

learn to create a project budget and schedule that delivers results under costs and time constraints

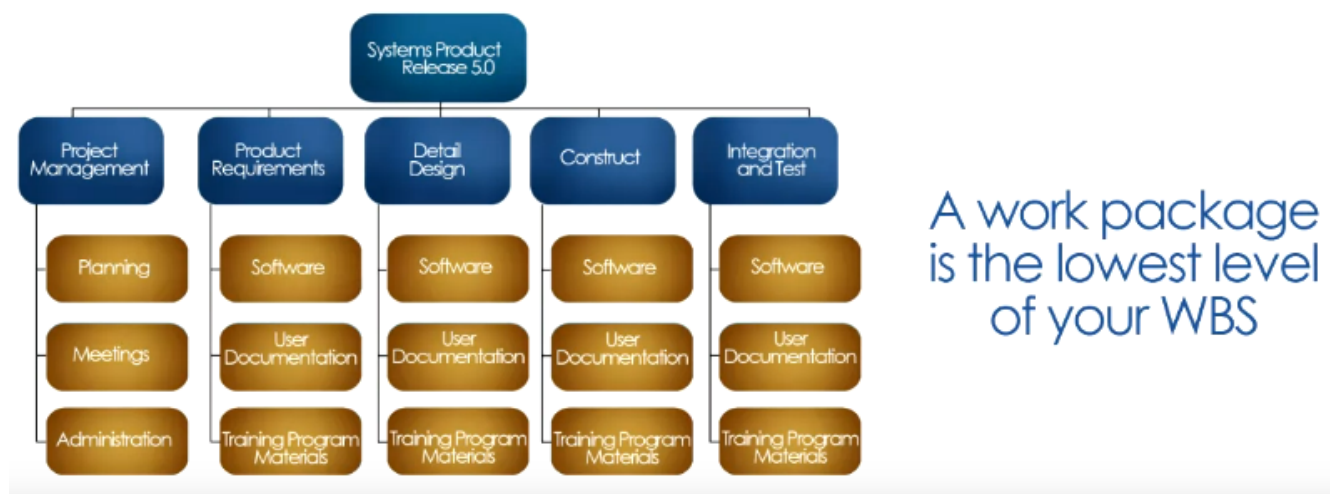
## Course Learning Objectives

- Identify the resource needs of the project
- Decompose work packages into activities
- Define what is needed to estimate activity durations
- Define milestones and create a milestone schedule
- Determine the critical path and calculate float
- Describe the purpose of using leads and lags in a project schedule
- Estimate the quantities and costs of resources required to perform project activities
- Select one of three common cost estimating techniques to determine a project budget
- Use a responsibility assignment matrix to assign responsibilities
- Recognize the components of a project's quality management plan

## Md2: Resources Needs & Quality Management

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### The Work Breakdown Structure



If your work packages are low enough that you can now use them to determine what types of resources are needed.

If not, now is the time to decompose them into activities.

By activity, I mean a piece of work that is assignable and can go into the schedule.

Some people would use the word task.

### Guidelines for WBS Creation:

- **8-80 Rule:** Tasks should take 8 to 80 hours to complete.
- **Status Point Rule:** Ensure work is measurable within two reporting periods.
- **Flexibility:** Exceptions can be made for critical work, even if it's smaller than 8 hours.

### Identifying Resources:

- Resources include people, money, equipment, materials, and facilities.
- Different approaches (e.g., online vs. in-person training) require different resources, such as IT support for online training.

### RACI Framework:

- **Responsible:** Those completing the work.
- **Accountable:** The individual ultimately answerable (only one per work package).
- **Consulted:** Subject matter experts providing input.
- **Informed:** Individuals kept up-to-date on progress

## Project Quality Management

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**Project Quality Management** includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. These processes interact with each other and with the processes of the other knowledge areas. Each process occurs at least once in every project and, in the case of a life-cycle driven project, occurs in each of the phases.



