COMSATS University Islamabad, Attock Campus Department of computer Science

Program: BSE

Course:	**DS (thorey)**
Assignment No.:	**01**
Registration No.:	**SP23-BSE-063**
Name:	**Farwa Qasim**
Date:	**23rd Sep, 2024**
Submitted to:	**SIR KAMRAN**

Objective:

You are required to create a task management system where each task has the following properties:

- Task ID: A unique identifier for the task (e.g., a number).
- Description: A short description of what the task is about (e.g., "Complete project report").
- Priority Level: A number representing the importance of the task, where higher numbers indicate higher priority.

Features of the System:

The system will allow users to add, view, and remove tasks based on their priority or task ID. These tasks will be organized using a singly linked list, where each task is stored as a node. Let's break down the system's requirements:

1. Adding Tasks (in Priority Order):

- When a task is added, it should be inserted into the list according to its priority.
- If the task has a higher priority (a higher priority number), it should appear before tasks with lower priority.
- This means the list should always be sorted by priority.

2. Viewing All Tasks:

- Users should be able to see a list of all tasks.
- The tasks should be displayed in order of priority, with the highest priority tasks shown first.

3. Removing Tasks:

- There are two ways to remove tasks:
    - By Priority: Remove the task with the highest priority (the first task in the list).
    - By Task ID: Remove a specific task by providing its ID (e.g., if a user wants to delete a specific task from the list).

Key Components:

1. **Task as a Node:**
    - Each task is represented as a node in the linked list.
    - A node contains:
        - **Task ID**

- **Description**
- **Priority**
- **Next pointer: Points to the next task in the list.**

2. **Singly Linked List:**
    - A singly linked list is used to store tasks.
    - The list will only link to the next task, and the tasks will be stored in priority order.

System Operations:

- Insert a Task: Add a new task into the list, making sure to keep the list sorted by priority.
- Print All Tasks: Display the tasks in the order of their priority.
- Delete Task by Priority: Remove the highest priority task (the task at the start of the list).
- Delete Task by ID: Remove a task by searching for its ID.

CODE EXPLANATION

Insert a new task (insert_task)

The insert_task function in the task management system adds a new task while maintaining a priority-ordered list using a singly linked list. Here's a brief summary of how it works:

1. Check for Duplicate Task ID: If the task ID already exists, it prevents adding a duplicate.
2. Create a New Task: A new node is created for the task, containing the task ID, description, and priority.
3. Insert at the Beginning if Needed: If the list is empty or the new task has a higher priority than the first task, it's added at the start.
4. Find Correct Position: Otherwise, it traverses the list to find the appropriate spot based on priority.
5. Insert the Task: The task is inserted into the correct position, ensuring the list stays sorted by priority.

2.print all task

Logic:

- It prints a header to separate the output.
- If the task list is empty, it informs the user.
- Otherwise, it iterates through the linked list and prints each task's details (ID, description, and priority).

