

D7 UNIT 3-B

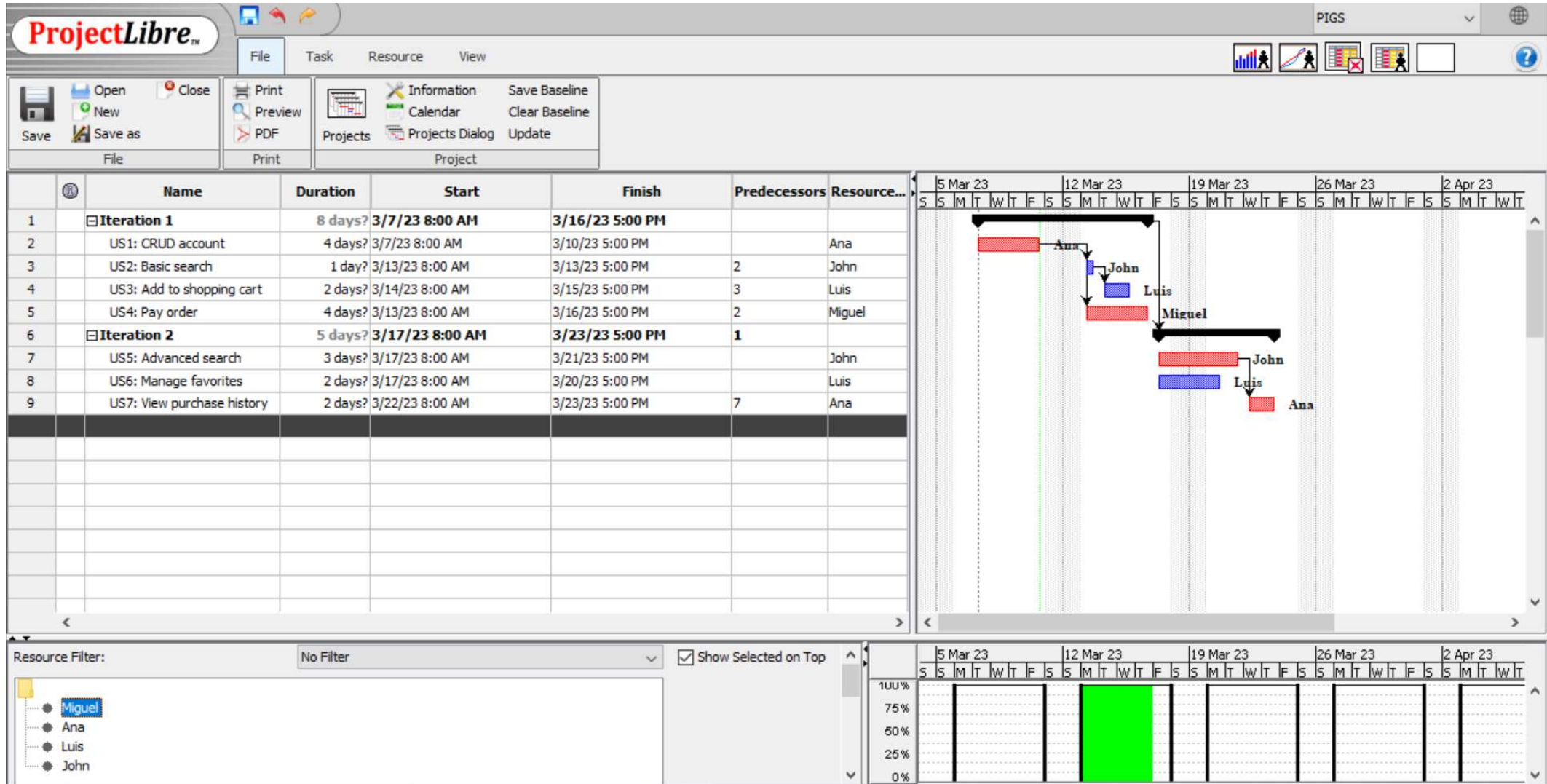
PLANNING

Time management and
scheduling

Time management and scheduling

Overview

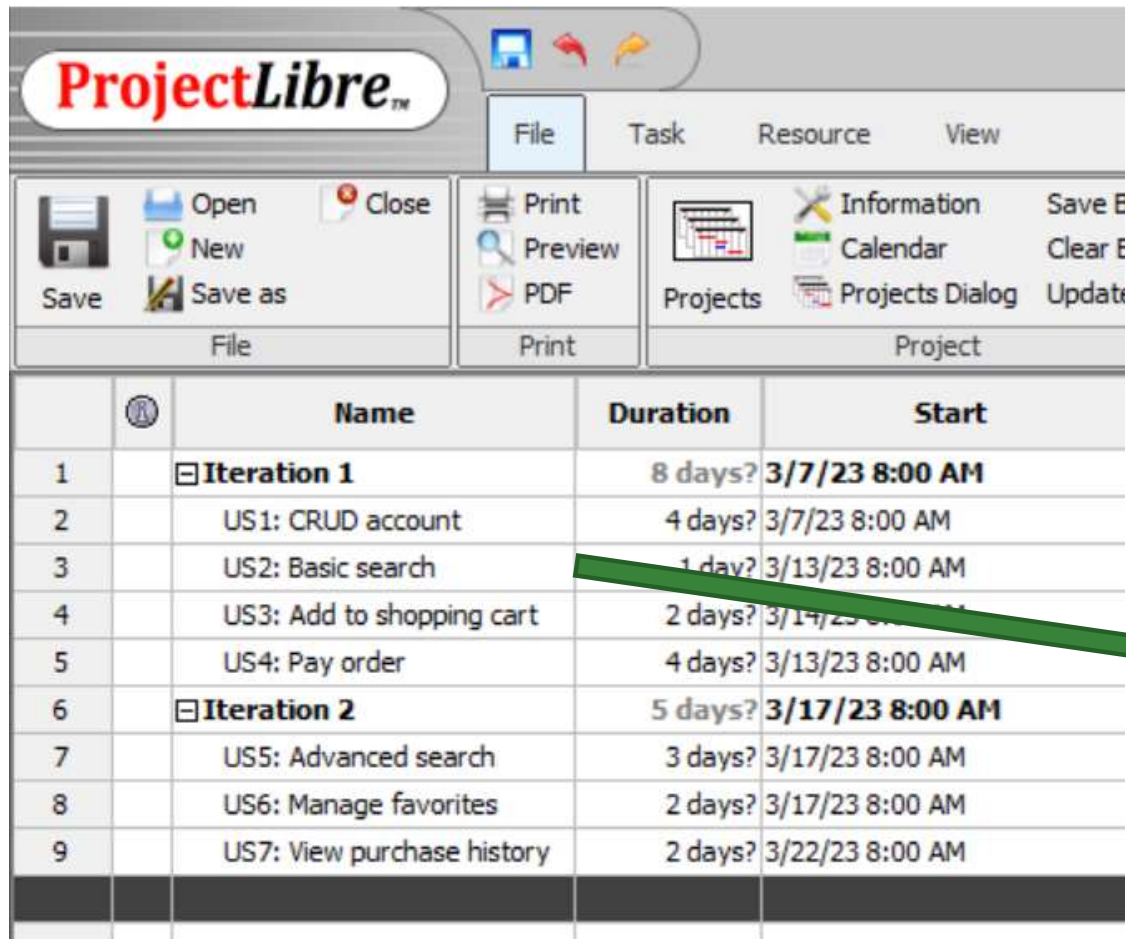
2



Time management and scheduling

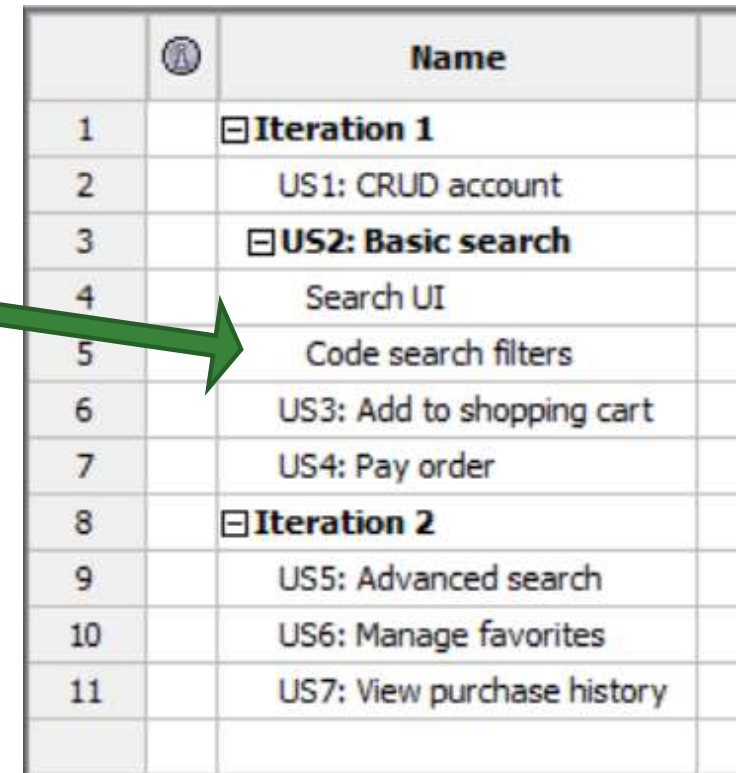
Identification of the tasks

3



The image shows the ProjectLibre software interface. At the top is the ProjectLibre logo. Below it are menu tabs: File, Task, Resource, and View. Under the File tab, there are icons for Save, Open, New, Save as, Close, Print, Preview, PDF, Information, Calendar, Projects, Projects Dialog, and Update. Below the menu is a table with columns: Name, Duration, and Start. The table contains the following data:

	Name	Duration	Start
1	<input type="checkbox"/> Iteration 1	8 days?	3/7/23 8:00 AM
2	US1: CRUD account	4 days?	3/7/23 8:00 AM
3	US2: Basic search	1 day?	3/13/23 8:00 AM
4	US3: Add to shopping cart	2 days?	3/14/23 8:00 AM
5	US4: Pay order	4 days?	3/13/23 8:00 AM
6	<input type="checkbox"/> Iteration 2	5 days?	3/17/23 8:00 AM
7	US5: Advanced search	3 days?	3/17/23 8:00 AM
8	US6: Manage favorites	2 days?	3/17/23 8:00 AM
9	US7: View purchase history	2 days?	3/22/23 8:00 AM



The image shows a zoomed-in view of the task list table. A green arrow points from the 'US2: Basic search' task in the first table to the 'US2: Basic search' task in this table. The table contains the following data:

	Name
1	<input type="checkbox"/> Iteration 1
2	US1: CRUD account
3	<input type="checkbox"/> US2: Basic search
4	Search UI
5	Code search filters
6	US3: Add to shopping cart
7	US4: Pay order
8	<input type="checkbox"/> Iteration 2
9	US5: Advanced search
10	US6: Manage favorites
11	US7: View purchase history

Time management and scheduling

Planning of the execution sequence

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The screenshot displays the ProjectLibre interface. On the left, a task list table shows the project structure. A green arrow points from the task 'US1: CRUD account' in the list to the 'Task Information - 2' dialog box on the right. The dialog box shows details for 'US1: CRUD account', including duration, completion percentage, priority, cost, work, and dates.

