

Task Priority

DFS Lab Project report by -1901,1903,1921

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Problem Statement :

Implementation of Priority Queues using Linked Lists and Arrays

Detailed Project Description:

The concept of Tasks and Task of highest priority was used for this project. Task that have the highest priority are completed first and if there is are two or more tasks with the same priority the task that was added 1st is completed 1st. The higher numbers denote higher priority and lower numbers denote lower. Priority can only be in integers. The only way to complete a task is if it is the highest priority task i.e in front of the queue. Our project also allows the user to add tasks, display tasks, show list of all the higher priority tasks, number of tasks in the task list and modify the task name.

Priority Queue using Linked List:

Since we used a linked list there was no restriction for number of tasks and thus this meant we did not have to set an upper or lower bound for priority so users could set it as they wish which meant they were not restricted to a set of priorities. The tasks were added in to the queue in sorted descending order of priority.

Priority Queue using Array:

Since we also used an array to implement the priority queue, there was restriction for number of tasks that could be inserted into the array, as the array size is fixed. We cannot utilize the blank spaces as the front pointer moves ahead. The tasks were added into the queue in sorted descending order of their priority.

Details of the Data Structures used:

Linked List

we used a struct data type called TaskNode which consisted of:

- char data[20] : stores name of task
- int priority: stores the priority value of task
- TaskNode* Link: which stored address of next node/task

Array

we used a struct data type called queue which consisted of

- char data[10] : stores name of task
- int priority: stores the priority value of task

Screen shots:

Priority Queue using Linked List:

Main menu:

```

Welcome to Task Priority
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option

```

Main Menu Invalid Choice:

```

Invalid choice please try again
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option

```

Empty Task List:

```

Your Task List is Empty
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option

```

Add Task:

```

Higher Priority Tasks are denoted by a higher number

There is no upper or lower bound for priority,
the user can choose their own higher or lower bound numbers

Priority is to be entered as integer only,
Value after decimal point will be dropped
-----

Enter Task Name: task 1
Enter Priority of task: 3

```

Task Add Confirmation:

```
alishahrya@localhost:~/DPS_1stproject/SDS1 -- ./run
Name: task 1
Priority: 3
-----
Confirm Addition of Task?
1:Yes
2:Back to Menu
```

Task Added:

```
alishahrya@localhost:~/DPS_1stproject/SDS1 -- ./run
Added Task
-----
Name: task 1
Priority: 3
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
```

Add Task Invalid Priority Input Response:

```
alishahrya@localhost:~/DPS_1stproject/SDS1 -- ./run
-----
Higher Priority Tasks are denoted by a higher number
There is no upper or lower bound for priority,
the user can choose their own higher or lower bound numbers
Priority is to be entered as integer only,
Value after decimal point will be dropped
-----
Enter Task Name: task 2
Enter Priority of task: char
Invalid input, please enter integer values only
Enter Priority of task:
```

Task Add Confirmation mixed string response:

```
alishahrya@localhost:~/DPS_1stproject/SDS1 -- ./run
Invalid input, please enter integer values only
Please choose between 1 and 2
-----
Name: task 2
Priority: 5
-----
Confirm Addition of Task?
1:Yes
2:Back to Menu
█
```

Task Add Confirmation Invalid Integer Response:

```
githuarg@hszcloud:~/DFS_todo/project/ToDo -- ./run
Please choose between 1 and 2
-----
Name: task 2
Priority: 5
-----
Confirm Addition of Task?
1:Yes
2:Back to Menu
```

Task Add Float Priority Value:

```
githuarg@hszcloud:~/DFS_todo/project/ToDo -- ./run
-----
Higher Priority Tasks are denoted by a higher number

There is no upper or lower bound for priority,
the user can choose their own higher or lower bound numbers

Priority is to be entered as integer only,
Value after decimal point will be dropped
-----

Enter Task Name: task 3
Enter Priority of task: 1.5
```

```
githuarg@hszcloud:~/DFS_todo/project/ToDo -- ./run
Name: task 3
Priority: 1
-----
Confirm Addition of Task?
1:Yes
2:Back to Menu
█
```

