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C PROGRAMMING LAB FILE 2022-23

Submitted by:

Submitted to:

Name: **BUSHRA SHAHZAD**
Course: **B. TECH**
Branch: **Computer Engineering**
Semester: **3rd**
Roll No.: **21BCS046**
Subject: **C Programming Lab**
Subject Code: **CEN-392**

S. No	Program Name	Date	Remarks	Signature
1.	Write a menu driven program having following functions: a. Linear Search b. Binary Search c. Display elements of array d. Exit	18th July,2022		
2.	Write a menu driven program having following functions: a. Sort in ascending order b. Sort in descending order c. Find largest element in array d. Exit	25th July,2022		
3.	Write a menu driven program which performs following operations on matrix: a. Addition of 2 matrices b. Multiplication of 2 matrices c. Transpose of matrix d. Exit	1st Aug,2022		
4.	Write a menu driven program to perform following conversion of number system: a. Decimal to hexadecimal b. Hexadecimal to decimal c. Exit	22nd Aug,2022		
5.	WAP to print spiral matrix.	29th Aug,2022		
6.	Write a menu driven program to perform following operations: a. To find length of a string b. To copy a string c. To concatenate a string d. To reverse a string e. To compare strings f. To check if string is palindrome or not g. To find substring index	12th Sept,2022		

7.	WAP to perform using 2D array to (Attributes -> roll no,sub1, sub2, sub3, %) a. Display percentage of each student b. Display highest marks in each subject c. Display roll no. with highest percentage (If students have same percentage, then whoever younger is displayed)	26th Sept,2022		
8.	Given a piece of text, write a program to no. of spaces, no. of vowels, no. of consonants, no. of tabs, no. of sentences and no. of lines.	17th Oct,2022		
9.	WAP in C to calculate the difference in no. of days between two dates.(Dates are entered in as a single string, e.g.: "08-11-2021,15-01-1932")	19th Nov,2022		
	Assignment			
10.	Given 2 arrays of size M and N respectively. The first array is in ascending order and the second one is in descending order. Create a third array either in ascending or descending order by merging the elements of both arrays.	19th Nov,2022		
11.	WAP in C using pointers which finds the occurrence of a word in a line of text and then replace it with another word of same length.	19th Nov,2022		
12.	WAP to create an array of structure to store the details of cricketers like name, age, no. of test matches played, average run. Display the record by ascending order of their average run.	19th Nov,2022		
13.	WAP in C to perform the following operations on complex numbers: add, subtract, multiply and divide. Your program should take input as a string from a user and then convert it into complex numbers. (E.g.: "2.3+0.113i,5+7.1i")	19th Nov,2022		
14.	Write a menu driven C program to perform the following operations on student data using file handling:- a. Insert Row b. Delete Row c. Update Row d. Display e. Exit	19th Nov,2022		

CODE 1:

```
/*Q1.*/
#include <stdio.h>
int linearSearch(int arr[], int n, int findEle)
{
   for (int i = 0; i < n; i++)
   {
      if (findEle == arr[i])
         return i;
   }
   return -1;
}
int binarySearch(int arr[], int n, int findEle)
{
   for (int i = 0; i < n; i++)
   {
      for (int j = i + 1; j < n; j++)
      {
         if (arr[i] > arr[j])
         {
            int temp = arr[i];
            arr[i] = arr[j];
            arr[j] = temp;
         }
      }
   }
   int start = 0, end = n - 1, mid;
   while (start <= end)
   {
      mid = (start + end) / 2;
      if (findEle == arr[mid])
         return mid;
      else if (findEle > arr[mid])
         start = mid + 1;
      else
         end = mid - 1;
   }
   return -1;
}
int main()
{
   int i, n, choice;
   printf("Enter the no of ele : ");
   scanf("%d", &n);
   printf("Enter the ele : \n");
```

```
int arr[n];
for (i = 0; i < n; i++)
   scanf("%d", &arr[i]);
while (1)
{
   printf("\nBushra Shahzad-21BCS046\n");
   printf("\nEnter '1' for linear search, \n'2' for binary search,");
   printf("\n'3' for displaying array, \n'4' to exit! : ");
   scanf("%d", &choice);
   switch (choice)
   {
   case 1:
   {
      int findEle;
      printf(("Enter the element to be searched:\n"));
      scanf("%d", &findEle);
      int flag = linearSearch(arr, n, findEle);
      if (flag == -1)
         printf("%d is not present.\n", findEle);
      else
         printf("%d is present at %d.\n", findEle, flag);
      break;
   }
   case 2:
   {
      int findEle;
      printf("Enter the element to be searched : ");
      scanf("%d", &findEle);
      int flag = binarySearch(arr, n, findEle);
      if (flag == -1)
         printf("%d is not present.\n", findEle);
      else
         printf("%d is present at %d in new sorted array.\n", findEle, flag);
      break;
   }
   case 3:
   {
      printf("Displaying the elements of an array : \n");
      for (int i = 0; i < n; i++)
         printf("%d ", arr[i]);
      printf("\n");
      break;
   }
   case 4:
      exit(1);
      break;
   default:
      printf("Invalid input.");
```

```
            break;
        }
    }
    return 0;
}
```

OUTPUT 1:

```
Enter the ele :
12
-34
29
46
78

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Enter '1' for linear search,
'2' for binary search,
'3' for displaying array,
'4' to exit! : 1
Enter the element to be searched:
-34
-34 is present at 1.

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Enter '1' for linear search,
'2' for binary search,
'3' for displaying array,
'4' to exit! : 2
Enter the element to be searched : 46
46 is present at 3 in new sorted array.

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Enter '1' for linear search,
'2' for binary search,
'3' for displaying array,
'4' to exit! : 3
Displaying the elements of an array :
-34 12 29 46 78
```

