

1.040/1.401

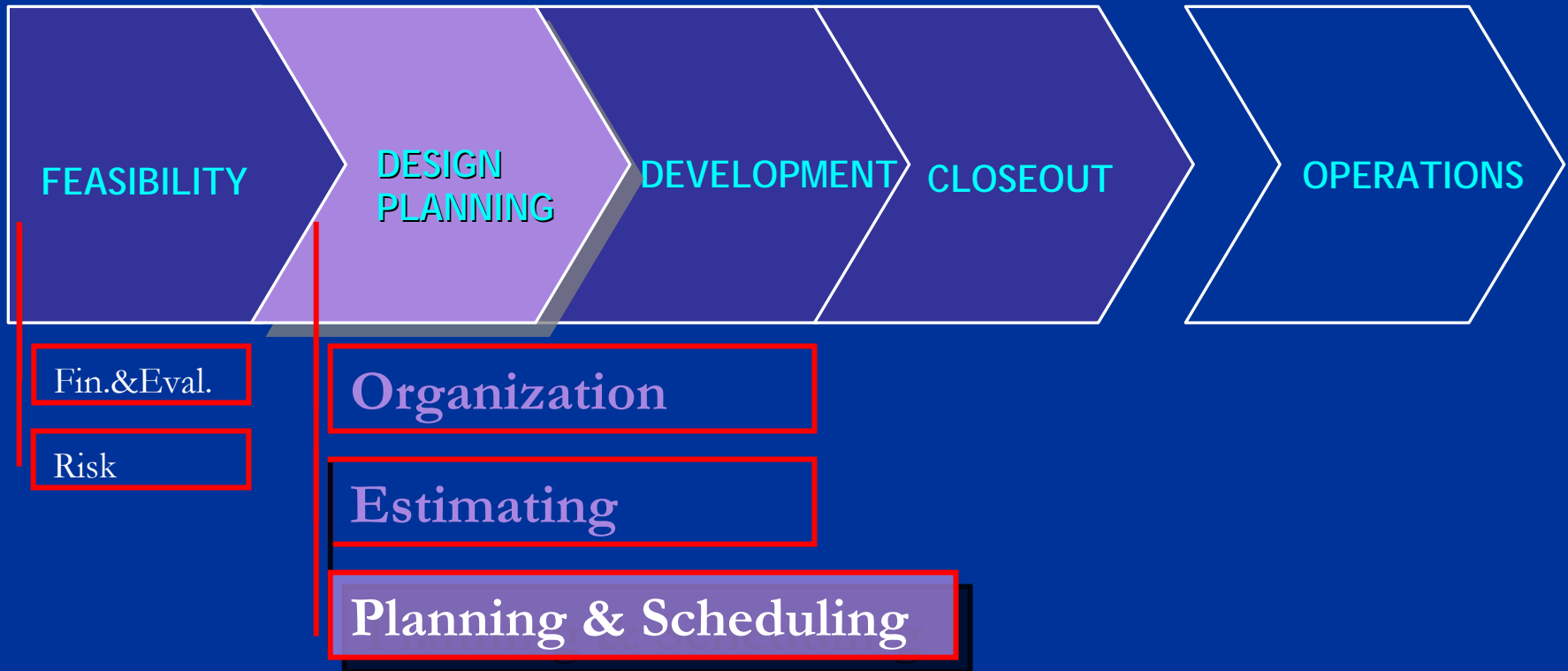
Project Management

Spring 2007

Deterministic Planning Part II

Dr. SangHyun Lee

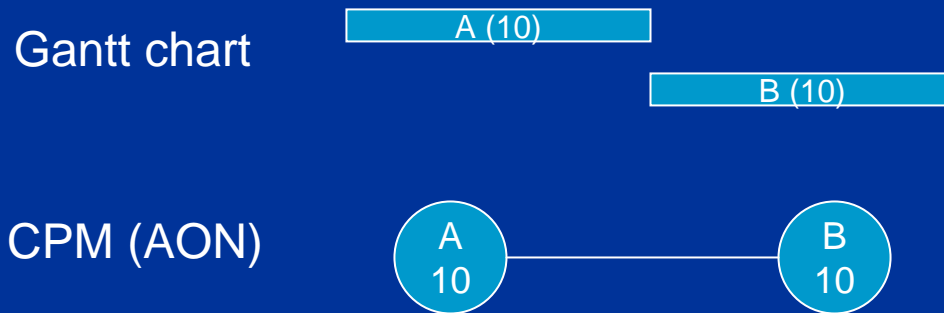
Project Management Phase



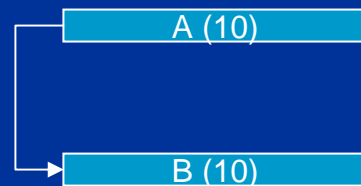
Outline

- Network Techniques
 - ✓ CPM
 - PDM
- Linear Scheduling Method

Precedence Diagram Method (PDM)



Activity B will start right after Activity A finishes



Activity B will start right after Activity A starts

Precedence Diagram Method (PDM)

- PDM Extends CPM to include
 - Multiple relationships beyond Finish-to-Start
 - Finish-to-Finish
 - Start-to-Start
 - Start-to-Finish

PDM – Types of Relationships

- FS Finish-to-start



- SS Start-to-start



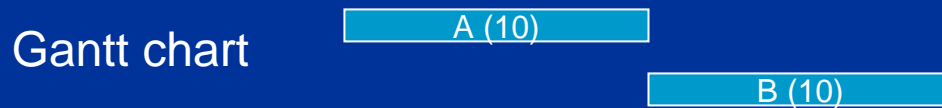
- FF Finish-to-finish



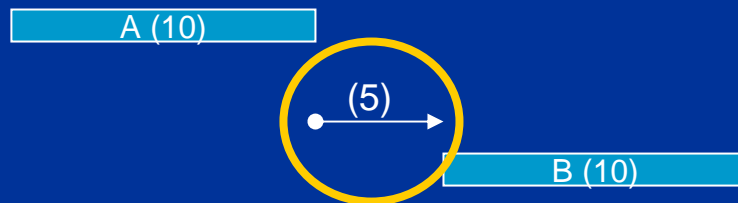
- SF Start-to-finish



Precedence Diagram Method (PDM)



Activity B will start after
Activity A finishes

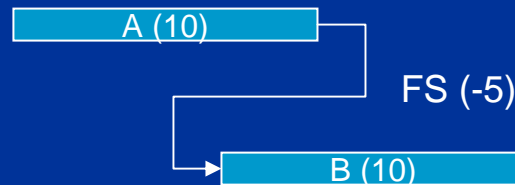
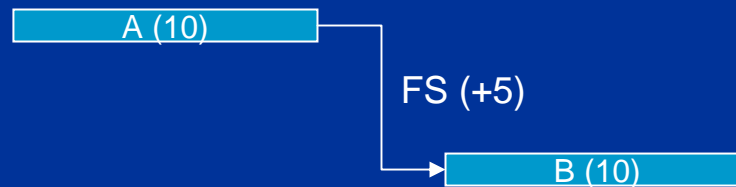