# Process Improvement Plan

The **Process Improvement Plan** is a *subsidiary*, or component, of the project management plan. It details how project management and development processes are to be analyzed in order to identify how to increase their value. These areas may be included:

- **Process boundaries** - Describe the purpose of the process(es), where it starts and ends, what it uses, who owns the process(es) and who is a stakeholder
- **Process configuration** - Graphic depiction of the process(es) with interfaces; this helps analyze the process(es)
- **Process metrics** - Facilitates an understanding and analysis of process efficiency
- Targets for improved performance

You create a Process Improvement Plan *and* a Quality Management Plan!

## Perform Quality Assurance

**Perform Quality Assurance** is the process of auditing the quality requirements and the results from quality control measurements to ensure appropriate quality standards and operational definitions are used

Quality Management

- ▶ 1. Overview
- ▼ 2. Project Quality Management
  - 2.1. Project Quality Management
  - 2.2. Evolution of Quality Management
- ▼ 3. Quality Management Planning Proces...
  - 3.1. Quality Management Planning Pr...
  - 3.2. Plan Quality Management
  - 3.3. Quality Management and Project ...
  - 3.4. Key Terms
  - 3.5. Quality vs. Grade**
  - 3.6. Product Quality vs. Project Quality
  - 3.7. Cost of Quality
  - 3.8. Quality Management Plan**
  - 3.9. Process Improvement Plan
- ▼ 4. Quality Management Executing Proce...
  - 4.1. Quality Management Executing P...
  - 4.2. Perform Quality Assurance
  - 4.3. Quality Assurance
  - 4.4. Perform Quality Assurance
  - 4.5. Quality Audits
  - 4.6. Process Analysis
- ▼ 5. Quality Management Monitoring and ...
  - 5.1. Quality Management Monitoring ...

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## Md3: Cost Management

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**Estimating** is covered in **Project Cost Management** and **Project Time Management** in the PMBOK Guide.

Stay away from providing estimates



before you have had a chance to really  
look at what it will take to complete the work.



Actual time  
for three  
modules

Additional  
time for  
one module

New  
estimate

A diagram illustrating the calculation of total hours. It consists of three circles and two mathematical symbols. The first circle is dark blue and contains the text "4 Hours". To its right is a multiplication sign "X". The second circle is brown and contains the text "4 Modules". To its right is an equals sign "=". The text "16 Hours" follows the equals sign.

$$4 \text{ Hours} \times 4 \text{ Modules} = 16 \text{ Hours}$$

Parametric Estimating

## BOTTOM UP ESTIMATING

- Look at the detailed work
- Provide estimates  
for each piece of work

# Apportioning

## Top-Down Approach

You assign estimates based on a percentage of the total.

### Redesigning Human Resources Hiring Processes

The last time the processes were redesigned:

**25%** on planning

**25%** on designing

**15%** on training

Use those percentages to allocate the budget.

We might now use those

Analogous	Parametric	Bottom-Up
Review past cost data breakdown by work package	Identify parameters that might have a historical cost correlation	Use current preliminary work package descriptions
Evaluate impact of new project factors <ul style="list-style-type: none"><li>• Scope changes (+\$/-\$)</li><li>• Economic/labor (+\$)</li><li>• Raw materials (+\$/-\$)</li><li>• Technology (-\$)</li></ul>	Scale cost relationships <ul style="list-style-type: none"><li>• \$/Lb of weight, payload</li><li>• \$/Unit of length, volume</li><li>• \$/Quantity of energy use</li><li>• \$/Year of product lifetime</li></ul>	Estimate cost of each individual work package <ul style="list-style-type: none"><li>• Best available level of detail</li></ul>
Use expert judgment to quantify impact to each work package; sum total cost	Use expert judgment to select best parameter(s); scale total cost of past project to new project	Sum individual work package estimates for total cost

## Basis of Estimates (BOE)



“What was I thinking?”  
documentation



# Padding

Adding extra to the budget to protect yourself.