CODE 2:

```
/*Q2.*/
#include <stdio.h>
#include <stdlib.h>
void swap(int *a, int *b)
{
   int temp = *a;
   *a = *b;
   *b = temp;
}
void display(int *arr, int n)
{
   printf("\nDisplaying Array:\n");
   for (int i = 0; i < n; i++)
      printf("%d ", arr[i]);
}
void ascending(int *arr, int n)
{
   for (int i = 0; i < n; i++)
   {
      for (int j = i + 1; j < n; j++)
      {
         if (arr[i] > arr[j])
            swap(&arr[i], &arr[j]);
      }
   }
   display(arr, n);
}
void descending(int *arr, int n)
{
   for (int i = 0; i < n; i++)
   {
      for (int j = i + 1; j < n; j++)
      {
         if (arr[i] < arr[j])
            swap(&arr[i], &arr[j]);
      }
   }
   display(arr, n);
}
int max(int *arr, int n)
{
   int max = arr[0];
   for (int i = 1; i < n; i++)
   {
```

```
        if (arr[i] > max)
            max = arr[i];
    }
    return max;
}
int main()
{
    int arr[100];
    int n;
    printf("Enter the no of ele in an array: ");
    scanf("%d", &n);
    printf("Enter the ele in an array:\n");
    for (int i = 0; i < n; i++)
        scanf("%d", &arr[i]);
    while (1)
    {
        printf("\nBushra Shahzad-21BCS046");
        printf("\nEnter '1' for ascending order.");
        printf("\n'2' for descending order.");
        printf("\n'3' to find maximum, '4' to exit!\n");
        int choice, index, element;
        scanf("%d", &choice);
        switch (choice)
        {
        case 1:
            ascending(arr, n);
            break;
        case 2:
            descending(arr, n);
            break;
        case 3:
            printf("The maximum element is %d", max(arr, n));
            break;
        case 4:
            exit(1);
            break;
        default:
            printf("Wrong Input!");
            break;
        }
    }
    return 0;
}
```

OUTPUT 2:

```
Enter the no of ele in an array: 5
Enter the ele in an array:
12
-34
45
-12
98

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Enter '1' for ascending order.
'2' for descending order.
'3' to find maximum, '4' to exit!
1

Displaying Array:
-34 -12 12 45 98
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Enter '1' for ascending order.
'2' for descending order.
'3' to find maximum, '4' to exit!
2

Displaying Array:
98 45 12 -12 -34
Bushra Shahzad-21BCS046
Enter '1' for ascending order.
'2' for descending order.
'3' to find maximum, '4' to exit!
3
The maximum element is 98
```

CODE 3:

```
#include <stdio.h>
void enterData(int arr[][10], int r, int c)
{
   printf("Enter the ele of matrix:\n");
   for (int i = 0; i < r; i++)
   {
      for (int j = 0; j < c; j++)
      {
         scanf("%d", &arr[i][j]);
      }
   }
}
void displayArray(int arr[][10], int r, int c)
{
   for (int i = 0; i < r; i++)
   {
      for (int j = 0; j < c; j++)
      {
         printf("%d ", arr[i][j]);
      }
      printf("\n");
   }
}
void addition(int arr1[][10], int arr2[][10], int result[][10], int r1, int c1)
{
   for (int i = 0; i < r1; i++)
   {
      for (int j = 0; j < c1; j++)
      {
         result[i][j] = arr1[i][j] + arr2[i][j];
      }
   }
}
void additonDisplay(int arr1[][10], int arr2[][10], int result[][10], int r, int c)
{
   for (int i = 0; i < r; i++)
   {
      int j = 0;
      while (j < c)
      {
         printf("%d ", arr1[i][j++]);
      }
      printf("\t");
      j = 0;
      while (j < c)
      {
```

```
            printf("%d ", arr2[i][j++]);
        }
        printf("\t");
        j = 0;
        while (j < c)
        {
            printf("%d ", result[i][j++]);
        }
        printf("\n");
    }
}
void multiply(int arr1[][10], int arr2[][10], int result[][10], int r1, int c1, int r2, int c2)
{
    for (int i = 0; i < r1; i++)
    {
        for (int j = 0; j < c2; j++)
        {
            result[i][j] = 0;
        }
    }

    for (int i = 0; i < r1; i++)
    {
        for (int j = 0; j < c2; j++)
        {
            for (int k = 0; k < c1; k++)
            {
                result[i][j] += arr1[i][k] * arr2[k][j];
            }
        }
    }
}
void tranpose(int arr1[][10], int trans[][10], int r, int c)
{
    for (int i = 0; i < r; i++)
    {
        for (int j = 0; j < c; j++)
        {
            trans[j][i] = arr1[i][j];
        }
    }
}
int main()
{
    printf("\nBushra Shahzad-21BCS046\n");
    printf("Enter the number of rows and colums of matrix A:\n");
    int row1, col1;
    scanf("%d%d", &row1, &col1);
```

```
int A[10][10];
enterData(A, row1, col1);
printf("Enter the number of rows and colums of matrix A:\n");
int row2, col2;
scanf("%d%d", &row2, &col2);
int B[10][10];
enterData(B, row2, col2);
printf("Displaying Matrix A:\n");
displayArray(A, row1, col1);
printf("Displaying Matrix B:\n");
displayArray(B, row2, col2);
int counter = 0, key, key1;
while (counter != 1)
{
   printf("\nEnter'1'for addition of two matrices\n");
   printf("Enter'2'for multiplication of two matrices\n");
   printf("Enter'3'for finding tranpose of matrices\n");
   printf("Enter'4' to exit!\n");
   scanf("%d", &key);
   switch (key)
   {
   case 1:
      if (row1 == row2 && col1 == col2)
      {
         int C[10][10];
         addition(A, B, C, row1, col1);
         printf("\nDisplaying:\n");
         additonDisplay(A, B, C, row1, col1);
      }
      else
      {
         printf("Not possible!\n");
      }

      break;
   case 2:
      if (row2 == col1)
      {
         int D[10][10];
         multiply(A, B, D, row1, col1, row2, col2);
         printf("Displaying resultant array:\n");
         displayArray(D, row1, col2);
      }
      else
      {
         printf("Not possible!\n");
      }
      break;
```

```
        case 3:
            printf("Enter '1' for displaying tranpose of Matrix 'A'\n");
            printf("Enter '2' for displaying tranpose of Matrix 'B'\n");
            scanf("%d", &key1);
            int E[10][10];
            if (key1 == 1)
            {
                tranpose(A, E, row1, col1);
                displayArray(E, col1, row1);
            }
            else if (key1 == 2)
            {
                tranpose(B, E, row2, col2);
                displayArray(E, col2, row2);
            }
            break;
        case 4:
            counter = 1;
            break;
        default:
            printf("Invalid input\n");
            break;
        }
    }

    return 0;
}
```

