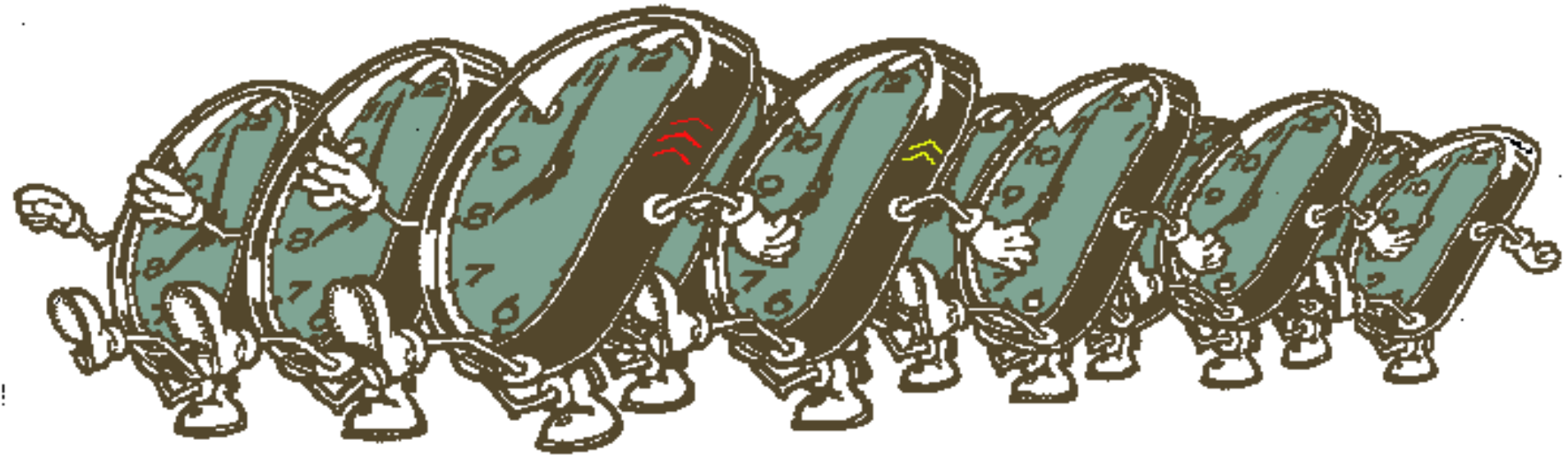
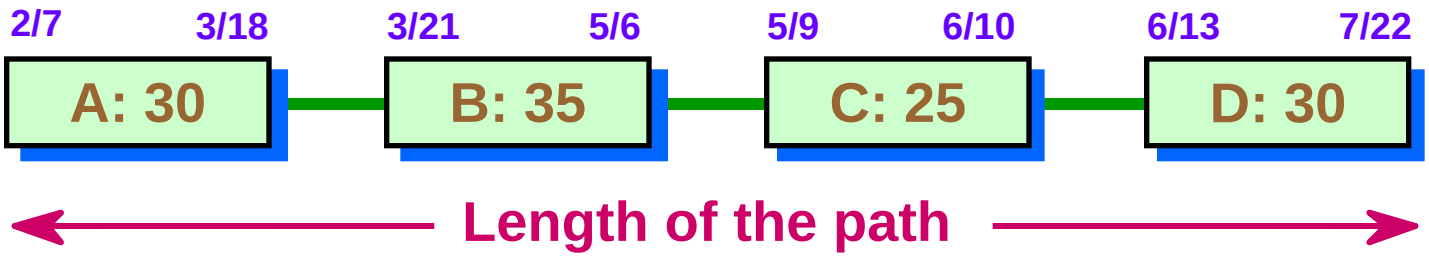


Time Reserves – What are they good for?

Length of a Path

To understand schedule problems, we must understand the relationship between two key parameters:

- **The length of the path**

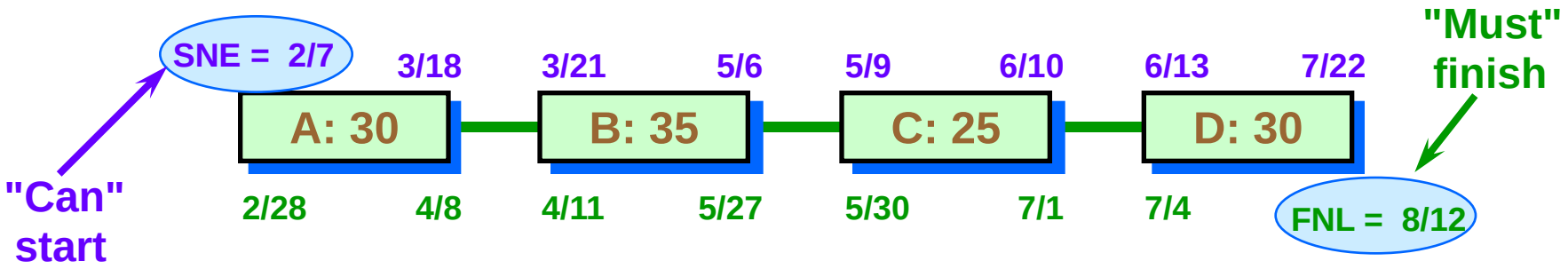


Sum of the spans (30 + 35 + 25 + 30 = 120 days) referred to as simply the "length of the path (LP)"

This simple project has 120 days of total span (LP) and if it starts on February 7, it can be expected to finish on July 22

Time Available To a Path

- Versus the time available to accomplish the work



The difference between when a path "can" start (SNE) and when it "must" finish (FNL)

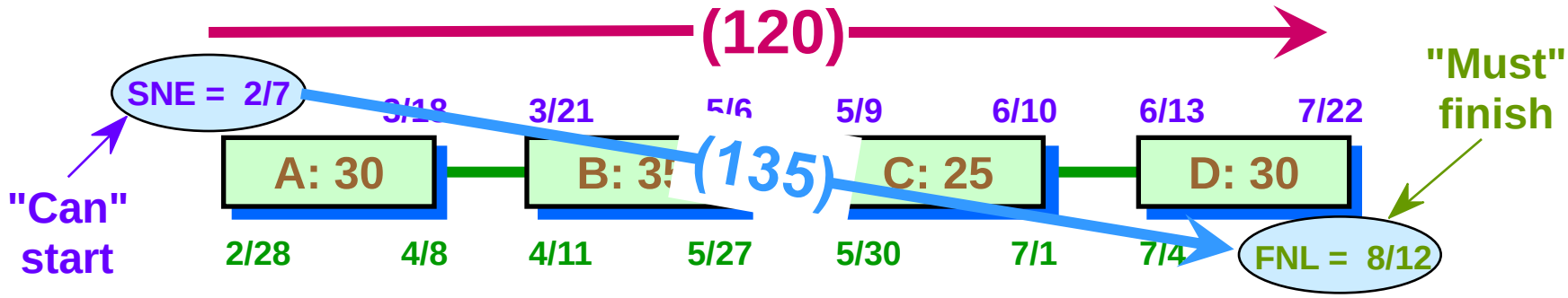
TA (time available) = (LF of Path) – (ES of Path) + 1

