

## DSA LAB

### Lab 1

Q1)

**File name: “smallest.h”**

```
int smallest(int arr[], int n)
{
    int *min = arr;
    for (int i = 0; i < n; ++i)
    {
        if(*min>*(arr+i))
            *min = *(arr+i);
    }

    return *min;
}
```

**File name: “Lab1\_1.c”**

```
#include <stdio.h>
#include <stdlib.h>
#include "smallest.h"

int main()
{
    int i, n;
    int *a;

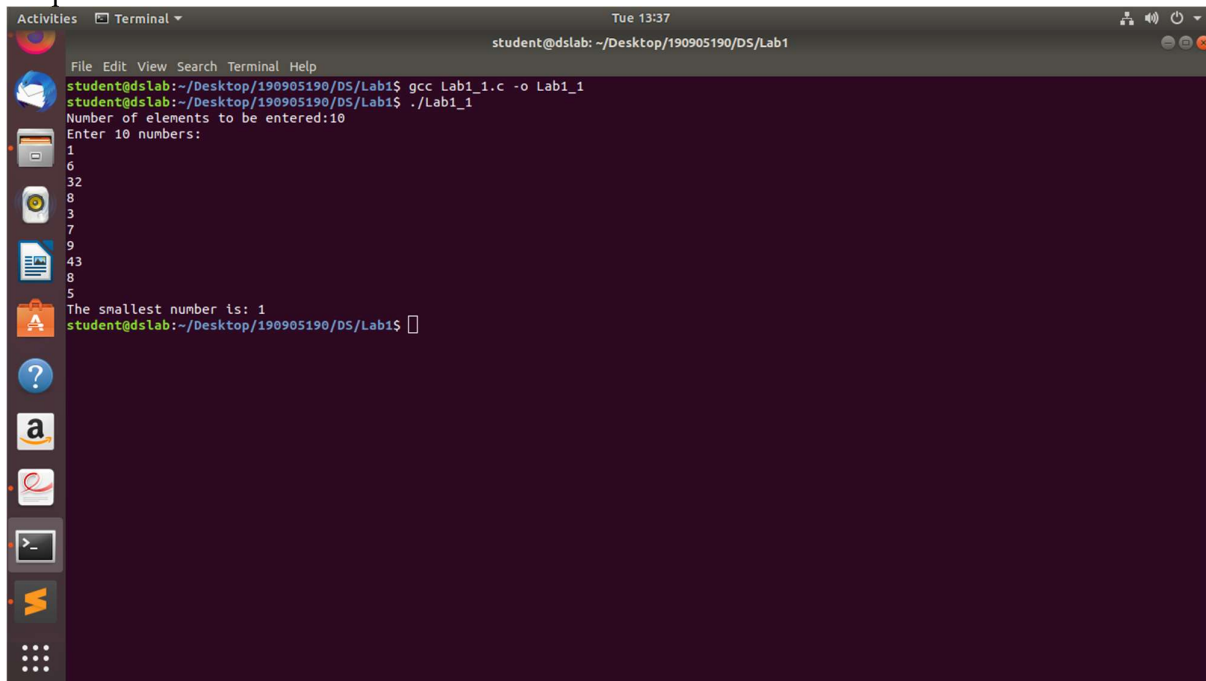
    printf("Number of elements to be entered: ");
    scanf("%d",&n);

    a = (int*)calloc(n, sizeof(int));
    printf("Enter %d numbers:\n",n);
    for( i=0 ; i < n ; i++ ) {
        scanf("%d",&a[i]);
    }
    int min = smallest(a, n);
    printf("The smallest number is: %d \n", min);

    free(a);

    return(0);
}
```

Output :

A terminal window with a dark purple background and a light grey title bar. The title bar contains the text 'Activities', 'Terminal', and 'Tue 13:37'. The terminal shows a user named 'student' at a host named 'dslab' in the directory '~/Desktop/190905190/DS/Lab1'. The user runs 'gcc Lab1\_1.c -o Lab1\_1' and then './Lab1\_1'. The program prompts for 'Number of elements to be entered:10' and 'Enter 10 numbers:'. The user enters the numbers 1, 6, 32, 8, 3, 7, 9, 43, 8, and 5. The program then outputs 'The smallest number is: 1'. The terminal window has a menu bar with 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. On the left side, there is a vertical dock with icons for various applications including a file manager, a web browser, and a terminal. The terminal window is the active application.

```
student@dslab:~/Desktop/190905190/DS/Lab1$ gcc Lab1_1.c -o Lab1_1
student@dslab:~/Desktop/190905190/DS/Lab1$ ./Lab1_1
Number of elements to be entered:10
Enter 10 numbers:
1
6
32
8
3
7
9
43
8
5
The smallest number is: 1
student@dslab:~/Desktop/190905190/DS/Lab1$
```

