40 PROGRAMS

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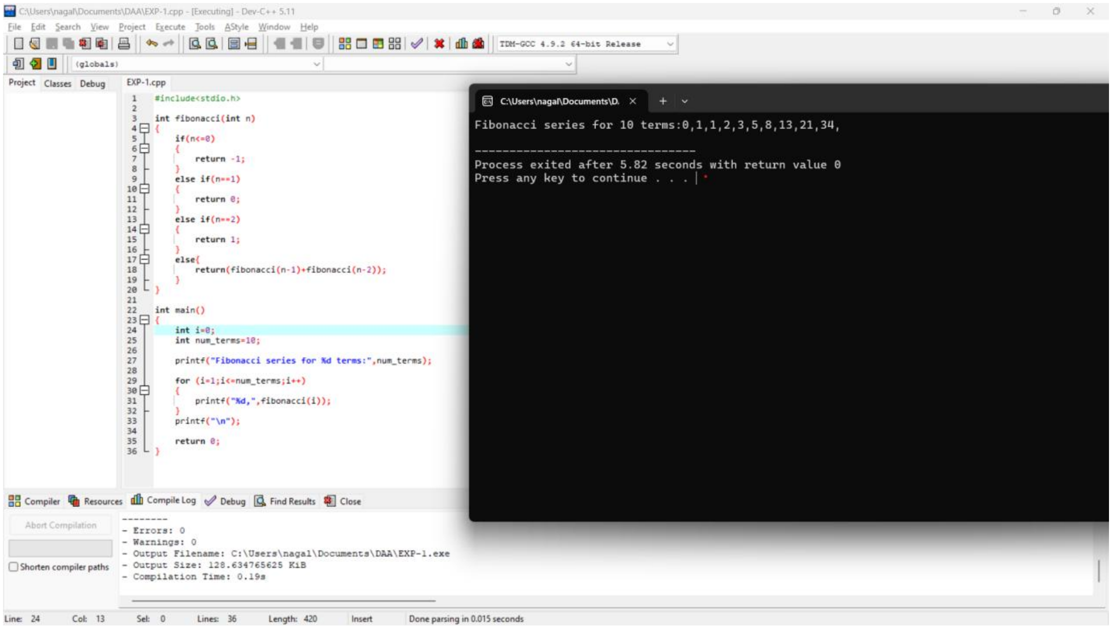
CSA0659-DESIGN AND ANALYSIS OF ALGORITHMS FOR NETWORK PROTOCOLS

1.

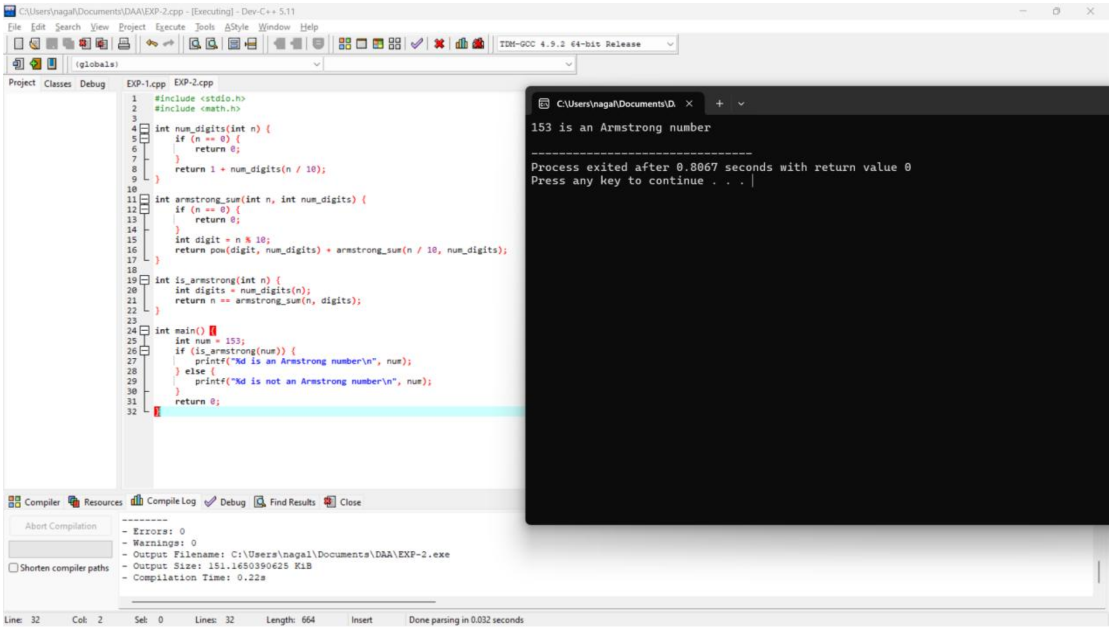

C:\Users\nagal\Documents\DAA\EXP-1.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
☐ Shorten compiler paths
Line: 24 Col: 13 Sel: 0 Lines: 36 Length: 420 Insert Done parsing in 0.015 seconds

```c
#include<stdio.h>

int fibonacci(int n)
{
    if(n<=0)
    {
        return -1;
    }
    else if(n==1)
    {
        return 0;
    }
    else if(n==2)
    {
        return 1;
    }
    else{
        return(fibonacci(n-1)+fibonacci(n-2));
    }
}

int main()
{
    int i=0;
    int num_terms=10;

    printf("Fibonacci series for %d terms:",num_terms);

    for (i=1;i<=num_terms;i++)
    {
        printf("%d,",fibonacci(i));
    }
    printf("\n");

    return 0;
}
```

```
Fibonacci series for 10 terms:0,1,1,2,3,5,8,13,21,34,

--------------------------------
Process exited after 5.82 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-1.exe
- Output Size: 128.634765625 KiB
- Compilation Time: 0.19s
```

2.

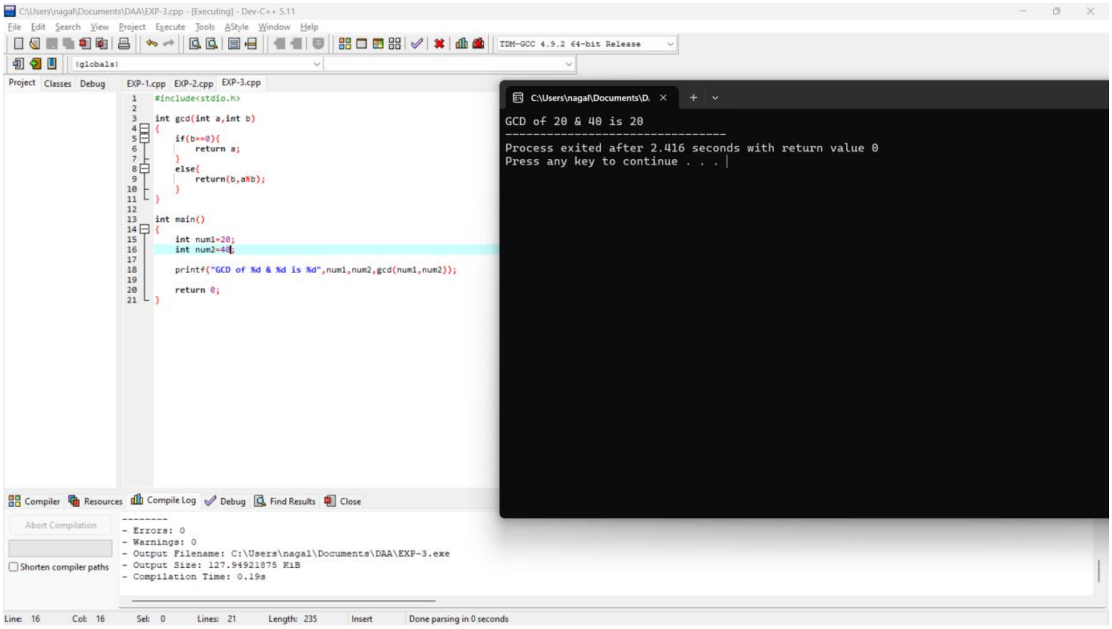

C:\Users\nagal\Documents\DAA\EXP-2.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp EXP-2.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
☐ Shorten compiler paths
Line: 32 Col: 2 Sel: 0 Lines: 32 Length: 664 Insert Done parsing in 0.032 seconds

```c
#include <stdio.h>
#include <math.h>

int num_digits(int n) {
    if (n == 0) {
        return 0;
    }
    return 1 + num_digits(n / 10);
}

int armstrong_sum(int n, int num_digits) {
    if (n == 0) {
        return 0;
    }
    int digit = n % 10;
    return pow(digit, num_digits) + armstrong_sum(n / 10, num_digits);
}

int is_armstrong(int n) {
    int digits = num_digits(n);
    return n == armstrong_sum(n, digits);
}

int main() {
    int num = 153;
    if (is_armstrong(num)) {
        printf("%d is an Armstrong number\n", num);
    } else {
        printf("%d is not an Armstrong number\n", num);
    }
    return 0;
}
```

```
153 is an Armstrong number

--------------------------------
Process exited after 0.8067 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-2.exe
- Output Size: 151.1650390625 KiB
- Compilation Time: 0.22s
```

3.


C:\Users\nagal\Documents\DAA\EXP-3.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp EXP-2.cpp EXP-3.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
□ Shorten compiler paths

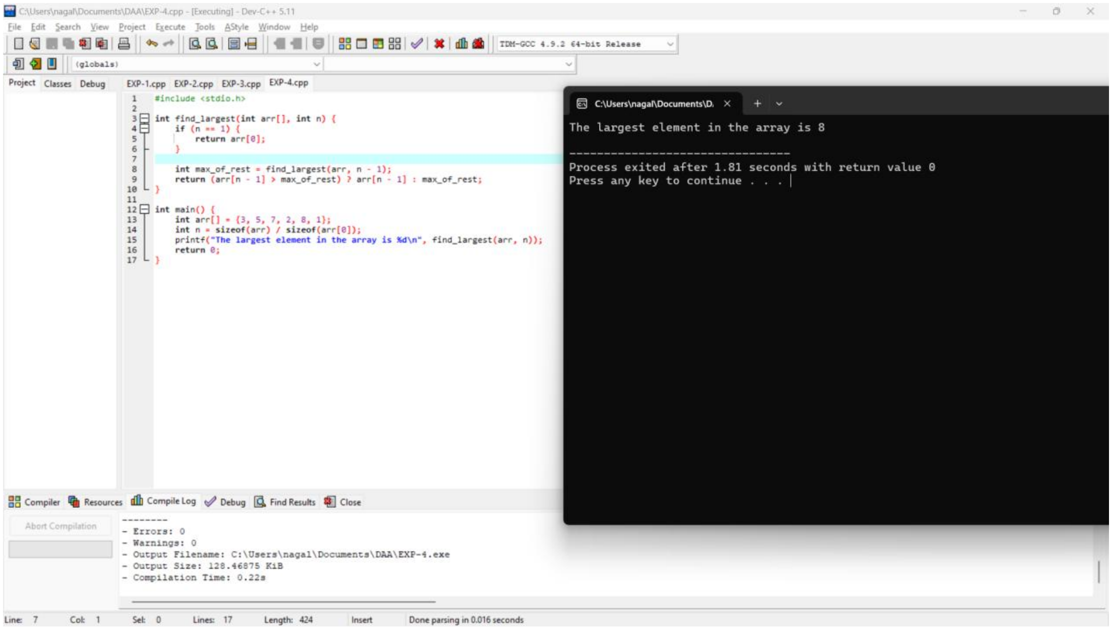
```c
#include<stdio.h>

int gcd(int a,int b)
{
    if(b==0){
        return a;
    }
    else{
        return(b,a%b);
    }
}

int main()
{
    int num1=20;
    int num2=40;

    printf("GCD of %d & %d is %d",num1,num2,gcd(num1,num2));

    return 0;
}
```

```
GCD of 20 & 40 is 20
--------------------------------
Process exited after 2.416 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-3.exe
- Output Size: 127.94921875 KiB
- Compilation Time: 0.19s
```

Line: 16 Col: 16 Sel: 0 Lines: 21 Length: 235 Insert Done parsing in 0 seconds

4.


C:\Users\nagal\Documents\DAA\EXP-4.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp EXP-2.cpp EXP-3.cpp EXP-4.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation

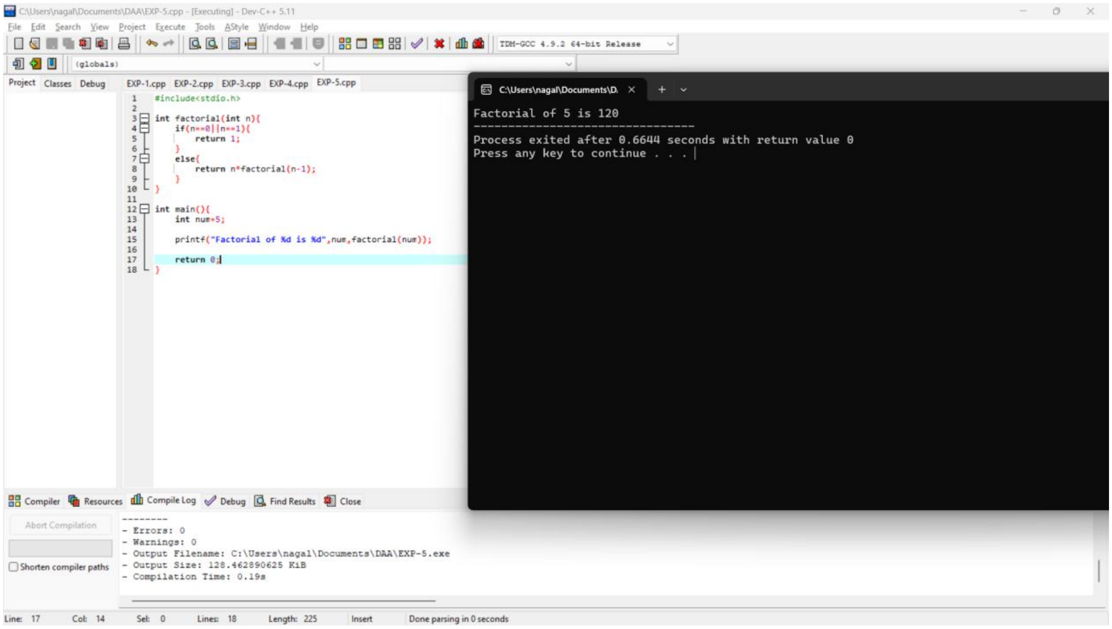
```c
#include <stdio.h>

int find_largest(int arr[], int n) {
    if (n == 1) {
        return arr[0];
    }

    int max_of_rest = find_largest(arr, n - 1);
    return (arr[n - 1] > max_of_rest) ? arr[n - 1] : max_of_rest;
}

int main() {
    int arr[] = {3, 5, 7, 2, 8, 1};
    int n = sizeof(arr) / sizeof(arr[0]);
    printf("The largest element in the array is %d\n", find_largest(arr, n));
    return 0;
}
```

```
The largest element in the array is 8

--------------------------------
Process exited after 1.81 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-4.exe
- Output Size: 128.46875 KiB
- Compilation Time: 0.22s
```

Line: 7 Col: 1 Sel: 0 Lines: 17 Length: 424 Insert Done parsing in 0.016 seconds

5.

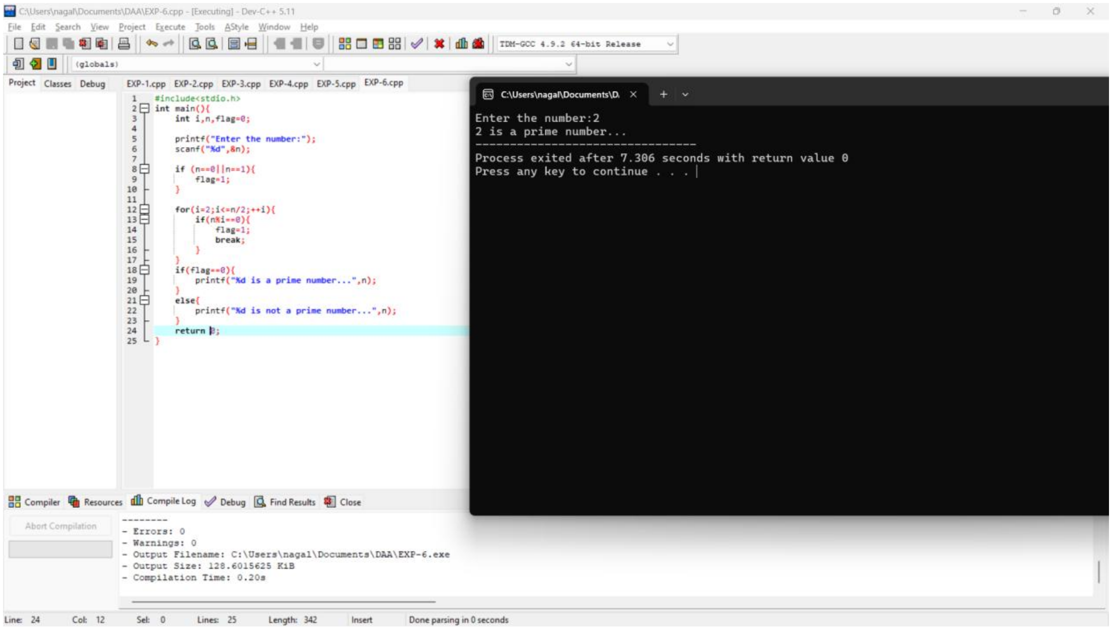

C:\Users\nagal\Documents\DAA\EXP-5.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp EXP-2.cpp EXP-3.cpp EXP-4.cpp EXP-5.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 17 Col: 14 Sel: 0 Lines: 18 Length: 225 Insert Done parsing in 0 seconds

```c
#include<stdio.h>

int factorial(int n){
    if(n==0||n==1){
        return 1;
    }
    else{
        return n*factorial(n-1);
    }
}

int main(){
    int num=5;

    printf("Factorial of %d is %d",num,factorial(num));

    return 0;
}
```

```
Factorial of 5 is 120
--------------------------------
Process exited after 0.6644 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-5.exe
- Output Size: 128.462890625 KiB
- Compilation Time: 0.19s
```

6.