TA = 8/12 – 2/7 + 1

135 = 160 – 26 + 1

Time Available Versus Path Length

- **Total float (TF) is the difference between time available and path length: (TF = TA – LP)**



TF = TA – LP

+ 15 = 135 – 120

120 days of work to do between 2/7 and 8/12 (135 days)

This is a time reserve or Total Float of +15 days

Positive Versus Negative Float

- **Positive Total Float (+)**
  - **150 days of work to do in 175 days is 25 days excess**
  - **More *time* than *work* available**

- **Negative Total Float (–)**
  - **150 days of work to do in 125 days is 25 days short**
  - **More *work* than *time* available**

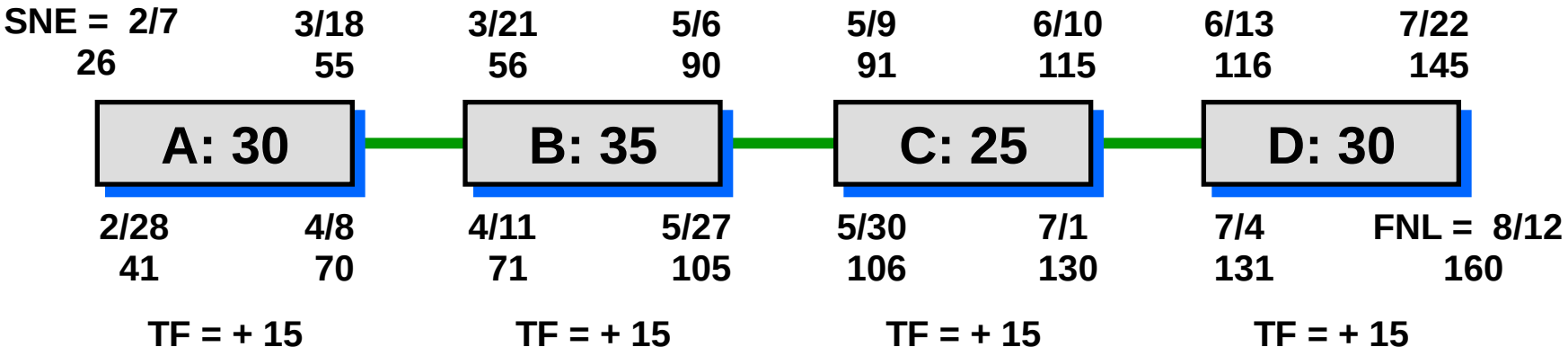
Practical Calculation of Total Float

Definition is not a practical process:

- **Complexity created when two or more paths merge**
- **Practical process is the *Critical Path Method* (CPM)**

Total Float In the CPM

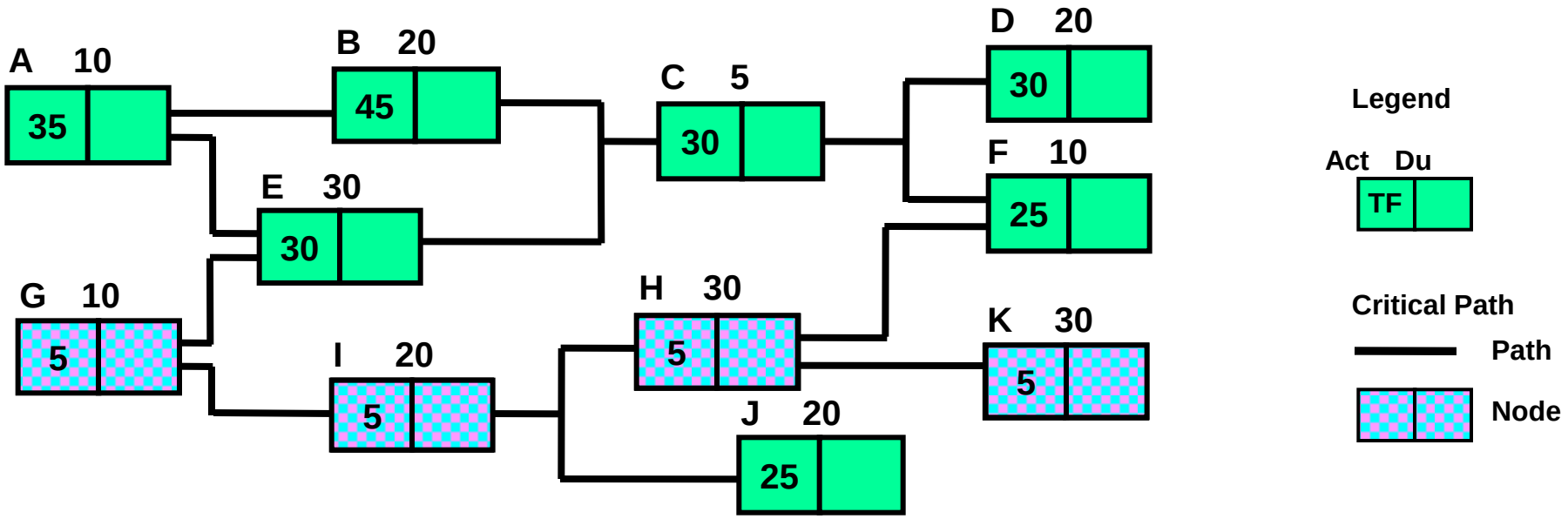
- **Total float is also:**
  - The difference between forward and backward pass data
  - Late dates less early dates (LF – EF or LS – ES)
  - The practical method of calculation



- **Although now calculated at each node, + 15 days still represents the amount of reserves available to the entire path of activities (120 days of work to do in 135 days)**

