Project - Milestone 1

Group Members:

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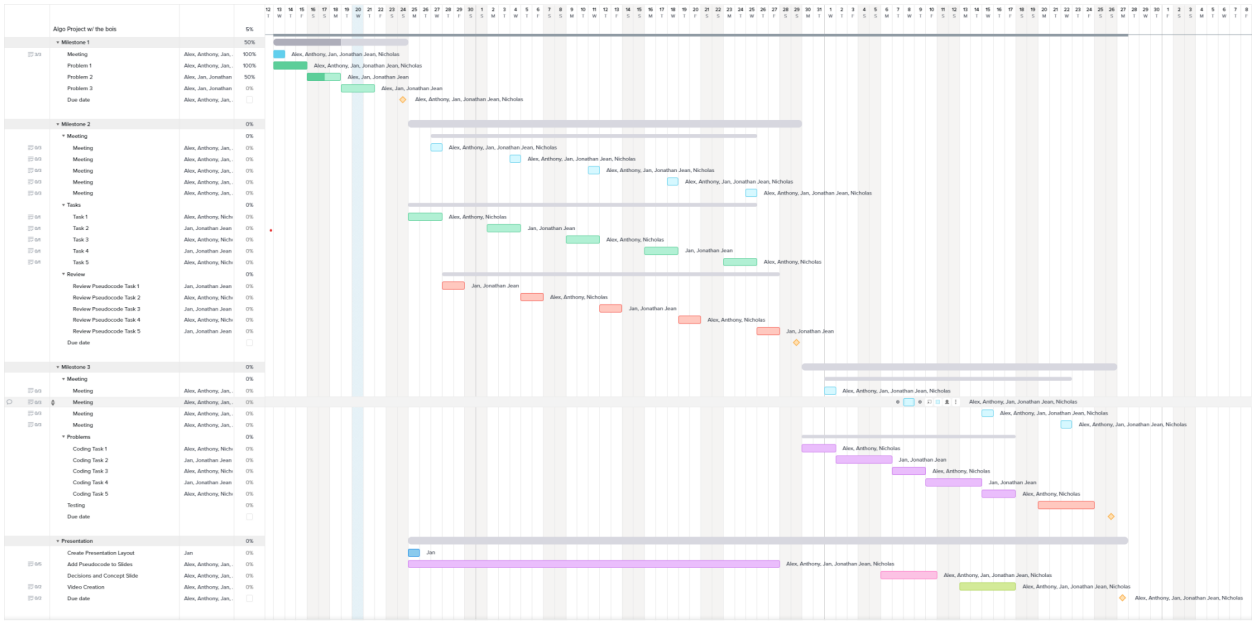
- Jonathan Jean
- Anthony Gravier

GitHub Link:
https://github.com/jtorruellas22/Algorithms-Abstraction-Design-Project/commits/main

Gantt Link:
https://app.teamgantt.com/projects/gantt?ids=3668406



Communication Method:
Discord

Roles:

Project Manager: Jan Torruellas
Gantt Manager: Jonathan Jean
Developer: Alex Tran
Developer: Nicholas Tran
Developer: Anthony Gravier

4.1: Problem 1

For stock with index 1:

$$A = \begin{bmatrix} 12 & 1 & 5 & 3 & 16 \\ 4 & 4 & 13 & 4 & 9 \\ 6 & 8 & 6 & 1 & 2 \\ 14 & 3 & 4 & 8 & 10 \end{bmatrix}$$

- Given buying on day 1: (1, 1, 2,-11), (1, 1, 3, -7,), (1, 1, 4, -9), (1, 1, 5, 4)
- Given buying on day 2: (1, 2, 3, 4), (1, 2, 4, 2), (1, 2, 5, 15)
- Given buying on day 3: (1, 3, 4, -2), (1, 3, 5, 11)
- Given buying on day 4: (1, 4, 5, 13)

For stock with index 2:

- Buying on day 1: (2, 1, 2, 0), (2, 1, 3, 9), (2, 1, 4, 0), (2, 1, 5, 5)
- Buying on day 2: (2, 2, 3, 9), (2, 2, 4, 0), (2, 2, 5, 5)
- Buying on day 3: (2, 3, 4, -9), (2, 3, 5, -4)
- Buying on day 4: (2, 4, 5, 5)

For stock with index 3:

- Buying on day 1: (3, 1, 2, 2), (3, 1, 3, 0), (3, 1, 4, -5), (3, 1, 5, -4)
- Buying on day 2: (3, 2, 3, -2), (3, 2, 4, -7), (3, 2, 5, -6)
- Buying on day 3: (3, 3, 4, -5), (3, 3, 5, -4)
- Buying on day 4: (3, 4, 5, 1)

For stock with index 4:

- Buying on day 1: (4, 1, 2, -11), (4, 1, 3, -10), (4, 1, 4, -9), (4, 1, 5, 4)
- Buying on day 2: (4, 2, 3, 1), (4, 2, 4, 5), (4, 2, 5, 7)
- Buying on day 3: (4, 3, 4, 4), (4, 3, 5, 5)
- Buying on day 4: (4, 4, 5, 2)

Step 3.

- For stock 1, the day with the highest potential profit is day 2.
- For stock 2, the day with the highest potential profit is day 1 or day 2.
- For stock 3, the day with the highest potential profit is day 1.
- For stock 3, the day with the highest potential profit is day 2.

Step 4.

- The stock and day combination that yields the maximum potential profit is (1, 2, 5, 15).

4.2 Problem 2:

Given Matrix:

$$A = \begin{bmatrix} 25 & 30 & 15 & 40 & 50 \\ 10 & 20 & 30 & 25 & 5 \\ 30 & 45 & 35 & 10 & 15 \\ 5 & 50 & 35 & 25 & 45 \end{bmatrix}$$

Answer for k = 3:
Analysis:
Step 1: Buy 4th stock on day 1, sell on day 2
Step 2: Buy 2nd stock on the 2nd day, sell on the 3rd day
Step 3: Buy 1st stock on 3rd day, sell on 5th day
Total profit: 50 - 5 = 45
30 - 20 = 10
50 - 15 = 35
= 90
Output: [(4,1,2), (2,2 3), (1,5)], k = 3 transactions

4.3 Problem 3:

Given Matrix:

$$A = \begin{bmatrix} 7 & 1 & 5 & 3 & 6 & 8 & 9 \\ 2 & 4 & 3 & 7 & 9 & 1 & 8 \\ 5 & 8 & 9 & 1 & 2 & 3 & 10 \\ 9 & 3 & 4 & 8 & 7 & 4 & 1 \\ 3 & 1 & 5 & 8 & 9 & 6 & 4 \end{bmatrix}$$

Answer for c = 2:
Analysis:

Step 1: Buy 3rd stock on day 1, sell on day 3
Step 2: Buy 2nd stock on day 6, sell on day 7

Total Profit:
Profit from step 1: (9 - 5) = 4

Profit from step 2: (8 - 1) = 7

Total Profit: (4+7) = 11

Output = [(3,1, 3), (2,6,7)]