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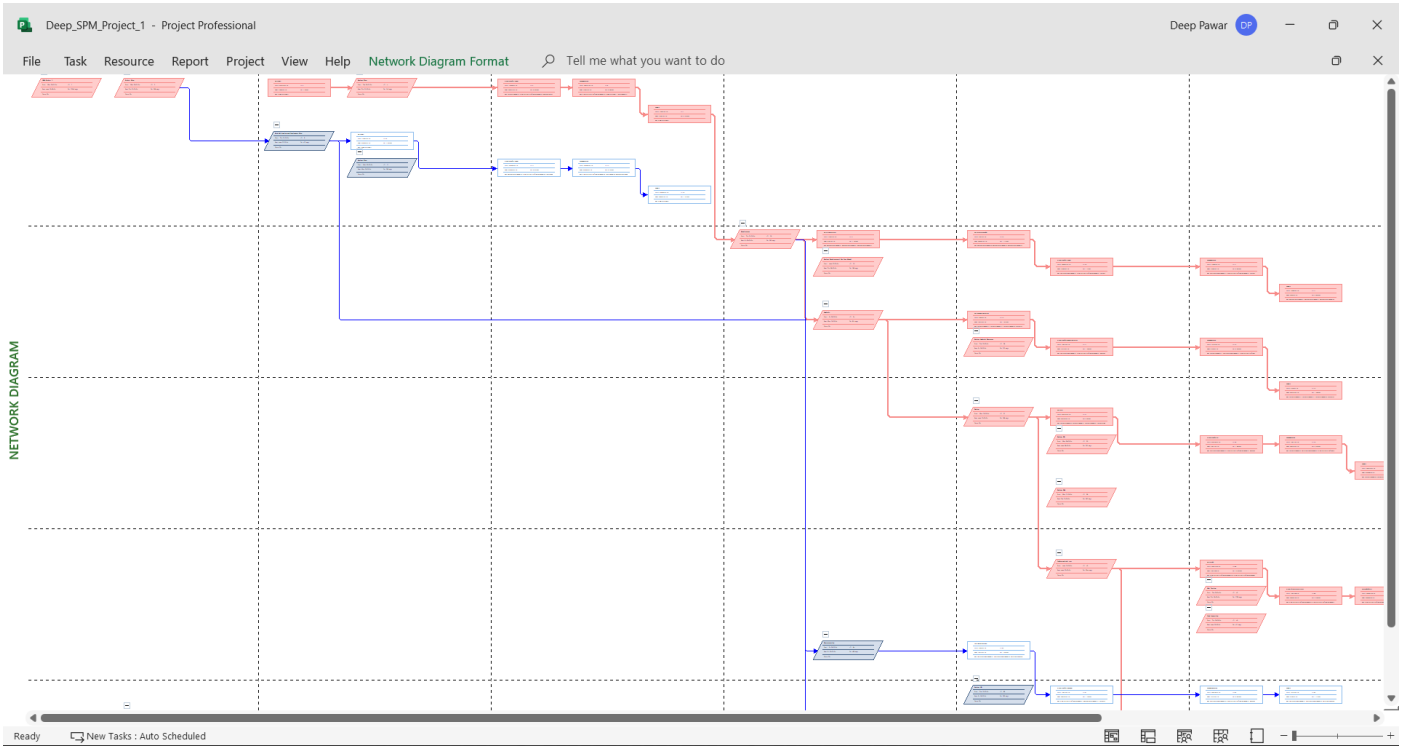
Institute: Illinois Institute of Technology