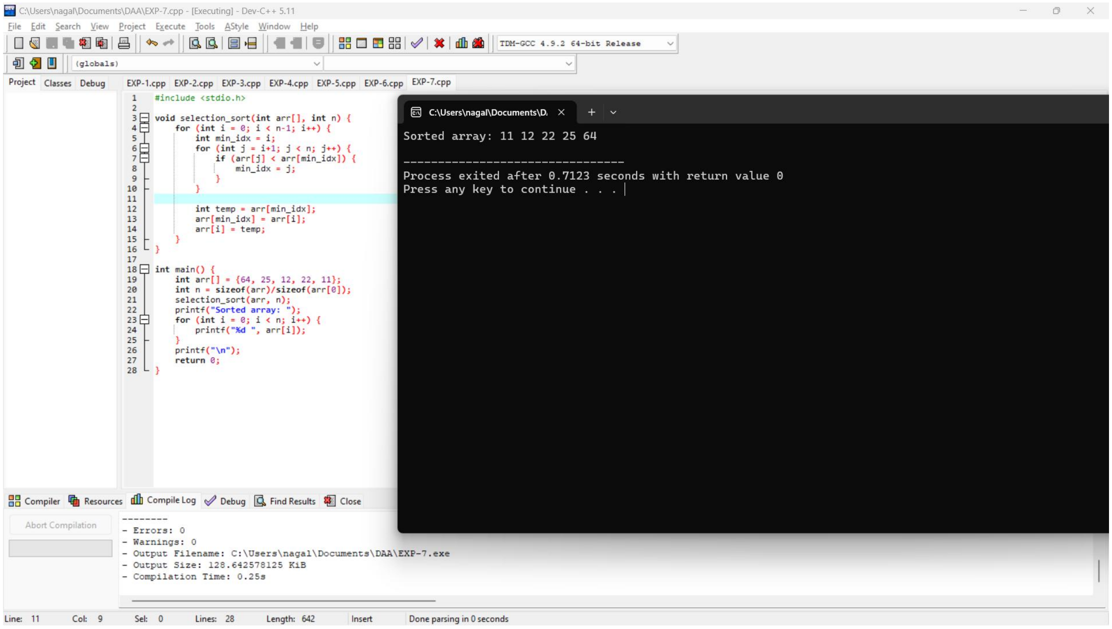

C:\Users\nagal\Documents\DAA\EXP-6.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp EXP-2.cpp EXP-3.cpp EXP-4.cpp EXP-5.cpp EXP-6.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Line: 24 Col: 12 Sel: 0 Lines: 25 Length: 342 Insert Done parsing in 0 seconds

```c
#include<stdio.h>
int main(){
    int i,n,flag=0;

    printf("Enter the number:");
    scanf("%d",&n);

    if (n==0||n==1){
        flag=1;
    }

    for(i=2;i<=n/2;++i){
        if(n%i==0){
            flag=1;
            break;
        }
    }
    if(flag==0){
        printf("%d is a prime number...",n);
    }
    else{
        printf("%d is not a prime number...",n);
    }
    return 0;
}
```

```
Enter the number:2
2 is a prime number...
--------------------------------
Process exited after 7.306 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-6.exe
- Output Size: 128.6015625 KiB
- Compilation Time: 0.20s
```

7.


C:\Users\nagal\Documents\DAA\EXP-7.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp EXP-2.cpp EXP-3.cpp EXP-4.cpp EXP-5.cpp EXP-6.cpp EXP-7.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation

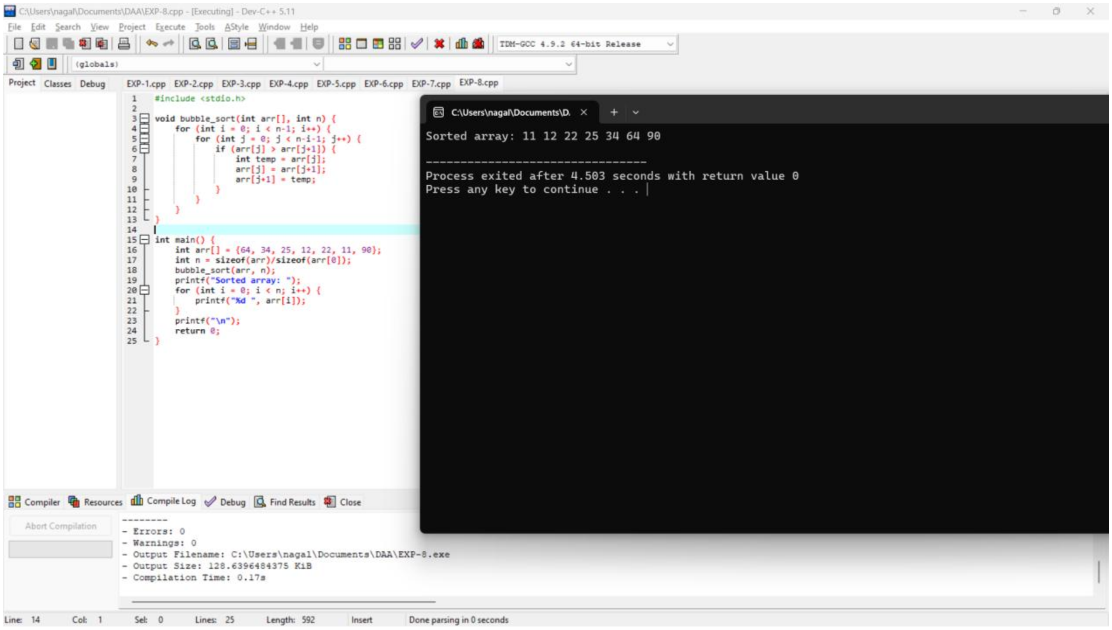
```c
#include <stdio.h>

void selection_sort(int arr[], int n) {
    for (int i = 0; i < n-1; i++) {
        int min_idx = i;
        for (int j = i+1; j < n; j++) {
            if (arr[j] < arr[min_idx]) {
                min_idx = j;
            }
        }

        int temp = arr[min_idx];
        arr[min_idx] = arr[i];
        arr[i] = temp;
    }
}

int main() {
    int arr[] = {64, 25, 12, 22, 11};
    int n = sizeof(arr)/sizeof(arr[0]);
    selection_sort(arr, n);
    printf("Sorted array: ");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
    return 0;
}
```

```
Sorted array: 11 12 22 25 64

--------------------------------
Process exited after 0.7123 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-7.exe
- Output Size: 128.642578125 KiB
- Compilation Time: 0.25s
```

Line: 11 Col: 9 Sel: 0 Lines: 28 Length: 642 Insert Done parsing in 0 seconds

8.


C:\Users\nagal\Documents\DAA\EXP-8.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-1.cpp EXP-2.cpp EXP-3.cpp EXP-4.cpp EXP-5.cpp EXP-6.cpp EXP-7.cpp EXP-8.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation

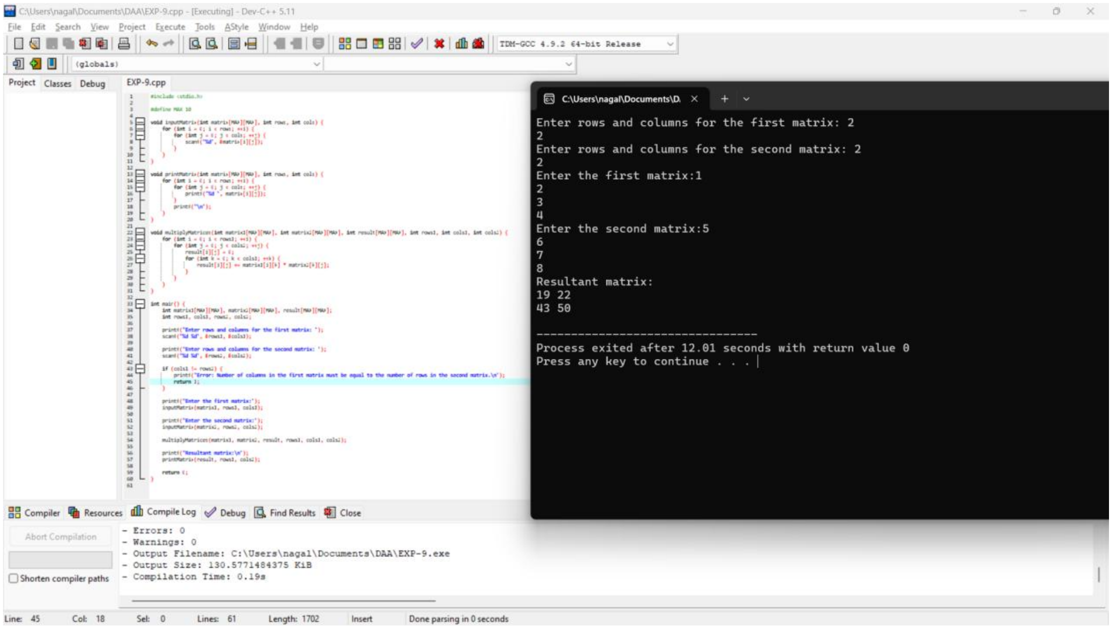
```c
#include <stdio.h>

void bubble_sort(int arr[], int n) {
    for (int i = 0; i < n-1; i++) {
        for (int j = 0; j < n-i-1; j++) {
            if (arr[j] > arr[j+1]) {
                int temp = arr[j];
                arr[j] = arr[j+1];
                arr[j+1] = temp;
            }
        }
    }
}

int main() {
    int arr[] = {64, 34, 25, 12, 22, 11, 90};
    int n = sizeof(arr)/sizeof(arr[0]);
    bubble_sort(arr, n);
    printf("Sorted array: ");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
    return 0;
}
```

```
Sorted array: 11 12 22 25 34 64 90

--------------------------------
Process exited after 4.503 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-8.exe
- Output Size: 128.6396484375 KiB
- Compilation Time: 0.17s
```

Line: 14 Col: 1 Sel: 0 Lines: 25 Length: 592 Insert Done parsing in 0 seconds

9.



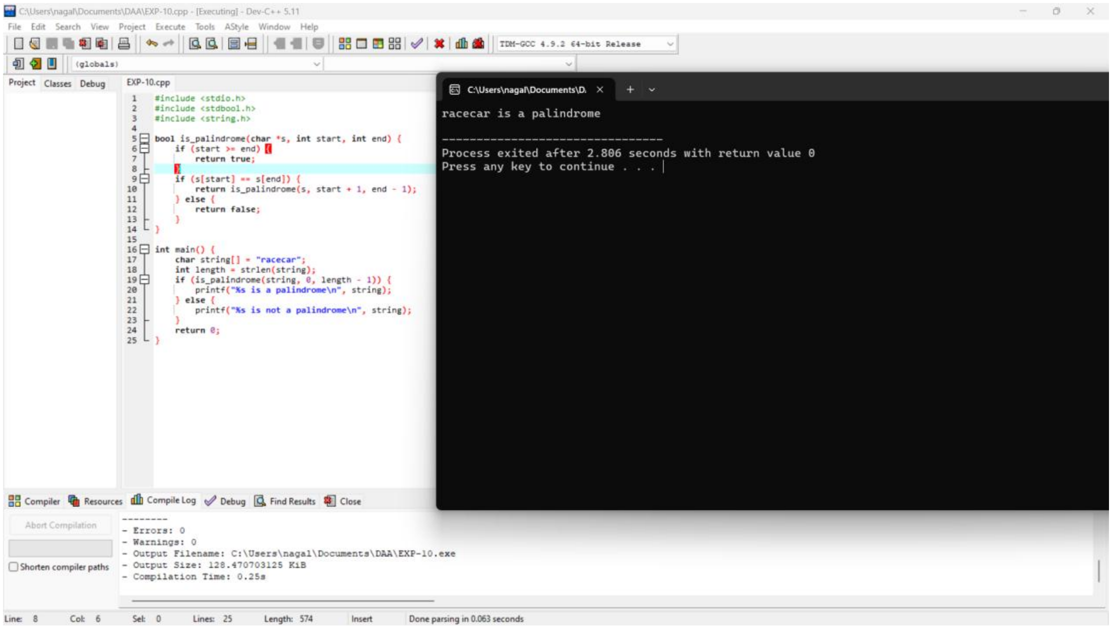
```
#include <stdio.h>

#define MAX 10

void inputMatrix(int matrix[MAX][MAX], int rows, int cols) {
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            scanf("%d", &matrix[i][j]);
        }
    }
}

void printMatrix(int matrix[MAX][MAX], int rows, int cols) {
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            printf("%d ", matrix[i][j]);
        }
        printf("\n");
    }
}

void multiplyMatrices(int matrix1[MAX][MAX], int matrix2[MAX][MAX], int result[MAX][MAX], int rows1, int cols1, int cols2) {
    for (int i = 0; i < rows1; ++i) {
        for (int j = 0; j < cols2; ++j) {
            result[i][j] = 0;
            for (int k = 0; k < cols1; ++k) {
                result[i][j] += matrix1[i][k] * matrix2[k][j];
            }
        }
    }
}

int main() {
    int matrix1[MAX][MAX], matrix2[MAX][MAX], result[MAX][MAX];
    int rows1, cols1, rows2, cols2;

    printf("Enter rows and columns for the first matrix: ");
    scanf("%d %d", &rows1, &cols1);

    printf("Enter rows and columns for the second matrix: ");
    scanf("%d %d", &rows2, &cols2);

    if (cols1 != rows2) {
        printf("Error: Number of columns in the first matrix must be equal to the number of rows in the second matrix.\n");
        return 1;
    }

    printf("Enter the first matrix:");
    inputMatrix(matrix1, rows1, cols1);

    printf("Enter the second matrix:");
    inputMatrix(matrix2, rows2, cols2);

    multiplyMatrices(matrix1, matrix2, result, rows1, cols1, cols2);

    printf("Resultant matrix:\n");
    printMatrix(result, rows1, cols2);

    return 0;
}
```

```
Enter rows and columns for the first matrix: 2
2
Enter rows and columns for the second matrix: 2
2
Enter the first matrix:1
2
3
4
Enter the second matrix:5
6
7
8
Resultant matrix:
19 22
43 50

--------------------------------
Process exited after 12.01 seconds with return value 0
Press any key to continue . . .
```

```
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-9.exe
- Output Size: 130.5771484375 KiB
- Compilation Time: 0.19s
```

C:\Users\nagal\Documents\DAA\EXP-9.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-9.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 45 Col: 18 Sel: 0 Lines: 61 Length: 1702 Insert Done parsing in 0 seconds

10.



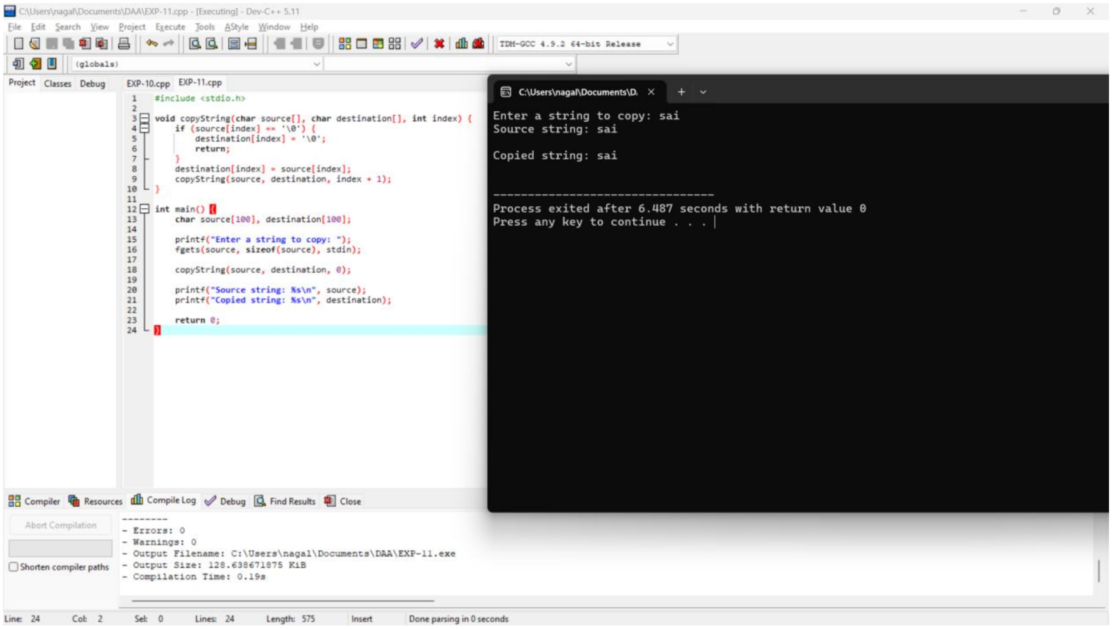
```
#include <stdio.h>
#include <stdbool.h>
#include <string.h>

bool is_palindrome(char *s, int start, int end) {
    if (start >= end) {
        return true;
    }
    if (s[start] == s[end]) {
        return is_palindrome(s, start + 1, end - 1);
    } else {
        return false;
    }
}

int main() {
    char string[] = "racecar";
    int length = strlen(string);
    if (is_palindrome(string, 0, length - 1)) {
        printf("%s is a palindrome\n", string);
    } else {
        printf("%s is not a palindrome\n", string);
    }
    return 0;
}
```

```
racecar is a palindrome

--------------------------------
Process exited after 2.806 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-10.exe
- Output Size: 128.470703125 KiB
- Compilation Time: 0.25s
```

C:\Users\nagal\Documents\DAA\EXP-10.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 8 Col: 6 Sel: 0 Lines: 25 Length: 574 Insert Done parsing in 0.063 seconds

11.