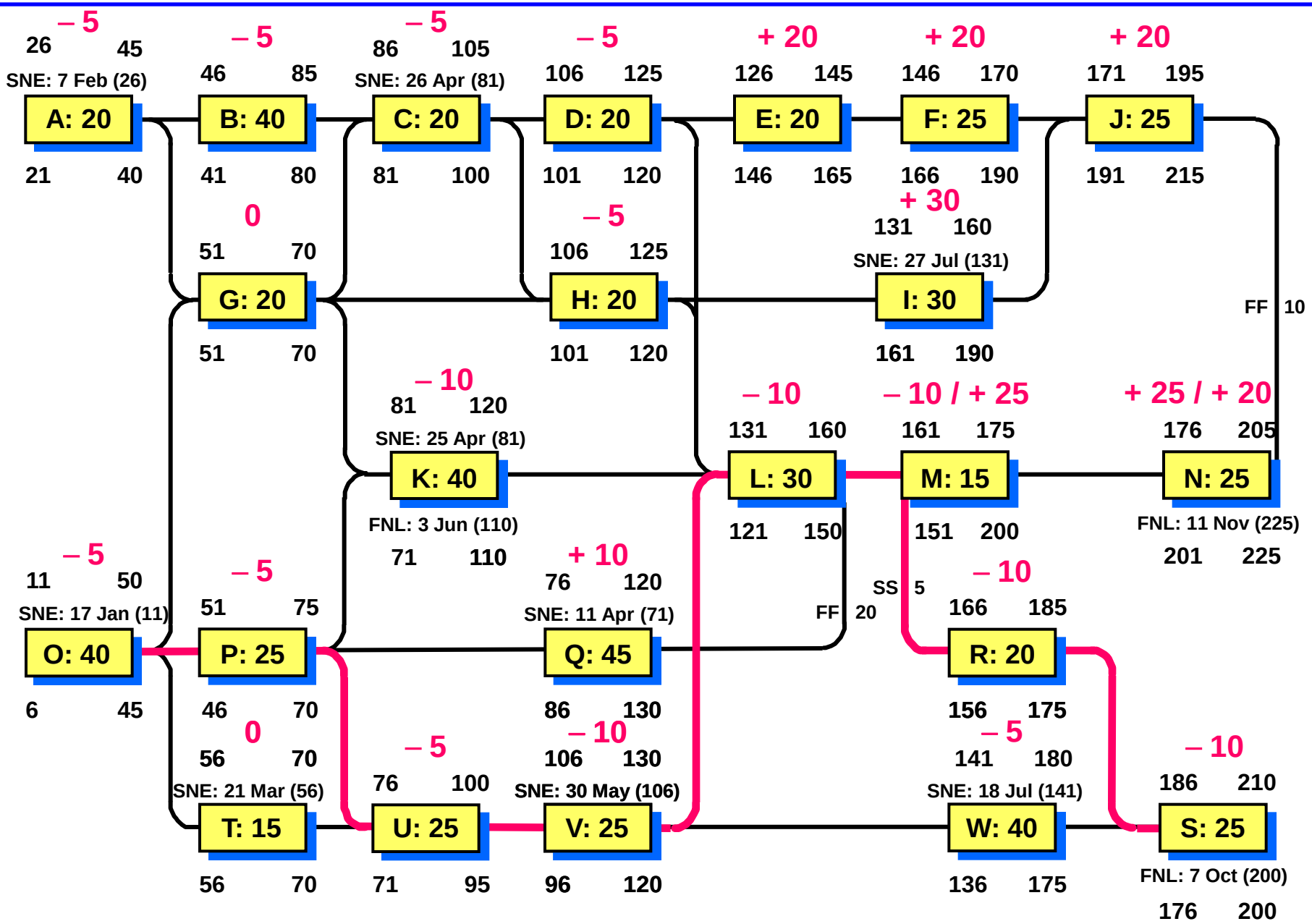
Total Float & the Critical Path

- The difference between the backward and forward passes: LS – ES or LF – EF



- The Critical Path is the longest path per the time available to the path or the path with the least TF

Total Float Analysis in a Bigger Example



The Total Float Relationship

We initiate actions to increase Total Float of paths that exhibit problems

↑TF = ↑TA – ↓LP

Actions on time availability (increase)

- Starting paths early
- When, where, and how much overtime

Actions on path length (decrease)

- Spans of tasks (defer effort)
- Resource levels applied to tasks
- Sequence of Work

Total Float from the CPM

CPM process takes parameters from the project model:

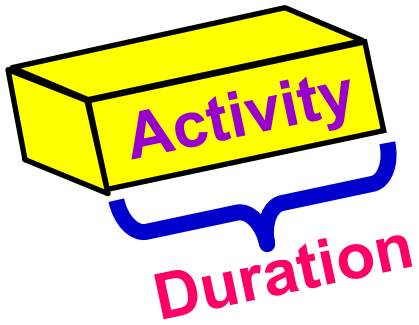
- Duration of individual tasks (Span)
- Relationship lag values (Span)
- Relationship types (Sequence)
- Date targets (Time Available)
- Status parameters (All the above)

and determines the schedule of tasks

- Relative to the predecessors (forward pass)
- Relative to the successors (backward pass)

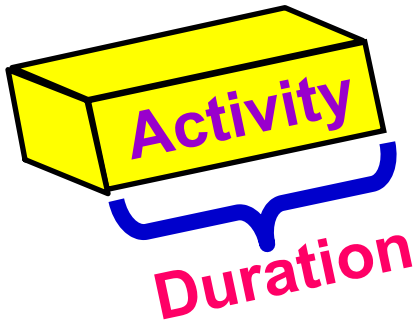
- **Total float / slack is the difference**

Task Durations – Path Length



- How long (real time) will each activity take to accomplish?
  - Estimate comes from responsible person
  - Time required not time available
  - Considers resource needs
  - Takes ‘Effectivity’ into account
  - Reasonable
  - In working time units