- **Contingency Reserve:** Allocated for specific identified risks at the activity level (e.g., extra 30 minutes per module for new software).
- **Management Reserve:** Allocated for unexpected events across the entire project, often as a percentage of the budget (e.g., 10%).

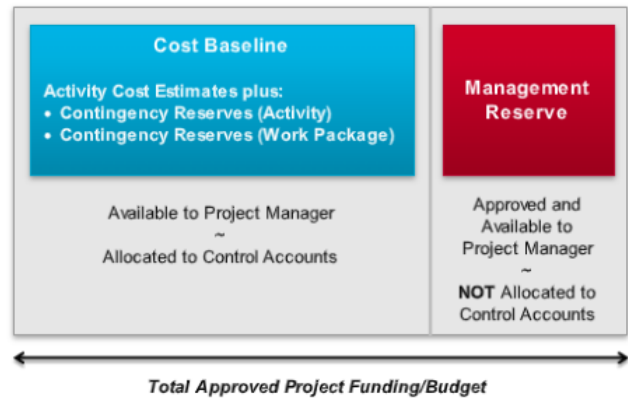
## Management Reserve

Time or money set aside not tied to a specific work package, but rather tied to the entire project.





In addition to developing an approximation of the cost of the resources needed to complete the activities required to create or otherwise acquire the work package deliverables, you may want to consider the establishment of a **monetary reserve** to address uncertainty (i.e., risk) associated with the cost estimates. According to the *PMBOK® Guide*, the term reserve is often used with a modifier (e.g., contingency reserve, management reserve) to provide an indication of what types of project risk are meant to be addressed. The illustration to the right serves to provide a better understanding of the relationship between the project's cost baseline and reserves. The distinction regarding the types of risk addressed by each reserve will be discussed in the lesson on Project Risk Management.



# BUDGET

Your budget is to be approved  
by the appropriate parties.

Once it is, you have a  
**baseline budget.**

# BUDGET

\$50  
an hour  
(baseline)

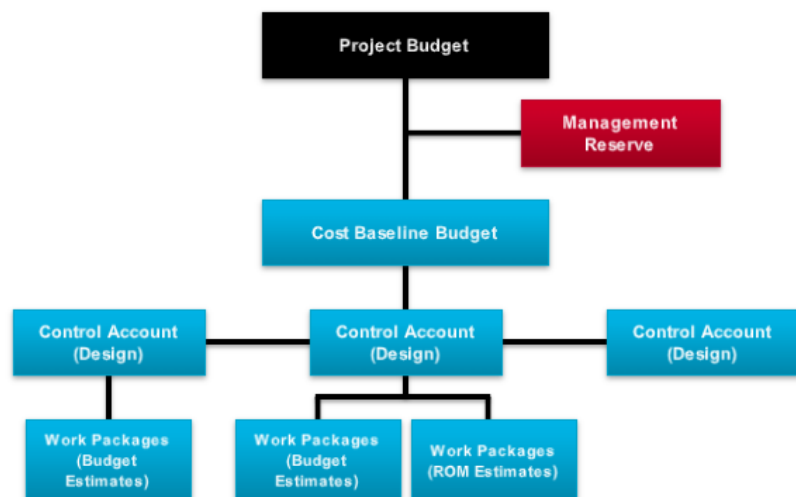
\$55  
an hour  
(actual cost)

Report the difference  
and explain why.

## Defining the Cost Baseline Budget

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The **Cost Baseline Budget** is the *approved* and *time-phased* version of the budget, excluding management reserves, and is only to be changed using formal change control. The **Project Budget** is equal to the cost baseline budget *plus* management reserves. If it becomes necessary to use management reserves, access to those reserves should be requested and documented through the change control process. See the diagram to the right for a graphical depiction of the cost baseline budget, management reserves, and the project budget.