OUTPUT 3:

```
Bushra Shahzad-21BCS046
Enter the number of rows and colums of matrix A:
2
3
Enter the ele of matrix:
1
2
3
4
5
6
Enter the number of rows and colums of matrix A:
2
3
Enter the ele of matrix:
1
2
3
4
5
6
Displaying Matrix A:
1 2 3
4 5 6
Displaying Matrix B:
1 2 3
4 5 6

Enter'1'for addition of two matrices
Enter'2'for multiplication of two matrices
Enter'3'for finding tranpose of matrices
Enter'4' to exit!
1

Displaying:
1 2 3   1 2 3   2 4 6
4 5 6   4 5 6   8 10 12


Displaying Matrix A:
1 2 3
4 5 6
Displaying Matrix B:
1 2 3 4
5 6 7 8
9 10 11 12

Enter'1'for addition of two matrices
Enter'2'for multiplication of two matrices
Enter'3'for finding tranpose of matrices
Enter'4' to exit!
2
Displaying resultant array:
38 44 50 56
83 98 113 128
```

```
Displaying Matrix A:
1 2 3 4
5 6 7 8
9 10 11 12
Displaying Matrix B:
1 2
3 4

Enter'1'for addition of two matrices
Enter'2'for multiplication of two matrices
Enter'3'for finding tranpose of matrices
Enter'4' to exit!
3
Enter '1' for displaying tranpose of Matrix 'A'
Enter '2' for displaying tranpose of Matrix 'B'
1
1 5 9
2 6 10
3 7 11
4 8 12

Enter'1'for addition of two matrices
Enter'2'for multiplication of two matrices
Enter'3'for finding tranpose of matrices
Enter'4' to exit!
3
Enter '1' for displaying tranpose of Matrix 'A'
Enter '2' for displaying tranpose of Matrix 'B'
2
1 3
2 4
```

CODE 4:

```
#include <stdio.h>
void hexa(int n)
{
   int remainder;
   int i = 0;
   char hexa[100];
   while (n != 0)
   {
      remainder = n % 16;
      if (remainder >= 10)
         remainder = remainder + 55;
      else
         remainder = remainder + 48;

      hexa[i++] = remainder;
      n = n / 16;
   }
   printf("The hexa decimal no is\n");
   for (int j = i - 1; j >= 0; j--)
      printf("%c", hexa[j]);
}
void decimal(char *no)
{
   int i, sum = 0, factor = 1, count = 0;
   for (i = 0; no[i] != '\0'; i++)
      count++;
   for (i = count - 1; i >= 0; i--)
   {
      if (no[i] >= 'A' && no[i] <= 'F')
         sum += (no[i] - 55) * factor;
      else if (no[i] >= 'a' && no[i] <= 'f')
         sum += (no[i] - 87) * factor;
      else if (no[i] >= '0' && no[i] <= '9')
         sum += (no[i] - 48) * factor;
      factor *= 16;
   }
   printf("The decimal no is %d.\n", sum);
}
int main()
{
   printf("\nBushra Shahzad-21BCS046\n");
   int n, key;
   char no[100];
   while (1)
   {
      printf("\nPress '1' to convert decimal no. into hexadecimal\n");
```

```
    printf("Press '2' to convert hexadecimal  no. into decimal \n");
    printf("Press '3' to Exit!\n");
    scanf("%d", &key);
    switch (key)
    {
    case 1:
       printf("Enter the decimal no.\n");
       scanf("%d", &n);
       hexa(n);
       break;
    case 2:
       printf("Enter the hexadecimal no.\n");
       scanf("%s", no);
       decimal(no);
       break;
    case 3:
       exit(1);
       break;
    default:
       printf("Invalid Input!\n");
       break;
    }
  }
  return 0;
}
```

OUTPUT 4:

```
Bushra Shahzad-21BCS046

Press '1' to convert decimal no. into hexadecimal
Press '2' to convert hexadecimal  no. into decimal
Press '3' to Exit!
1
Enter the decimal no.
123
The hexa decimal no is
7B
Press '1' to convert decimal no. into hexadecimal
Press '2' to convert hexadecimal  no. into decimal
Press '3' to Exit!
2
Enter the hexadecimal no.
7B
The decimal no is 123.
```

CODE 5:

```
#include <stdio.h>
int main()
{
   int m, n, i, j;
   printf("Enter the rows and columns of a matrix\n");
   scanf("%d", &m);
   scanf("%d", &n);
   int matrix[m][n];
   printf("Enter the elements of a matrix\n");
   for (i = 0; i < m; i++)
   {
      for (j = 0; j < n; j++)
         scanf("%d", &matrix[i][j]);
   }
   printf("Given matrix is\n");
   for (i = 0; i < m; i++)
   {
      for (j = 0; j < n; j++)
         printf("%d ", matrix[i][j]);
      printf("\n");
   }
   printf("\nSpiral print of matrix is\n");
   int row_start = 0, col_start = 0, row_end = m - 1, col_end = n - 1, row, col;
   while (row_start <= row_end && col_start <= col_end)
   {
      for (col = col_start; col <= col_end; col++)
         printf("%d ", matrix[row_start][col]);

      row_start++;
      for (row = row_start; row <= row_end; row++)
         printf("%d ", matrix[row][col_end]);

      col_end--;
      for (col = col_end; col >= col_start; col--)
         printf("%d ", matrix[row_end][col]);

      row_end--;
      for (row = row_end; row >= row_start; row--)
         printf("%d ", matrix[row][col_start]);

      col_start++;
   }
}
```

OUTPUT 5:

```
Enter the rows and columns of a matrix
4
4
Enter the elements of a matrix
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Given matrix is
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16

Spiral print of matrix is
1 2 3 4 8 12 16 15 14 13 9 5 6 7 11 10
```