How to Determine a Task's Duration



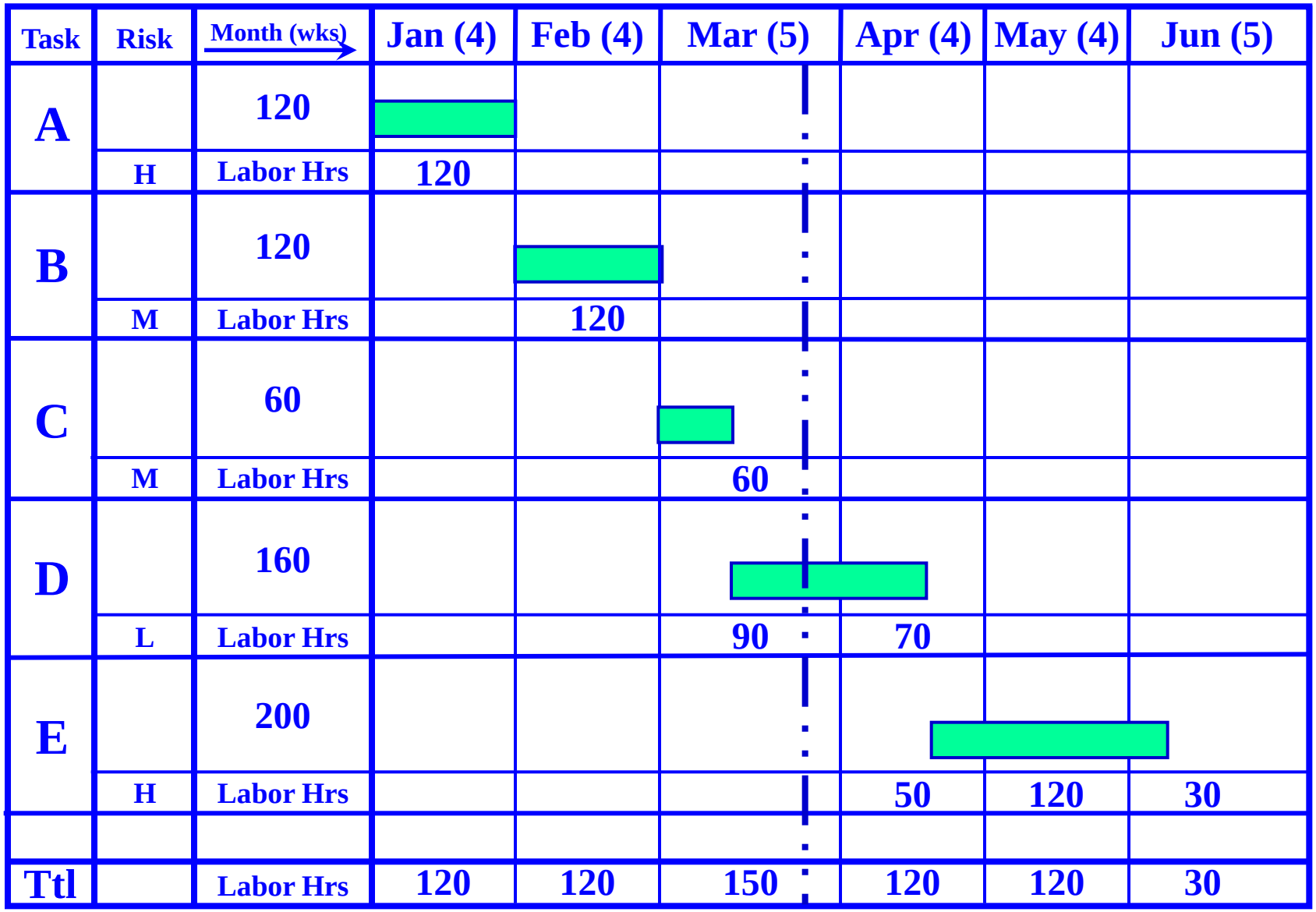
- Working with the person who is responsible for the task's accomplishment
  - Get estimate of labor-hours to accomplish task's work
  - Make assessment of and accommodation for risk
  - Lay out schedule of the tasks for each resource
  - Take 'Effectivity' into account
  - Stretch durations and schedule tasks to take all of the above factors into account

Scheduling One Resource – 40 hrs / wk

Task	Risk	Month (wks)	Jan (4)	Feb (4)	Mar (5)	Apr (4)	May (4)	Jun (5)
A	140%	120						
	H	Labor Hrs	120					
B	110%	120						
	M	Labor Hrs	40	80				
C	110%	60						
	M	Labor Hrs	40	20				
D	100%	160						
	L	Labor Hrs	40	120				
E	140%	200						
	H	Labor Hrs		40	160			
Ttl		Labor Hrs	240	260	160			

