UNIVERSITY OF LEICESTER

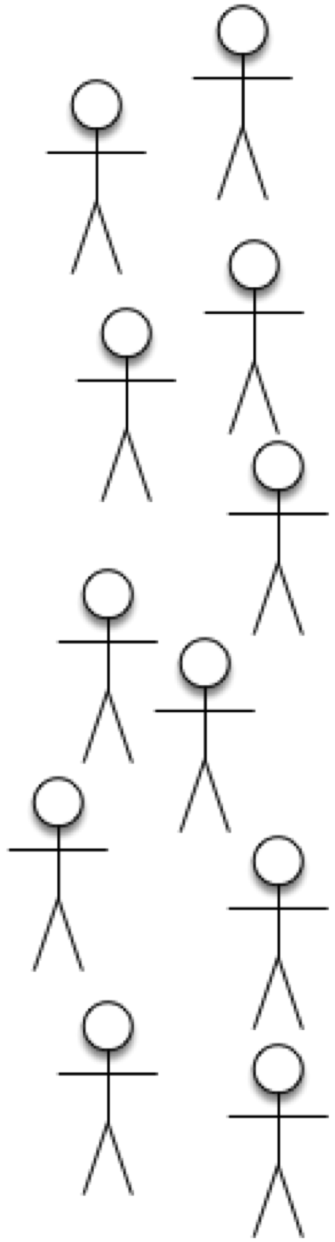
Software Project Planning

CO3095, CO7095, CO7508

José Miguel Rojas – *material provided by Neil Walkinshaw*

Estimating Cost and Time

- Estimating resources that will be required for a project?
- A **fine balance** to be struck:
  - Too high – might not be awarded project.
  - Too low – insufficient resources to achieve goals, leads to a low quality outcome.
- **Difficult**
  - Requirements are vague, liable to change.
  - Difficult to gauge team capabilities.
  - Difficult to gauge complexity of requirements.



An Unsolved Problem

A 2012 study by the Saïd Business School (Oxford) surveyed 1355 public sector ICT project.

- Average actual expenditure was $130 million.
- Average duration was 35 months.

"Typical" project has zero cost overrun!

- But took 24% longer than expected.

18% of projects have cost overruns of >25%.

- Typical overrun for these projects is 130%!
- Cost overrun increases as project length increases.

Budzier and Flyvbjerg. "*Overspend? Late? Failure? What the Data Say About IT Project Risk in the Public-Sector*"

An Unsolved Problem

A 2012 study by the Saïd Business School (Oxford) surveyed 1355 public sector ICT project

	Black Swans [1]	Projects with cost overrun	Normal projects	Starved projects
Cost overrun	+130	+47	+0	-75
Schedule overrun	+41	+38	+24	n/a
Likelihood	18	28	31	51

"

1

Cost overrun in gth increases.

1 in 6 public sector projects

Budzier and Flyvbjerg. "*Overspend? Late? Failure? What the Data Say About IT Project Risk in the Public-Sector*"

UNIVERSITY OF LEICESTER

Planning

What needs to be done **when**, and by **whom**?

In what **order**?

What are the **priorities**?

What are the **time-constraints**?

Program Evaluation and Review Technique (PERT)

Program and Evaluation Review Technique (PERT)

- Developed by the US Navy in 1957
  - For development of the Polaris submarine-launched nuclear missile.
- Required a technique that could:
  - Factor-in uncertainty wrt. timings.
  - Assist with sequencing of tasks.
  - Identify potentials for time-savings.

Activities and Time Estimates

Activity
A: Develop storage format
B: Develop file reader
C: Develop file writer
D: Develop core data structure

Activities and Time Estimates

Activity	Predecessor
A: Develop storage format	D
B: Develop file reader	A
C: Develop file writer	A
D: Develop core data structure	-

Activities and Time Estimates

Activity	Predecessor	Time Estimates		
		Optimistic	Normal	Pessimistic
A: Develop storage format	D	2	3	4
B: Develop file reader	A	3	5	6
C: Develop file writer	A	3	4	7
D: Develop core data structure	-	3	5	10

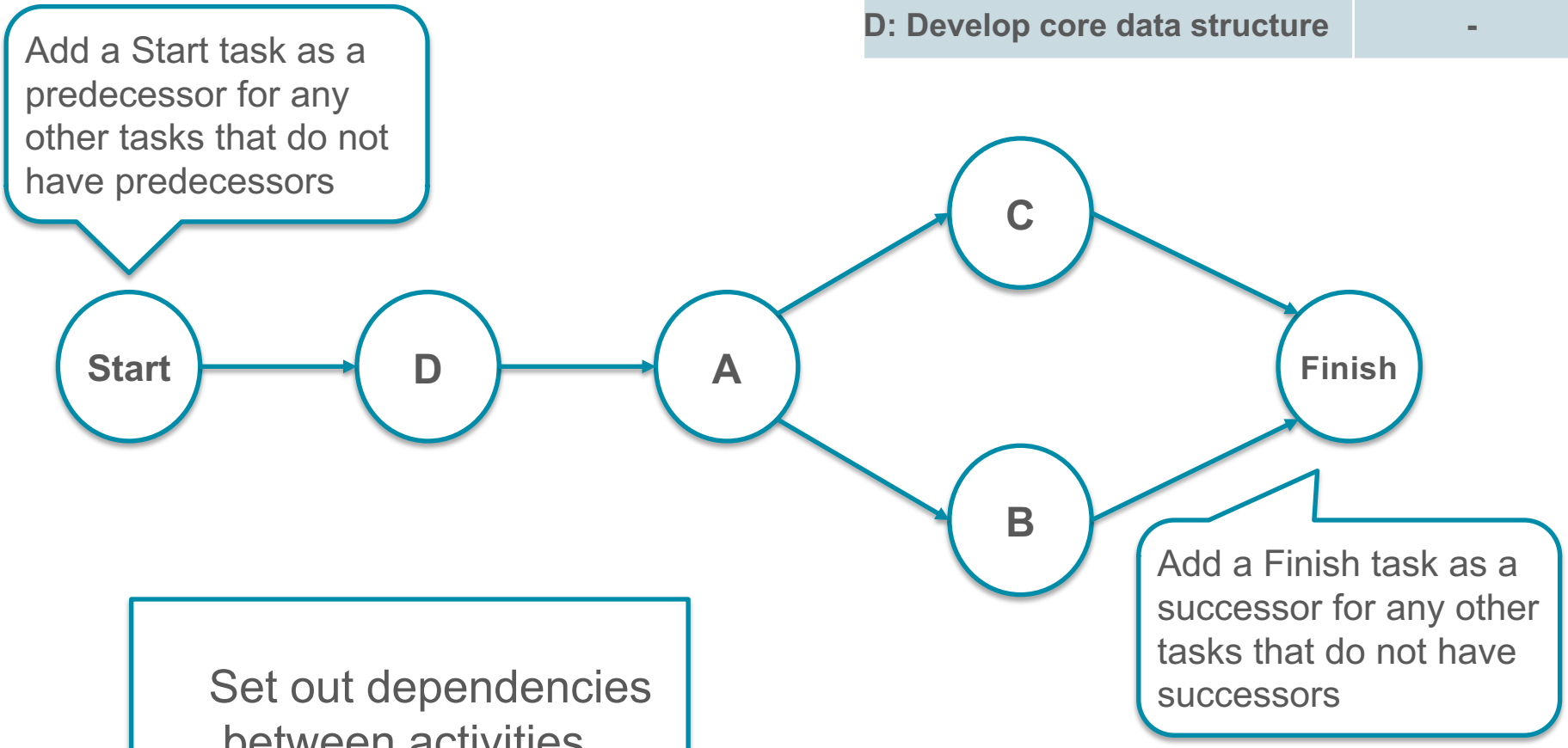
Activities and Time Estimates

(Optimistic + (4 *normal) + pessimistic) / 6

Activity	Predecessor	Time Estimates			Expected
		Optimistic	Normal	Pessimistic	
A: Develop storage format	D	2	3	4	3.00
B: Develop file reader	A	3	5	6	4.83
C: Develop file writer	A	3	4	7	4.33
D: Develop core data structure	-	3	5	10	5.50