CODE 6:

```
#include <stdio.h>
int strrlen(char *s)
{
   int count = 0;
   for (int i = 0; s[i] != '\0'; i++)
   {
      count++;
   }
   return count;
}
void strrcpy(char a[])
{
   int n = strrlen(a) - 1;
   char b[n];
   int i;
   for (i = 0; a[i] != '\0'; i++)
   {
      b[i] = a[i];
   }
   b[i] = '\0';
   printf("%s", b);
}

void concatenate(char *a, char *b)
{
   int n1 = strrlen(a);

   int i;
   for (i = 0; b[i] != '\0'; ++i, n1++)
   {
      a[n1] = b[i];
   }
   a[n1++] = '\0';
   printf("The concatenated string is %s", a);
}

void reverse(char a[])
{

   int n = strrlen(a) - 1;
   char b[n];
   int i, j;
   for (i = 0, j = n; a[i] != '\0'; i++, j--)
   {
      b[j] = a[i];
   }
```

```
    b[i++] = '\0';
    printf("The reversed string is %s", b);
}
void compare(char *a, char *b)
{
    int counter = 0;
    int n1 = strrlen(a);
    int n2 = strrlen(b);

    if (n1 == n2)
    {
        int i;
        for (i = 0; a[i] != '\0'; i++)
        {
            if (a[i] != b[i])
            {
                counter = 1;
                break;
            }
        }
    }
    else if (n1 != n2)
        counter = 1;

    if (counter == 0)
        printf("yes, the enetred strings are  same.\n");
    else
        printf("Noi, the enetred strings are NOT same.\n");
}
void isPalindorme(char a[])
{
    int n = strrlen(a);
    int i = 0, j = n - 1, counter = 0;
    while (i <= j)
    {
        if (a[i] != a[j])
        {
            counter = 1;
            break;
        }
        else
        {
            i++;
            j--;
        }
    }
    if (counter == 0)
        printf("yes, the enetred string is Palindome\n");
```

```
    else
        printf("Noi, the enetred strings are NOT palindome.\n");
}
void substring(char *a, char *b)
{
    int n1 = 0, n2 = 0, i, j, flag = 0;
    n1 = strrlen(a);
    n2 = strrlen(b);
    for (i = 0; i <= n1 - n2; i++)
    {
        ;
        for (j = i; j < i + n2; j++)
        {
            flag = 1;
            if (a[j] != b[j - i])
            {
                flag = 0;
                break;
            }
        }
        if (flag == 1)
            break;
    }
    if (flag == 1)
        printf("yes, '%s' is a substring of '%s'!", b, a);
    else
        printf("no, '%s' is not a substring of '%s'!", b, a);
}
int main()
{
    printf("Bushra Shahzad-21BCS046.\n");
    int flag = 0, choice;
    char str1[100];
    char str2[100];
    char str3;
    while (1)
    {
        printf("\nPress '1' for finding length.\n");
        printf("Press '2' for copying strings\n");
        printf("Press '3' for concatenating two string.\n");
        printf("Press '4' for reversing the string\n");
        printf("Press '5' for comapring the two strings .\n");
        printf("Press '6' for checking if a string is palindrome.\n");
        printf("Press '7' for checking substring.\n");
        printf("Press '8' to Exit!.\n");
        scanf("%d", &choice);
        switch (choice)
        {
```

```
case 1:
   printf("Enter string:\n");
   getchar();
   gets(str1);
   printf("The length of the string is %d.", strrlen(str1));
   break;
case 2:
   printf("Enter string:\n");
   getchar();
   gets(str1);
   printf("The copied string is:\n");
   strrcpy(str1);

   break;
case 3:
   printf("Enter string 1:\n");
   getchar();
   gets(str1);
   printf("Enter string 2:\n");
   gets(str2);
   concatenate(str1, str2);

   break;
case 4:
   printf("Enter string 1:\n");
   getchar();
   gets(str1);
   reverse(str1);
   break;
case 5:
   printf("Enter string 1:\n");
   getchar();
   gets(str1);
   printf("Enter string 2:\n");
   gets(str2);
   compare(str1, str2);
   break;
case 6:
   printf("Enter string 1:\n");
   scanf("%s", str1);
   isPalindorme(str1);
   break;
case 7:
   printf("Enter string 1:\n");
   getchar();
   gets(str1);
   printf("Enter string 2:\n");
   gets(str2);
```

```
            substring(str1, str2);
            break;
        case 8:
            exit(1);
            break;
        default:
            printf("Invalid Input!");
            break;
        }
    }
    return 0;
}
```

OUTPUT 6:

```
Bushra Shahzad-21BCS046.

Press '1' for finding length.
Press '2' for copying strings
Press '3' for concatenating two string.
Press '4' for reversing the string
Press '5' for comapring the two strings .
Press '6' for checking if a string is palindrome.
Press '7' for checking substring.
Press '8' to Exit!.
1
Enter string:
bushra shahzad
The length of the string is 14.
2
Enter string:
what is the meaning of life
The copied string is:
what is the meaning of life
3
Enter string 1:
bushra
Enter string 2:
shahzad
The concatenated string is bushrashahzad
4
Enter string 1:
say loud yoo
The reversed string is ooy duol yas
5
Enter string 1:
bushra
Enter string 2:
buhsra
Noi, the enetred strings are NOT same.
6
Enter string 1:
abba
yes, the enetred string is Palindome
7
Enter string 1:
bushra
Enter string 2:
sh
yes, 'sh' is a substring of 'bushra'!
```