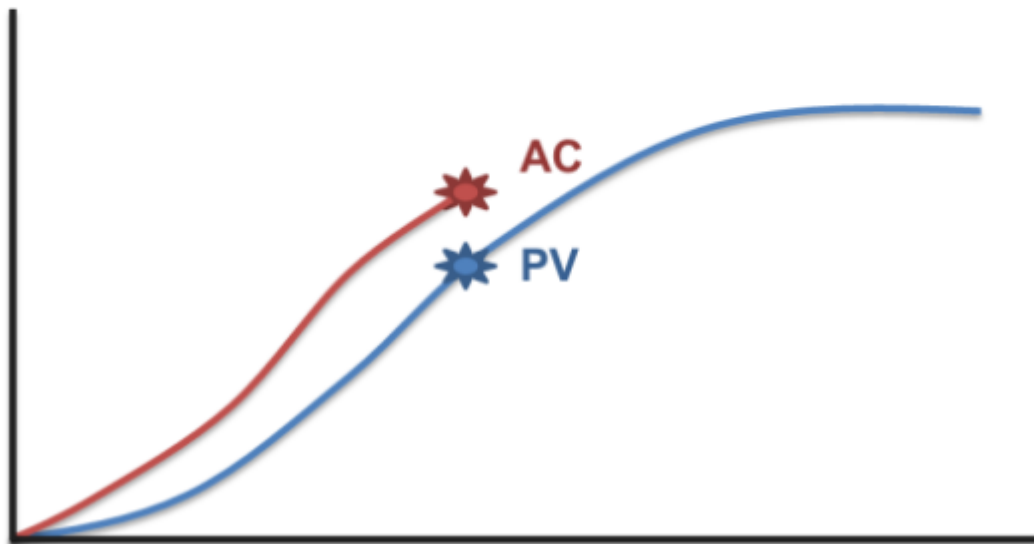
- **Time-Phased Budgeting:** Map planned costs over time to reflect expenditures throughout the project lifecycle.
- Once approved, the budget becomes the **Baseline Budget**.
- **-Variance Reporting:**
  - Compare actual costs to the baseline.
  - Explain variances (e.g., using a team lead at \$55/hour instead of a developer at \$50/hour results in an \$80 variance).

## Earned Value Management

**Earned Value Management** integrates scope, cost, and schedule measures to better assess progress and performance of the project. It must be planned in as part of the project's performance measurement baseline. Measurement is planned and performed through management control points on the WBS defined as **control accounts**. You should establish control accounts on the WBS as management control points where the integration of scope, budget, actual cost, and schedule take place, and where the measurement of performance will occur.

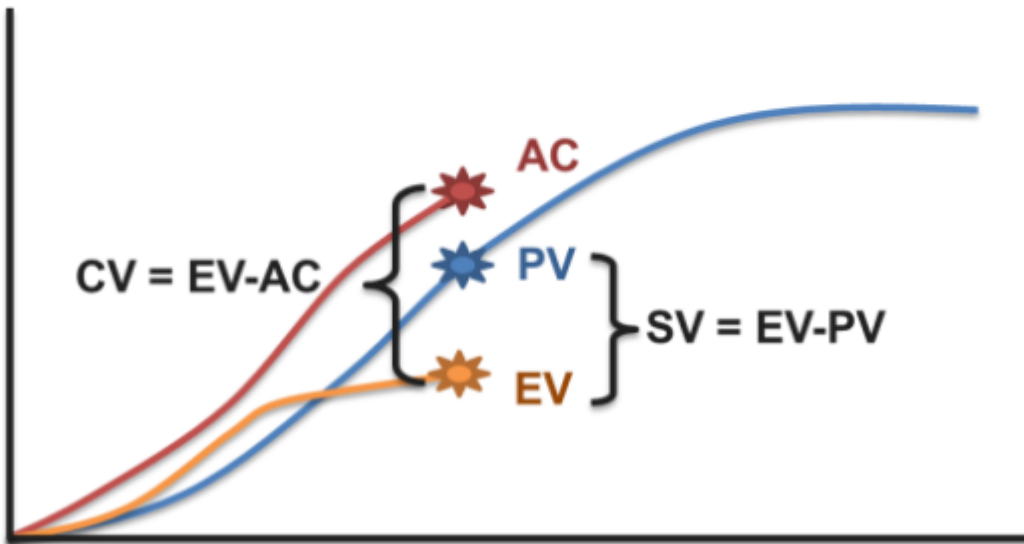
### Traditional Level of Effort Performance Management