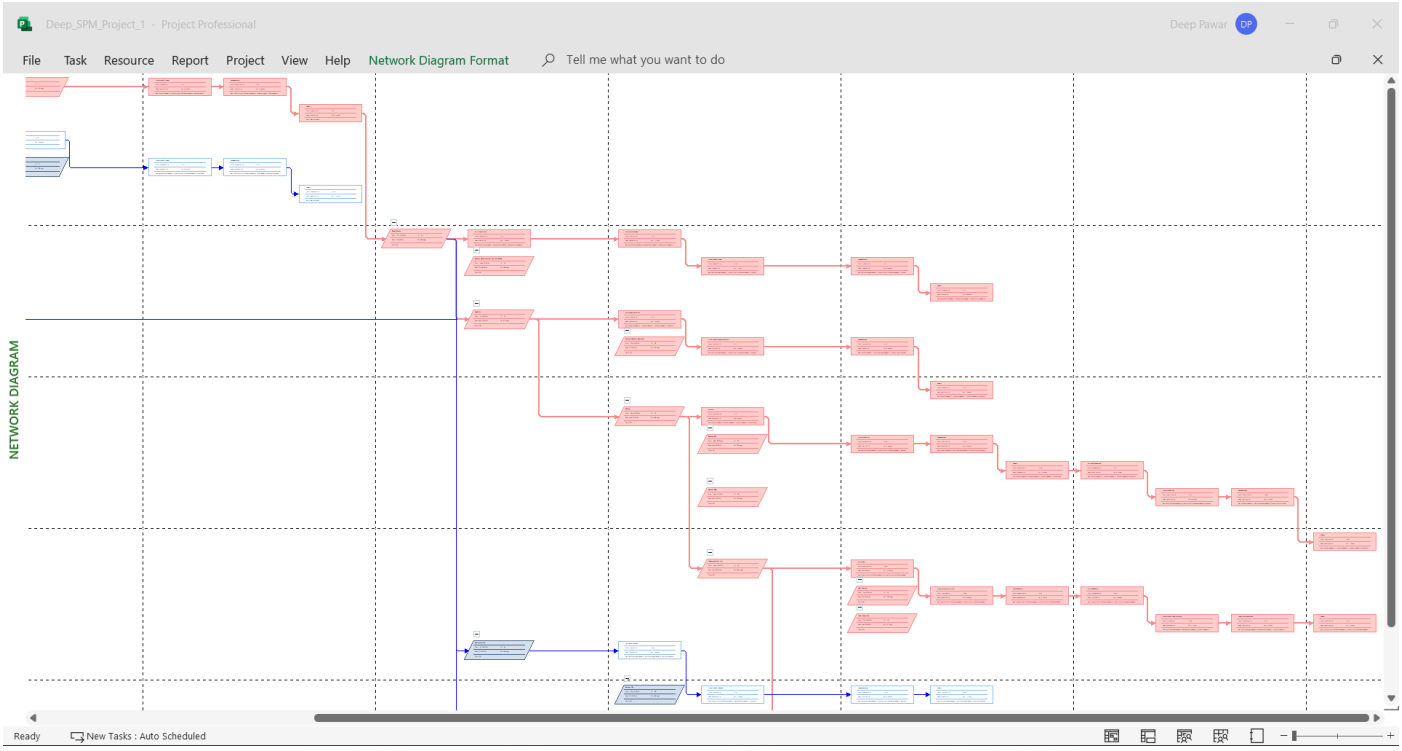
CS 587: Software Project Management

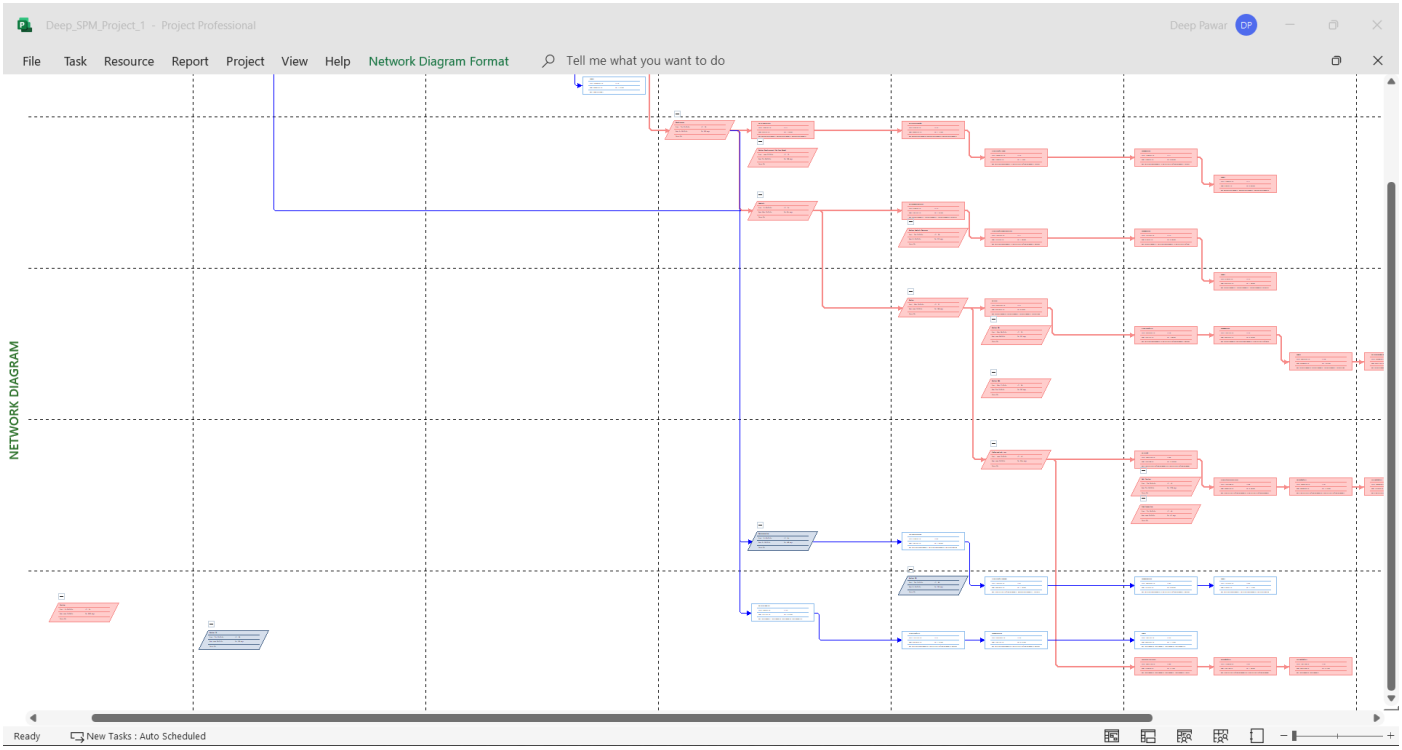
Spring 2024 - Assignment 2

1. Project 1:

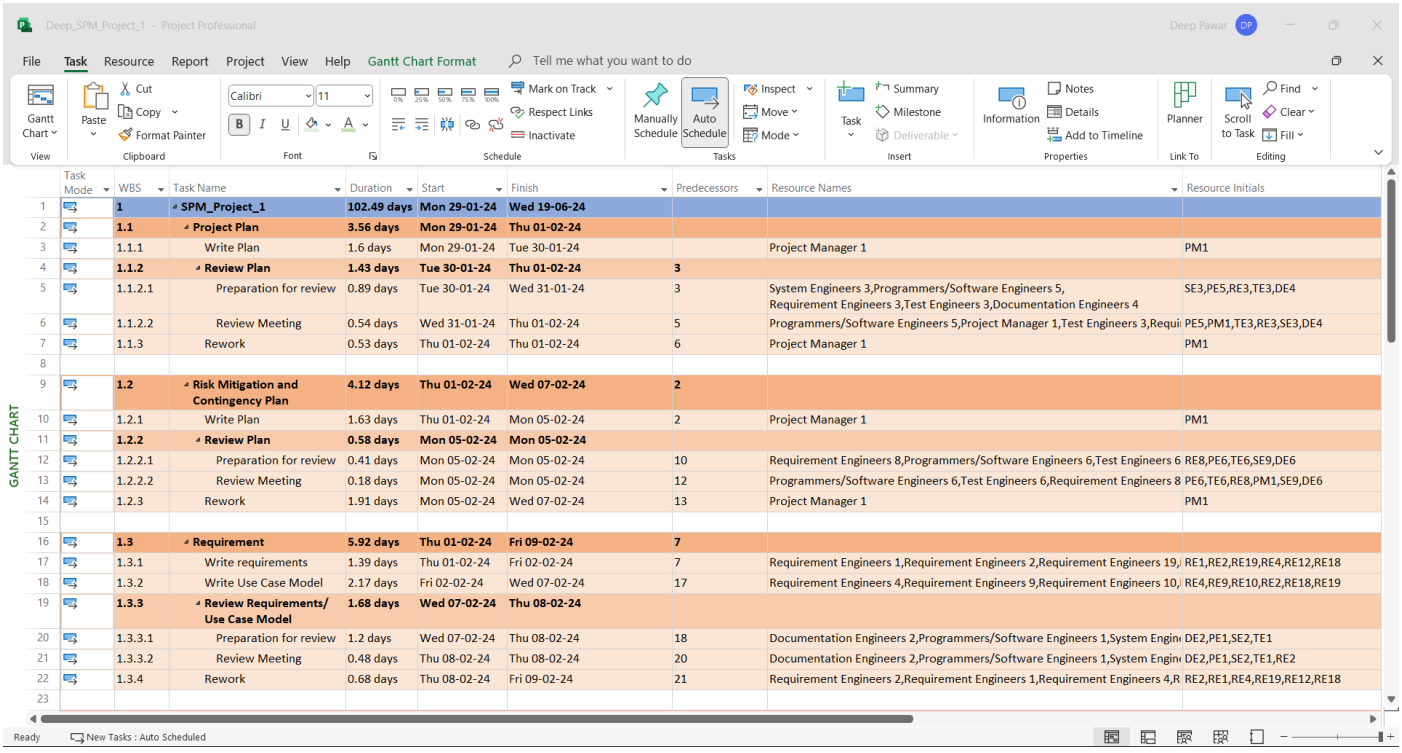
- **Network Diagram:**







- **Gantt Chart:**



	Task Mode	WBS	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Resource Initials
1		**1**	**SPM_Project_1**	**102.49 days**	**Mon 29-01-24**	**Wed 19-06-24**			
2		**1.1**	**Project Plan**	**3.56 days**	**Mon 29-01-24**	**Thu 01-02-24**			
3		1.1.1	Write Plan	1.6 days	Mon 29-01-24	Tue 30-01-24		Project Manager 1	PM1
4		**1.1.2**	**Review Plan**	**1.43 days**	**Tue 30-01-24**	**Thu 01-02-24**	**3**		
5		1.1.2.1	Preparation for review	0.89 days	Tue 30-01-24	Wed 31-01-24	3	System Engineers 3,Programmers/Software Engineers 5, Requirement Engineers 3,Test Engineers 3,Documentation Engineers 4	SE3,PE5,RE3,TE3,DE4
6		1.1.2.2	Review Meeting	0.54 days	Wed 31-01-24	Thu 01-02-24	5	Programmers/Software Engineers 5,Project Manager 1,Test Engineers 3,Requi	PE5,PM1,TE3,RE3,SE3,DE4
7		1.1.3	Rework	0.53 days	Thu 01-02-24	Thu 01-02-24	6	Project Manager 1	PM1
8									
9		**1.2**	**Risk Mitigation and Contingency Plan**	**4.12 days**	**Thu 01-02-24**	**Wed 07-02-24**	**2**		
10		1.2.1	Write Plan	1.63 days	Thu 01-02-24	Mon 05-02-24	2	Project Manager 1	PM1
11		**1.2.2**	**Review Plan**	**0.58 days**	**Mon 05-02-24**	**Mon 05-02-24**			
