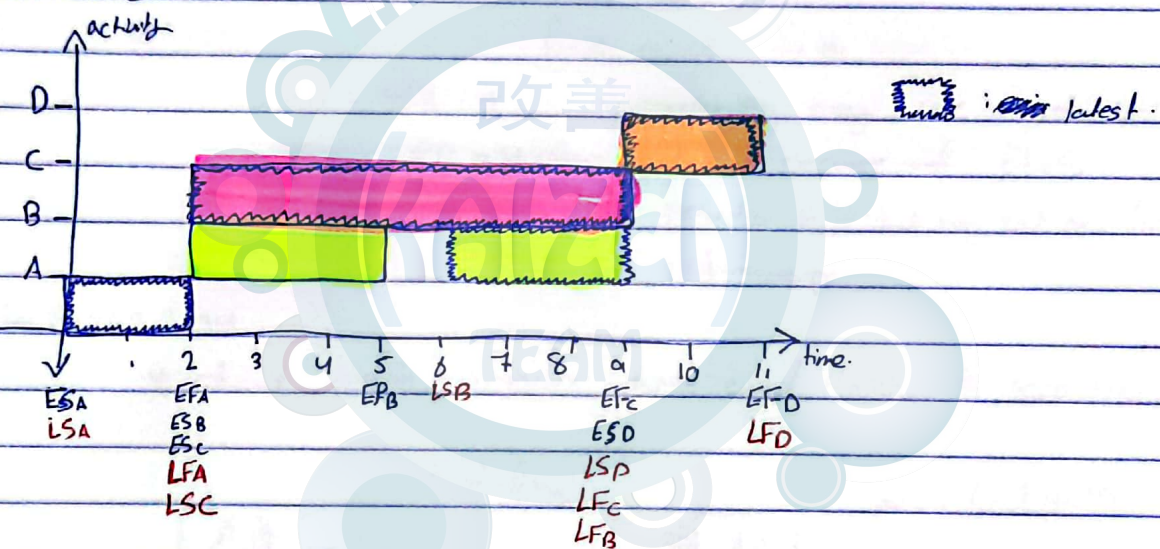
↳ WP3 WP4 are done by the same person at the same time and for a specific deliverable.

lec10: 24.3.2024

Activity	Description	Preceding activity	Activity time.
A	approval	None	5
B	construction plan	A	15
C	traffic study	A	10
D	availability check	A	5
E	report	B, C	15
F	commission approval	B, C, D	10
G	went for construction	F	170
H	occupancy	E, G	35



Graph chart



*EF = Largest EF for the predecessor.

*Minimum project duration = largest path = $P_2 = 11$ days.

*(CPM) critical path method: 2 types of calculations:

1) Forward path calculations:

2) Backward calculations:

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1) includes: the earliest start start
 " " Finish
 minimum project duration.

2) includes: latest start
 " " Finish
 slack start } Total
 " " Finish }
 critical path.

* LF of an activity & one successor = LS of the successor.

* slack: allowable delay that doesn't make the project late than the minimum project duration.

(SS) Slack start = latest start - earlier start

(SF) Slack Finish = " " Finish - " " Finish.

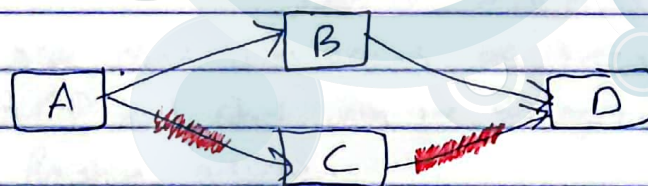
→ SSA = SFA = 0

→ SSB = SFB = 4 days

usually they are equal but this is because of FtoS relationship but may not be for other relationships.

lec 11: 26.3.2024

* critical path: includes starts and finishes for zero slack activity.