ID	Name	Duration	Start	Finish	Predecessors
1	Iteration 1	8 days?	3/7/23 8:00 AM	3/16/23 5:00 PM	
2	US1: CRUD account	4 days?	3/7/23 8:00 AM	3/10/23 5:00 PM	
3	Iteration 2	5 days?	3/17/23 8:00 AM	3/22/23 8:00 AM	
4	US2: Basic search	1 day?	3/13/23 8:00 AM	3/13/23 5:00 PM	2
5	Search UI	0.5 days?	3/13/23 8:00 AM	3/13/23 1:00 PM	4
6	Code search filters	0.5 days?	3/13/23 1:00 PM	3/13/23 5:00 PM	4
7	US3: Add to shopping cart	2 days?	3/14/23 8:00 AM	3/16/23 8:00 AM	
8	US4: Pay order	4 days?	3/13/23 8:00 AM	3/17/23 8:00 AM	
9	US5: Advanced search	3 days?	3/17/23 8:00 AM	3/20/23 8:00 AM	
10	US6: Manage favorites	2 days?	3/17/23 8:00 AM	3/19/23 8:00 AM	
11	US7: View purchase history	2 days?	3/22/23 8:00 AM	3/24/23 8:00 AM	

Task Information - 2

Name: US1: CRUD account

Duration: 4 days? ☒ Estimated

Percent Complete: 0% Priority: 500

Cost: EURO 0.00 Work: 32 hours

Dates

Start: 3/7/23 8:00 AM Finish: 3/10/23 5:00 PM

Baseline Start: Baseline Finish:

Time management and scheduling

Allocation of resources

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Project Libre - C:\Users\malem\Desktop\PIGS.pod *

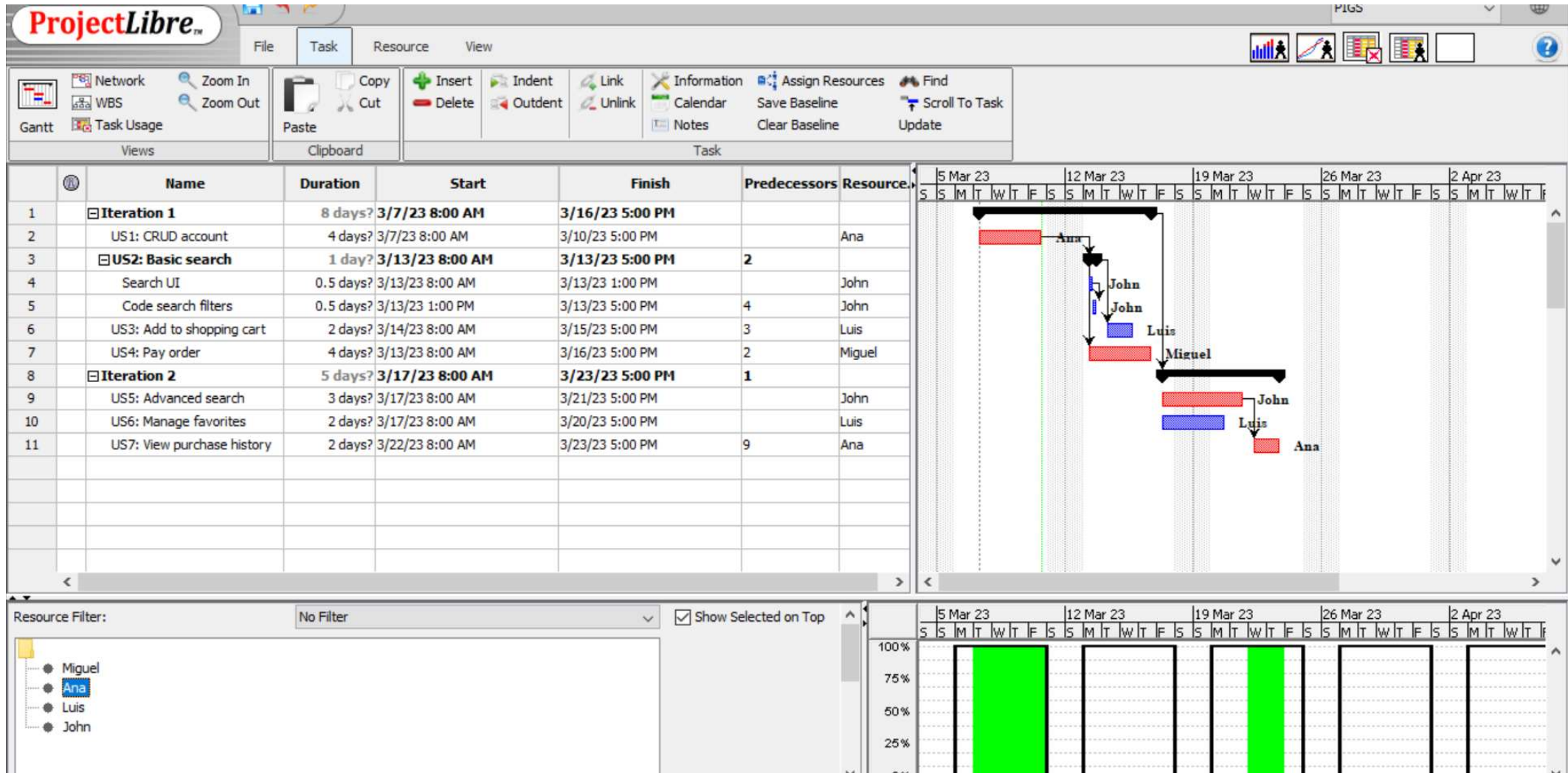
ProjectLibre™				
File Task Resource View				
Resources		Clipboard		
Views		Resource		
		Name	RBS	Type
1		Miguel		Work
2		Ana		Work
3		Luis		Work
4		John		Work

		Name	Duration	Start	Finish	Predecessors	Resource
1	<input checked="" type="checkbox"/>	Iteration 1	8 days?	3/7/23 8:00 AM	3/16/23 5:00 PM		
2		US1: CRUD account	4 days?	3/7/23 8:00 AM	3/10/23 5:00 PM		Ana
3	<input checked="" type="checkbox"/>	US2: Basic search	1 day?	3/13/23 8:00 AM	3/13/23 5:00 PM	2	
4		Search UI	0.5 days?	3/13/23 8:00 AM	3/13/23 1:00 PM		John
5		Code search filters	0.5 days?	3/13/23 1:00 PM	3/13/23 5:00 PM	4	John
6		US3: Add to shopping cart	2 days?	3/14/23 8:00 AM	3/15/23 5:00 PM	3	Luis
7		US4: Pay order	4 days?	3/13/23 8:00 AM	3/16/23 5:00 PM	2	Miguel
8	<input checked="" type="checkbox"/>	Iteration 2	5 days?	3/17/23 8:00 AM	3/23/23 5:00 PM	1	
9		US5: Advanced search	3 days?	3/17/23 8:00 AM	3/21/23 5:00 PM		John
10		US6: Manage favorites	2 days?	3/17/23 8:00 AM	3/20/23 5:00 PM		Luis
11		US7: View purchase history	2 days?	3/22/23 8:00 AM	3/23/23 5:00 PM	9	Ana

Time management and scheduling

Distribution of the estimated effort

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Time management and scheduling

Overview

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***Scheduling** is the art of **planning** your **activities** so that you can achieve your **goals** and **priorities** in the **time** you have available.*

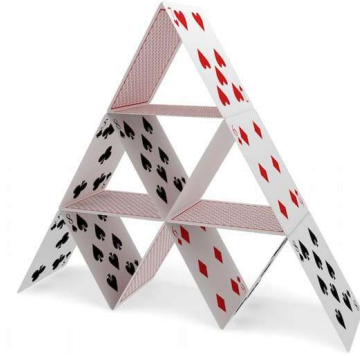
Project Management Institute

*Software project **scheduling** is an activity that distributes estimated **effort** across the planned project **duration** by **allocating** the effort to specific software engineering tasks.*

Allen B. Tucker

Principles of software project scheduling

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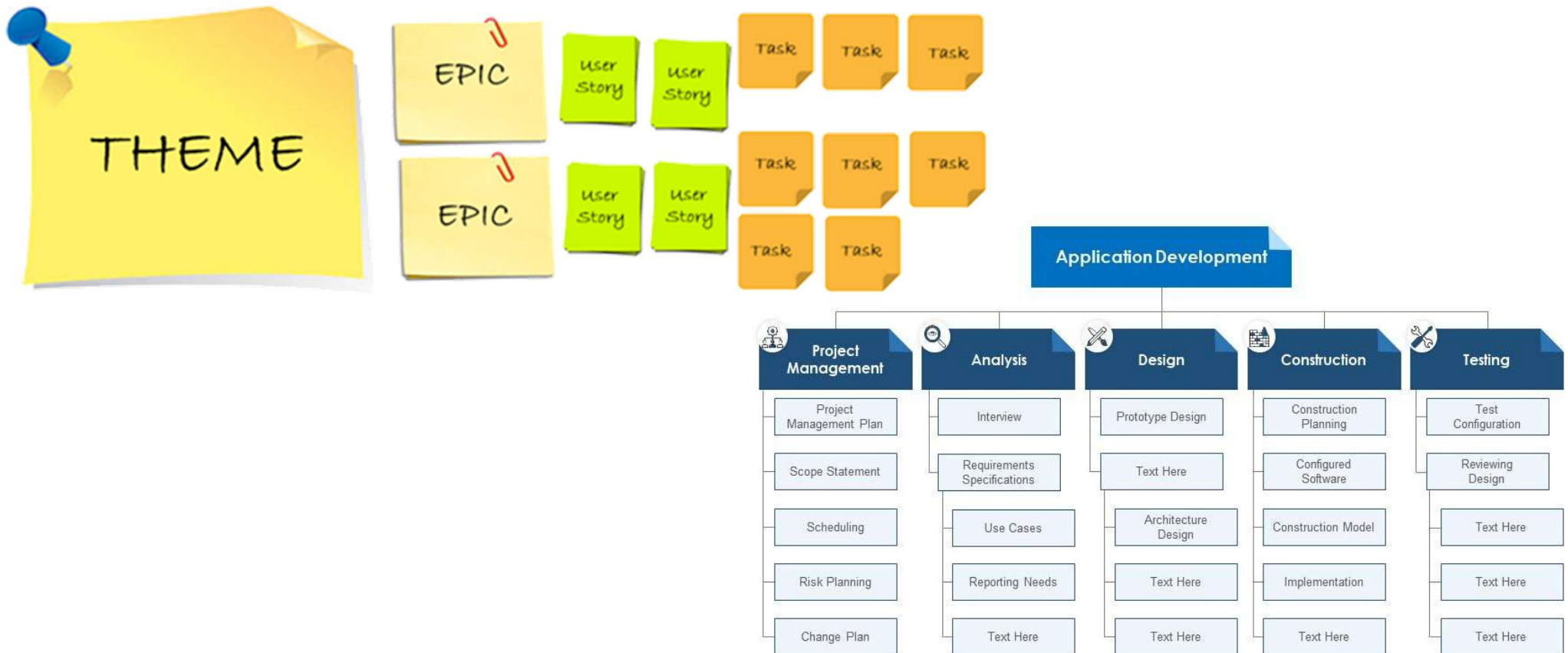
Credit: Getty images/iStockphoto

Principles of software project scheduling

Compartmentalization

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- The project must be compartmentalized into manageable activities and tasks.
- Both the product and the process are decomposed.

