

Project Time Management

مقرر: إداره وقت المشروع

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PMG 212

Lecture 8



Agenda

- Critical Path method
- Scheduling Terminology
- Estimate the duration
- Scheduling Consists of
- Develop the Schedule
- The common Scheduling Failures

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- **Critical Path method**
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One or more continuous chains of **zero** or **negative** float activities running from the start event to the finish event in the schedule.

The Critical Path is normally the Longest Path (longest series of continuous activities) in the schedule.

Any activity on the critical path is called a **Critical Activity**.

Critical Path method

The critical path method (CPM) is a technique that's used by project managers to create a project schedule and estimate the total duration of a project.

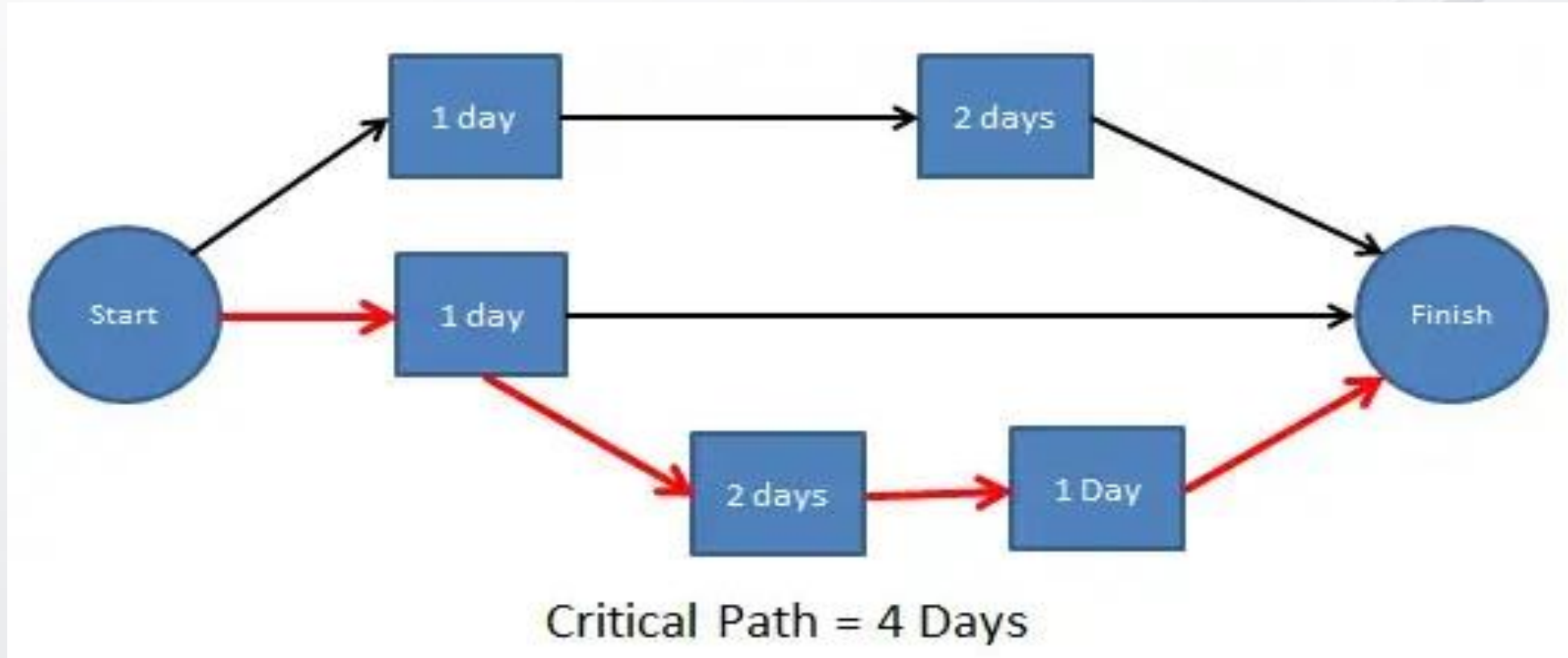
Activity	Duration
A	1
B	7
C	6
D	4
E	8
F	6
G	4
H	3
I	5
J	5
K	3
Sum	52

Critical Path method

The CPM method, also known as critical path analysis (CPA), consists in using a network diagram to visually represent the sequences of tasks needed to complete a project.

Once these task sequences or paths are defined, their duration is calculated to identify the critical path, which determines the total duration of the project.

Critical Path method



Why use critical path analysis?

CPA can provide valuable insight on how to plan projects, allocate resources, pace towards milestones, and schedule tasks.