12		1.2.2.1	Preparation for review	0.41 days	Mon 05-02-24	Mon 05-02-24	10	Requirement Engineers 8,Programmers/Software Engineers 6,Test Engineers 6	RE8,PE6,TE6,SE9,DE6
13		1.2.2.2	Review Meeting	0.18 days	Mon 05-02-24	Mon 05-02-24	12	Programmers/Software Engineers 6,Test Engineers 6,Requirement Engineers 8	PE6,TE6,RE8,PM1,SE9,DE6
14		1.2.3	Rework	1.91 days	Mon 05-02-24	Wed 07-02-24	13	Project Manager 1	PM1
15									
16		**1.3**	**Requirement**	**5.92 days**	**Thu 01-02-24**	**Fri 09-02-24**	**7**		
17		1.3.1	Write requirements	1.39 days	Thu 01-02-24	Fri 02-02-24	7	Requirement Engineers 1,Requirement Engineers 2,Requirement Engineers 19,	RE1,RE2,RE19,RE4,RE12,RE18
18		1.3.2	Write Use Case Model	2.17 days	Fri 02-02-24	Wed 07-02-24	17	Requirement Engineers 4,Requirement Engineers 9,Requirement Engineers 10,	RE4,RE9,RE10,RE2,RE18,RE19
19		**1.3.3**	**Review Requirements/ Use Case Model**	**1.68 days**	**Wed 07-02-24**	**Thu 08-02-24**			
20		1.3.3.1	Preparation for review	1.2 days	Wed 07-02-24	Thu 08-02-24	18	Documentation Engineers 2,Programmers/Software Engineers 1,System Engin	DE2,PE1,SE2,TE1
21		1.3.3.2	Review Meeting	0.48 days	Thu 08-02-24	Thu 08-02-24	20	Documentation Engineers 2,Programmers/Software Engineers 1,System Engin	DE2,PE1,SE2,TE1,RE2
22		1.3.4	Rework	0.68 days	Thu 08-02-24	Fri 09-02-24	21	Requirement Engineers 2,Requirement Engineers 1,Requirement Engineers 4,R	RE2,RE1,RE4,RE19,RE12,RE18
23									