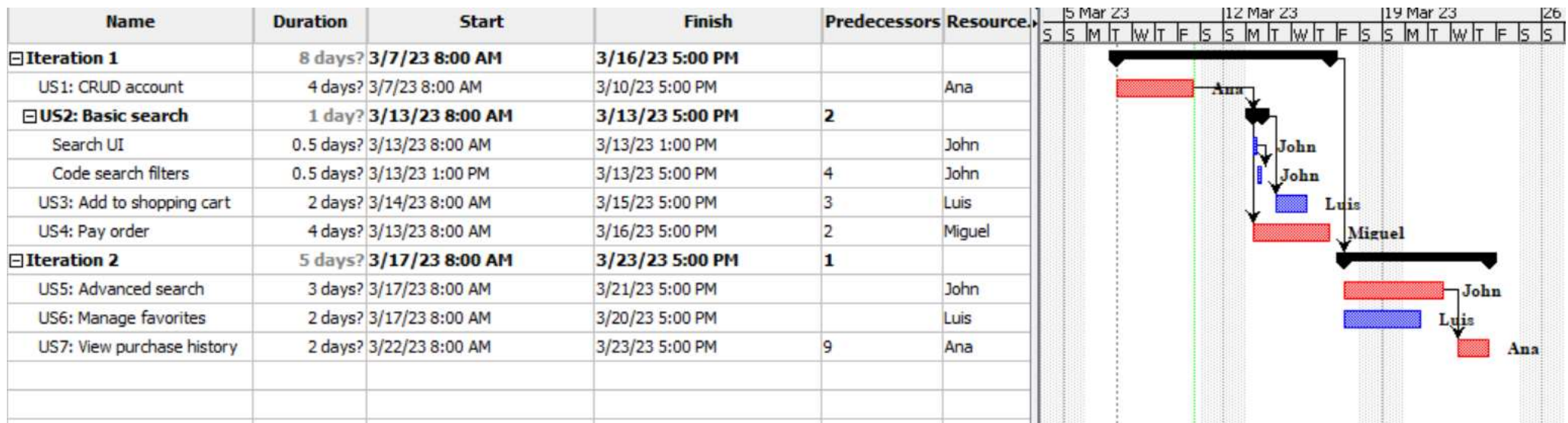
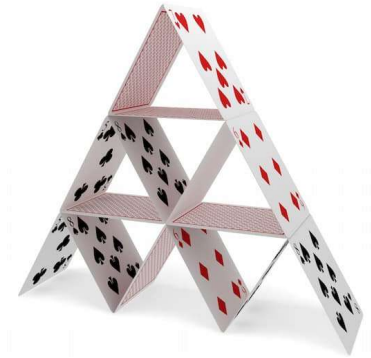


Principles of software project scheduling

Interdependency

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- Certain tasks must be performed in a sequential order since the output of one task will be the input of the next task.
- Other tasks can occur independently.

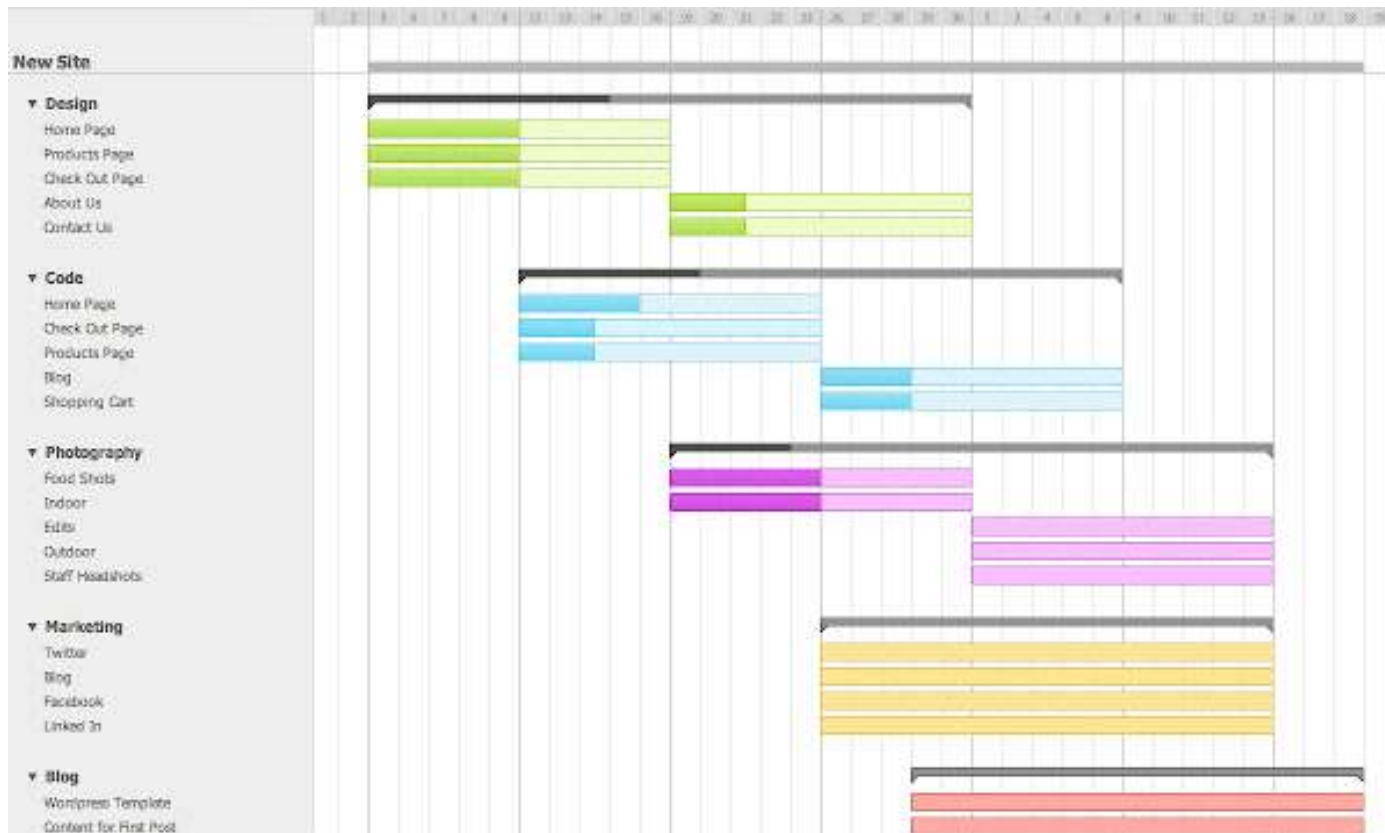


Principles of software project scheduling

Time allocation

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- Each task must be allocated some number of work units (e.g., person-days of effort).
- Each task must be assigned a start date and a completion date.



Principles of software project scheduling

Defined responsibilities

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Every task which is scheduled should be assigned to a specific team member.



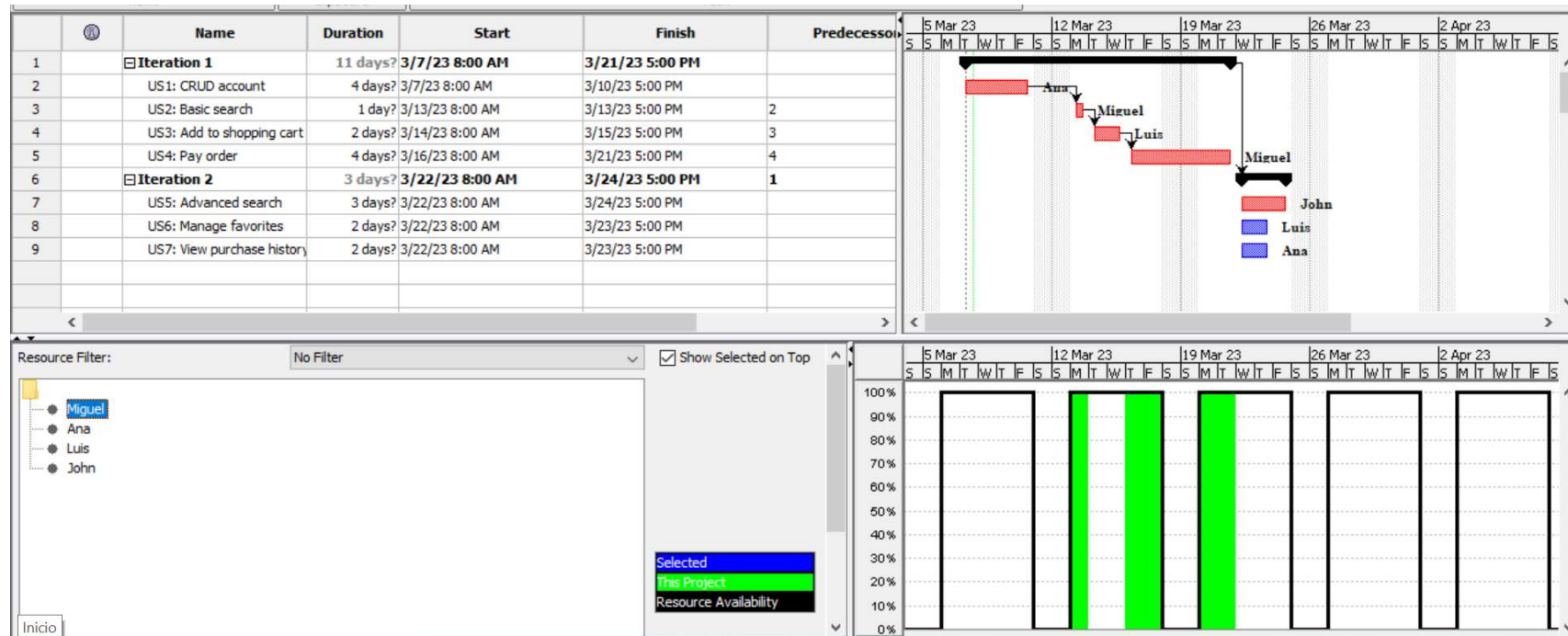
Name	Duration	Start	Finish	Predecessors	Resource Names
<input checked="" type="checkbox"/> Iteration 1	11 days?	3/7/23 8:00 AM	3/21/23 5:00 PM		
US1: CRUD account	4 days?	3/7/23 8:00 AM	3/10/23 5:00 PM		Ana
US2: Basic search	1 day?	3/13/23 8:00 AM	3/13/23 5:00 PM	2	Miguel
US3: Add to shopping cart	2 days?	3/14/23 8:00 AM	3/15/23 5:00 PM	3	Luis
US4: Pay order	4 days?	3/16/23 8:00 AM	3/21/23 5:00 PM	4	Miguel
<input checked="" type="checkbox"/> Iteration 2	3 days?	3/22/23 8:00 AM	3/24/23 5:00 PM	1	
US5: Advanced search	3 days?	3/22/23 8:00 AM	3/24/23 5:00 PM		John
US6: Manage favorites	2 days?	3/22/23 8:00 AM	3/23/23 5:00 PM		Luis
US7: View purchase history	2 days?	3/22/23 8:00 AM	3/23/23 5:00 PM		Ana

Principles of software project scheduling

Effort validation

13

The project manager must ensure that the effort allocated does not exceed the capacity of the staff members available.

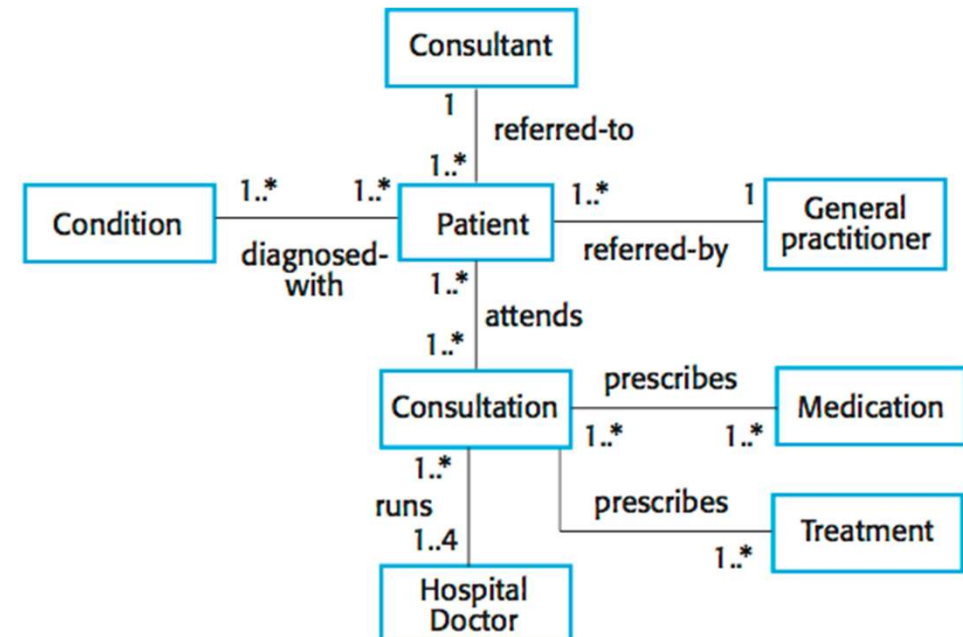


Principles of software project scheduling

Defined outcomes

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- Every task which is scheduled should have a defined outcome.
- The outcome is normally a work product or a part of a work product.
- Work products are often combined in deliverables.

