ANALYSIS OF ALGORITHMS

LECTURE 14 : PERT CHARTS

BASED ON SECTION 6.2

WHAT IS A PERT CHART?

- Performance, evaluation and review technique
- Projects have lots of activities
- Some can absorb delays, others cannot
- Identify the relationships between tasks to discover the critical path

EXAMPLE : CREATE A WEBSITE

- First, we must enumerate the subtasks involved and how much time they take

Task	Description	Duration
T1	Pick Colours	1
T2	Decide on sections	5
T3	Produce section icons	2
T4	Write section content	7
T5	Buy domain name	1
T6	Decide on web host	4
T7	Buy hosting package	1
T8	Deploy site	2
T9	Run advertising campaign	2

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T5	Buy domain name	1
T6	Decide on web host	4
T7	Buy hosting package	1
T8	Deploy site	2
T9	Distribute credentials	2

Task	Depends On
T1	
T2	
T3	T1,T2
T4	T2
T5	
T6	
T7	T6,T5
T8	T3,T4,T7
T9	T8

EXAMPLE : CREATE A WEBSITE

- Next, we can draw the directed, acyclic graph representing this task set

Task	Depends	Duration
T1		1
T2		5
T3	T1,T2	2
T4	T2	7
T5		1
T6		4
T7	T6,T5	1
T8	T3,T4,T7	2
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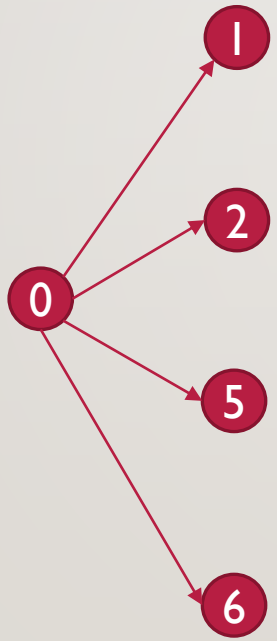

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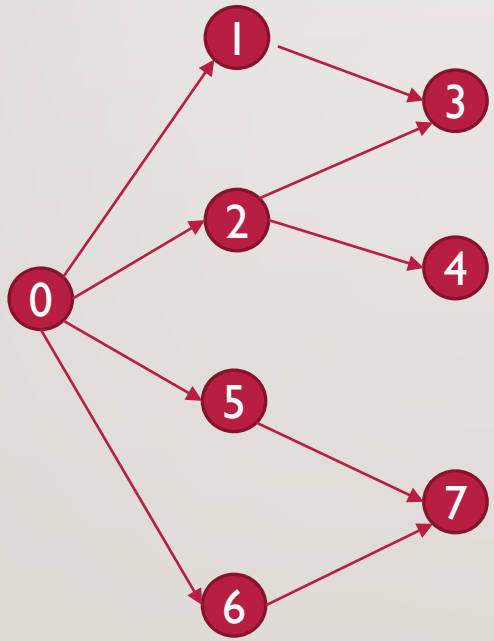

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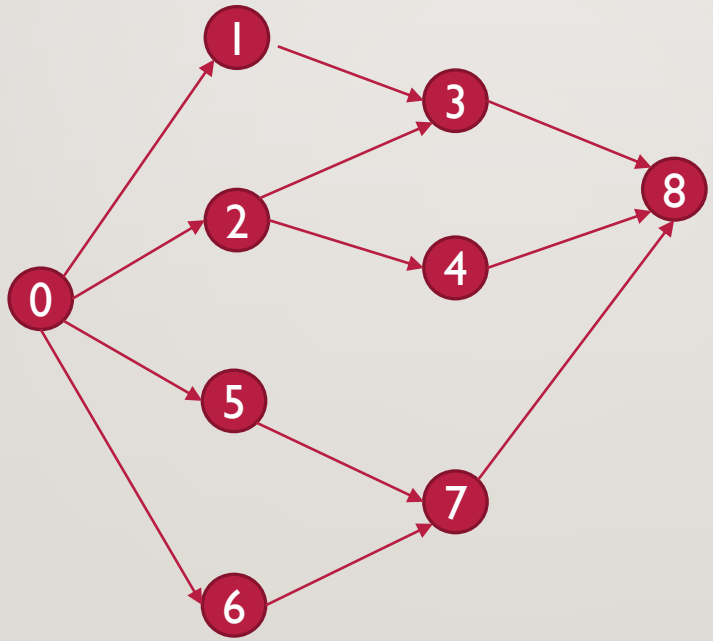

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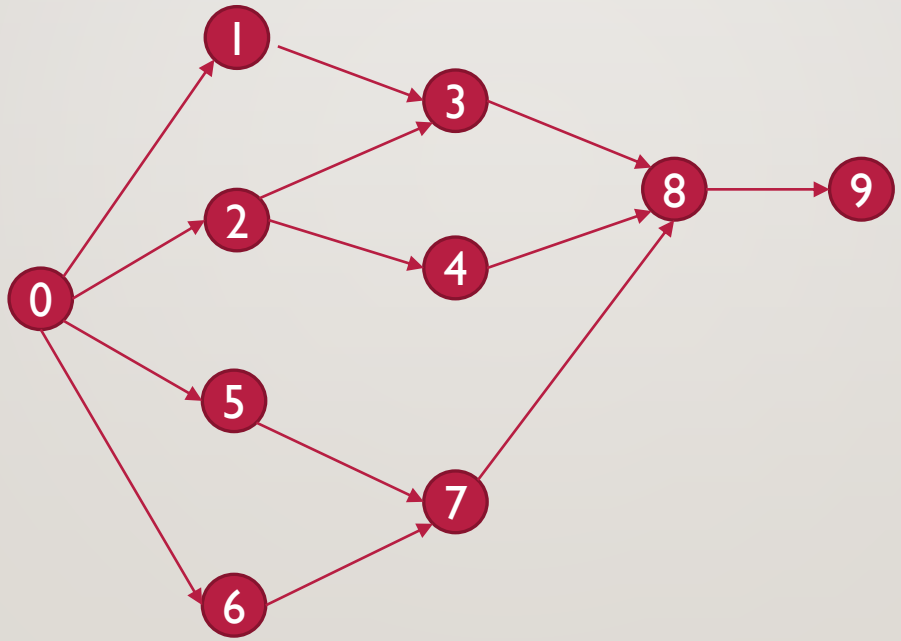

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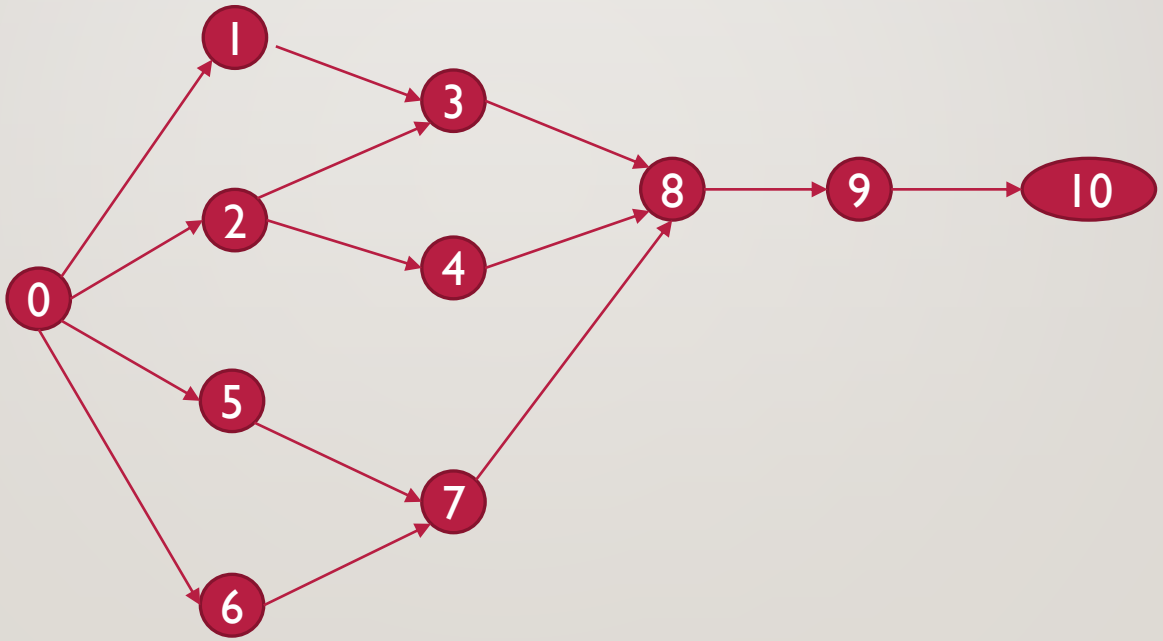

EXAMPLE : CREATE A WEBSITE

- Every edge is given a weight equal to the preceding task's duration

Task	Depends	Duration
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T2		5
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T4	T2	7
T5		1
T6		4
T7	T6,T5	1
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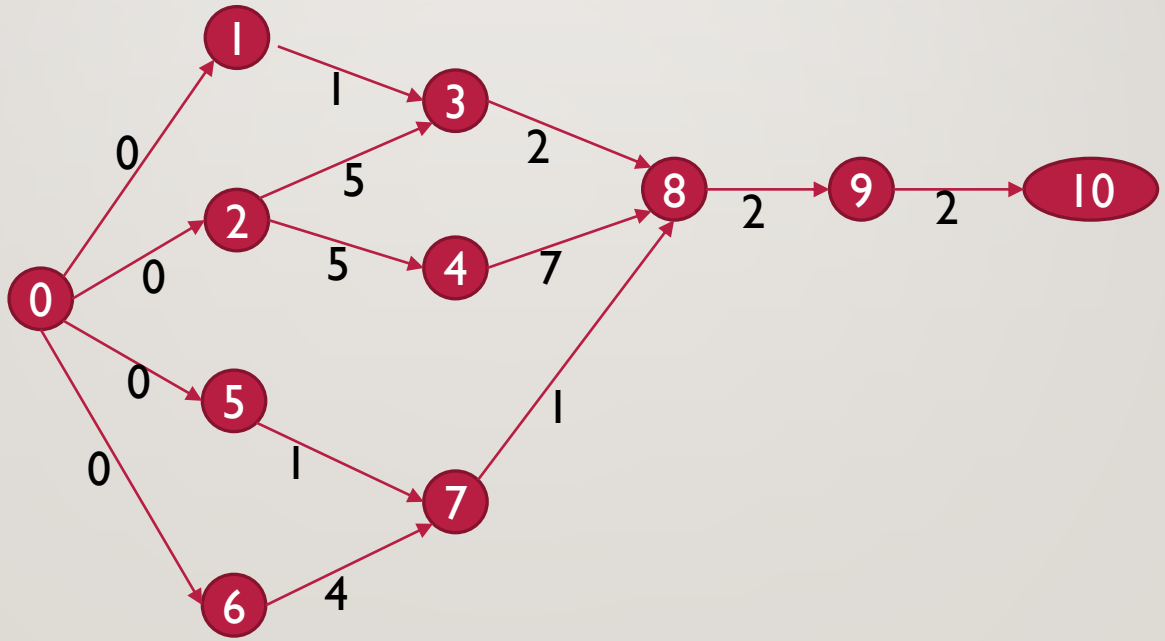

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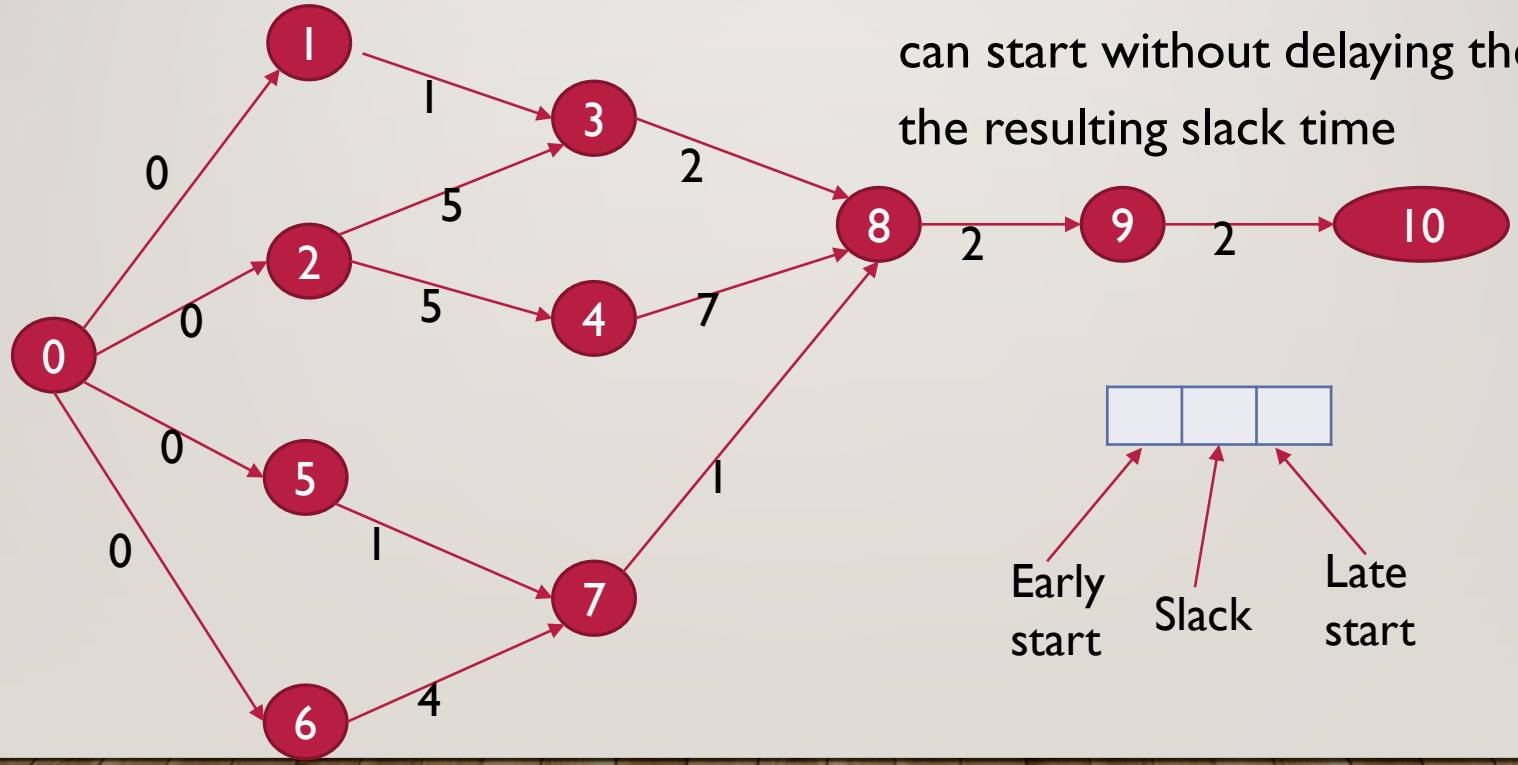

- Next, we try to figure out three things – the earliest a task can start, the latest it can start without delaying the project, and the resulting slack time