C:\Users\nagal\Documents\DAA\EXP-11.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths

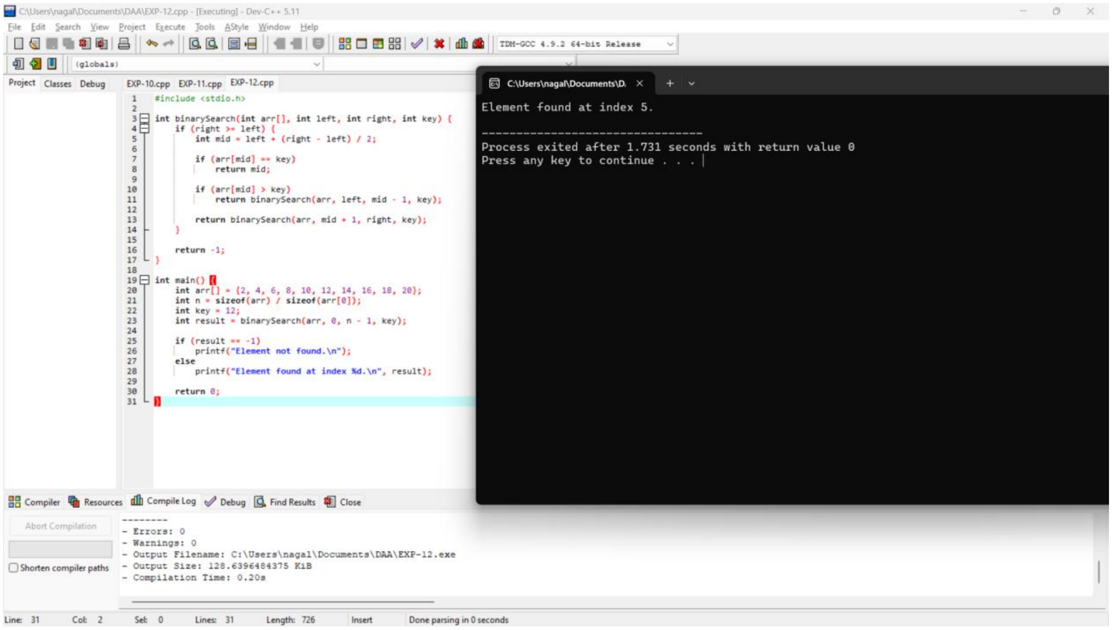
```c
#include <stdio.h>

void copyString(char source[], char destination[], int index) {
    if (source[index] == '\0') {
        destination[index] = '\0';
        return;
    }
    destination[index] = source[index];
    copyString(source, destination, index + 1);
}

int main() {
    char source[100], destination[100];

    printf("Enter a string to copy: ");
    fgets(source, sizeof(source), stdin);

    copyString(source, destination, 0);

    printf("Source string: %s\n", source);
    printf("Copied string: %s\n", destination);

    return 0;
}
```

```
Enter a string to copy: sai
Source string: sai

Copied string: sai


--------------------------------
Process exited after 6.487 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-11.exe
- Output Size: 128.638671875 KiB
- Compilation Time: 0.19s
```

Line: 24 Col: 2 Sel: 0 Lines: 24 Length: 575 Insert Done parsing in 0 seconds

12.


C:\Users\nagal\Documents\DAA\EXP-12.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths

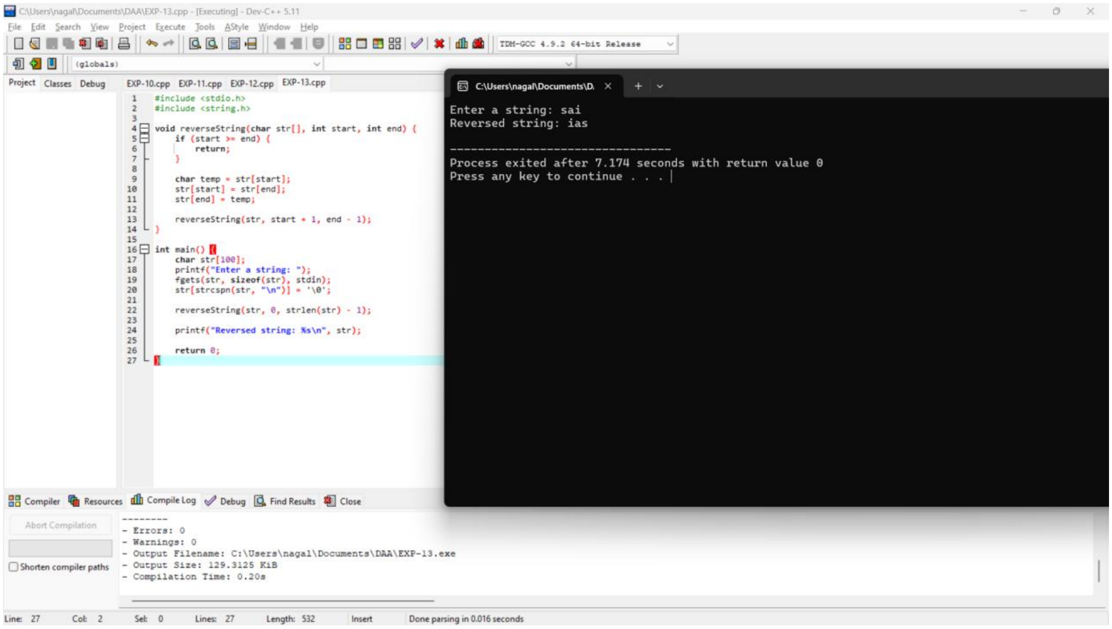
```c
#include <stdio.h>

int binarySearch(int arr[], int left, int right, int key) {
    if (right >= left) {
        int mid = left + (right - left) / 2;

        if (arr[mid] == key)
            return mid;

        if (arr[mid] > key)
            return binarySearch(arr, left, mid - 1, key);

        return binarySearch(arr, mid + 1, right, key);
    }

    return -1;
}

int main() {
    int arr[] = {2, 4, 6, 8, 10, 12, 14, 16, 18, 20};
    int n = sizeof(arr) / sizeof(arr[0]);
    int key = 12;
    int result = binarySearch(arr, 0, n - 1, key);

    if (result == -1)
        printf("Element not found.\n");
    else
        printf("Element found at index %d.\n", result);

    return 0;
}
```

```
Element found at index 5.

--------------------------------
Process exited after 1.731 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-12.exe
- Output Size: 128.6396484375 KiB
- Compilation Time: 0.20s
```

Line: 31 Col: 2 Sel: 0 Lines: 31 Length: 726 Insert Done parsing in 0 seconds

13.



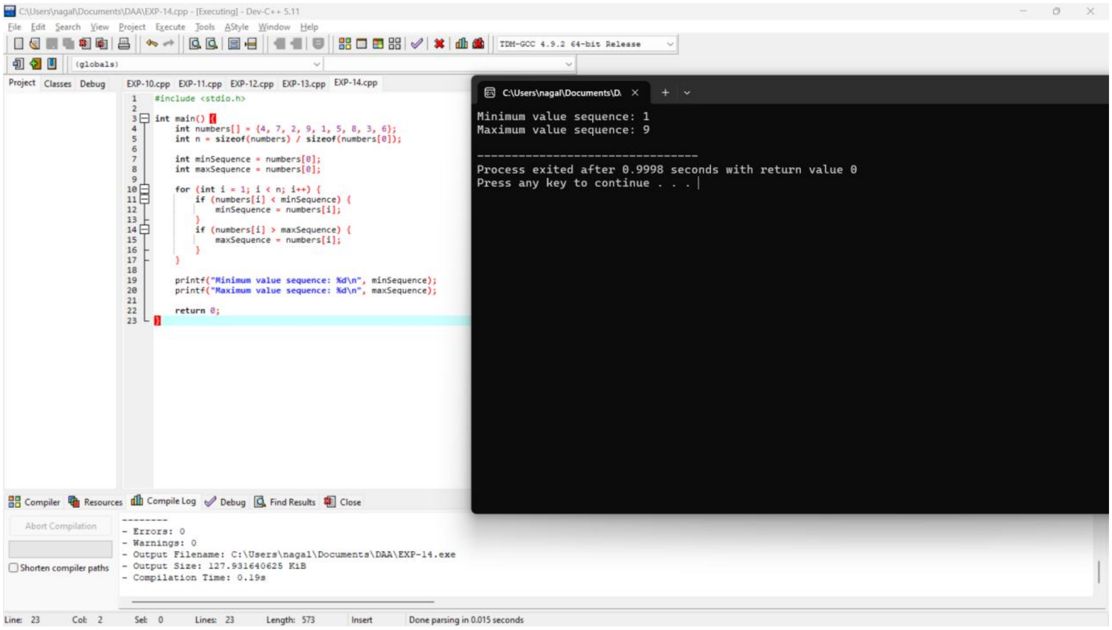
```c
#include <stdio.h>
#include <string.h>

void reverseString(char str[], int start, int end) {
    if (start >= end) {
        return;
    }

    char temp = str[start];
    str[start] = str[end];
    str[end] = temp;

    reverseString(str, start + 1, end - 1);
}

int main() {
    char str[100];
    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);
    str[strcspn(str, "\n")] = '\0';

    reverseString(str, 0, strlen(str) - 1);

    printf("Reversed string: %s\n", str);

    return 0;
}
```

```
Enter a string: sai
Reversed string: ias

--------------------------------
Process exited after 7.174 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-13.exe
- Output Size: 129.3125 KiB
- Compilation Time: 0.20s
```

C:\Users\nagal\Documents\DAA\EXP-13.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
□ Shorten compiler paths
Line: 27 Col: 2 Sel: 0 Lines: 27 Length: 532 Insert Done parsing in 0.016 seconds

14.



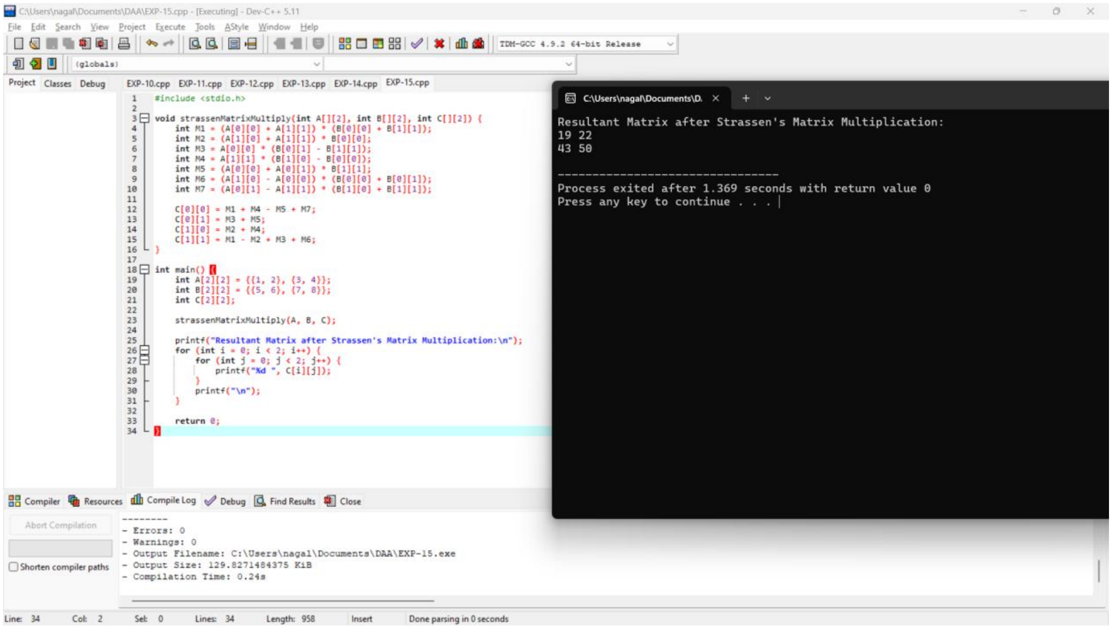
```c
#include <stdio.h>

int main() {
    int numbers[] = {4, 7, 2, 9, 1, 5, 8, 3, 6};
    int n = sizeof(numbers) / sizeof(numbers[0]);

    int minSequence = numbers[0];
    int maxSequence = numbers[0];

    for (int i = 1; i < n; i++) {
        if (numbers[i] < minSequence) {
            minSequence = numbers[i];
        }
        if (numbers[i] > maxSequence) {
            maxSequence = numbers[i];
        }
    }

    printf("Minimum value sequence: %d\n", minSequence);
    printf("Maximum value sequence: %d\n", maxSequence);

    return 0;
}
```

```
Minimum value sequence: 1
Maximum value sequence: 9

--------------------------------
Process exited after 0.9998 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-14.exe
- Output Size: 127.931640625 KiB
- Compilation Time: 0.19s
```

C:\Users\nagal\Documents\DAA\EXP-14.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
□ Shorten compiler paths
Line: 23 Col: 2 Sel: 0 Lines: 23 Length: 573 Insert Done parsing in 0.015 seconds

15.



C:\Users\nagal\Documents\DAA\EXP-15.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths

```
#include <stdio.h>

void strassenMatrixMultiply(int A[][2], int B[][2], int C[][2]) {
    int M1 = (A[0][0] + A[1][1]) * (B[0][0] + B[1][1]);
    int M2 = (A[1][0] + A[1][1]) * B[0][0];
    int M3 = A[0][0] * (B[0][1] - B[1][1]);
    int M4 = A[1][1] * (B[1][0] - B[0][0]);
    int M5 = (A[0][0] + A[0][1]) * B[1][1];
    int M6 = (A[1][0] - A[0][0]) * (B[0][0] + B[0][1]);
    int M7 = (A[0][1] - A[1][1]) * (B[1][0] + B[1][1]);

    C[0][0] = M1 + M4 - M5 + M7;
    C[0][1] = M3 + M5;
    C[1][0] = M2 + M4;
    C[1][1] = M1 - M2 + M3 + M6;
}

int main() {
    int A[2][2] = {{1, 2}, {3, 4}};
    int B[2][2] = {{5, 6}, {7, 8}};
    int C[2][2];

    strassenMatrixMultiply(A, B, C);

    printf("Resultant Matrix after Strassen's Matrix Multiplication:\n");
    for (int i = 0; i < 2; i++) {
        for (int j = 0; j < 2; j++) {
            printf("%d ", C[i][j]);
        }
        printf("\n");
    }

    return 0;
}
```

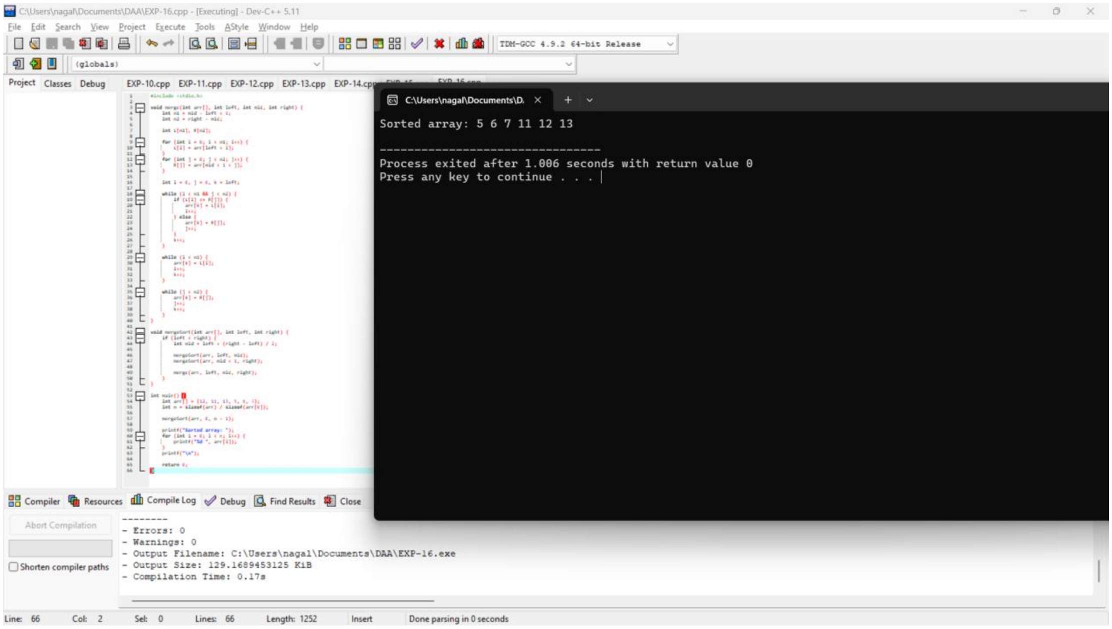
C:\Users\nagal\Documents\D.

```
Resultant Matrix after Strassen's Matrix Multiplication:
19 22
43 50

--------------------------------
Process exited after 1.369 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-15.exe
- Output Size: 129.8271484375 KiB
- Compilation Time: 0.24s
```

Line: 34 Col: 2 Sel: 0 Lines: 34 Length: 958 Insert Done parsing in 0 seconds

16.