Q2)

**File name : “multiply.h”**

```
int ** multiply(int **m1, int **m2, int n, int m, int x){
    int **m3;
    m3 = (int **)calloc(n, sizeof(int*));
    for (int i = 0; i < m; ++i)
    {
        m3[i] = (int *)calloc(m, sizeof(int*));
    }
    for (int i = 0; i < n; ++i)
    {
        for (int j = 0; j < m; ++j)
        {
            for (int k = 0; k < x; ++k)
            {
                m3[i][j] = m3[i][j] + m1[i][k] * m2[k][j];
            }
        }
    }
    return m3;
}
```

**File name: “Lab1\_2.c”**

```
#include <stdio.h>
#include <stdlib.h>
#include "multiply.h"
int main()
{
    int **mat1;
    int **mat2;
    int **mat3;
    int n1, m1, n2, m2;
    printf("Enter dimensions of Matrix 1: ");
    scanf("%d", &n1);
    scanf("%d", &m1);
    printf("Enter dimensions of Matrix 2: ");
    scanf("%d", &n2);
    scanf("%d", &m2);
    if(m1==n2)
    {
        mat1 = (int **)calloc(n1, sizeof(int*));
        for (int i = 0; i < m1; ++i)
        {
            mat1[i] = (int *)calloc(m1, sizeof(int*));
        }
        mat2 = (int **)calloc(n2, sizeof(int*));
        for (int i = 0; i < m2; ++i)
        {
            mat2[i] = (int *)calloc(m2, sizeof(int*));
        }
    }
}
```

```

    }
    mat3 = (int **)calloc(n1, sizeof(int*));
    for (int i = 0; i < m2; ++i)
    {
        mat3[i] = (int *)calloc(m2, sizeof(int*));
    }

    printf("Enter Matrix 2:\n");
    for (int i = 0; i < n1; ++i)
    {
        for (int j = 0; j < m1; ++j)
        {
            printf("[%d][%d]: ", i, j);
            scanf("%d", &mat1[i][j]);
        }
    }

    printf("Enter Matrix 2:\n");
    for (int i = 0; i < n2; ++i)
    {
        for (int j = 0; j < m2; ++j)
        {
            printf("[%d][%d]: ", i, j);
            scanf("%d", &mat2[i][j]);
        }
    }
    printf("Matrix 1:\n");
    for (int i = 0; i < n1; ++i)
    {
        for (int j = 0; j < m1; ++j)
        {
            printf("%d\t", mat1[i][j]);
        }
        printf("\n");
    }
    printf("Matrix 2:\n");
    for (int i = 0; i < n2; ++i)
    {
        for (int j = 0; j < m2; ++j)
        {
            printf("%d\t", mat2[i][j]);
        }
        printf("\n");
    }

    mat3 = multiply(mat1, mat2, n1, m2, m1);
    printf("Matrix Multiplication:\n");
    for (int i = 0; i < n1; ++i)
    {
        for (int j = 0; j < m2; ++j)
        {

```

```

        printf("%d\t", mat3[i][j]);
    }
    printf("\n");
}
}
return 0;
}

```

Output:

The screenshot shows a terminal window titled "Terminal" with the following content:

```

student@dslab: ~/Desktop/190905190/DS/Lab1
student@dslab:~/Desktop/190905190/DS/Lab1$ gcc Lab1_2.c -o Lab1_2
student@dslab:~/Desktop/190905190/DS/Lab1$ ./Lab1_2
Enter dimensions of Matrix 1: 2 2
Enter dimensions of Matrix 2: 2 2
Enter Matrix 2:
[0][0]: 1
[0][1]: 2
[1][0]: 3
[1][1]: 4
Enter Matrix 2:
[0][0]: 5
[0][1]: 6
[1][0]: 7
[1][1]: 8
Matrix 1:
1 2
3 4
Matrix 2:
5 6
7 8
Matrix Multiplication:
19 22
43 50
student@dslab:~/Desktop/190905190/DS/Lab1$

```

Q3)

**File name: “employee.h”**

```
struct DOB {
    int day, month, year;
};

struct ADRS {
    int house_no;
    long zipcode;
    char state[20];
};

struct EMPLOYEE {
    char name[20];
    struct DOB dob;
    struct ADRS address;
};
```