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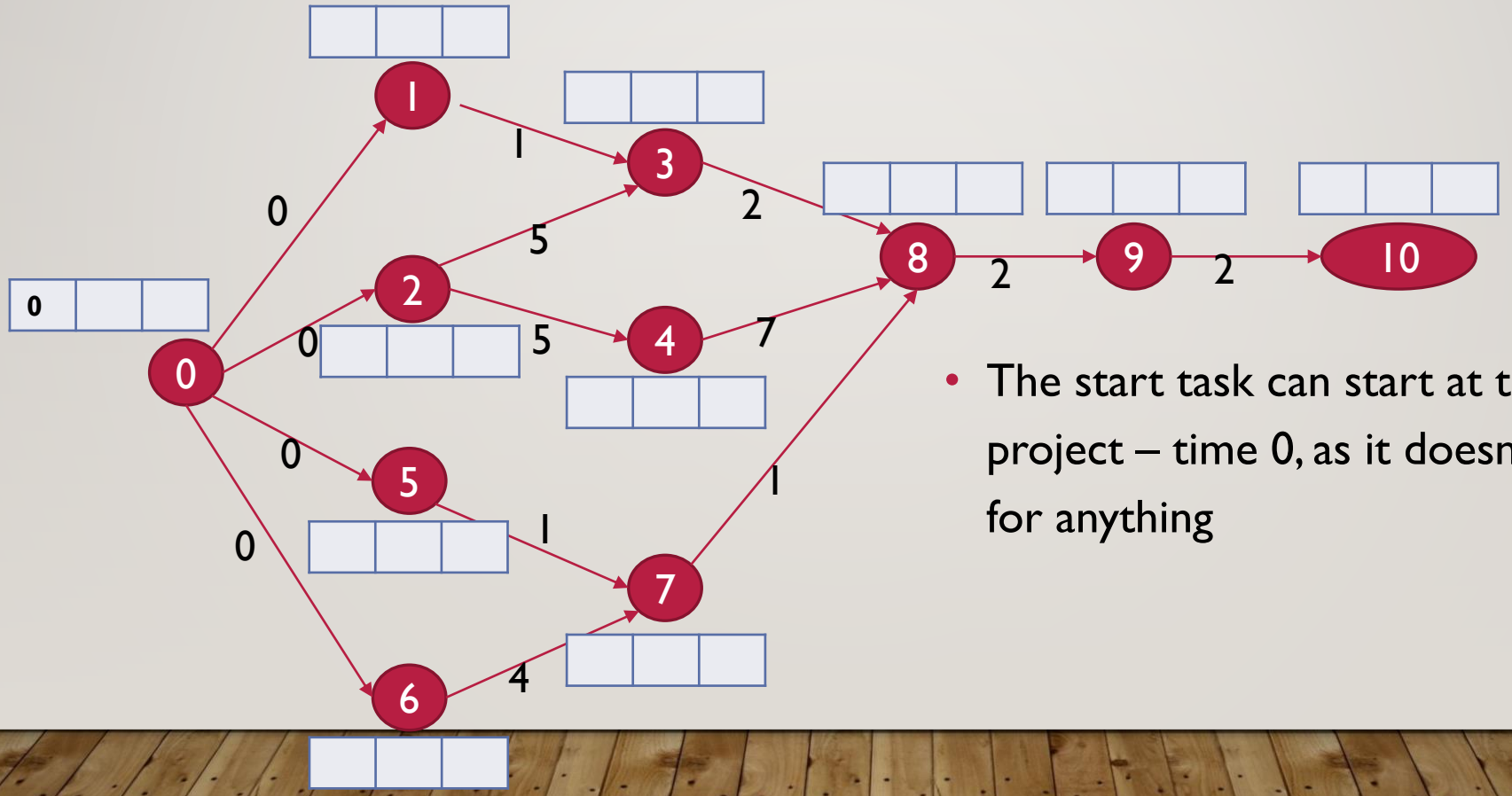

- The start task can start at the start of the project – time 0, as it doesn't have to wait for anything

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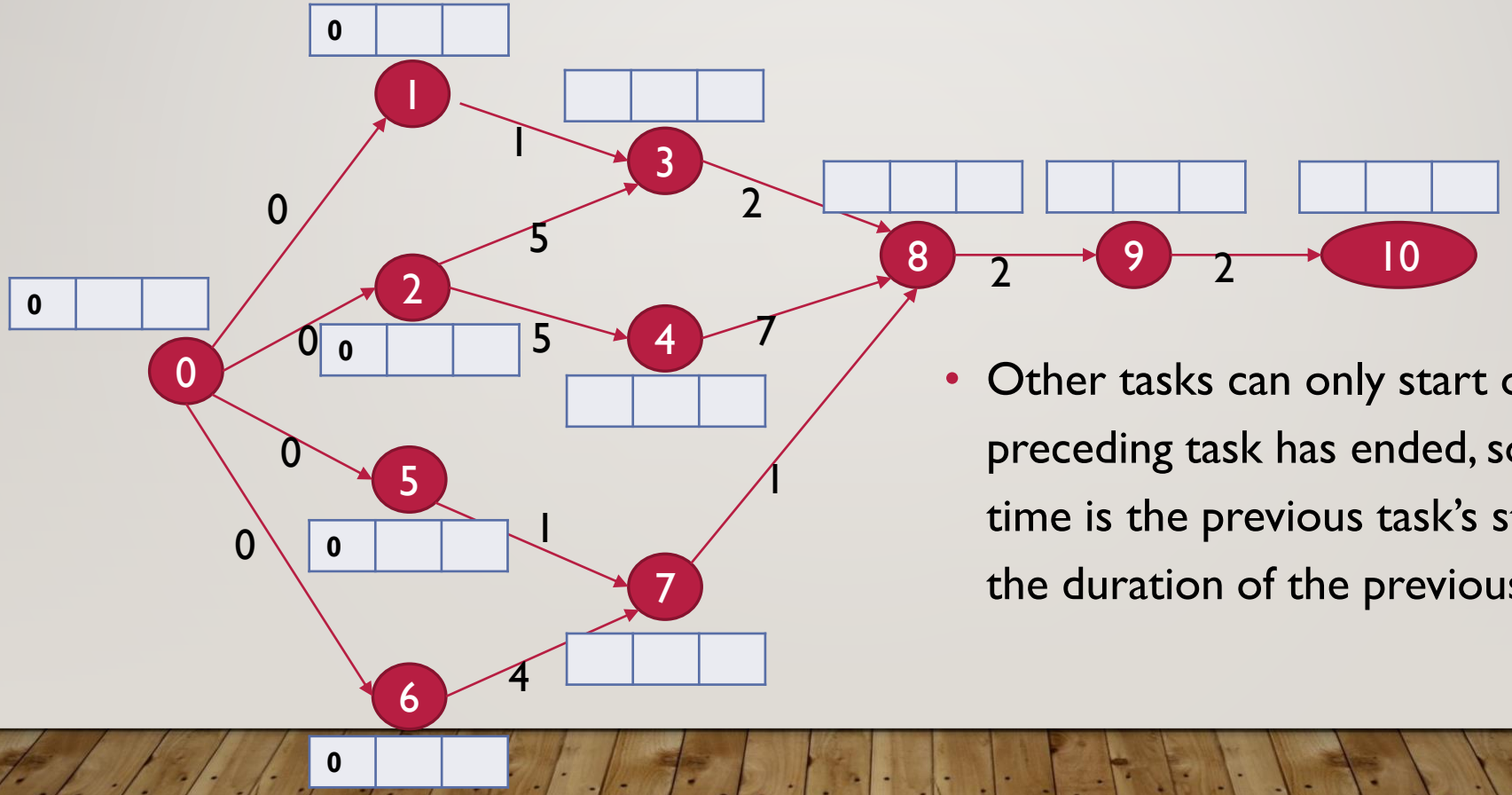

- Other tasks can only start once the preceding task has ended, so their start time is the previous task's start time plus the duration of the previous task

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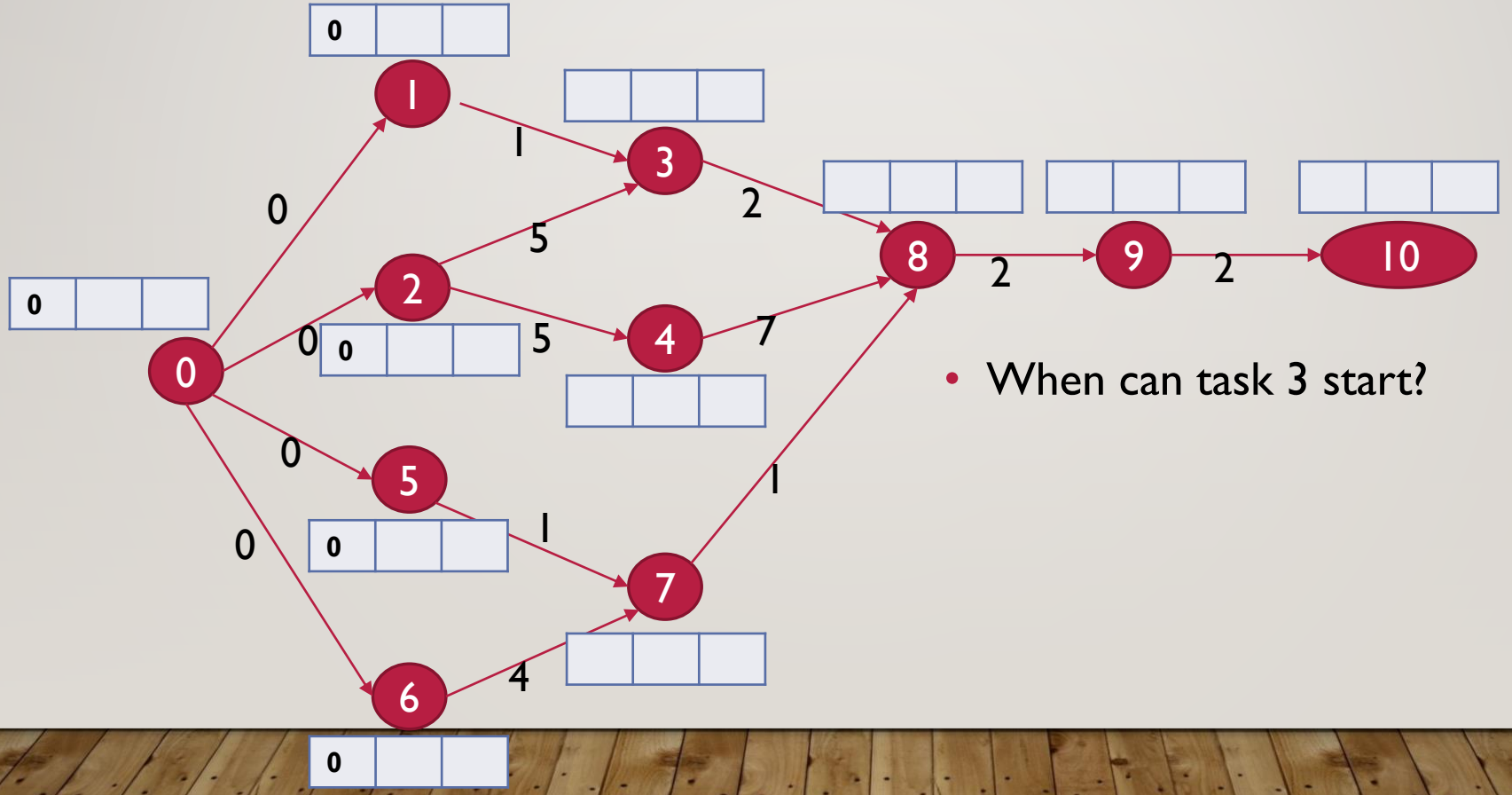

- When can task 3 start?

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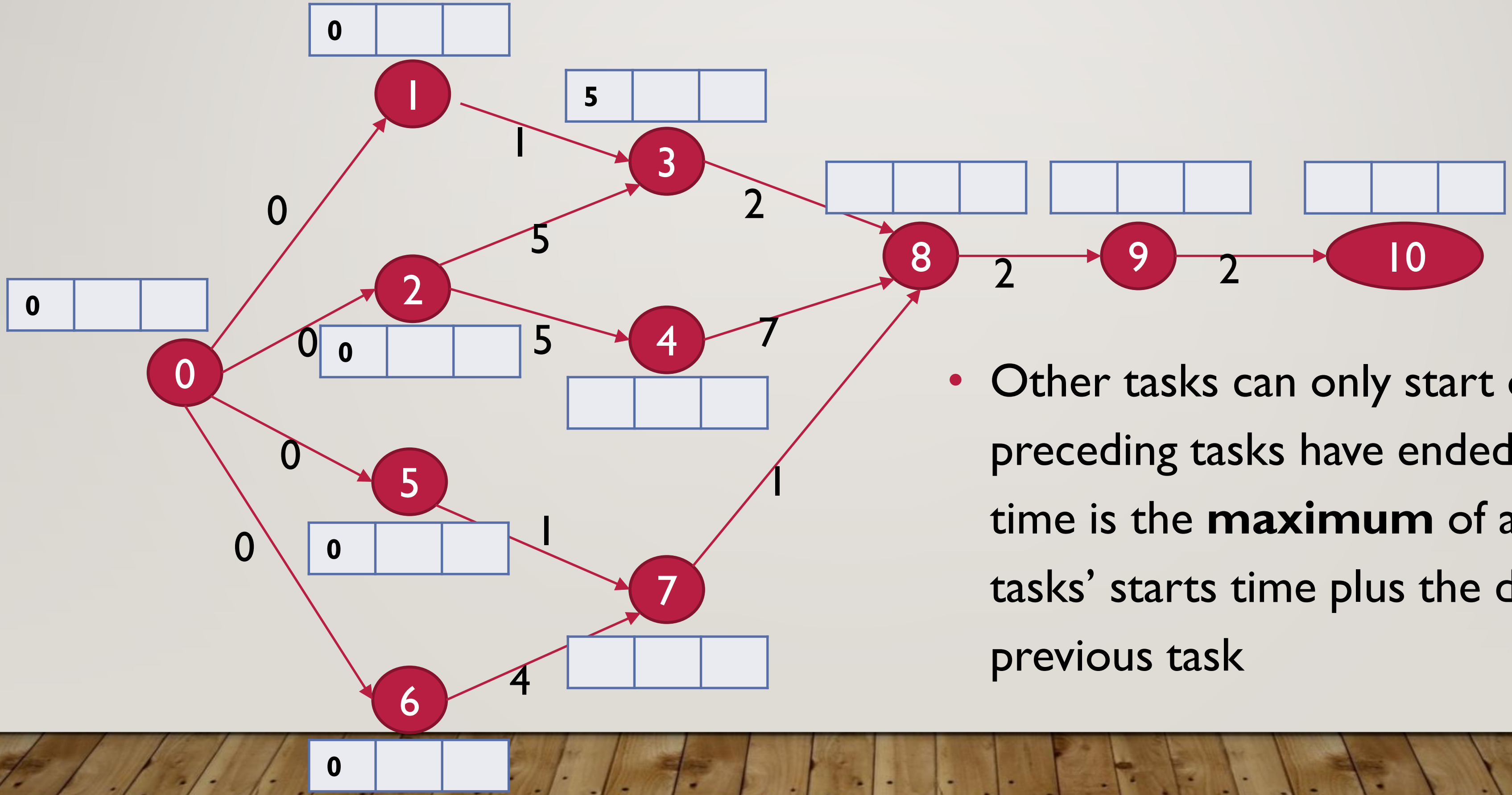

- Other tasks can only start once all preceding tasks have ended, so their start time is the **maximum** of all previous tasks' starts time plus the duration of the previous task