- **Calculation:**

The formula to calculate duration:

Number of days = $\frac{(\text{Amount of work / Productivity Rate})}{8}$

Here,

8 hours is considered as 1 day as per 9-5 office hours

- **Example Calculation:**

1. **Project Plan - Write plan:**
   - ✓ Amount of work: 51 pages
   - ✓ Productivity rate: 2 pages/hour
   - ✓ Duration = $\frac{51/2}{8}$ = 3.19 days
2. **Risk Mitigation and Contingency Plan – Write Plan**
   - ✓ Amount of work: 65 pages
   - ✓ Productivity rate: 5 pages/hour
   - ✓ Duration = $\frac{65/5}{8}$ = 1.63 days
3. **Requirement – Write Use case Models:**
   - ✓ Amount of work: 167 requests
   - ✓ Productivity rate: 5 requests/hour
   - ✓ Duration = $\frac{167/5}{8}$ = 4.18 days
4. **Analysis –Review Meeting:**
   - ✓ Amount of work: 89 pages
   - ✓ Productivity rate: 3 pages/hour
   - ✓ Duration = $\frac{89/3}{8}$ = 3.71 days
5. **Design – Rework**
   - ✓ Amount of work: 184 pages
   - ✓ Productivity rate: 5 pages/hour
   - ✓ Duration/Effort = $\frac{184/5}{8}$ = 4.6 days
6. **Coding and Unit Test - Prep for code inspection**
   - ✓ Amount of work: 5123 SLOC
   - ✓ Productivity rate: 5 SLOC/hour
   - ✓ Duration/Effort = $\frac{5123/5}{8}$ = 128.08 days
7. **Testing – Execute TP (test cases):**
   - ✓ Amount of work: 231 pages
   - ✓ Productivity rate: 5 pages/day
   - ✓ Duration/Effort = $\frac{231/5}{8}$ = 46.2 days
8. **Documentation - Review UD Meeting:**
   - ✓ Amount of work: 146 pages
   - ✓ Productivity rate: 4 pages/hour
   - ✓ Duration/Effort = $\frac{146/4}{8}$ = 4.56 days

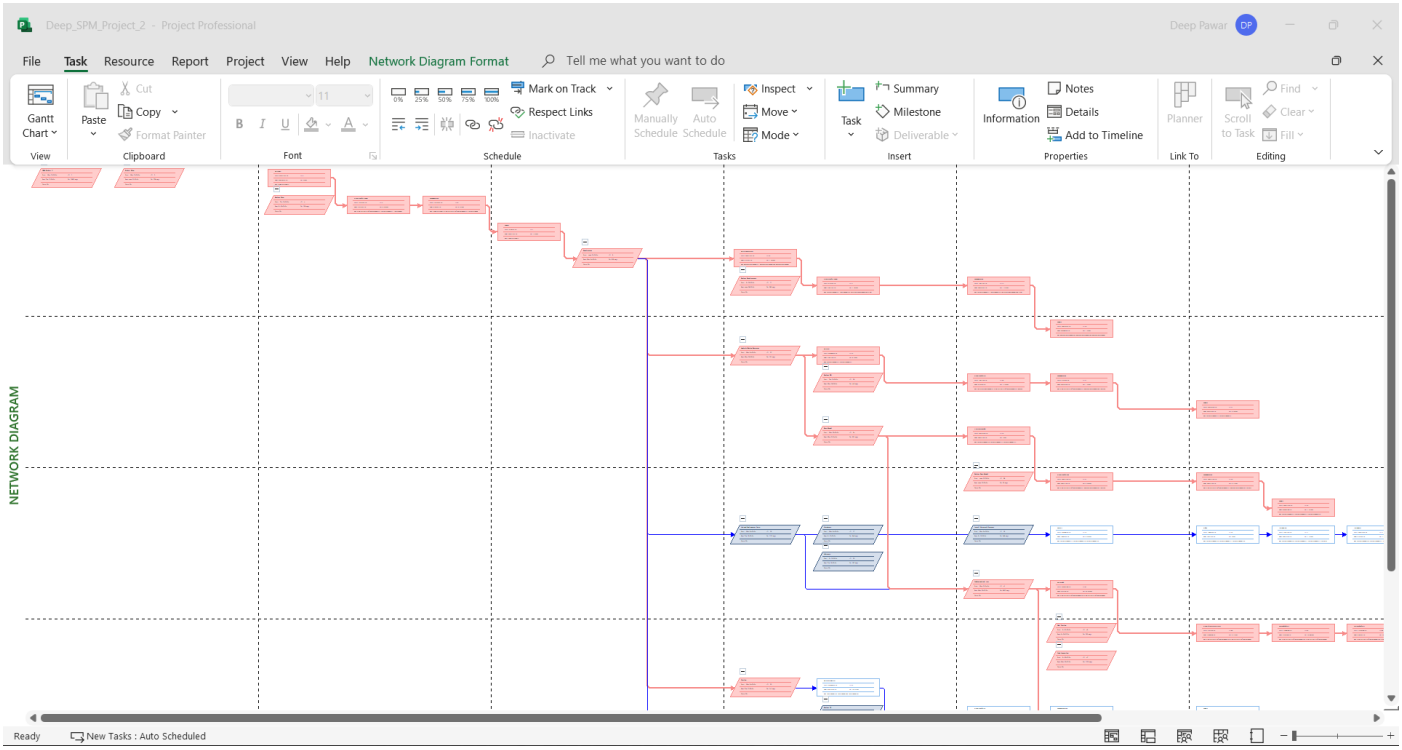
- **Below is the rest of the calculation of each remaining Task:**