Task Add Cancelled:

```
githuarg@hszcloud:~/DFS_todo/project/ToDo -- ./run
Task Not Added
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
█
```

Total number of Tasks:

```
githuarg@hszcloud:~/DFS_todo/project/ToDo -- ./run
-----
Current Total Number of Tasks in Your Tasklist: 3
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
```

Your Task List:

```
altheary@localhost:~/DPS_1st/project/1001 -- /usr
Your Task List :
-----
Number  Priority      Name
-----
1       5             task 2
2       3             task 1
3       1             task 3
-----
Current Total Number of Tasks in Your Tasklist: 3
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
```

Highest Priority Tasks:

If only 1 Highest Priority task:

```
altheary@localhost:~/DPS_1st/project/1001 -- /usr
Your Highest Priority Tasks are :
-----
Number  Priority      Name
-----
1       5             task 2
-----
Total Number of Highest Priority Tasks: 1
-----
Next task that is to be completed:
Task: task 2
Priority: 5
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
```

If more than one task has highest priority Task Added 1st is to be completed first:

```
altheary@localhost:~/DPS_1st/project/1001 -- /usr
Your Highest Priority Tasks are :
-----
Number  Priority      Name
-----
1       5             task 2
2       5             task 4
-----
Total Number of Highest Priority Tasks: 2
-----
Next task that is to be completed:
Task: task 2
Priority: 5
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
```

Modify Task:

```
githu@ps@localhost:~/DPS_4thproject/SM1 -- /bin
Your Task List :
-----
Number  Priority      Name
-----
1       5             task 2
2       5             task 4
3       3             task 1
4       2             task 5tif
5       1             task 3
-----
Current Total Number of Tasks in Your Tasklist: 5
-----
Which Task would like to modify? Task Number: 
```

Task Number Not in list:

```
githu@ps@localhost:~/DPS_4thproject/SM1 -- /bin
-----
Task Number 10 Not Found
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
```

Task Modification Confirmation:

```
githu@ps@localhost:~/DPS_4thproject/SM1 -- /bin
-----
Task: task 5tif
Priority: 2
-----
Is this the task you want to modify?
1:Yes
2:No
```

Task Name Modification Confirmed:

```
githu@ps@localhost:~/DPS_4thproject/SM1 -- /bin
New Task Name: task 5
```

```
githu@ps@localhost:~/DPS_4thproject/SM1 -- /bin
Task Modified To
Name: task 5
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option

```

Task Name Modification Cancelled:

```
Task Name not modified
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
█
```

Task Completion:

```
Task that will be be completed:
-----
Task: task 2
Priority: 5
-----
Confirm Task Completion?
1:Yes
2:Back to Menu
```

Task Completion Confirmed:

```
Completed Task:
task 2
-----
Current Total Number of Tasks in Your Tasklist: 4
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
█
```

Task Completion Cancelled:

```
Task Not completed
-----
1:Add task
2:Complete Task of Highest priority
3:Total Number of tasks
4:Your Task List
5:Your Highest priority Tasks
6:Modify Task Name
7:Exit
-----
Choose your option
```

Exit Screen:

```
You have chosen to exit
-----
```

Priority Queue using Array:

Main Menu

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit
Choice please: █
```

Main Menu Invalid Choice

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit
Choice please: 9
Please choose from the options provided to you!
```

Enqueue

Valid Entries

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit
Choice please: 1
Enter the data in the queue
Task Name: task1
Priority(1-5): 3
Task successfully inserted
```


Invalid Priority Value

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)      3: Display Total number of tasks      4: Modify task name      5: Display All Tasks
6: Display Highest Priority      7: Exit

Choice please: 1

Enter the data in the queue
Task Name: task2

Priority(1-5): 7

Please enter priority number between 1-5 only: 8

Please enter priority number between 1-5 only: -1

Please enter priority number between 1-5 only: _
```