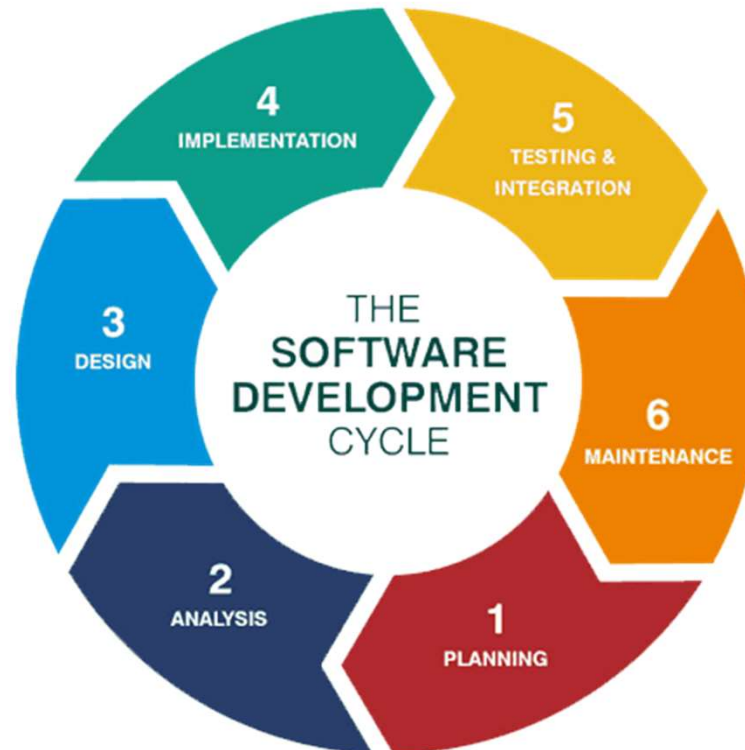


Principles of software project scheduling

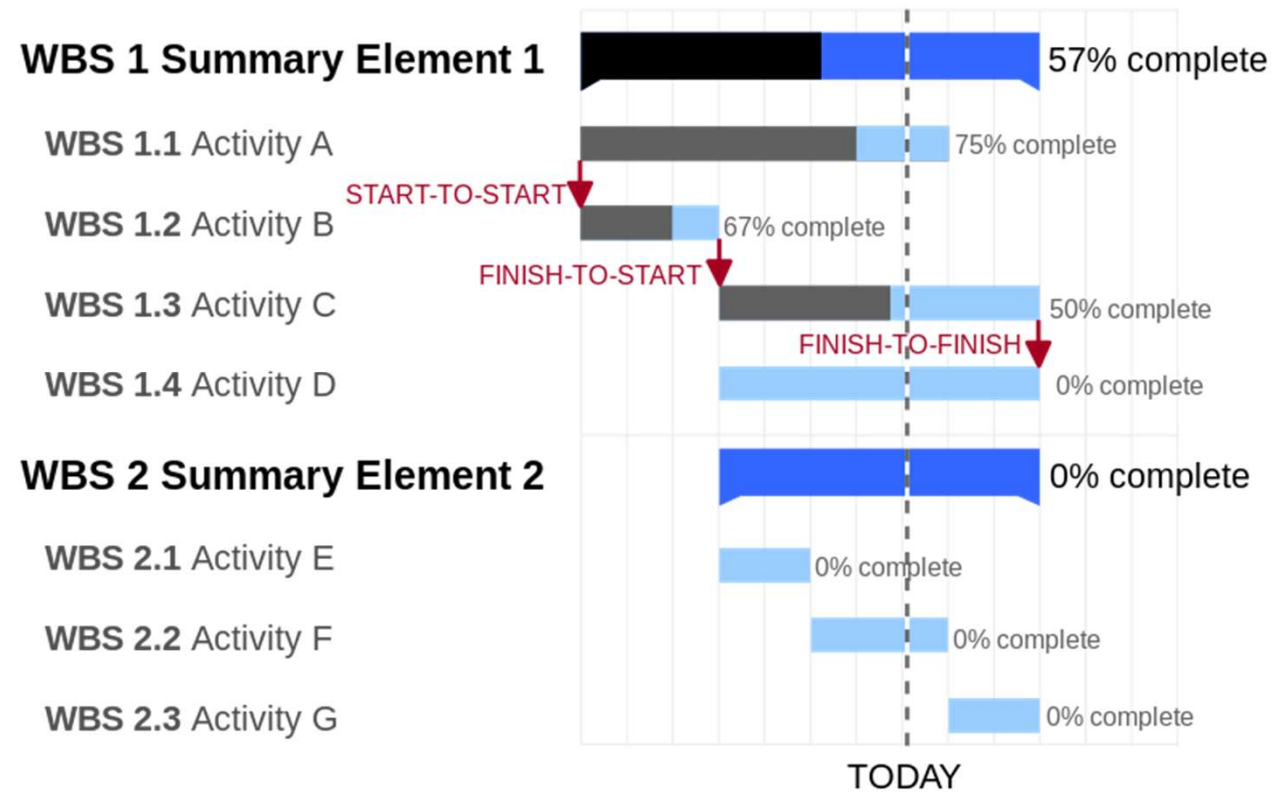
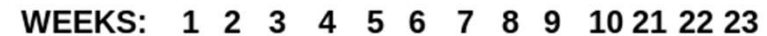
Defined milestones

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- Every task or group of tasks is associated with a milestone.
- A milestone is accomplished when one or more work products have been reviewed and approved.



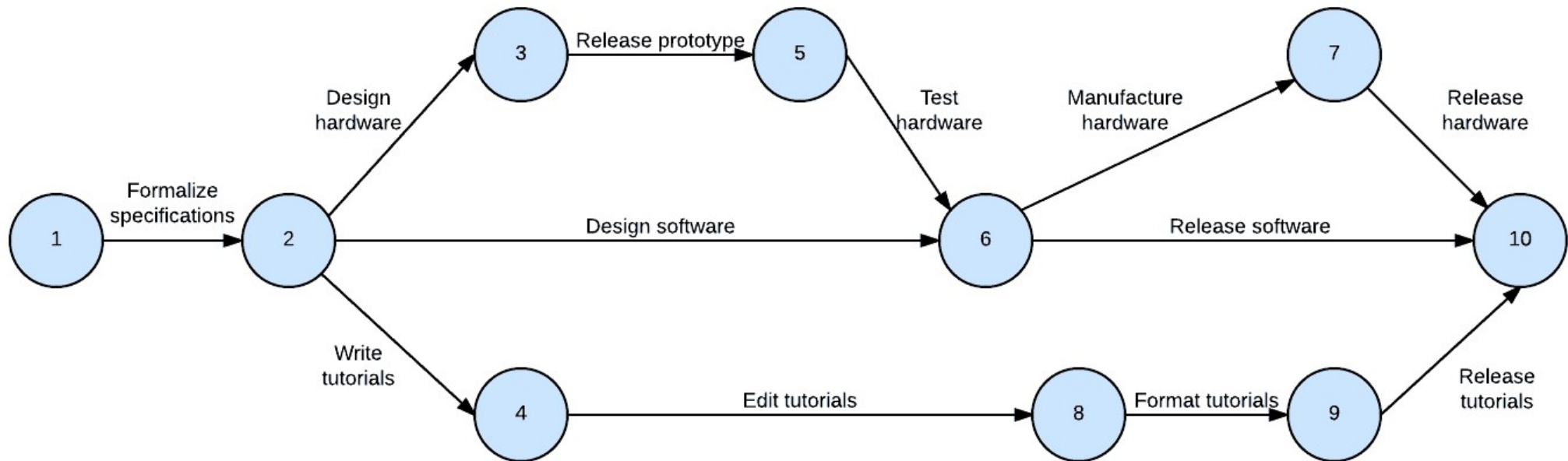
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PERT (*Program/Project Evaluation and Review Technique*)

Elements

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PERT (*Program/Project Evaluation and Review Technique*)

Elements

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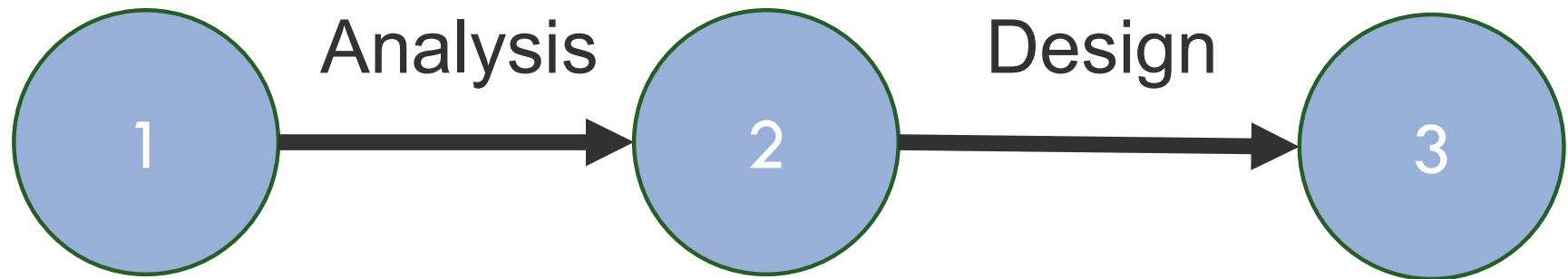
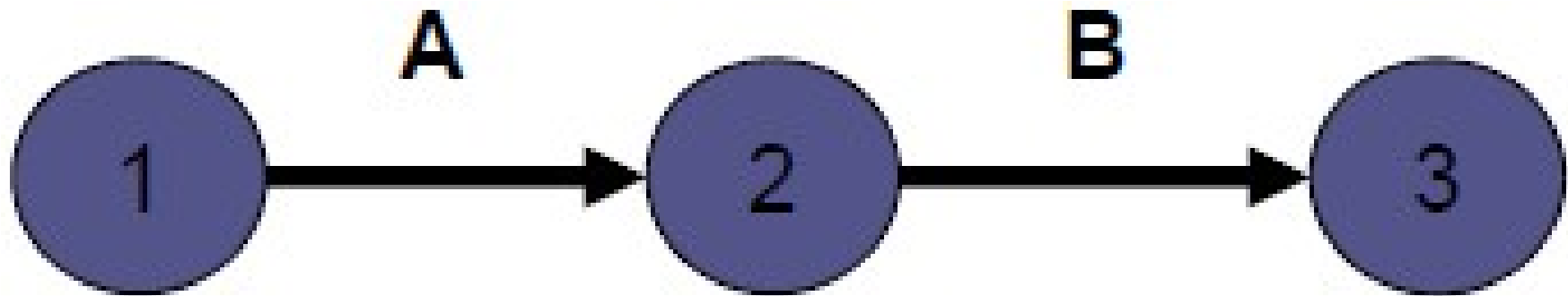
- **Activity:** task to be performed (**edges or arrows of the graph**)
- **Event:** start or finish of an activity or a group of activities (**nodes or vertices**)
- **Predecessor:** An activity that precedes another and must finish before its successor can start.



