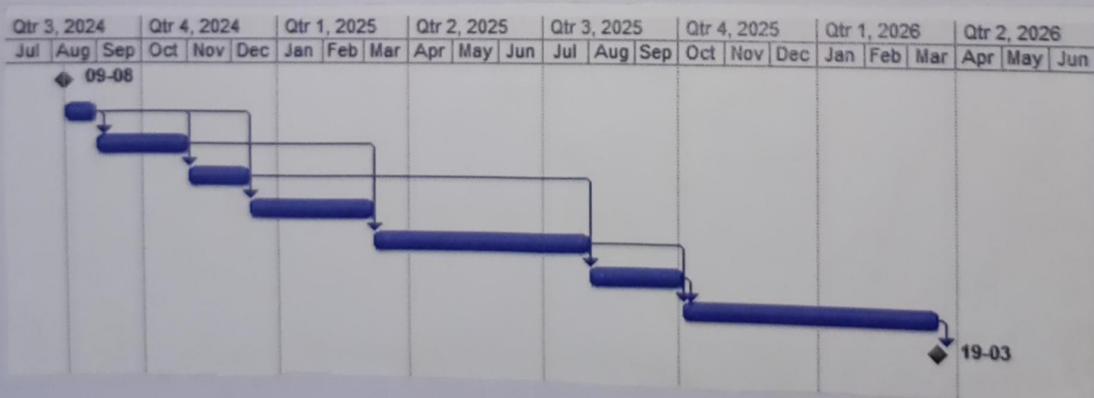


Shuvom Dhar

Particulars of The Experiments Performed

		Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		Start	0 days	Fri 09-08-24	Fri 09-08-24		
2		Specification	15 days	Fri 09-08-24	Thu 29-08-24		
3		Design Database	45 days	Fri 30-08-24	Thu 31-10-24	2	
4		Design GUI Part	30 days	Fri 01-11-24	Thu 12-12-24	2	
5		Write user manual	60 days	Fri 13-12-24	Thu 06-03-25	2	
6		Code Database Part	105 days	Fri 07-03-25	Thu 31-07-25	3	
7		Code GUI Part	45 days	Fri 01-08-25	Thu 02-10-25	4	
8		Integrate and test	120 days	Fri 03-10-25	Thu 19-03-26	6,7	
9		Finish	0 days	Thu 19-03-26	Thu 19-03-26	8	



Project Scheduling : Activity Network & Gantt Chart

(A) Consider the following activities of a project :

a) Specification	(15 days)
b) Design database	(45 days)
c) Design GUI part	(30 days)
d) Write user manual	(60 days)
e) Code database part	(105 days)
f) Code GUI part	(45 days)
g) Integrate and test	(120 days)

The following precedence relations hold among the tasks :
 $a < \{b, c, d\}$; $\{b, e\} < c$; $c < f$; $\{e, f\} < g$.

Draw the Activity Network Diagram. Find out the following time parameter for each job : ES, LS, EF, LF, ST & MT for the project

Draw the Gantt chart.

Objective : The objective of this assignment is to prepare Activity Network Diagram and Gantt Chart with the given activities of a project and their precedence relations.

Software Used: The software used to perform this task is Microsoft Project.

Step by step documentation to prepare Gantt Chart and Activity Network Diagram:

Step 1: At first, Gantt Chart is made of several rows and columns.

Rows are identified by numbers.

Columns are identified by specific names —

- (i) Task Name, (ii) Duration, (iii) Start, (iv) Finish,
- (v) Predecessors, (vi) Resource Names

Following the question, activities of project have to write in the 'Task Name' column. But, before and after the activities of project, there have to write 'start' and 'finish' respectively.

Step 2: Duration of start and finish must be 0. Other tasks duration have to put accordingly to the question.

Step 3: Start date and finish date should be same for 'start' task and 'other same date' for 'finish' task.

Specification task have to start in the same day of start. Automatically, 'Finish' date will be updated in the 'Finish' column.

The duration selected for specific task is calculated as 'working day' and weekly off and holidays are excluded.

Step 4: Predecessors of a particular task have to put manually, with the help of given precedence relations in question. In this way, Activity Network Diagram will form and having links according to the precedence relations.

Time Parameters in Project :

- i) MT (Minimum Time) to complete the project
= maximum of all paths from start to finish
- ii) ES (Earliest Start) time of a task
= maximum of all paths from start to this task
- iii) LS (Latest Start) time = MT - maximum of all paths from this task to finish
- iv) EF (Earliest Finish) time of a task = ES time + duration of the task
- v) LF (Latest Finish) time of a task = LS time + duration of the task
- vi) ST (Slack Time) = LS - ES (or LF - EF)
Slack time is the total time that a task may be delayed without affecting the end time of the project.

The following time parameters for each task is shown below :

Task	MT	ES	LS	EF	LF	ST
Specification		0	0	15	15	0
Design database		15	15	60	60	0
Design GUI part		15	90	45	120	75
Write User manual	285	15	225	75	285	210
Code database part		60	60	165	165	0
Code GUI part		45	120	90	165	75
Integrate and test		165	165	285	285	0

Conclusion: After completing this assignment, the clear concept about Activity-Network Diagram, Gantt Chart and time parameters. It is also useful to understand the whole process of how to manage selected time duration of each task until the project completes.

(B) An annual general meeting of a large company will be held on 25th August, 2014.

List of activities:

- a) Book the meeting space.
- b) Schedule speakers.
- c) Arrange for audio-visual equipments.
- d) Order food.
- e) Send out invitation.
- f) Mail out annual report.

