

COL100

Introduction to Computer Science

Assignment 5

1 Instructions

Dear Students, Assignment 5 has been released on Gradescope. Below, you'll find important details regarding the assignment, submission guidelines, and support channels for any queries.

1.1 Assignment Details:

Weightage: 8% of the overall grade

Submission Platform: Gradescope (<https://www.gradescope.com/courses/561465>)

Deadline: 21st October 2023, 11:55pm

1.2 Support and Queries:

1. **All queries about this assignment should be posted only in the relevant Piazza board.** No other queries shall be entertained. Please read through the previously posted queries before posting.
2. **Before using any function from any existing library or using any algorithm not covered in the class, get a confirmation from the instructors by posting on Piazza.**

Additional Resources:

For a refresher on the concepts related to the assignment, you can refer to the course lecture notes, slides, and relevant sections from the textbook. Assignment Grading: Your assignments will be graded on correctness, efficiency of your code, proper usage of comments, and adherence to the submission guidelines. We wish you the best of luck with the assignment.

2 BitCrypt

With the ongoing disputes between countries, safeguarding the nuclear codes have become a major challenge. You are appointed by the Defense Ministry of India to devise a robust encryption-decryption technique to secure the nuclear codes of India. With your love for bitwise XOR and recursion, you decide to deploy a recursive encryption algorithm. Following is the truth table for XOR:

Input A	Input B	Output
0	0	0
0	1	1
1	0	1
1	1	0

Assume that the number is 7 (Binary: 111) and the key is 5 (Binary: 101) A bitwise XOR would yield the output as 010. Hence, 2 (Binary: 010) would be the encrypted message.

Encrypted message: 010 and the key: 101

Algorithm 1: XOR Encryption

```
Function Encrypt(n, key)
    If n = 0 or key = 0
        Return 0
    End If
    extract the least significant bit of the number (bit_n) and the
    key (bit_key)
    Return Encrypt(floor(n / 2), floor(key / 2)) * 2 + (bit_n XOR bit_key)
End Function
```

Note: To ensure that recursion is used to solve the problem, we will output certain intermediate state values for testing and check for stack depth. Learn more about stack depth here: <https://www.youtube.com/watch?v=BNeOE1qMyRA>

3 Handling Employees Data

In this problem you have to write a program to manage employee records using C structures. Each employee has the following **attributes**:

1. Employee.ID (integer)

2. First_Name (string)
3. Last_Name (string)
4. Salary (integer)
5. Joining_Date (string) (dd/mm/yyyy format)

You need to implement the following tasks by creating function for each task:

1. **Task 1 :** Add each new Employee.
2. **Task 2 :** Delete an Employee record by Employee ID.
3. **Task 3 :** Display the details of a particular employee by Employee ID.
4. **Task 4 :** Display the details of all employees.
5. **Task 5 :** Update the salary of an employee by Employee ID.
6. **Task 6 :** Display the statistical detail of employees salary which are currently working in company. Statistical Detail include Minimum,Maximum and Mean(Average) value of Salary for currently working Employees.
7. **Task 7 :** Find the number of employees working in company for a given particular date.

You should use an array of structures to store the employee records.

3.1 Input Format of each Task :

1. **Task 1 :** 1 23 John Doe 1200 12/03/2012

Here 1 is represent Task 1, "23" represent Employee ID, "John" represent First Name, "Doe" represent Last Name, "1200" represent salary, "12/03/2012" represent Joining Date.

2. **Task 2 :** 2 23.

Here 2 represent Task 2, "23" represent Employee ID which to be deleted from Company record list.

3. Task 3 : 3 23

Here 3 represent Task 3, "23" represent Employee ID whose detailed to display.

4. Task 4 : 4

Here 4 represent Task 4 , in this you have to display details of all Employees currently working at company.

5. Task 5 : 5 23 1500

Here 5 represent Task 5, "23" represent Employee ID whose salary to be updated(not increment) to 1500. Now employee with ID "23" new salary is now 1500.

6. Task 6 : 6

Here 6 represent Task 6, in this you have to display the Minimum, Maximum and Mean value of Salary of currently working Employees.

7. Task 7 : 7 06/04/2012

Here 7 represent Task 7, You have to print a number which represent number of employees currently working at company on 06/04/2012.

3.2 Constraints on Input:

Joining_Date: Format of date will be dd/mm/yyyy.

Salary : It will belong to range [100,100000].

Number of employees : It will not exceed 100.

3.3 Sample Input

```
9
1 23 John Doe 1200 12/03/2012
1 16 Anu Arora 1500 09/03/2012
1 8 Dheeraj Kumar 1800 12/03/2014
3 16
2 16
4
5 8 1700
```

6

7 10/04/2013

3.4 Sample Output

```
16 Anu Arora 1500 12/03/2012
8 Dheeraj Kumar 1800 12/03/2014
23 John Doe 1200 12/03/2012
1200 1700 1450
1
```

3.5 Explanation

First line in Sample Input is **9** which represent number of tasks to perform.

Next line in Sample Input is **1 23 John Doe 1200 12/03/2012** which represent **Task 1** i.e., Adding employee John Doe with ID 23, Salary 1200 and Joining Data 12/03/2012.

Next line in Sample Input is **1 16 Anu Arora 1500 09/03/2012** which represent **Task 1** i.e., Adding employee Anu Arora with ID 16, Salary 1500 and Joining Data 09/03/2012.

Next line in Sample Input is **1 8 Dheeraj Kumar 1800 12/03/2014** which represent **Task 1** i.e., Adding employee Dheeraj Kumar with ID 8, Salary 1800 and Joining Data 12/03/2014.

Next line in Sample Input is **3 16** which represent **Task 3** i.e., Displaying details of employee with ID 16. Hence in First line of Sample Output ,detail of employee with id 16 (i.e., Anu Arora) is printed/displayed.

Next line in Sample Input is **2 16** which represent **Task 2** i.e., Removing details of employee with ID 16(i.e., Anu Arora).

Next line in Sample Input is **4** which represent **Task 4** i.e., Displaying details of all employees currently working on company. As for now "Anu Arora" is removed from list of employees so the remaining employee "Dheeraj Kumar" and "John Doe" details will be display (as can be seen in Sample Output line 2 and 3). **Output/Print details of each employee according to their employee ID in ascending order.**

Next line in Sample Input is **5 8 1700** which represent **Task 5** i.e., Salary of employee "Dheeraj Kumar" (with Id 8) is changed from 1800 to 1700.

Next line in Sample Input is **6** which represent **Task 6** i.e., To display the statistical data of employees salaries who are currently working in the company. Hence as we have two employees left in company "Dheeraj Kumar" and "John Doe" with salary 1700 and 1200 respectively. Hence Minimum, Maximum and Mean value will be 1200 , 1700 and 1450 respectively.

Next line in Sample Input is **7 10/04/2013** which represent **Task 7** i.e., To count the number of employees which are working on **10/04/2013**.

As from our employees list we can see that only "**John Doe**" had start working from **12/03/2012** and "**Dheeraj Kumar**" join later (i.e., from 12/03/2014). Hence "**John Doe**" is the only employee who is working on 10/04/2013". Hence **count=1**.

Note : Each task will be performed on current list of employees during that particular task time.