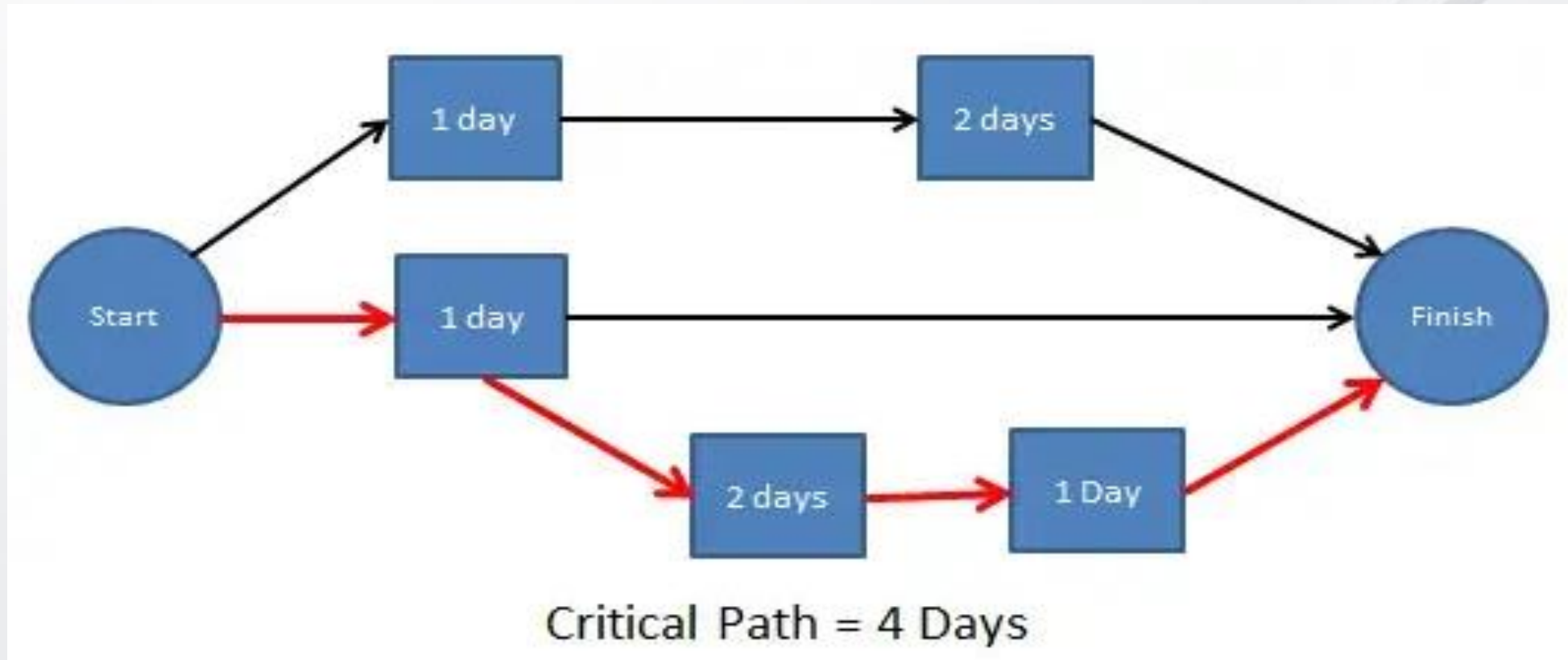
Here are some reasons why you should use the critical path method:

- **Improves future planning:** CPM can be used to compare expectations with actual progress. The data used from current projects can inform future project plans.
- **Facilitates more effective resource management:** CPM helps project managers prioritize tasks, giving them a better idea of how to avoid resource constraints.

Critical Path method

- **Helps avoid bottlenecks:** Bottlenecks in projects can result in lost valuable time. Plotting out project dependencies using a network diagram will give you a better idea of which activities can and can't run in parallel, allowing you to schedule work accordingly.

Critical Path method



Critical Path method

The seven (7) steps in the CPM are:

- Step 1: List of all activities required to complete the project
- Step 2: Determine the sequence of activities
- Step 3: Draw a network diagram
- Step 4: Determine the time that each activity will take to completion
- Step 5: Determine the dependencies between the activities
- Step 6: Determine the critical path
- Step 7: Update the network diagram as the project progresses

The seven (7) steps in the CPM are:

- Step 1: List all the activities or tasks required to complete the project, such as measuring, cutting, assembling, painting, etc.
- Step 2: Estimate the duration of each activity or task, based on the resources available and the complexity of the work.
- Step 3: Identify the dependencies between the activities or tasks, such as which ones need to be done before or after others.

Critical Path method

The seven (7) steps in the CPM are:

- Step 4: Draw a network diagram that shows the sequence and dependencies of the activities or tasks, using nodes to represent activities and arrows to represent dependencies.
- Step 5: Calculate the earliest start time (ES), earliest finish time (EF), latest start time (LS), and latest finish time (LF) for each activity or task, using the forward and backward pass methods.