Activity B will start 5 days
later after Activity A finishes



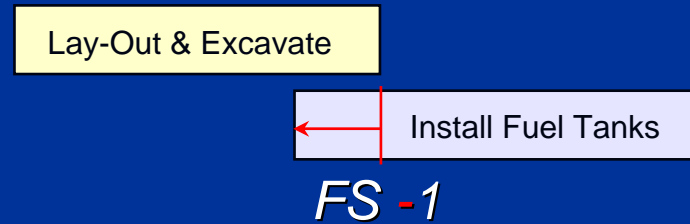
Precedence Diagram Method (PDM)

- PDM Extends CPM to include
 - Lag (+) & Lead (-)

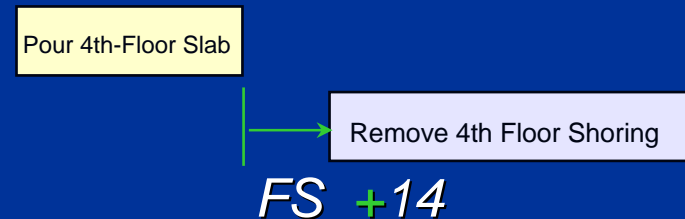


PDM Relationships w/ Lag & Lead

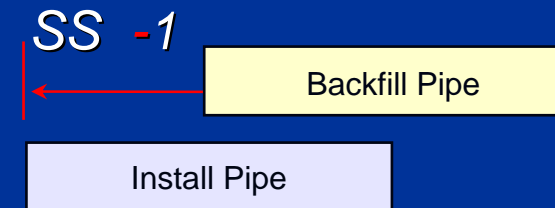
Finish-to-Start **Lead**



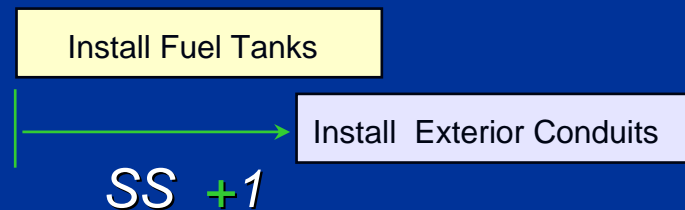
Finish-to-Start **Lag**



Start-to-Start **Lead**

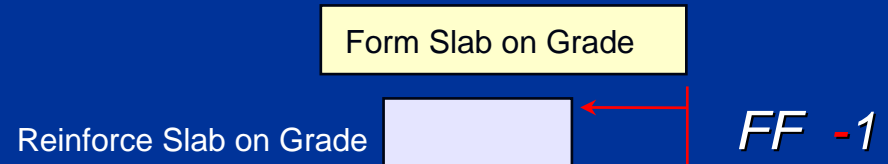


Start-to-Start **Lag**