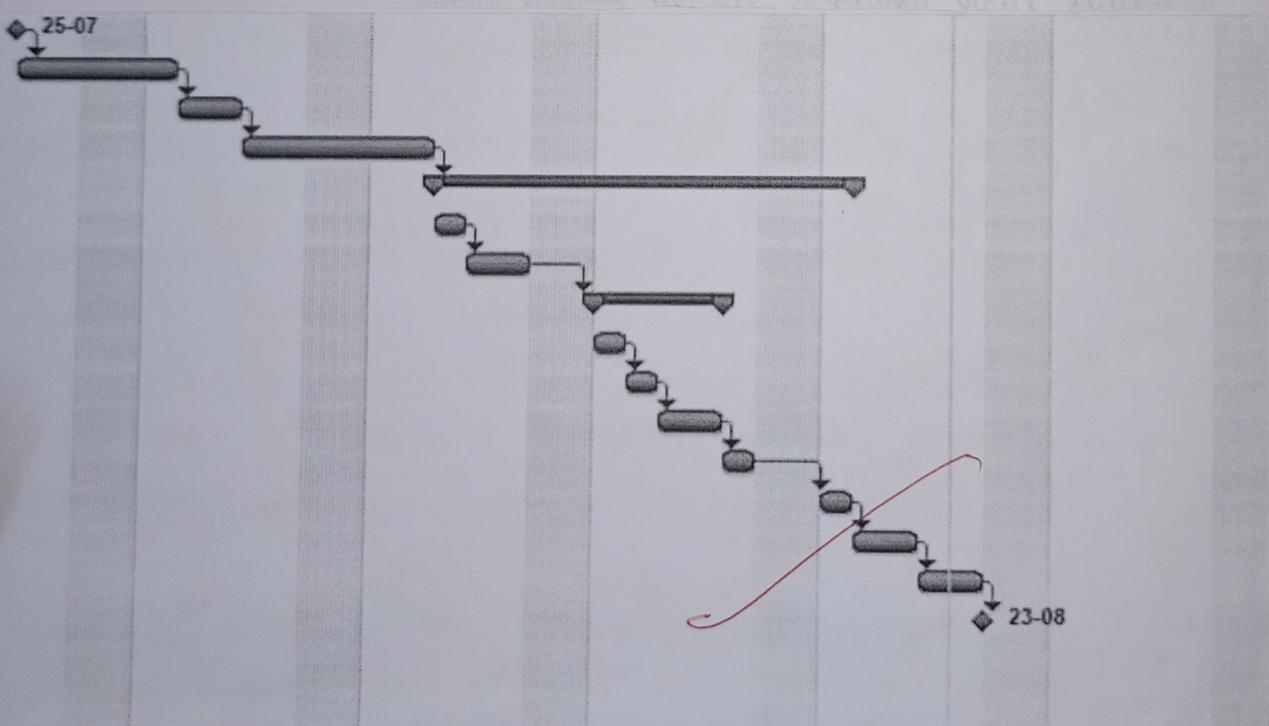
Details task analysis under order food:

- d. 1) Create a budget.
- d. 2) Determine a menu.
- d. 3) Select a caterer.
 - d. 3. 1) Send out request for bids.
 - d. 3. 2) Receive all estimates.
 - d. 3. 3) Review estimates and award contract.
- d. 4) Give final head count to caterer.
- d. 5) Confirm menu one week before the meeting.

Draw the Gantt chart and determine the finish date.

(C) Construct a work break down structure to organize a picnic.

	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	start	0 days	Thu 25-07-24	Thu 25-07-24		
2	Book the Meeting Space	3 days?	Thu 25-07-24	Mon 29-07-24	1	
3	Schedule Speaker	2 days?	Tue 30-07-24	Wed 31-07-24	2	
4	Arrange for Audio-Visual Equipments	4 days?	Thu 01-08-24	Tue 06-08-24	3	
5	- Order Food	9 days	Wed 07-08-24	Mon 19-08-24	4	
6	Create a budget	1 day	Wed 07-08-24	Wed 07-08-24		
7	Determine a menu	2 days	Thu 08-08-24	Fri 09-08-24	6	
8	- Select a caterer	4 days	Mon 12-08-24	Thu 15-08-24	7	
9	Send out request bids	1 day	Mon 12-08-24	Mon 12-08-24		
10	Receive all estimates	1 day	Tue 13-08-24	Tue 13-08-24	9	
11	Review estimates and award contract	2 days	Wed 14-08-24	Thu 15-08-24	10	
12	Give final head count	1 day	Fri 16-08-24	Fri 16-08-24	11	
13	Confirm Menu	1 day	Mon 19-08-24	Mon 19-08-24	12	
14	Send out Invitations	2 days?	Tue 20-08-24	Wed 21-08-24	13	
15	Mail out annual report	2 days?	Thu 22-08-24	Fri 23-08-24	14	
16	finish	0 days	Fri 23-08-24	Fri 23-08-24	15	