CODE 7:

```
#include <stdio.h>
int i, j;
void details(int n, int arr[n][5])
{
   printf("ROLL-NO\t\tAGE\t\tSUB-1\t\tSUB-2\t\tSUB-3\n");
   for (i = 0; i < n; i++)
   {
      for (j = 0; j < 5; j++)
         printf("%d\t\t", arr[i][j]);
      printf("\n");
   }
}
void percentage(int n, int arr[n][5])
{
   float p;
   for (i = 0; i < n; i++)
   {
      int s = 0;
      printf("Percentage of roll. %d ", arr[i][0]);
      for (j = 2; j < 5; j++)
         s = s + arr[i][j];
      printf("\n");
      p = s * 100.0 / (300.0);
      printf("%.2f", p);
      printf("\n");
   }
}
void highest(int n, int arr[n][5])
{

   for (j = 2; j < 5; j++)
   {
      printf("\nmaximum in SUB%d :", j - 1);
      int max = arr[0][j];
      for (i = 0; i < n; i++)
      {
         if (max < (arr[i][j]))
            max = arr[i][j];
      }
      printf("%d", max);
   }
}
void rollhigh(int n, int arr[n][5])
{
   for (j = 2; j < 5; j++)
   {
```

```
        printf("Roll with highest percentage in SUB-%d : ", j - 1);
        int max = arr[0][j];
        int roll = arr[0][0];
        int age = arr[0][1];
        for (i = 0; i < n; i++)
        {
            if (max < arr[i][j])
            {
                max = arr[i][j];
                roll = arr[i][0];
                age = arr[i][1];
            }
        }
        for (i = 0; i < n; i++)
        {
            if (arr[i][j] == max)
            {
                if (arr[i][1] < age)
                {
                    roll = arr[i][0];
                    age = arr[i][1];
                }
            }
        }
        for (i = 0; i < n; i++)
        {
            if (arr[i][j] == max)
            {
                if (arr[i][1] == age)
                {
                    printf("%d", arr[i][0]);
                }
            }
            printf("\n");
        }
    }
}
int main()
{

    int n, choice;
    printf("Enter the number of students :");
    scanf("%d", &n);
    int table[n][5];
    for (i = 0; i < n; i++)
    {
        printf("Enter the details of student %d", i + 1);
        for (j = 0; j < 5; j++)
```

```
    {
        if (j == 0)
        {
            printf("\nRoll No. : ");
            scanf("%d", &table[i][j]);
        }
        else if (j == 1)
        {
            printf("Age : ");
            scanf("%d", &table[i][j]);
        }
        else if (j == 2)
        {
            printf("Subject 1 : ");
            scanf("%d", &table[i][j]);
        }
        else if (j == 3)
        {
            printf("Subject 2 : ");
            scanf("%d", &table[i][j]);
        }
        else if (j == 4)
        {
            printf("Subject 3 : ");
            scanf("%d", &table[i][j]);
        }
    }
}
details(n, table);
while (1)
{
    printf("\n1. Display percentage of each student.");
    printf("\n2. Display highest marks in each subject.");
    printf("\n3. Display roll with highest percentage.");
    printf("\n4. Exit!\n");
    scanf("%d", &choice);
    switch (choice)
    {
    case 1:
        percentage(n, table);
        break;
    case 2:
        highest(n, table);
        break;
    case 3:
        rollhigh(n, table);
        break;
    case 4:
```

```
            exit(1);
            break;
        default:
            printf("Invalid Input");
            break;
        }
    }
    return 0;
}
```

OUTPUT 7:

```
Enter the number of students :3
Enter the details of student 1
Roll No. : 1
Age : 19
Subject 1 : 90
Subject 2 : 91
Subject 3 : 92
Enter the details of student 2
Roll No. : 2
Age : 20
Subject 1 : 67
Subject 2 : 89
Subject 3 : 100
Enter the details of student 3
Roll No. : 3
Age : 21
Subject 1 : 89
Subject 2 : 90
Subject 3 : 91
ROLL-NO         AGE             SUB-1           SUB-2           SUB-3
1               19              90              91              92
2               20              67              89              100
3               21              89              90              91


1. Display percentage of each student.
2. Display highest marks in each subject.
3. Display roll with highest percentage.
4. Exit!
1
Percentage of roll. 3
90.00

1. Display percentage of each student.
2. Display highest marks in each subject.
3. Display roll with highest percentage.
4. Exit!
2

maximum in SUB1 :90
maximum in SUB2 :91
maximum in SUB3 :100
1. Display percentage of each student.
2. Display highest marks in each subject.
3. Display roll with highest percentage.
4. Exit!
3
Roll with highest percentage in SUB-1 : 1


Roll with highest percentage in SUB-2 : 1


Roll with highest percentage in SUB-3 :
2
```

CODE 8:

```
#include <stdio.h>
int spaces(char *s)
{
   int cnt = 0;
   for (int i = 0; s[i] != '~'; i++)
   {
      if (s[i] == ' ')
         cnt++;
   }
   return cnt;
}
int tabs(char *s)
{
   int cnt = 0;
   for (int i = 0; s[i] != '~'; i++)
   {
      if (s[i] == '\t')
         cnt++;
   }
   return cnt;
}
int vowels(char *s)
{
   int cnt = 0;
   for (int i = 0; s[i] != '~'; i++)
   {
      if (s[i] == 'a' || s[i] == 'e' || s[i] == 'i' || s[i] == 'o' || s[i] == 'u')
         cnt++;
      if (s[i] == 'A' || s[i] == 'E' || s[i] == 'I' || s[i] == 'O' || s[i] == 'U')
         cnt++;
   }
   return cnt;
}
int consonants(char *s, int vowelsCount)
{
   int count = 0;
   for (int i = 0; s[i] != '~'; i++)
   {
      if (s[i] >= 65 && s[i] <= 90)
         count++;
      if (s[i] >= 97 && s[i] <= 122)
         count++;
   }
   return (count - vowelsCount);
}
```

```
int sentences(char *s)
{
   int cnt = 0;
   for (int i = 0; s[i] != '~'; i++)
   {
      if (s[i] == '.')
         cnt++;
   }
   return cnt;
}
int lines(char *s)
{
   int cnt = 0;
   for (int i = 0; s[i] != '~'; i++)
   {
      if (s[i] == '\n')
         cnt++;
   }
   return cnt;
}
void replace(char *s)
{
   for (int i = 0; s[i] != '~'; i++)
   {
      if (s[i] == '\t' || s[i] == '  ')
         s[i] = ' ';
   }
}
int main()
{

   int flag = 0, choice;
   char str1[5000];
   printf("Enter string:\n");
   int k = 0;
   while (str1[k - 1] != '~')
   {
      scanf("%c", &str1[k]);
      k++;
   }

   while (flag == 0)
   {

      printf("\nPress '1' for countig spaces, tabs,vowels,sentences,lines.");
      printf("\nPress '2' for replacing multiple space with single space.");
      printf("\nPress 3 to exit.\n");
      scanf("%d", &choice);
```

```
        switch (choice)
        {
        case 1:
            printf("The no of spaces is %d.\n", spaces(str1));
            printf("The no of tabs is %d.\n", tabs(str1));
            printf("The no of vowels is %d \n", vowels(str1));
            printf("The no of consonants is %d \n", consonants(str1, vowels(str1)));
            printf("The no of sentences is %d \n", sentences(str1));
            printf("The no of lines is %d \n", lines(str1));
            break;
        case 2:
            replace(str1);
            printf("%s", str1);
            break;
        case 3:
            flag = 1;
            break;

        default:
            printf("Invalid Input!");
            break;
        }
    }
}
```