Cumulative **actual costs** (AC) to date are generally compared to **planned costs** (PV) to assess project progress and performance. A challenge with this approach can be found in examining this question: *Did you spend less because you are really under budget or did you spend less because you accomplished less work?*



# Performance Management with Earned Value

Earned value (EV) provides an additional perspective on project progress and performance and helps you understand if you are really under budget. Earned value represents the planned (budgeted) value of only the work actually performed to date. This allows you to answer the question accurately. Be sure to review all of the available calculation in the Table 7-1 of the *PMBOK® Guide* (to the right).



Let's see how earned value can help. Consider this scenario:

*Your project has been active for two months. At this point, the amount of work you should have completed is valued at \$25,000. Per your budget reports, you see that you have spent \$30,000 to date. The amount of work that has actually been completed is worth \$20,000.*

Your actual costs are \$30,000, which means that your cost variance (CV) is:

$$CV = EV - AC = \$20,000 - \$30,000 = -\$10,000$$

A negative cost variance means you are not on budget, you are **over budget**.

Full term: [https://s3-us-west-2.amazonaws.com/unex-pm-mooc/lesson04/story\\_content/external\\_files/PMBOK5\\_Tab\\_7-1.jpg](https://s3-us-west-2.amazonaws.com/unex-pm-mooc/lesson04/story_content/external_files/PMBOK5_Tab_7-1.jpg)

## Md4 : Time management

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# Realistic Schedule

- Has the detailed information about the work to be completed
- Activities are sequenced in the right order
- Can be accomplished given the availability of resources
- Enhances communication



### Sequenced Activities

- The tasks are ordered logically, considering dependencies:
  - **Mandatory dependencies** (e.g., building a foundation before erecting walls).
  - **Discretionary dependencies** (e.g., preferred sequencing based on best practices).
  - **External dependencies** (e.g., inspections from external agencies).

If Develop Online Modules must be 100% completed before Review Online Modules can begin,



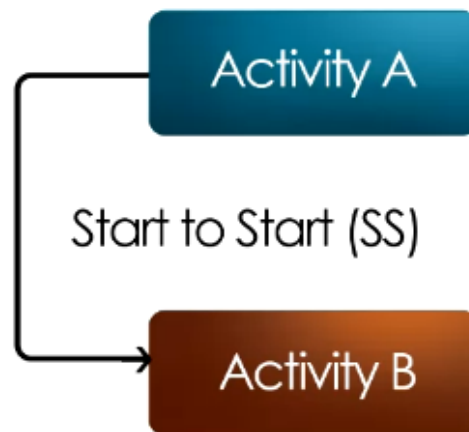
it is a  
FINISH TO START  
relationship.

If Develop Online Modules needs to finish before Review Online Modules can finish,



it is a  
FINISH TO FINISH

If Develop Online Modules can start  
and then Review Online Modules can start,



it is a  
START TO START  
relationship

Another less common type of relationship is  
START TO FINISH.