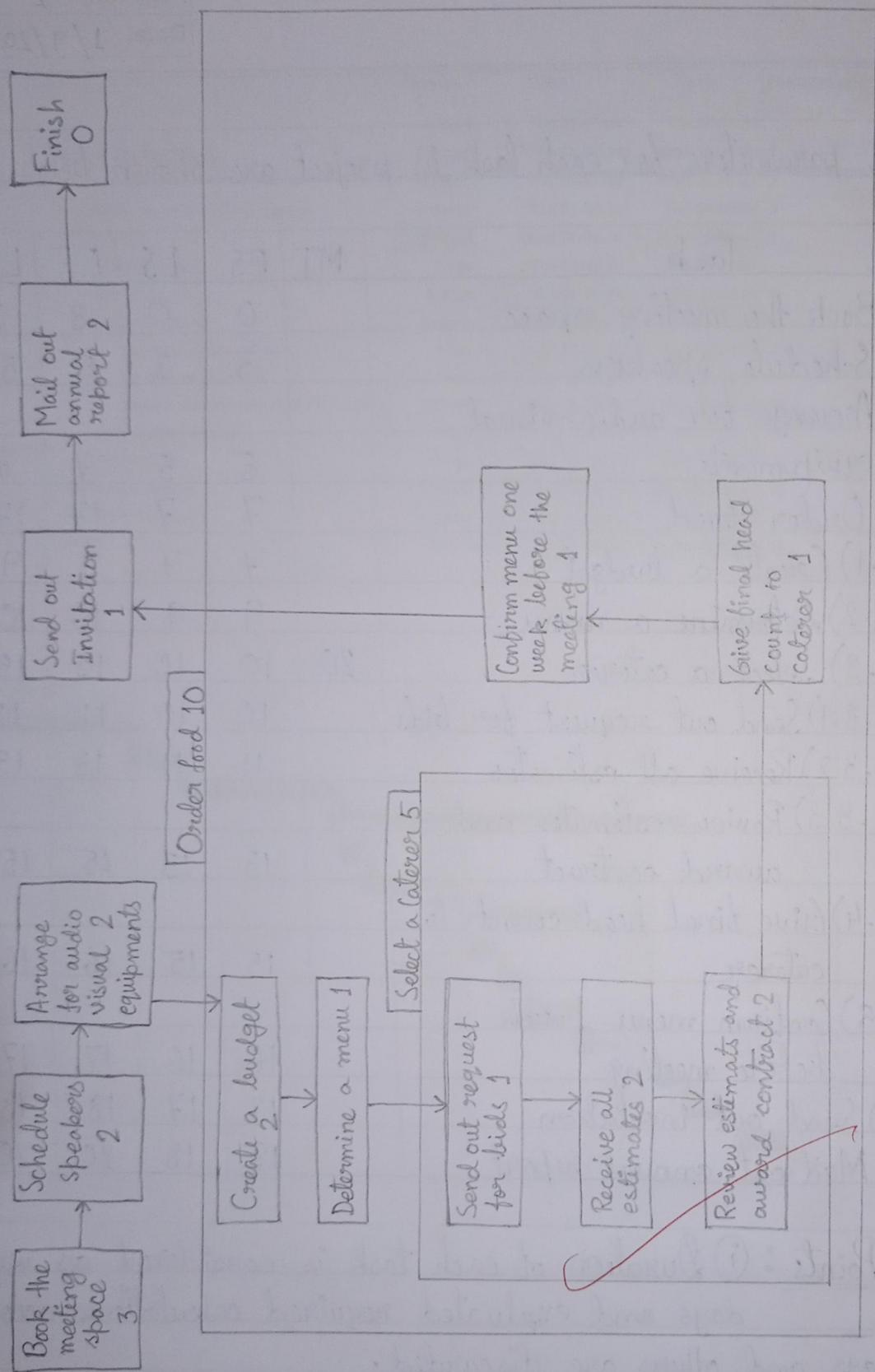


Time parameters for each task in project are shown below:

Task	MT	ES	LS	EF	LF	ST
1. a) Book the meeting space		0	0	3	3	0
2. b) Schedule speakers		3	3	5	5	0
3. c) Arrange for audio-visual equipments		5	5	7	7	0
4. d) Order food		7	7	17	17	0
5. d.1) Create a budget		7	7	9	9	0
6. d.2) Determine a menu		9	9	10	10	0
7. d.3) Select a caterer	20	10	10	15	15	0
8. d.3.1) Send out request for bids		10	10	11	11	0
9. d.3.2) Receive all estimates		11	11	13	13	0
10. d.3.3) Review estimates and award contract		13	13	15	15	0
11. d.4) Give final head count to caterer		15	15	16	16	0
12. d.5) Confirm menu 1 week before meeting		16	16	17	17	0
13. e) Send out invitation		17	17	18	18	0
14. f) Mail out annual report		18	18	20	20	0

Key Points : ① Duration of each task is considered as working days and evaluated required calculations accordingly.
Holidays and others are discarded.

Activity Network Diagram



So, the MT = 20

- (ii) Precedence of a task is the task or subtask just before it.
- (iii) Duration of each task is noted in the attached printcopy.

Where,

MT (Minimum Time) to complete the project = maximum of all paths from start to finish

ES (Earliest Start) time of a task = maximum of all paths from start to this task

LS (Latest Start) time = MT - maximum of all paths from this task to finish

EF (Earliest Finish) time of a task = ES time + duration of the task

LF (Latest Finish) time of a task = LS time + duration of the task

ST (Slack Time) = LS - ES (or LF - EF)

Conclusion: After completing this task, clear concept about the topic of critical path method, activity network diagram, gantt chart are understood well. Also got the idea of how to manage a project by dividing it into small task with assigned duration.

(D) Consider the following tasks :

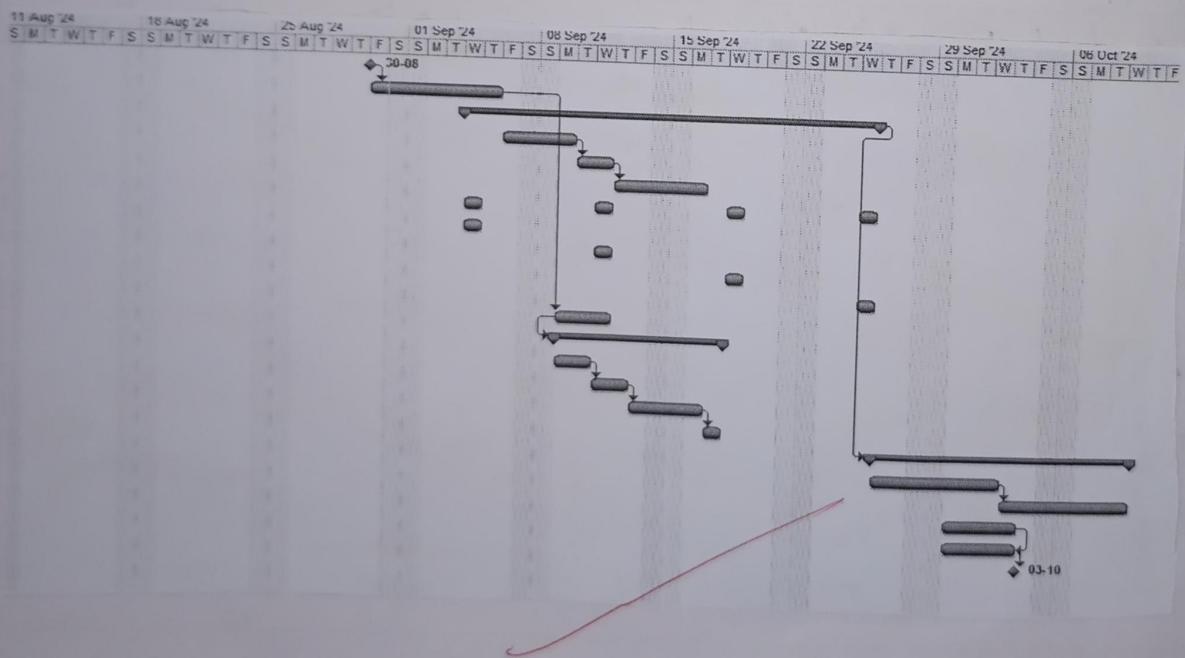
Task name	Duration	Dependency
T ₁	5	Independent
T ₂	7	Independent
T ₃	3	T ₁ (FS)
T ₄	7	T ₃ (SS)
T ₅	10	T ₂ (FS)
T ₆	4	Independent
T ₇	4	T ₆ (FF)

- a) Create 3 subtasks of T₂.
- b) Create 4 subtasks of T₄.
- c) Create 2 subtasks of T₅.
- d) Insert one weekly recurring task with 4 occurrences before T₃ on Wednesday.
- e) Show the critical path and determine the finish date.