Network Diagram

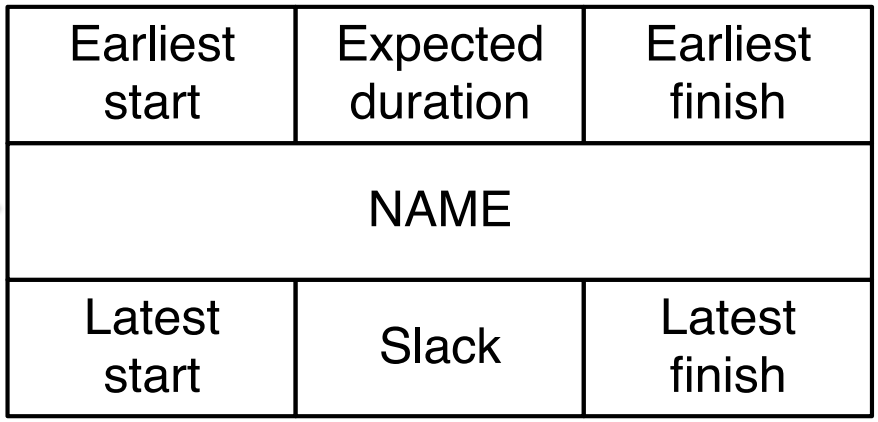
Activity	Predecessor
A: Develop storage format	D
B: Develop file reader	A
C: Develop file writer	A
D: Develop core data structure	-



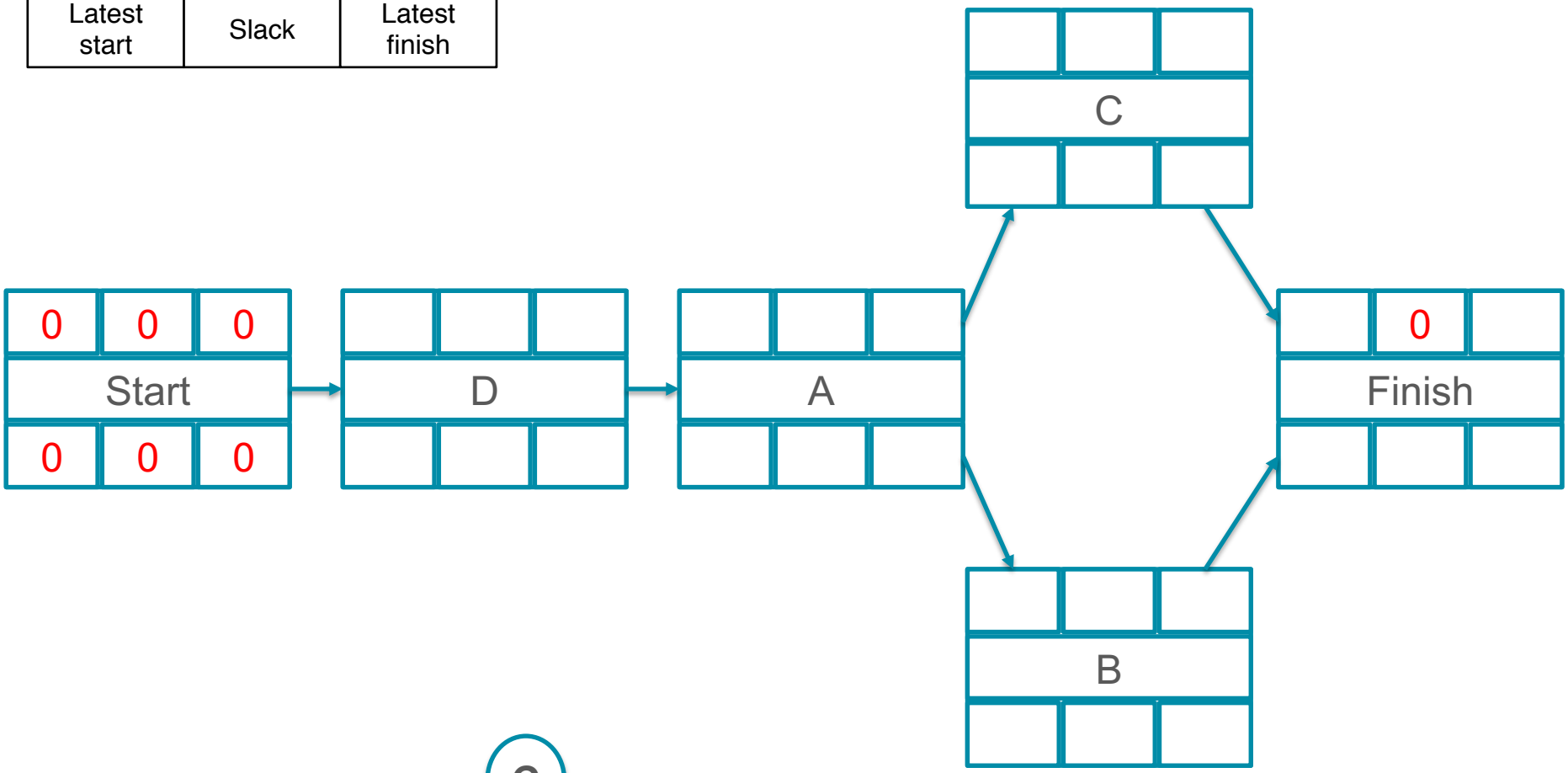
Set out dependencies between activities.