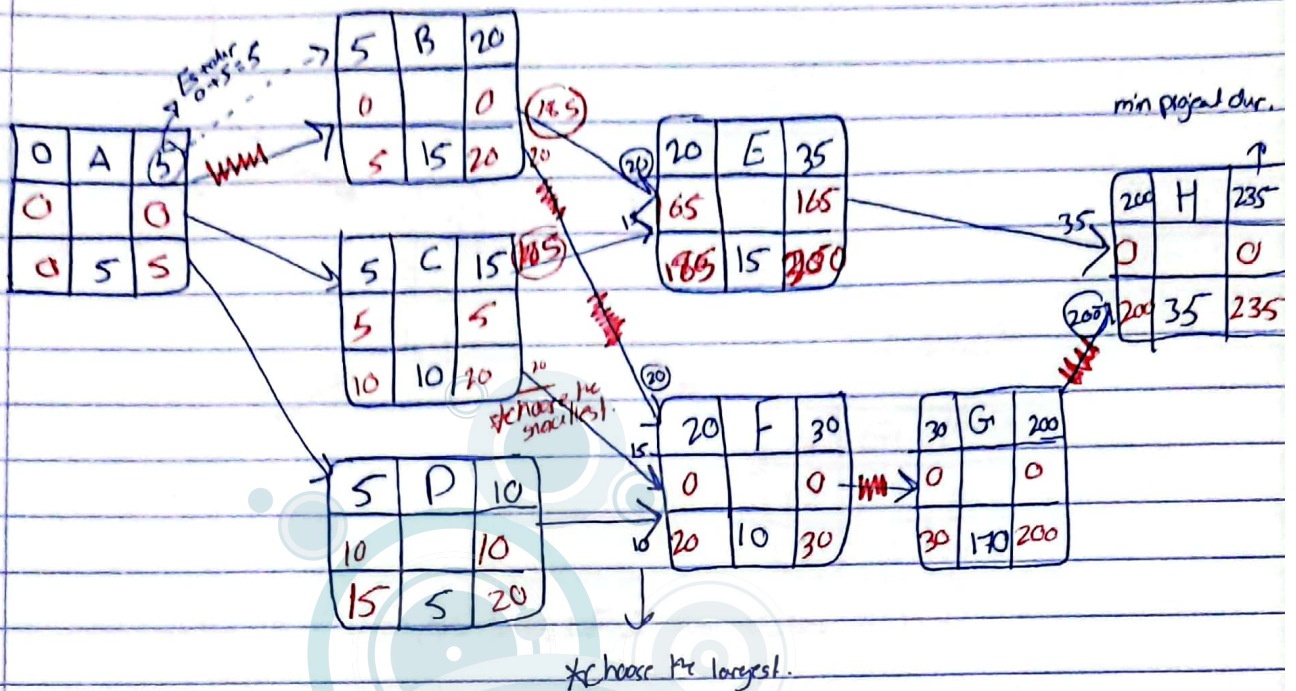
critical path.

* activities in the network are drawn like this:

S		P	
ES	10	EF	
SIK		SIK	
LS	Dur	LF	



back to the preceding table of the previous lecture:



lec 12: 28.3.2024: calculations in real ↑

* each finishing activity: $LF = \text{min project duration}$

* critical path: sequence of critical events

(CP) $\rightarrow$ sequence of critical events $\rightarrow$ 2 activities in parallel $\leftarrow$

$\rightarrow$ critical path: A - B - F - G - H

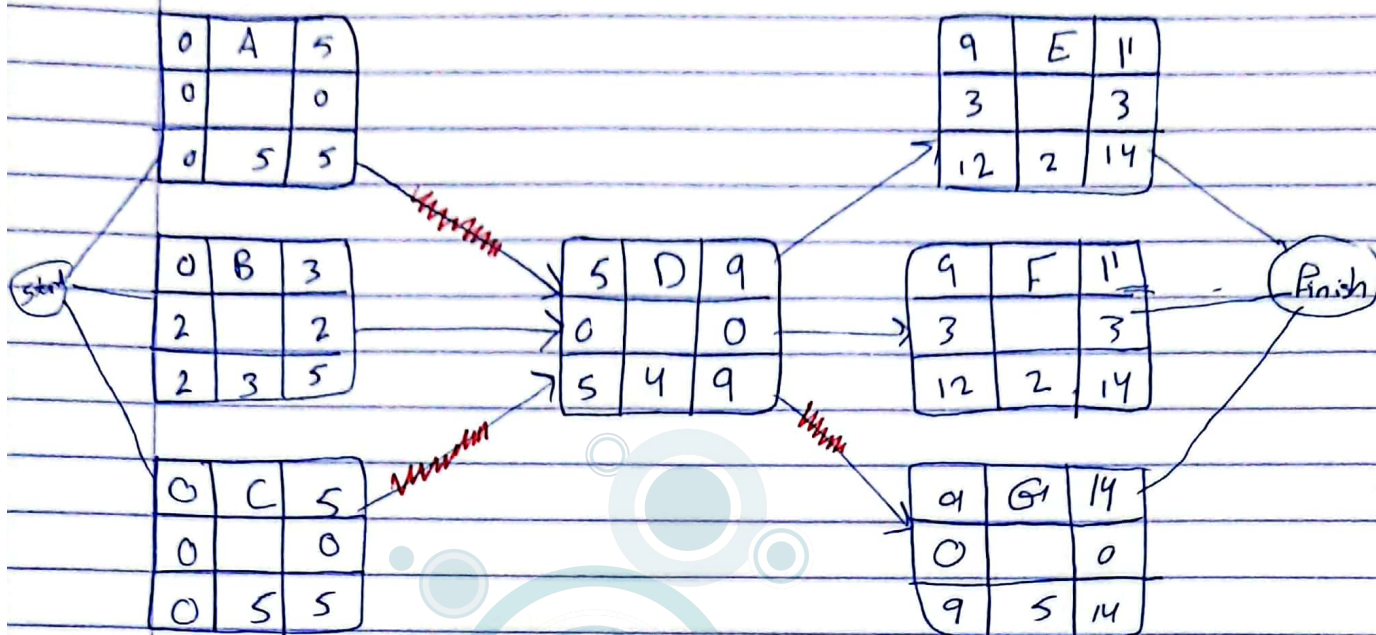
(sequence of activities)

* We deal with arrows as technical or logical constraints.