C:\Users\nagal\Documents\DAA\EXP-16.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp EXP-16.cpp
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths

```
#include <stdio.h>

void merge(int arr[], int left, int mid, int right) {
    int n1 = mid - left + 1;
    int n2 = right - mid;

    int L[n1], R[n2];

    for (int i = 0; i < n1; i++) {
        L[i] = arr[left + i];
    }
    for (int j = 0; j < n2; j++) {
        R[j] = arr[mid + 1 + j];
    }

    int i = 0, j = 0, k = left;

    while (i < n1 && j < n2) {
        if (L[i] <= R[j]) {
            arr[k] = L[i];
            i++;
        } else {
            arr[k] = R[j];
            j++;
        }
        k++;
    }

    while (i < n1) {
        arr[k] = L[i];
        i++;
        k++;
    }

    while (j < n2) {
        arr[k] = R[j];
        j++;
        k++;
    }
}

void mergeSort(int arr[], int left, int right) {
    if (left < right) {
        int mid = left + (right - left) / 2;

        mergeSort(arr, left, mid);
        mergeSort(arr, mid + 1, right);

        merge(arr, left, mid, right);
    }
}

int main() {
    int arr[] = {12, 11, 13, 5, 6, 7};
    int n = sizeof(arr) / sizeof(arr[0]);

    mergeSort(arr, 0, n - 1);

    printf("Sorted array: ");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");

    return 0;
}
```

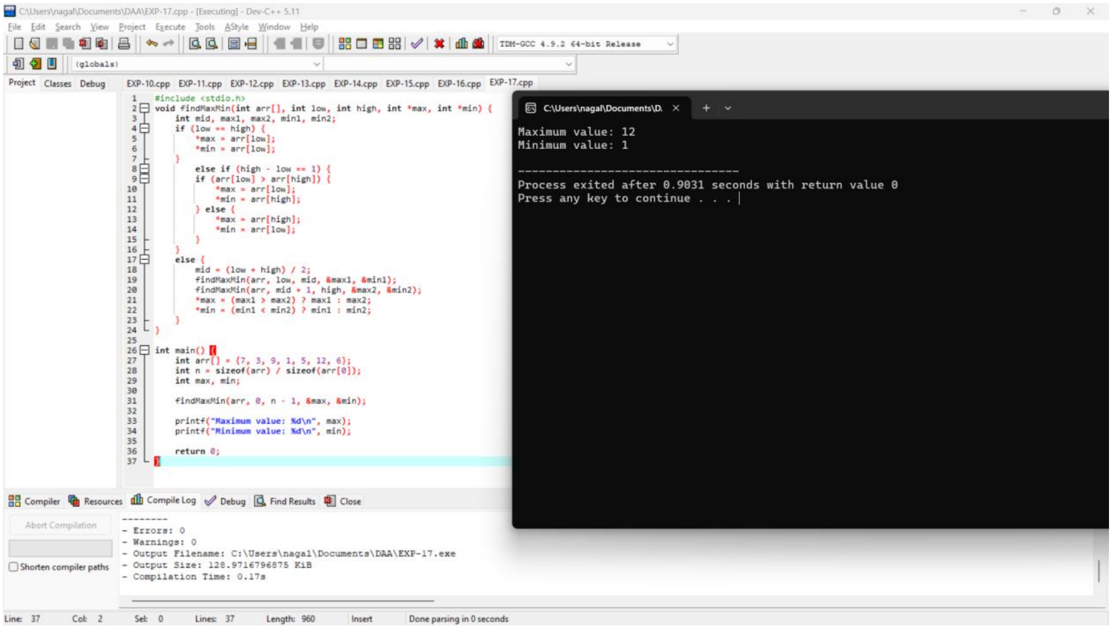
C:\Users\nagal\Documents\D.

```
Sorted array: 5 6 7 11 12 13

--------------------------------
Process exited after 1.006 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-16.exe
- Output Size: 129.1689453125 KiB
- Compilation Time: 0.17s
```

Line: 66 Col: 2 Sel: 0 Lines: 66 Length: 1252 Insert Done parsing in 0 seconds

17.



C:\Users\nagal\Documents\DAA\EXP-17.cpp - [Executing] - Dev-C++ 5.11

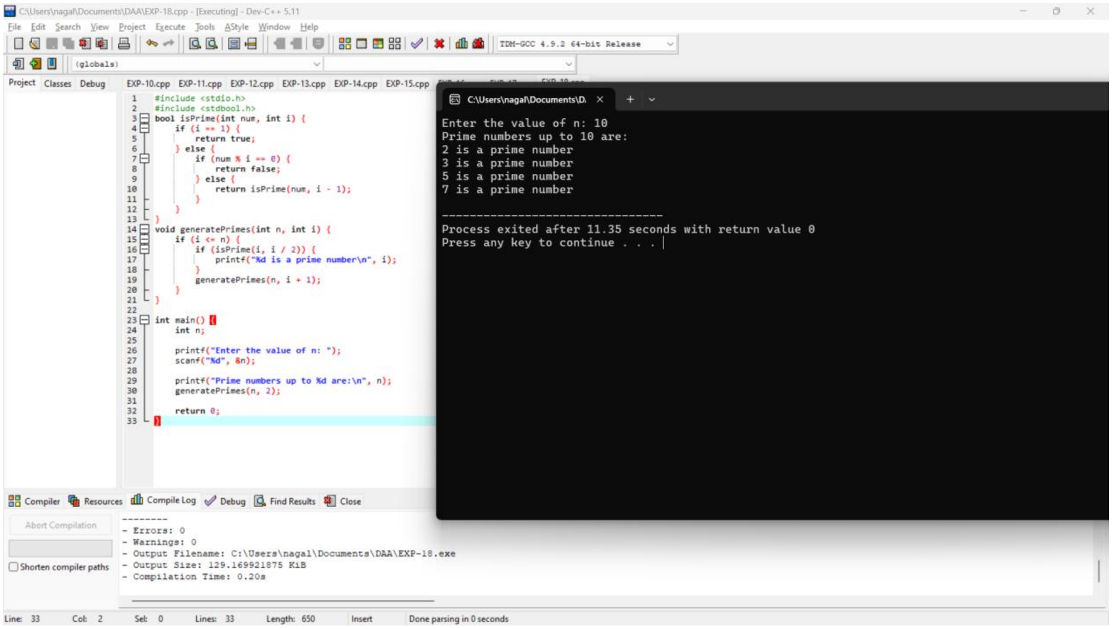
```c
#include <stdio.h>
void findMaxMin(int arr[], int low, int high, int *max, int *min) {
    int mid, max1, max2, min1, min2;
    if (low == high) {
        *max = arr[low];
        *min = arr[low];
    }
        else if (high - low == 1) {
        if (arr[low] > arr[high]) {
            *max = arr[low];
            *min = arr[high];
        } else {
            *max = arr[high];
            *min = arr[low];
        }
    }
    else {
        mid = (low + high) / 2;
        findMaxMin(arr, low, mid, &max1, &min1);
        findMaxMin(arr, mid + 1, high, &max2, &min2);
        *max = (max1 > max2) ? max1 : max2;
        *min = (min1 < min2) ? min1 : min2;
    }
}

int main() {
    int arr[] = {7, 3, 9, 1, 5, 12, 6};
    int n = sizeof(arr) / sizeof(arr[0]);
    int max, min;

    findMaxMin(arr, 0, n - 1, &max, &min);

    printf("Maximum value: %d\n", max);
    printf("Minimum value: %d\n", min);

    return 0;
}
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-17.exe
- Output Size: 128.9716796875 KiB
- Compilation Time: 0.17s
```

```
Maximum value: 12
Minimum value: 1

--------------------------------
Process exited after 0.9031 seconds with return value 0
Press any key to continue . . .
```

File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp EXP-16.cpp EXP-17.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 37 Col: 2 Sel: 0 Lines: 37 Length: 960 Insert Done parsing in 0 seconds

18.



C:\Users\nagal\Documents\DAA\EXP-18.cpp - [Executing] - Dev-C++ 5.11

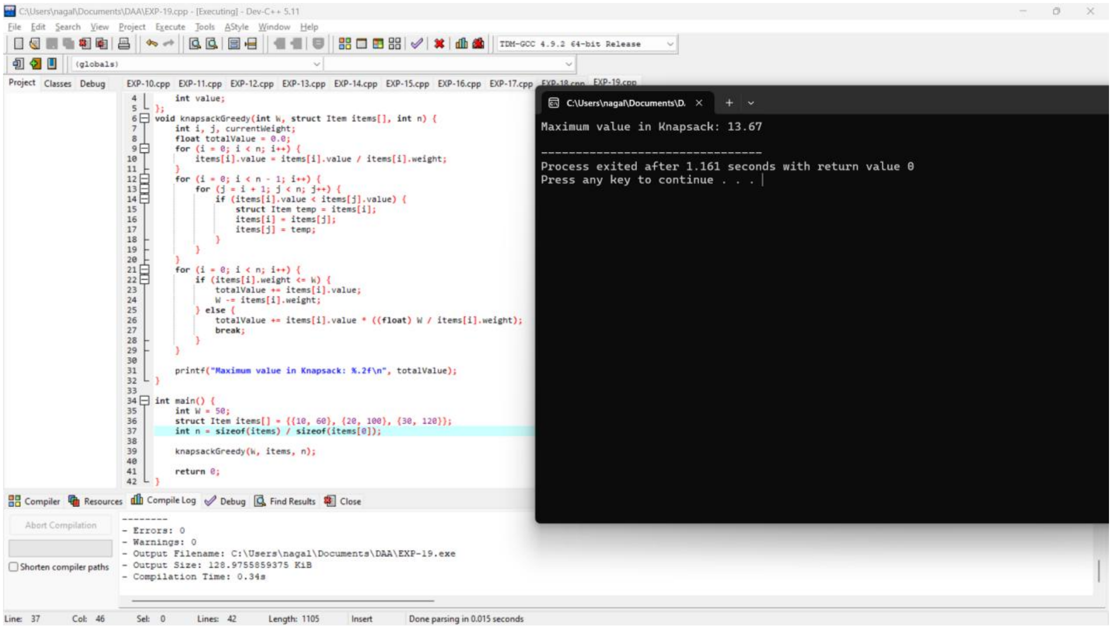
```c
#include <stdio.h>
#include <stdbool.h>
bool isPrime(int num, int i) {
    if (i == 1) {
        return true;
    } else {
        if (num % i == 0) {
            return false;
        } else {
            return isPrime(num, i - 1);
        }
    }
}
void generatePrimes(int n, int i) {
    if (i <= n) {
        if (isPrime(i, i / 2)) {
            printf("%d is a prime number\n", i);
        }
        generatePrimes(n, i + 1);
    }
}

int main() {
    int n;

    printf("Enter the value of n: ");
    scanf("%d", &n);

    printf("Prime numbers up to %d are:\n", n);
    generatePrimes(n, 2);

    return 0;
}
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-18.exe
- Output Size: 129.169921875 KiB
- Compilation Time: 0.20s
```

```
Enter the value of n: 10
Prime numbers up to 10 are:
2 is a prime number
3 is a prime number
5 is a prime number
7 is a prime number

--------------------------------
Process exited after 11.35 seconds with return value 0
Press any key to continue . . .
```

File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 33 Col: 2 Sel: 0 Lines: 33 Length: 650 Insert Done parsing in 0 seconds

19.



C:\Users\nagal\Documents\DAA\EXP-19.cpp - [Executing] - Dev-C++ 5.11

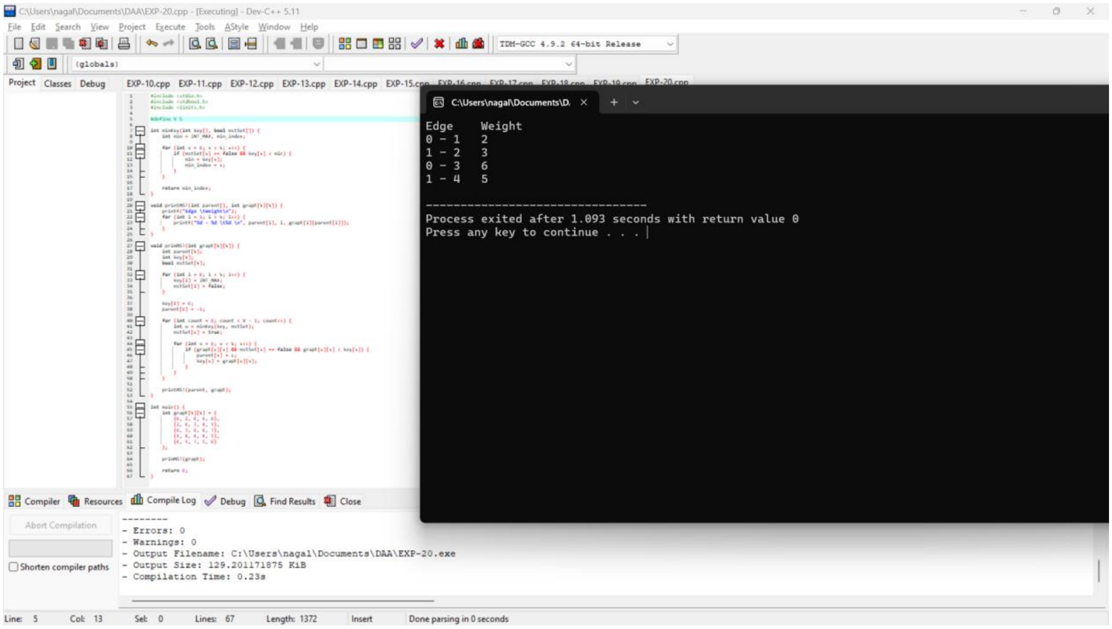
```
    int value;
};
void knapsackGreedy(int W, struct Item items[], int n) {
    int i, j, currentWeight;
    float totalValue = 0.0;
    for (i = 0; i < n; i++) {
        items[i].value = items[i].value / items[i].weight;
    }
    for (i = 0; i < n - 1; i++) {
        for (j = i + 1; j < n; j++) {
            if (items[i].value < items[j].value) {
                struct Item temp = items[i];
                items[i] = items[j];
                items[j] = temp;
            }
        }
    }
    for (i = 0; i < n; i++) {
        if (items[i].weight <= W) {
            totalValue += items[i].value;
            W -= items[i].weight;
        } else {
            totalValue += items[i].value * ((float) W / items[i].weight);
            break;
        }
    }

    printf("Maximum value in Knapsack: %.2f\n", totalValue);
}

int main() {
    int W = 50;
    struct Item items[] = {{10, 60}, {20, 100}, {30, 120}};
    int n = sizeof(items) / sizeof(items[0]);

    knapsackGreedy(W, items, n);

    return 0;
}
```

```
Maximum value in Knapsack: 13.67

--------------------------------
Process exited after 1.161 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-19.exe
- Output Size: 128.9755859375 KiB
- Compilation Time: 0.34s
```

Line: 37 Col: 46 Sel: 0 Lines: 42 Length: 1105 Insert Done parsing in 0.015 seconds

20.