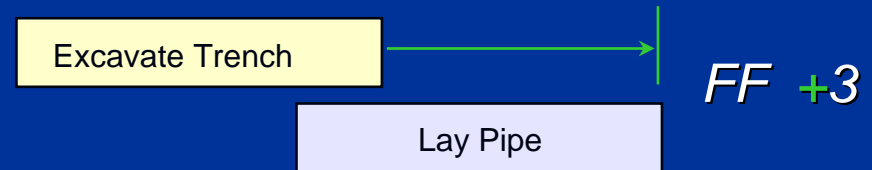


PDM Relationships w/ Lag & Lead

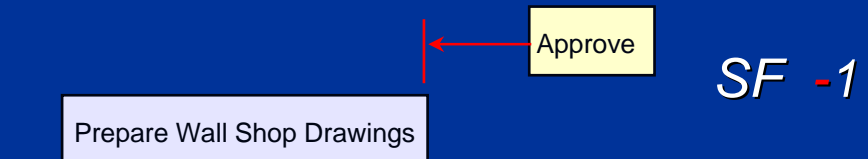
Finish-to-Finish **Lead**



Finish-to-Finish **Lag**



Start-to-Finish **Lead**



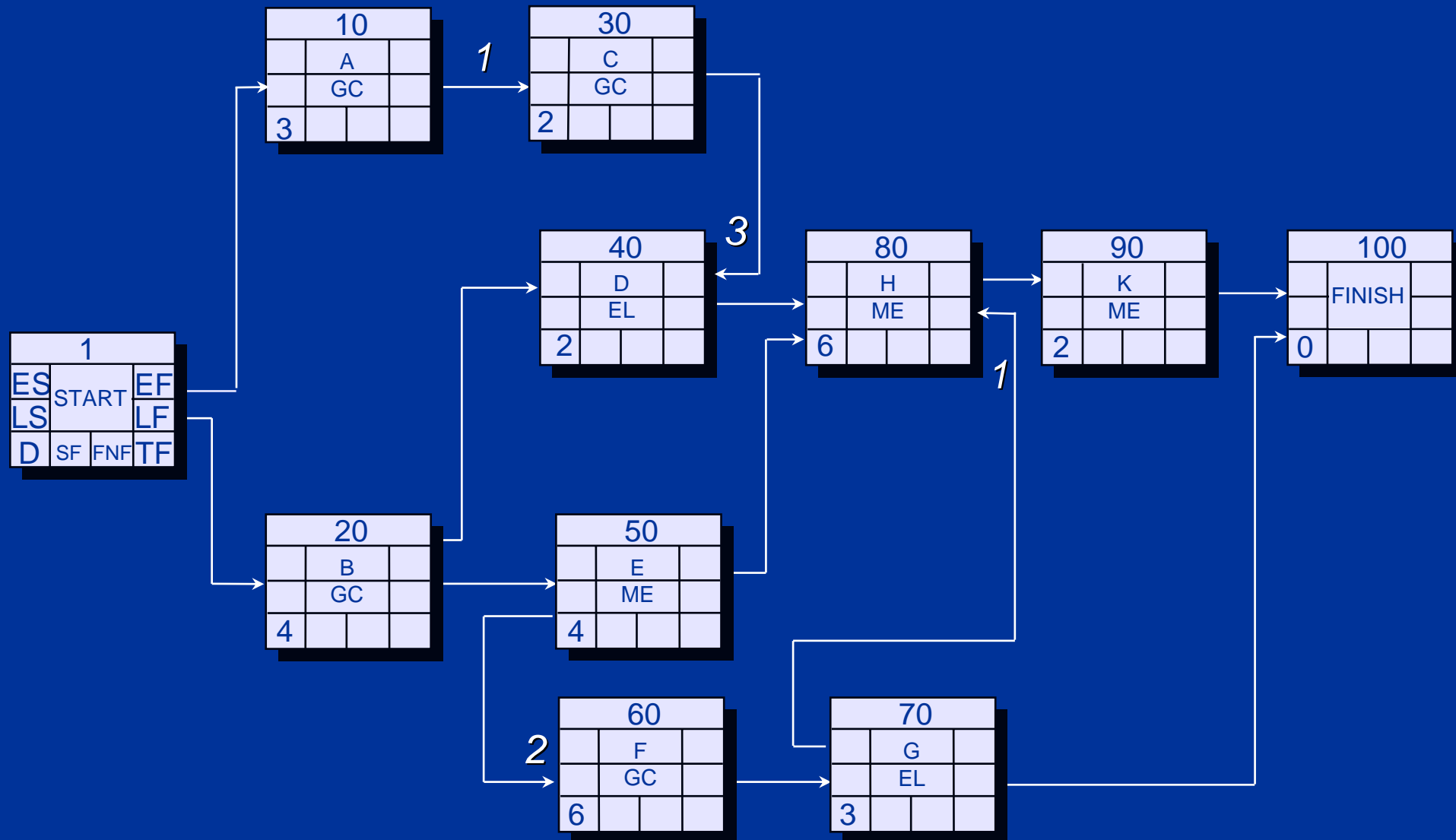
Start-to-Finish **Lag**



Slack or Float in PDM

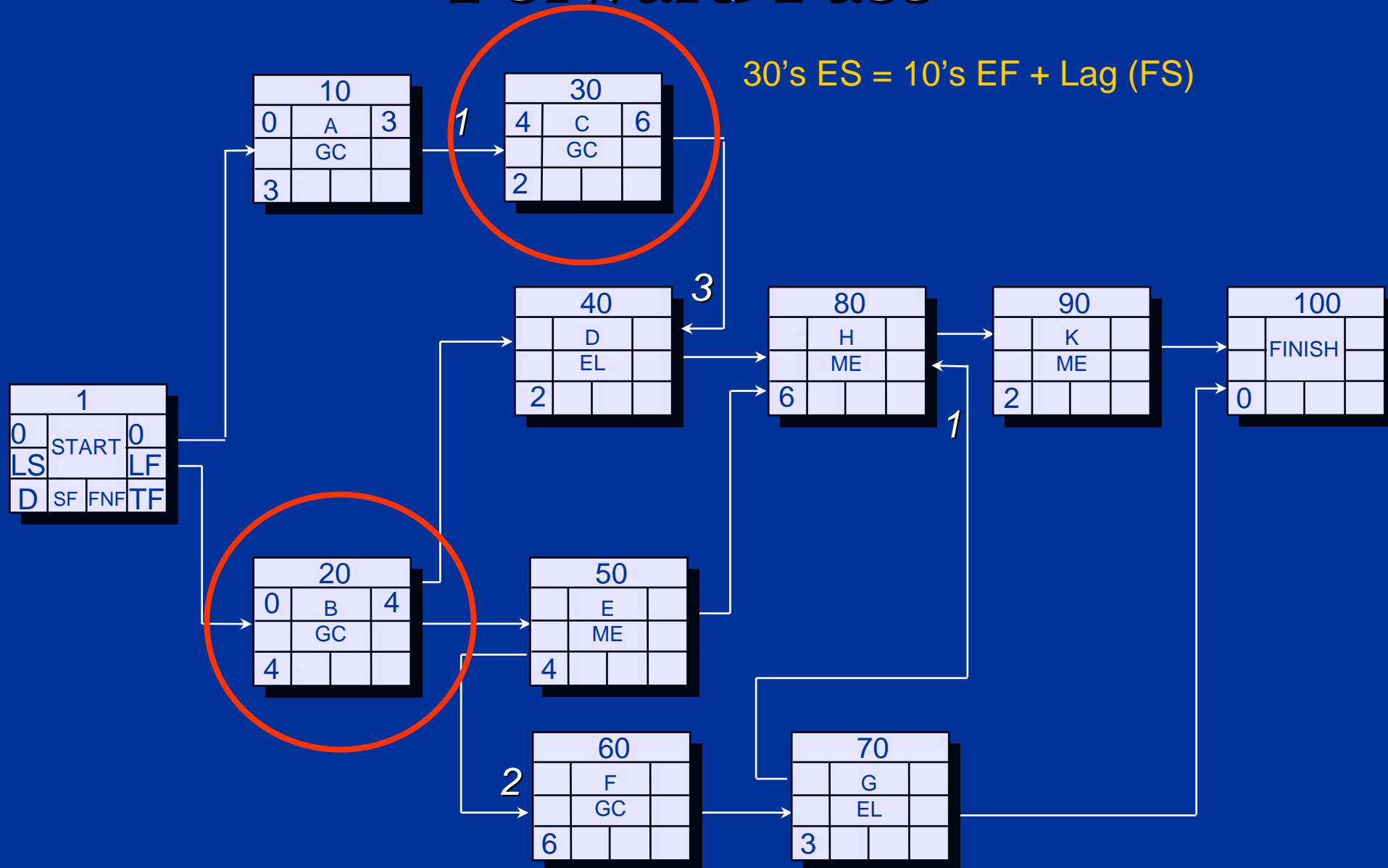
- Total Float (TF)
 - $TF(k) = LF(k) - ES(k) - D_k$
- Start Float (SF)
 - $SF(k) = LS(k) - ES(k)$
- Finish Float (FNF)
 - $FNF(k) = LF(k) - EF(k)$