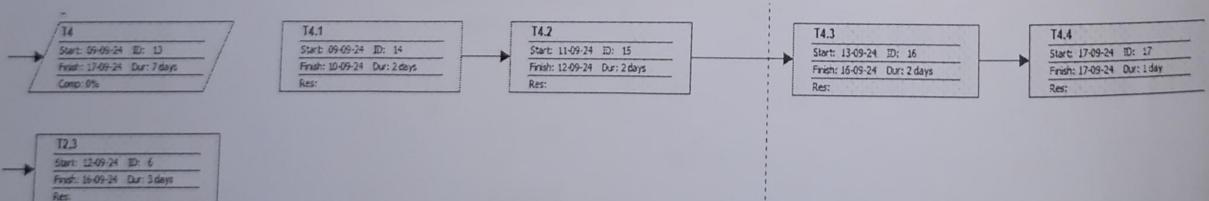
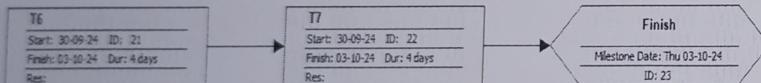
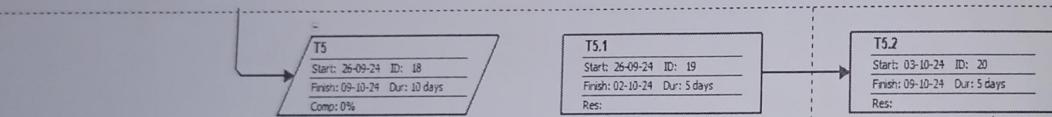
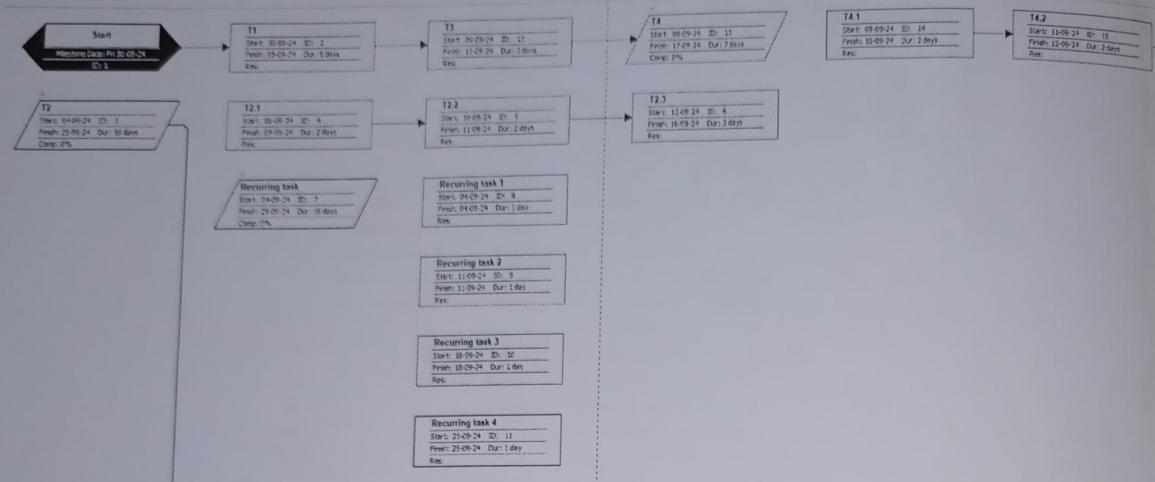


Dated
6/9/2024

	Task Name	Duration	Start	Finish	Predecessors	Resource
1	Start	0 days	Fri 30-08-24	Fri 30-08-24		
2	T1	5 days	Fri 30-08-24	Thu 05-09-24	1	
3	- T2	16 days	Wed 04-09-24	Ned 25-09-24		
4	T2.1	2 days	Fri 06-09-24	Mon 09-09-24		
5	T2.2	2 days	Tue 10-09-24	Wed 11-09-24	4	
6	T2.3	3 days	Thu 12-09-24	Mon 16-09-24	5	
7	- Recurring task	16 days	Wed 04-09-24	Ned 25-09-24		
8	Recurring task 1	1 day	Wed 04-09-24	Wed 04-09-24		
9	Recurring task 2	1 day	Wed 11-09-24	Wed 11-09-24		
10	Recurring task 3	1 day	Wed 18-09-24	Wed 18-09-24		
11	Recurring task 4	1 day	Wed 25-09-24	Wed 25-09-24		
12	T3	3 days	Mon 09-09-24	Wed 11-09-24	2	
13	- T4	7 days	Mon 09-09-24	Tue 17-09-24	12SS	
14	T4.1	2 days	Mon 09-09-24	Tue 10-09-24		
15	T4.2	2 days	Wed 11-09-24	Thu 12-09-24	14	
16	T4.3	2 days	Fri 13-09-24	Mon 16-09-24	15	
17	T4.4	1 day	Tue 17-09-24	Tue 17-09-24	16	
18	- T5	10 days	Thu 26-09-24	Ned 09-10-24	3	
19	T5.1	5 days	Thu 26-09-24	Wed 02-10-24		
20	T5.2	5 days	Thu 03-10-24	Wed 09-10-24	19	
21	T6	4 days	Mon 30-09-24	Thu 03-10-24		
22	T7	4 days	Mon 30-09-24	Thu 03-10-24	21FF	
23	Finish	0 days	Thu 03-10-24	Thu 03-10-24	22	



Network diagram:



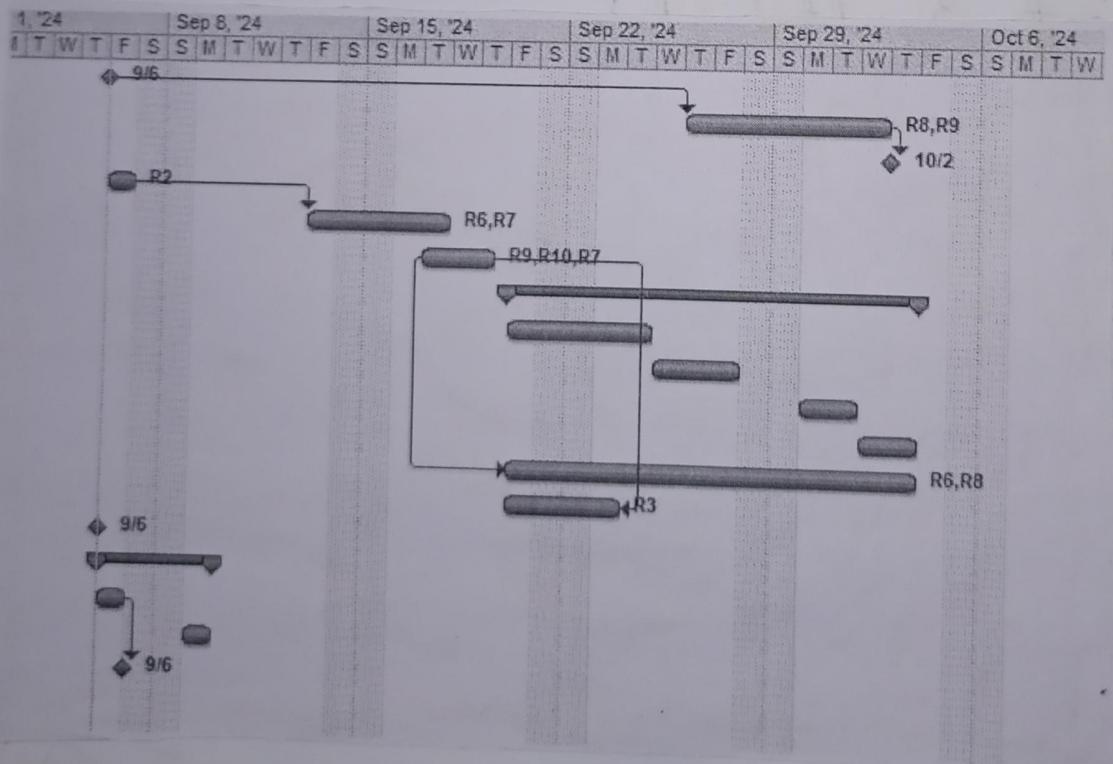
(E) Enter the following tasks :