Original end date

Scheduling One Resource w/ Effectivity #1

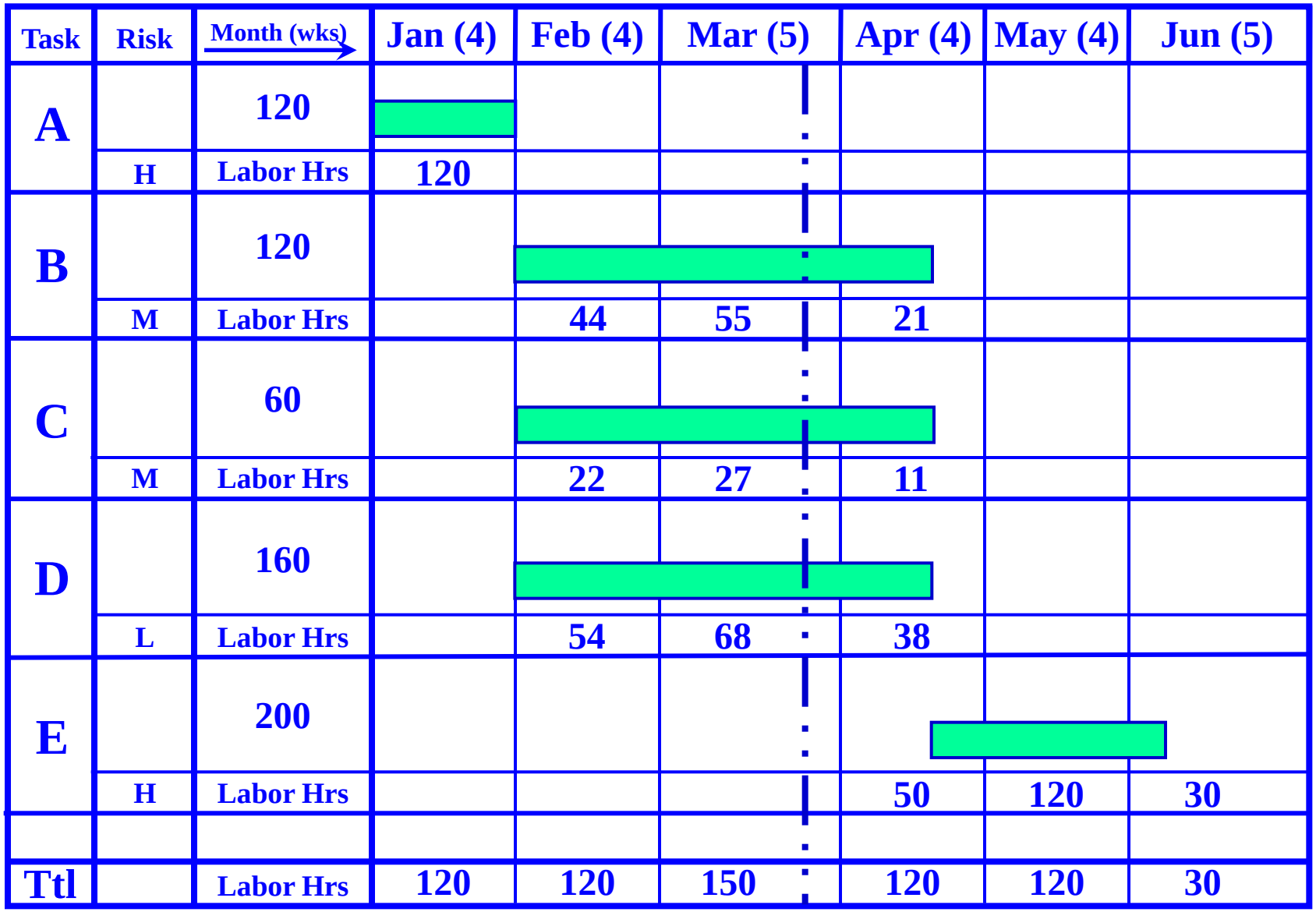


75% Effectivity

Original end date

10 weeks

Scheduling One Resource w/ Effectivity #2

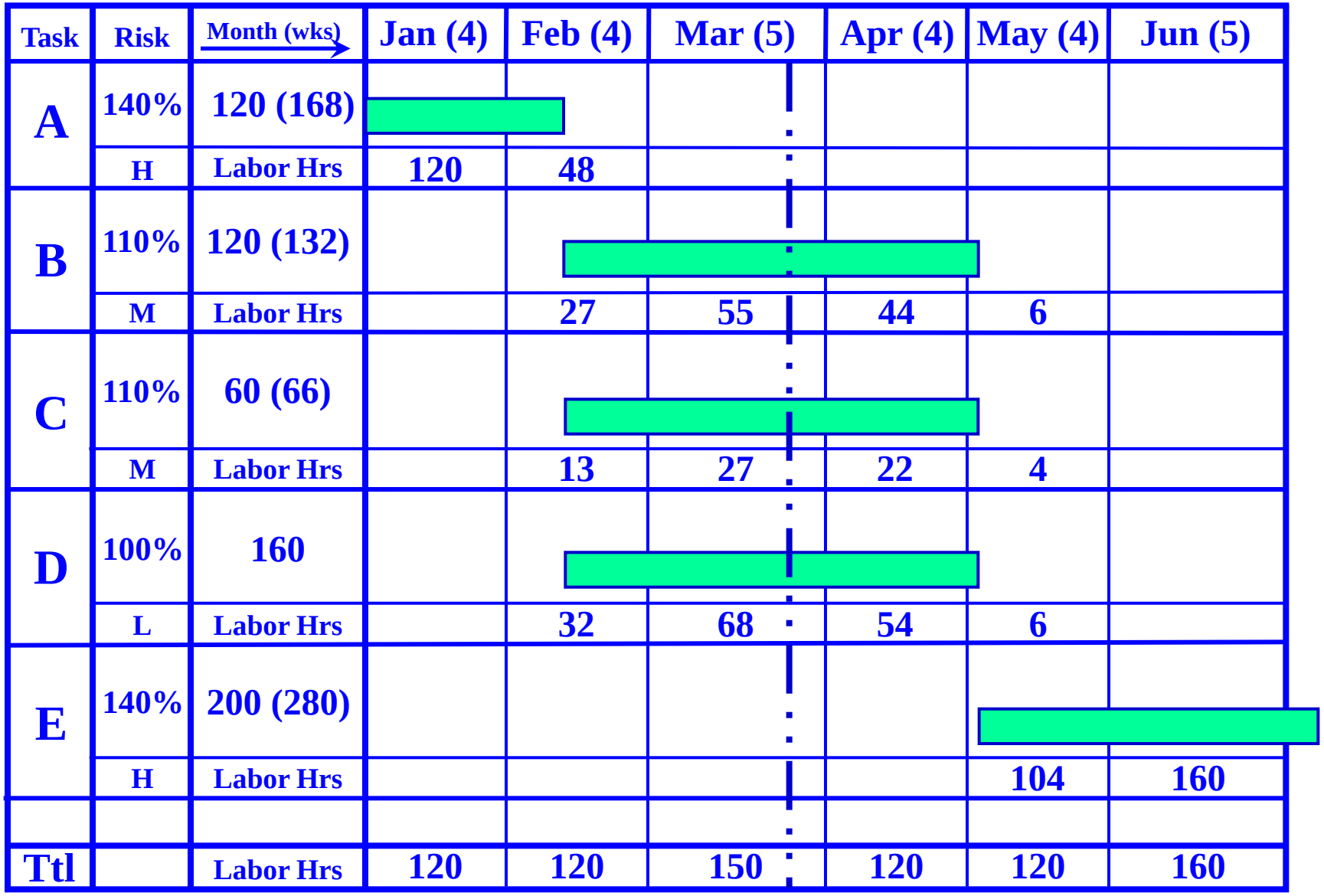


75% Effectivity

Original end date

10 weeks

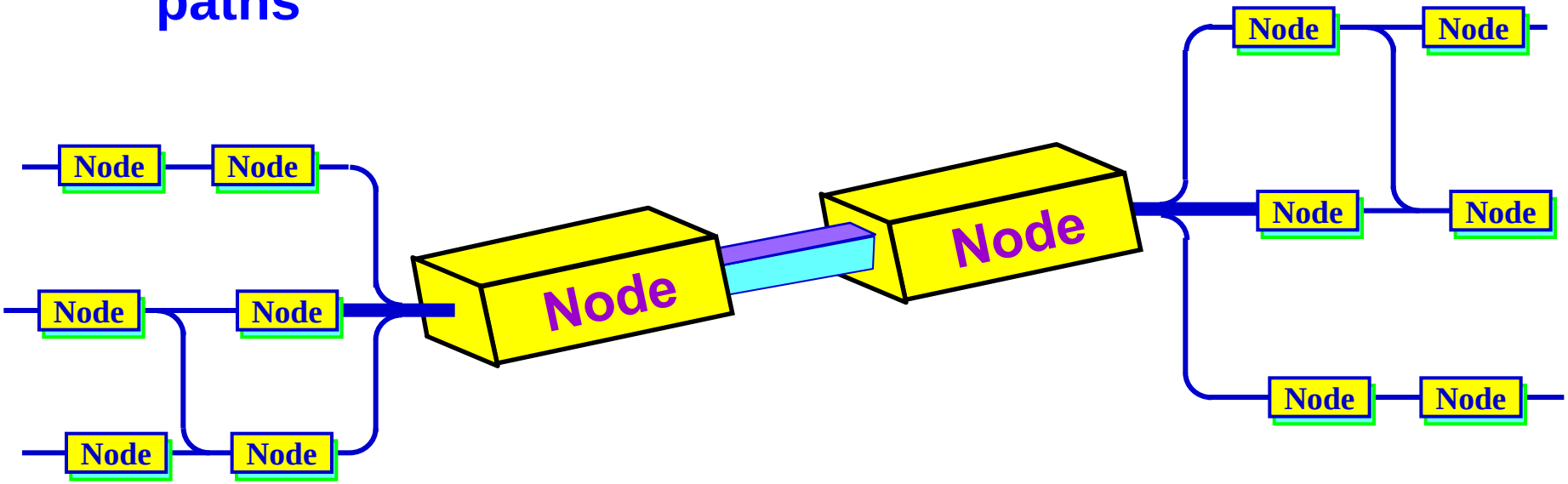
Scheduling One Resource



Task	Risk	Month (wks)	Jan (4)	Feb (4)	Mar (5)	Apr (4)	May (4)	Jun (5)
A	140%	120 (168)						
	H	Labor Hrs	120	48				
B	110%	120 (132)						
	M	Labor Hrs		27	55	44	6	
C	110%	60 (66)						
	M	Labor Hrs		13	27	22	4	
D	100%	160						
	L	Labor Hrs		32	68	54	6	
E	140%	200 (280)						
	H	Labor Hrs					104	160
Ttl		Labor Hrs	120	120	150	120	120	160