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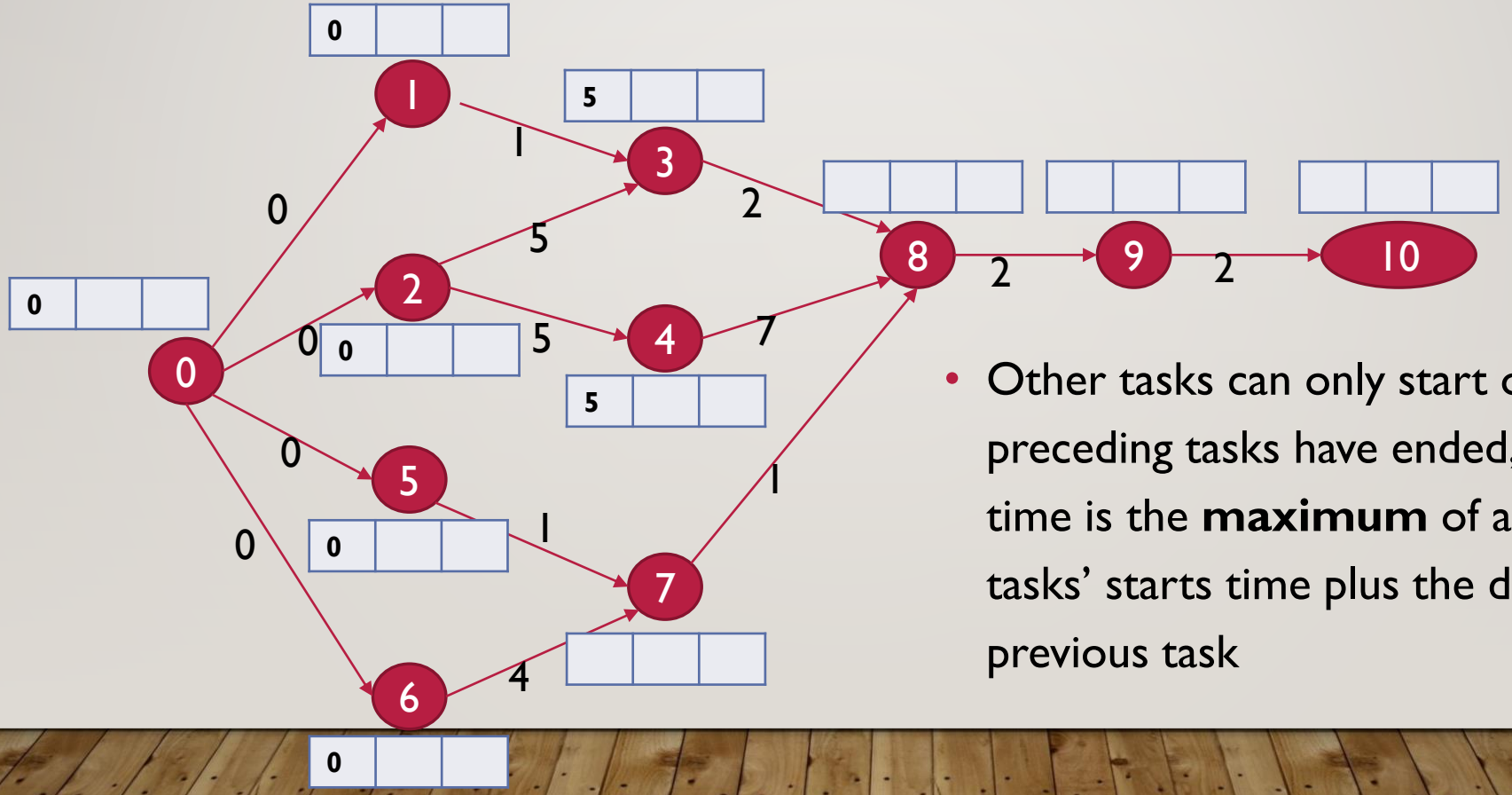

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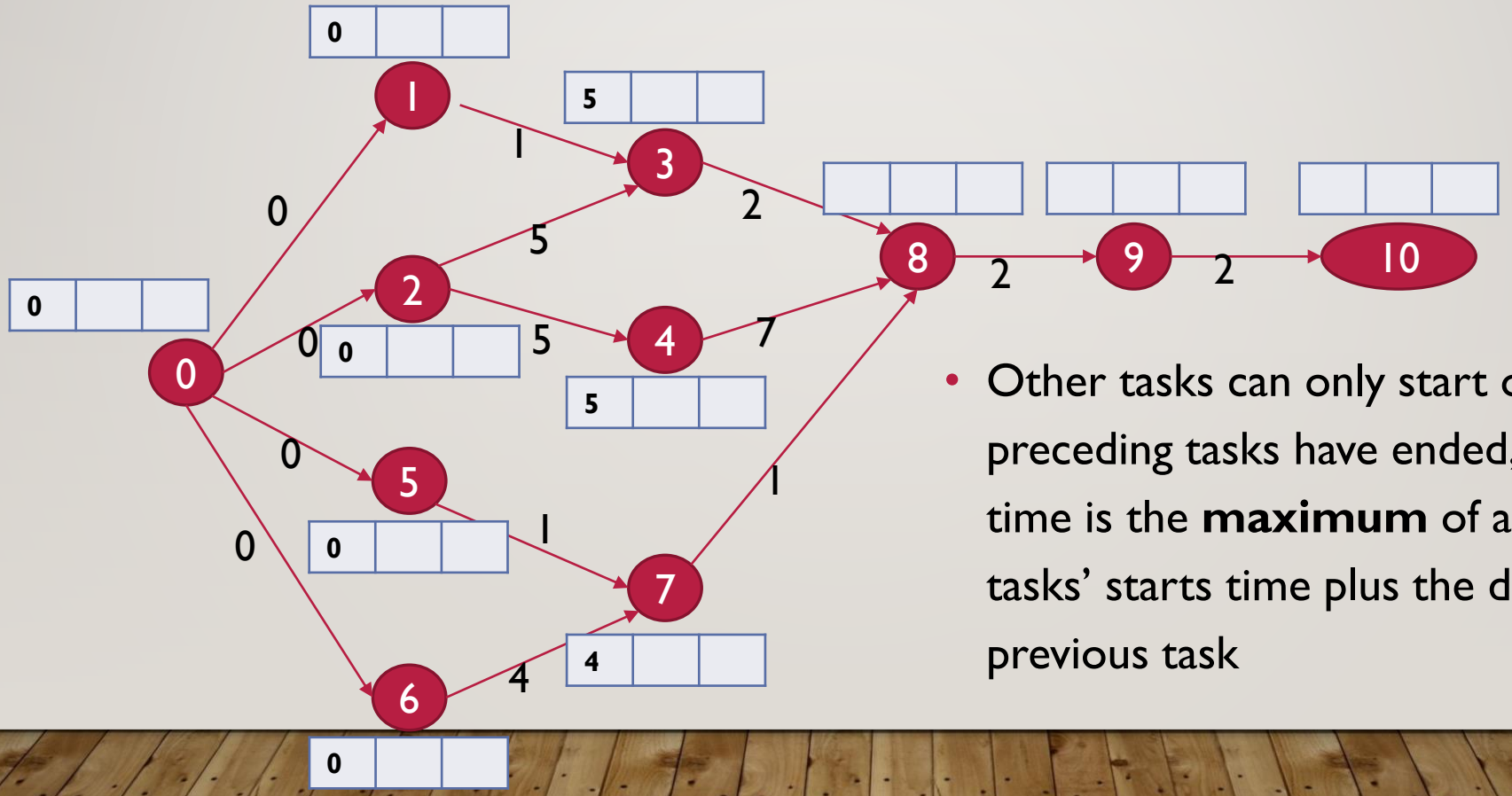

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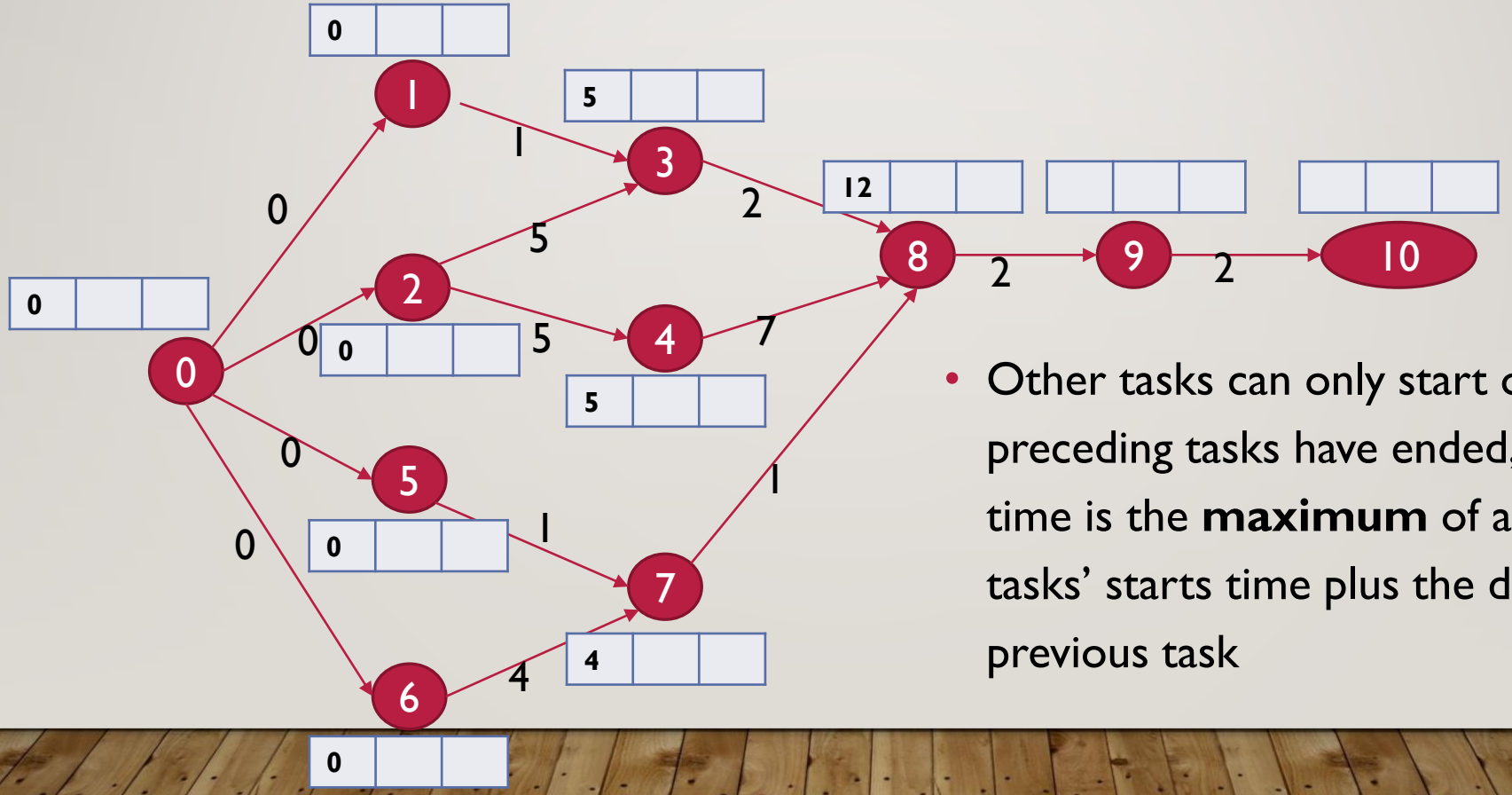

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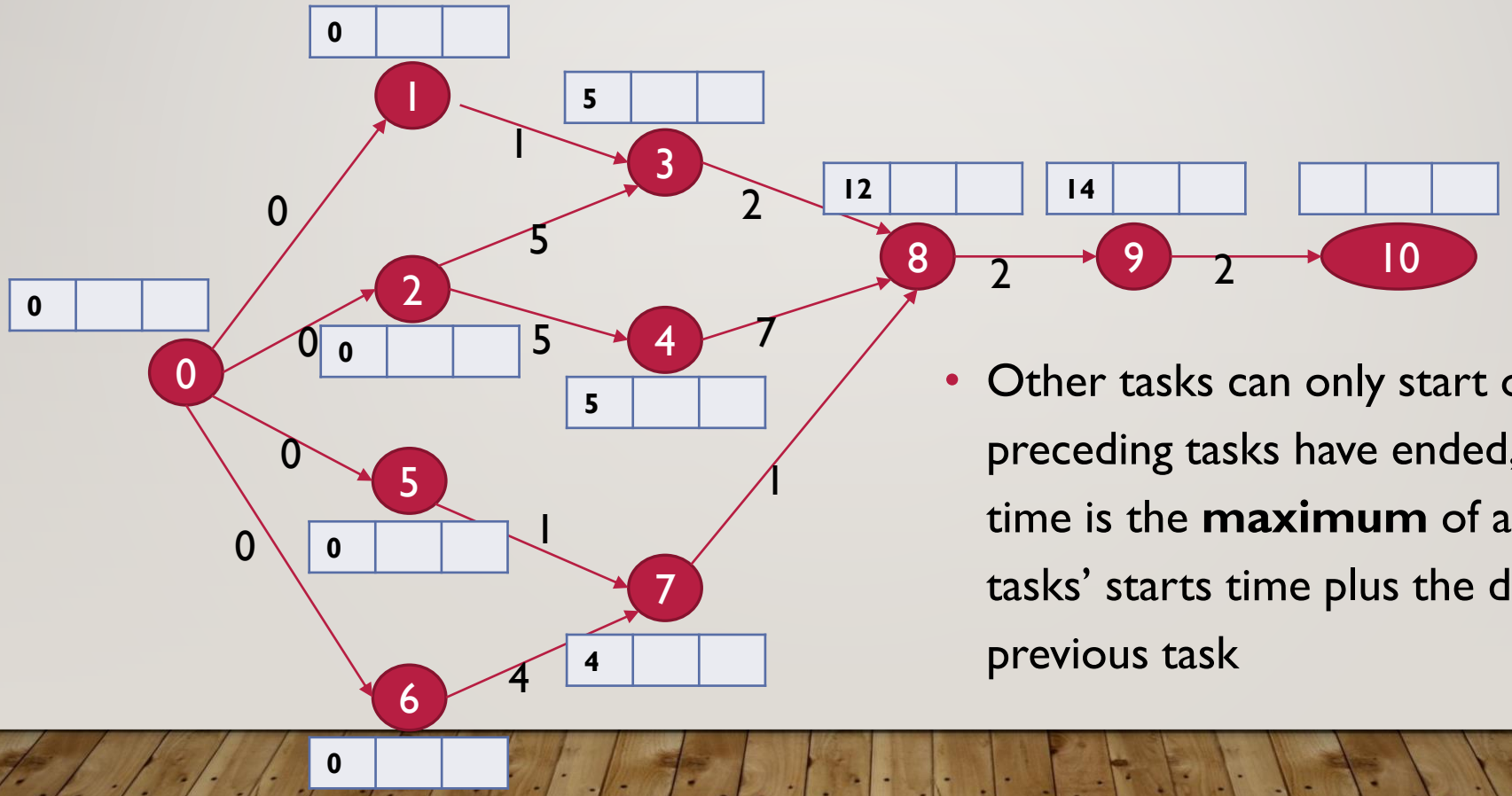