C:\Users\nagal\Documents\DAA\EXP-20.cpp - [Executing] - Dev-C++ 5.11

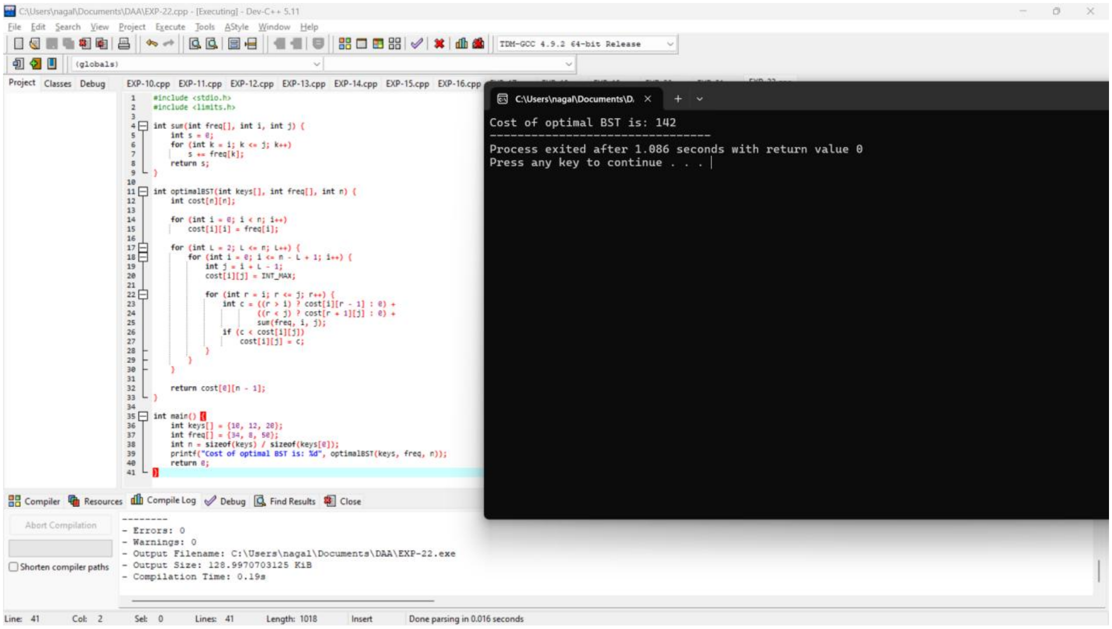
```
#include <stdio.h>
#include <stdbool.h>
#include <limits.h>

#define V 5

int minKey(int key[], bool mstSet[]) {
    int min = INT_MAX, min_index;

    for (int v = 0; v < V; v++) {
        if (mstSet[v] == false && key[v] < min) {
            min = key[v];
            min_index = v;
        }
    }

    return min_index;
}

void printMST(int parent[], int graph[V][V]) {
    printf("Edge \tWeight\n");
    for (int i = 1; i < V; i++) {
        printf("%d - %d \t%d \n", parent[i], i, graph[i][parent[i]]);
    }
}

void primMST(int graph[V][V]) {
    int parent[V];
    int key[V];
    bool mstSet[V];

    for (int i = 0; i < V; i++) {
        key[i] = INT_MAX;
        mstSet[i] = false;
    }

    key[0] = 0;
    parent[0] = -1;

    for (int count = 0; count < V - 1; count++) {
        int u = minKey(key, mstSet);
        mstSet[u] = true;

        for (int v = 0; v < V; v++) {
            if (graph[u][v] && mstSet[v] == false && graph[u][v] < key[v]) {
                parent[v] = u;
                key[v] = graph[u][v];
            }
        }
    }

    printMST(parent, graph);
}

int main() {
    int graph[V][V] = {
        {0, 2, 0, 6, 0},
        {2, 0, 3, 8, 5},
        {0, 3, 0, 0, 7},
        {6, 8, 0, 0, 9},
        {0, 5, 7, 9, 0}
    };

    primMST(graph);

    return 0;
}
```

```
Edge    Weight
0 - 1   2
1 - 2   3
0 - 3   6
1 - 4   5

--------------------------------
Process exited after 1.093 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-20.exe
- Output Size: 129.201171875 KiB
- Compilation Time: 0.23s
```

Line: 5 Col: 13 Sel: 0 Lines: 67 Length: 1372 Insert Done parsing in 0 seconds

21.


C:\Users\nagal\Documents\DAA\EXP-22.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp EXP-16.cpp
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
C:\Users\nagal\Documents\D.

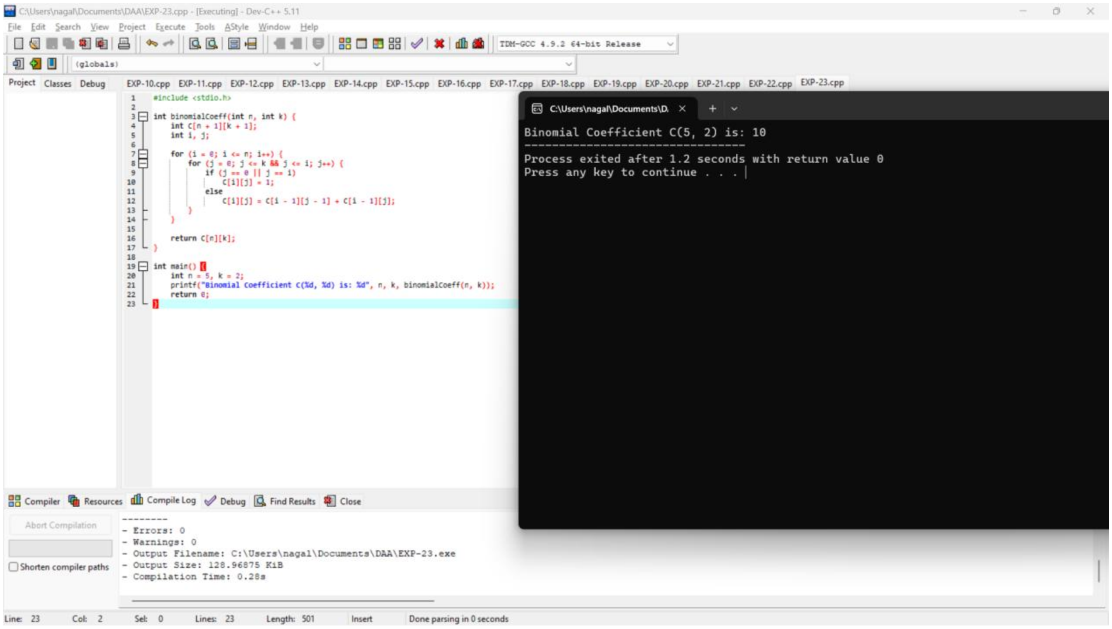
```c
#include <stdio.h>
#include <limits.h>

int sum(int freq[], int i, int j) {
    int s = 0;
    for (int k = i; k <= j; k++)
        s += freq[k];
    return s;
}

int optimalBST(int keys[], int freq[], int n) {
    int cost[n][n];

    for (int i = 0; i < n; i++)
        cost[i][i] = freq[i];

    for (int L = 2; L <= n; L++) {
        for (int i = 0; i <= n - L + 1; i++) {
            int j = i + L - 1;
            cost[i][j] = INT_MAX;

            for (int r = i; r <= j; r++) {
                int c = ((r > i) ? cost[i][r - 1] : 0) +
                        ((r < j) ? cost[r + 1][j] : 0) +
                        sum(freq, i, j);
                if (c < cost[i][j])
                    cost[i][j] = c;
            }
        }
    }

    return cost[0][n - 1];
}

int main() {
    int keys[] = {10, 12, 20};
    int freq[] = {34, 8, 50};
    int n = sizeof(keys) / sizeof(keys[0]);
    printf("Cost of optimal BST is: %d", optimalBST(keys, freq, n));
    return 0;
}
```

```
Cost of optimal BST is: 142
--------------------------------
Process exited after 1.086 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-22.exe
- Output Size: 128.9970703125 KiB
- Compilation Time: 0.19s
```

Line: 41 Col: 2 Sel: 0 Lines: 41 Length: 1018 Insert Done parsing in 0.016 seconds

22.


C:\Users\nagal\Documents\DAA\EXP-23.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp EXP-16.cpp EXP-17.cpp EXP-18.cpp EXP-19.cpp EXP-20.cpp EXP-21.cpp EXP-22.cpp EXP-23.cpp
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
C:\Users\nagal\Documents\D.

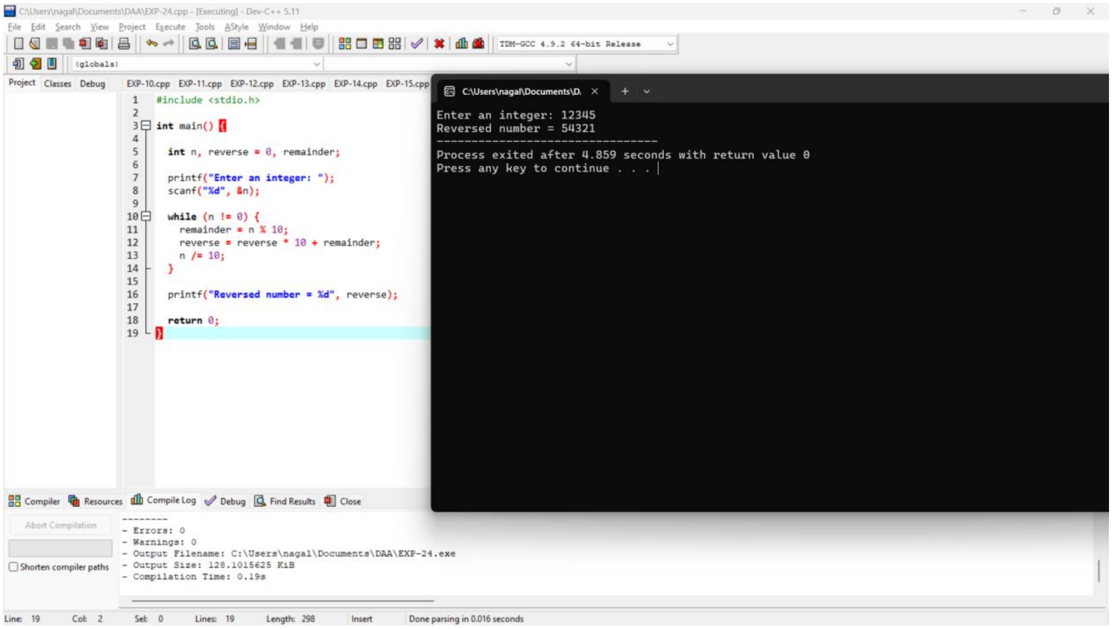
```c
#include <stdio.h>

int binomialCoeff(int n, int k) {
    int C[n + 1][k + 1];
    int i, j;

    for (i = 0; i <= n; i++) {
        for (j = 0; j <= k && j <= i; j++) {
            if (j == 0 || j == i)
                C[i][j] = 1;
            else
                C[i][j] = C[i - 1][j - 1] + C[i - 1][j];
        }
    }

    return C[n][k];
}

int main() {
    int n = 5, k = 2;
    printf("Binomial Coefficient C(%d, %d) is: %d", n, k, binomialCoeff(n, k));
    return 0;
}
```

```
Binomial Coefficient C(5, 2) is: 10
--------------------------------
Process exited after 1.2 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-23.exe
- Output Size: 128.96875 KiB
- Compilation Time: 0.28s
```

Line: 23 Col: 2 Sel: 0 Lines: 23 Length: 501 Insert Done parsing in 0 seconds

23.



C:\Users\nagal\Documents\DAA\EXP-24.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation

```
#include <stdio.h>

int main() {

  int n, reverse = 0, remainder;

  printf("Enter an integer: ");
  scanf("%d", &n);

  while (n != 0) {
    remainder = n % 10;
    reverse = reverse * 10 + remainder;
    n /= 10;
  }

  printf("Reversed number = %d", reverse);

  return 0;
}
```

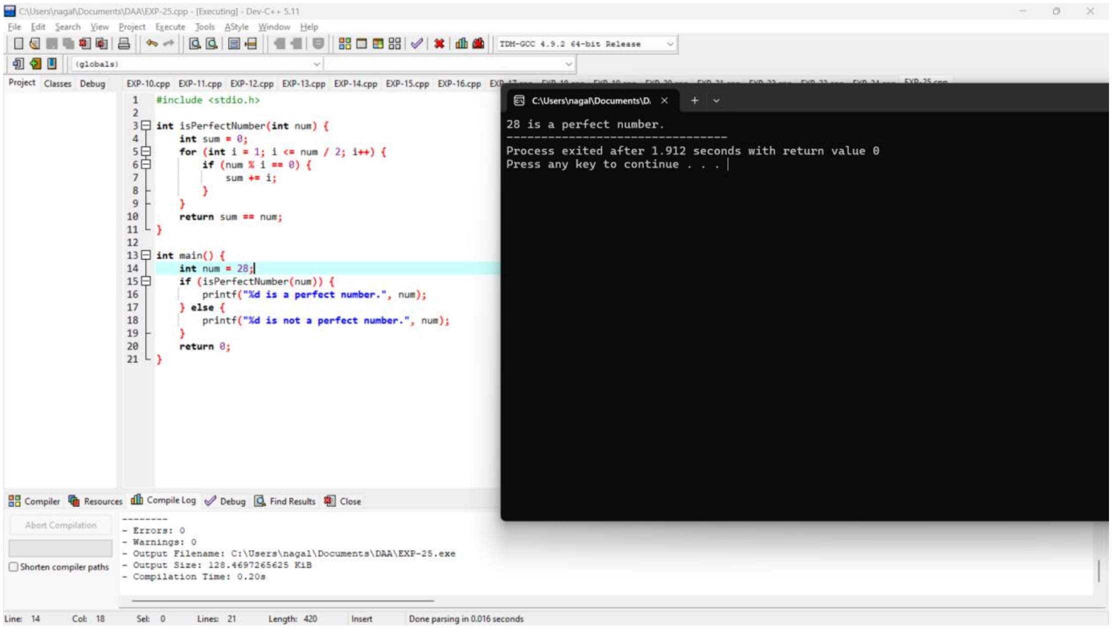
```
Enter an integer: 12345
Reversed number = 54321
--------------------------------
Process exited after 4.859 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-24.exe
- Output Size: 128.1015625 KiB
- Compilation Time: 0.19s
```

□ Shorten compiler paths

Line: 19 Col: 2 Sel: 0 Lines: 19 Length: 298 Insert Done parsing in 0.016 seconds

24.



C:\Users\nagal\Documents\DAA\EXP-25.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp EXP-16.cpp EXP-25.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation

```
#include <stdio.h>

int isPerfectNumber(int num) {
    int sum = 0;
    for (int i = 1; i <= num / 2; i++) {
        if (num % i == 0) {
            sum += i;
        }
    }
    return sum == num;
}

int main() {
    int num = 28;
    if (isPerfectNumber(num)) {
        printf("%d is a perfect number.", num);
    } else {
        printf("%d is not a perfect number.", num);
    }
    return 0;
}
```

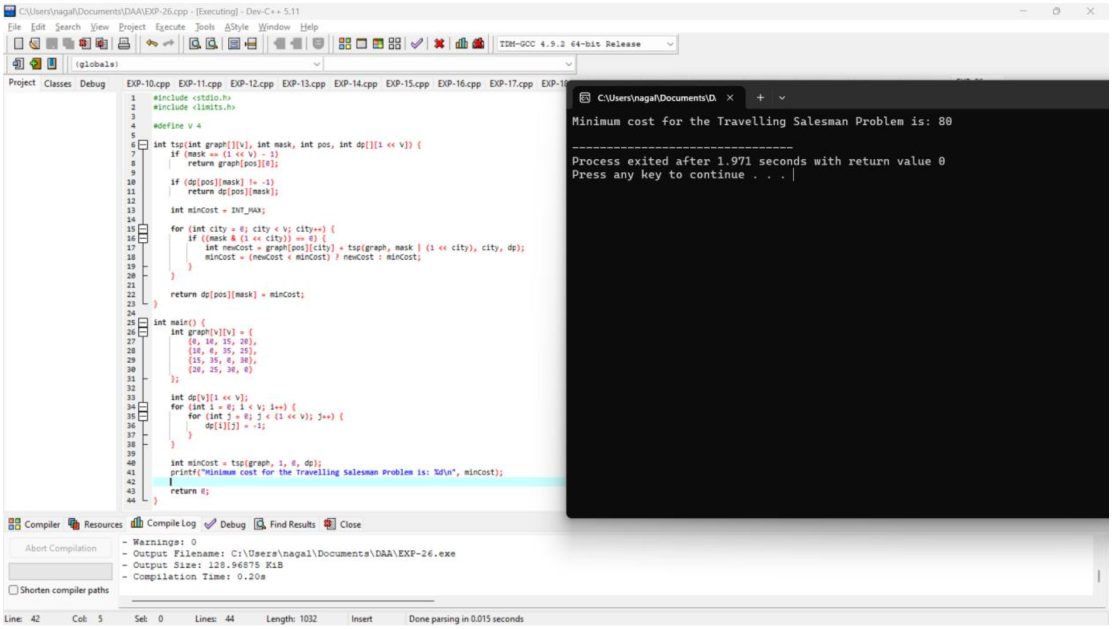
```
28 is a perfect number.
--------------------------------
Process exited after 1.912 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-25.exe
- Output Size: 128.4697265625 KiB
- Compilation Time: 0.20s
```

□ Shorten compiler paths

Line: 14 Col: 18 Sel: 0 Lines: 21 Length: 420 Insert Done parsing in 0.016 seconds

25.