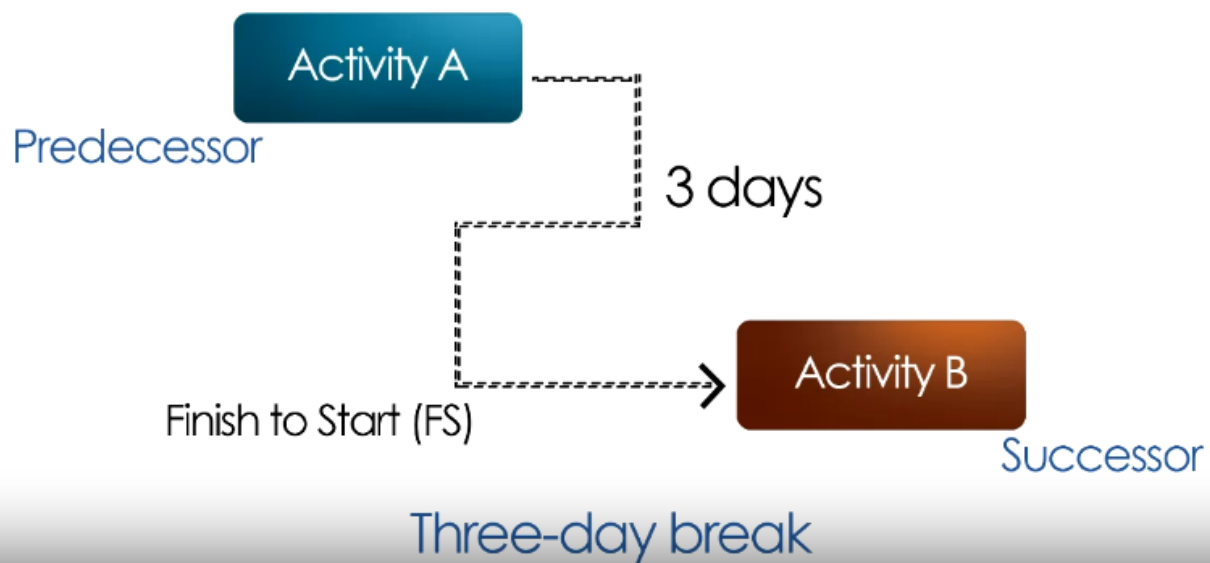
# LAG

Adds time between activities.

# LEAD

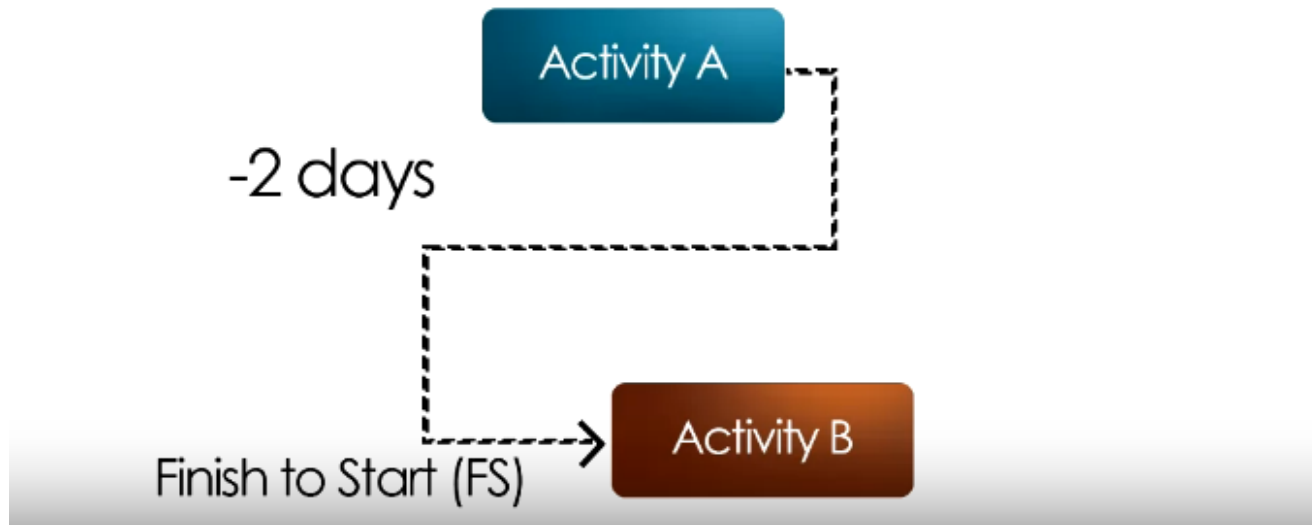
Decreases the amount of time between two activities.