OUTPUT 8:

```
Enter string:
the tussle      between a politician and the  other
is how to gain power    .
after which both are ignorant.
ignorance is the key to  success.
~

Press '1' for countig spaces, tabs,vowels,sentences,lines.
Press '2' for replacing multiple space with single space.
Press 3 to exit.
1
The no of spaces is 21.
The no of tabs is 2.
The no of vowels is 42
The no of consonants is 63
The no of sentences is 3
The no of lines is 4

Press '1' for countig spaces, tabs,vowels,sentences,lines.
Press '2' for replacing multiple space with single space.
Press 3 to exit.
2
the tussle between a politician and the  other
is how to gain power .
after which both are ignorant.
ignorance is the key to  success.
~
```

CODE 9:

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
void dayys(int d1, int d2, int m1, int m2, int y1, int y2)
{
   int day_diff, mon_diff, year_diff;
   if (d2 < d1)
   {
      if (m2 == 3)
      {
         if (y2 % 100 != 0 && y2 % 4 == 0 || y2 % 400 == 0) /*check for leap year*/
            d2 = d2 + 29;
         else
            d2 = d2 + 28;
      }
      else if (m2 == 5 || m2 == 7 || m2 == 10 || m2 == 12)
         d2 = d2 + 30;
      else
         d2 = d2 + 31;
      m2 = m2 - 1;
   }
   if (m2 < m1)
   {
      y2 = y2 - 1;
      m2 = m2 + 12;
   }
   day_diff = d1 - d2;
   mon_diff = m1 - m2;
   year_diff = y1 - y2;
printf("Difference: %d years %d months and %d days.", year_diff, mon_diff, day_diff);
}
int main()
{
   printf("Bushra Shahzad-21BCS046");
   char ch[100];
   printf("\nEnter date  in (d1-m1-y1,d2-m2-y2) form :");
   scanf("%s", &ch);
   int d1, d2, m1, m2, y1, y2;
   int i, j = 0;
   char *x, *x1, *x2, *x3, *x4, *x5;
   x = strtok(ch, ",");
   x2 = strtok(NULL, ",");
   x1 = x;
   x3 = x2;
   if (x)
   {
```

```
        printf("Date 1: %s\n", x);
        x1 = strtok(x, "-");
        d1 = atoi(x1);
        x1 = strtok(NULL, "-");
        m1 = atoi(x1);
        x1 = strtok(NULL, "-");
        y1 = atoi(x1);
    }
    if (x2)
    {
        printf("Date 2: %s\n", x2);
        x3 = strtok(x2, "-");
        d2 = atoi(x3);
        x3 = strtok(NULL, "-");
        m2 = atoi(x3);
        x3 = strtok(NULL, "-");
        y2 = atoi(x3);
    }
    dayys(d1, d2, m1, m2, y1, y2);
    return 0;
}
```

OUTPUT 9:

```
Bushra Shahzad-21BCS046
Enter date  in (d1-m1-y1,d2-m2-y2) form :3-5-1987,6-10-2021
Date 1: 3-5-1987
Date 2: 6-10-2021
Difference: -34 years -5 months and -3 days.
```

ASSIGNMENT

CODE 10:

```
#include <stdio.h>
void merge(int arr1[], int arr2[], int m, int n, int result[])
{
   int i = 0, j = n - 1, k = 0;
   while (i < m && j >= 0)
   {
      if (arr1[i] < arr2[j])
         result[k++] = arr1[i++];

      else if (arr1[i] == arr2[j])
      {
         result[k++] = arr1[i++];
         result[k++] = arr2[j--];
      }
      else if (arr1[i] > arr2[j])
         result[k++] = arr2[j--];
   }
   while (i < m)
      result[k++] = arr1[i++];
   while (j >= 0)
      result[k++] = arr2[j--];
}
void display(int *arr, int n)
{
   for (int i = 0; i < n; i++)
      printf("%d ", arr[i]);
}
int main()
{
   printf("Bushra Shahzad-21BCS046");
   int m, n;
   printf("\nEnter the size of Array 1: ");
   scanf("%d", &m);
   int arr1[m];
   printf("Enter Array1 ascending order:\n");
   for (int i = 0; i < m; i++)
   {
      scanf("%d", &arr1[i]);
   }
   printf("Enter the size of Array 2: ");
   scanf("%d", &n);
   int arr2[n];
   printf("Enter Array2 in descending order:\n");
   for (int i = 0; i < n; i++)
```

```
    {
        scanf("%d", &arr2[i]);
    }
    int resultArray[m + n];
    merge(arr1, arr2, m, n, resultArray);
    printf("Displaying merged array : \n");
    display(resultArray, m + n);
    return 0;
}
```

OUTPUT 10:

```
Bushra Shahzad-21BCS046
Enter the size of Array 1: 5
Enter Array1 ascending order:
1
3
5
7
9
Enter the size of Array 2: 4
Enter Array2 in descending order:
7
6
3
2
Displaying merged array :
1 2 3 3 5 6 7 7 9
```

CODE 11:

```
#include <stdio.h>
int strCount(char *s)
{
   int count = 0;
   for (int i = 0; s[i] != '\0'; i++)
      count++;
   return count;
}
int allOccureneces(char *s, char *oldWord)
{
   int i, j, l1, l2;
   int count = 0, count1 = 0;
   l1 = strCount(s);
   l2 = strCount(oldWord);
   for (i = 0; i < l1;)
   {
      j = 0;
      count = 0;
      while ((s[i] == oldWord[j]))
      {
         count++;
         i++;
         j++;
      }
      if (count == l2)
      {
         count1++;
         count = 0;
      }
      else
         i++;
   }
   return count1;
}
void replace(char *s, char *old, char *new)
{
   int l1, l2, l;
   l = strCount(s);
   l1 = strCount(old);
   l2 = strCount(new);
   int i, j, k, p;
   for (i = 0; i < l; i++)
   {
      j = 0;
      if (s[i] == old[j])
```

