

PROJECT MANAGEMENT

MODULE 5 – Winter 2022



**WE ARE
HUMBER**

Agenda:

- **Project Scheduling**
 - Creating a WBS
 - Activity sequencing
 - Assigning Resources
 - Critical Path Method (CPM)
- **MS Project**
 - Lab #3 – Creating a project schedule – MS Project

What is a Project Schedule?

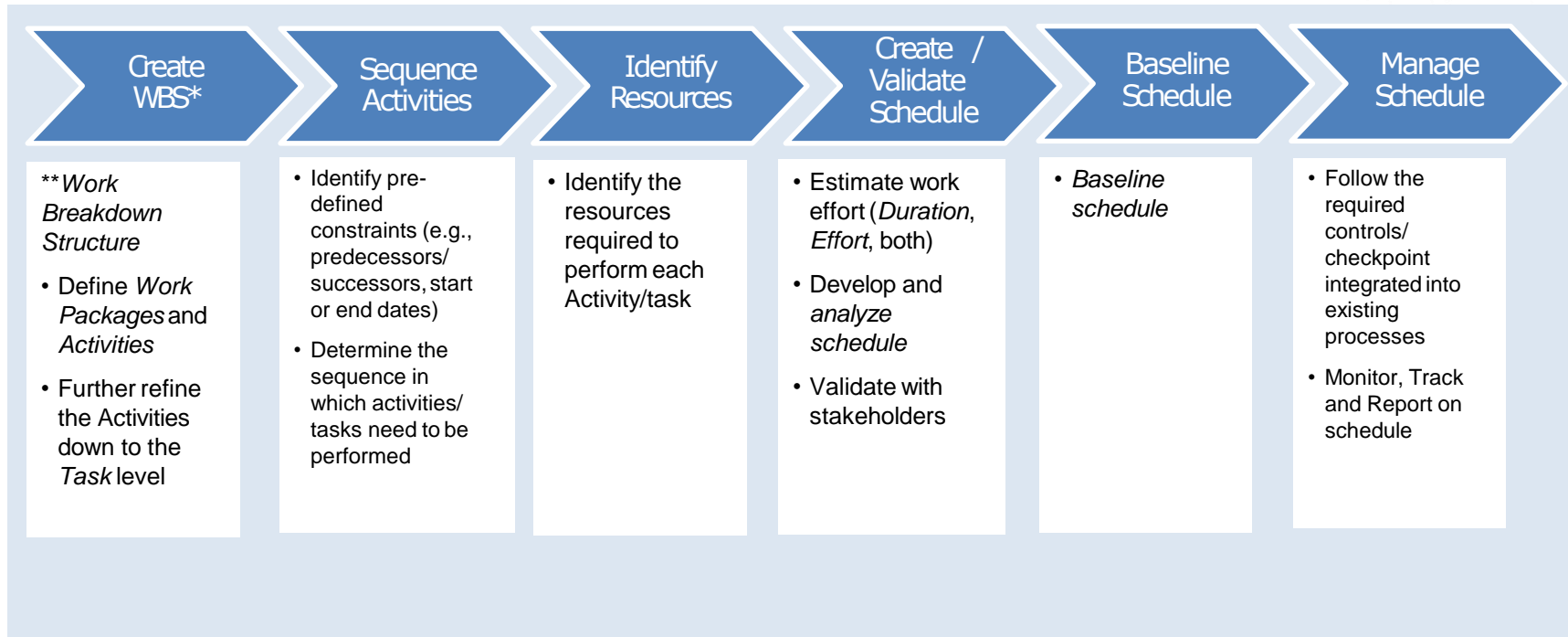
The Project Management Institute's Project Management Body of Knowledge defines a project schedule as the planned dates for performing schedule activities and the planned dates for meeting schedule milestones

The project schedule is a document that outlines:

- what work needs to be done,
- the order in which it needs to be done,
- what resources are required,
- how they will be distributed,
- how long different parts of the work will take.

The schedule helps project managers communicate and collaborate with team members and stakeholders and keeps the project on track.