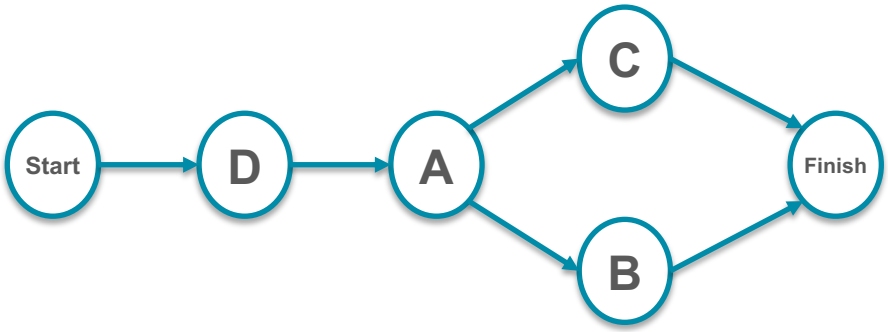
Incorporating Time Constraints

Replace each network node with this template

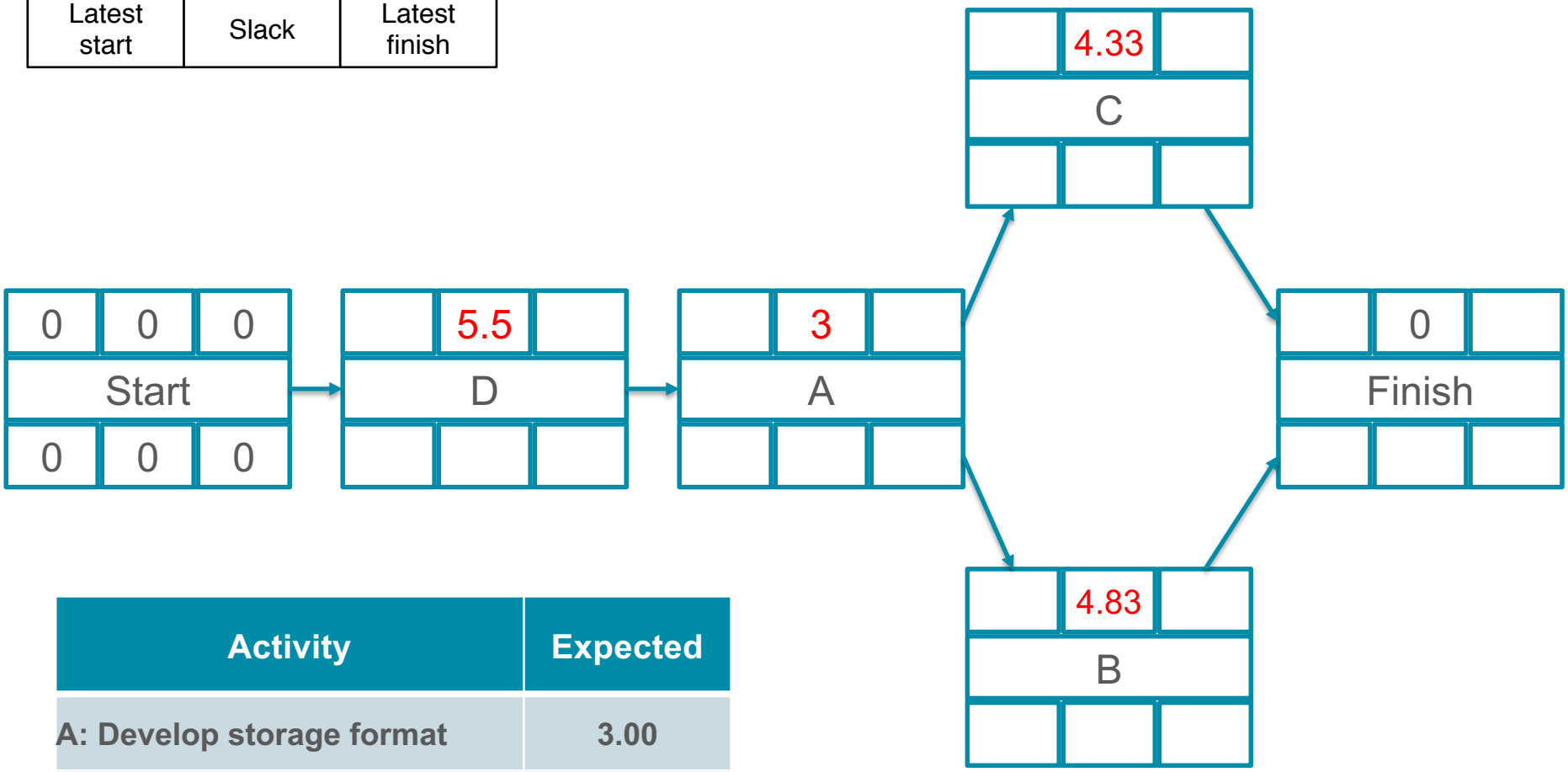


Earliest start	Expected duration	Earliest finish
NAME		
Latest start	Slack	Latest finish