PDM Example

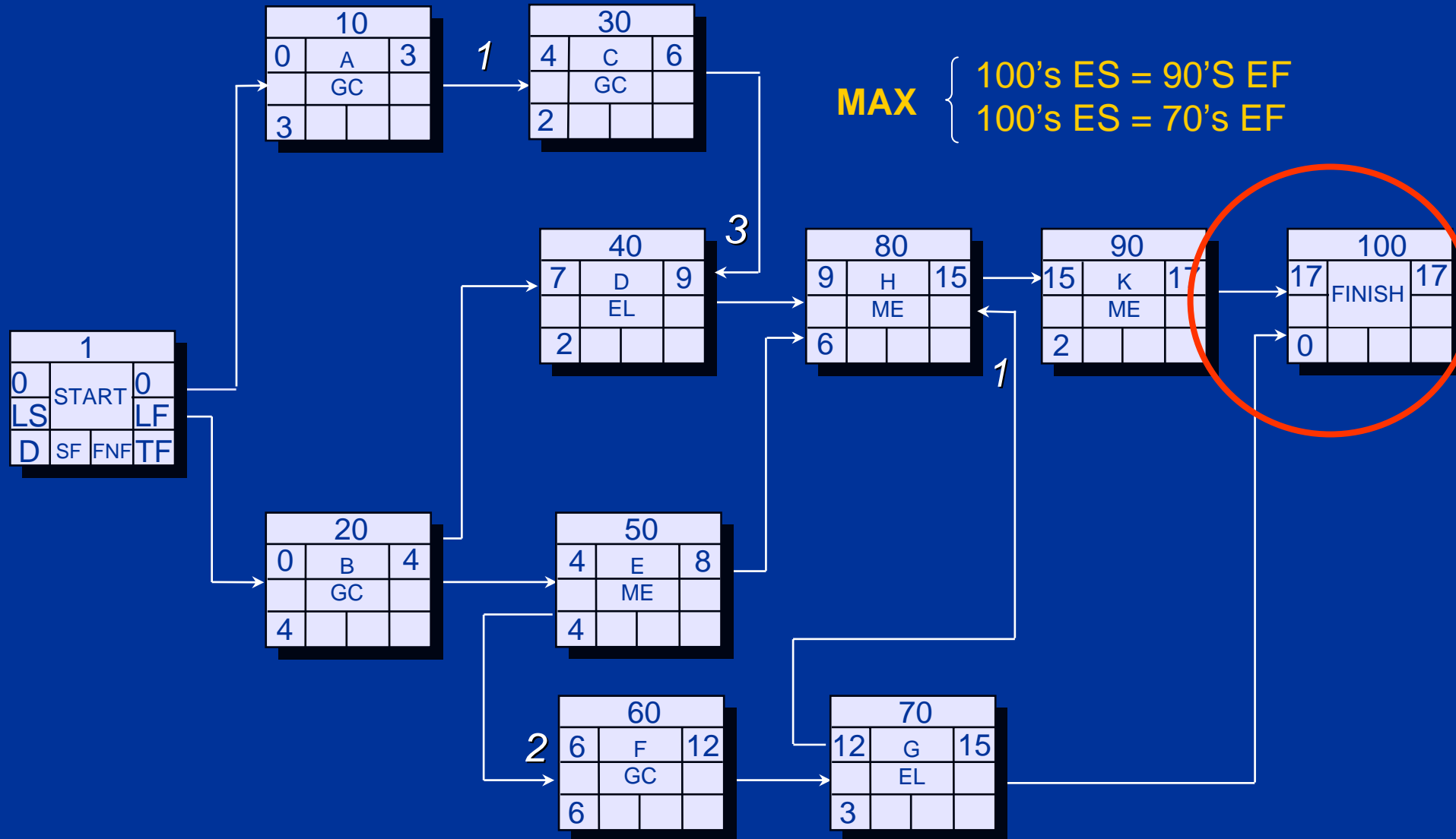


Forward Pass

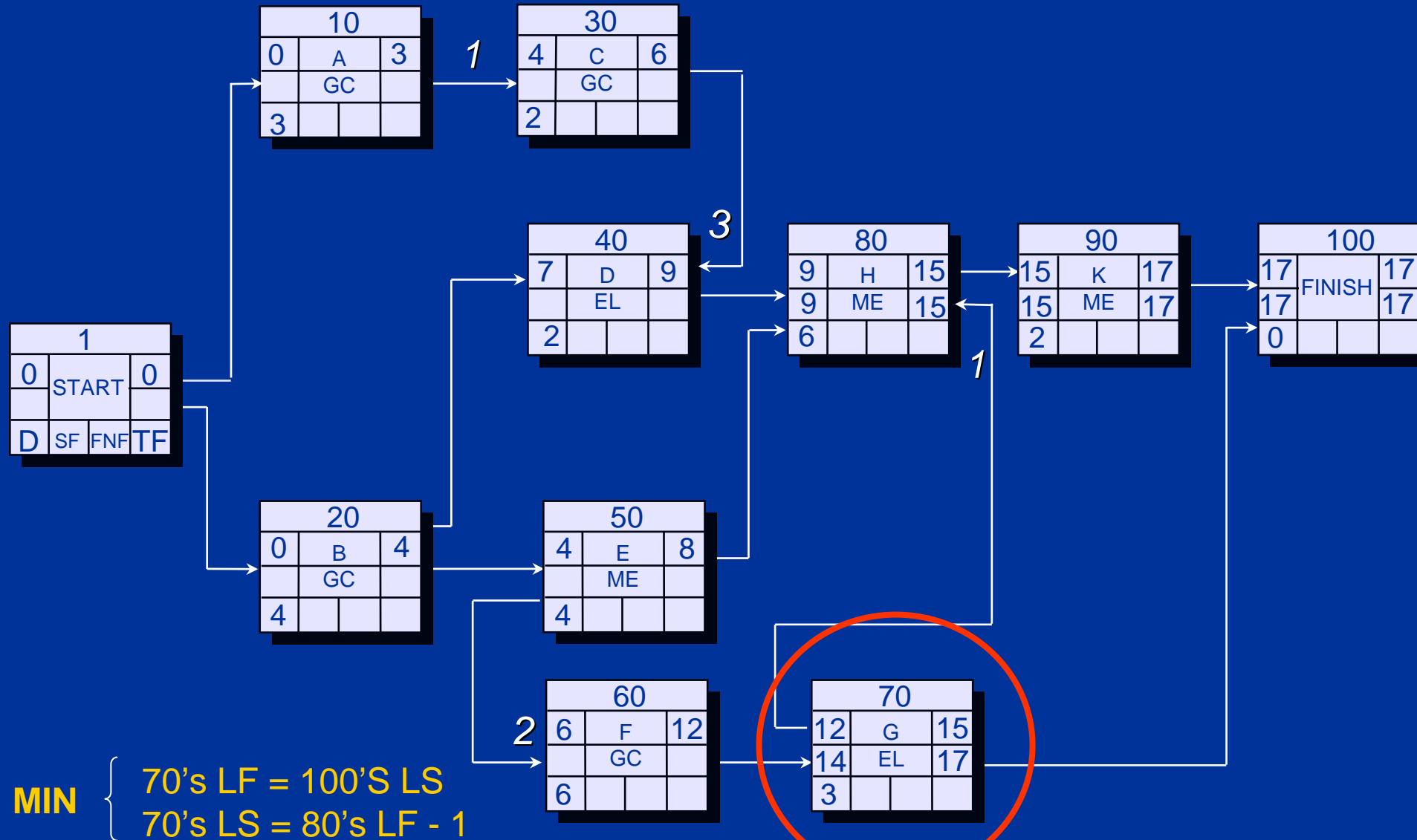
30's ES = 10's EF + Lag (FS)