Key steps to create and manage a schedule



Project Scheduling – Key Terms

Component	Description
Detailed Schedule	<ul style="list-style-type: none"> Representation of the project's activities and tasks, including durations, dependencies, mapped against actual dates to form a timeline Maintained and monitored through the project lifecycle Leverage the WBS as a starting point It includes: 1) what will be done (activity description), 2) how it will be done (task description), 3) when it will be done (time/duration), and 4) who will do it (resource) Typically documented in MS Project (standard), but other applications can be used
Work Breakdown Structure	<ul style="list-style-type: none"> Hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables
Milestones (sometimes known as "high-level milestones")	<ul style="list-style-type: none"> Used to measure the progress of a project and to signify the completion or start of a major deliverable An event in the project schedule with zero duration, requires no resources Needs to map to project deliverables identified in the project Sometimes referred to as "High-Level Milestones"
Work Package	<ul style="list-style-type: none"> Work defined at the lowest level of the work breakdown structure for which cost and duration are estimated and managed
Activity	<ul style="list-style-type: none"> Distinct, scheduled portion of work performed during the course of a project
Task	<ul style="list-style-type: none"> Description of how an activity will be performed
Schedule Baseline	<ul style="list-style-type: none"> The approved version of a schedule model that can be changed using formal change control procedures and is used as the basis for comparison to actual results
Critical Path	<ul style="list-style-type: none"> Sequence of activities that represents the longest path through a project, which determines the shortest possible duration of the project
CPM (Critical Path Method)	<ul style="list-style-type: none"> A method to analyze the schedule to determine the minimum total project duration and the earliest possible finish date for the project, which helps to identify gaps or issues with the scheduling logic so adjustments can be made prior to baselining the schedule
Effort	<ul style="list-style-type: none"> Amount of time to complete the specific task only, i.e. the amount of time required from start to finish with no other interruptions (other commitments, work, meetings, etc.)
Duration	<ul style="list-style-type: none"> Amount of time to complete a specific task given other commitments (e.g., vacation, other work, etc.)

Work Breakdown Structure (WBS)

The most important part of creating a schedule is the proper development of the work breakdown structures (WBS). The WBS provides a clear description of the project's deliverables. It describes the "what is to be done" **not** the process or schedule.

The WBS:

- Is a **deliverable** breakdown structure
- Is a hierarchical decomposition of the work – the deliverables are decomposed to a level where a work package can be defined,
- Is a graphical representation or textual outline of the project scope
- Represents 100% of the work defined by the project scope and captures ALL deliverables, internal, external, and interim, including project management

The WBS has the following characteristics:

1. It is representative of work, and this work has a tangible result.
2. It is arranged in a hierarchical structure.
3. It provides a management structure.

Developing the WBS

1. Define the project goals and objectives. Begin with the project charter—the scope, objectives and who is participating in the project—determine what it is and describe it.
2. What are your deliverables? List them all and note what is necessary for those deliverables to be deemed successfully delivered
3. The next level down is the project phases: break the larger project deliverables into components that will take it from conception to completion.
4. Decompose deliverables and components into sub-deliverables, work packages, resources, participants, etc.).
5. Take your work packages from above and break them down into every single task and subtask that is necessary to deliver them. Make a list of all those tasks.

WBS Levels

The WBS will include all work/deliverables of the project.

The depth of a WBS is dependent upon the size and complexity of the project and the level of detail needed to plan and manage it. The WBS levels may be broadly categorized into five major levels.

These levels, arranged in a descending hierarchical order are:

- Level 1: Project
- Level 2: Deliverables (software, manuals etc)
- Level 3: Components: key work items that lead to the production of the deliverables
- Level 4: Work-packages: major work items or collection of related activities to produce a component (phases)
- Level 5: Tasks/activities (individual responsibility)

Define Work Packages and Activities

- Decompose major deliverables to a level of detail appropriate to manage it. Decide if adequate cost and duration estimates can be developed at this level of detail for each deliverable.
- A project schedule is developed by further decomposing WBS work packages and analyzing activity sequences, durations, resource requirements, and project constraints to create a formal list of project activities and an outline of which order they should be performed.

Activity Definition

- For scheduling purposes, WBS work packages are decomposed into even smaller components known as schedule activities. This process is referred to as activity definition. Schedule activities are work defined to a level that can be easily estimated, scheduled, executed, and monitored and controlled.