Relationships – Paths

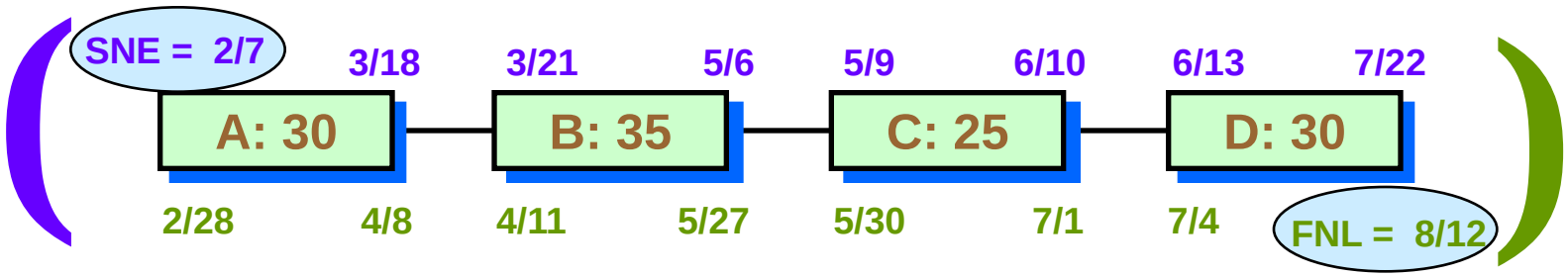
- Represents the dependency of work (between one activity / milestone and another activity / milestone)
- Binds the project into a set of complex / co-mingled paths



- Creates the paths

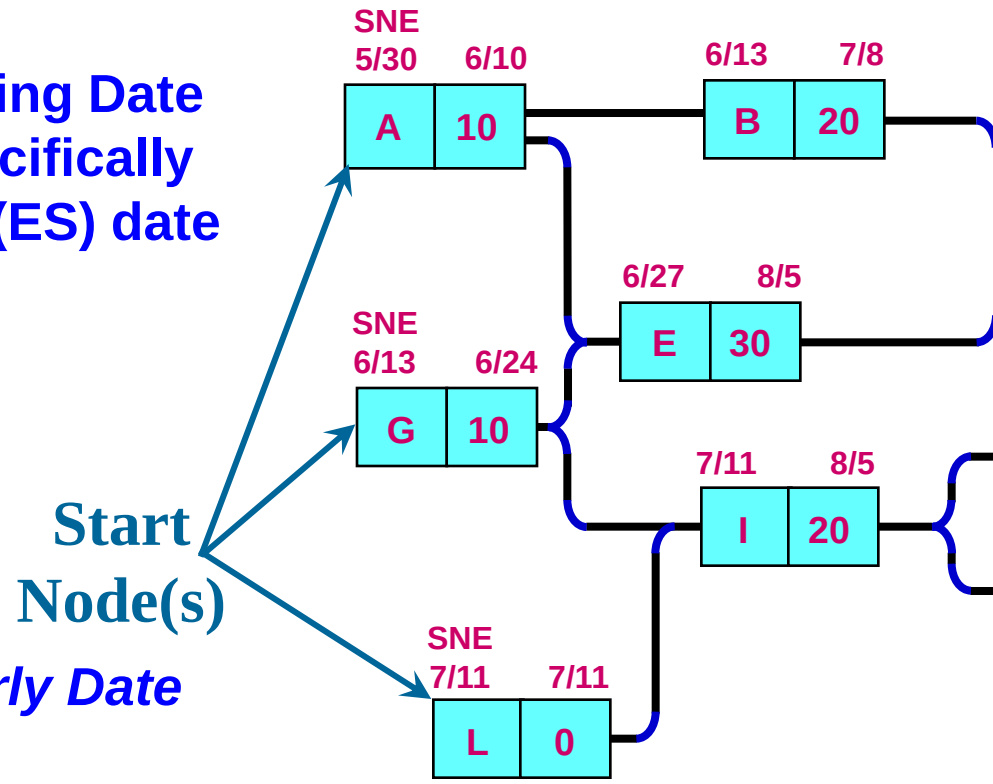
Date Targets / Constraints

- Once prolific, backlash has made them endangered
  - In some of the SW tools, some of the Date Target types do NOT work correctly – forcing a kluge
    - Essential tools of the process but their use must be disciplined
      - Date Targets / Constraints establish path time boundaries



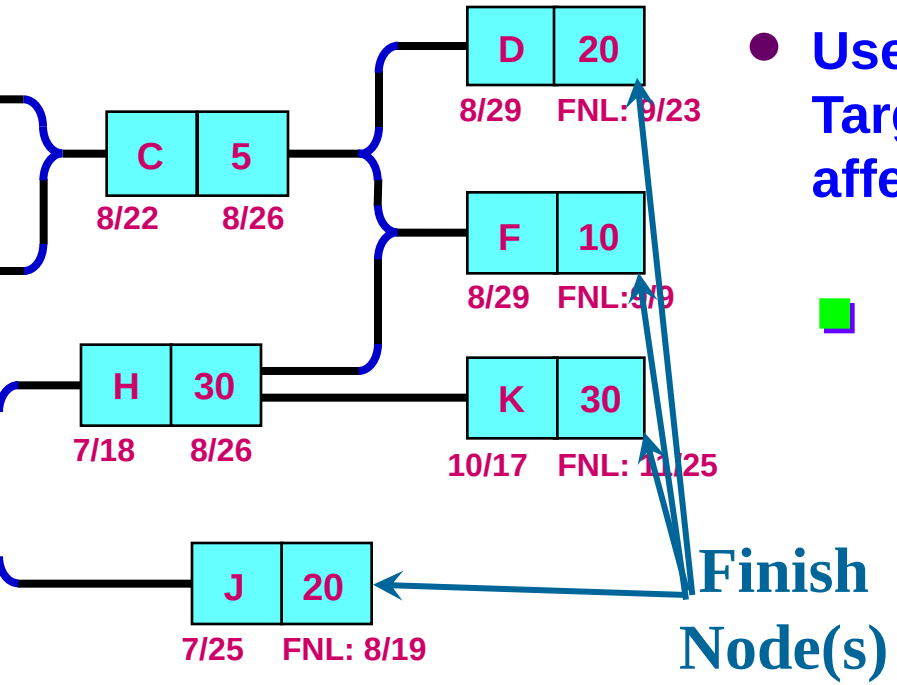
Properly Initiate the Forward Pass

- **The user MUST properly initiate the Forward Pass (Early Dates) at each and every Start Node**
  - **Use an early date operating Date Target / Constraint – specifically affecting the Early Start (ES) date**
- **Start No Earlier Than (SNE) Date Target / Constraint**
  - **Subject to the *Latest Early Date Rule***
  - **Actual Start dates (AS) will also properly initiate the Forward Pass at a Start Node**



Properly Initiate the Backward Pass

- **The user MUST properly initiate the Backward Pass (Late Dates) at each and every Finish (End) Node**