Duplicate Entry

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)      3: Display Total number of tasks      4: Modify task name      5: Display All Tasks
6: Display Highest Priority      7: Exit

Choice please: 1

Enter the data in the queue
Task Name: task2

Priority(1-5): 2

Task already exist
```

Same Priority but different Task Name

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)      3: Display Total number of tasks      4: Modify task name      5: Display All Tasks
6: Display Highest Priority      7: Exit

Choice please: 1

Enter the data in the queue
Task Name: task7

Priority(1-5): 2

Task successfully inserted
```

Display

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)      3: Display Total number of tasks      4: Modify task name      5: Display All Tasks
6: Display Highest Priority      7: Exit

Choice please: 5

The tasks in the queue

Location      Task Name      Priority
0             task1         3
1             task2         2
2             task7         2

Press 1 to continue:
```

Dequeue / Display completed task

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)      3: Display Total number of tasks      4: Modify task name      5: Display All Tasks
6: Display Highest Priority      7: Exit

Choice please: 2

Completed task is: task1
```

```
Priority Queue(Array)

1: Add Task      2: Display Completed Task(Dequeue)      3: Display Total number of tasks      4: Modify task name      5: Display All Tasks
6: Display Highest Priority      7: Exit

Choice please: 5

The tasks in the queue

Location      Task Name      Priority
1             task2         2
2             task7         2

Press 1 to continue:
```

Display Total Number of Tasks

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit

Choice please: 3

Total Number of tasks in the queue: 2_
```

Modify

Valid Input

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit

Choice please: 4

The tasks in the queue

Location      Task Name      Priority
1             task1          3
2             task2          2
3             task7          2

Enter name of the task you wanna modify: task7

Priority(1-5): 2

Enter new name: task9

Task name modified successfully
_
```

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit

Choice please: 5

The tasks in the queue

Location      Task Name      Priority
1             task1          3
2             task2          2
3             task9          2

Press 1 to continue: _
```

Invalid Input

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit
Choice please: 4
The tasks in the queue
Location      Task Name      Priority
1             task1         3
2             task2         2
3             task9         2

Enter name of the task you wanna modify: task1
Priority(1-5): 2

Couldn't find task named task1 with priority 2
```

Display Highest Priority

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit
Choice please: 6
Highest Priority task
Task Name: task1      Priority: 3_
```

Empty Queue

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit
Choice please: 4
Its an empty queue
```

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit
Choice please: 3
No Tasks in the queue
_
```

Queue Full

```
Priority Queue(Array)

1: Add Task    2: Display Completed Task(Dequeue)    3: Display Total number of tasks    4: Modify task name    5: Display All Tasks
6: Display Highest Priority    7: Exit

Choice please: 1

Queue full
```

Exit

```
You chose to exit

-----
Process exited after 3.526 seconds with return value 0
Press any key to continue . . .
```

Division of work:

Implementation using Linked List: 1901

Implementation using Arrays: 1903,1921

Any interesting problems faced and their solutions:

1. Scanning of integers and then scanning string using scanf would cause the string input to get skipped to get rid of this and clear the buffer of non int characters the statement:

```
while((getchar())!= '\n');
```

was used to clear the buffer;

2. This was also a part of a solution that was used for the data validation of integers, if non numerical characters were input

The following statements were used to check if only integers were input:

```
status = scanf("%d",&ch);    scanf returns 1 on valid datatype input and 0 on invalid
```

```
while((getchar())!= '\n');    //clear input buffer of non int chars
```

```
if(status!=1)//no integer is input
```

```
    printf("Invalid input, please enter integer values only\n");
```

scanf returns 1 on valid datatype input and 0 on invalid and here pure numerical character input is valid and mixed string is invalid. Thus storing the return value and checking it allowed us to tell the user if they didn't input the expected integers.