<u>Tasks</u>	<u>Start Date</u>	<u>Durations (Days)</u>	<u>Resources</u>	<u>Dependency</u>
T ₁	<Today>	1	R ₁ , R ₂	Ind.
T ₂	<Today>	2	R ₂ , R ₄	Ind.
T ₃	<Today> + 5	3	R ₆ , R ₇	T ₁ (FS)
T ₄	<Today> + 7	4	R ₉ , R ₁₀	Ind.
T ₅	<Today> + 10	10	R ₁ , R ₅	Ind.
T ₆	<Today> + 10	10	R ₆ , R ₈	T ₄ (SS)
T ₇	<Today> + 10	2	R ₃	T ₄ (FF)
T ₈	<Today> + 14	5	R ₈ , R ₉	Ind.

Do the following :

- Enter a Task (NEW1) before the first task (T₁).
- Enter a Task (NEW2) just before the last Task (T₈).
- Create 2 sequential subtasks for the task T₂.
- Move the 2nd Independent task (T₂) just before the last task.
- Create 4 sequential subtasks under the 4th Independent Task (T₅).
- Move the 5th Independent Task at the Top.
- Increase the Resource (one) for 3rd Independent Task and observe its change in duration.
- Decrease the Resources (one) of 1st Independent Tasks and observe the change in the duration of the tasks accordingly.

	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	start	0 days	Fri 9/6/24	Fri 9/6/24		
2	T6	5 days	Thu 9/26/24	Wed 10/2/24	1	R8,R9
3	NEW1	0 days	Wed 10/2/24	Wed 10/2/24	2	
4	T1	1 day	Fri 9/6/24	Fri 9/6/24		R2
5	T3	3 days	Fri 9/13/24	Tue 9/17/24	4	R6,R7
6	T4	2.67 days	Tue 9/17/24	Thu 9/19/24		R9,R10,R7
7	- T5	10 days	Fri 9/20/24	Thu 10/3/24		R1,R5
8	T5.1	3 days	Fri 9/20/24	Tue 9/24/24		
9	T5.2	3 days	Wed 9/25/24	Fri 9/27/24		
10	T5.3	2 days	Mon 9/30/24	Tue 10/1/24		
11	T5.4	2 days	Wed 10/2/24	Thu 10/3/24		
12	T6	10 days	Fri 9/20/24	Thu 10/3/24	ESS	R6,R8
13	T7	2 days	Fri 9/20/24	Mon 9/23/24	EFF	R3
14	NEW2	0 days	Fri 9/6/24	Fri 9/6/24		
15	- T2	2 days	Fri 9/6/24	Mon 9/9/24		R2,R4
16	T2.1	1 day	Fri 9/6/24	Fri 9/6/24		
17	T2.2	1 day	Mon 9/9/24	Mon 9/9/24		
18	finish	0 days	Fri 9/6/24	Fri 9/6/24	16	



(F) Consider the following tasks and resource information:

Tasks	Duration (Days)	Resources	Standard Rate	Dependency
T ₁	3	R ₁ , R ₂		Ind.
T ₂	5	R ₃ , R ₄	R ₁ : \$10/Hr	Ind.
T ₃	3	R ₂ , R ₅	R ₂ : \$12/Hr	T ₁ (FS)
T ₄	4	R ₄ , R ₆	R ₃ : \$10/Hr	T ₂ (FS), T ₃ (SS)
T ₅	10	R ₁ , R ₃	R ₄ : \$15/Hr	T ₄ (FS)
T ₆	12	R ₂	R ₅ : \$15/Hr	T ₃ (FS)
T ₇	4	R ₄	R ₆ : \$20/Hr	T ₅ (FF)
T ₈	5	R ₅ , R ₆		T ₆ (FS), T ₇ (FS)

Calculate the usage of the resources (in hours) with assigned tasks and determine manufacturing cost of the project and market price to achieve 25% profit.

Project Statistics for 'AS_1- (F)'

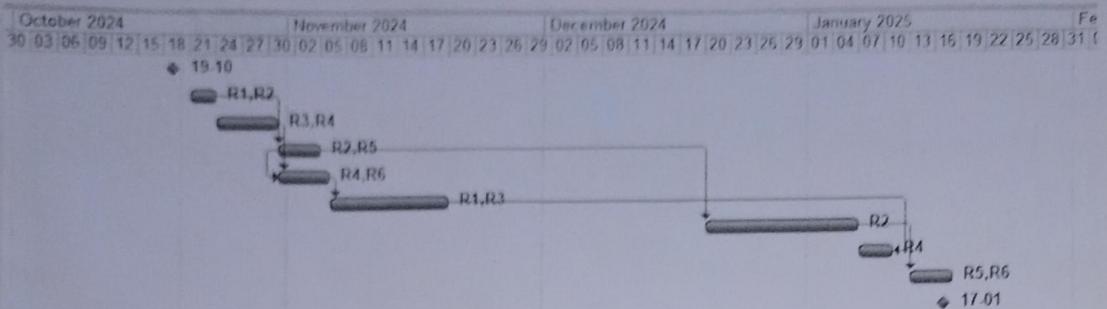
X

	Start	Finish	
Current	Sat 19-10-24	Fri 17-01-25	
Baseline	NA	NA	
Actual	NA	NA	
Variance	0d	0d	
	Duration	Work	Cost
Current	65d	608h	₹ 7,928.00
Baseline	0d?	0h	₹ 0.00
Actual	0d	0h	₹ 0.00
Remaining	65d	608h	₹ 7,928.00