## Using a Lag

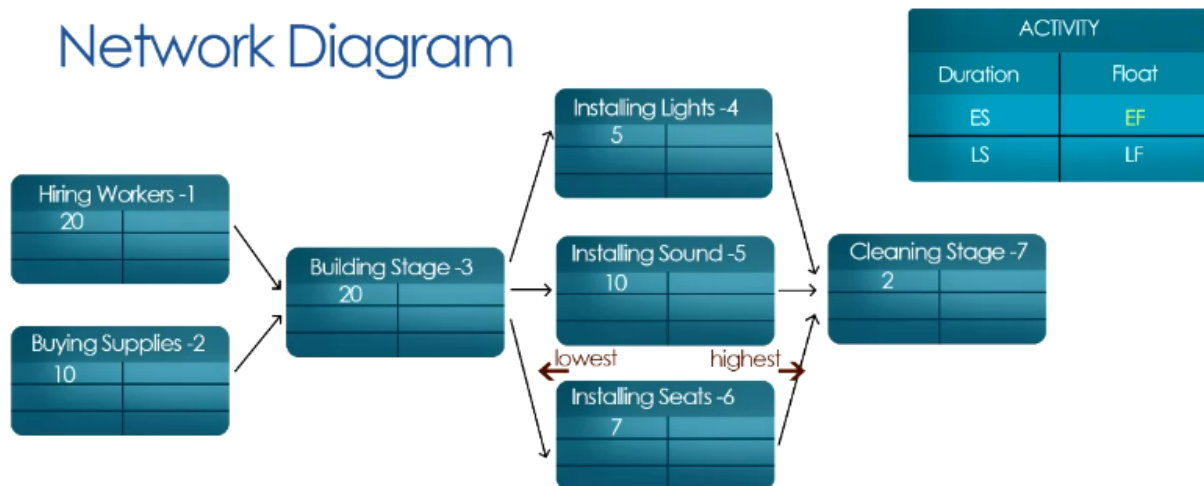


# Using a Lead

The successor can start  
BEFORE the predecessor completes.



## Network Diagram



EF = Early Finish  
(the earliest an activity can end)

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FL or SL = Float or Slack  
(the amount of time an activity can be delayed)

## Critical Path Method

The path which is the maximum amount of time it takes to get from the start to the finish of the project.

The minimum amount of time the project will take.

Quality management is integrated from the project's beginning. Define **acceptance criteria**, plan for **reviews and sign-offs** (đánh giá và ký kết), and ensure quality checks are scheduled and budgeted. Engage the quality team early for better results

**Scenario #1.** Your team member informs you that the test system must be refreshed with your test data before testing can be begin. This dependency is:

Discretionary

External

Mandatory

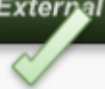


**Scenario #2.** Your sponsor informs you that you must receive local government approval of your proposed building design before you can begin construction of your building, this dependency is:

Discretionary

External

Mandatory



**Scenario #3.** You have two activities, A and B. Once A begins, then B can also begin. This relationship is best described as:

Start to Start

Start to Finish

Finish to Start




## Shortening the Critical Path

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It is not uncommon to receive a request to decrease your schedule. If your estimates are accurate, you can't just reduce your estimates. You might be able to change the way in which the team is completing the work. **Fast tracking** is one way to reduce your schedule. With fast tracking, you re-plan the work and try to perform more overlapping sequential activities to be in parallel.

**Crashing** is another approach. If you use crashing, you look at the critical path and determine if providing more resources (labor, overtime, etc.) will help decrease the critical path. This results in cost and schedule trade-offs to achieve reductions in schedule activity durations; you might pay more in order to reduce the schedule. It generally requires additional resources and person-hours. You must produce a shorter critical path to be viable (non-critical path activities can be crashed, but may not provide an overall benefit).



Schedule compression seeks to shorten the project schedule without changing the project scope. However, scope can also be modified, with management and customer approval, to shorten the project schedule.

Definitions adapted from the Glossary of A Guide to the Project Management Body of Knowledge (PMBOK® Guide) - Fifth Edition, Project Management Institute, Inc., 2013.

PREV

NEXT