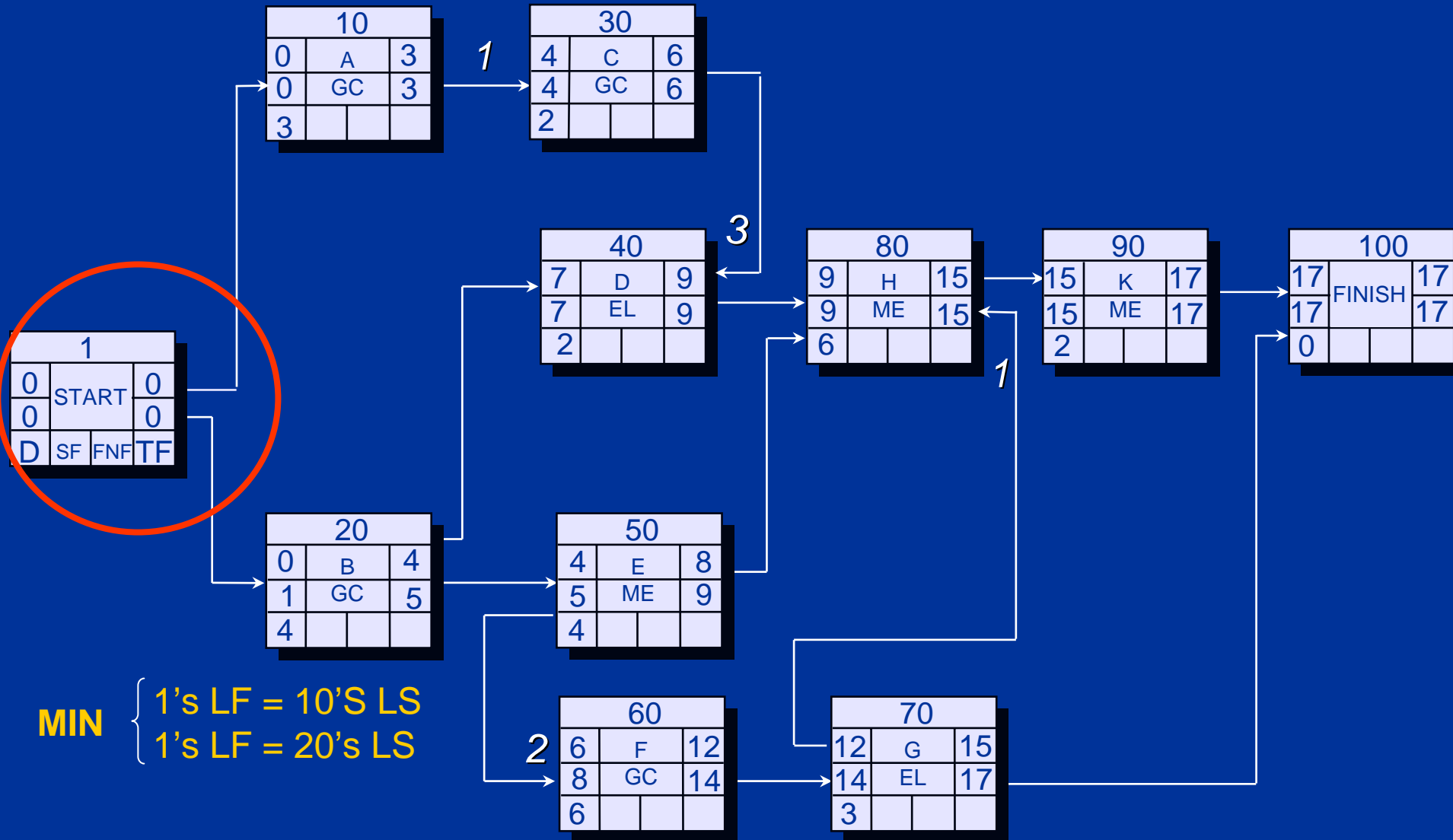
Forward Pass



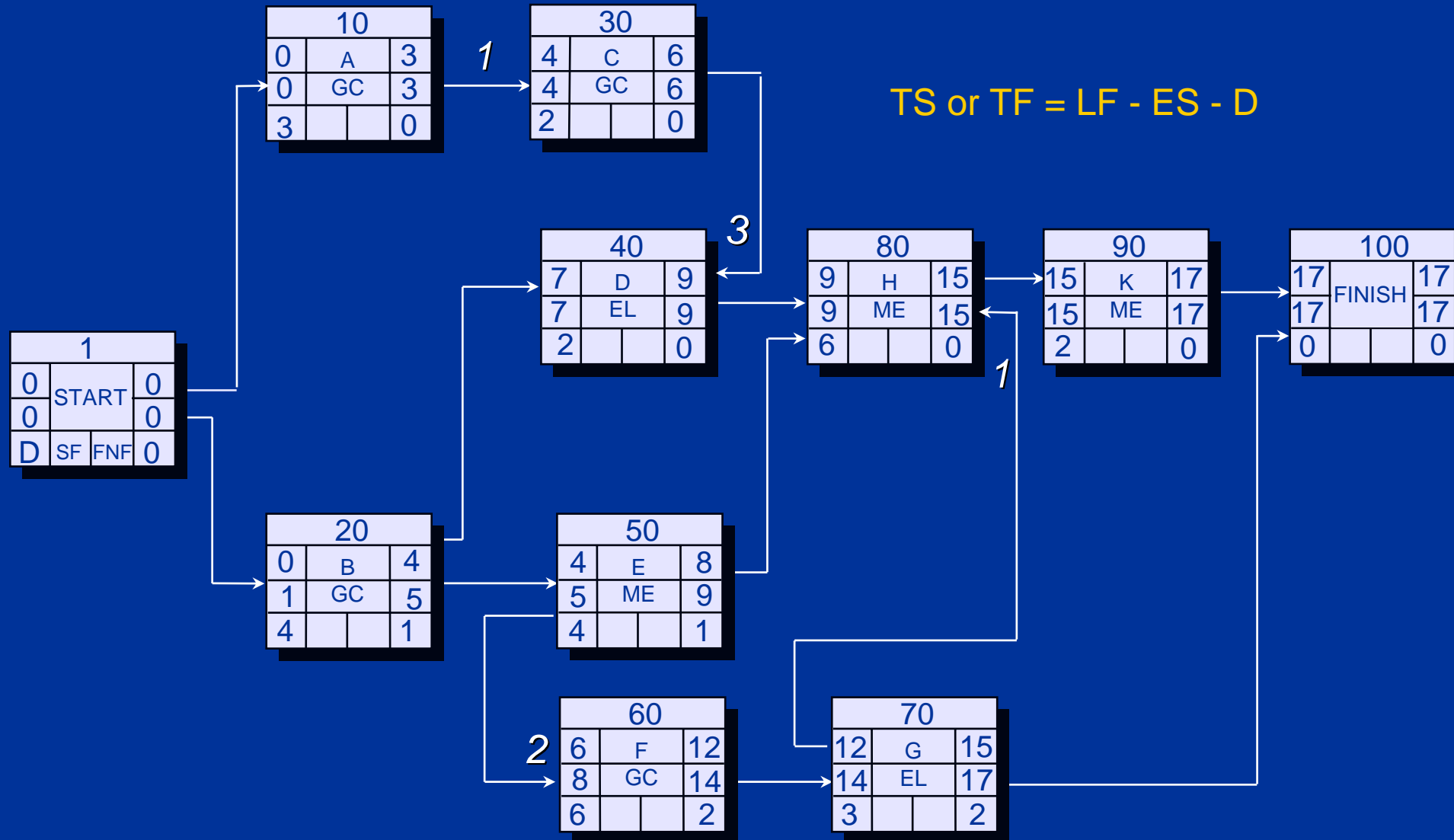
Backward Pass



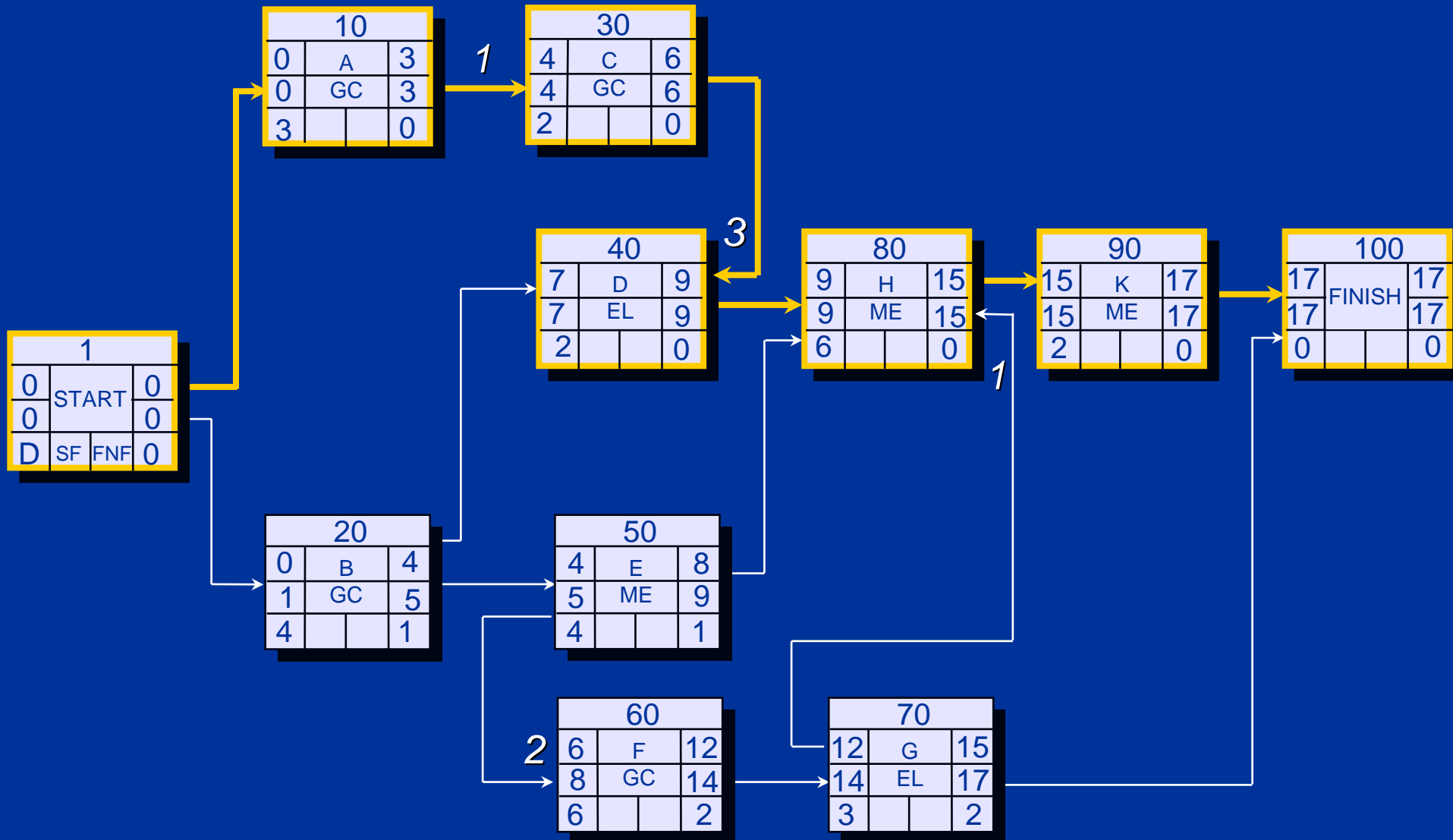
Backward Pass



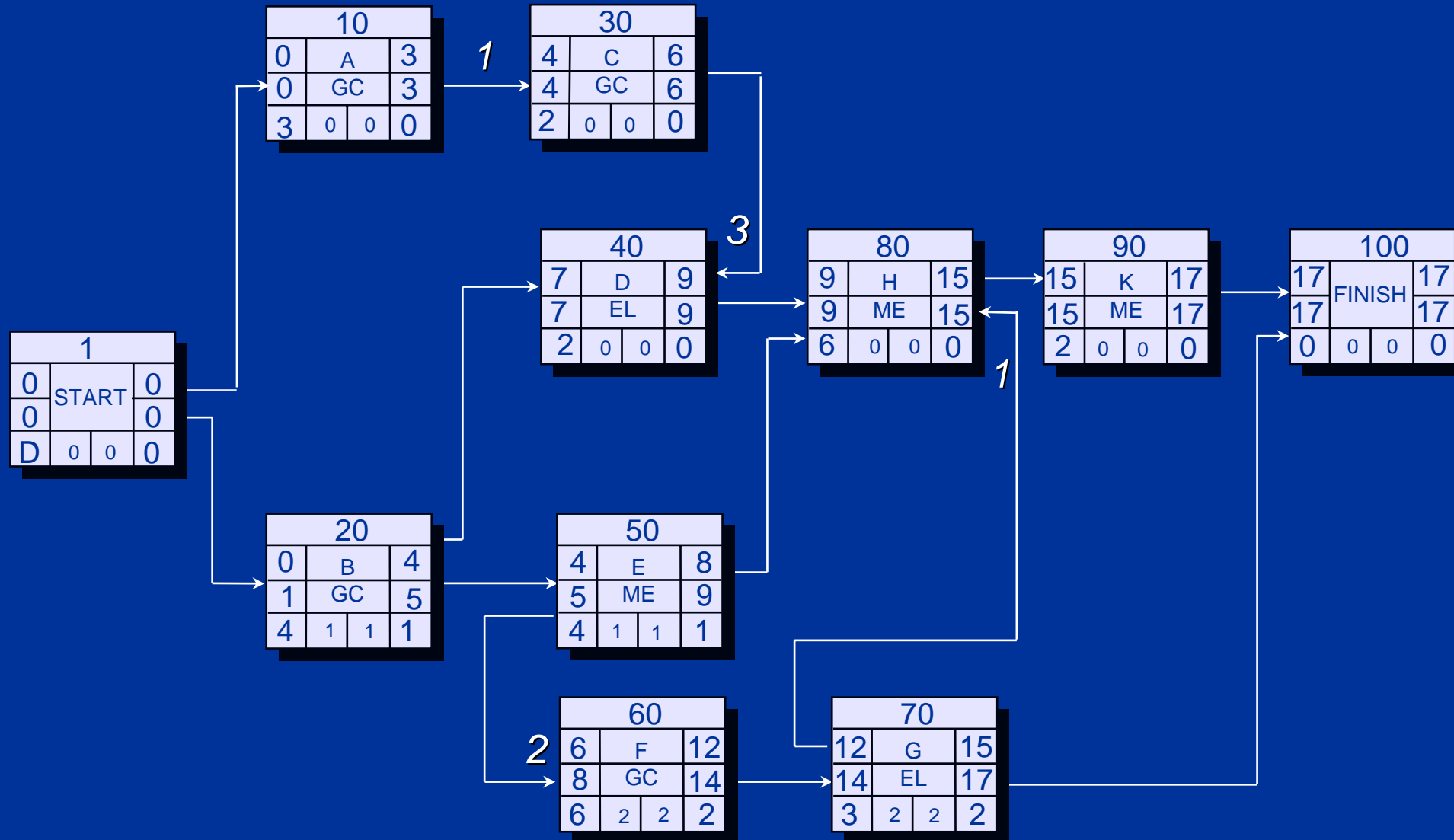
Total Slack or Float



Critical Path