```
        {
            k = i;
            while (s[i + j] == old[j])
                j++;
            if (j > (l2 - 1))
            {
                for (p = 0; p < l2; p++)
                {
                    s[k] = new[p];
                    k++;
                }
            }
        }
    }
    s[i] = '\0';
}

int main()
{   printf("Bushra Shahzad-21BCS046");
    char str[5000], oldWord[20], newWord[20];
    printf("\nEnter the text:\n");
    int k = 0;
    while (str[k - 1] != '.')
    {
        scanf("%c", &str[k]);
        k++;
    }
    printf("Enter the word whose occurenece is to be find:\n");
    scanf("%s", &oldWord);
    printf("The word %s occurs %d times in text.", oldWord, allOccureneces(str, oldWord));
    printf("\nEnter the word that will replace the above word:\n");
    scanf("%s", &newWord);

    replace(str, oldWord, newWord);
    int i = 0;
    while (str[i] != '\0')
    {
        printf("%c", str[i]);
        i++;
    }
return 0;
}
```

OUTPUT 11:

```
Bushra Shahzad-21BCS046
Enter the text:
my name is cat
cat is my name
.
Enter the word whose occurenece is to be find:
cat
The word cat occurs 2 times in text.
Enter the word that will replace the above word:
ant
my name is ant
ant is my name
.
```

CODE 12:

```
#include <stdio.h>
struct cricket
{
   char name[30];
   int age;
   int noOfMatch;
   float averageRun;

} player[20], temp;
int main()
{
   int i, j, n;
   printf("Enter the no of players : \n");
   scanf("%d", &n);
   for (i = 0; i < n; i++)
   {
      printf("Enter data of cricketer %d", i + 1);

      printf("\nName: ");
      getchar();
      gets(player[i].name);
      printf("Age: ");
      scanf("%d", &player[i].age);
      printf("Matches: ");
      scanf("%d", &player[i].noOfMatch);
      printf("Average runs: ");
      scanf("%f", &player[i].averageRun);
   }
   for (i = 0; i < n; i++)
   {
      for (j = i+1; j < n; j++)
      {
         if (player[i].averageRun > player[j].averageRun)
         {
            temp = player[i];
            player[i] = player[j];
            player[j] = temp;
         }
      }
   }
   printf("Displaying according to Average Run\n");
   printf("Name\t\tAge\t\tNo Of Matches\tAverage Run\n");
   for (i = 0; i < n; i++)
   {
      printf("%s\t\t%d\t\t%d\t\t%.f\n", player[i].name, player[i].age, player[i].noOfMatch,
player[i].averageRun);
```

```
    }

    return 0;
}
```

OUTPUT 12:

```
Bushra Shahzad=21BCS046
Enter the no of players :
3
Enter data of cricketer 1
Name: bush
Age: 11
Matches: 1
Average runs: 123
Enter data of cricketer 2
Name: tabs
Age: 12
Matches: 1
Average runs: 145
Enter data of cricketer 3
Name: laib
Age: 13
Matches: 1
Average runs: 132
Displaying according to Average Run
Name            Age             No Of Matches   Average Run
bush            11              1               123
laib            13              1               132
tabs            12              1               145
```

CODE 13:

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
float convert(char *s)
{
   int sign = 1, index = 0;
   float number;
   if (s[0] == '-')
   {
      sign = -1;
      index = 1;
   }
   while (s[index] != '\0')
   {
      if (s[index] >= '0' && s[index] <= '9')
         number = number * 10 + s[index] - '0';
      else
         break;
      index++;
   }
   number = number * sign;
   return number;
}
int main()
{printf("Bushra Shahzad-21BCS046");
   char ch[100];
   printf("\nEnter two complex no in (a+bi,c+di) form :");
   scanf("%s", &ch);
   float a, b, c, d;
   int i, j = 0;
   char *x, *x1, *x2, *x3;
   x = strtok(ch, ",");
   x2 = strtok(NULL, ",");
   x3 = x;
   if (x)
   {
      printf("Complex 1: %s\n", x);
      x1 = strtok(x3, "+");
      a = convert(x1);
      x1 = strtok(NULL, "+");
      x1 = strtok(x1, "i");
      b = convert(x1);
   }

   if (x2)
   {
```

```
        printf("Complex 2: %s\n", x2);
        x1 = strtok(x2, "+");
        c = convert(x1);
        x1 = strtok(NULL, "+");
        x1 = strtok(x1, "i");
        d = convert(x1);
    }
   printf("Adding both complex no: %0.2f + %0.2fi\n", a + c, b + d);
    printf("Substracting both complex no: %0.2f + %0.2fi\n", a - c, b - d);
    printf("Multiplying both complex no: %0.2f + %0.2fi\n", a * c - b * d, a * d + b * c);
    printf("Dividing both complex no: %0.2f + %0.2fi\n", (a * c + b * d) / (c * c + d * d), (b * c - a * d)
/ (c * c + d * d));
 return 0;
}
```

OUTPUT 13:

```
Bushra Shahzad-21BCS046
Enter two complex no in (a+bi,c+di) form :12+13i,12+13i
Complex 1: 12+13i
Complex 2: 12+13i
Adding both complex no: 24.00 + 26.00i
Substracting both complex no: 0.00 + 0.00i
Multiplying both complex no: -25.00 + 312.00i
Dividing both complex no: 1.00 + 0.00i
```