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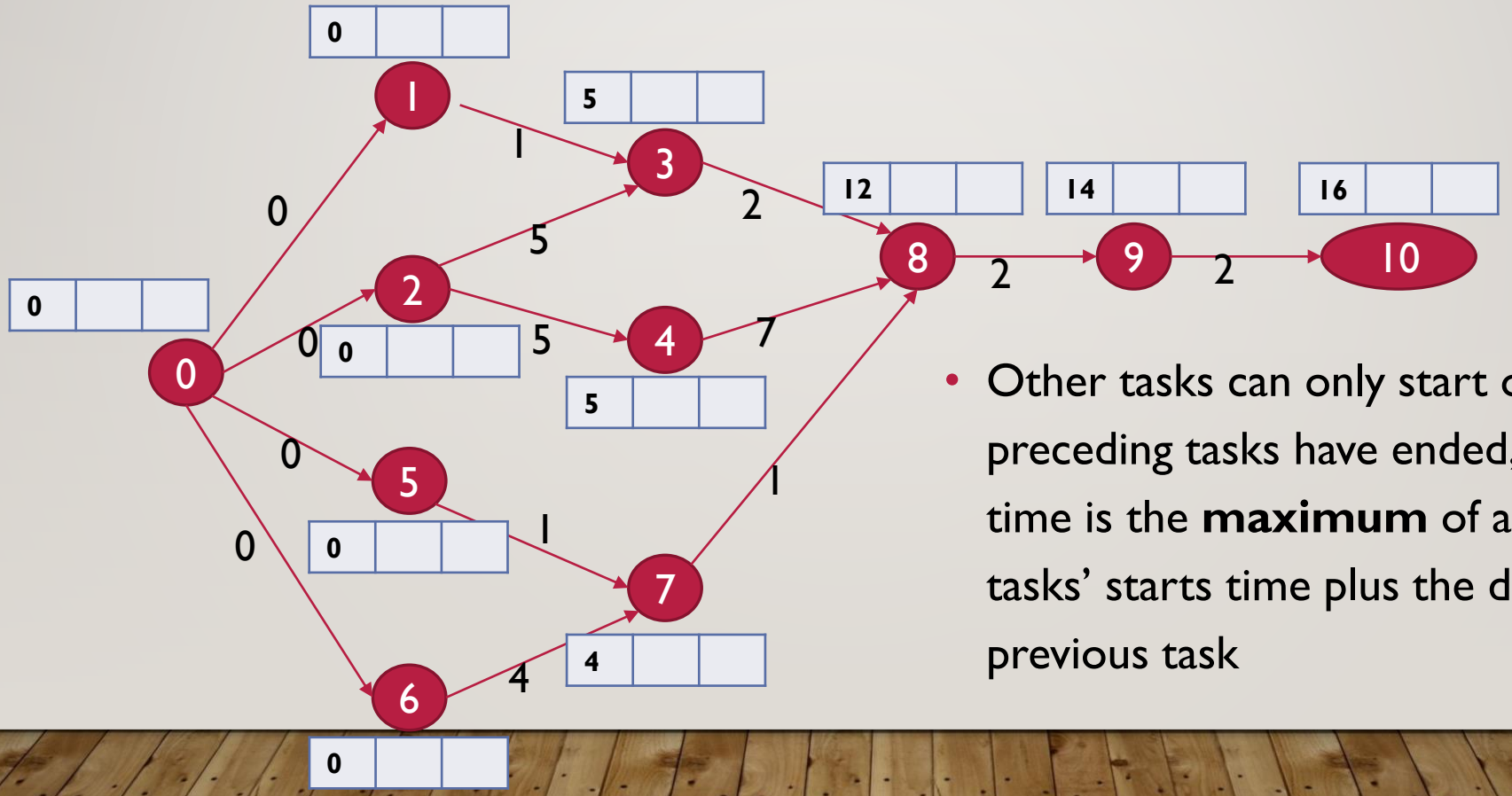

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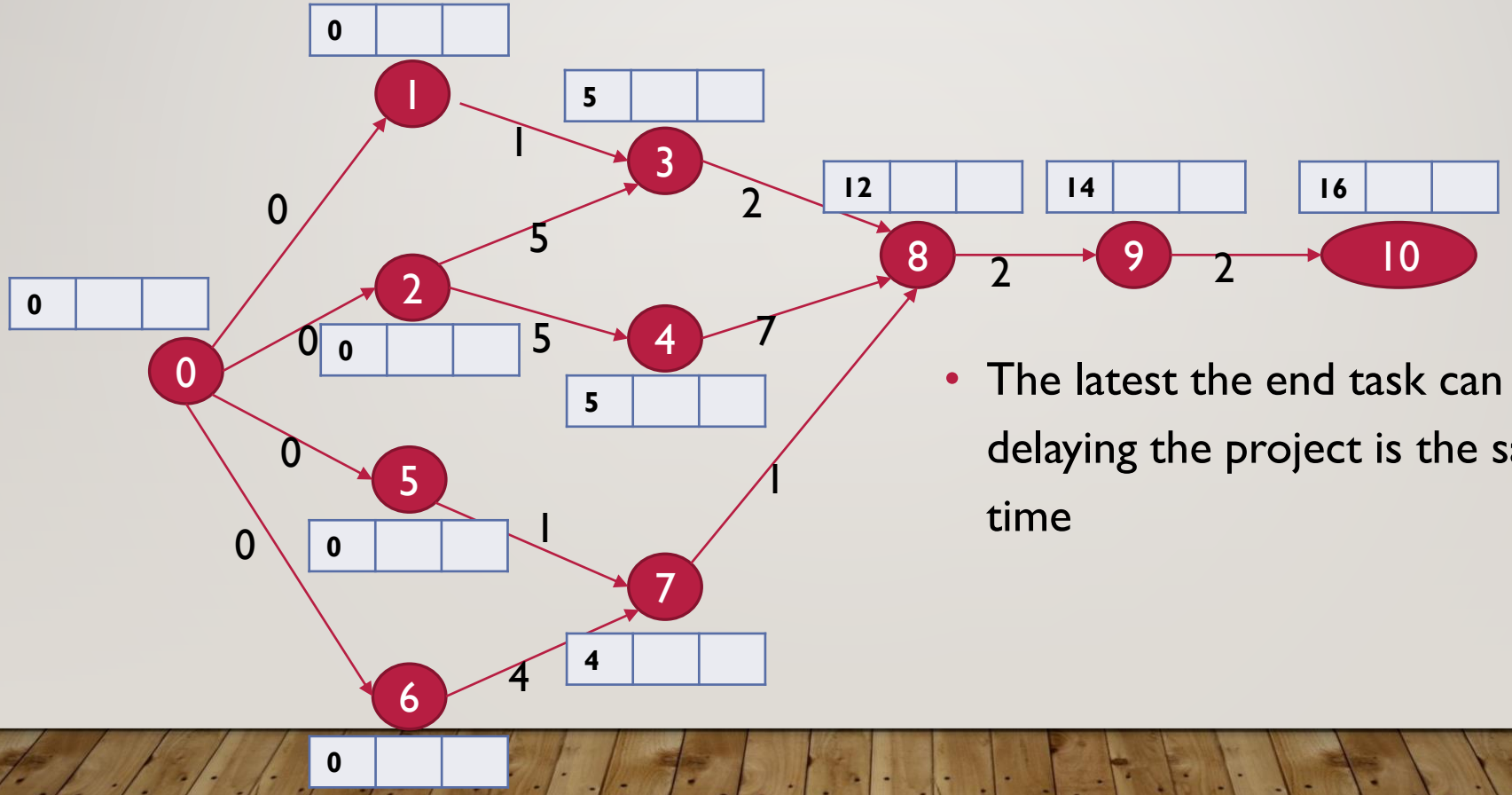

- The latest the end task can start to avoid delaying the project is the same as its start time

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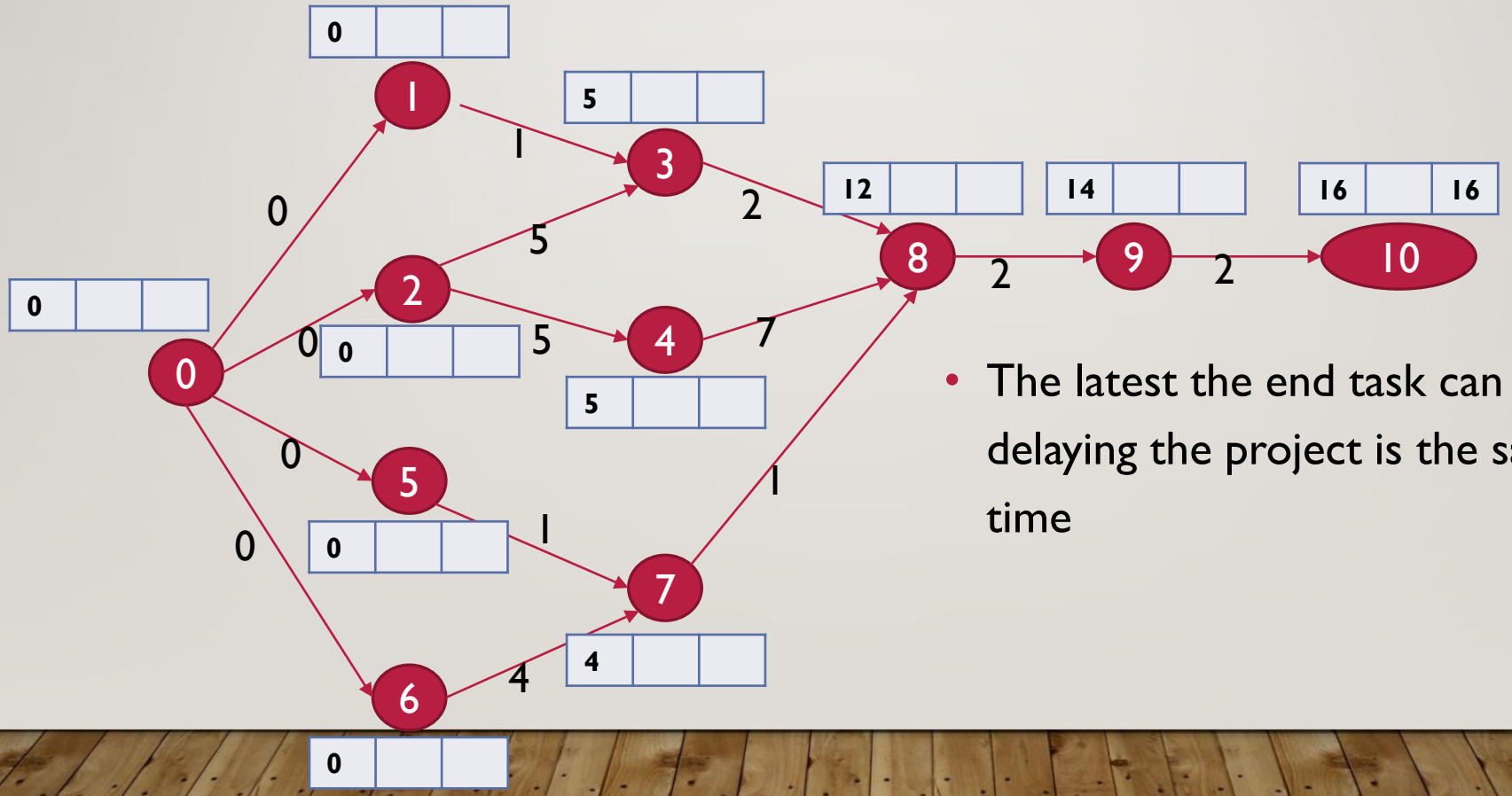

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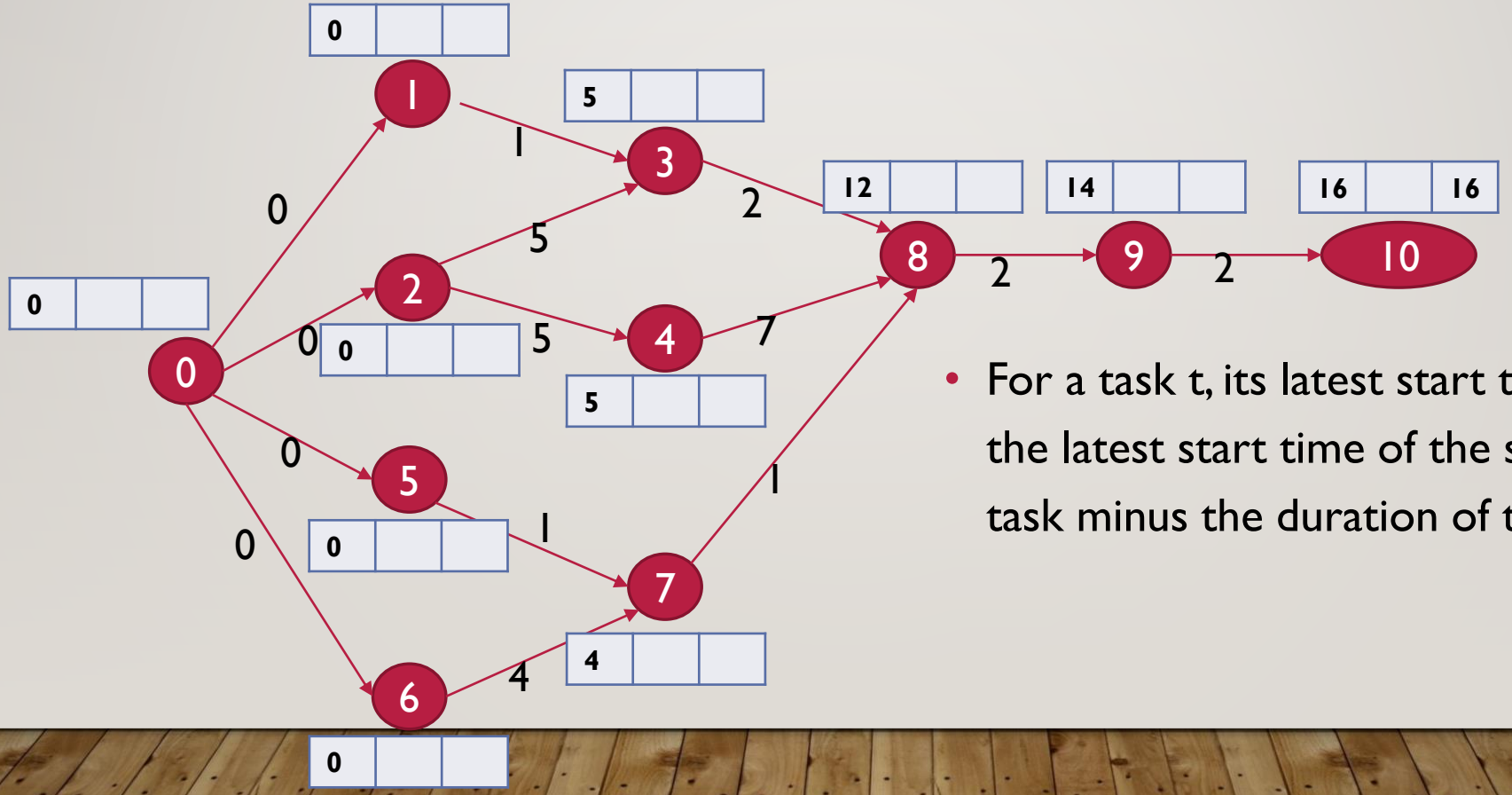

- For a task t, its latest start time is set to the latest start time of the succeeding task minus the duration of t