**File name: “Lab1\_3.c”**

```
#include <stdio.h>
#include <stdlib.h>
#include "employee.h"

int main()
{
    struct EMPLOYEE emp[10];
    struct EMPLOYEE* ptr = emp;
    int N;
    printf("Enter number of employees: ");
    scanf("%d", &N);

    for (int i = 0; i < N; ++i)
    {
        // char n[20];
        printf("Enter Name of Employee %d: ", (i+1));
        scanf("%s", (ptr+i)->name);
        // (ptr+i)->name
        int d, m, y;
        printf("Enter Date of Birth: \n");
        scanf("%d %d %d", &d, &m, &y);
        (ptr+i)->dob.day = d;
        (ptr+i)->dob.month = m;
        (ptr+i)->dob.year = y;
        int hno;
        long z;
        char st[20];
        printf("Enter House Number: \n");
        scanf("%d", &hno);
        printf("Enter Zip Code: \n");
```

```

scanf("%ld", &z);
printf("Enter State: \n");
scanf("%s", (ptr+i)->address.state);
(ptr+i)->address.house_no = hno;
(ptr+i)->address.zipcode = z;
// = *st;

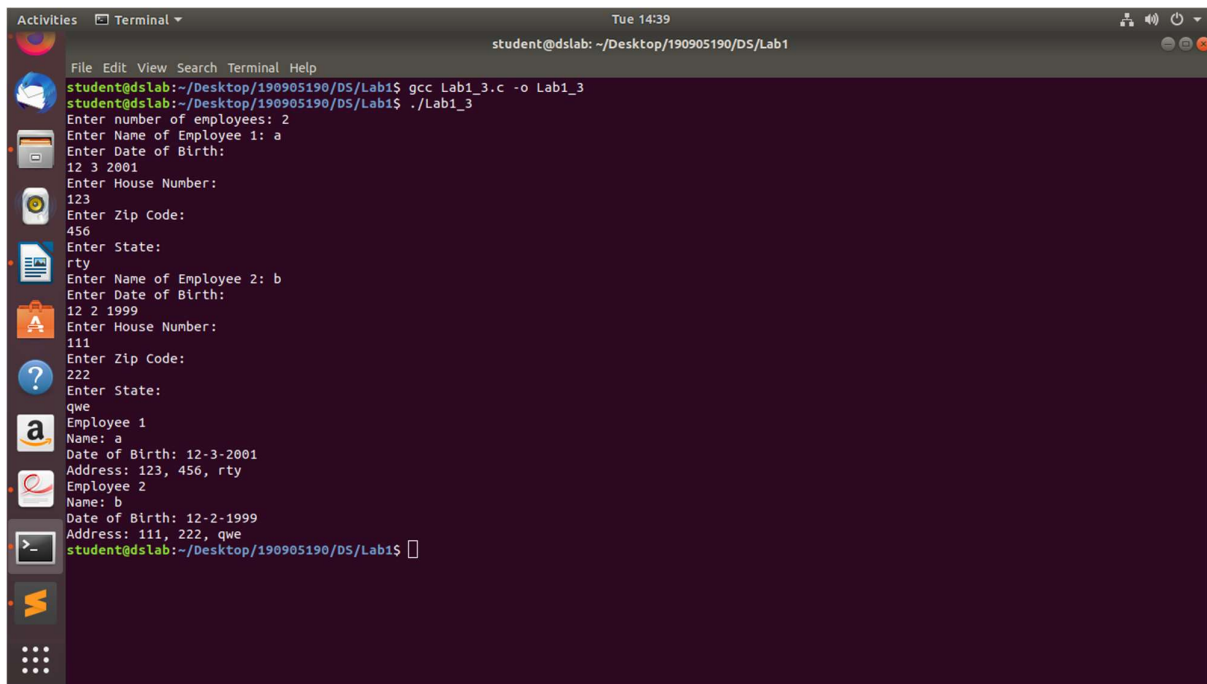
}

for (int i = 0; i < N; ++i)
{
    printf("Employee %d\n", (i+1));
    printf("Name: %s\n", (ptr+i)->name);
    printf("Date of Birth: %d-%d-%d\n", (ptr+i)->dob.day, (ptr+i)->dob.month,
(ptr+i)->dob.year);
    printf("Address: %d, %ld, %s\n", (ptr+i)->address.house_no,
(ptr+i)->address.zipcode, (ptr+i)->address.state);

}
return 0;
}

```

Output:



```

student@dslab: ~/Desktop/190905190/DS/Lab1
File Edit View Search Terminal Help
student@dslab:~/Desktop/190905190/DS/Lab1$ gcc Lab1_3.c -o Lab1_3
student@dslab:~/Desktop/190905190/DS/Lab1$ ./Lab1_3
Enter number of employees: 2
Enter Name of Employee 1: a
Enter Date of Birth:
12 3 2001
Enter House Number:
123
Enter Zip Code:
456
Enter State:
rty
Enter Name of Employee 2: b
Enter Date of Birth:
12 2 1999
Enter House Number:
111
Enter Zip Code:
222
Enter State:
qwe
Employee 1
Name: a
Date of Birth: 12-3-2001
Address: 123, 456, rty
Employee 2
Name: b
Date of Birth: 12-2-1999
Address: 111, 222, qwe
student@dslab:~/Desktop/190905190/DS/Lab1$

```