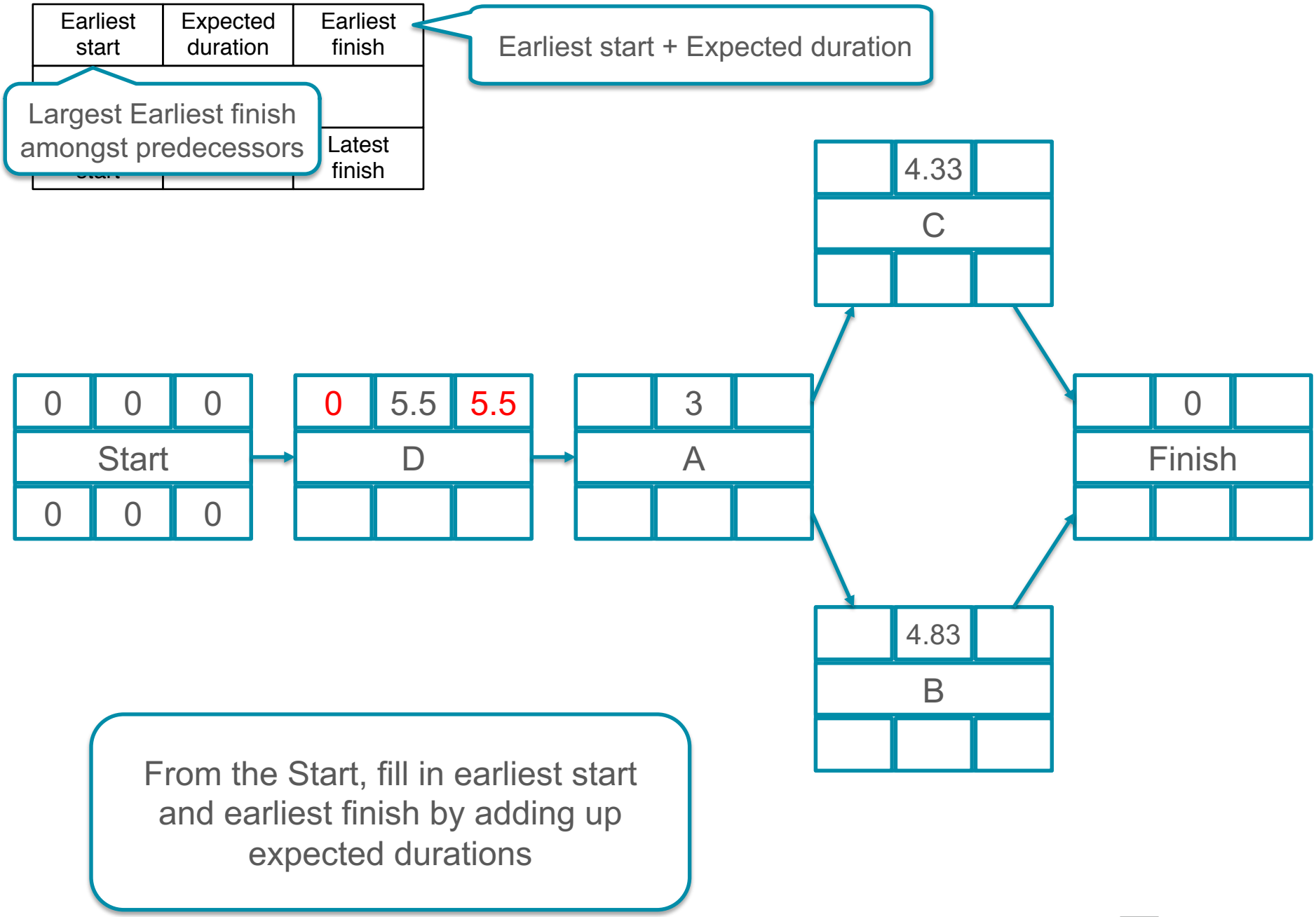


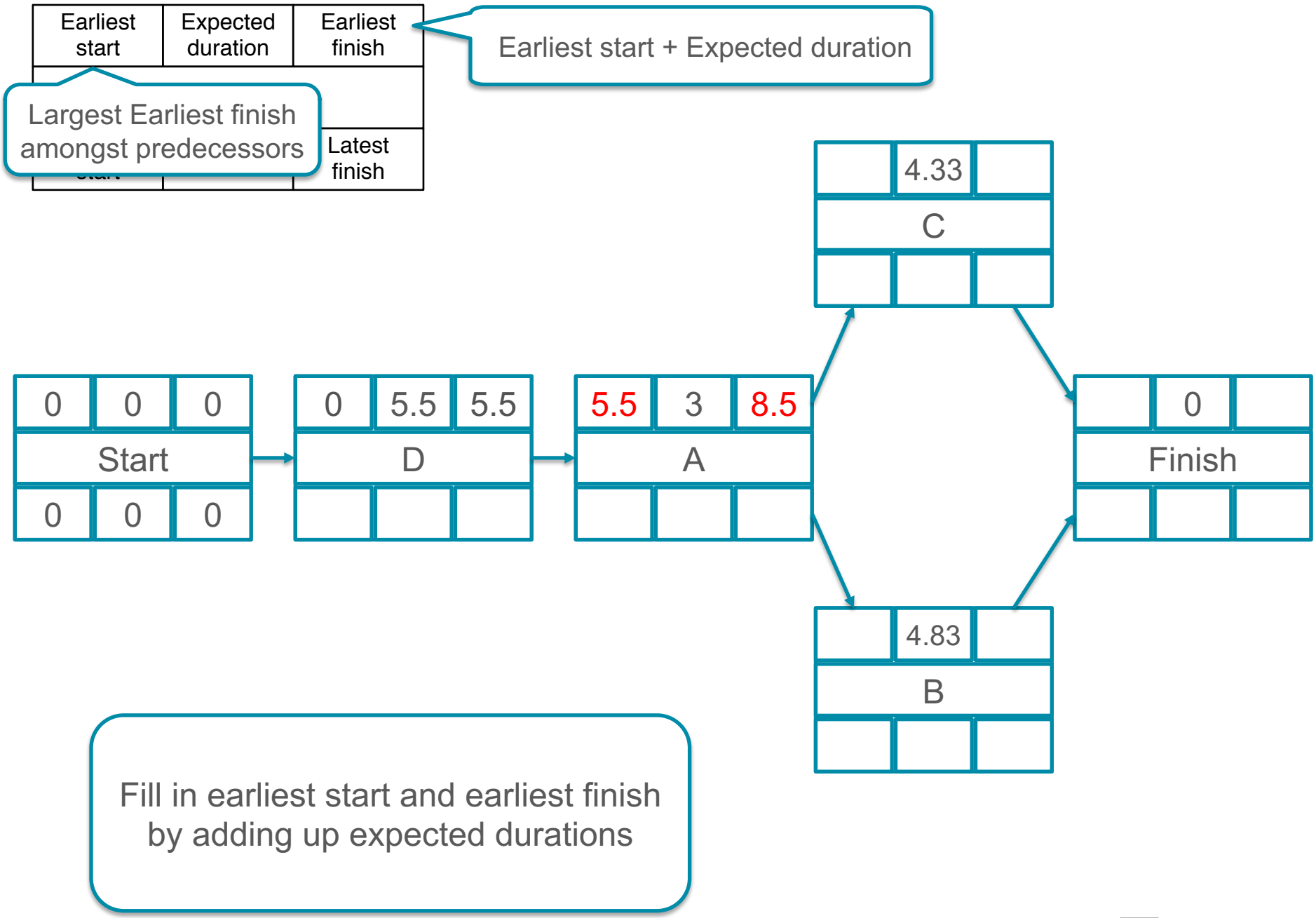


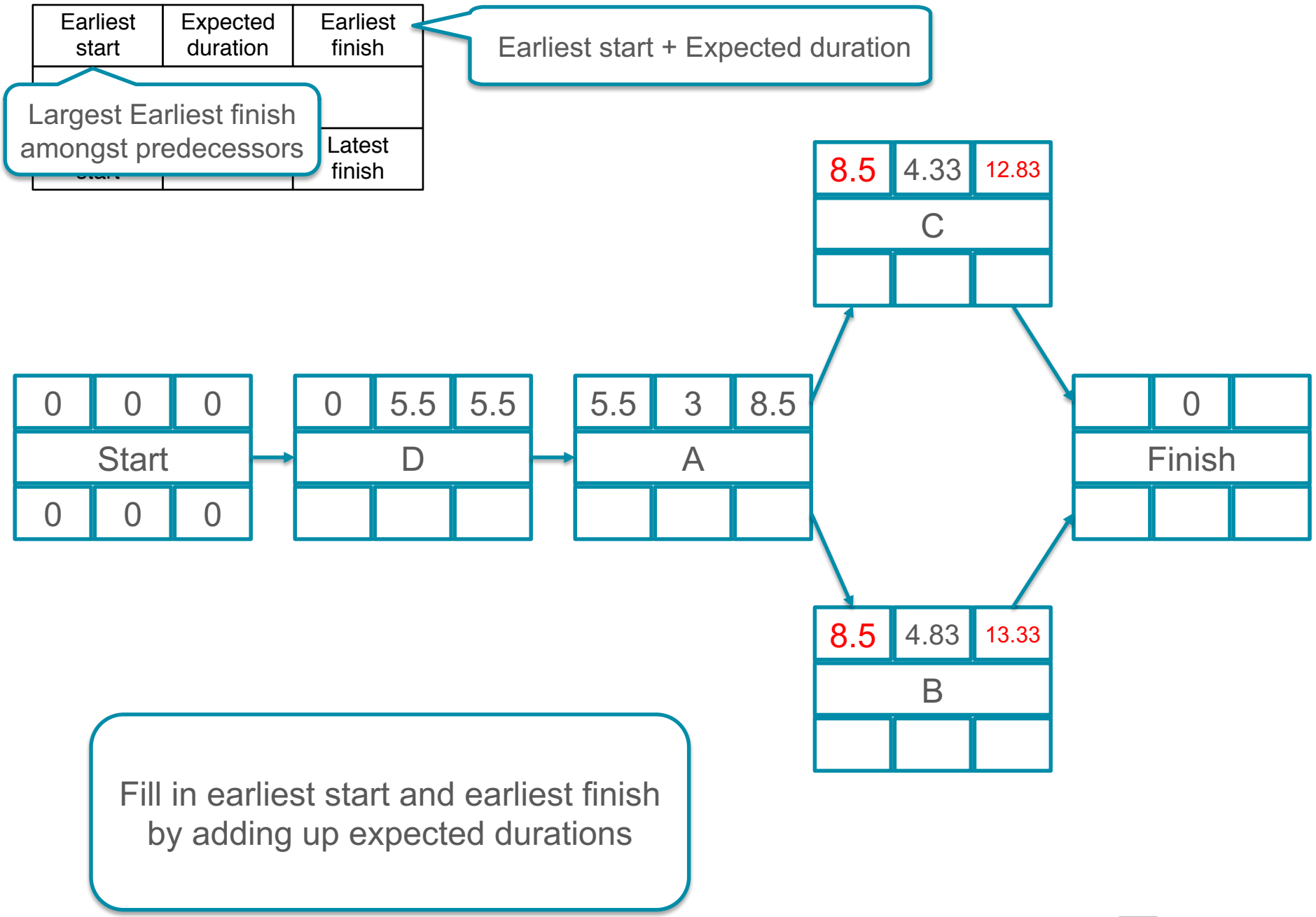
Earliest start	Expected duration	Earliest finish
NAME		
Latest start	Slack	Latest finish