Sequence Activities

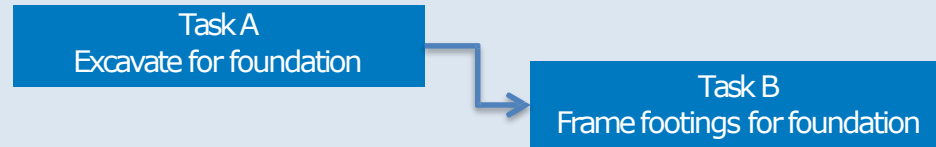
- Schedule activities have inherent interdependencies, resource limitations, date constraints, etc. that all need to be considered when outlining how project work aligns in the form of a defined project schedule.
- Once all the project activities have been documented, each one must be carefully assessed to identify which tasks rely on others to be completed. For example, If you're building a house, you can't put the roof on until the frame is completed. It's important to correctly define all activity dependencies to create an accurate schedule and avoid project delays.
- Once dependencies have been established among project activities, the activities can be sequenced. At this point, there is no *time/effort* assigned to the activities in terms of work hours or due dates. Instead, the focus is on the *order* in which all project activities should be done so that the most efficient flow is created.

Scheduling Logic

- Most tasks/activities in the schedule should have at least one predecessor and one successor
- The first task in the schedule will not have a predecessor, and the last task will not have a successor

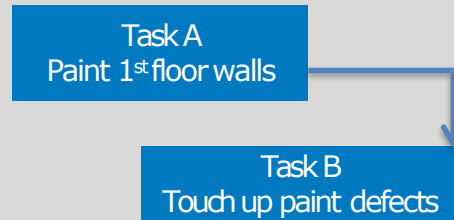
Finish-to-Start (FS):

Task A must finish before task B can start



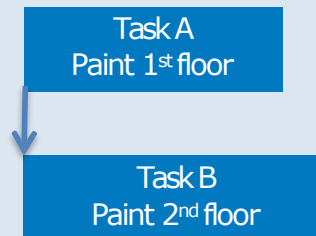
Finish-to-Finish (FF):

- Task A and B finish at the same time
- Tasks are being worked in parallel and the completion of task A is dependent on the completion of task B



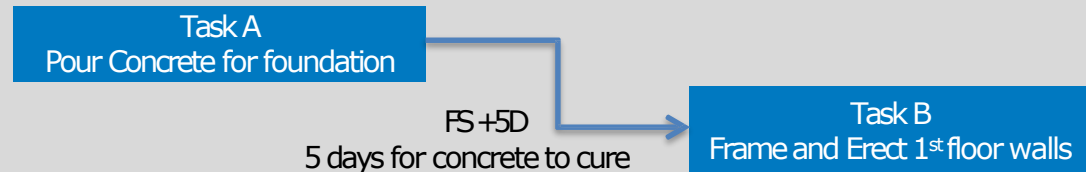
Start-to-Start (SS):

- Task A and B can start at the same time
- Tasks can be worked in parallel



Leads/Lags:

- Leads and lags are a way to offset the logic
- Most tools define this usage as a lag and allow the lead as a negative value of the lag



Dependencies

- **Mandatory dependencies** are inherent in the nature of the work being performed on a project. They are sometimes referred to as hard logic. For example, you cannot test code until after the code is written.
- **Discretionary dependencies** are defined by the project team. For example, a project team might follow good practice and not start the detailed design of a new information system until the users sign off on all of the analysis work. Discretionary dependencies are sometimes referred to as soft logic and should be used with care since they may limit later scheduling options.
- **External dependencies** involve relationships between project and non-project activities. The installation of a new operating system and other software may depend on delivery of new hardware from an external supplier. Even though the delivery of the new hardware may not be in the scope of the project, you should add an external dependency to it because late delivery will affect the project schedule.