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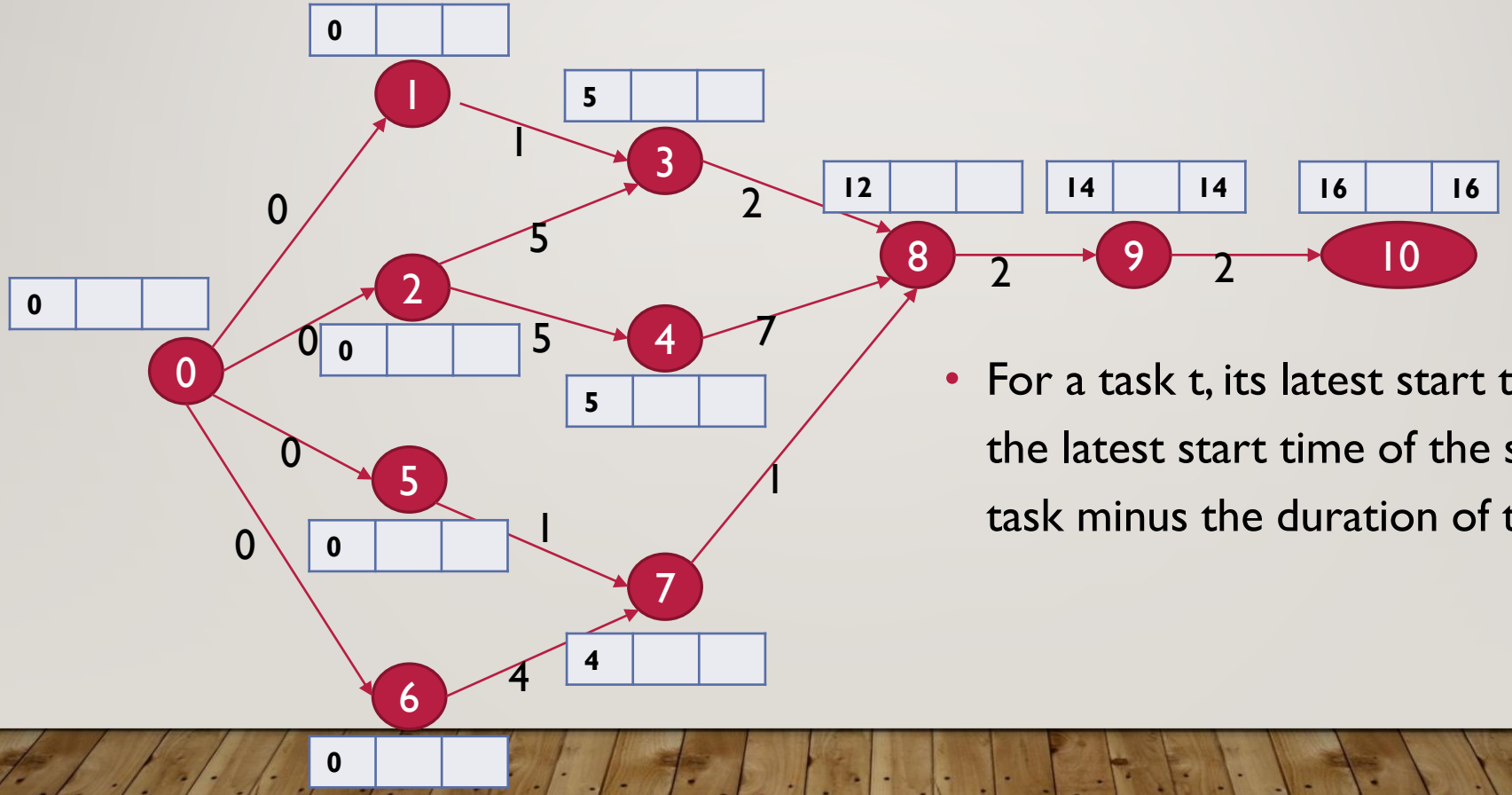

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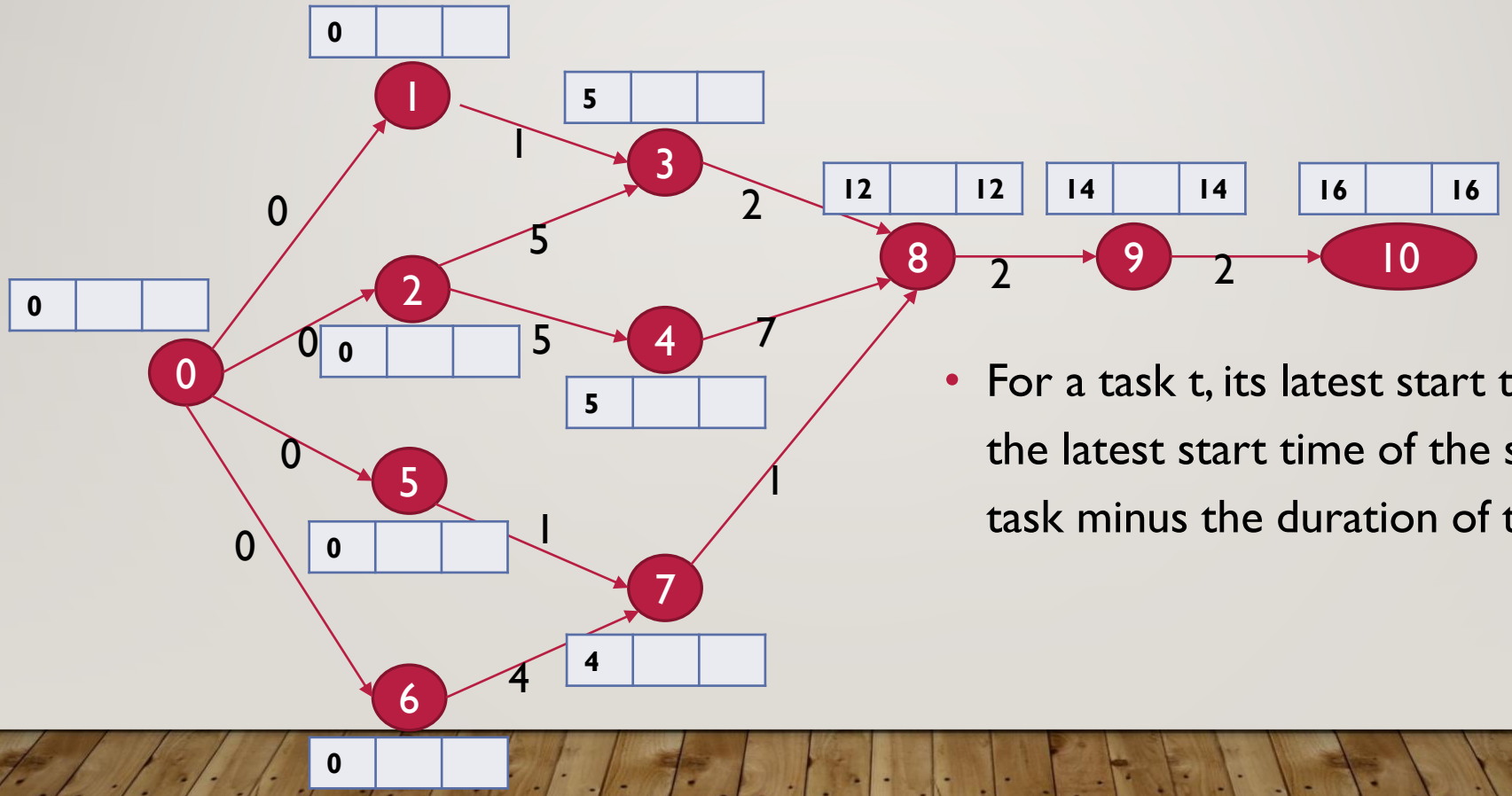

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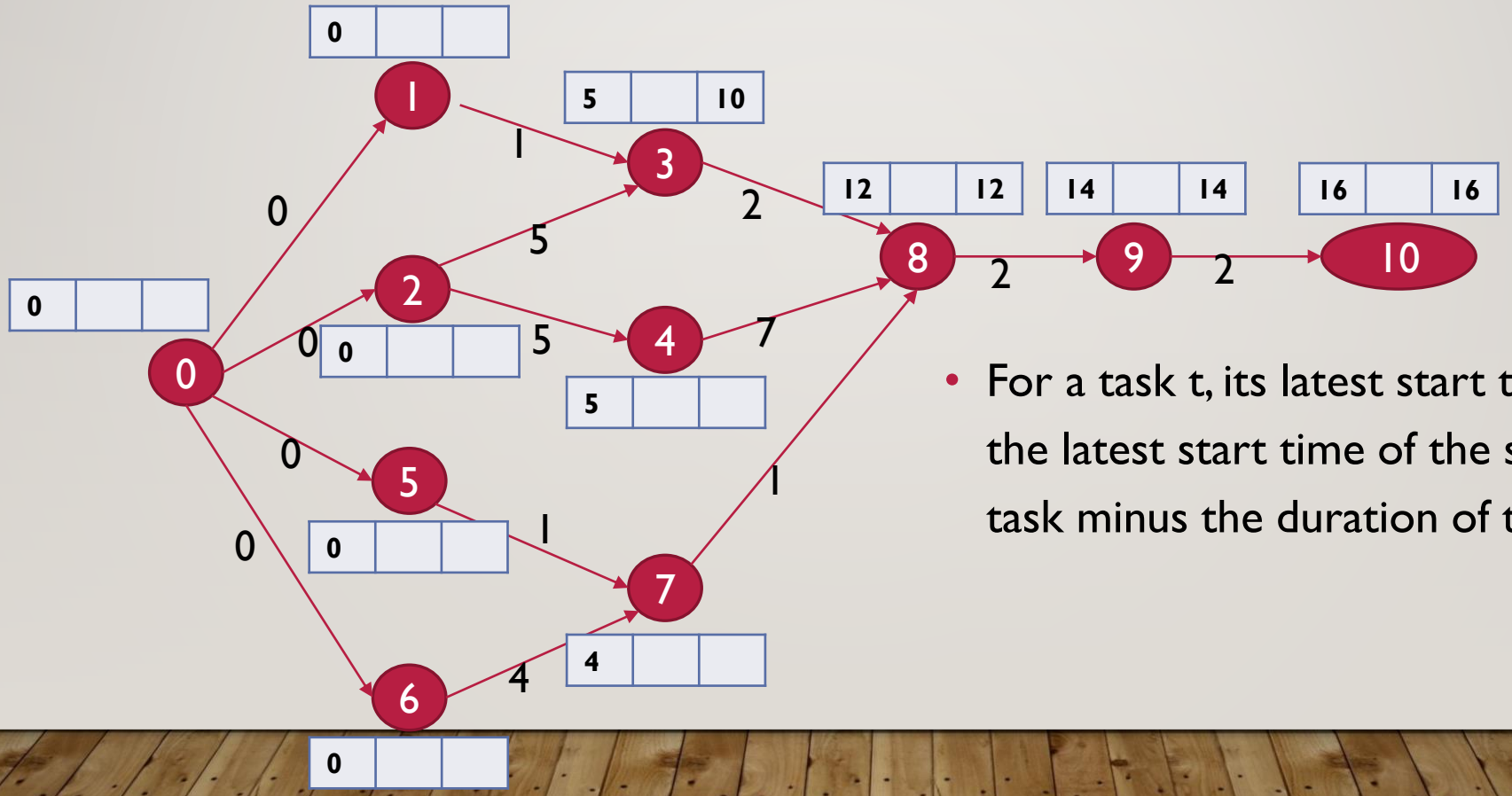

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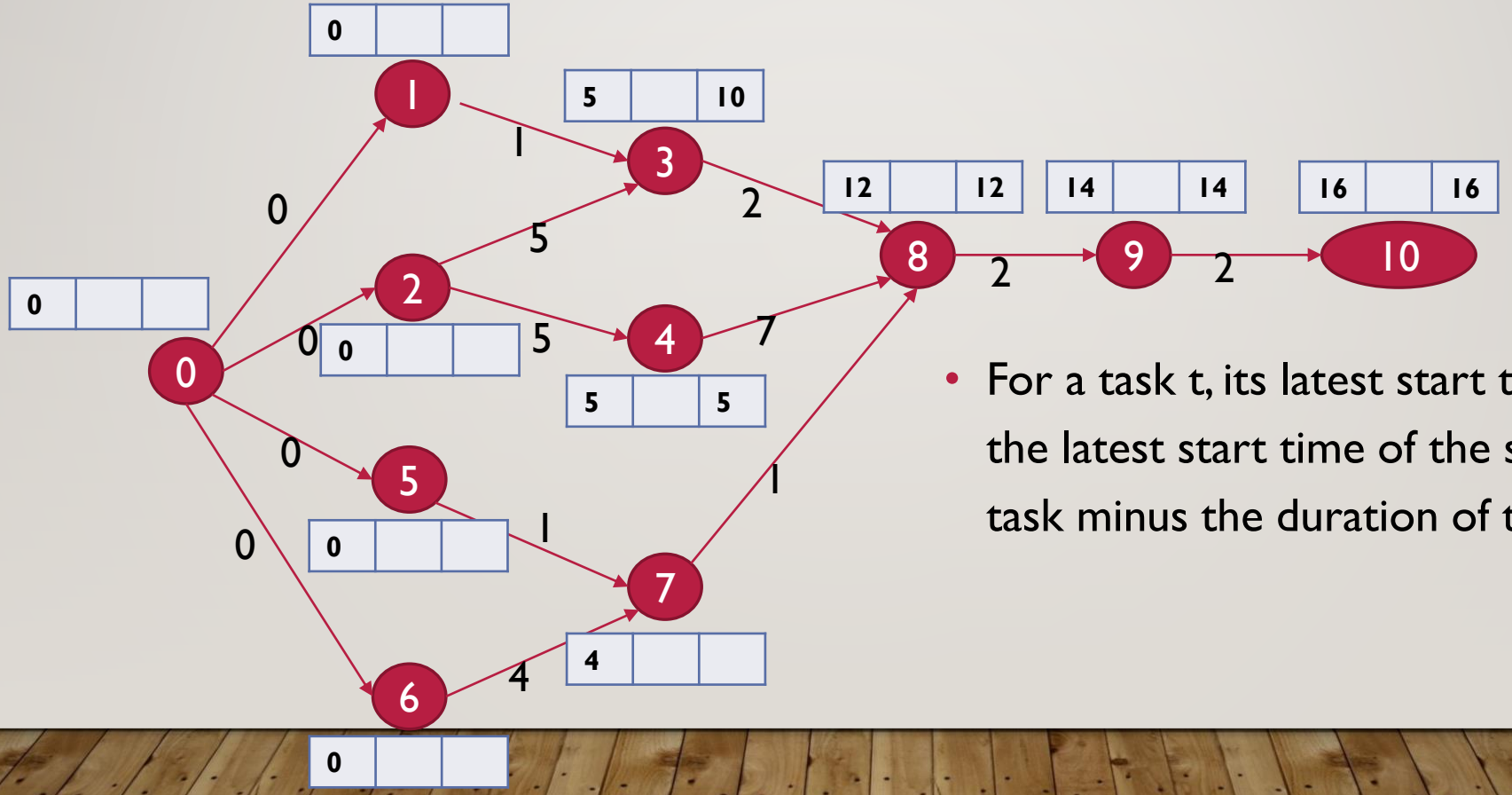