PERT Charts

Representation

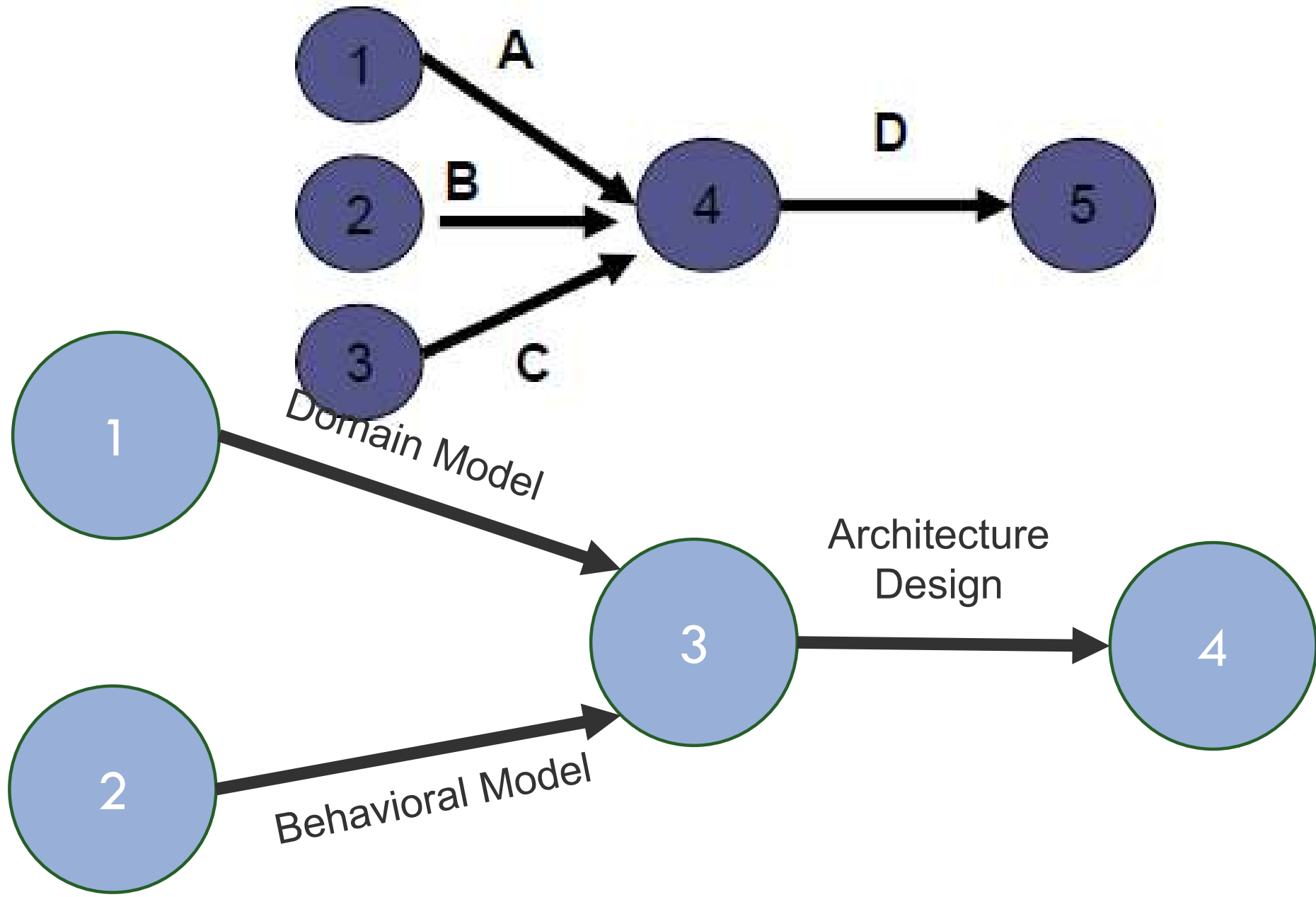
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PERT Charts

Representation

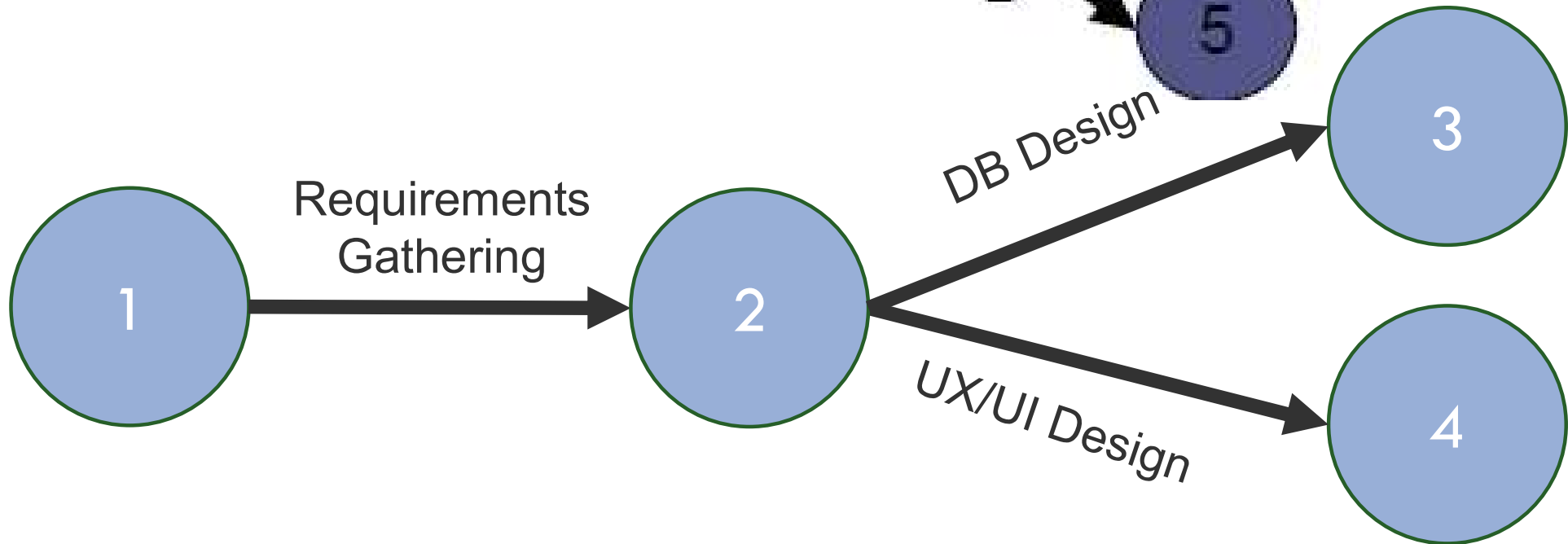
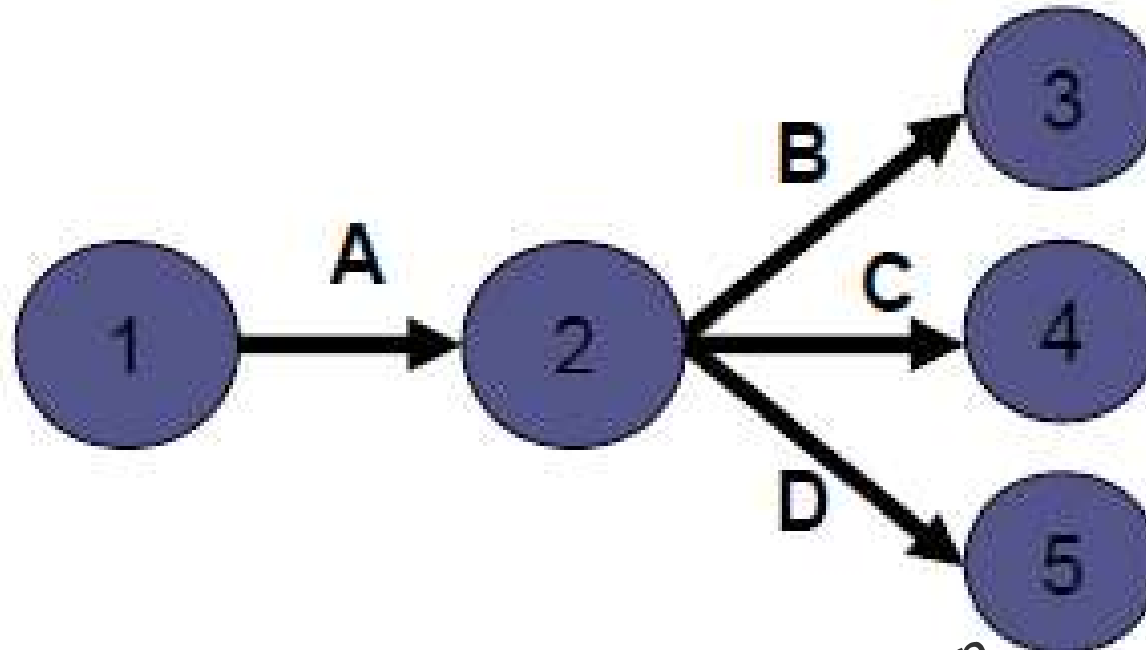
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PERT Charts

Representation

21

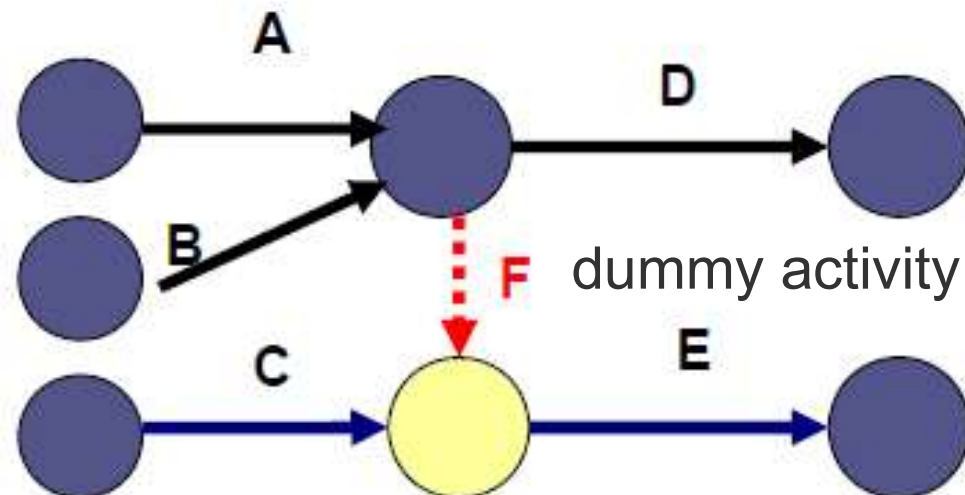
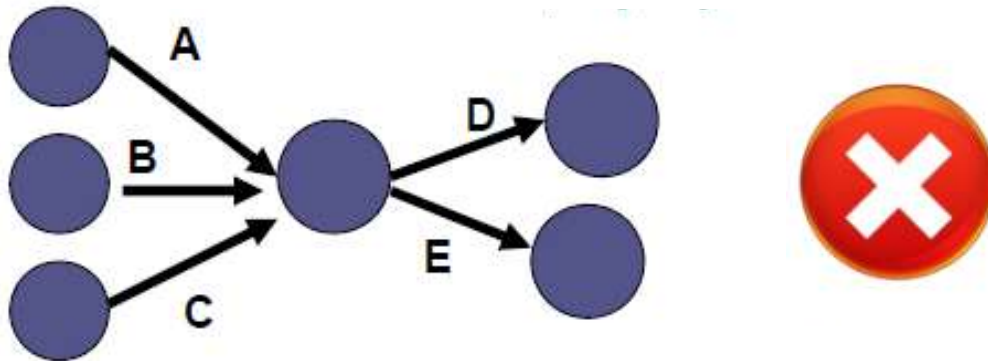