Assigning Resources

- When reviewing the tasks for work to be accomplished, ensure that you identify the types of resources required to accomplish the activity.
- Do you have the right expertise assigned? There are assumptions made when assigning the resource and how valid are the assumptions?
- Each activity in your project will require resources in the form of personnel, subcontractor costs, tools (physical and/or digital tools like software programs), and workspace. Make sure to consider other resources that are specific to your industry or project. Estimate the resources needed for each project activity.
- Remember that resource allocation will affect your schedule; if the same team member is responsible for multiple tasks, they can't be completed at the same time

Breakout Group Exercise 10-15min

In your Breakout Group –

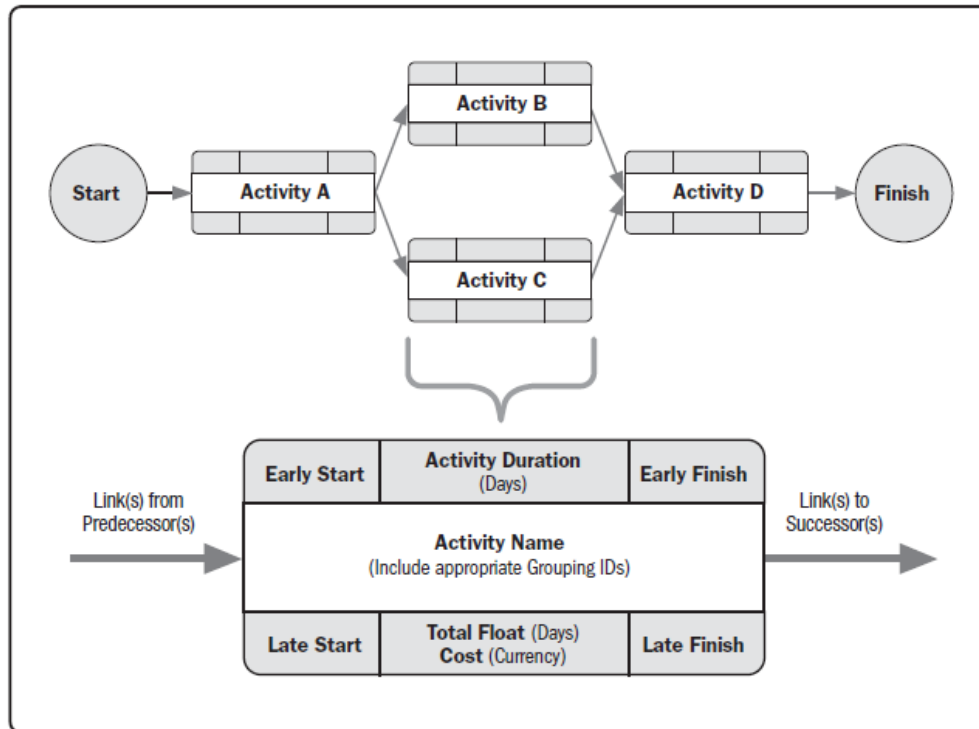
- 1) Discuss Scheduling Logic concepts**
- 2) What are some examples (at least 2) of F-S, F-F, S-S, Lead/Lags, Hard constraints?**
- 3) Nominate one person to share with rest of class**

Critical Path Method (CPM)

As per PMP PMBOK definition, project critical path method (CPM) is a method used to estimate the minimum project duration and determine the amount of scheduling flexibility on the logical network paths within the schedule model.