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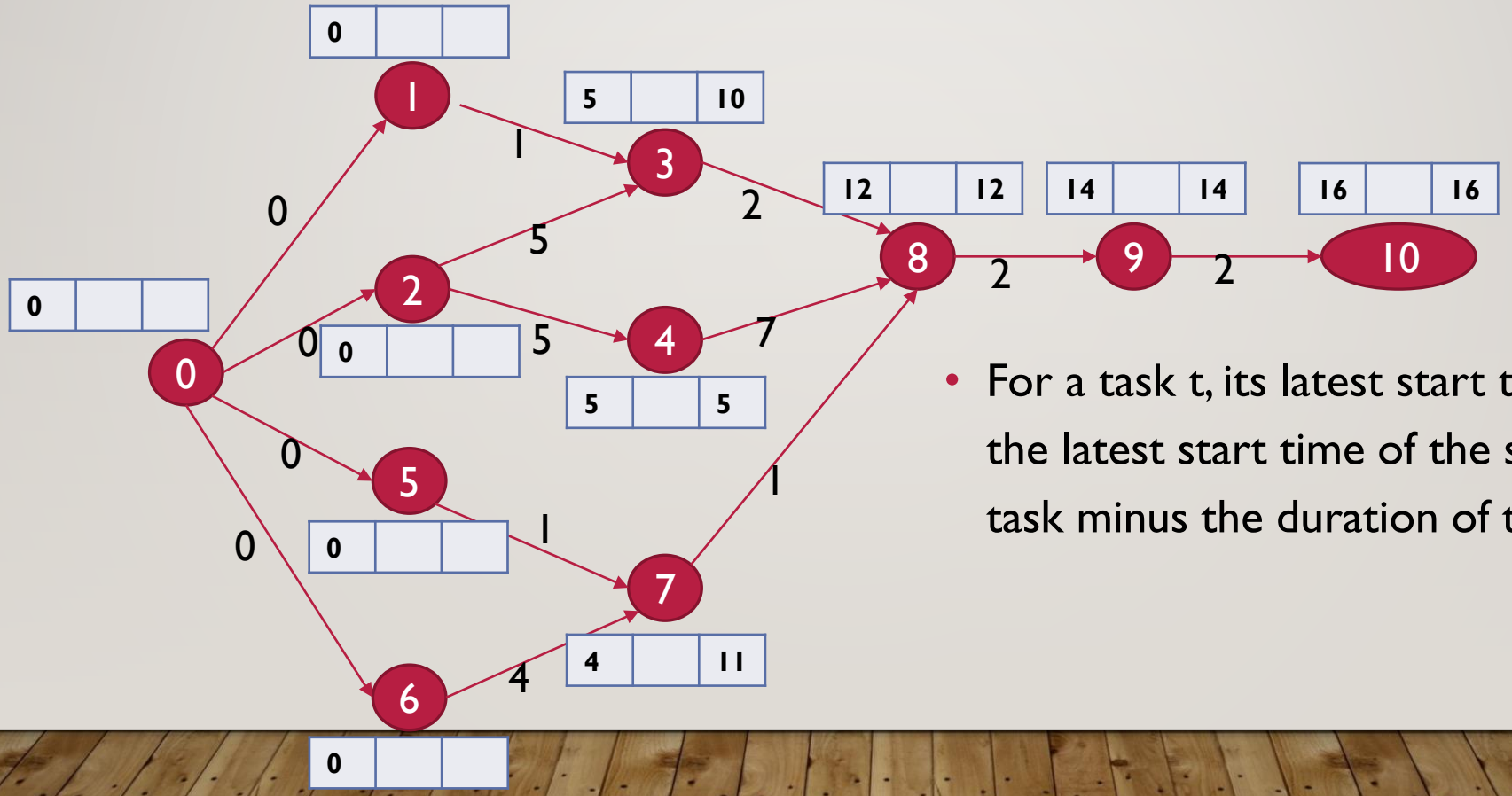

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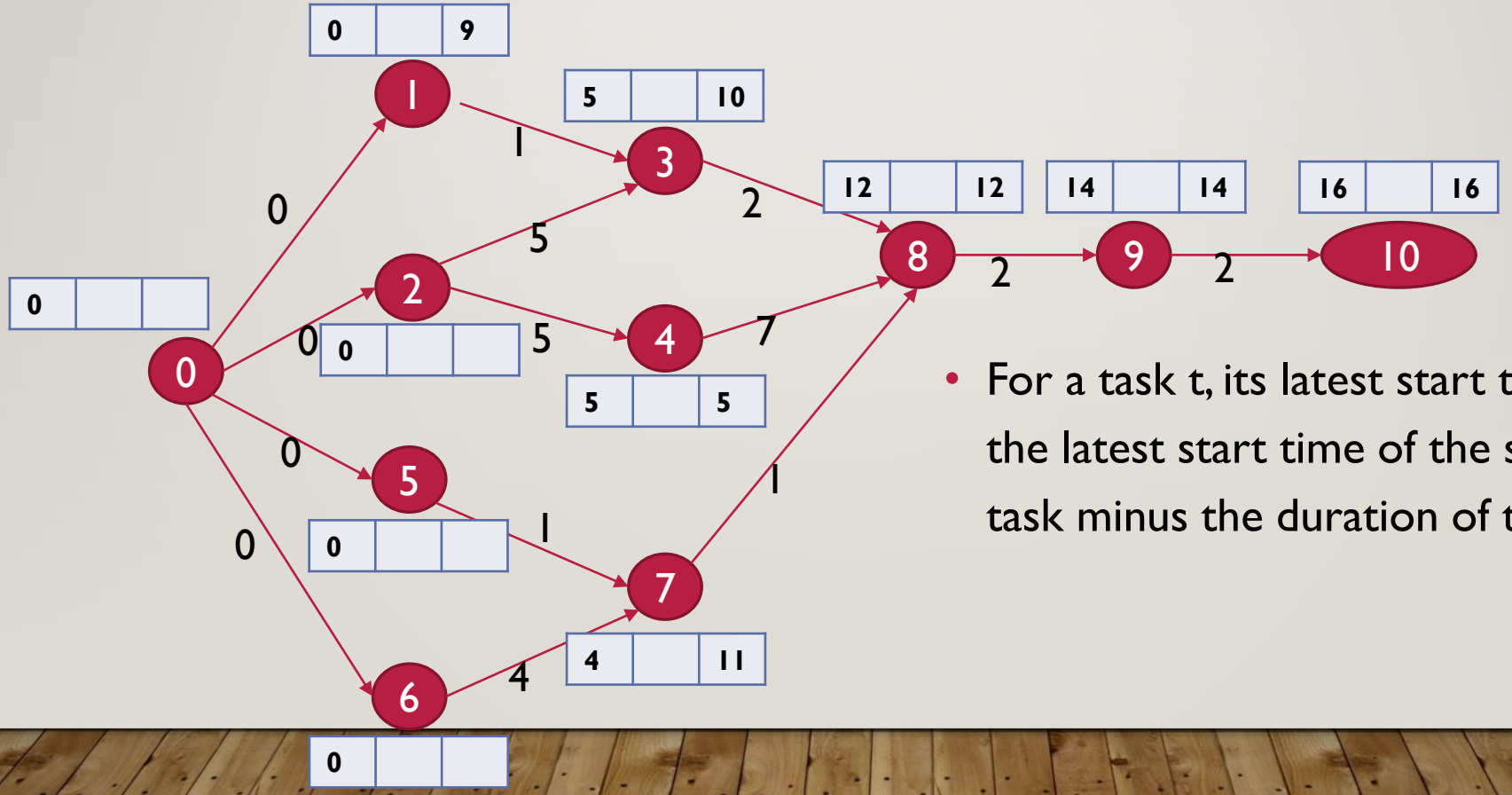

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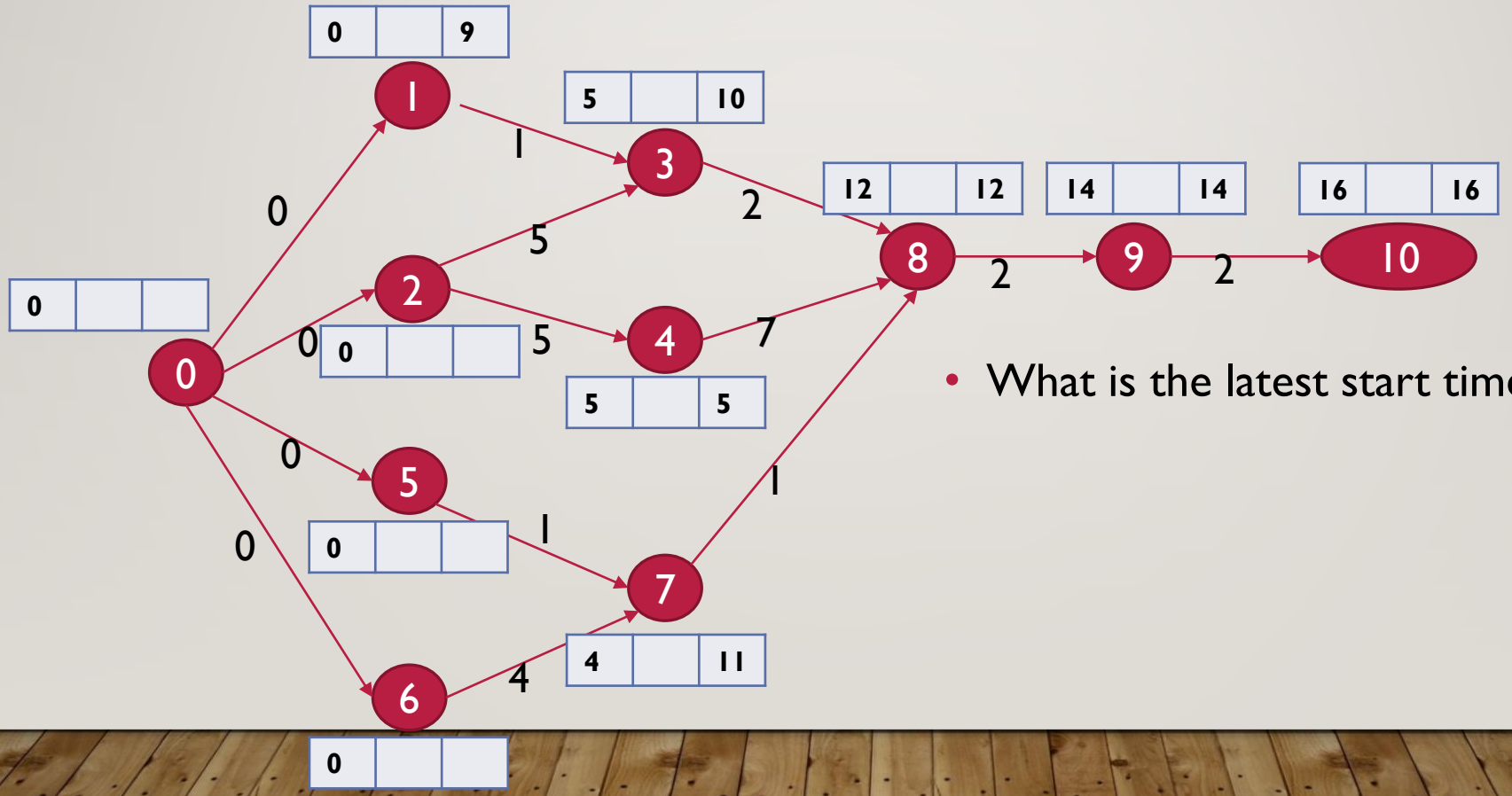

- What is the latest start time of task 2?

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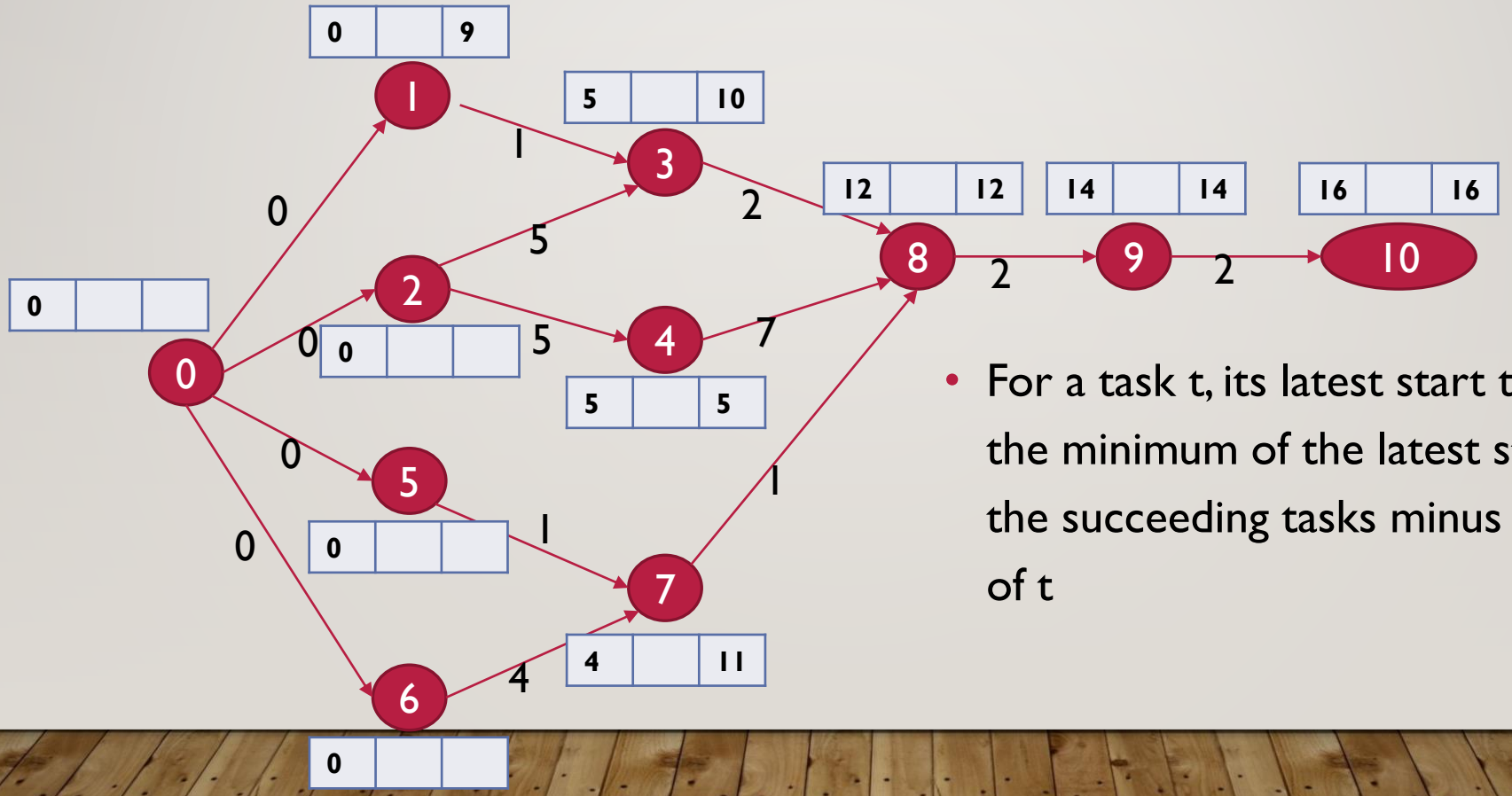