* CP must start with the starting activity and end with the finishing activity.

* each network should have at least one CP it may have more but it can have only one.

$\rightarrow$

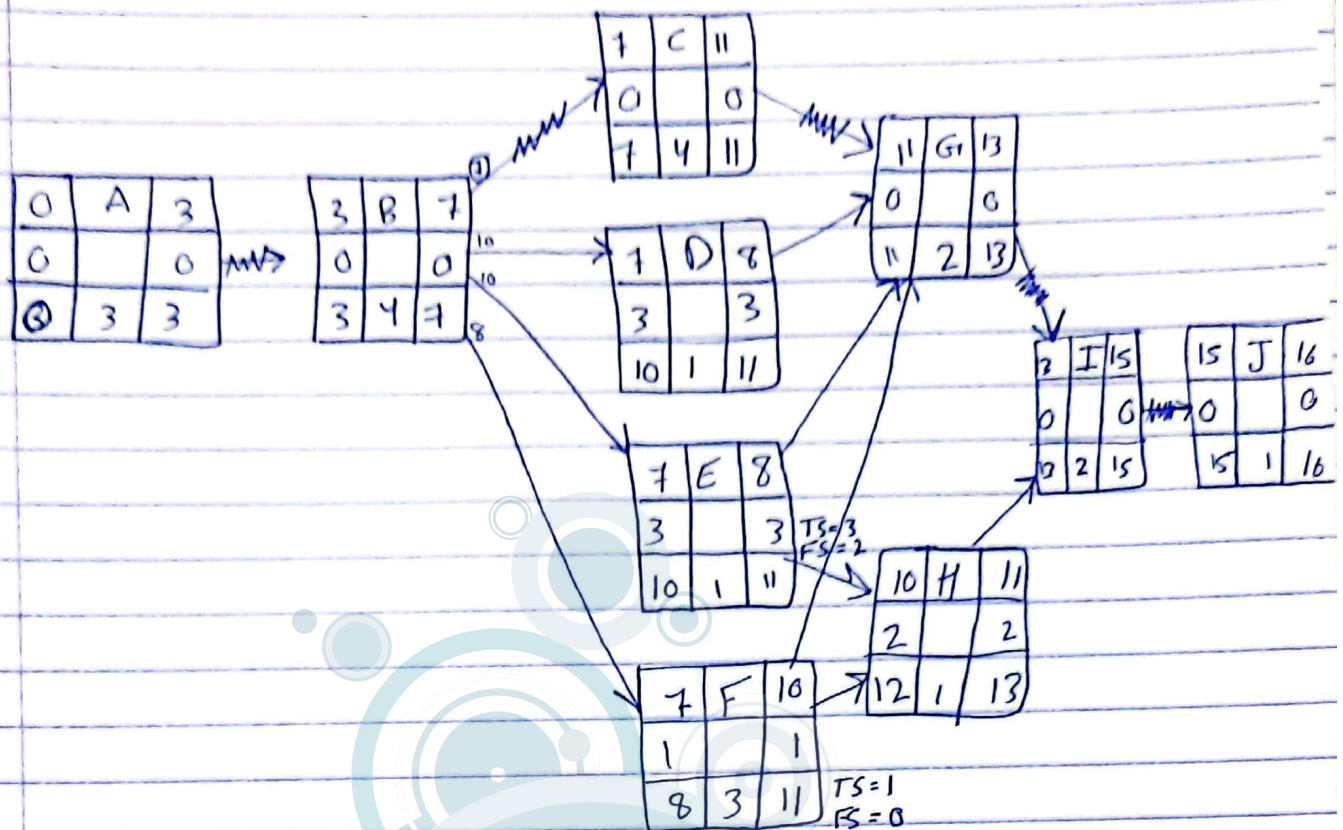


9 paths

1) same duration which is the min project duration
but all other paths will have a smaller duration.

lec13:31.3.2024.

Activity	Preceding activity	Time.
A	None	3
B	A	4
C	B	4
D	B	1
E	B	1
F	B	3
G	C, D, E, F	2
H	E, F	1
I	G, H	2
J	I	1



Free slack: allowable delay for the finish of activity without affecting the start of the successor.

Total = 0 $\rightarrow$ Free = 0

Free $\neq 0$ if the activity has a total slack.

$$FS < TS$$

$$\rightarrow \text{Free slack}_{\text{activity}} = ES_{\text{successor}} - EF_{\text{activity}}$$

(only one successor)

$$\rightarrow \text{Free slack} = \min (ES_{\text{successor}} - EF_{\text{activity}})$$

(more than one successor)

$$\begin{aligned} \times FS \text{ may } &= TS \\ \text{or } &< TS \\ \text{or } &= 0. \end{aligned}$$