Percent complete:

Duration: 0% Work: 0%

Close



	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	start	0 days	Sat 19-10-24	Sat 19-10-24		
2	T1	3 days	Mon 21-10-24	Wed 23-10-24		R1 R2
3	T2	5 days	Thu 24-10-24	Wed 30-10-24		R3 R4
4	T3	3 days	Thu 31-10-24	Mon 04-11-24	2	R2 R5
5	T4	4 days	Thu 31-10-24	Tue 05-11-24	3 4 SS	R4 R6
6	T5	10 days	Wed 06-11-24	Tue 19-11-24	5	R1 R3
7	T6	12 days	Fri 20-12-24	Mon 06-01-25	4	R2
8	T7	4 days	Tue 07-01-25	Fri 10-01-25	6 FF	R4
9	T8	5 days	Mon 13-01-25	Fri 17-01-25	7 8	R5 R6
10	end	0 days	Fri 17-01-25	Fri 17-01-25		

	Resource Name	Type	Material Label	Initials	Group	Max. Units	Std. Rate	Ovt. Rate	Cost/Use	Accrued At	Base Calendar	Code
1	R1	Work		R		100%	€ 10.00/hr	€ 0.00/hr	€ 0.00	Prorated	Standard	
2	R2	Work		R		100%	€ 12.00/hr	€ 0.00/hr	€ 0.00	Prorated	Standard	
3	R3	Work		R		100%	€ 10.00/hr	€ 0.00/hr	€ 0.00	Prorated	Standard	
4	R4	Work		R		100%	€ 15.00/hr	€ 0.00/hr	€ 0.00	Prorated	Standard	
5	R5	Work		R		100%	€ 15.00/hr	€ 0.00/hr	€ 0.00	Prorated	Standard	
6	R6	Work		R		100%	€ 20.00/hr	€ 0.00/hr	€ 0.00	Prorated	Standard	

(B) Consider the following activities with optimistic, nominal & pessimistic duration to organize a conference:

a) Conference

a.1) Preplanning

a.1.1) Determine topics (3, 5, 7)

a.1.2) Send invitation (2, 3, 5)

a.2) Selection

a.2.1) Receive papers (1, 2, 3)

a.2.2) Review and select papers (5, 8, 10)

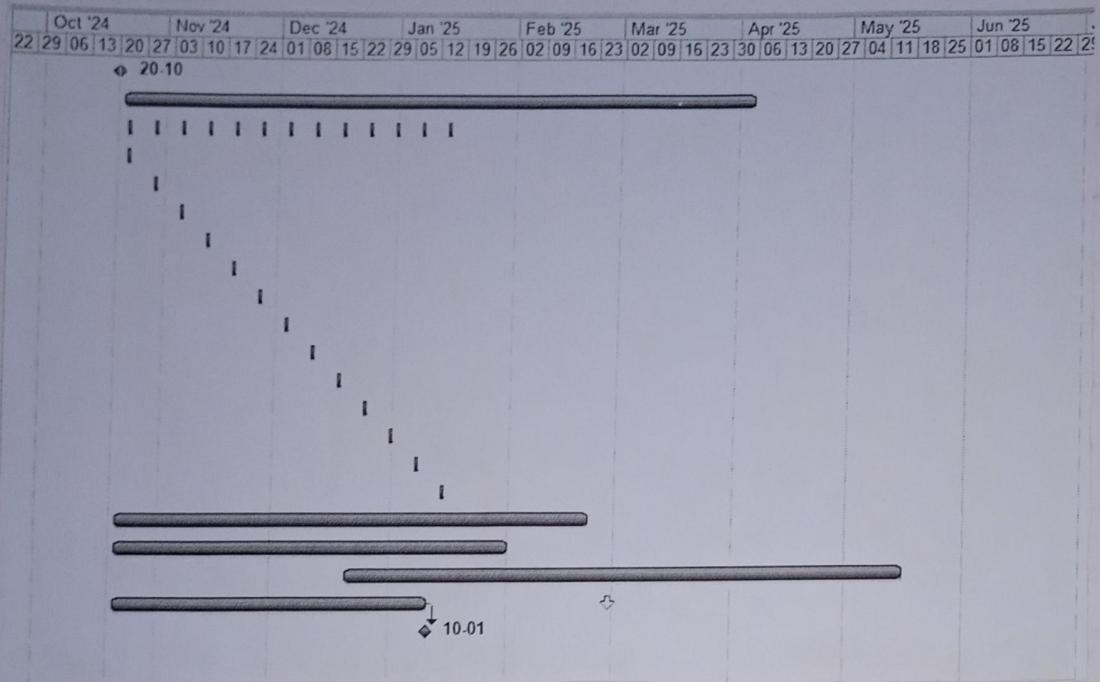
a.2.3) Prepare schedule (2, 3, 5)

Precedence relations : a.1 < a.2 ; a.1.1 < a.1.2 ;

a.2.1 < a.2.2 < a.2.3

Determine the duration of the summary tasks.

Draw the optimistic, expected and pessimistic Gantt chart for the project.



	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	start	0 days	Sun 20-10-24	Sun 20-10-24		
2	T1	120 days	Mon 21-10-24	Fri 04-04-25		
3	- Review of weekly progress	61 days	Tue 22-10-24	Tue 14-01-25		
4	Review of weekly progress 1	1 day	Tue 22-10-24	Tue 22-10-24		
5	Review of weekly progress 2	1 day	Tue 29-10-24	Tue 29-10-24		
6	Review of weekly progress 3	1 day	Tue 05-11-24	Tue 05-11-24		
7	Review of weekly progress 4	1 day	Tue 12-11-24	Tue 12-11-24		
8	Review of weekly progress 5	1 day	Tue 19-11-24	Tue 19-11-24		
9	Review of weekly progress 6	1 day	Tue 26-11-24	Tue 26-11-24		
10	Review of weekly progress 7	1 day	Tue 03-12-24	Tue 03-12-24		
11	Review of weekly progress 8	1 day	Tue 10-12-24	Tue 10-12-24		
12	Review of weekly progress 9	1 day	Tue 17-12-24	Tue 17-12-24		
13	Review of weekly progress 10	1 day	Tue 24-12-24	Tue 24-12-24		
14	Review of weekly progress 11	1 day	Tue 31-12-24	Tue 31-12-24		
15	Review of weekly progress 12	1 day	Tue 07-01-25	Tue 07-01-25		
16	Review of weekly progress 13	1 day	Tue 14-01-25	Tue 14-01-25		
17	T2	90 days	Mon 21-10-24	Fri 21-02-25		
18	T3	75 days	Mon 21-10-24	Fri 31-01-25		
19	T4	105 days	Fri 20-12-24	Thu 15-05-25		
20	T5	60 days	Mon 21-10-24	Fri 10-01-25		
21	end	0 days	Fri 10-01-25	Fri 10-01-25	20	