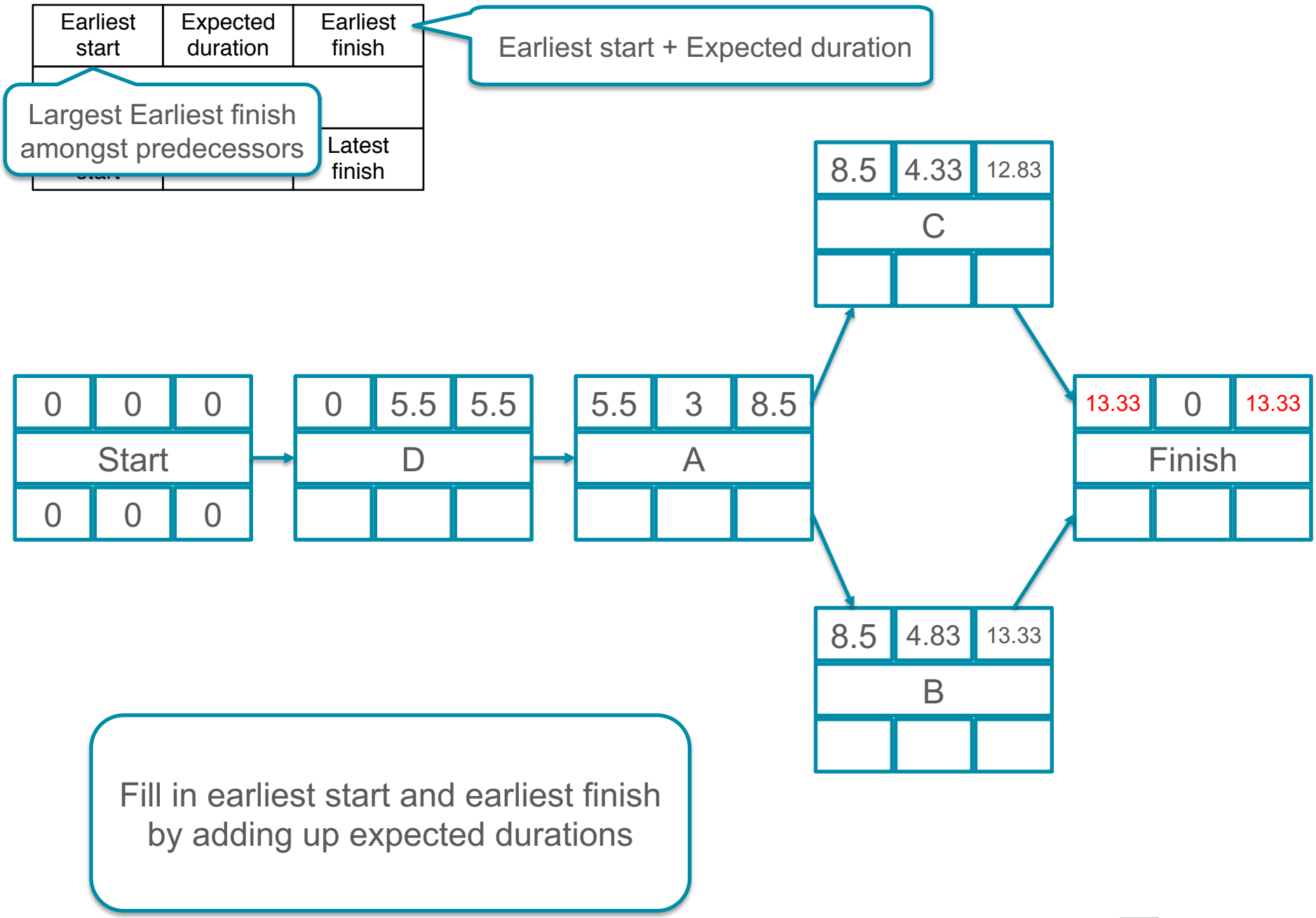


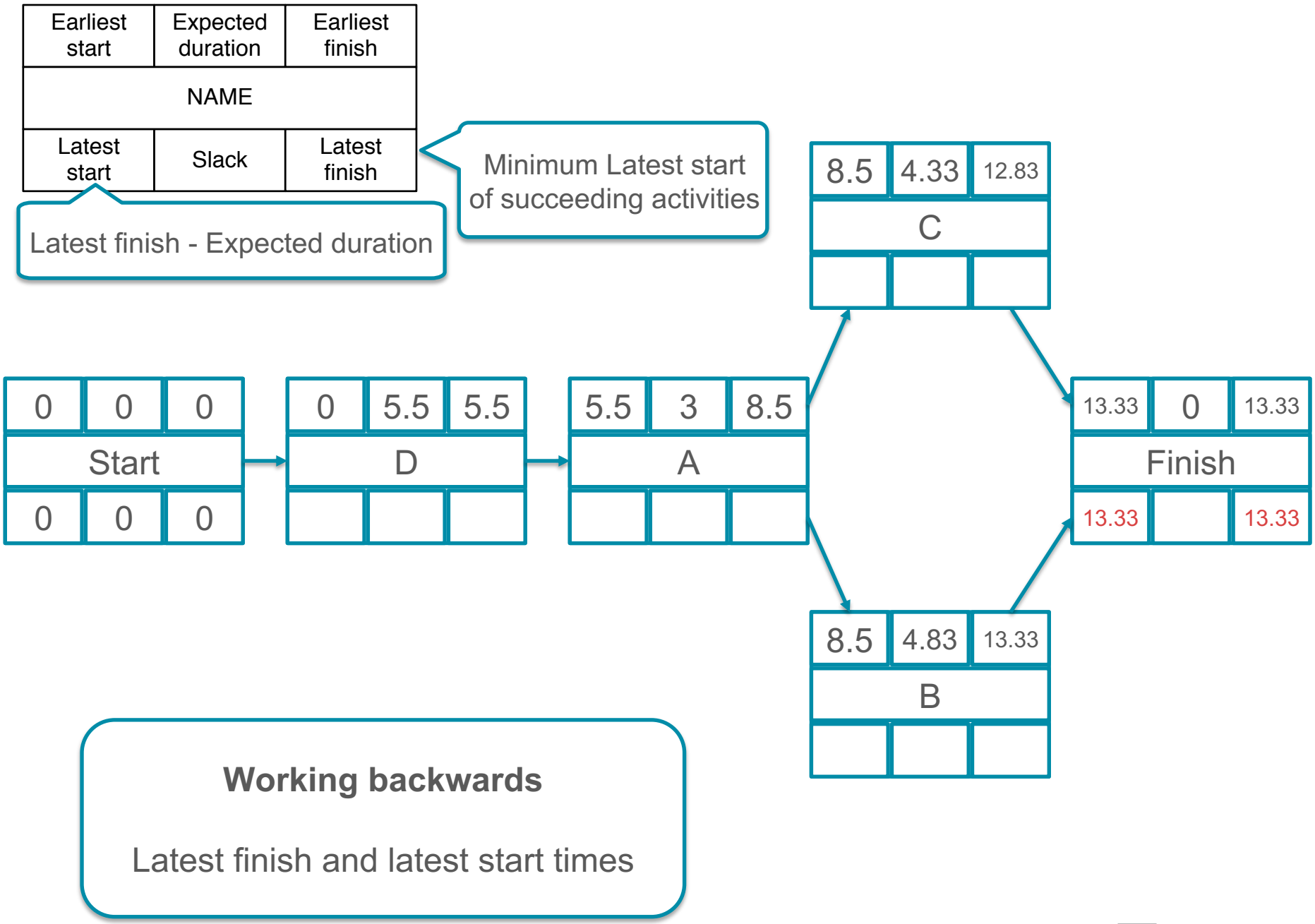
Activity	Expected
A: Develop storage format	3.00
B: Develop file reader	4.83
C: Develop file writer	4.33
D: Develop core data structure	5.50