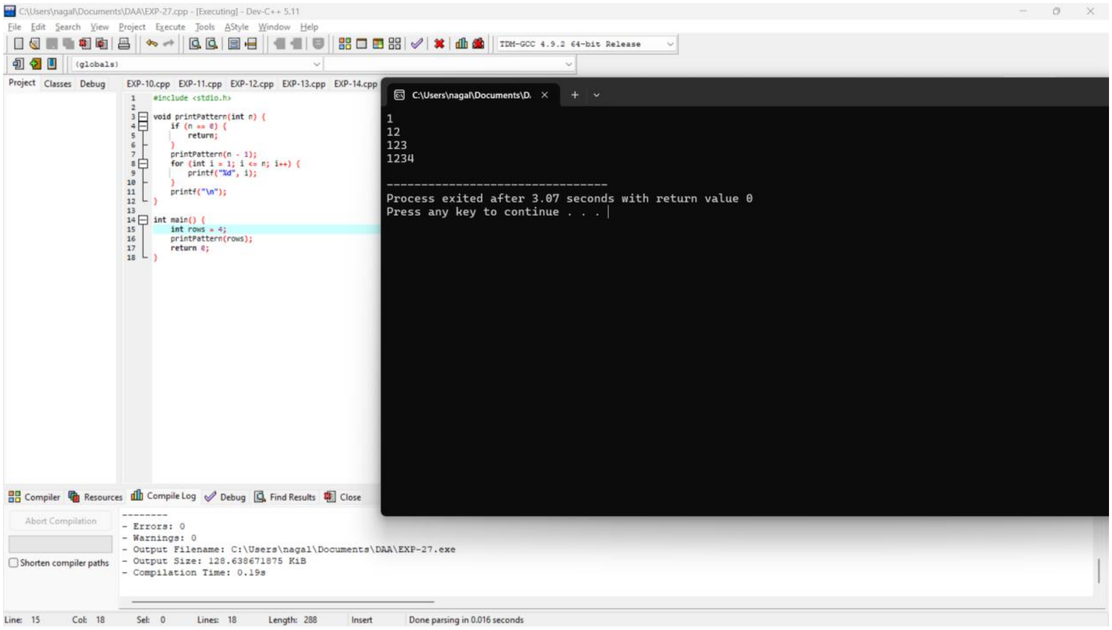

C:\Users\nagal\Documents\DAA\EXP-26.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp EXP-15.cpp EXP-16.cpp EXP-17.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
□ Shorten compiler paths
Line: 42 Col: 5 Sel: 0 Lines: 44 Length: 1032 Insert Done parsing in 0.015 seconds

```c
#include <stdio.h>
#include <limits.h>

#define V 4

int tsp(int graph[][V], int mask, int pos, int dp[][1 << V]) {
    if (mask == (1 << V) - 1)
        return graph[pos][0];

    if (dp[pos][mask] != -1)
        return dp[pos][mask];

    int minCost = INT_MAX;

    for (int city = 0; city < V; city++) {
        if ((mask & (1 << city)) == 0) {
            int newCost = graph[pos][city] + tsp(graph, mask | (1 << city), city, dp);
            minCost = (newCost < minCost) ? newCost : minCost;
        }
    }

    return dp[pos][mask] = minCost;
}

int main() {
    int graph[V][V] = {
        {0, 10, 15, 20},
        {10, 0, 35, 25},
        {15, 35, 0, 30},
        {20, 25, 30, 0}
    };

    int dp[V][1 << V];
    for (int i = 0; i < V; i++) {
        for (int j = 0; j < (1 << V); j++) {
            dp[i][j] = -1;
        }
    }

    int minCost = tsp(graph, 1, 0, dp);
    printf("Minimum cost for the Travelling Salesman Problem is: %d\n", minCost);

    return 0;
}
```

```
Minimum cost for the Travelling Salesman Problem is: 80

--------------------------------
Process exited after 1.971 seconds with return value 0
Press any key to continue . . .
```

```
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-26.exe
- Output Size: 128.96875 KiB
- Compilation Time: 0.20s
```

26.

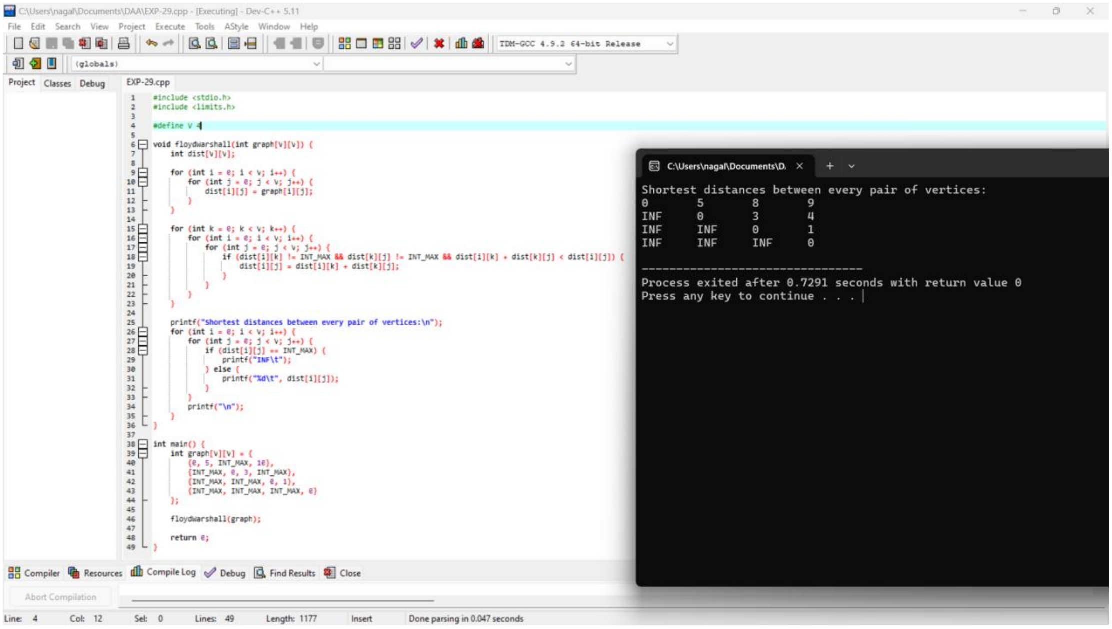

C:\Users\nagal\Documents\DAA\EXP-27.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-10.cpp EXP-11.cpp EXP-12.cpp EXP-13.cpp EXP-14.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
□ Shorten compiler paths
Line: 15 Col: 18 Sel: 0 Lines: 18 Length: 288 Insert Done parsing in 0.016 seconds

```c
#include <stdio.h>

void printPattern(int n) {
    if (n == 0) {
        return;
    }
    printPattern(n - 1);
    for (int i = 1; i <= n; i++) {
        printf("%d", i);
    }
    printf("\n");
}

int main() {
    int rows = 4;
    printPattern(rows);
    return 0;
}
```

```
1
12
123
1234

--------------------------------
Process exited after 3.07 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-27.exe
- Output Size: 128.638671875 KiB
- Compilation Time: 0.19s
```

27.

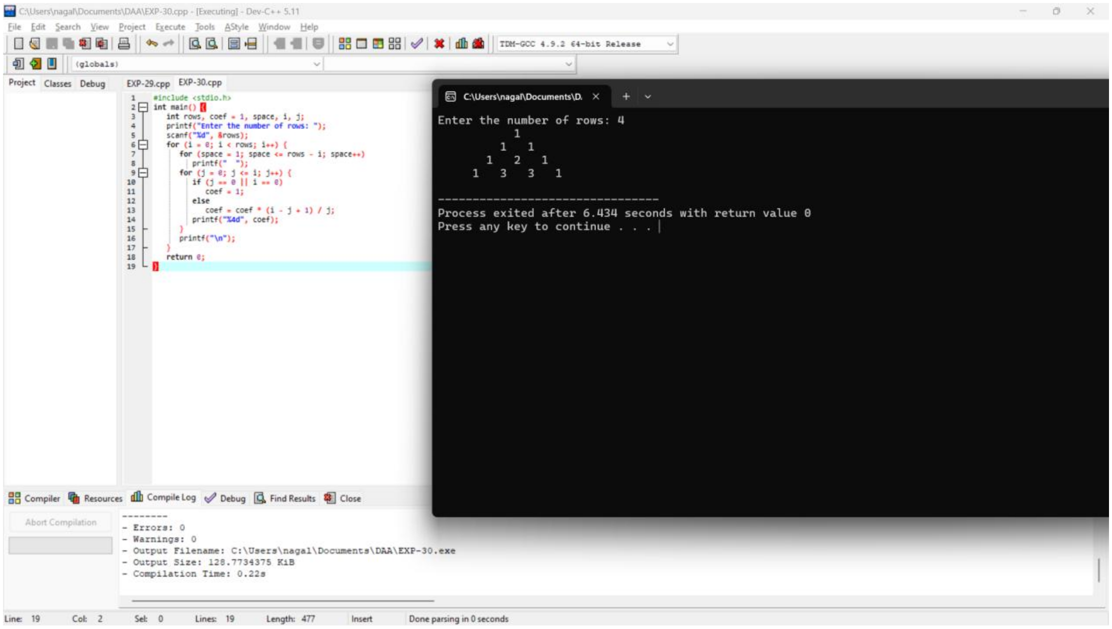


```
#include <stdio.h>
#include <limits.h>

#define V 4

void floydWarshall(int graph[V][V]) {
    int dist[V][V];

    for (int i = 0; i < V; i++) {
        for (int j = 0; j < V; j++) {
            dist[i][j] = graph[i][j];
        }
    }

    for (int k = 0; k < V; k++) {
        for (int i = 0; i < V; i++) {
            for (int j = 0; j < V; j++) {
                if (dist[i][k] != INT_MAX && dist[k][j] != INT_MAX && dist[i][k] + dist[k][j] < dist[i][j]) {
                    dist[i][j] = dist[i][k] + dist[k][j];
                }
            }
        }
    }

    printf("Shortest distances between every pair of vertices:\n");
    for (int i = 0; i < V; i++) {
        for (int j = 0; j < V; j++) {
            if (dist[i][j] == INT_MAX) {
                printf("INF\t");
            } else {
                printf("%d\t", dist[i][j]);
            }
        }
        printf("\n");
    }
}

int main() {
    int graph[V][V] = {
        {0, 5, INT_MAX, 10},
        {INT_MAX, 0, 3, INT_MAX},
        {INT_MAX, INT_MAX, 0, 1},
        {INT_MAX, INT_MAX, INT_MAX, 0}
    };

    floydWarshall(graph);

    return 0;
}
```

```
Shortest distances between every pair of vertices:
0       5       8       9
INF     0       3       4
INF     INF     0       1
INF     INF     INF     0

--------------------------------
Process exited after 0.7291 seconds with return value 0
Press any key to continue . . .
```

C:\Users\nagal\Documents\DAA\EXP-29.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-29.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Line: 4 Col: 12 Sel: 0 Lines: 49 Length: 1177 Insert Done parsing in 0.047 seconds

28.



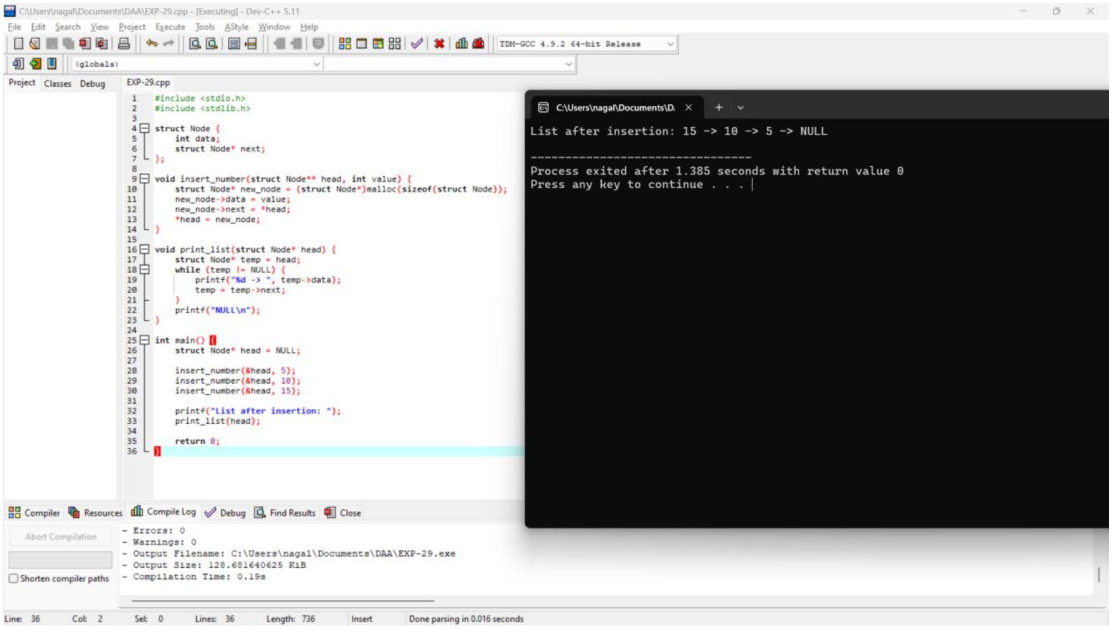
```
#include <stdio.h>
int main() {
    int rows, coef = 1, space, i, j;
    printf("Enter the number of rows: ");
    scanf("%d", &rows);
    for (i = 0; i < rows; i++) {
        for (space = 1; space <= rows - i; space++)
            printf("  ");
        for (j = 0; j <= i; j++) {
            if (j == 0 || i == 0)
                coef = 1;
            else
                coef = coef * (i - j + 1) / j;
            printf("%4d", coef);
        }
        printf("\n");
    }
    return 0;
}
```

```
Enter the number of rows: 4
           1
         1   1
       1   2   1
     1   3   3   1

--------------------------------
Process exited after 6.434 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-30.exe
- Output Size: 128.7734375 KiB
- Compilation Time: 0.22s
```

C:\Users\nagal\Documents\DAA\EXP-30.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-29.cpp EXP-30.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Line: 19 Col: 2 Sel: 0 Lines: 19 Length: 477 Insert Done parsing in 0 seconds

29.

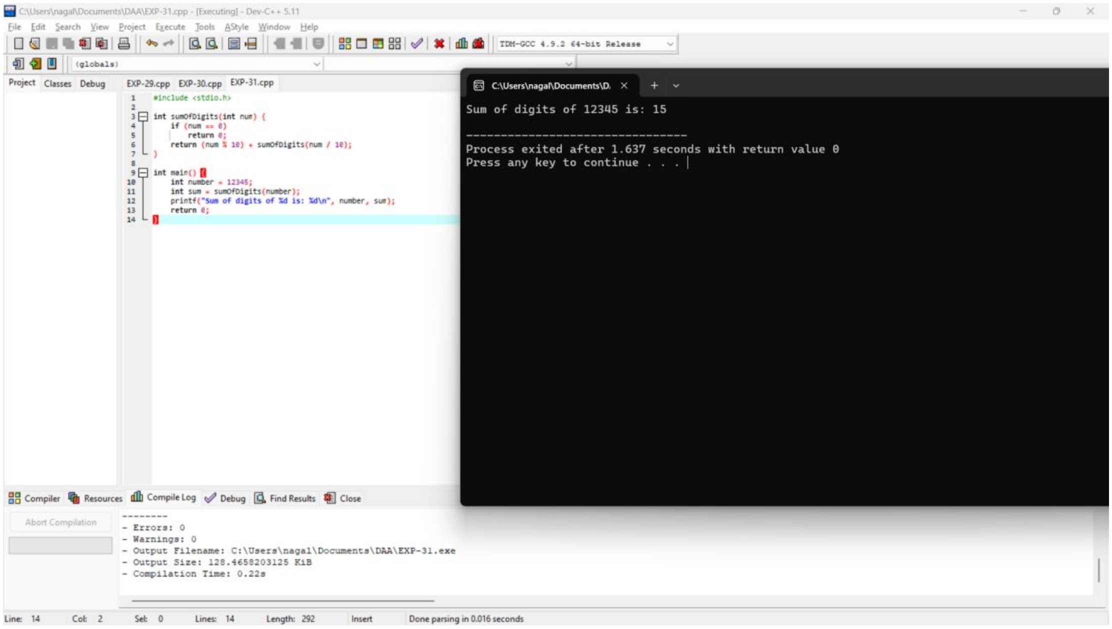

C:\Users\nagal\Documents\DAA\EXP-29.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-29.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 36 Col: 2 Sel: 0 Lines: 36 Length: 736 Insert Done parsing in 0.016 seconds

```c
#include <stdio.h>
#include <stdlib.h>

struct Node {
    int data;
    struct Node* next;
};

void insert_number(struct Node** head, int value) {
    struct Node* new_node = (struct Node*)malloc(sizeof(struct Node));
    new_node->data = value;
    new_node->next = *head;
    *head = new_node;
}

void print_list(struct Node* head) {
    struct Node* temp = head;
    while (temp != NULL) {
        printf("%d -> ", temp->data);
        temp = temp->next;
    }
    printf("NULL\n");
}

int main() {
    struct Node* head = NULL;

    insert_number(&head, 5);
    insert_number(&head, 10);
    insert_number(&head, 15);

    printf("List after insertion: ");
    print_list(head);

    return 0;
}
```

```
List after insertion: 15 -> 10 -> 5 -> NULL

--------------------------------
Process exited after 1.385 seconds with return value 0
Press any key to continue . . .
```

```
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-29.exe
- Output Size: 128.681640625 KiB
- Compilation Time: 0.19s
```

30.