Critical Path method

The seven (7) steps in the CPM are:

- Step 6: Calculate the total float (TF) or slack for each activity or task, which is the difference between the LF and EF or between the LS and ES. The float represents how much activity can be delayed without affecting the project completion time.
- Step 7: Identify the critical path, the longest path in the network diagram with zero float. The critical path determines the minimum completion time of the project, and any delay in any activity on this path will delay the entire project.

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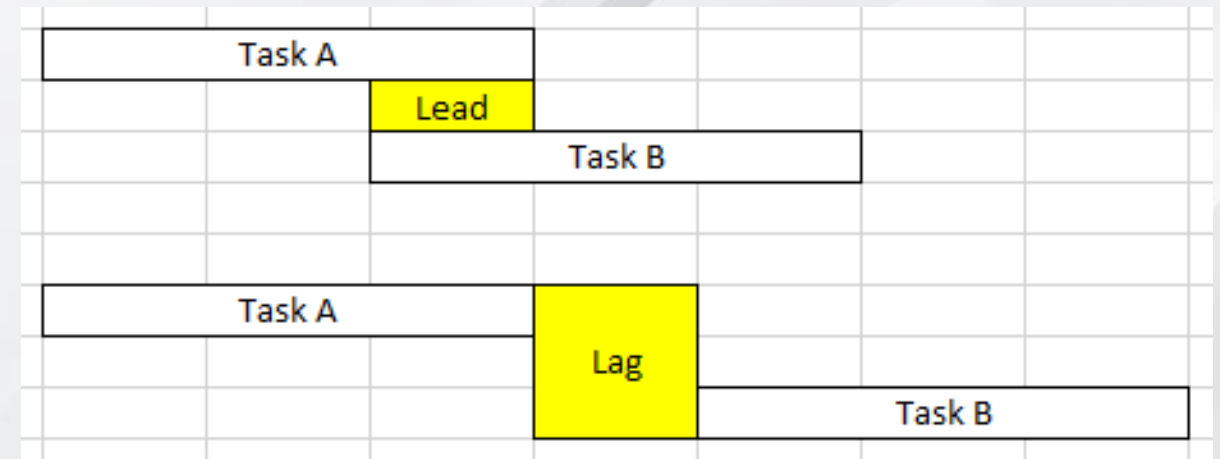
Scheduling Terminology

Lead & Lag

Lead and Lag are the duration unit of tasks.

Lead is portrayed by negative (-) sign

whereas Lag is by positive (+) sign.



Scheduling Terminology

Float

Total Float

Amount of time an activity can exceed its early finish date without affecting the project end date or other imposed dates.

Free Float

Amount of time by which an activity can exceed its early finish date without affecting the early start date of any successor(s).

Negative Float

Amount of time that the start or finish of any activity exceeds the time allowed.

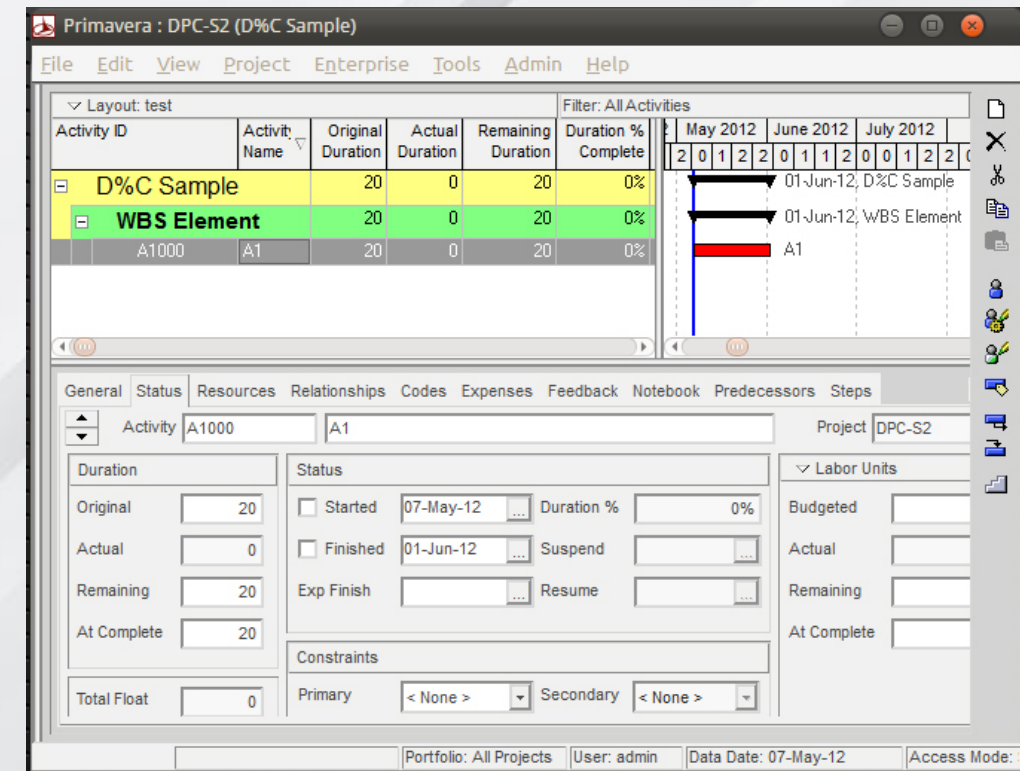
The disadvantages of showing float on the schedule