CODE 14:

```
#include <stdio.h>
#include <stdlib.h>
struct student
{
   char name[30];
   int roll;
   float subject1, subject2, subject3, percentage;
};
struct student stu;

void writeData()
{
   FILE *fp;
   if (fp == NULL)
      printf("\nError!.\n");

   printf("Enter the data of student.\n");

   printf("\nName: ");
   getchar();
   gets(stu.name);
   printf("Roll No.: ");
   scanf("%d", &stu.roll);
   printf("Subject 1: ");
   scanf("%f", &stu.subject1);
   printf("Subject 2: ");
   scanf("%f", &stu.subject2);
   printf("Subject 3: ");
   scanf("%f", &stu.subject3);
   stu.percentage = (stu.subject1 + stu.subject2 + stu.subject3) / 3.0;
   fp = fopen("dataFile.txt", "a");
   fwrite(&stu, sizeof(stu), 1, fp);

   fclose(fp);
}
void updateData()
{
   int roll_no, found = 0;
   printf("Enter roll no to update data: ");
   scanf("%d", &roll_no);

   FILE *fp, *fp1;
   fp = fopen("dataFile.txt", "r");
   fp1 = fopen("tempFile.txt", "w");
   printf("Enter updated data : \n");
   while (fread(&stu, sizeof(stu), 1, fp))
```

```
    {
        if (stu.roll == roll_no)
        {
            found = 1;
            printf("\nName: ");
            getchar();
            gets(stu.name);
            printf("Roll No.: ");
            scanf("%d", &stu.roll);
            printf("Subject 1: ");
            scanf("%f", &stu.subject1);
            printf("Subject 2: ");
            scanf("%f", &stu.subject2);
            printf("Subject 3: ");
            scanf("%f", &stu.subject3);
            stu.percentage = (stu.subject1 + stu.subject2 + stu.subject3) / 3.0;
        }
        fwrite(&stu, sizeof(stu), 1, fp1);
    }
    fclose(fp);
    fclose(fp1);

    if (found == 1)
    {
        fp = fopen("dataFile.txt", "w");
        fp1 = fopen("tempFile.txt", "r");
        while (fread(&stu, sizeof(stu), 1, fp1))
        {
            fwrite(&stu, sizeof(stu), 1, fp);
        }

        fclose(fp1);
        fclose(fp);
    }
    else
        printf("Roll No. not found!\n");
}
void delete ()
{
    int roll_no, found = 0;
    printf("Enter roll no to delete data: ");
    scanf("%d", &roll_no);

    FILE *fp, *fp1;
    fp = fopen("dataFile.txt", "r");
    fp1 = fopen("tempFile.txt", "w");

    while (fread(&stu, sizeof(stu), 1, fp))
```

```
    {
        if (stu.roll == roll_no)
            found = 1;
        else
            fwrite(&stu, sizeof(stu), 1, fp1);
    }
    fclose(fp1);
    fclose(fp);
    if (found)
    {
        fp = fopen("dataFile.txt", "w");
        fp1 = fopen("tempFile.txt", "r");
        while (fread(&stu, sizeof(stu), 1, fp1))
        {
            fwrite(&stu, sizeof(stu), 1, fp);
        }
        fclose(fp1);
        fclose(fp);
    }
    else
        printf("\nRoll No. not found!\n");
}
void display()
{
    FILE *fp;
    fp = fopen("dataFile.txt", "r");
    if (fread(&stu, sizeof(stu), 1, fp) == '\0')
        printf("No data.\n");
    else
        printf("\nName\t\tRoll-no\t\tSubject-1\tSubject-2\tSubject-3\tPercentage\n");
    fclose(fp);

    fp = fopen("dataFile.txt", "r");
    while (fread(&stu, sizeof(stu), 1, fp))
    {
        printf("%s\t\t%d\t\t%.1f\t\t%.1f\t\t%.1f\t\t%0.2f\n", stu.name, stu.roll, stu.subject1, stu.subject2,
stu.subject3, stu.percentage);
    }
    fclose(fp);
}

int main()
{  printf("Bushra Shahzad-21BCS046");
    while (1)
    {
        int key;
        printf("\nEnter '1' to insert a row.\nEnter '2' to delete a row.\nEnter '3' to update a row.\n");
        printf("Enter '4' to display student records.\nEnter '5' to exit the program.\n");
```

```
        printf("Enter your choice: ");
        scanf("%d", &key);

        switch (key)
        {
        case 1:
            writeData();
            break;
        case 2:
            delete ();
            break;
        case 3:
            updateData();
            break;
        case 4:
            display();
            break;
        case 5:
            exit(0);
            break;
        }
    }
    return 0;
}
```

OUTPUT 14:

```
Bushra Shahzad-21BCS046
Enter '1' to insert a row.
Enter '2' to delete a row.
Enter '3' to update a row.
Enter '4' to display student records.
Enter '5' to exit the program.
Enter your choice: 1
Enter the data of student.

Name: bushra
Roll No.: 1
Subject 1: 90
Subject 2: 78
Subject 3: 89

Enter '1' to insert a row.
Enter '2' to delete a row.
Enter '3' to update a row.
Enter '4' to display student records.
Enter '5' to exit the program.
Enter your choice: 4

Name            Roll-no         Subject-1       Subject-2       Subject-3       Percentage
bushra          1               90.0            78.0            89.0            85.67

Enter your choice: 4

Name            Roll-no         Subject-1       Subject-2       Subject-3       Percentage
bushra          1               90.0            78.0            89.0            85.67
laiba           2               98.0            89.0            70.0            85.67
tabinda         3               90.0            89.0            99.0            92.67

Enter your choice: 3
Enter roll no to update data: 1
Enter updated data :

Name: BUSH
Roll No.: 1
Subject 1: 90
Subject 2: 91
Subject 3: 92

Enter '1' to insert a row.
Enter '2' to delete a row.
Enter '3' to update a row.
Enter '4' to display student records.
Enter '5' to exit the program.
Enter your choice: 4

Name            Roll-no         Subject-1       Subject-2       Subject-3       Percentag
BUSH            1               90.0            91.0            92.0            91.00
laiba           2               98.0            89.0            70.0            85.67
tabinda         3               90.0            89.0            99.0            92.67

Enter roll no to delete data: 1

Enter '1' to insert a row.
Enter '2' to delete a row.
Enter '3' to update a row.
Enter '4' to display student records.
Enter '5' to exit the program.
Enter your choice: 4

Name            Roll-no         Subject-1       Subject-2       Subject-3       Percentage
laiba           2               98.0            89.0            70.0            85.67
tabinda         3               90.0            89.0            99.0            92.67
```