PERT Charts

Representation

22

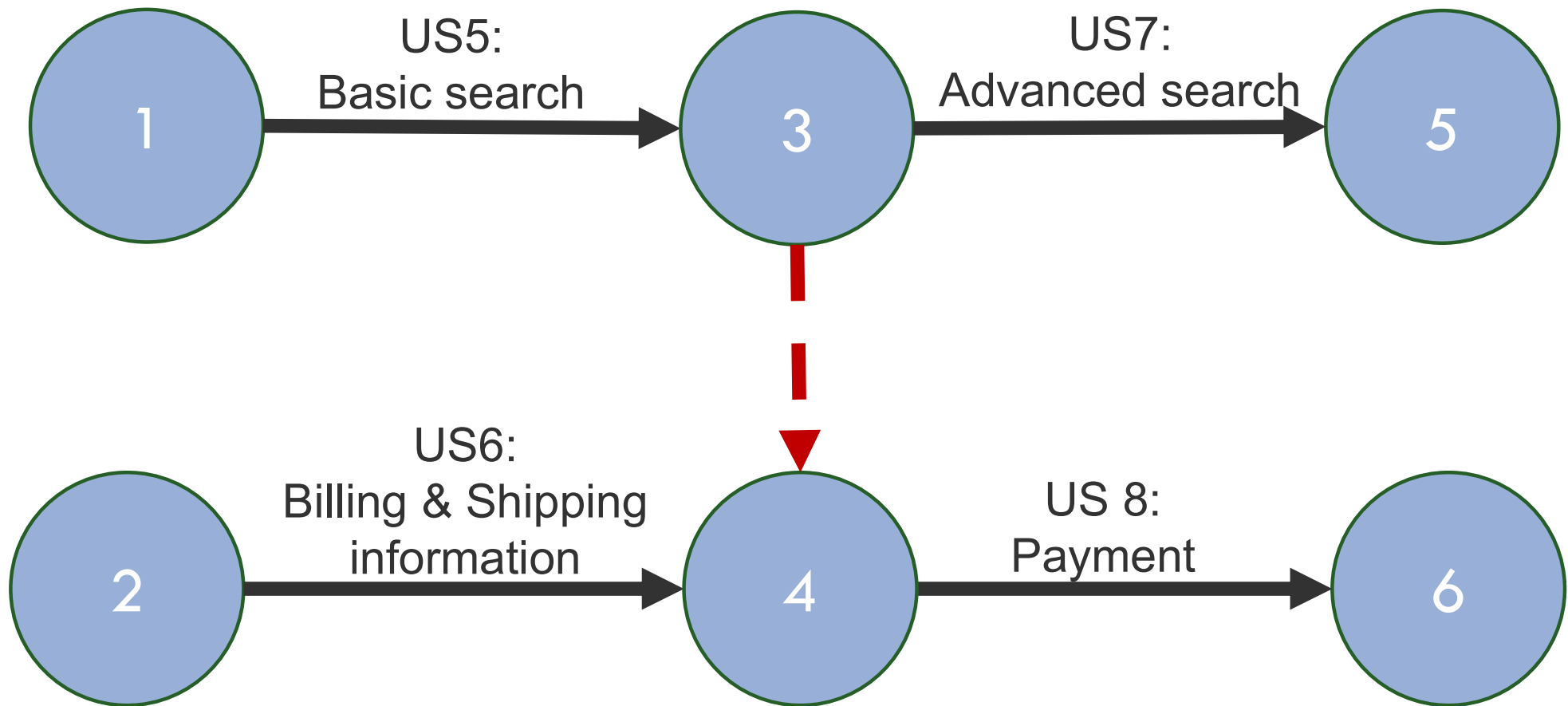
Activities A and B precede activity D.
Activities A, B and C precede activity E.



PERT Charts

Representation

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PERT Charts

Table-graph transformation

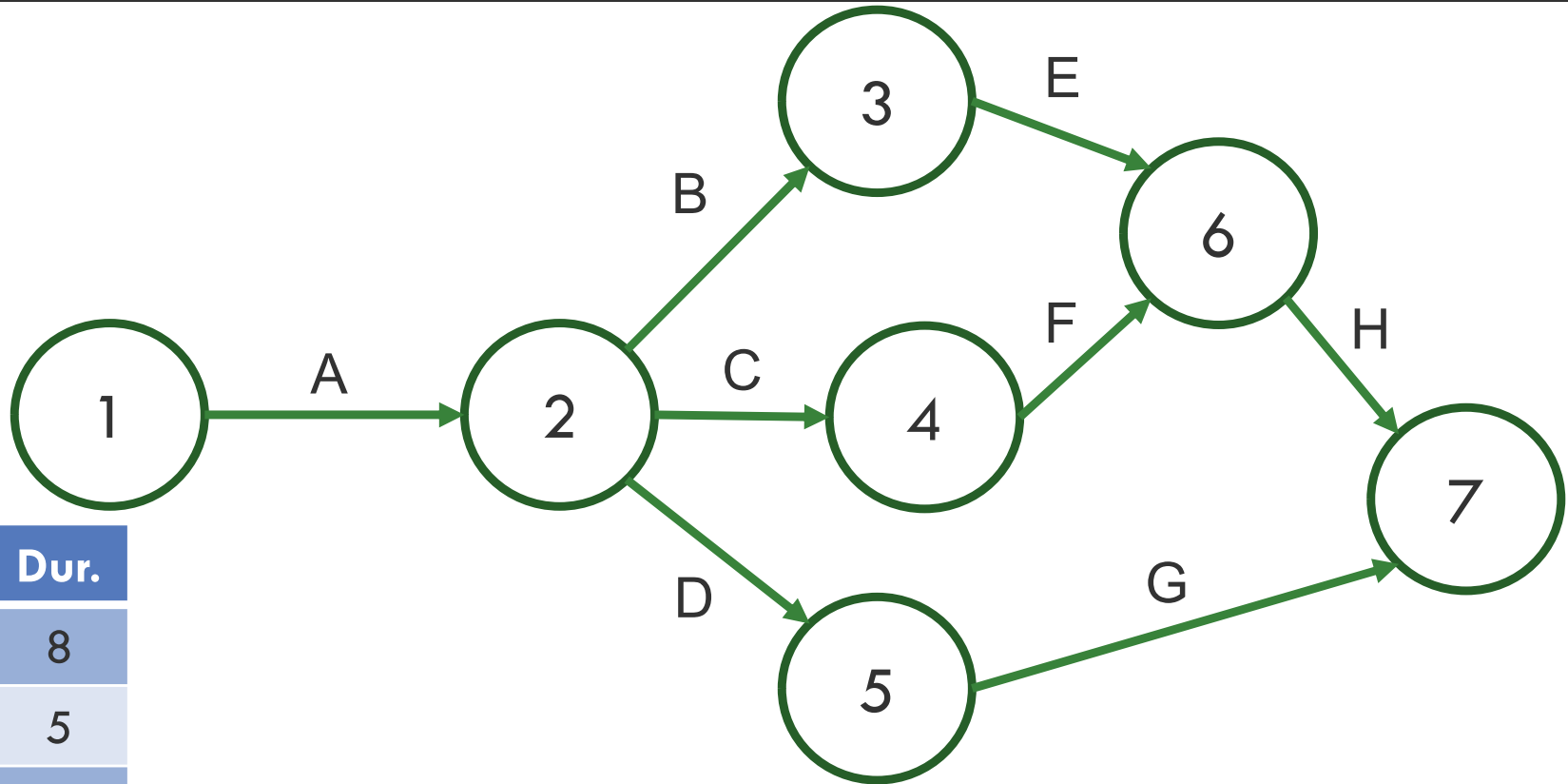
24

Activities	Predecessors	Duration (days)
A		8
B	A	5
C	A	6
D	A	5
E	B	6
F	C	7
G	D	9
H	E F	3

PERT Charts

Table-graph transformation

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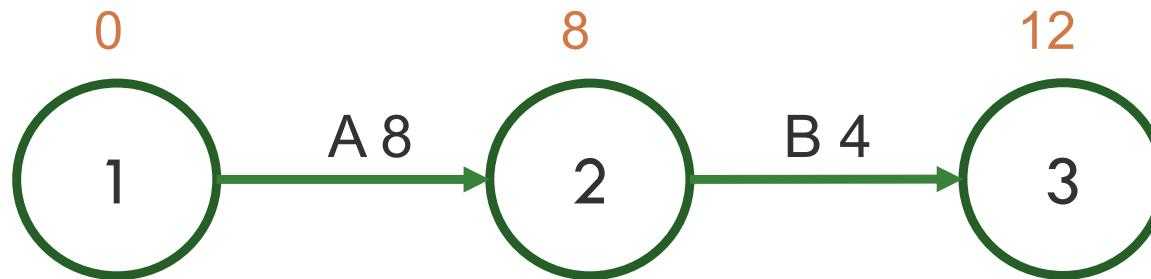


Activ.	Pred.	Dur.
A		8
B	A	5
C	A	6
D	A	5
E	B	6
F	C	7
G	D	9
H	E F	3

PERT Charts

Earliest and latest times

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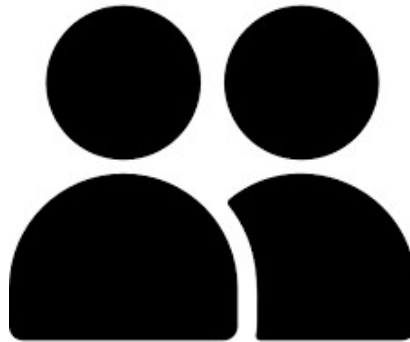
Assuming our estimates are right...

- How soon can we reach events 2 and 3?
- What happens if activity A takes longer than expected?

PERT Charts

Earliest and latest times

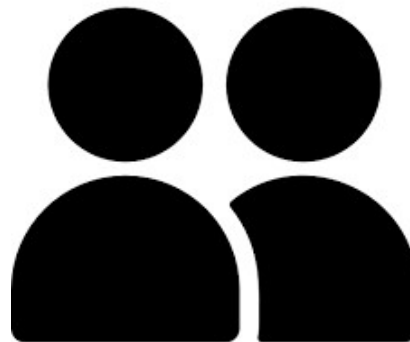
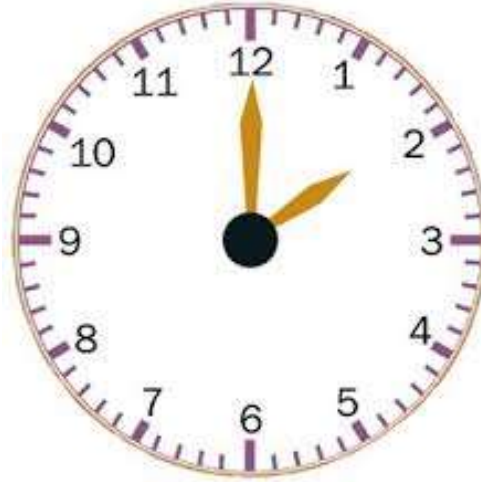
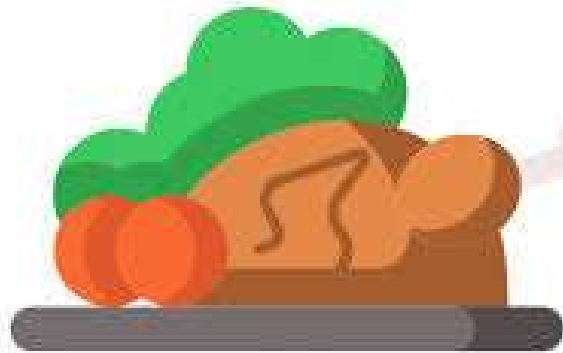
27



PERT Charts

Earliest and latest times

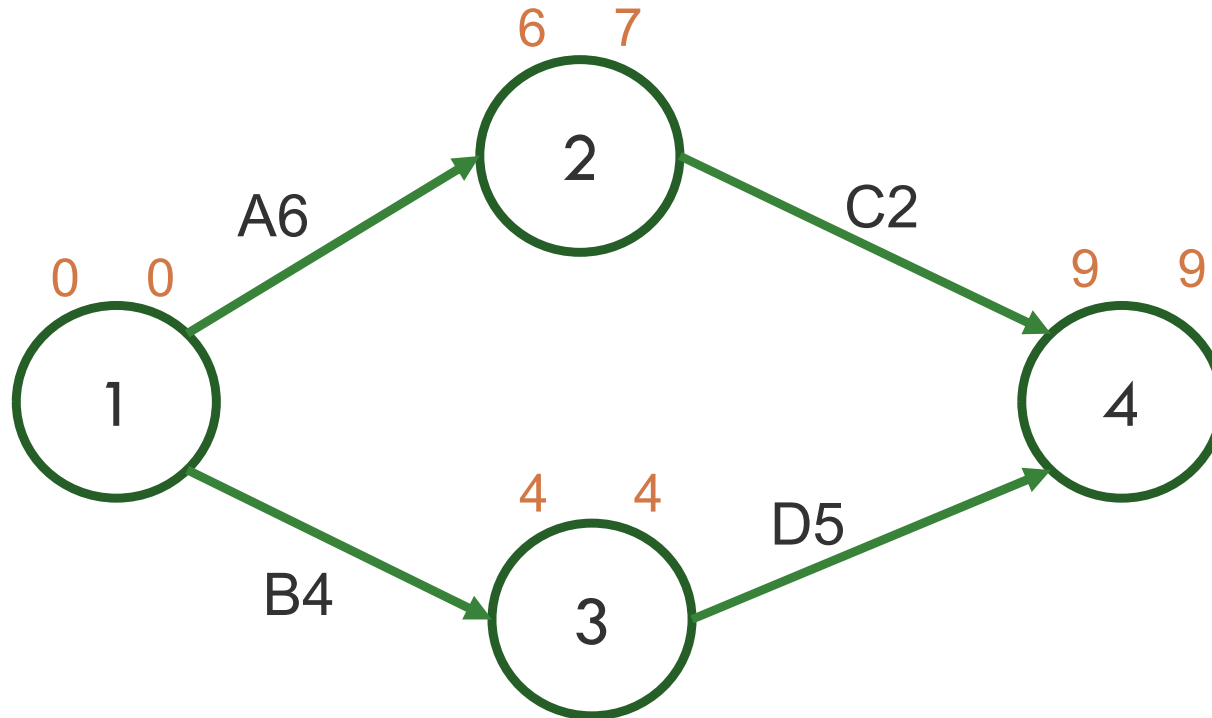
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PERT Charts

Earliest and latest times

29



How soon can we reach events 2, 3 and 4?