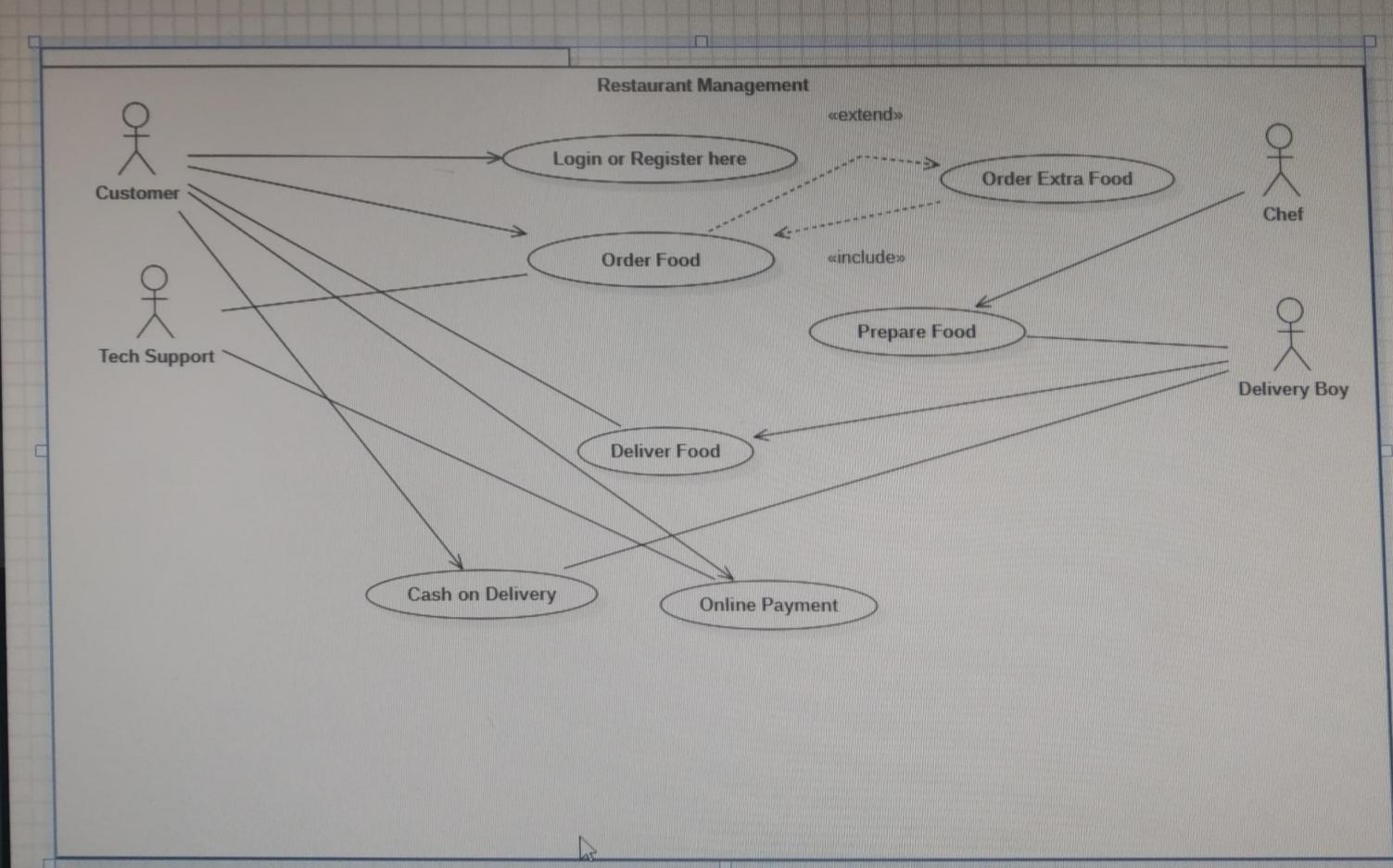
(A) Do the following :

- i) Enter 5 tasks with duration 120 days, 90 days, 75 days, 105 days, 60 days.
- ii) Enter a Recurring Tasks after Task 1. Name of the recurring tasks "Review of weekly progress", Occurrence - weekly, Recurrence Frequency - Tuesday, Range of recurrence - From Start Date to 90 days after the Start Date.
- iii) Change the constraints of Task 3 - Finish No Earlier Than.
- iv) Change the constraints of Task 4 - Must start on - 50 days after the start of the project.
- v) Set the Deadline date for Task 5 as 100 days after the start of the project.
- vi) Manipulate the Gantt chart to view Timing.