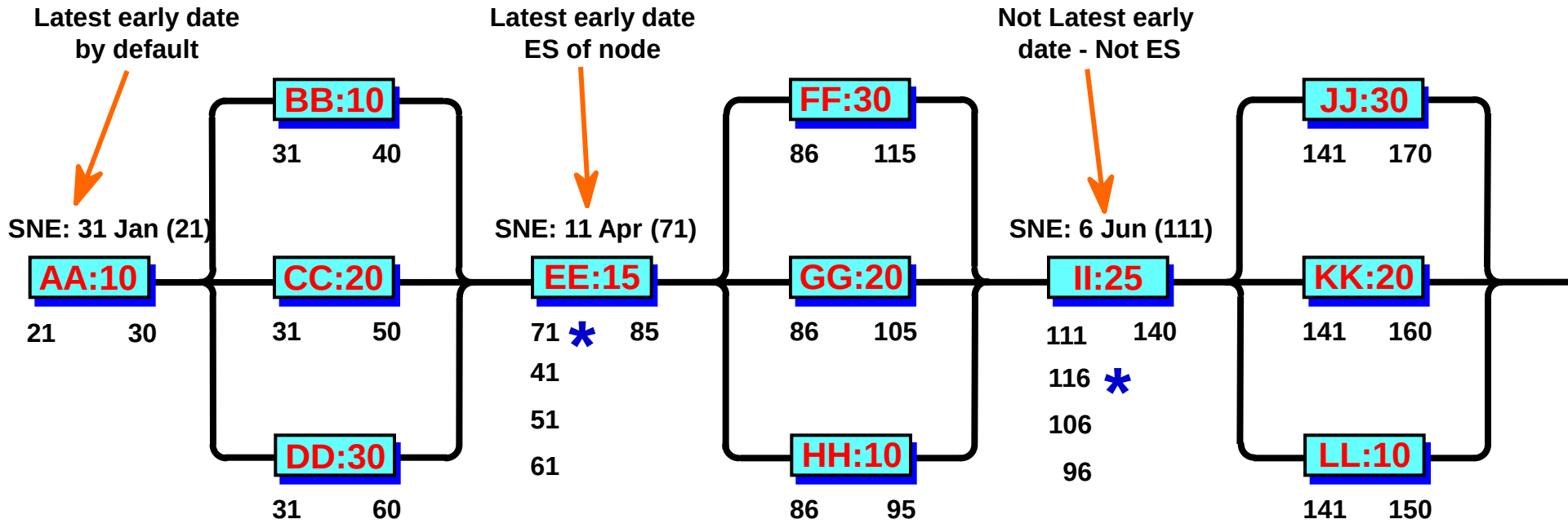


- **Use a late date operating Date Target / Constraint – specifically affecting only the Late Finish (LF) date**
  - **Finish No Later Than (FNL) Date Target / Constraint**
- **Subject to the *Earliest Late Date Rule***

- **It is important to note than in several of the PM software tools, the FNL Date Target / Constraint does NOT work properly – a workaround must be employed to initiate the BW pass**

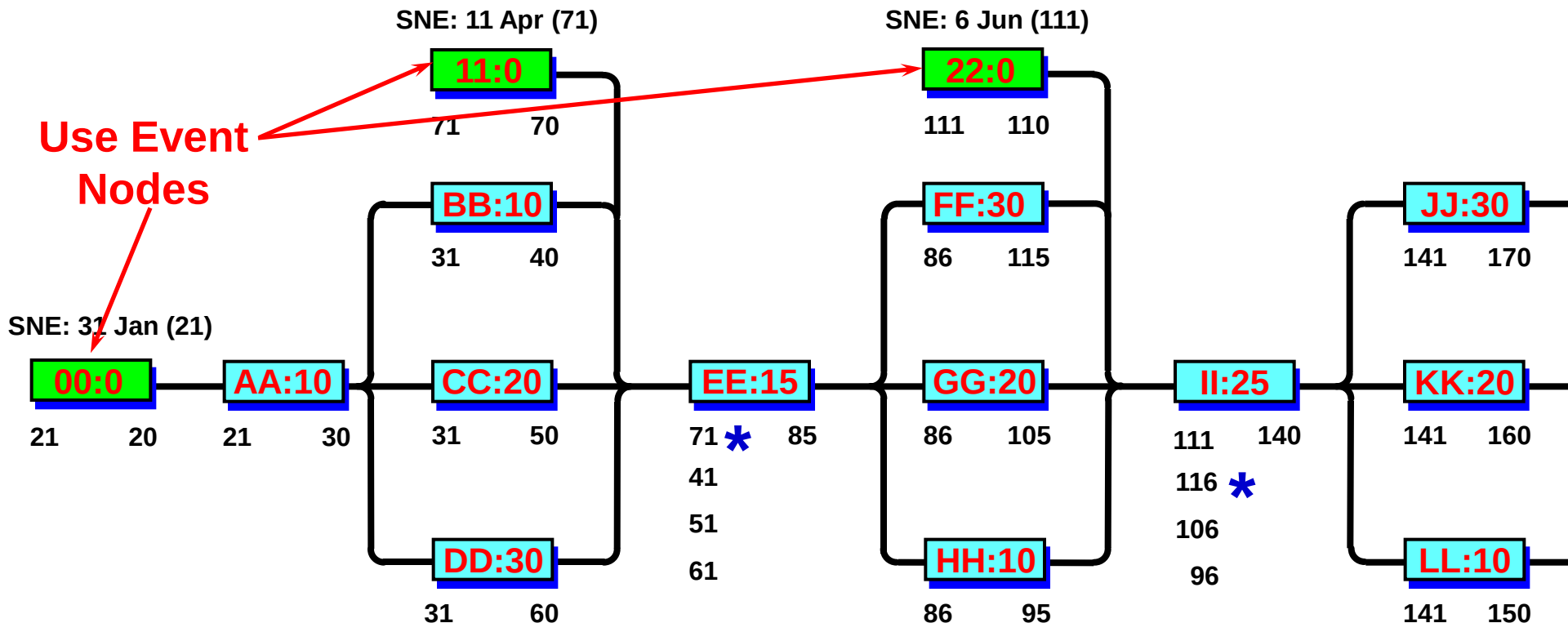
Date Targets (constraints) on Internal Nodes

- Start-No-Earlier (SNE) date targets (constraints) can be used on any node in the model (not just start nodes)
- It is used to represent a delay not modeled by any other predecessor (such as resource availability)
- The latest early date (LED) rule still applies -- The SNE date will be the ES of a node provided it is the LED