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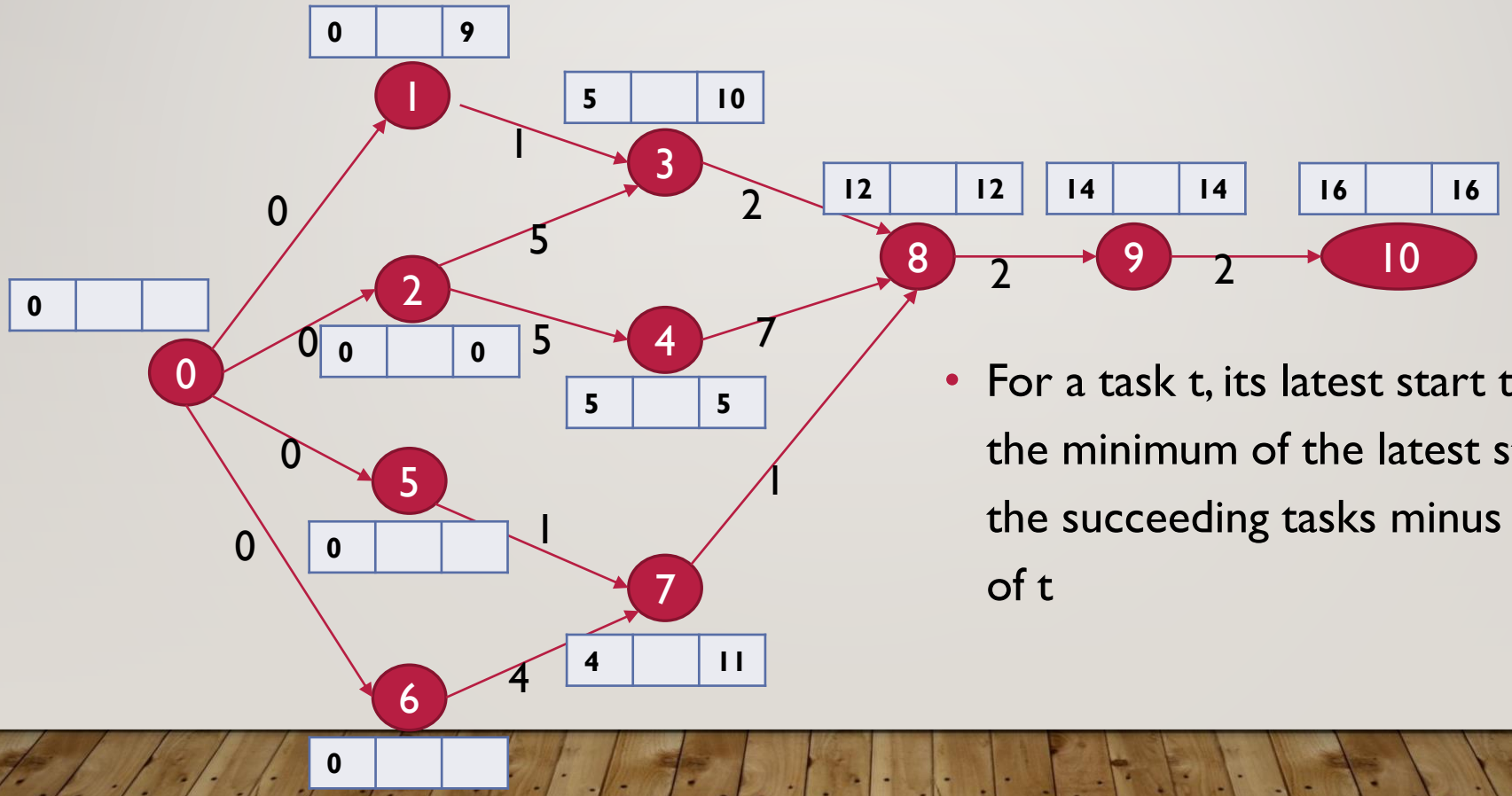

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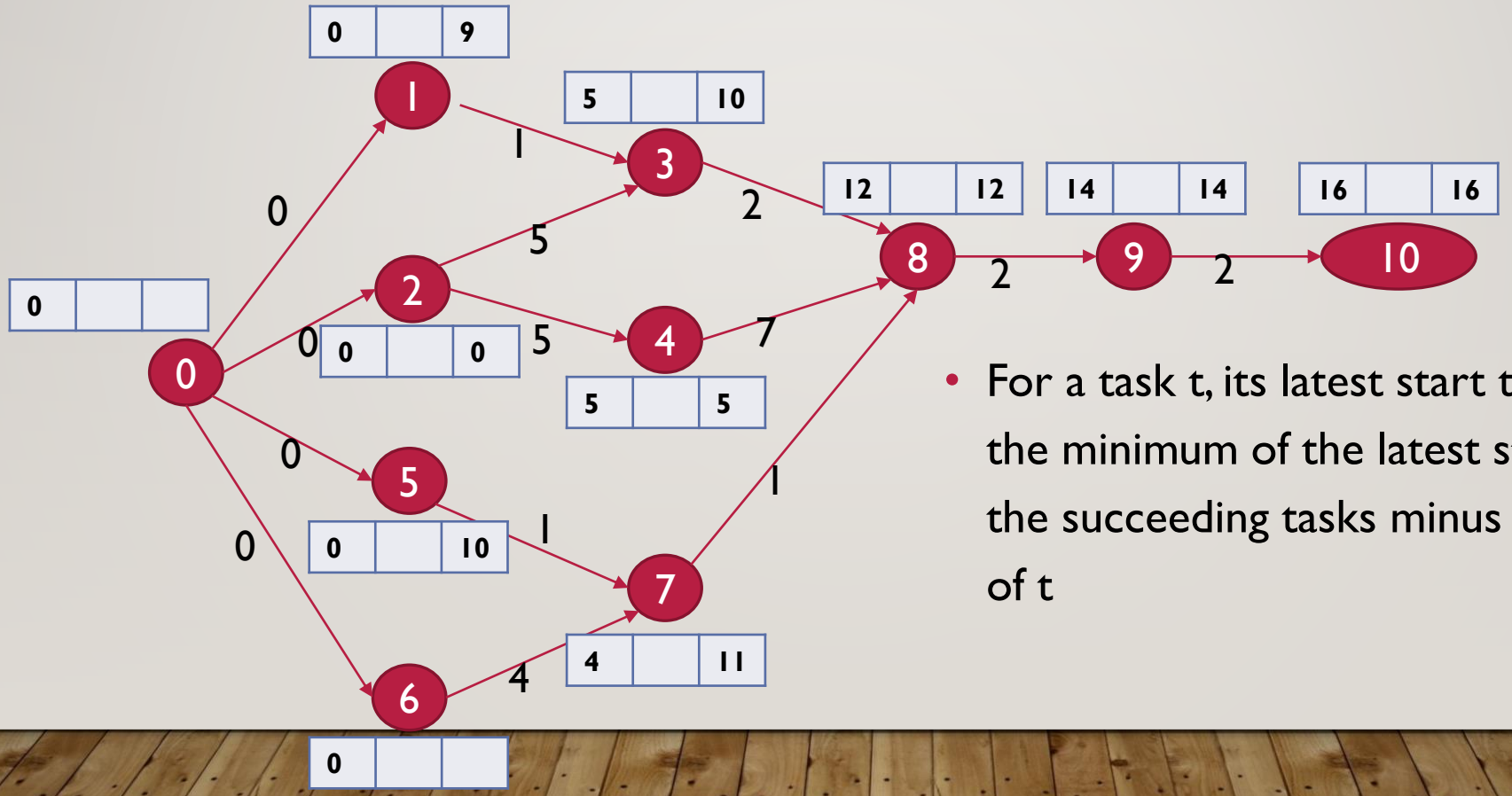

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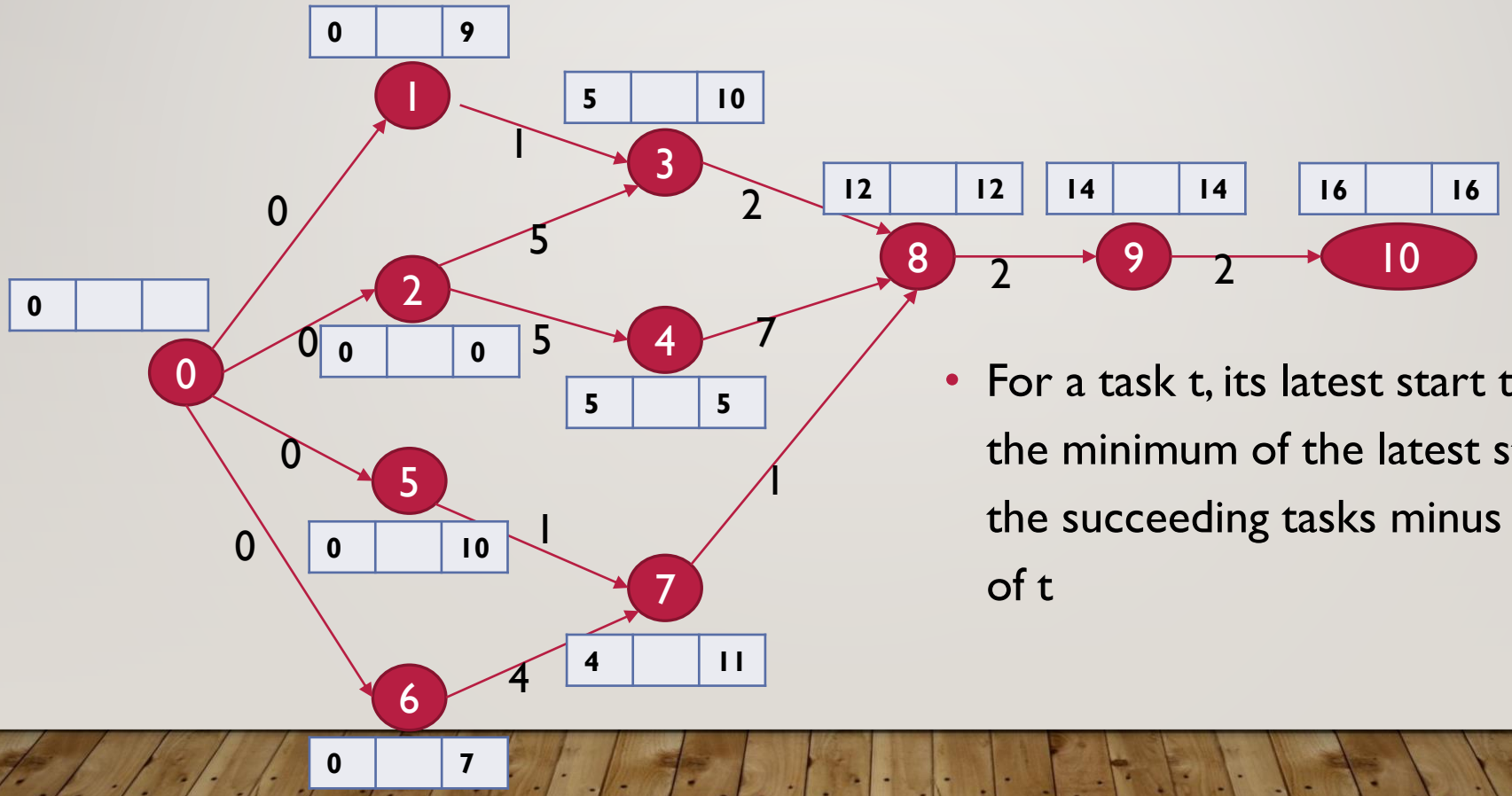

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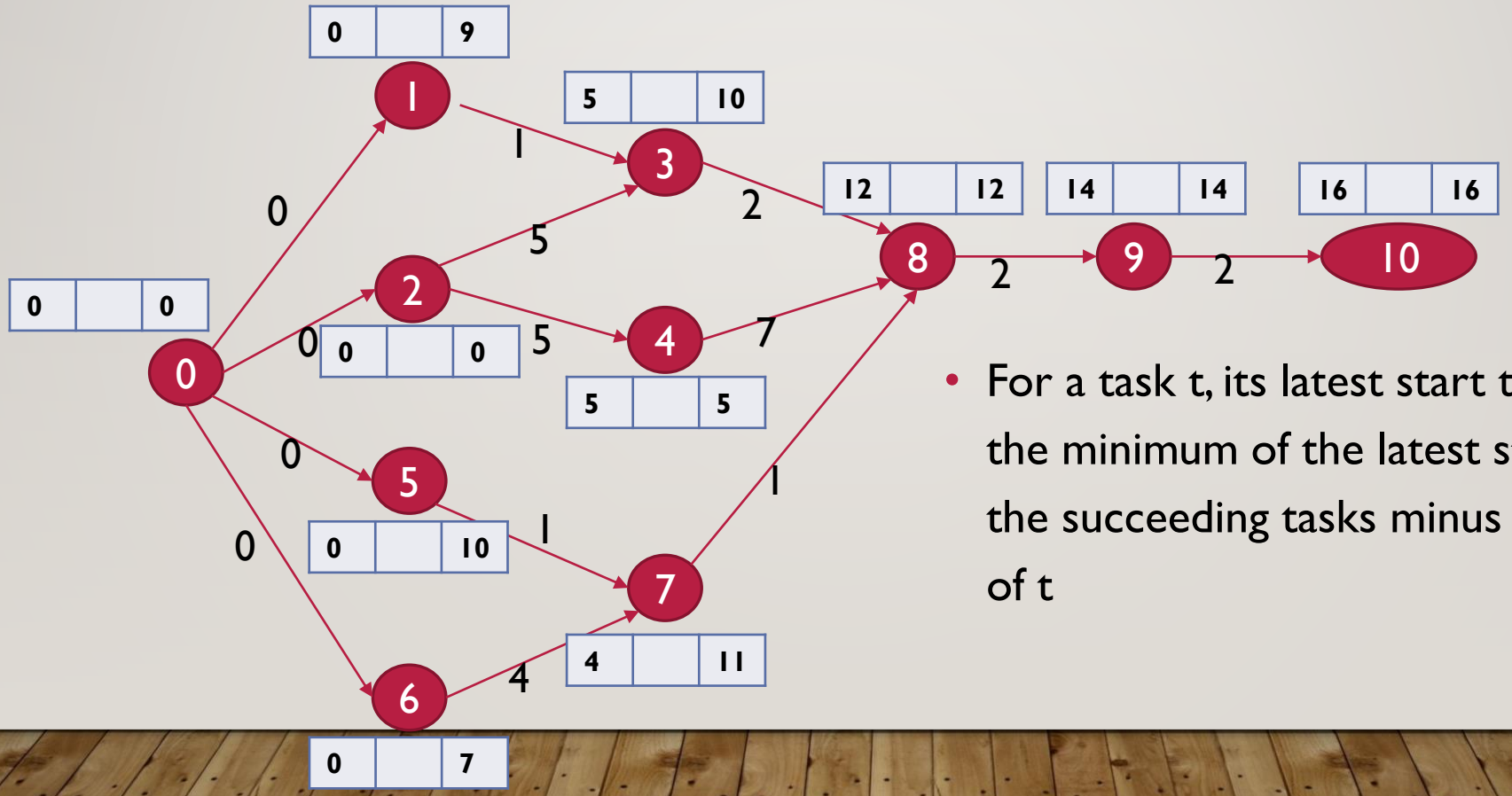