If we want to finish the project on the expected date,
what is the latest possible date for events 2 and 3?

What happens if activity A is delayed and takes 7 days?

PERT Charts

Slack/Float of an activity

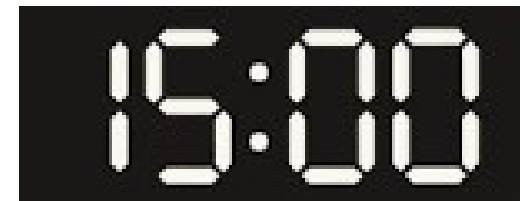
30



Activity: driving from the university to the hospital



Start event
Earliest time

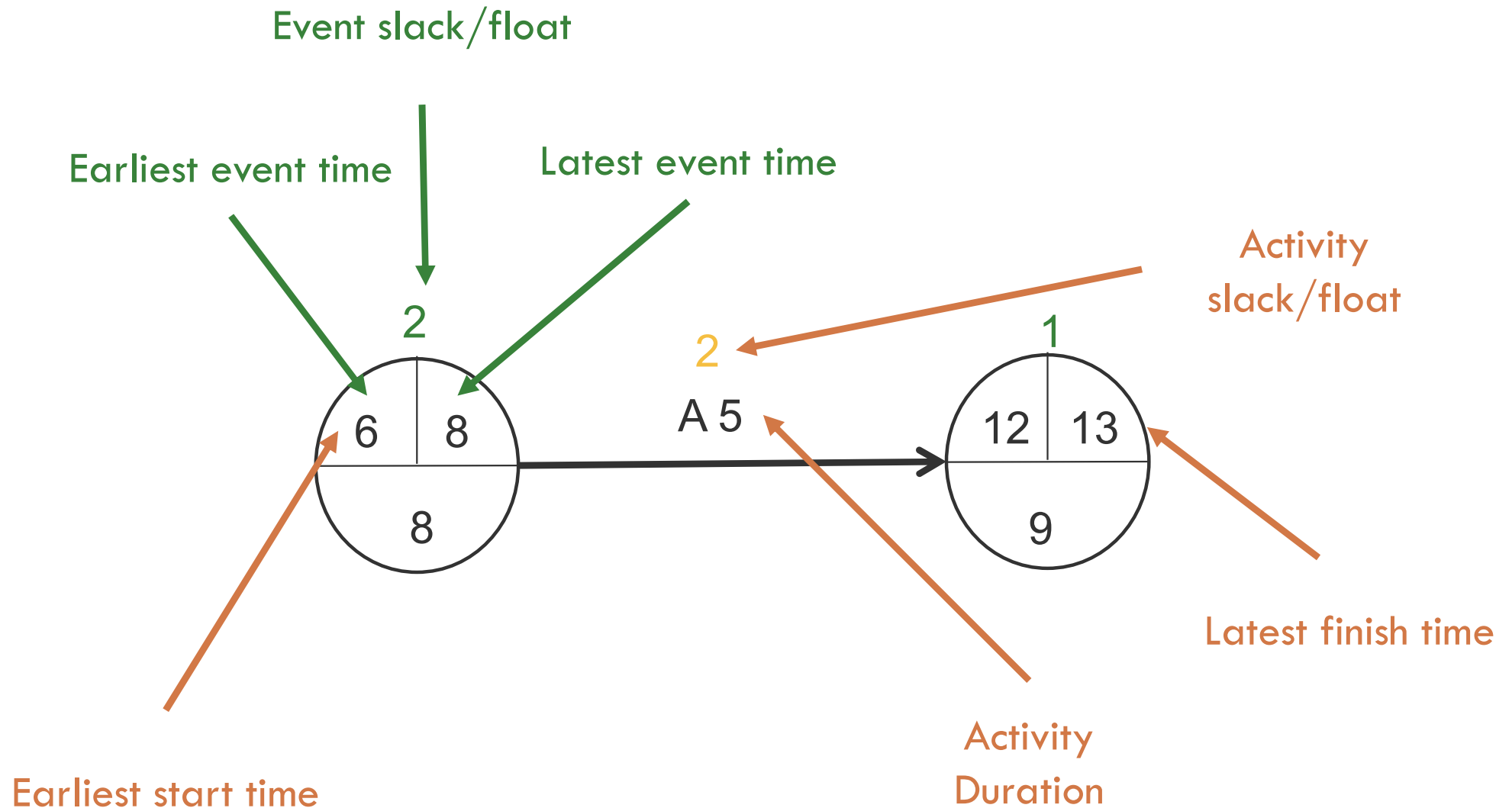


Finish event
Latest time

PERT Charts

Earliest and latest times

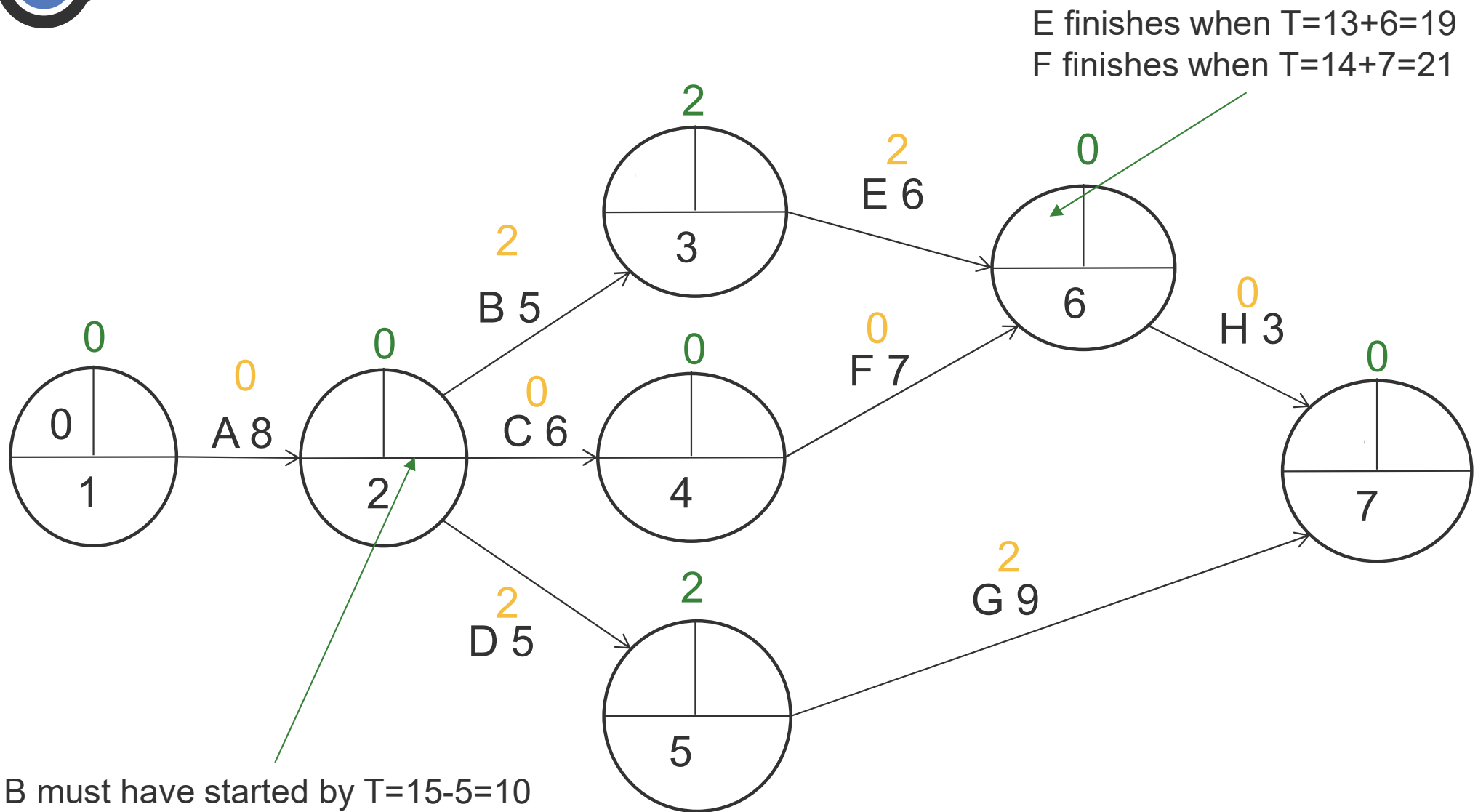
31



PERT Charts

Earliest and latest times

32

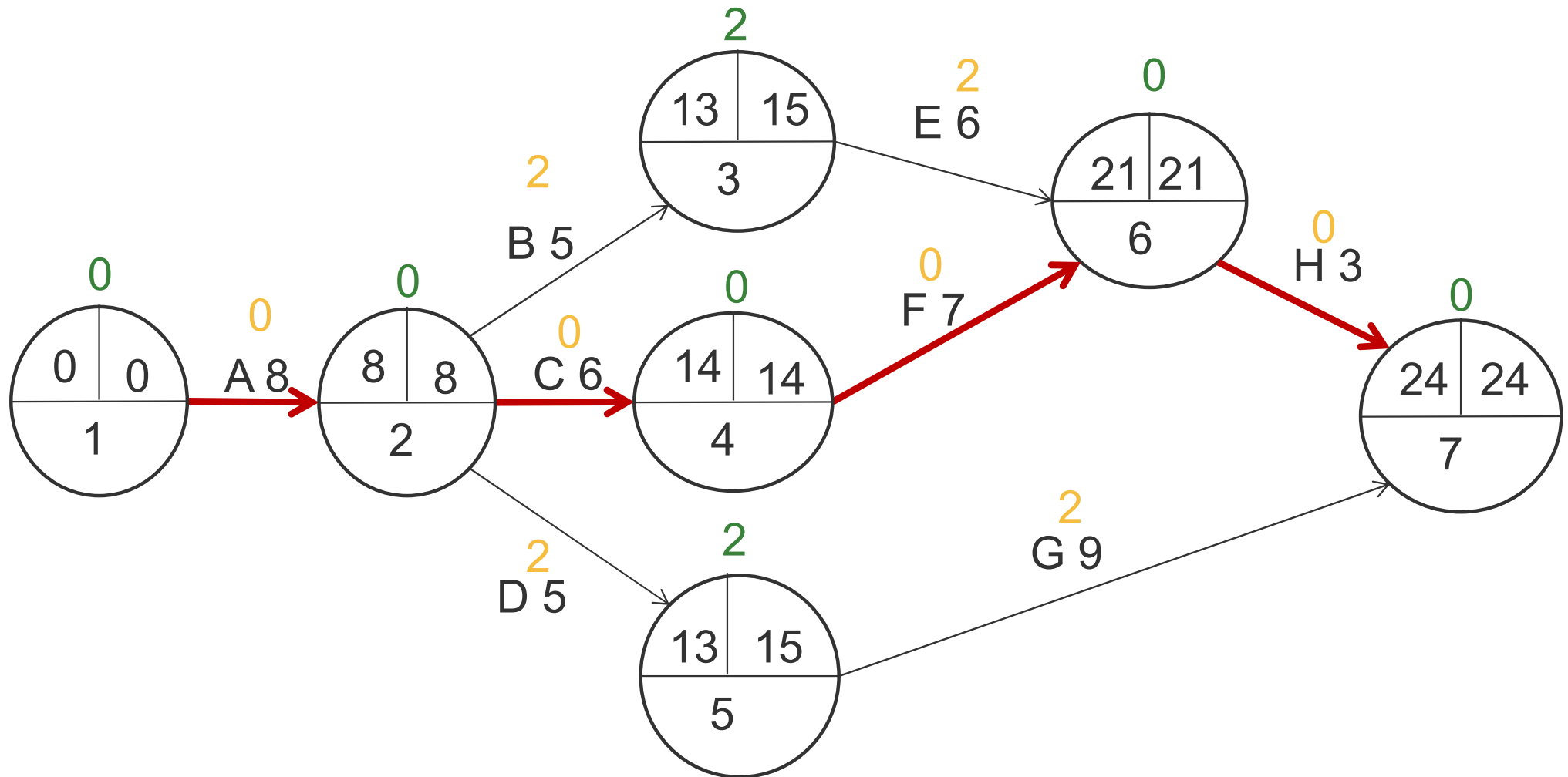


B must have started by $T=15-5=10$
C must have started by $T=14-6=8$
D must have started by $T=15-5=10$