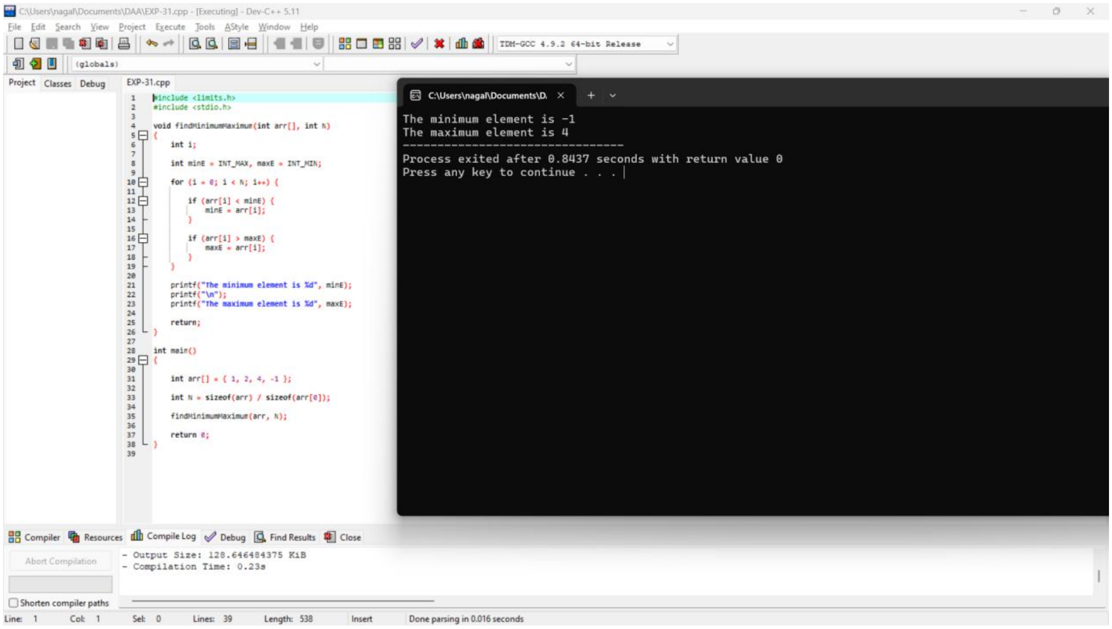

C:\Users\nagal\Documents\DAA\EXP-31.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-29.cpp EXP-30.cpp EXP-31.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Line: 14 Col: 2 Sel: 0 Lines: 14 Length: 292 Insert Done parsing in 0.016 seconds

```c
#include <stdio.h>

int sumOfDigits(int num) {
    if (num == 0)
        return 0;
    return (num % 10) + sumOfDigits(num / 10);
}

int main() {
    int number = 12345;
    int sum = sumOfDigits(number);
    printf("Sum of digits of %d is: %d\n", number, sum);
    return 0;
}
```

```
Sum of digits of 12345 is: 15

--------------------------------
Process exited after 1.637 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-31.exe
- Output Size: 128.4658203125 KiB
- Compilation Time: 0.22s
```

31.

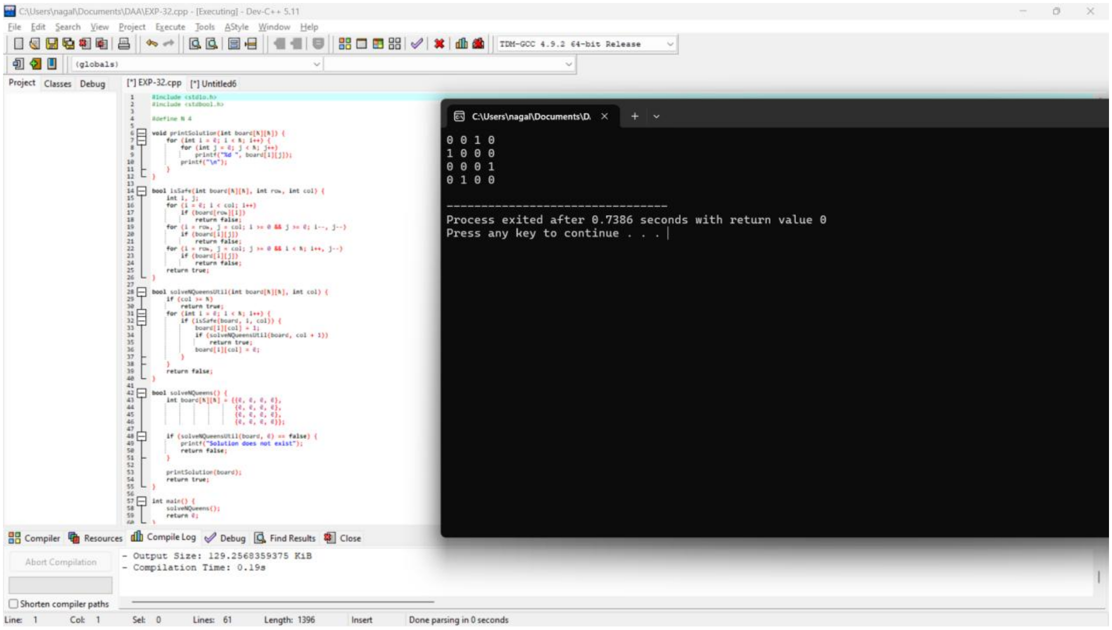

C:\Users\nagal\Documents\DAA\EXP-31.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-31.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 1 Col: 1 Sel: 0 Lines: 39 Length: 538 Insert Done parsing in 0.016 seconds

```c
#include <limits.h>
#include <stdio.h>

void findMinimumMaximum(int arr[], int N)
{
    int i;

    int minE = INT_MAX, maxE = INT_MIN;

    for (i = 0; i < N; i++) {

        if (arr[i] < minE) {
            minE = arr[i];
        }

        if (arr[i] > maxE) {
            maxE = arr[i];
        }
    }

    printf("The minimum element is %d", minE);
    printf("\n");
    printf("The maximum element is %d", maxE);

    return;
}

int main()
{

    int arr[] = { 1, 2, 4, -1 };

    int N = sizeof(arr) / sizeof(arr[0]);

    findMinimumMaximum(arr, N);

    return 0;
}
```

```
The minimum element is -1
The maximum element is 4
--------------------------------
Process exited after 0.8437 seconds with return value 0
Press any key to continue . . .
```

```
- Output Size: 128.646484375 KiB
- Compilation Time: 0.23s
```

32.

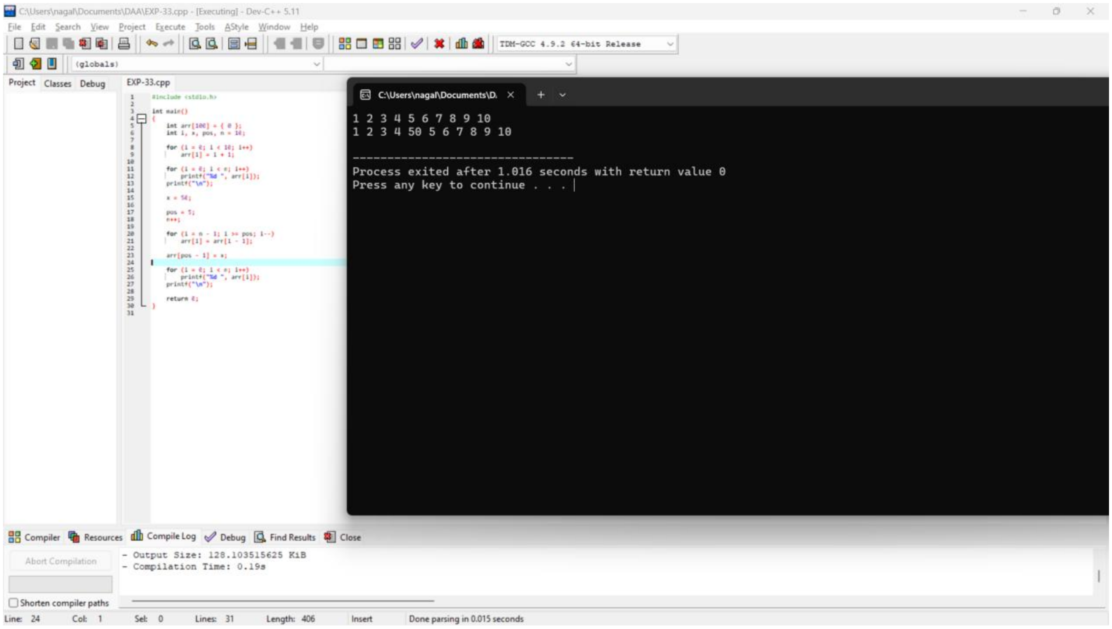

C:\Users\nagal\Documents\DAA\EXP-32.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
[*] EXP-32.cpp
[*] Untitled6
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 1 Col: 1 Sel: 0 Lines: 61 Length: 1396 Insert Done parsing in 0 seconds

```c
#include <stdio.h>
#include <stdbool.h>

#define N 4

void printSolution(int board[N][N]) {
    for (int i = 0; i < N; i++) {
        for (int j = 0; j < N; j++)
            printf("%d ", board[i][j]);
        printf("\n");
    }
}

bool isSafe(int board[N][N], int row, int col) {
    int i, j;
    for (i = 0; i < col; i++)
        if (board[row][i])
            return false;
    for (i = row, j = col; i >= 0 && j >= 0; i--, j--)
        if (board[i][j])
            return false;
    for (i = row, j = col; j >= 0 && i < N; i++, j--)
        if (board[i][j])
            return false;
    return true;
}

bool solveNQueensUtil(int board[N][N], int col) {
    if (col >= N)
        return true;
    for (int i = 0; i < N; i++) {
        if (isSafe(board, i, col)) {
            board[i][col] = 1;
            if (solveNQueensUtil(board, col + 1))
                return true;
            board[i][col] = 0;
        }
    }
    return false;
}

bool solveNQueens() {
    int board[N][N] = {{0, 0, 0, 0},
                       {0, 0, 0, 0},
                       {0, 0, 0, 0},
                       {0, 0, 0, 0}};

    if (solveNQueensUtil(board, 0) == false) {
        printf("Solution does not exist");
        return false;
    }

    printSolution(board);
    return true;
}

int main() {
    solveNQueens();
    return 0;
}
```

```
0 0 1 0
1 0 0 0
0 0 0 1
0 1 0 0

--------------------------------
Process exited after 0.7386 seconds with return value 0
Press any key to continue . . .
```

```
- Output Size: 129.2568359375 KiB
- Compilation Time: 0.19s
```

33.

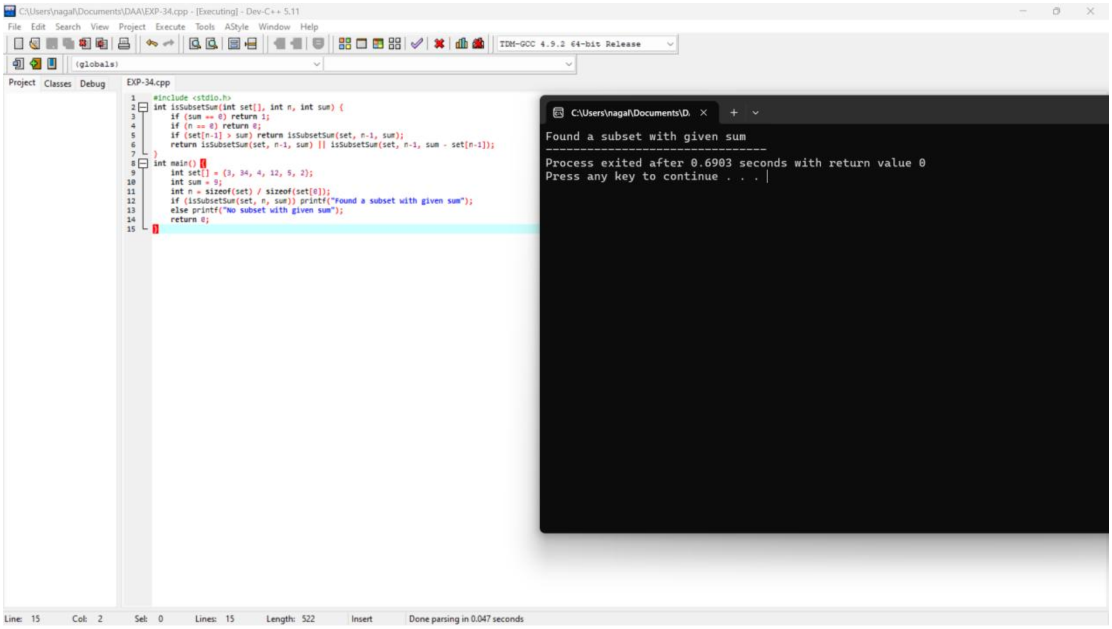

C:\Users\nagal\Documents\DAA\EXP-33.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-33.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 24 Col: 1 Sel: 0 Lines: 31 Length: 406 Insert Done parsing in 0.015 seconds

```
#include <stdio.h>

int main()
{
    int arr[100] = { 0 };
    int i, x, pos, n = 10;

    for (i = 0; i < 10; i++)
        arr[i] = i + 1;

    for (i = 0; i < n; i++)
        printf("%d ", arr[i]);
    printf("\n");

    x = 50;

    pos = 5;
    n++;

    for (i = n - 1; i >= pos; i--)
        arr[i] = arr[i - 1];

    arr[pos - 1] = x;

    for (i = 0; i < n; i++)
        printf("%d ", arr[i]);
    printf("\n");

    return 0;
}
```

```
1 2 3 4 5 6 7 8 9 10
1 2 3 4 50 5 6 7 8 9 10

--------------------------------
Process exited after 1.016 seconds with return value 0
Press any key to continue . . .
```

```
- Output Size: 128.103515625 KiB
- Compilation Time: 0.19s
```

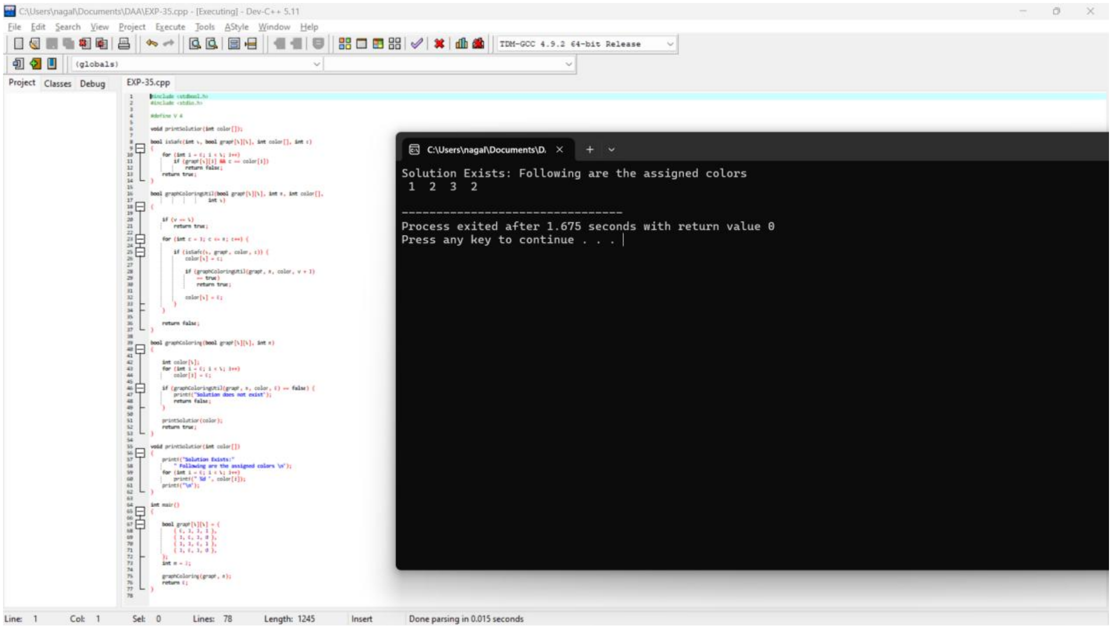
34.