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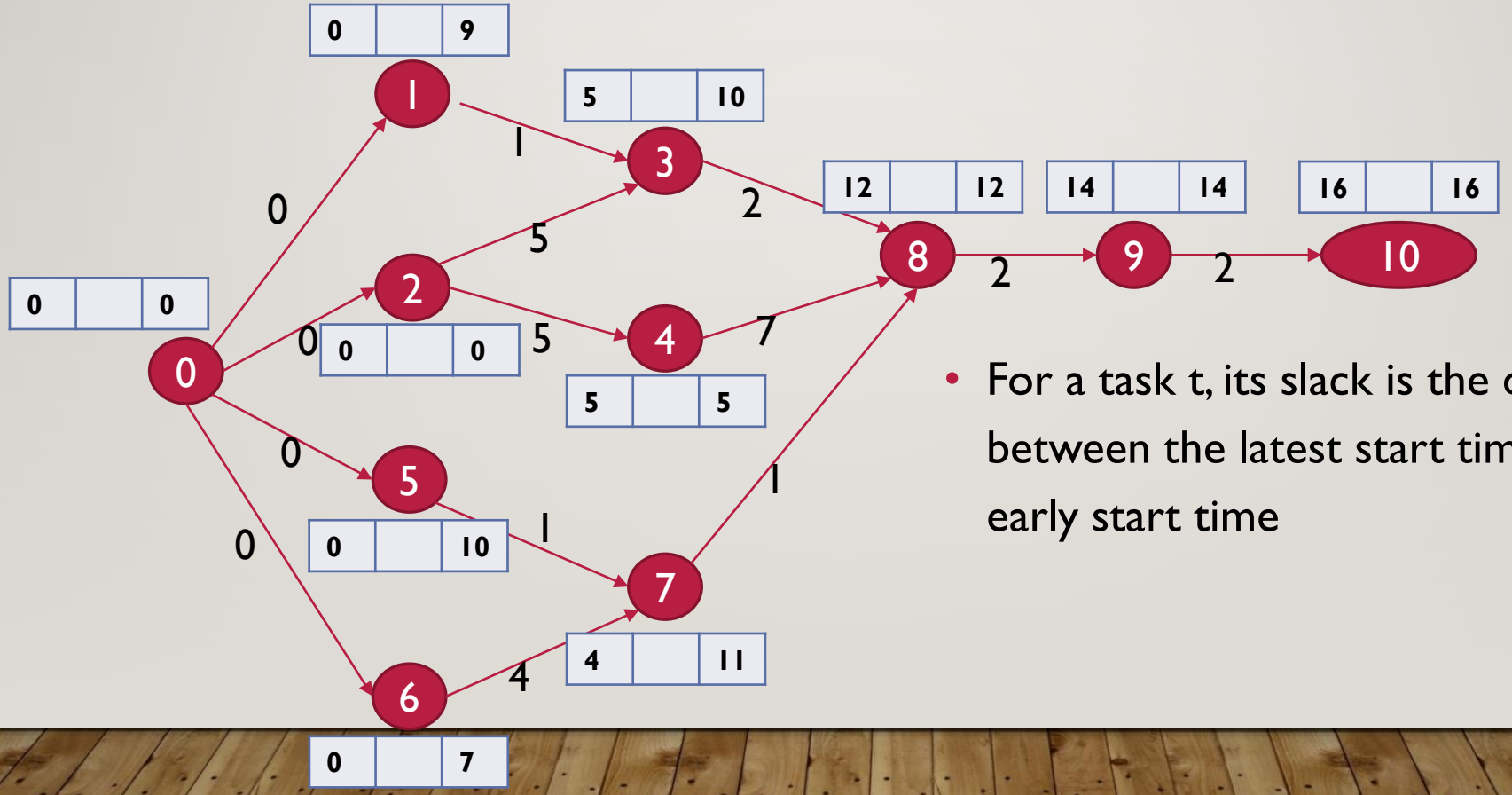

- For a task t, its slack is the difference between the latest start time and the early start time

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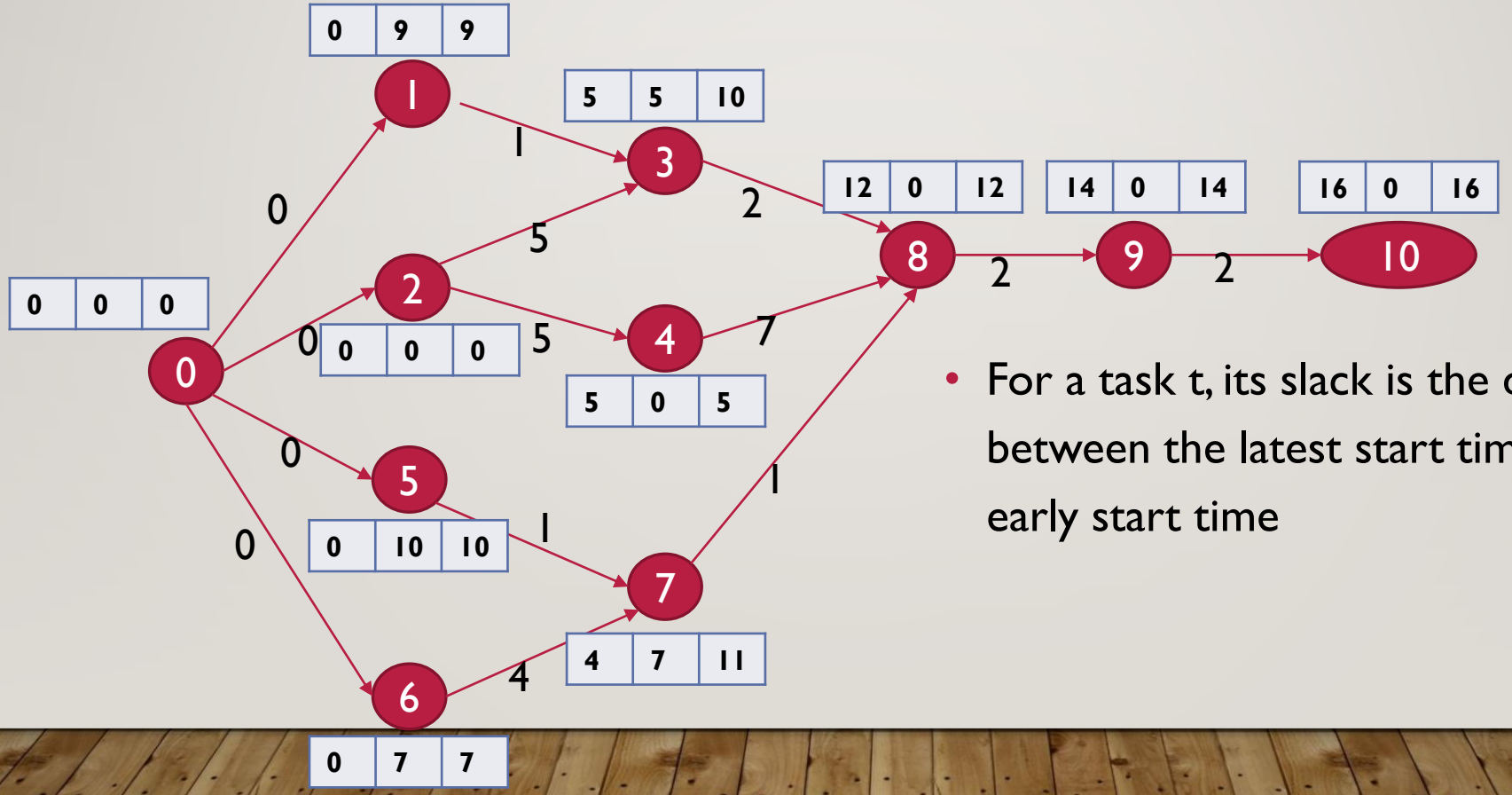

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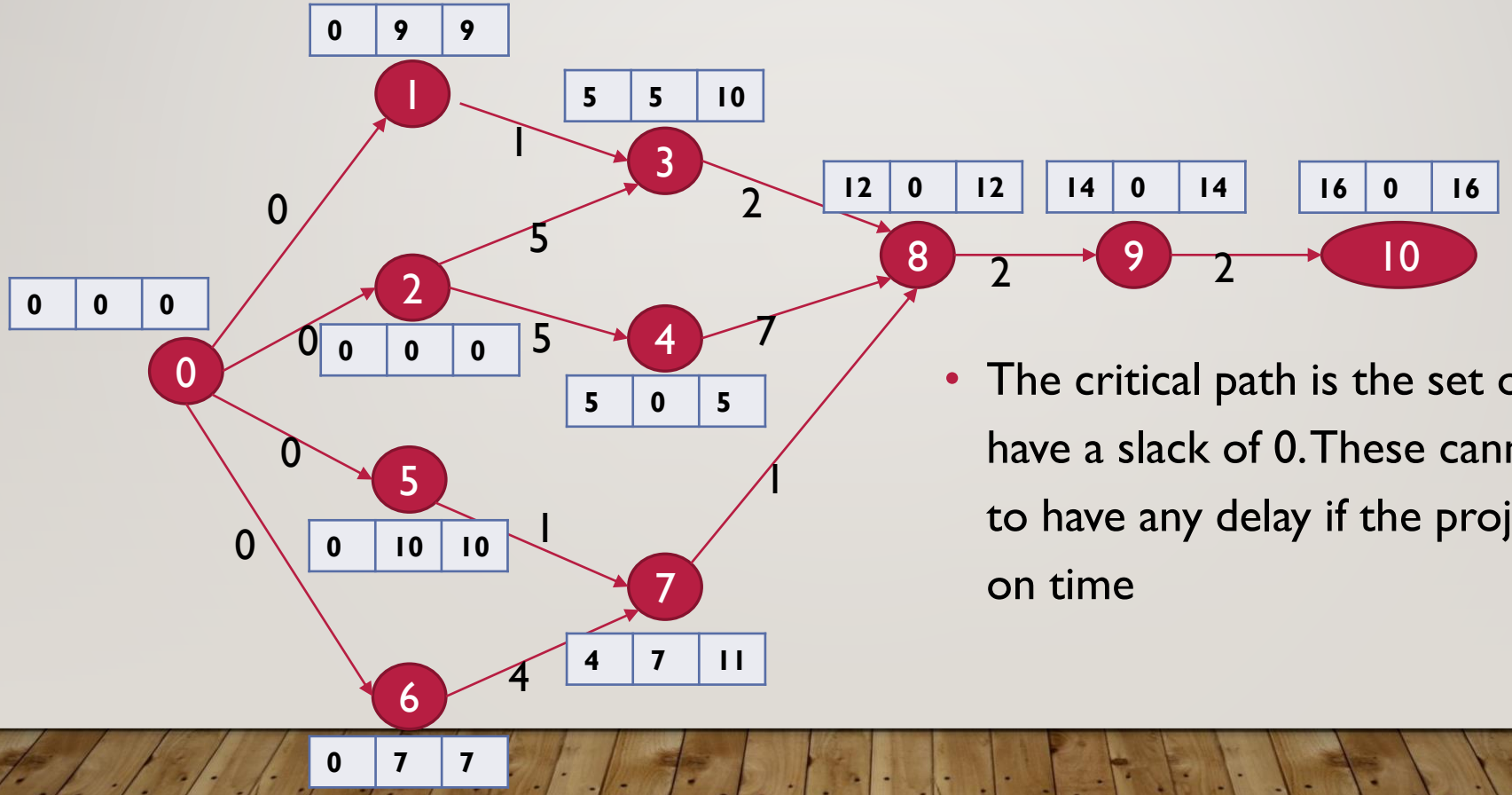

- The critical path is the set of tasks that have a slack of 0. These cannot be allowed to have any delay if the project is to finish on time

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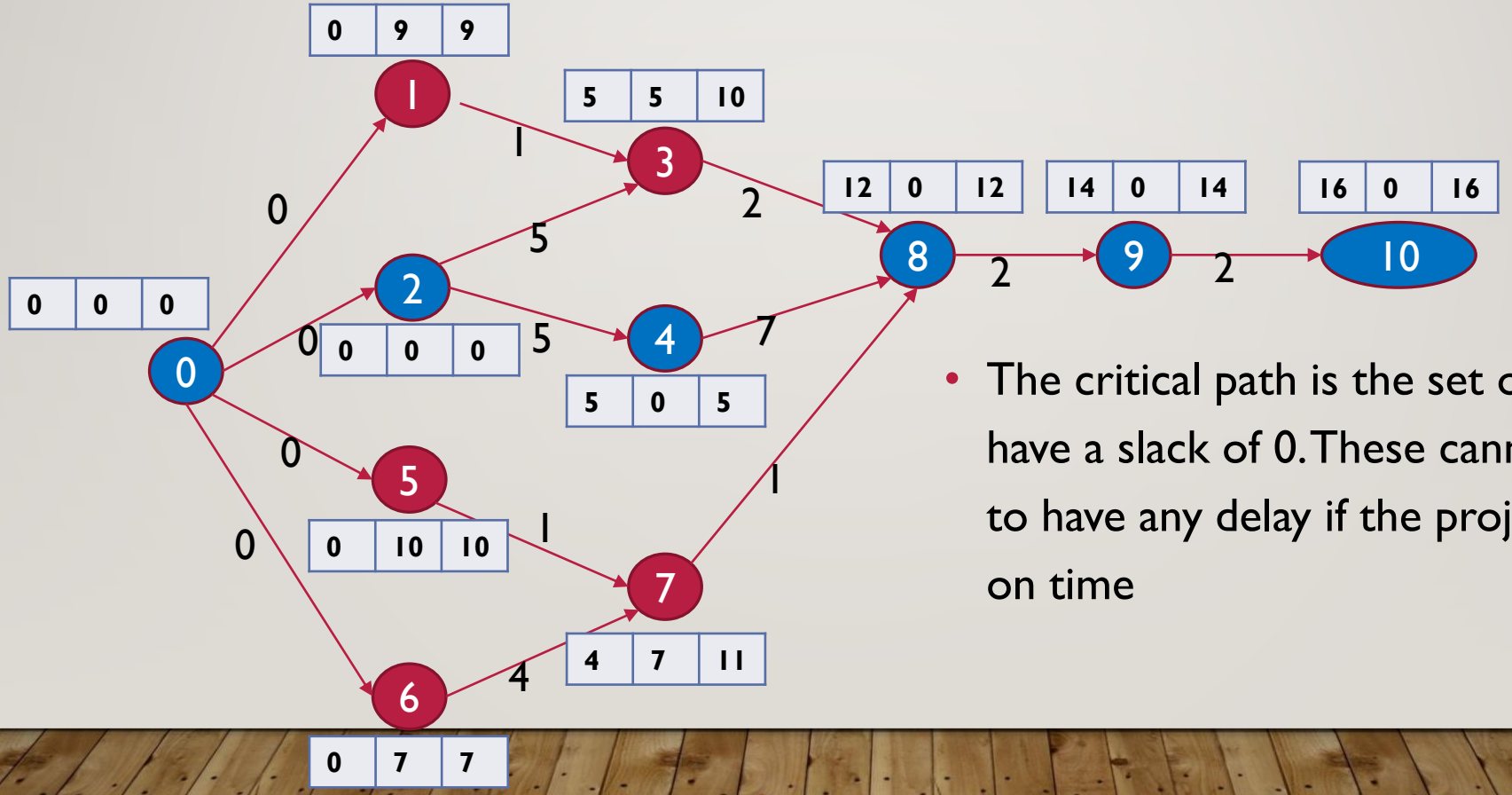

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