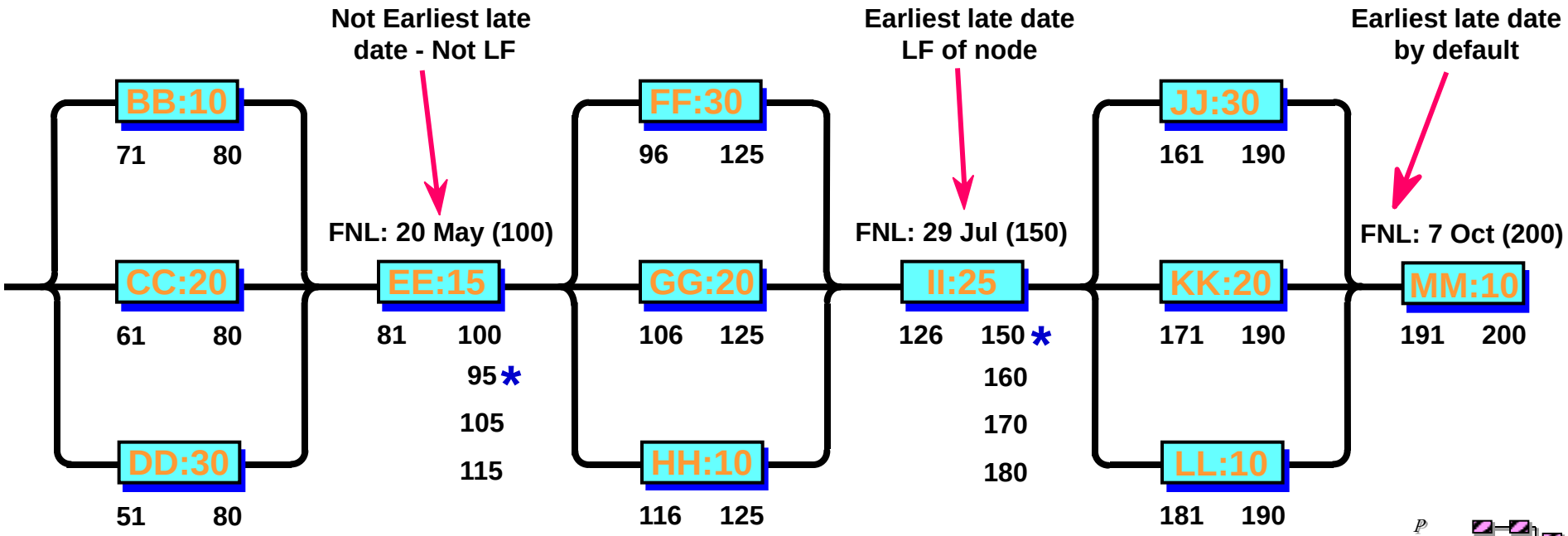
Start Date Targets - Preferred Discipline

- Set up Event Node to represent each start requirement
- Set SNE date on Event Node - Description on Event Node describes input and source
- The latest early date (LED) rule still applies -- The SNE date will be the ES of a node provided it is the LED



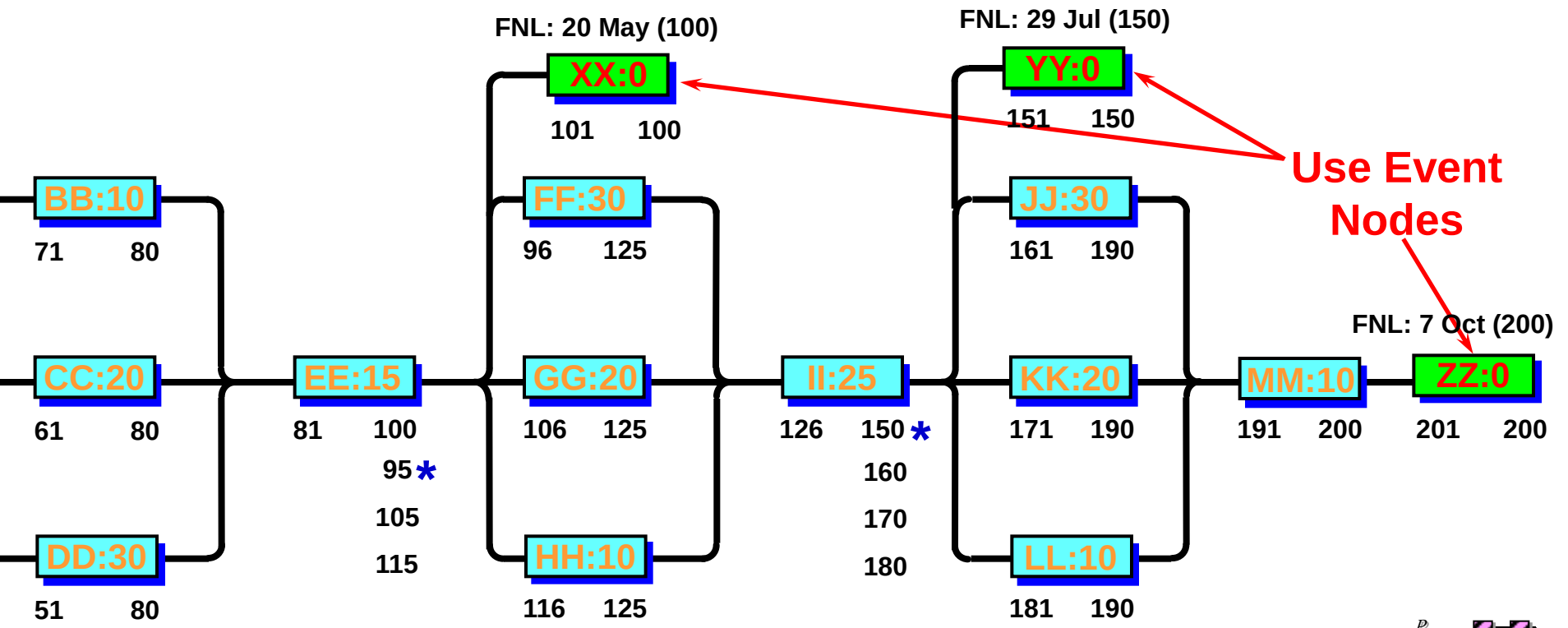
Date Targets (constraints) on Internal Nodes

- Finish-No-Later (FNL) date targets (constraints) can be used on any node in the model (not just finish nodes)
- It is used to represent a requirement on a node such as an external deliverable or other schedule requirement
- The earliest late date (ELD) rule still applies -- The FNL date will be the LF of a node provided it is the ELD



Finish Date Targets - Preferred Discipline

- Set up Event Node to represent each finish requirement
- Set FNL date on Event Node - Description on Event Node describes requirement
- The earliest late date (ELD) rule still applies -- The FNL date will be the LF of a node provided it is the ELD



Summary & Conclusions

- Total Float is the difference between cumulative path length & the time available to the path
- Total Float is actually calculated as the difference between early & late dates
- Can be used to isolate & quantify schedule problems
- Can be used to identify & test potential solutions to problems
- Defines the use & purpose of each & every model parameter

- This all requires the proper use & discipline of model parameters