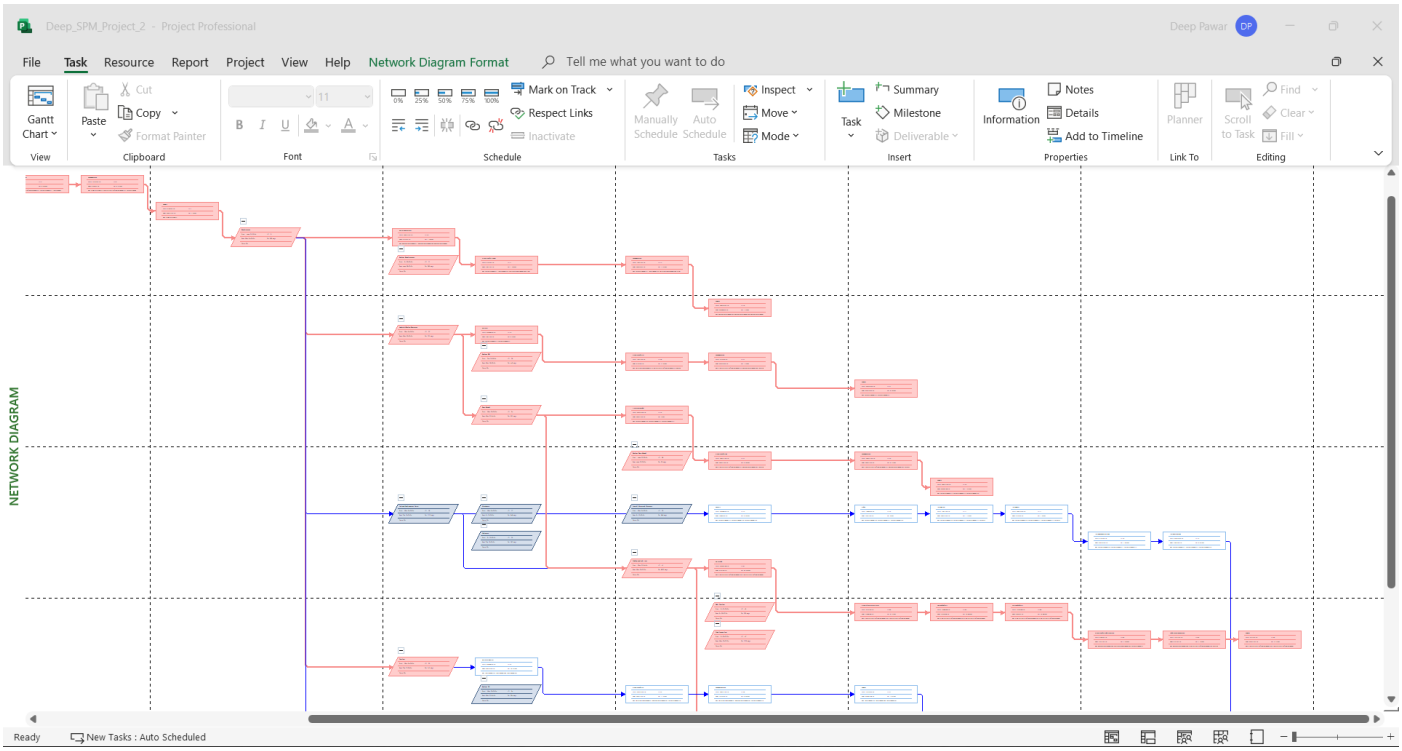
Task	Amount of Work	Productivity Rate	Calculated Duration (in days)
Project Plan			
Write Plan	51 pages	2 pages/Hour	3.19
Review Plan			
Preparation for review		4 pages/Hour	1.59
Review Meeting		5 pages/Hour	1.28
Rework	32 defects	5 defects/Hour	0.8
Risk Mitigation and Contingency Plan			
Write Plan	65 pages	5 pages/Hour	1.63
Review Plan			
Preparation for review		5 pages/Hour	1.63
Review Meeting		10 pages/Hour	0.81
Rework	61 defects	4 defects/Hour	1.91
Requirement			
Write requirements	167 Req	5 Req/Hour	4.18
Write Use Case Model	78 Use Cases	3 use case/2 Hours	6.5
Review Requirements/ Use Case Model			
Preparation for review		18 Req/Hour	1.16
		4 Use Cases/Hour	2.44
Review Meeting		28 Req/Hour	0.75
		6 Use Cases/Hour	1.63
Rework	189 defects	10 defects/Hour	2.36
Analysis			
Write Analysis Document	89 pages	3 pages/Hour	3.71
Review Analysis Document			
Preparation for Analysis Document		4 pages/Hour	2.78
Review Meeting		9 pages/Hour	1.24
Rework	123 defects	5 defects/Hour	3.08
Design			
Write DD	184 pages	5 pages/Hour	4.6
Review DD			
Preparation for DD		4 pages/Hour	5.75
Review Meeting		8 pages/Hour	2.88
Rework	231 defects	4 defects/Hour	7.22
Write Data Model (DM)	34 pages	1 page/4 Hours	17
Review DM			
Preparation for DM		3 pages/Hour	1.42
Review Meeting		5 pages/Hour	0.85
Rework	92 defects	5 defects/Hour	2.3
Coding and unit test			
Write Code	5123 SLOC	5 SLOC/Hour	128.08
Unit Testing			
Prepare/Execute Test Cases	317 test cases	10 Test Cases/Day	31.7
Fix Found Defects	271 Defects	8 Defects/Day	33.88
Test Fixed Defects	271 Defects	12 Defects/Day	22.58
Code Inspection			
Preparation for Code Inspection		100 SLOC/Hour	6.40
Code Inspection Meeting		210 SLOC/Hour	3.05