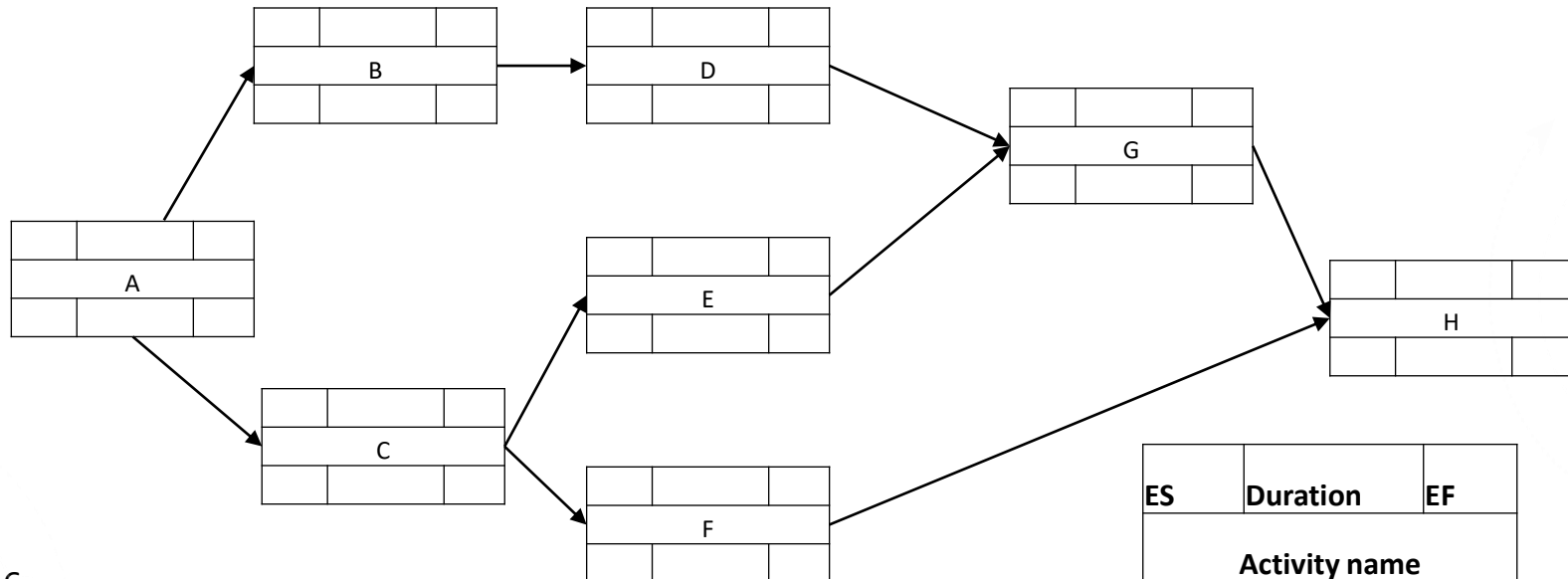
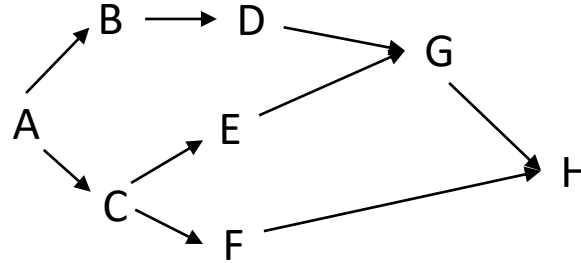
The critical path is the sequence of activities that represents the longest path through a project, which determines the shortest possible project duration and has zero float.

On any network path the schedule flexibility is measured by the amount of time that a schedule activity can be delayed or extended from its early start date without delaying the project finish date, or violating a schedule constraint, and is termed total float