- End user may delay start of activity thinking there is slack time
- May cause false sense of security
- Once used as an activity -- it's gone forever
- Assumes CPM is complete with correct logic

Scheduling Terminology

Duration - Original / Remaining

Duration: is the amount of time required to complete an activity.



Scheduling Terminology

Original Duration - the planned estimate of the number of work periods required to accomplish an activity.

Remaining Duration - the number of work periods currently forecast to complete the activity.

Work periods can be hours, days, weeks or months.

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Estimate the duration

- Historical information
- Market information
- Rates of installation
- What is a “Normal” rate of installation? How do we come up with this?
Varies by area?

Calendar(s)

The work periods and holidays defined for the Project.

There can be **multiple Calendars** on a Project:

- Engineering - 5 day work week
- Manufacturing - 7 day work week
- Construction - 6 day work week
- Different local Holidays ?

Project Assumptions

Project assumptions are identified at the beginning of the project. Throughout the project life cycle, they will be refined and reanalyzed.

An assumption is what you believe to be true. These are anticipated events or circumstances that are expected during your project's life cycle. You make assumptions based on your experience or the information available on hand.

Project Constraints

Project Constraints are identified at the beginning of the project.
Throughout the project life cycle, they will be refined and reanalyzed.

These constraints are defined at the beginning of your project, and you must work within their boundaries.

A constraint can be of two types:

business Constraints

Technical Constraints

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Scheduling Consists of

- Determining the **activity duration's**.
- **Ties** individual plans together.
- **Timing** of activities.
- Minimizing **resource conflicts**.
- Identifying **critical** activities.

Scheduling Consists of

- Establishing the **baseline**.
- Providing a **tool** for project **evaluation**.
- Provides outputs for **analysis**.
- **Monitoring** and analyzing progress.
- Assists in developing **work-arounds**

Information Gathering

- Information outlining the project is available in many forms and from many sources
- From the project scope description look for similar projects
- The Client - gather as much information about this Project and other similar Projects in which they have been involved.

Information Gathering

Asking about these simple questions

- **What** are you **going to do**?
- **How long** is it **going to take**?
- **What** do you need **to start** the activity?
- **What** do you need **to finish** the activity?

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Develop the Schedule

- **Integrate** individual plans
- Identify **activities**
- Determine activity **duration**
- Determine activity **sequence**
- Establish dependencies and **constraints**
- Identify **critical activities**
- Optimize the application of **resources**

Types of logic among the activities

- Mandatory/Hard logic
- Preferential/Preferred/Discretionary/soft logic

Developing an EPC Schedule

- Engage in an **iterative process**.
 - **Starting** with **Level I and II**, build the schedule.
 - **Check viability** (milestone comparisons, curves, etc.).
 - Build **Level III** with activity logic, resources, etc.
 - **Confirm** Level I and II, and then finalize Level III baseline.
- **Planners facilitate discussions** between Engineering, Procurement, Construction, and Startup team members, and interface between workgroups to optimize the overall schedule.

Communicate the Schedule

- The project's **principal sequences** and overall **strategy** is clear to the team.
- The project must have **basic boundaries** and **commitments identified**.
- The project needs a **workable** plan to accomplish its objectives and everyone **understands their role**.

Implement the Schedule

Once everyone (including the Client) agrees on the Schedule, it becomes the **BASELINE** Schedule.

This the reference point from which the Project will be measured from and from which all **VARIANCES/ CLAIMS** will be analyzed.

A copy of this Schedule will be updated with actual progress and then it becomes the **Current Schedule** which will change as the Project evolves.

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The common Scheduling Failures

- Lack of **buy-in** by all project team members
- Lack of **planning**
- Poorly **defined activities**
- Inappropriate scheduling **detail**
- Inadequate **logic** ties

The common Scheduling Failures

- Poor **duration** estimating
- Lack of **information**
- **Failure to disseminate** the proper information to all parties
- **Excessive details** that overwhelm the sanity
- Updates **without analysis**





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