Start & Finish Slack or Float



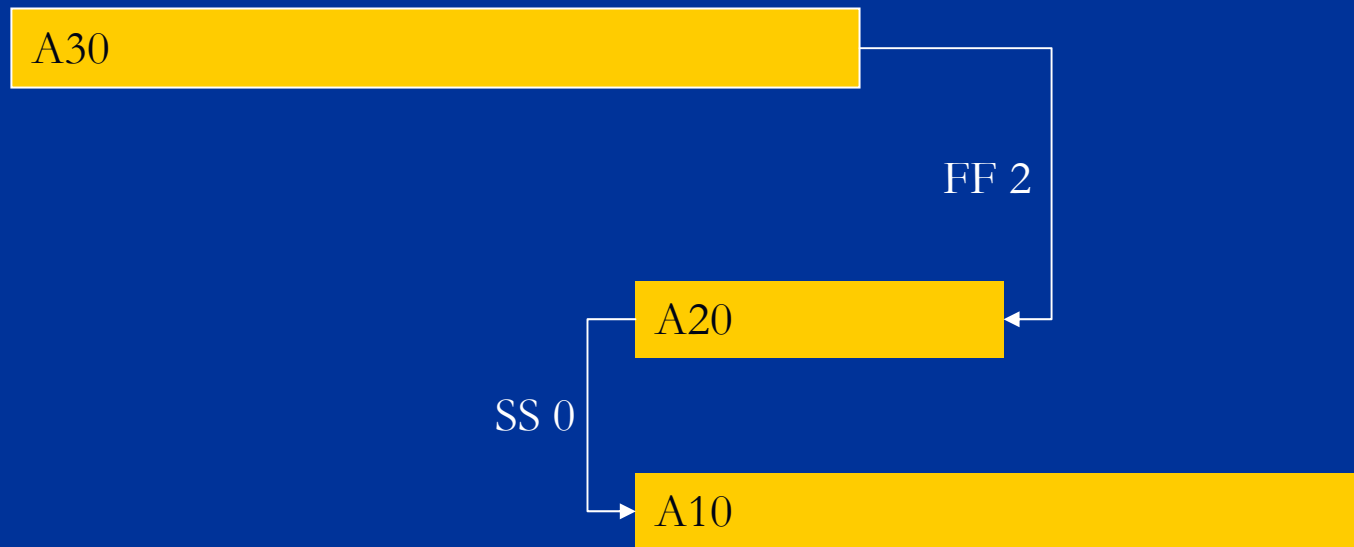
PDM Caveat: Vanishing Critical Path

- Tracing critical path can be difficult
 - Finish-finish constraints with leads can lead to “vanishing” critical path

Screenshot removed due to copyright restrictions.