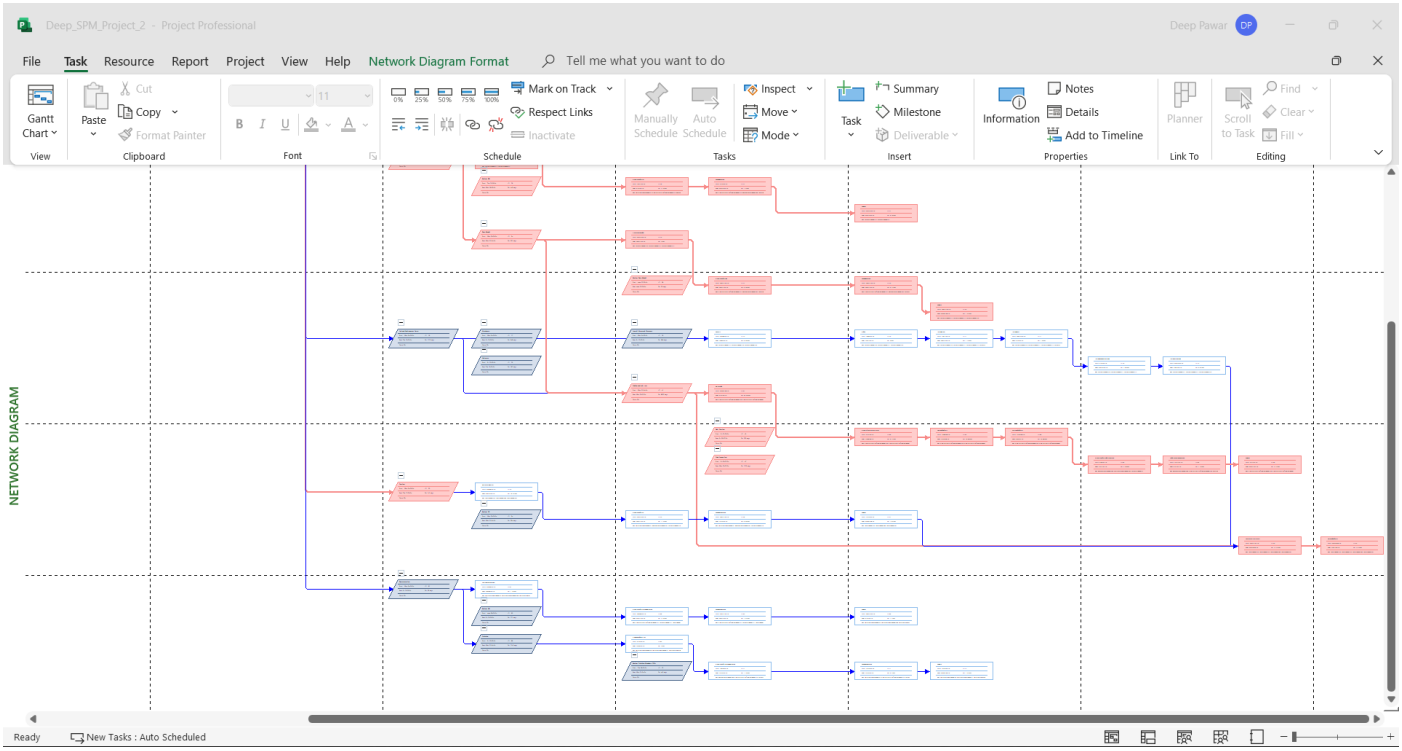
Rework	195 defects	5 defects/Hour	4.88
Testing			
Write test plan (TP)	231 pages	5 pages/Day	46.2
Review TP			
Preparation for TP		4 pages/Hour	7.29
Review TP Meeting		8 pages/Hour	3.61
Rework	310 defects	7 defects/Hour	5.54
Execute TP (test cases)	345 test cases	14 test cases/day	24.64
Fix Found Defects	248 defects	5 defects/day	49.6
Test Fixed Defects	248 defects	10 defects/day	24.8
Documentation			
User Documentation	146 pages	4 pages/Hour	4.56
Review UD			
Preparation for UD Review		4 pages/Hour	4.56
Review UD Meeting		10 pages/Hour	1.83
Rework	283 defects	6 defects/Hour	5.90

