COMSATS University Islamabad, Attock Campus

Department of computer Science

Program: BSE

Course: **DS**

Assignment No.: **01**

Registration No.: **SP23-BSE-005**

Name: **Inshara Eman Khadija**

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Submitted to: **Sir Muhammad Kamran**

Introduction

This C++ code implements a simple Task Manager application. It allows users to create tasks with descriptions and priorities, view all existing tasks, remove the highest priority task, or remove a specific task by its ID.

Components

- **Task Struct:**
  - Represents a single task with three attributes:
    - id: A unique integer identifier for the task (automatically generated).
    - description: A string containing the task's description.
    - priority: An integer representing the task's priority (higher values indicate higher priority).
  - Includes a constructor Task(int id, const std::string& description, int priority) to easily create new tasks.
- **compareByPriority Function:**
  - A custom comparator function used by the std::sort algorithm.
  - Takes two Task objects as arguments (a and b).
  - Returns true if task a has a higher priority than b, effectively sorting tasks in descending order of priority (highest priority first).
- **TaskManager Class:**
  - Manages the collection of tasks and provides methods for adding, removing, and viewing tasks.
  - Private members:
    - tasks: A vector of Task objects to store all the tasks.
    - nextId: An integer used to generate unique IDs for new tasks.
  - Public methods:
    - addTask(const std::string& description, int priority): Adds a new task with the given description and priority.

        - removeHighestPriorityTask(): Removes the task with the highest priority from the list (if any).
        - removeTaskById(int id): Removes the task with the specified ID from the list (if found).
        - viewTasks() const: Displays information about all tasks in the list.

- **showMenu Function:**
    - Prints a menu to the console listing available options for managing tasks.
- **main Function:**
    - The entry point of the program.
    - Creates an instance of the TaskManager class.
    - Enters a loop that displays the menu, prompts the user for input, and performs the selected action based on the user's choice.
    - Continues looping until the user chooses to exit (option 5).

Logic and Conclusion

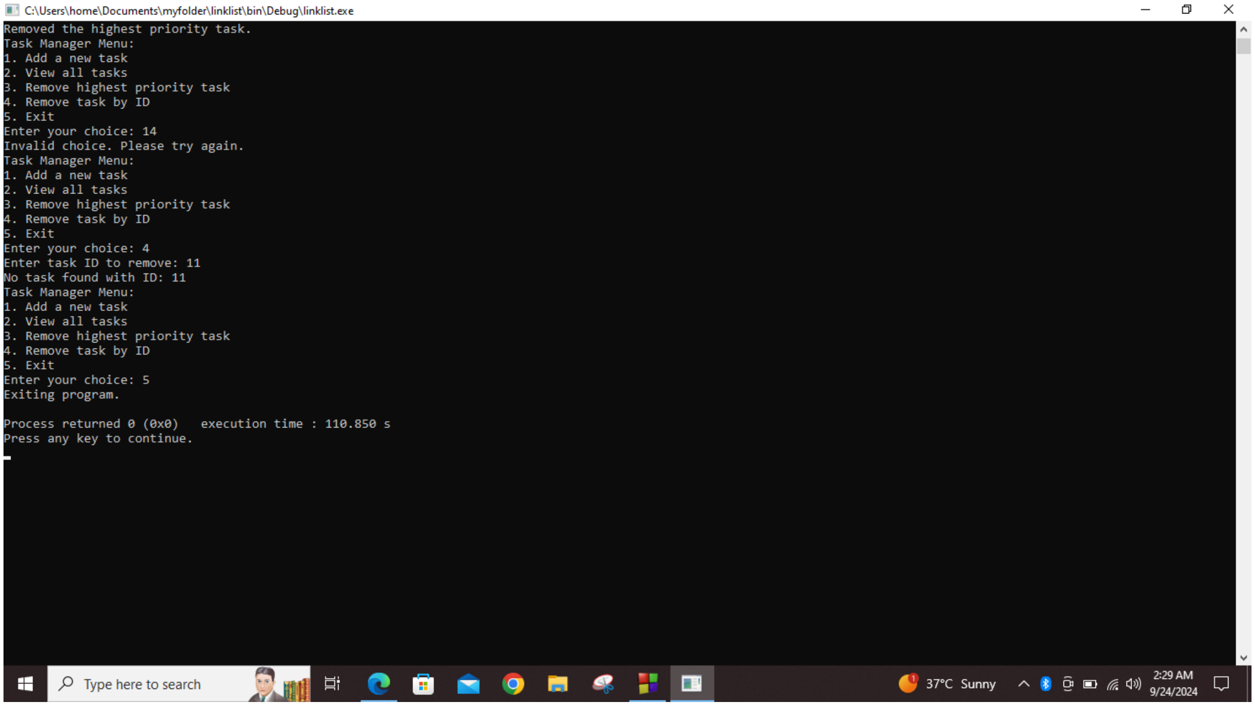
1. **Initialization:**
    - The program starts by creating a TaskManager object (taskManager).
    - It then enters a loop that continues until the user exits.
2. **Menu Display and User Input:**
    - Inside the loop, the showMenu function displays the available options.
    - The user is prompted to enter their choice (1, 2, 3, 4, or 5).
3. **Action Based on Choice:**
    - A switch statement handles the user's choice:
        - Case 1 (Add new task): Prompts the user for a description and priority, creates a new task using the Task constructor, adds it to the tasks vector in taskManager, and sorts the list using std::sort with the compareByPriority function.
        - Case 2 (View all tasks): Calls the viewTasks method on taskManager to display information about all tasks.

        - Case 3 (Remove highest priority task): Calls the removeHighestPriorityTask method on taskManager to remove the task with the highest priority (if any).
        - Case 4 (Remove task by ID): Prompts the user for an ID, calls the removeTaskById method on taskManager with the provided ID, and removes the task if found.
        - Case 5 (Exit): Exits the loop and terminates the program.
        - Default: Handles invalid choices by displaying an error message.

4. **Loop Termination:**
    - The loop continues as long as the user doesn't choose option 5 (Exit).

Conclusion

This code provides a basic task management system in C++. It demonstrates working with user input, collections (vectors), custom data structures (structs), and functions to achieve a practical application. You could extend this code to add features like editing task details, saving tasks to a file, and setting deadlines.


C:\Users\home\Documents\myfolder\linklist\bin\Debug\linklist.exe
Type here to search
37°C Sunny
2:29 AM
9/24/2024

```
Removed the highest priority task.
Task Manager Menu:
1. Add a new task
2. View all tasks
3. Remove highest priority task
4. Remove task by ID
5. Exit
Enter your choice: 14
Invalid choice. Please try again.
Task Manager Menu:
1. Add a new task
2. View all tasks
3. Remove highest priority task
4. Remove task by ID
5. Exit
Enter your choice: 4
Enter task ID to remove: 11
No task found with ID: 11
Task Manager Menu:
1. Add a new task
2. View all tasks
3. Remove highest priority task
4. Remove task by ID
5. Exit
Enter your choice: 5
Exiting program.

Process returned 0 (0x0)   execution time : 110.850 s
Press any key to continue.
```