PERT Charts

Critical activities and critical path

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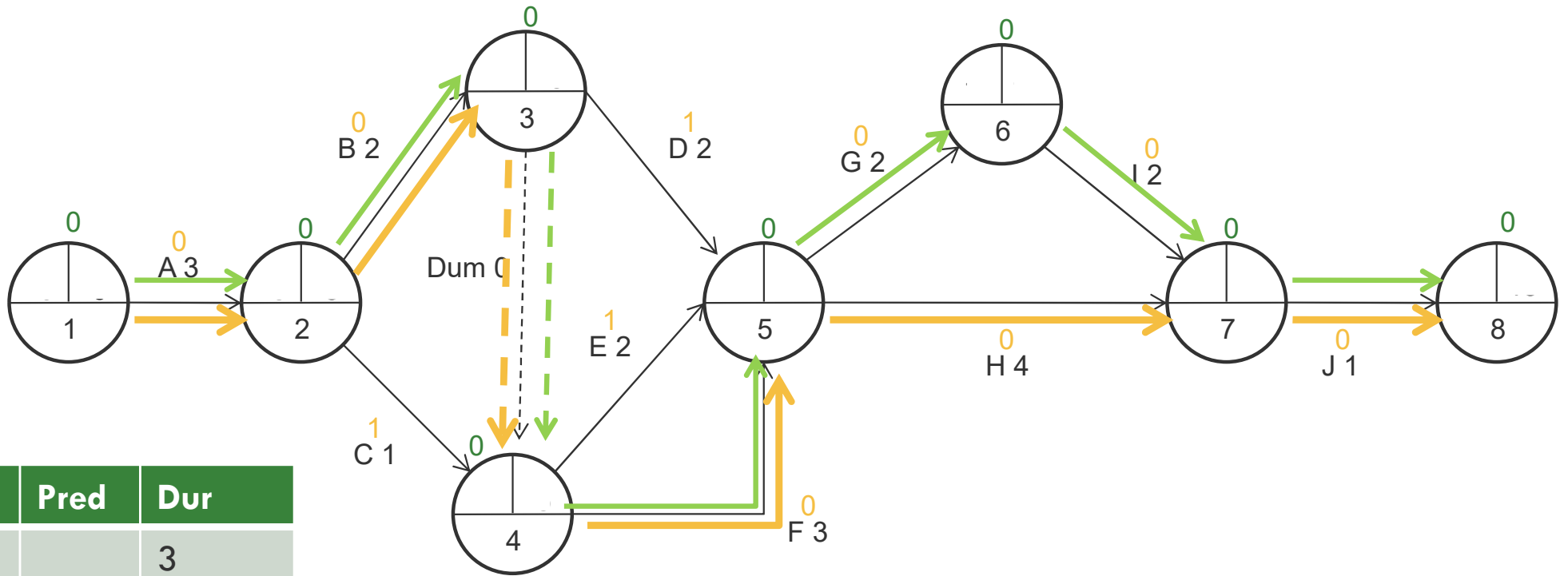


PERT Charts

Advantages

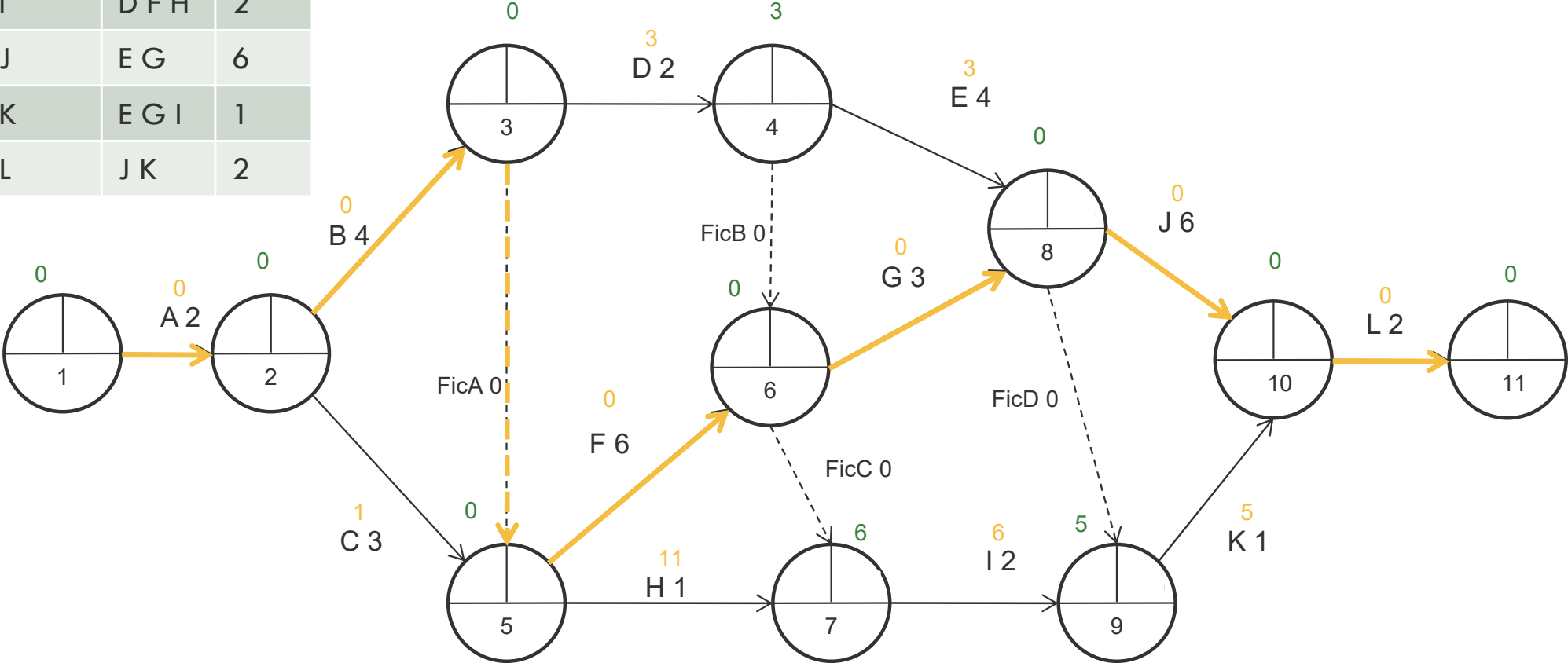
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- Graphical representation
- Clear visualization of dependencies
- Options for complex dependencies
- Estimation of earliest and latest times
- Calculation of floats
- Identification of critical activities and paths

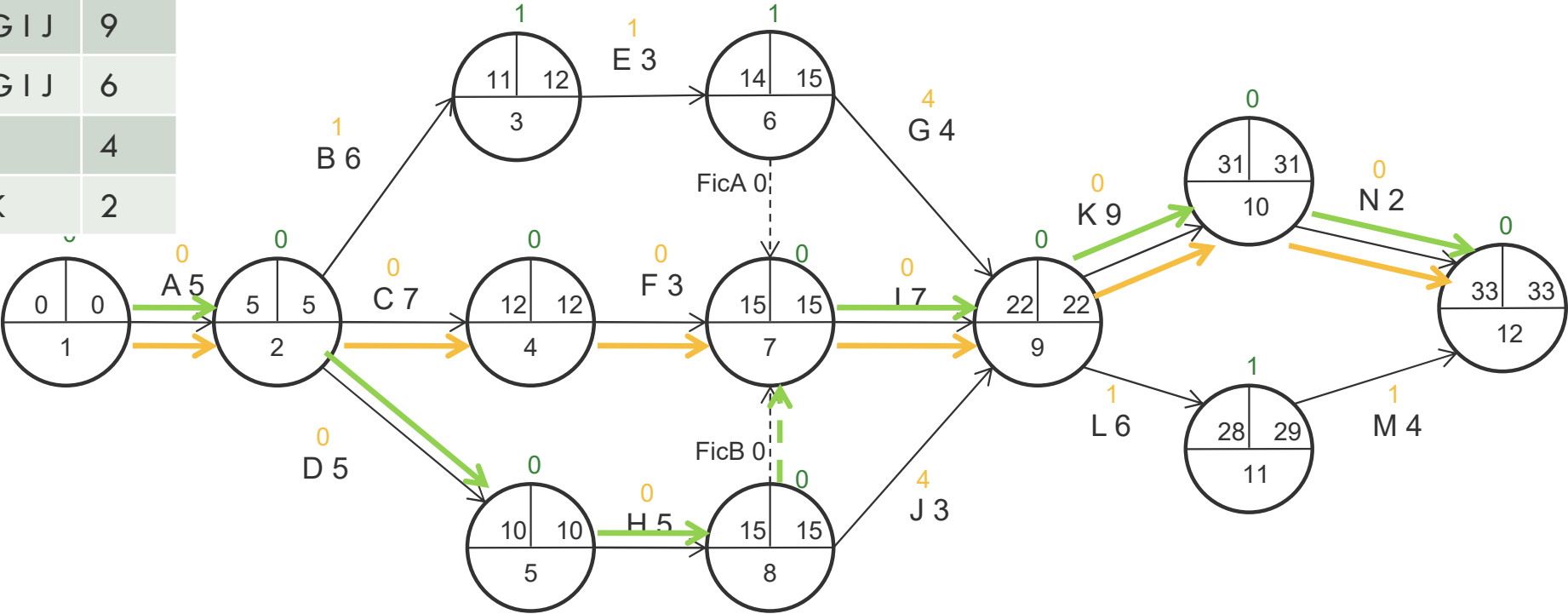


Activ	Pred	Dur
A		3
B	A	2
C	A	1
D	B	2
E	B C	2
F	B C	3
G	D E F	2
H	D E F	4
I	G	2
J	I H	1

Activ	Pred	Dur
A		2
B	A	4
C	A	3
D	B	2
E	D	4
F	B C	6
G	D F	3
H	B C	1
I	D F H	2
J	E G	6
K	E G I	1
L	J K	2



Activ	Pred	Dur
A		5
B	A	6
C	A	7
D	A	5
E	B	3
F	C	3
G	E	4
H	D	5
I	EFH	7
J	H	3
K	G I J	9
L	G I J	6
M	L	4
N	K	2



References

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Project Management Institute, 2017
- Computer Science Handbook
Allen B. Tucker
CRC Press, 2004
- PM Project Manager
<https://www.projectmanager.com/guides/pert-chart>
- Corporate Finance Institute
<https://corporatefinanceinstitute.com/resources/knowledge/other/project-evaluation-review-technique-pert/>