PDM Caveat - Counter-Intuitive

- Tracing critical path can be difficult
 - Can be counter-intuitive
 - The longer A20 is, the smaller the critical path duration and quicker can complete!



Slack or Float “Ownership”

- Tension between owner and contractor
- Significant legal implications
- Problem:
 - Owners seek to push contractors on tight schedule
 - Too many late starts risk overall project duration
 - Contractors seek flexibility
 - Flexibility has value

Outline

- ✓ Network Techniques

 - ✓ CPM

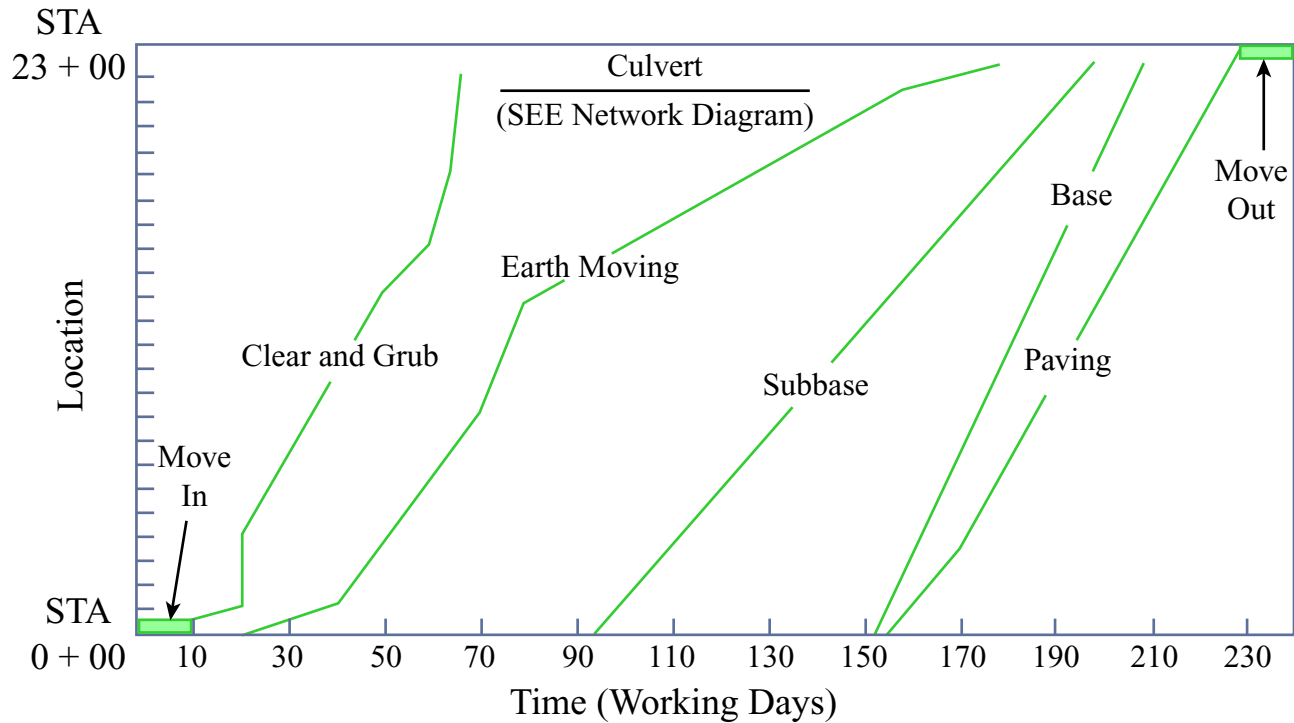
 - ✓ PDM

- Linear Scheduling Method

Linear Scheduling Method (LOM)

- Line-of-Balance
- Time + Location
- Repetitive Linear Activities
- Rate of Progress (production rate)