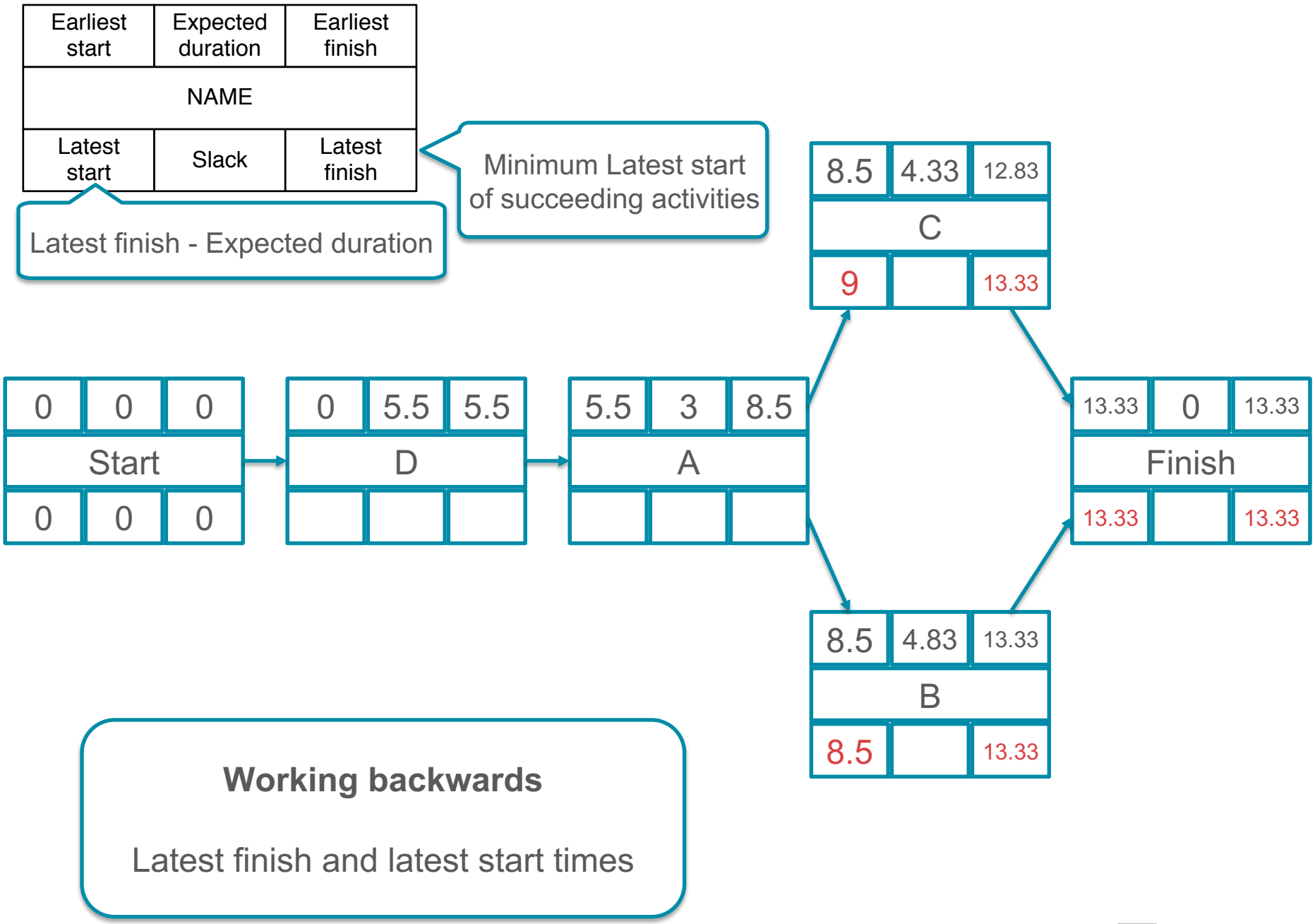


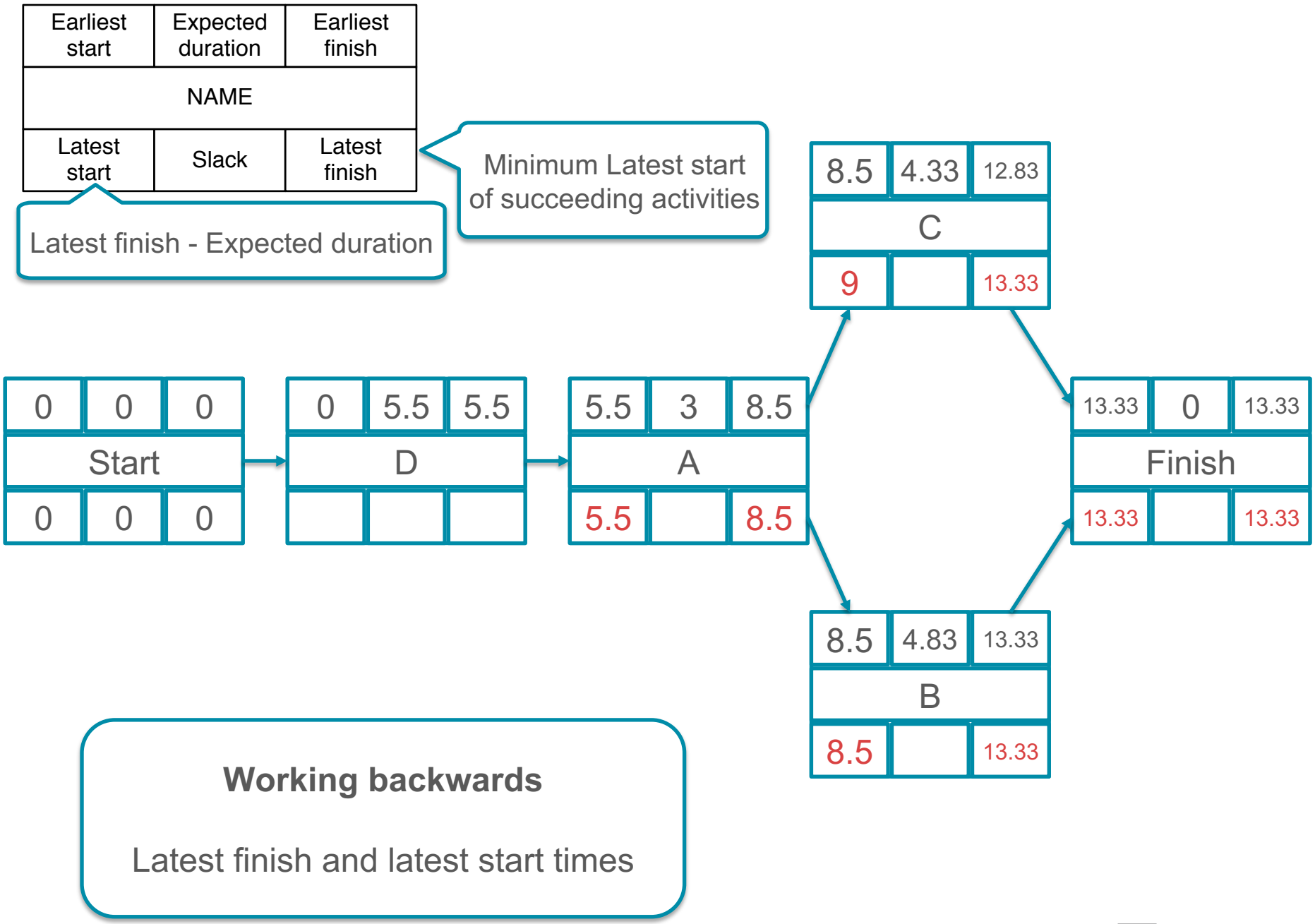


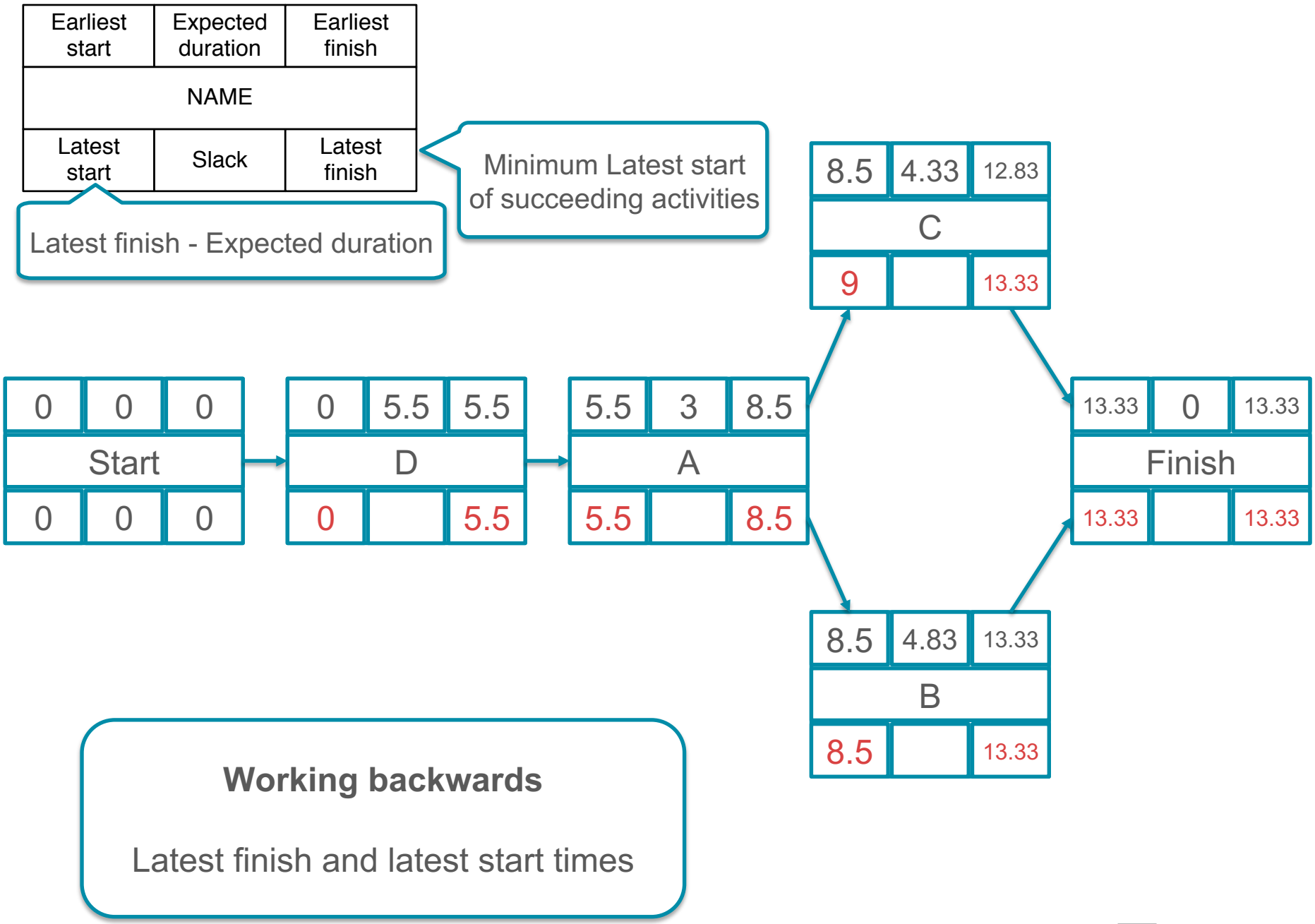


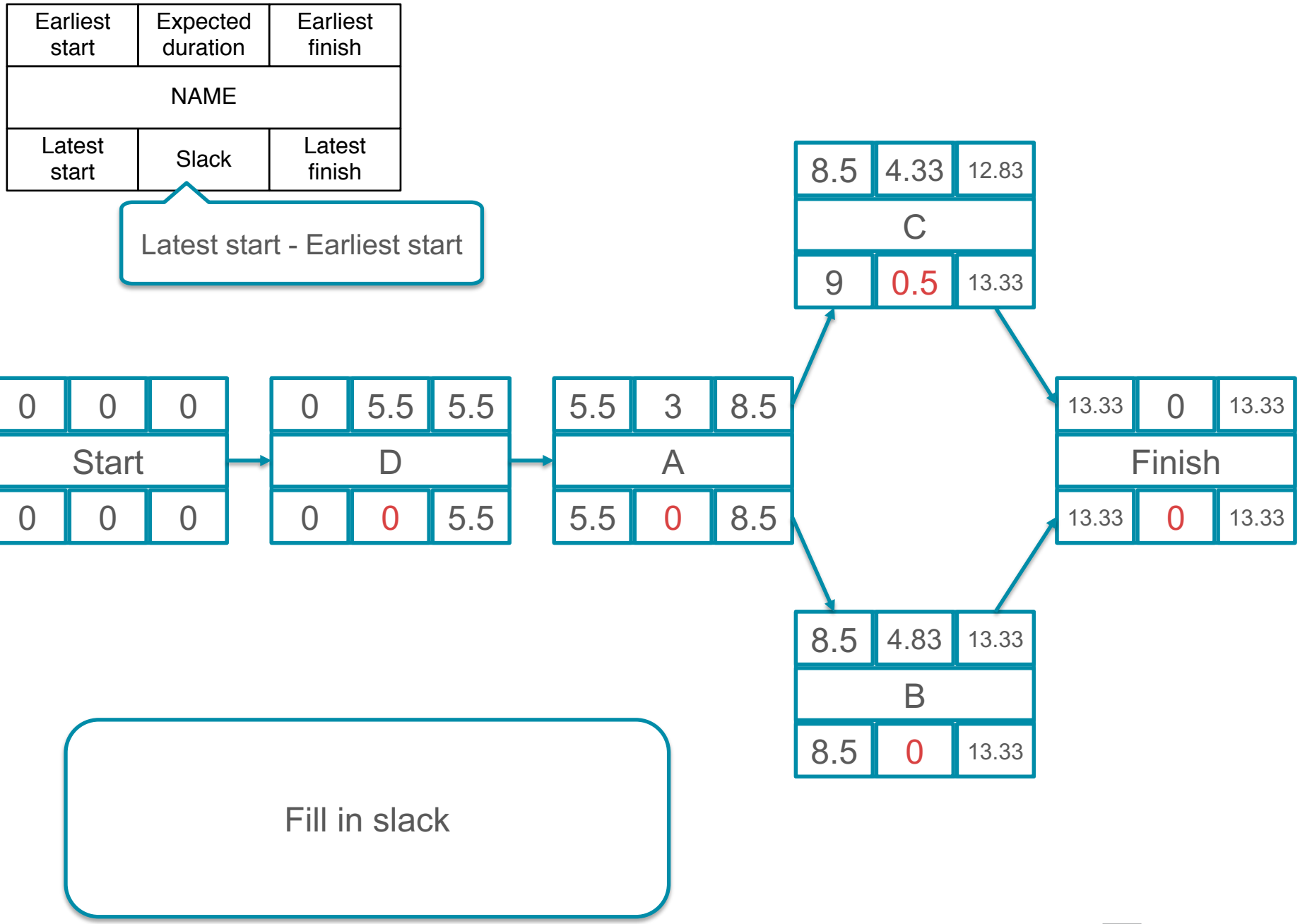




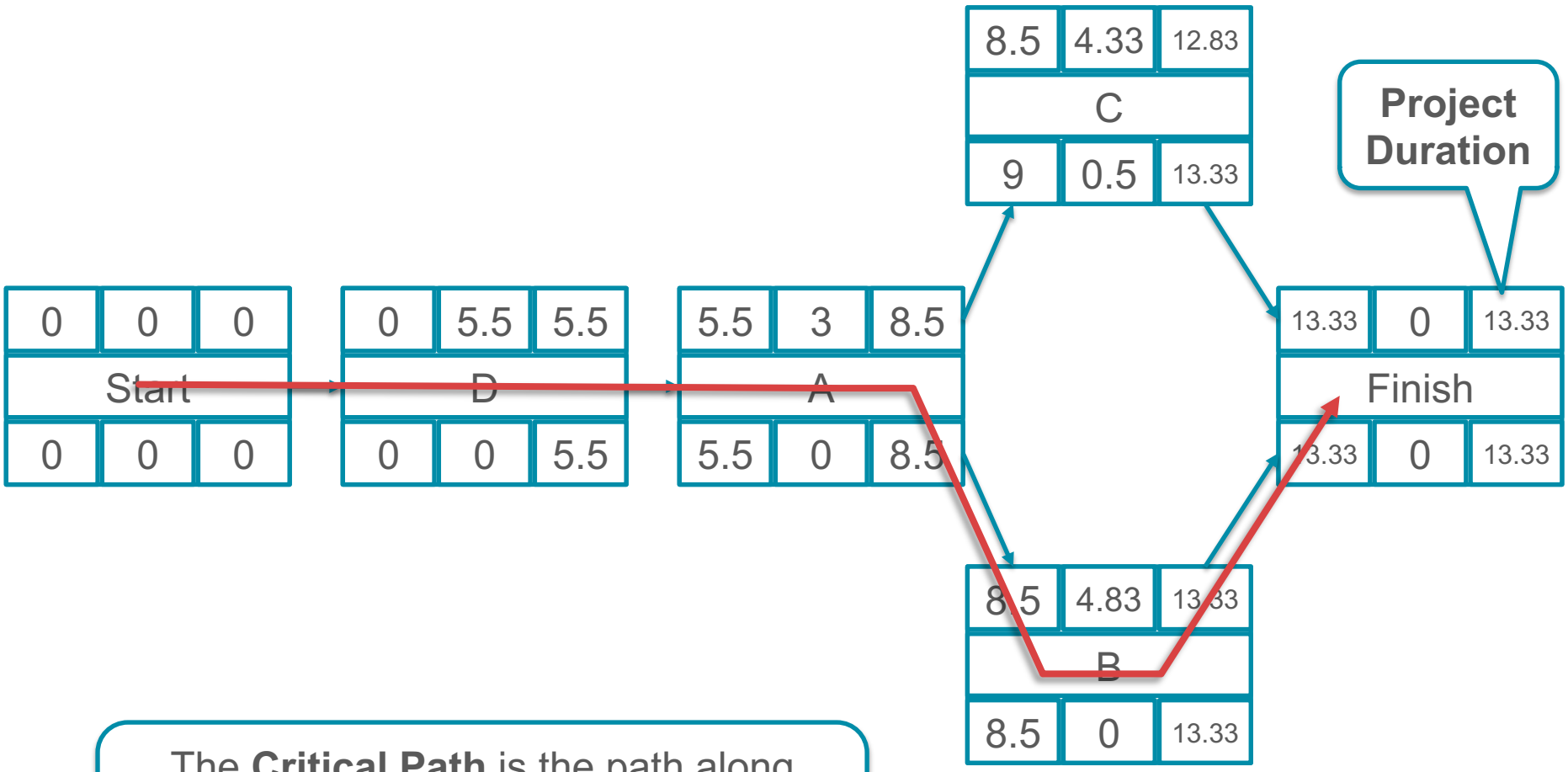








Critical Path



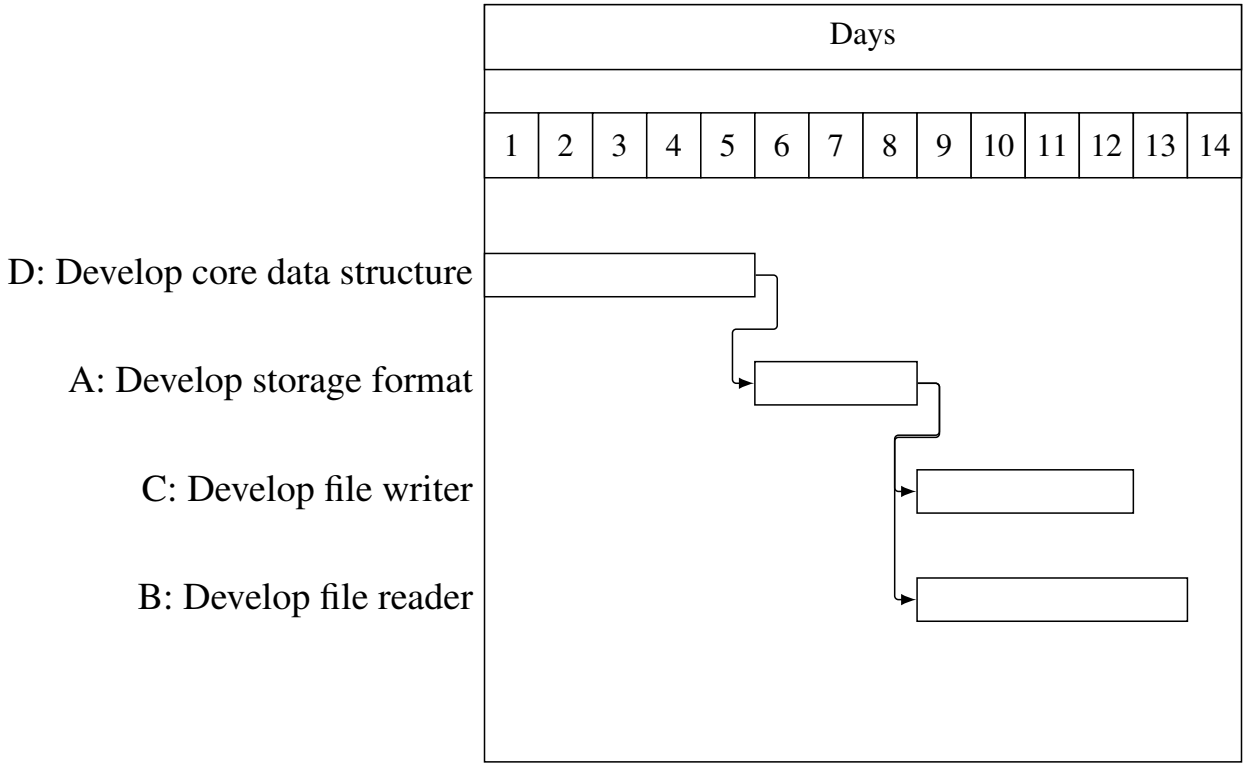
The **Critical Path** is the path along which there is no slack. Any delay in any activity will delay the project as a whole.

Gantt Charts

Workflow

- PERT charts are good at:
  - Highlighting dependencies between activities.
  - Calculating time-frames and slack in each activity.
- They are bad for **visualisation**.
  - Do not show the *flow* of activities in a project.
  - The existence of a dependency does not imply that two activities should happen consecutively.
  - Do not visualise *duration*.

Gantt Charts



Complement PERT charts — show additional layer of information

Summary

- Project management is a crucial component of software development.
  - Crucial for avoiding delays
- PERT charts can set out dependencies between activities.
  - Help to calculate deadlines and slack-times.
- Gantt charts display temporal elements and flow between activities.