CPM Example

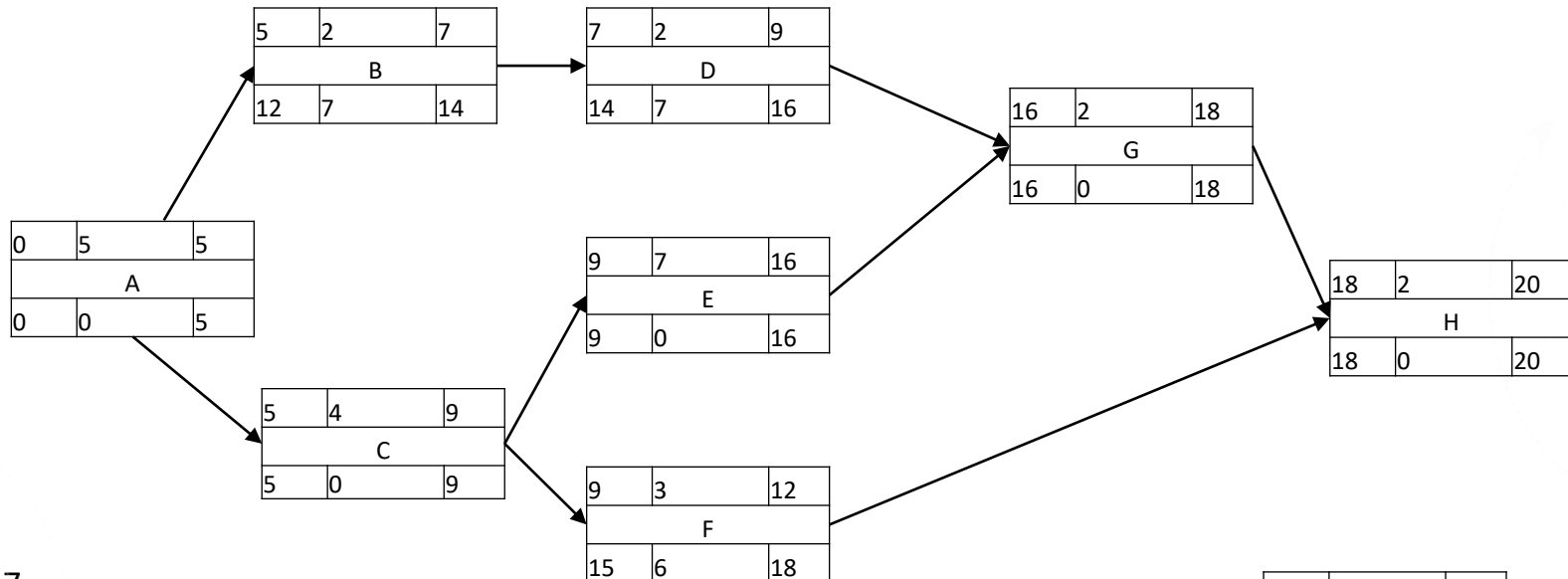
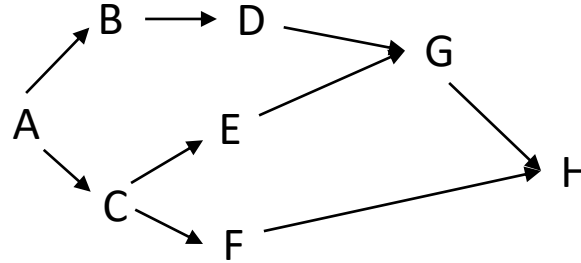
Activity	Predecessors	Duration (days)
A	-	5
B	A	2
C	A	4
D	B	2
E	C	7
F	C	3
G	D, E	2
H	F, G	2



ES	Duration	EF
Activity name		
LS	Float	LF

CPM Example

Activity	Predecessors	Duration (days)
A	-	5
B	A	2
C	A	4
D	B	2
E	C	7
F	C	3
G	D, E	2
H	F, G	2



Critical Path: A-C-E-G-H = 20 days

ES	Duration	EF
Activity name		
LS	Float	LF

Breakout Group Exercise 15-20 min

In your Breakout Group – work on the following CPM question.

	Activity	Predecessors	Duration (days)
A	Excavate	-	3
B	Foundation	A	15
C	Rough Walls	B	25
D	Roof	C	5
E	Exterior Plumbing	C	5
F	Electrical Work	C	20
G	Exterior Siding	D	5
H	Interior Plumbing	E	20
I	Drywall installation	F,H	7
J	Exterior Painting	E,G	5
K	Flooring	I	5
L	Interior Painting	I	5
M	Exterior Fixtures	J	2
N	Interior Fixtures	K,L	10
O	Final Inspection	M,N	1

What is the Critical Path?

Which path has the most float/slack?

We will review the answers together in class

MS Project Tutorial (Optional)

For those that are not familiar with MS Projects, this is an excellent overview to learn more about using MS Project to create a schedule.

- If you are familiar with MS Project, please proceed to Lab #2 on the following page

<https://www.youtube.com/watch?v=A-yPSJGY- Y>

LAB 2: MS Project

MS Project:

1. *Create a schedule using MS Project – use the WBS on next page or create your own (e.g. house construction, planning a wedding, Vacation, etc.)*
 2. *Add Tasks and subtasks to your project to define the complete scope*
 3. *Add dependencies/constraints*
 4. *Add resources (e.g. Sponsor, PM , Business Analyst, Solution Architect, UI/UX Designers, Content Specialists, Developers, QA / Test Leads, etc.)*
- *Use the lab time explore MS Project, test its features/functionality.*
 - *You can't break it, have fun with it!*

Submit via Blackboard / Assignments / Lab #2

- naming convention: "Last name.first name – lab2"

You have until end of class today to submit your lab

Once you have completed your lab, CLASS IS FINISHED! See you next week

LAB 3: MS Project

MS Project:

Continue with your MS project schedule from Lab 2

- *Add sub-tasks*
- *Estimate the duration for each task*
- *Add Phases, milestones to your project*
- *Show progress of tasks (how much work has been completed)*
- *Show critical path on the Gantt chart*

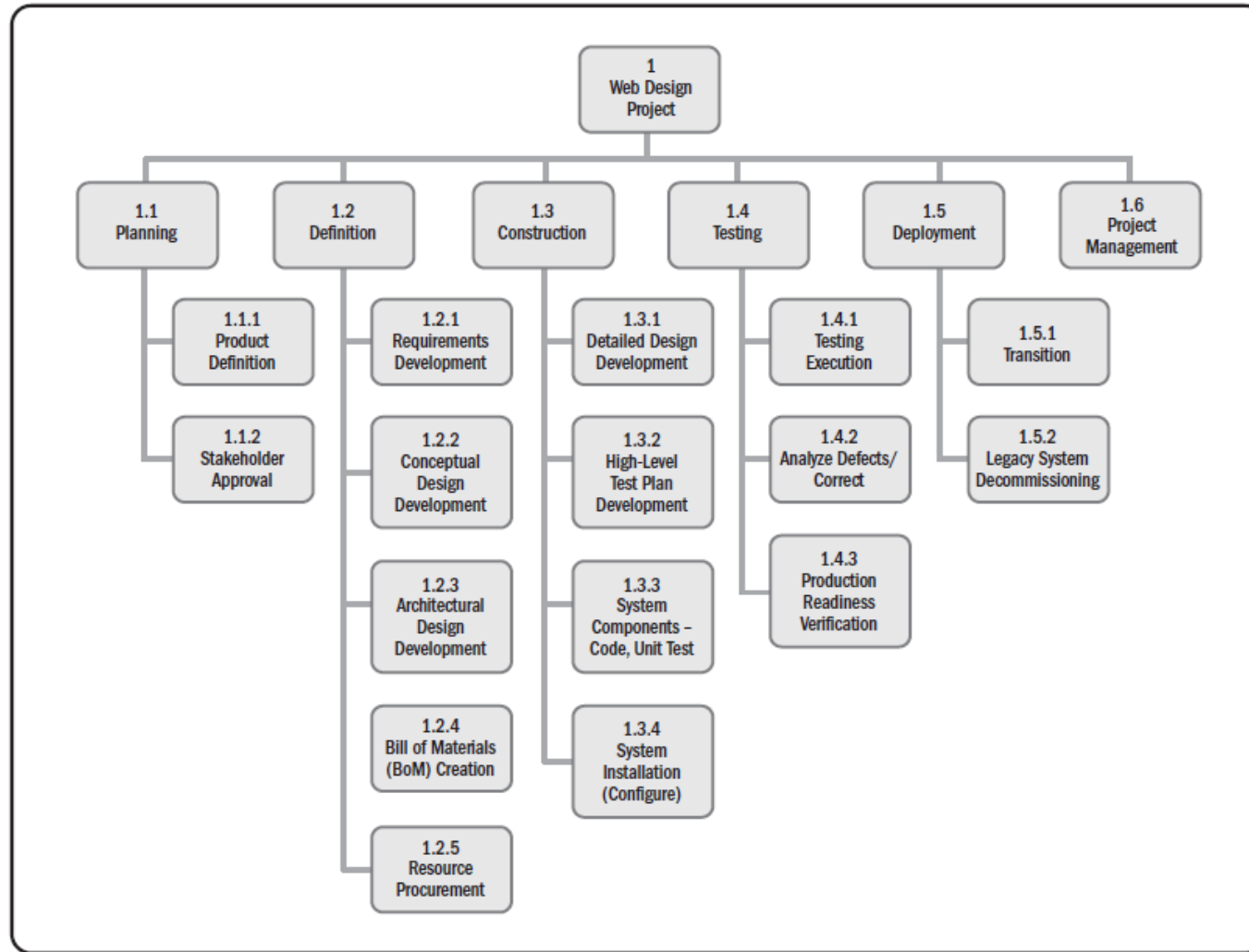
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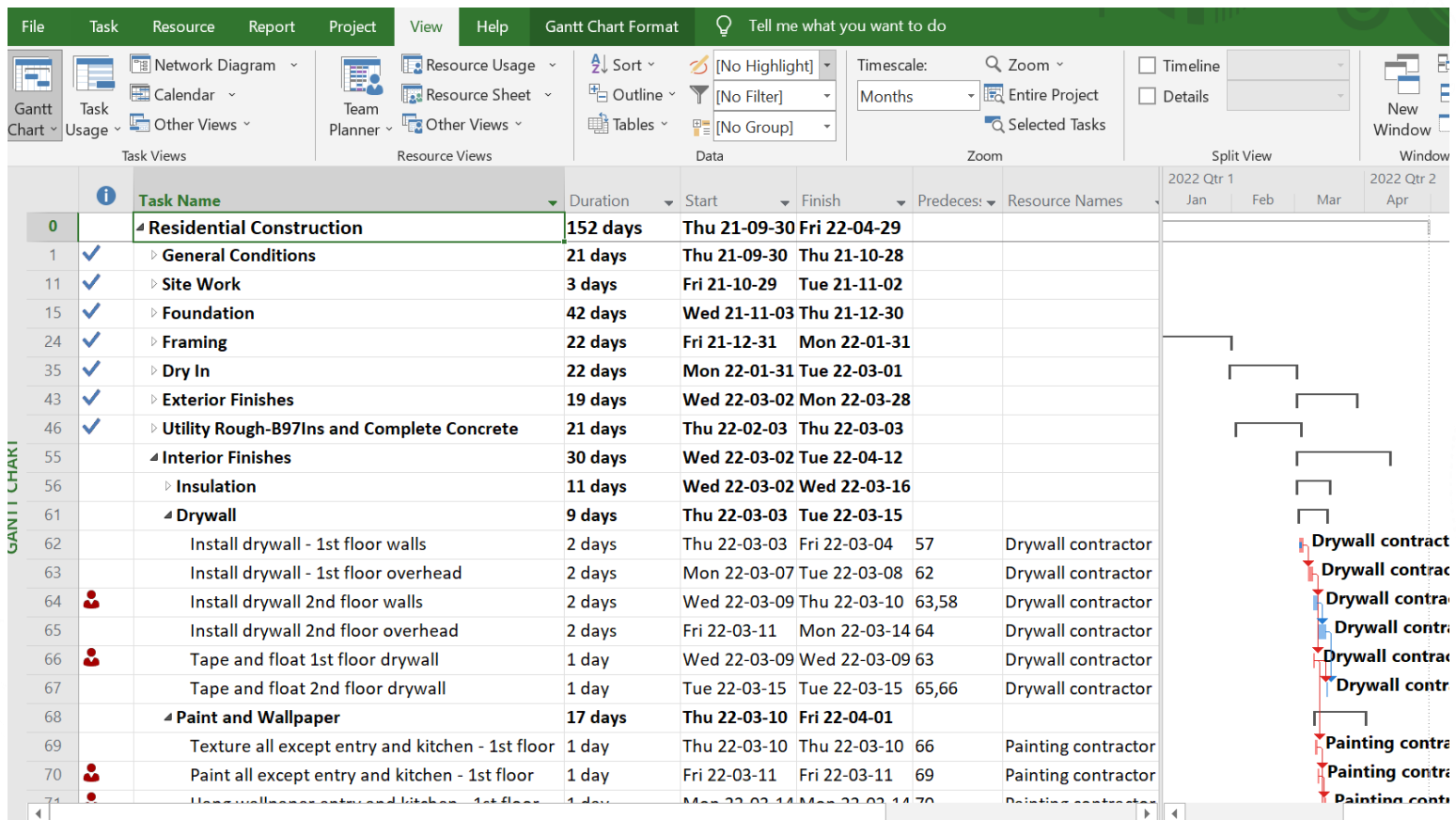
LAB 2: Sample WBS



LAB 3: Sample

Continue to update your schedule

- Add sub-tasks
- Estimate the duration for each task
- Add Phases, milestones to your project
- Show progress of tasks (how much work has been completed)
- Show critical path on the Gantt chart



NEXT WEEK:

- **Project Monitoring Analysis and Control**
 - **Earned Value Management (EVM)**
- **Mid term exam topics and logistics**

THANK YOU.



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