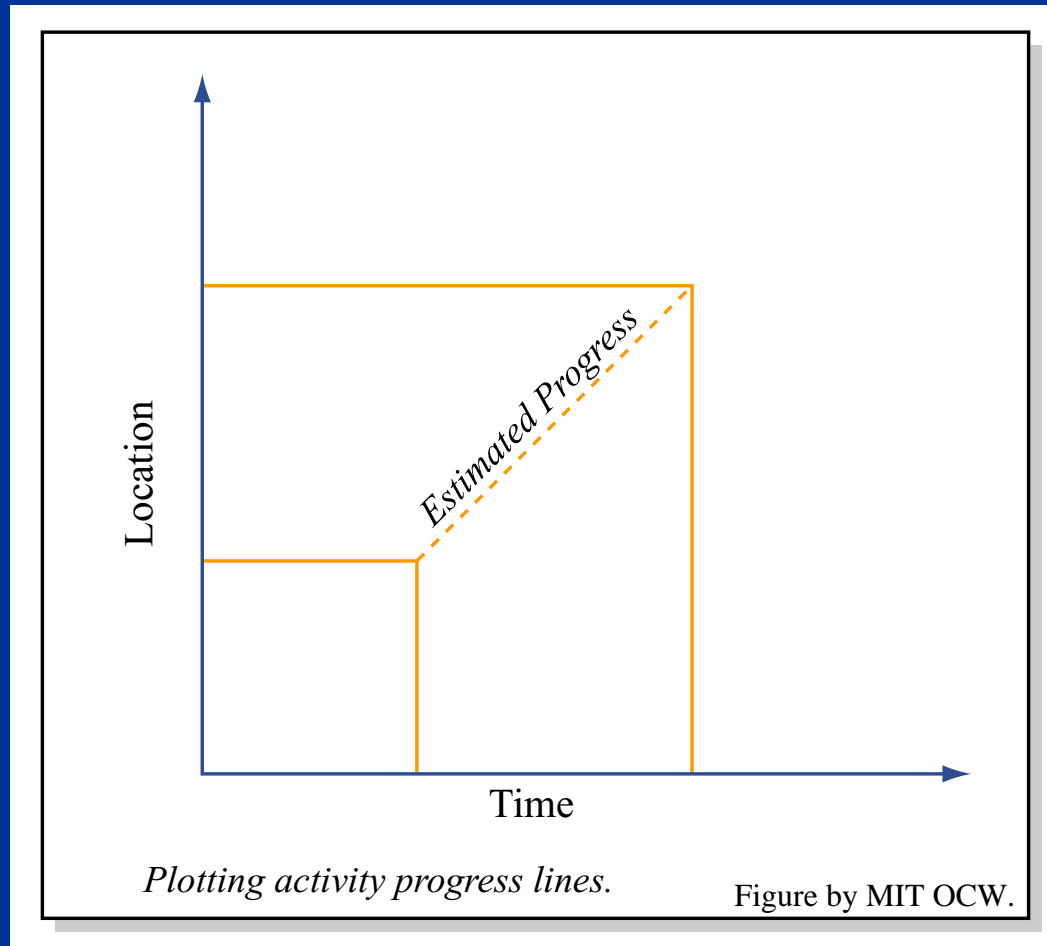
LSM Diagram



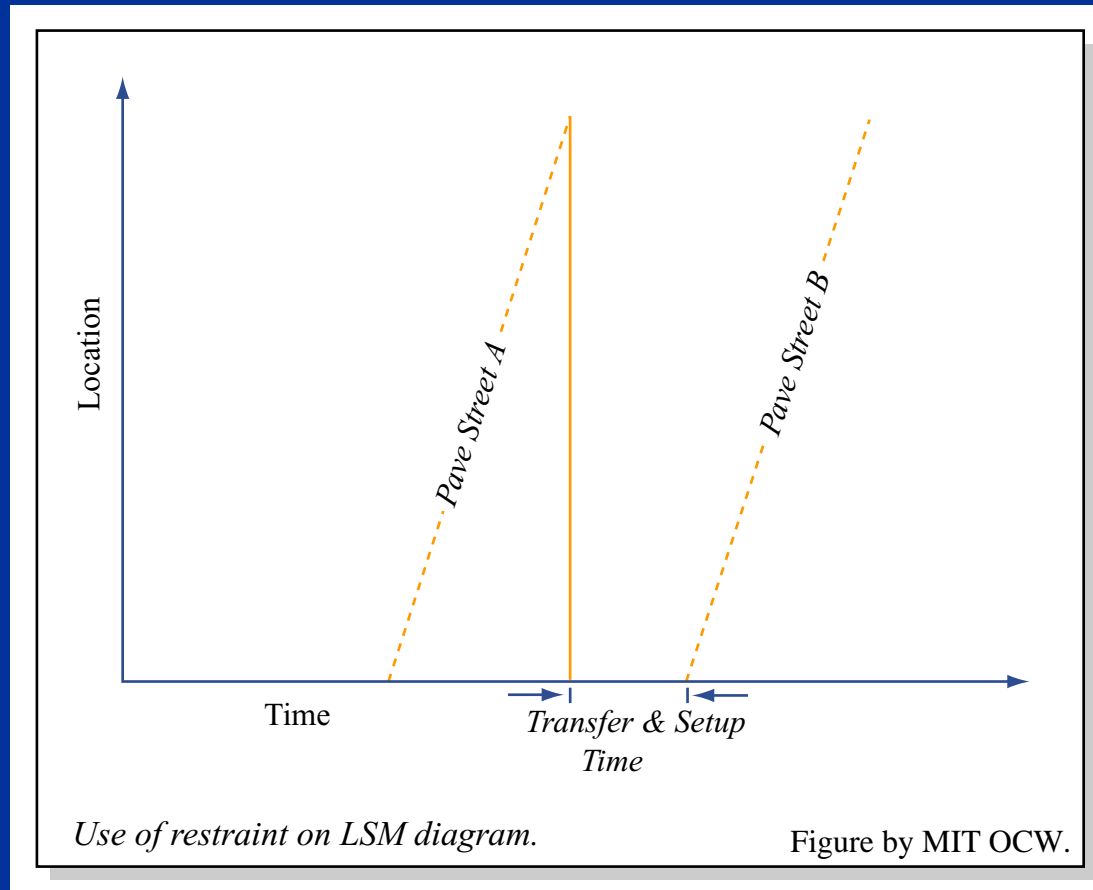
Linear Scheduling Method Diagram

Figure by MIT OCW.

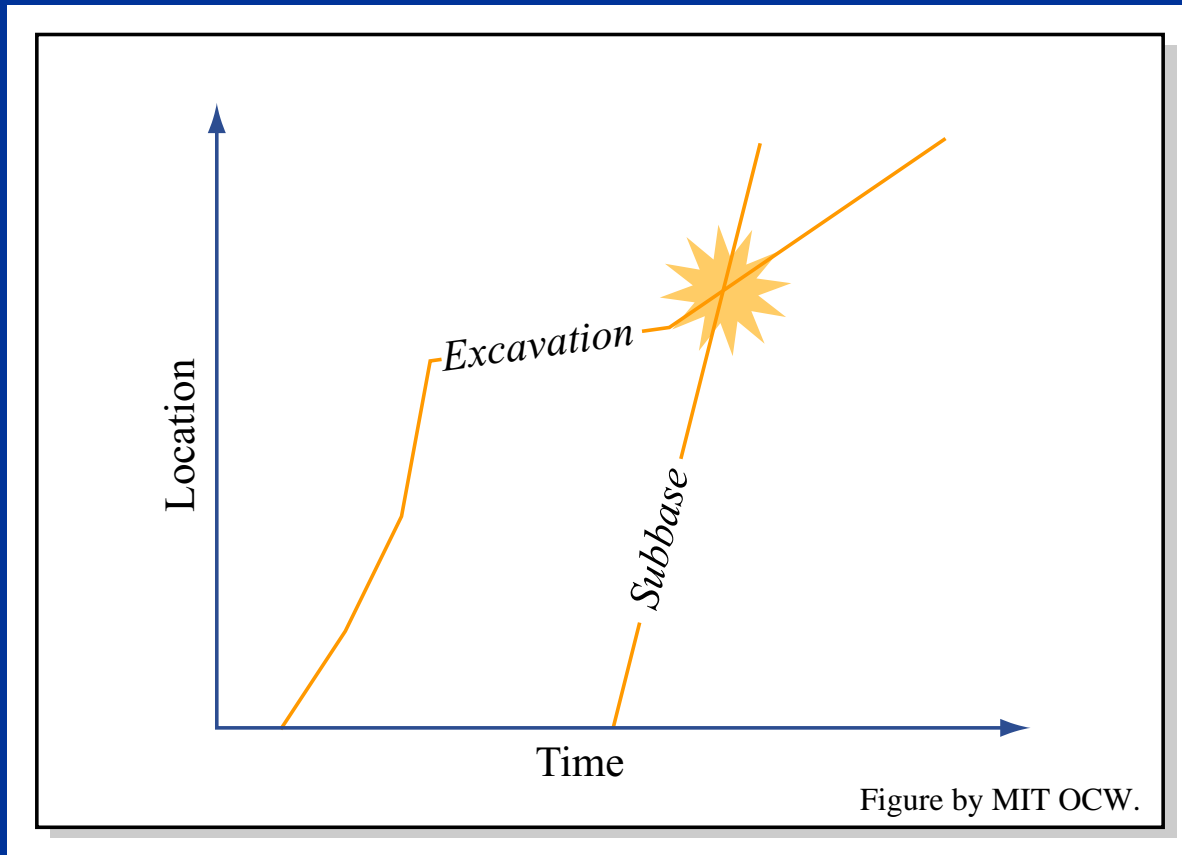
Plotting Activity Progress Lines



Use of Restraint on LSM Diagram



Activity Interference



Use of Activity Buffers in LSM Schedules