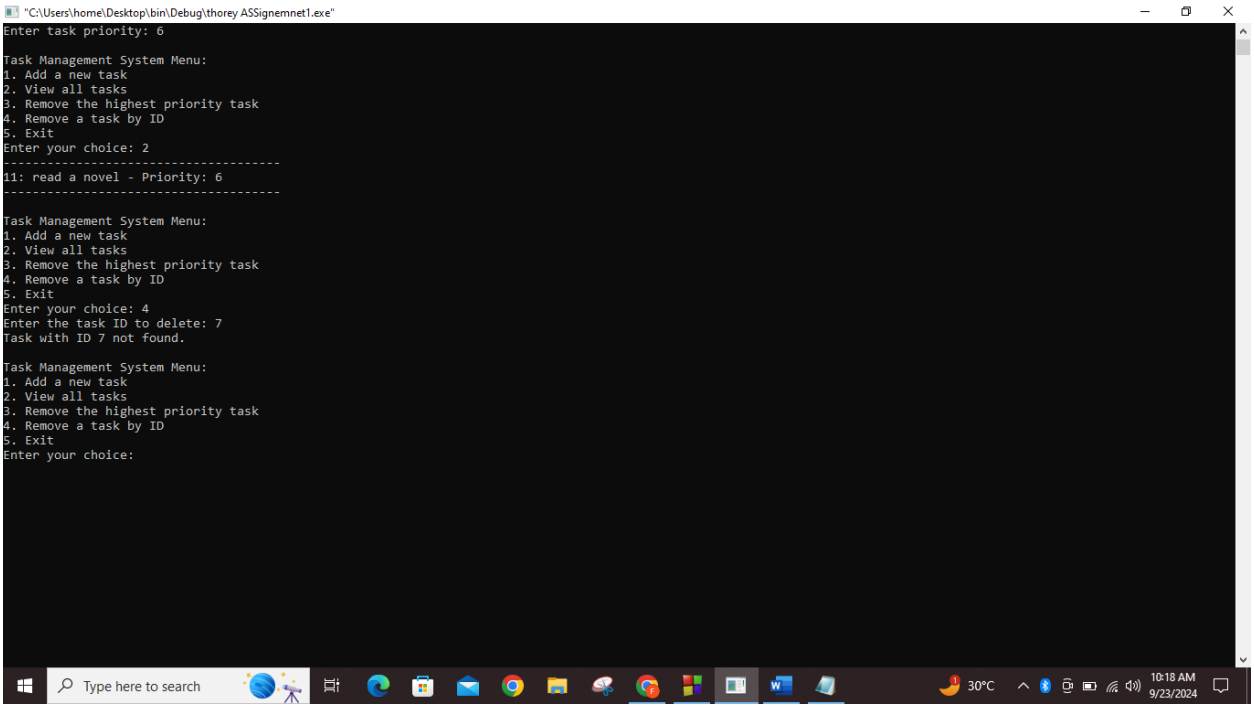
Delete task by ID

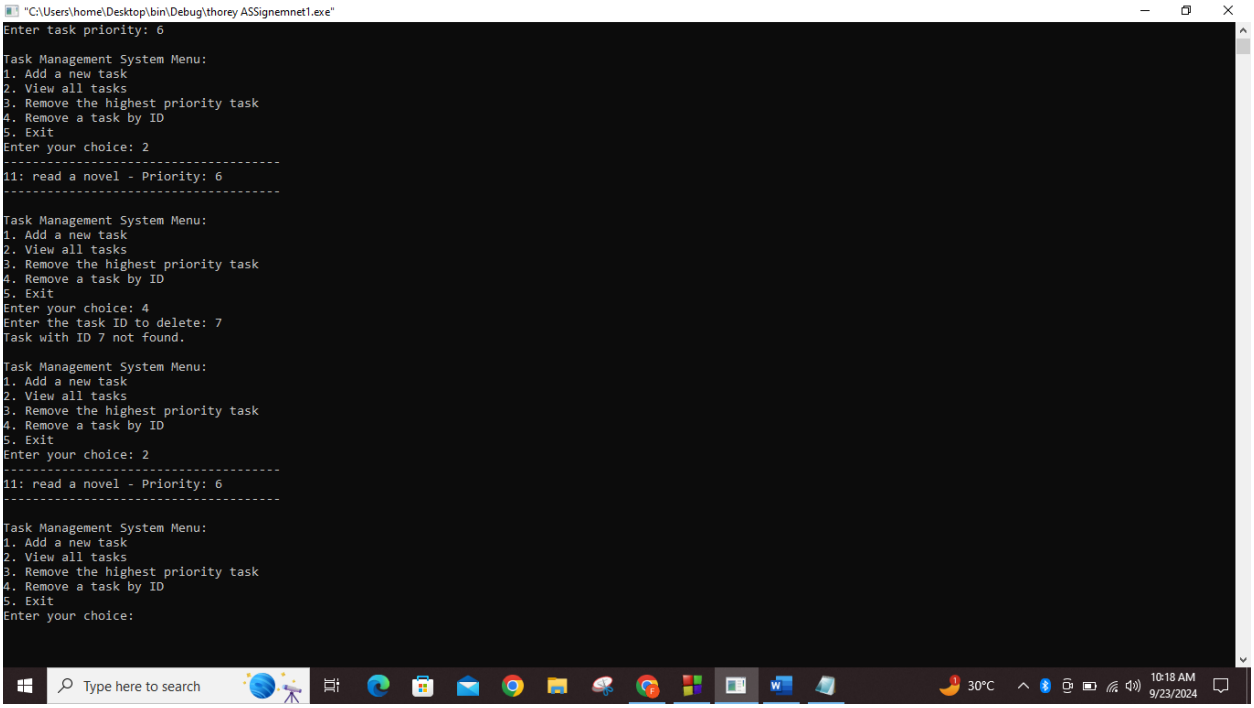
Logic:

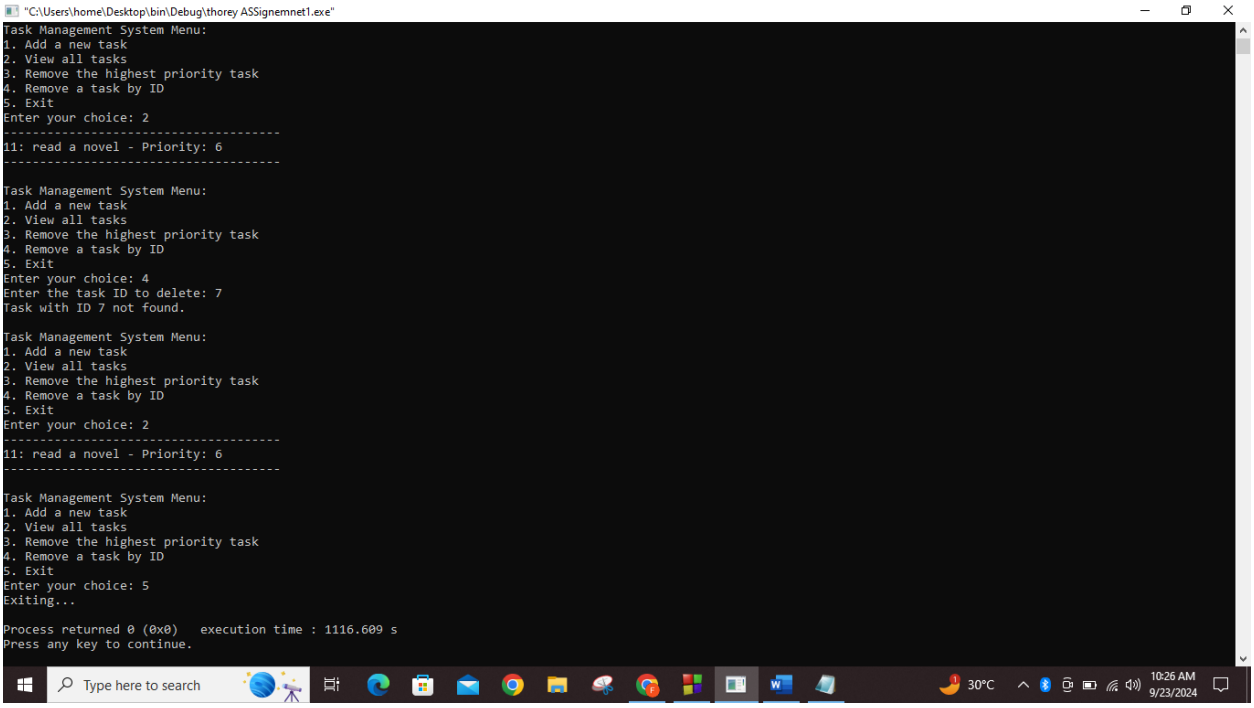
- It checks if the task list is empty.
- If the task to delete is at the head, it updates the head to the next task.
- Otherwise, it searches through the list for the task with the specified ID.
- If found, it adjusts the pointers to remove the task and frees the memory.
- If not found, it informs the user.

Conclusion

This program provides a foundational understanding of linked lists, dynamic memory management, and basic operations that can be performed in a task management system. It is suitable for beginners to learn and expand upon by adding more features like editing tasks, sorting, or saving tasks to a file.




"C:\Users\home\Desktop\bin\Debug\thorey ASSignemnet1.exe"
Enter task priority: 6
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice: 2
11: read a novel - Priority: 6
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice: 4
Enter the task ID to delete: 7
Task with ID 7 not found.
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice: 2
11: read a novel - Priority: 6
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice:
Type here to search
30°C
10:18 AM
9/23/2024


"C:\Users\home\Desktop\bin\Debug\thorey ASSignemnet1.exe"
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice: 2
11: read a novel - Priority: 6
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice: 4
Enter the task ID to delete: 7
Task with ID 7 not found.
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice: 2
11: read a novel - Priority: 6
Task Management System Menu:
1. Add a new task
2. View all tasks
3. Remove the highest priority task
4. Remove a task by ID
5. Exit
Enter your choice: 5
Exiting...
Process returned 0 (0x0) execution time : 1116.609 s
Press any key to continue.
Type here to search
30°C
10:26 AM
9/23/2024