2. Project 2:

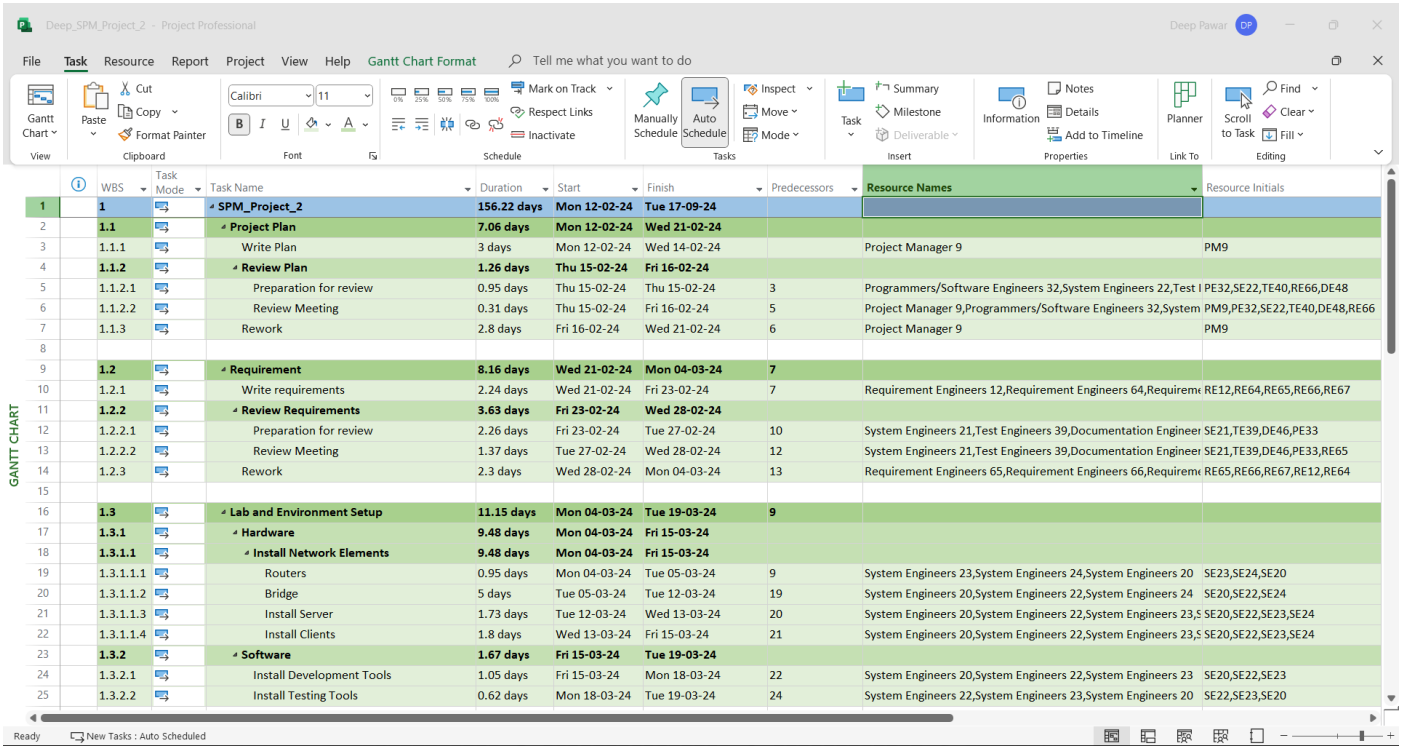
- **Network Diagram:**







- **Gantt Chart:**



	WBS	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Resource Initials
1	1		SPM_Project_2	156.22 days	Mon 12-02-24	Tue 17-09-24			
2	1.1		Project Plan	7.06 days	Mon 12-02-24	Wed 21-02-24			
3	1.1.1		Write Plan	3 days	Mon 12-02-24	Wed 14-02-24		Project Manager 9	PM9
4	1.1.2		Review Plan	1.26 days	Thu 15-02-24	Fri 16-02-24			
5	1.1.2.1		Preparation for review	0.95 days	Thu 15-02-24	Thu 15-02-24	3	Programmers/Software Engineers 32,System Engineers 22,Test I	PE32,SE22,TE40,RE66,DE48
6	1.1.2.2		Review Meeting	0.31 days	Thu 15-02-24	Fri 16-02-24	5	Project Manager 9,Programmers/Software Engineers 32,System	PM9,PE32,SE22,TE40,DE48,RE66
7	1.1.3		Rework	2.8 days	Fri 16-02-24	Wed 21-02-24	6	Project Manager 9	PM9
8									
9	1.2		Requirement	8.16 days	Wed 21-02-24	Mon 04-03-24	7		
10	1.2.1		Write requirements	2.24 days	Wed 21-02-24	Fri 23-02-24	7	Requirement Engineers 12,Requirement Engineers 64,Requirem	RE12,RE64,RE65,RE66,RE67
11	1.2.2		Review Requirements	3.63 days	Fri 23-02-24	Wed 28-02-24			
12	1.2.2.1		Preparation for review	2.26 days	Fri 23-02-24	Tue 27-02-24	10	System Engineers 21,Test Engineers 39,Documentation Engineer	SE21,TE39,DE46,PE33
13	1.2.2.2		Review Meeting	1.37 days	Tue 27-02-24	Wed 28-02-24	12	System Engineers 21,Test Engineers 39,Documentation Engineer	SE21,TE39,DE46,PE33,RE65
14	1.2.3		Rework	2.3 days	Wed 28-02-24	Mon 04-03-24	13	Requirement Engineers 65,Requirement Engineers 66,Requirem	RE65,RE66,RE67,RE12,RE64
15									
16	1.3		Lab and Environment Setup	11.15 days	Mon 04-03-24	Tue 19-03-24	9		
17	1.3.1		Hardware	9.48 days	Mon 04-03-24	Fri 15-03-24			
18	1.3.1.1		Install Network Elements	9.48 days	Mon 04-03-24	Fri 15-03-24			
19	1.3.1.1.1		Routers	0.95 days	Mon 04-03-24	Tue 05-03-24	9	System Engineers 23,System Engineers 24,System Engineers 20	SE23,SE24,SE20
20	1.3.1.1.2		Bridge	5 days	Tue 05-03-24	Tue 12-03-24	19	System Engineers 20,System Engineers 22,System Engineers 24	SE20,SE22,SE24
21	1.3.1.1.3		Install Server	1.73 days	Tue 12-03-24	Wed 13-03-24	20	System Engineers 20,System Engineers 22,System Engineers 23,S	SE20,SE22,SE23,SE24
22	1.3.1.1.4		Install Clients	1.8 days	Wed 13-03-24	Fri 15-03-24	21	System Engineers 20,System Engineers 22,System Engineers 23,S	SE20,SE22,SE23,SE24
23	1.3.2		Software	1.67 days	Fri 15-03-24	Tue 19-03-24			
24	1.3.2.1		Install Development Tools	1.05 days	Fri 15-03-24	Mon 18-03-24	22	System Engineers 20,System Engineers 22,System Engineers 23	SE20,SE22,SE23
25	1.3.2.2		Install Testing Tools	0.62 days	Mon 18-03-24	Tue 19-03-24	24	System Engineers 22,System Engineers 23,System Engineers 20	SE22,SE23,SE20

- **Calculation:**

The formula to calculate duration:

$$\text{Number of days} = \frac{(\text{Amount of work} / \text{Productivity Rate})}{8}$$