UML DIAGRAMS

Main — Model

UseCaseDiagram2 — Model



LBOX



Use Case Subject

Use Case

Actor

Frame

Association

Directed Association

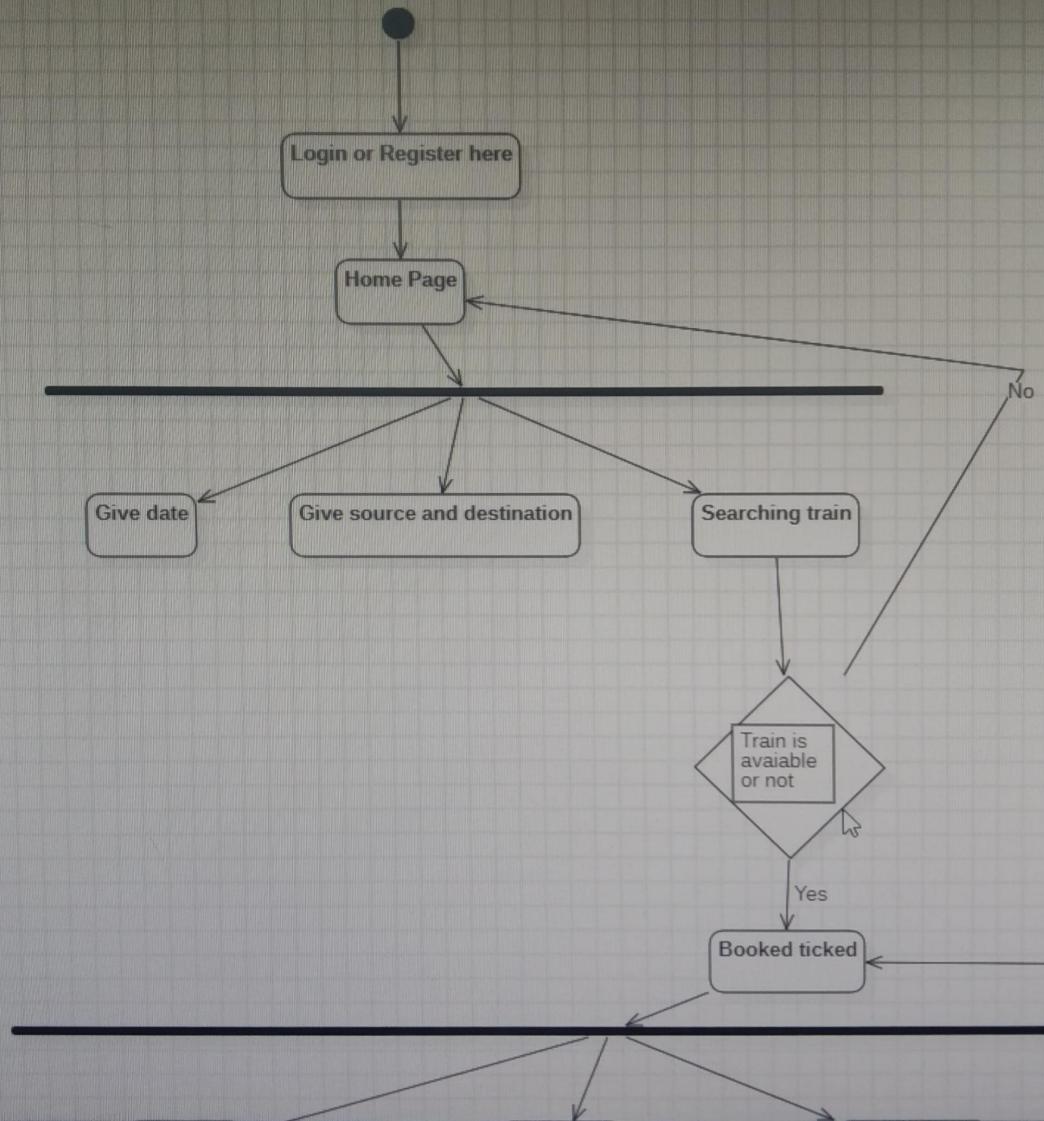
Generalization

Dependency

Include

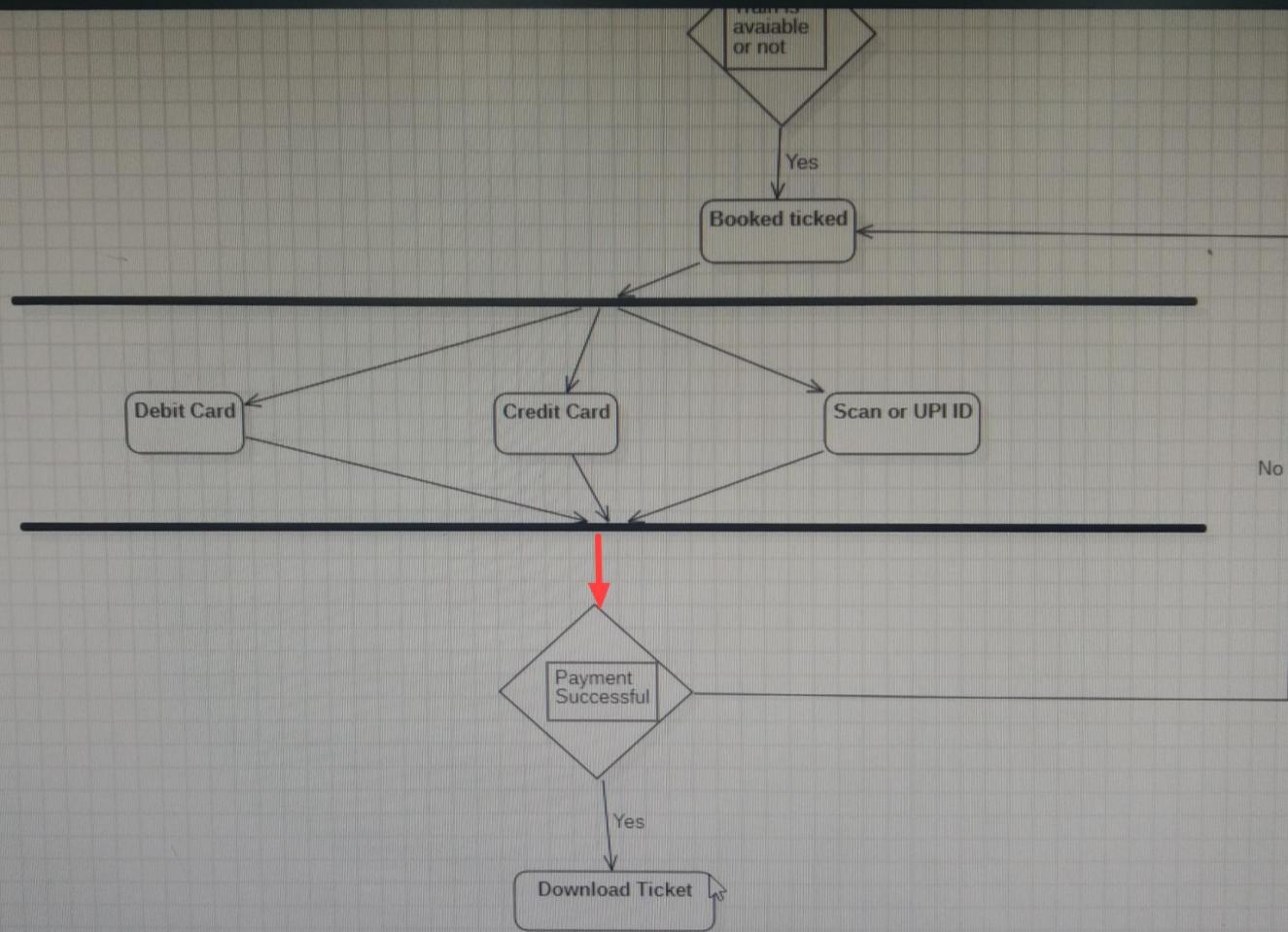
Extend

Annotations



EVALUATION MODE)

View Window Debug Help



EDIT