Department of Mechanical, Industrial, and Mechatronics Engineering

Please select your current program below:

☐ **Mechanical Engineering**

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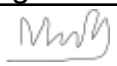
Course Number	MTE301
Course Title	Programming for Mechatronics Engineering
Semester/Year	Winter 2025
Section Number	4

Assignment No.2

Submission Date	Sep 26, 2025
Due Date	Sep 26, 2025

Student Name	Student ID (xxxx1234)	Signature*
Moosa Mughal	xxxx93125	

(Note: Remove the first 4 digits from your student ID)

Assignment 2 Problem 1

Database for films and songs.

1. Create structs for films & songs with parameters (name, director/singer, date) [All strings]
2. Create constructor functions for easy addition of records
    - ```
      Record(string n, string d, string dat)
          {name = n; director/singer = d; date = dat;}
      ```
3. Initialize vectors of the structure types.
4. ```
   vector<Film> films;
   ```
5. Add sample films and songs using .emplace_back()
6. Create a while loop and display actions with numbers as choices
7. Use cin for user input
8. Use if statements to check which choice to do
9. **For displaying records:**
    - Use a for loop and print all films in vector in a numbered list
    - for(records) {
      Cout << i+1<< name << director/singer<< date << endl;
      }
10. **For adding records:**
    - Get input of name, author, date
    - Use appropriate vector and emplace_back to add to vector
11. **For removing records:**
    - Display the records using numbered list (showRecords())
    - Ask which number to remove (with error handling)
    - Use .erase to erase that index
12. **For sorting records:**
    - #include <algorithm>
    - Ask choice (sort by: Name, author, date)
    - Use sort function to sort the vector by selected choice
13. If choice = 0 close program.

```
--- Actions Menu (Enter 0-6) ---
1. Display Films, 2. Display Songs
3. Add Film, 4. Add Song
5. Remove Film, 6. Remove Song
7. Sort Films, 8. Sort Songs
0. Exit
Choose: 1

--- Films ---
1. Kung Fu Panda 2 | Director: Jennifer
2. Interstellar | Director: Christopher
3. The Godfather | Director: Francis Fo
4. Spirited Away | Director: Hayao Miya
```

Assignment 2 Problem 2

Prime Number Finder

1. Add struct Numbers with variables: int num, bool isPrime
2. Create constructor function for Numbers struct and set initial isPrime to true
3. Ask user for an integer for the range (2-n)
4. Have input validation to check if more than 1 and is an integer
5. Create a vector of type Numbers
6. Use for loop to add consecutive integers to Numbers vector [Using emplace_back(num, true)]
7. **Sort using Sieve of Eratosthenes**
    - Loop through vector
    - If current num is marked prime store its value in another int (n)
    - Use an internal loop to mark all multiples of n to not prime

```
// Mark multiples of n as not prime
            for (int j = i + n; j < allNumbers.size(); j += n)
            {
                allNumbers[j].isPrime = false;
            }
```

    - Give user option to only display primes (1) or all numbers labeled (2)
    - If option 1 use for loop to display primes
    - If option 2 use for loop to display all
    - End program.

```
---Prime Number Finder (2-X)---
Until what integer do you want to find the primes? 59
Enter 1 for only primes, or 2 for all numbers labeled: 1

2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59
```

```
---Prime Number Finder (2-X)---
Until what integer do you want to find the primes? 5
Enter 1 for only primes, or 2 for all numbers labeled: 2

2 | Prime
3 | Prime
4 | Not Prime
5 | Prime
```