Here, 8 hours is considered as 1 day as per 9-5 office hours

- **Example Calculation:**

1. **Project Plan - Write plan:**
   - ✓ Amount of work: 120 pages
   - ✓ Productivity rate: 5 pages/hour
   - ✓ Duration = $\frac{120/5}{8}$ = 3 days
2. **Requirement – Write requirements:**
   - ✓ Amount of work: 410 requests
   - ✓ Productivity rate: 4 requests/hour
   - ✓ Duration = $\frac{410/4}{8}$ = 12.8 days
3. **Lab and environment Setup - Routers:**
   - ✓ Amount of work: 10
   - ✓ Productivity rate: 3 Routers/day
   - ✓ Duration = $\frac{10}{8}$ = 3.33 days
4. **Analysis/Design document –Write DD:**
   - ✓ Amount of work: 403 pages
   - ✓ Productivity rate: 4 pages/hour
   - ✓ Duration = $\frac{403/4}{8}$ = 12.6 days
5. **Data Model – Create Data Model:**
   - ✓ Amount of work: 48 pages
   - ✓ Productivity rate: 1 pages/hour
   - ✓ Duration/Effort = $\frac{48/1}{8}$ = 6 days
6. **Coding and Unit Test – Write Code**
   - ✓ Amount of work: 8420 SLOC
   - ✓ Productivity rate: 6 SLOC/hour
   - ✓ Duration/Effort = $\frac{8420/6}{8}$ = 175.42 days
7. **Testing – Write test plan (TP):**
   - ✓ Amount of work: 357 pages
   - ✓ Productivity rate: 8 pages/day
   - ✓ Duration/Effort = $\frac{357}{8}$ = 44.63 days
8. **Documentation – User Documentation:**
   - ✓ Amount of work: 510 pages
   - ✓ Productivity rate: 5 pages/hour
   - ✓ Duration/Effort = $\frac{510/5}{8}$ = 12.75 days
9. **Training – Training Handouts (TH):**
   - ✓ Amount of work: 280 pages
   - ✓ Productivity rate: 1 pages/hour
   - ✓ Duration/Effort = $\frac{280/1}{8}$ = 35 days

- **Below is the rest of the calculation of each remaining Task:**

Task	Amount of Work	Productivity Rate	Calculated Duration (in days)
Project Plan			
Write Plan	120 pages	5 pages/Hour	3
Review Plan			
Preparation for review		3 pages/Hour	5
Review Meeting		10 pages/Hour	1.5
Rework	156 defects	7 defects/Hour	2.8
Requirement			
Write requirements	410 Req	4 Req/Hour	12.81
Review Requirements			
Preparation for review		5 Req/Hour	10.25
Review Meeting		8 Req/Hour	6.41
Rework	378 defects	4 defects/Hour	11.81
Lab and Environment Setup			
Hardware			
Install Network Elements			
Routers	10	3 Routers/day	3.33
Bridge	30	2 Bridges/day	15
Install Server	26 servers	3 servers/day	8.66
Install Clients	90 clients	10 clients/day	9
Software			
Install Development Tools	21 tools	5 tools/day	4.2
Install Testing Tools	21 tools	8 tools/day	2.62
Analysis/Design Document			
Write DD	403 pages	4 pages/Hour	12.6
Review DD			
Preparation for DD		4 pages/Hour	12.6
Review Meeting		8 pages/Hour	6.3
Rework	343 defects	5 defects/Hour	8.6
Data Model			
Create Data Model	48 pages	1 page/Hour	6
Review Data Model			
Preparation for DM		4 pages/Hour	1.5
Review Meeting		10 pages/Hour	0.6
Rework	309 defects	5 defects/Hour	7.73
Coding and unit test			
Write Code	8420 SLOC	6 SLOC/Hour	175.42
Unit Testing			
Prepare/Execute Test Cases	945 test cases	5 Test Cases/Hour	23.62
Fix Found Defects	783 Defects	13 Defects/Day	60.23
Test Fixed Defects	783 Defects	10 Defects/Day	78.3
Code Inspection			
Preparation for Code Inspection		70 SLOC/Hour	15.04
Code Inspection Meeting		120 SLOC/Hour	8.77
Rework	935 defects	5 defects/Hour	23.38
Testing			
Write test plan (TP)	357 pages	8 pages/Day	44.63
Review TP			

Preparation for TP		5 pages/Hour	8.93
Review TP Meeting		10 pages/Hour	4.46
Rework	290 defects	5 defects/Hour	7.25
Execute TP (test cases)	810 test cases	8 test cases/day	101.25
Fix Found Defects	306 defects	5 defects/day	61.2
Documentation			
User Documentation	510 pages	5 page/Hour	12.75
Review UD			
Preparation for UD Review meeting		5 pages/Hour	12.75
Review UD Meeting		7 pages/Hour	9.11
Rework	490 defects	5 defects/Hour	12.25
Training			
Training Handouts (TH)	280 pages	1 page/Hour	35
Review Training Handouts (TH)			
Preparation for TH review meeting		5 pages/Hour	7
Review TH Meeting		10 pages/Hour	3.5
Rework	632 defects	8 defects/Hour	9.88

- **Questions and Answers:**

Q. 6 What is the earliest finish date for this project if it is scheduled to start on 2/12/24? (under this scenario, as soon as engineers complete their tasks on Homework#1 you will assign them to start working on tasks for the Homework#2 project)

Ans:

The earliest finish date for this project if it is scheduled to start on 2/12/24 is 9/17/24.

Q. 7 Is it feasible to complete this project (Assignment#2 project) 3 weeks after the completion date you identified for the project in Assignment#1? Explain.

Ans:

No, it is **not feasible** to complete this project (Assignment 2) 3 weeks after completion of the first project (Assignment 1). This is because lab and environment setup take nearly 2 weeks and since programming tasks like coding and unit testing tasks are dependent on that, they take even more time, just a little less than 3 months. Due to this, testing tasks take up a lot of time, which is around 5 months, which cannot be reduced unless we have more resources which is not the case since, we are sharing resources with the first project (Assignment 1).

Q.9 Submit your Comments regarding the start and completion dates and resources assignments for the two projects in a PDF document called Analysis.pdf.

Ans:

- **Duration:**

Assignment 1 (Project 1): Start Date: 1/29/24 and Completion Date: 6/19/24 (Total: 102.49 days)

Assignment 2 (Project 2): Start Date: 2/12/24 and Completion Date: 9/17/24 (Total: 156.22 days)