C:\Users\nagal\Documents\DAA\EXP-34.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-34.cpp
C:\Users\nagal\Documents\D.
Line: 15 Col: 2 Sel: 0 Lines: 15 Length: 522 Insert Done parsing in 0.047 seconds

```
#include <stdio.h>
int isSubsetSum(int set[], int n, int sum) {
    if (sum == 0) return 1;
    if (n == 0) return 0;
    if (set[n-1] > sum) return isSubsetSum(set, n-1, sum);
    return isSubsetSum(set, n-1, sum) || isSubsetSum(set, n-1, sum - set[n-1]);
}
int main() {
    int set[] = {3, 34, 4, 12, 5, 2};
    int sum = 9;
    int n = sizeof(set) / sizeof(set[0]);
    if (isSubsetSum(set, n, sum)) printf("Found a subset with given sum");
    else printf("No subset with given sum");
    return 0;
}
```

```
Found a subset with given sum
--------------------------------
Process exited after 0.6903 seconds with return value 0
Press any key to continue . . .
```

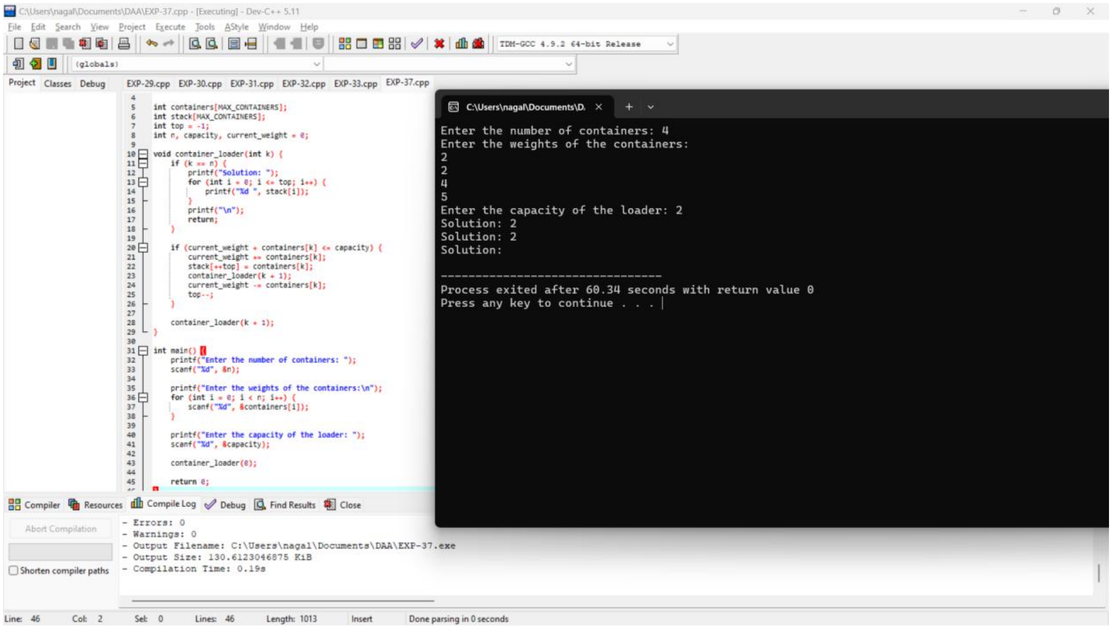
35.


C:\Users\nagal\Documents\DAA\EXP-35.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-35.cpp
C:\Users\nagal\Documents\D.
Line: 1 Col: 1 Sel: 0 Lines: 78 Length: 1245 Insert Done parsing in 0.015 seconds

```
#include <stdbool.h>
#include <stdio.h>

#define V 4

void printSolution(int color[]);

bool isSafe(int v, bool graph[V][V], int color[], int c)
{
    for (int i = 0; i < V; i++)
        if (graph[v][i] && c == color[i])
            return false;
    return true;
}

bool graphColoringUtil(bool graph[V][V], int m, int color[],
                       int v)
{

    if (v == V)
        return true;

    for (int c = 1; c <= m; c++) {

        if (isSafe(v, graph, color, c)) {
            color[v] = c;

            if (graphColoringUtil(graph, m, color, v + 1)
                == true)
                return true;

            color[v] = 0;
        }
    }

    return false;
}

bool graphColoring(bool graph[V][V], int m)
{

    int color[V];
    for (int i = 0; i < V; i++)
        color[i] = 0;

    if (graphColoringUtil(graph, m, color, 0) == false) {
        printf("Solution does not exist");
        return false;
    }

    printSolution(color);
    return true;
}

void printSolution(int color[])
{
    printf("Solution Exists:"
           " Following are the assigned colors \n");
    for (int i = 0; i < V; i++)
        printf(" %d ", color[i]);
    printf("\n");
}

int main()
{

    bool graph[V][V] = {
        { 0, 1, 1, 1 },
        { 1, 0, 1, 0 },
        { 1, 1, 0, 1 },
        { 1, 0, 1, 0 },
    };
    int m = 3;

    graphColoring(graph, m);
    return 0;
}
```

```
Solution Exists: Following are the assigned colors
 1  2  3  2

--------------------------------
Process exited after 1.675 seconds with return value 0
Press any key to continue . . .
```

36.

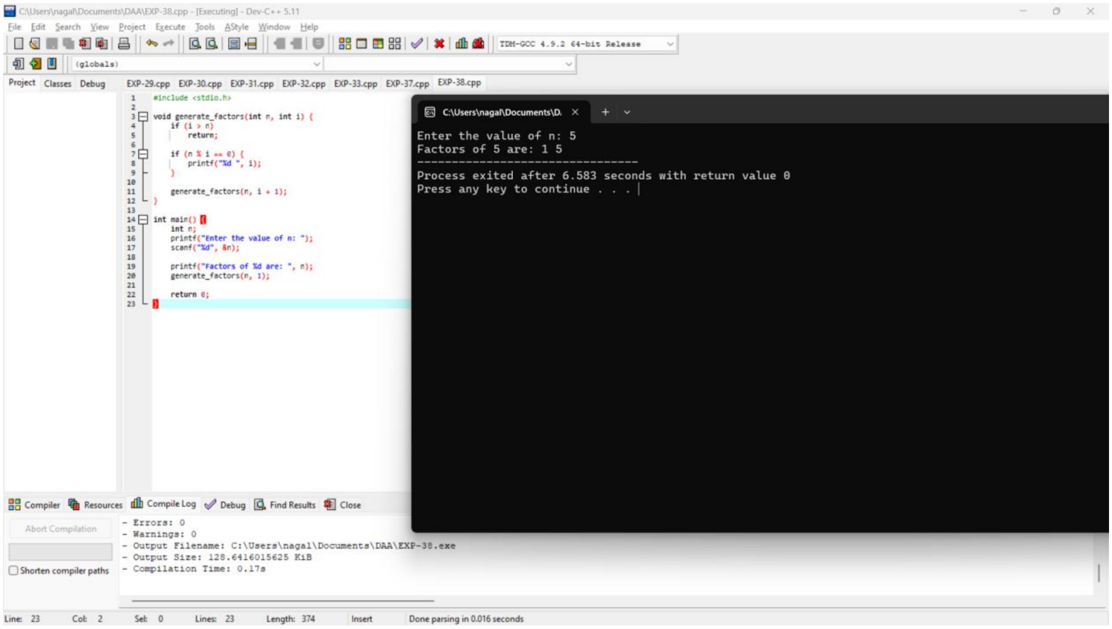

C:\Users\nagal\Documents\DAA\EXP-37.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-29.cpp EXP-30.cpp EXP-31.cpp EXP-32.cpp EXP-33.cpp EXP-37.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
□ Shorten compiler paths
Line: 46 Col: 2 Sel: 0 Lines: 46 Length: 1013 Insert Done parsing in 0 seconds

```

int containers[MAX_CONTAINERS];
int stack[MAX_CONTAINERS];
int top = -1;
int n, capacity, current_weight = 0;

void container_loader(int k) {
    if (k == n) {
        printf("Solution: ");
        for (int i = 0; i <= top; i++) {
            printf("%d ", stack[i]);
        }
        printf("\n");
        return;
    }

    if (current_weight + containers[k] <= capacity) {
        current_weight += containers[k];
        stack[++top] = containers[k];
        container_loader(k + 1);
        current_weight -= containers[k];
        top--;
    }

    container_loader(k + 1);
}

int main() {
    printf("Enter the number of containers: ");
    scanf("%d", &n);

    printf("Enter the weights of the containers:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &containers[i]);
    }

    printf("Enter the capacity of the loader: ");
    scanf("%d", &capacity);

    container_loader(0);

    return 0;
```

```
Enter the number of containers: 4
Enter the weights of the containers:
2
2
4
5
Enter the capacity of the loader: 2
Solution: 2
Solution: 2
Solution:

--------------------------------
Process exited after 60.34 seconds with return value 0
Press any key to continue . . .
```

```
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-37.exe
- Output Size: 130.6123046875 KiB
- Compilation Time: 0.19s
```

37.

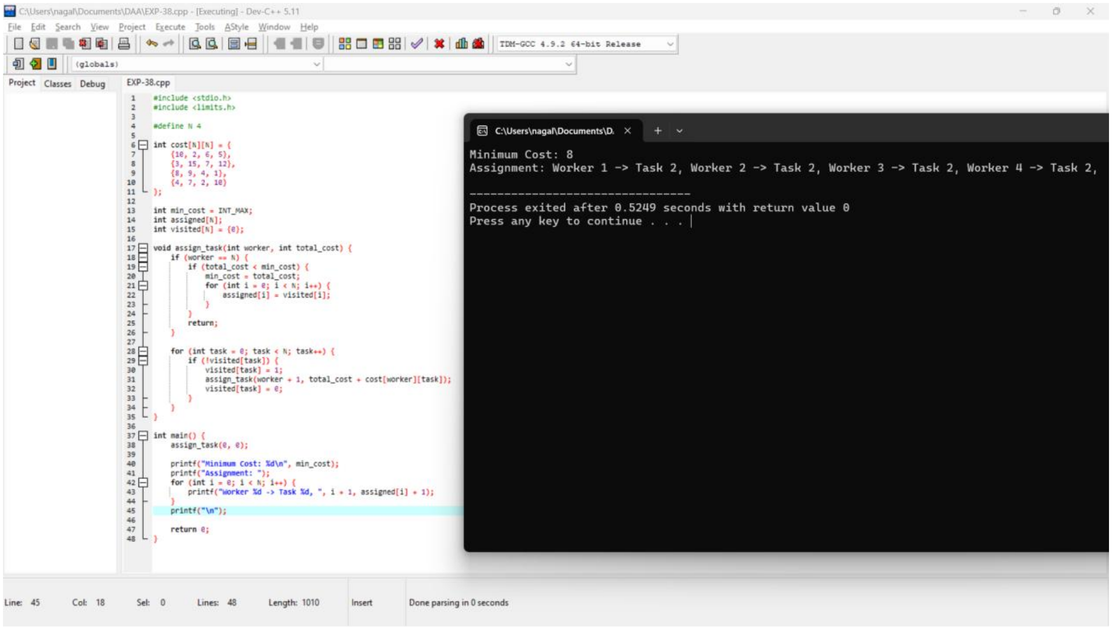

C:\Users\nagal\Documents\DAA\EXP-38.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-29.cpp EXP-30.cpp EXP-31.cpp EXP-32.cpp EXP-33.cpp EXP-37.cpp EXP-38.cpp
C:\Users\nagal\Documents\D.
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 23 Col: 2 Sel: 0 Lines: 23 Length: 374 Insert Done parsing in 0.016 seconds

```c
#include <stdio.h>

void generate_factors(int n, int i) {
    if (i > n)
        return;

    if (n % i == 0) {
        printf("%d ", i);
    }

    generate_factors(n, i + 1);
}

int main() {
    int n;
    printf("Enter the value of n: ");
    scanf("%d", &n);

    printf("Factors of %d are: ", n);
    generate_factors(n, 1);

    return 0;
}
```

```
Enter the value of n: 5
Factors of 5 are: 1 5
--------------------------------
Process exited after 6.583 seconds with return value 0
Press any key to continue . . .
```

```
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-38.exe
- Output Size: 128.6416015625 KiB
- Compilation Time: 0.17s
```

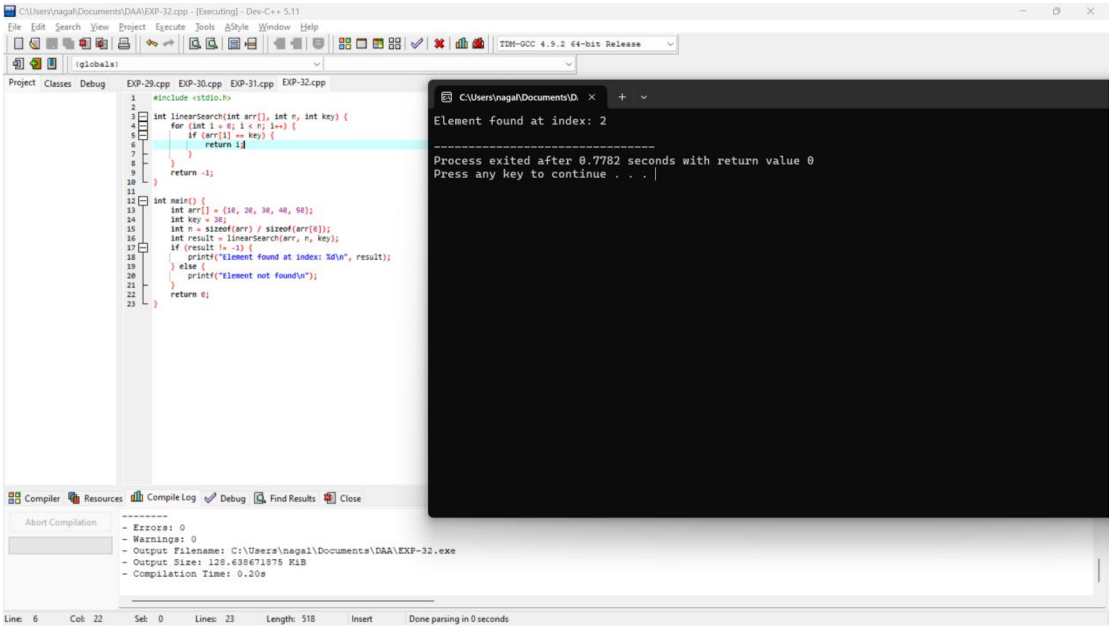
38.


C:\Users\nagal\Documents\DAA\EXP-38.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
EXP-38.cpp
C:\Users\nagal\Documents\D.
Line: 45 Col: 18 Sel: 0 Lines: 48 Length: 1010 Insert Done parsing in 0 seconds

```c
#include <stdio.h>
#include <limits.h>

#define N 4

int cost[N][N] = {
    {10, 2, 6, 5},
    {3, 15, 7, 12},
    {8, 9, 4, 1},
    {4, 7, 2, 10}
};

int min_cost = INT_MAX;
int assigned[N];
int visited[N] = {0};

void assign_task(int worker, int total_cost) {
    if (worker == N) {
        if (total_cost < min_cost) {
            min_cost = total_cost;
            for (int i = 0; i < N; i++) {
                assigned[i] = visited[i];
            }
        }
        return;
    }

    for (int task = 0; task < N; task++) {
        if (!visited[task]) {
            visited[task] = 1;
            assign_task(worker + 1, total_cost + cost[worker][task]);
            visited[task] = 0;
        }
    }
}

int main() {
    assign_task(0, 0);

    printf("Minimum Cost: %d\n", min_cost);
    printf("Assignment: ");
    for (int i = 0; i < N; i++) {
        printf("Worker %d -> Task %d, ", i + 1, assigned[i] + 1);
    }
    printf("\n");

    return 0;
}
```

```
Minimum Cost: 8
Assignment: Worker 1 -> Task 2, Worker 2 -> Task 2, Worker 3 -> Task 2, Worker 4 -> Task 2,

--------------------------------
Process exited after 0.5249 seconds with return value 0
Press any key to continue . . .
```

39.

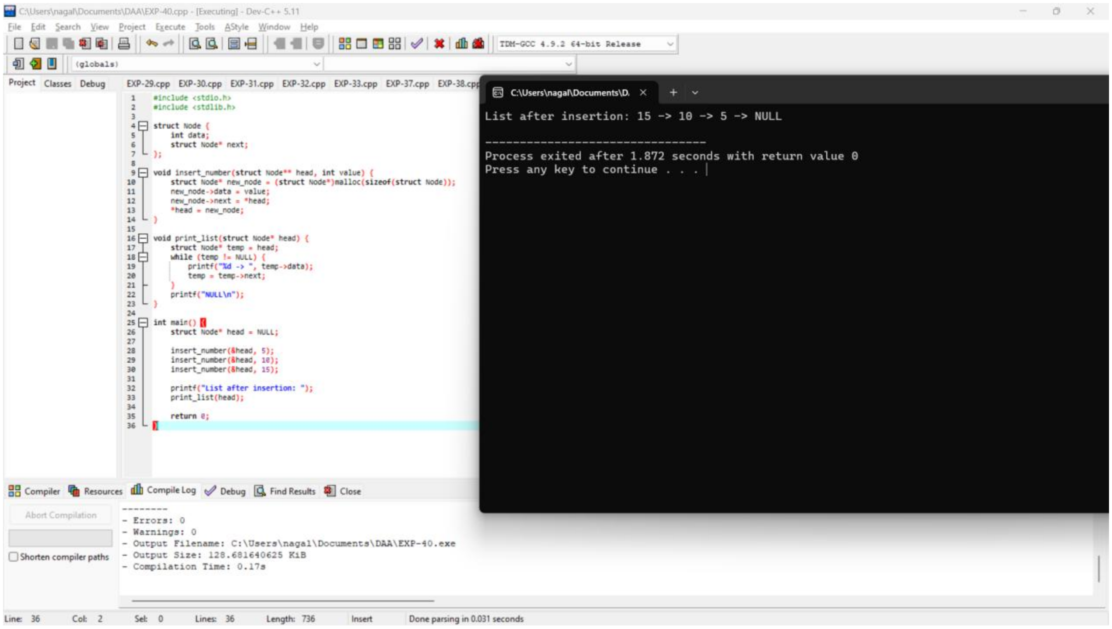


```c
#include <stdio.h>

int linearSearch(int arr[], int n, int key) {
    for (int i = 0; i < n; i++) {
        if (arr[i] == key) {
            return i;
        }
    }
    return -1;
}

int main() {
    int arr[] = {10, 20, 30, 40, 50};
    int key = 30;
    int n = sizeof(arr) / sizeof(arr[0]);
    int result = linearSearch(arr, n, key);
    if (result != -1) {
        printf("Element found at index: %d\n", result);
    } else {
        printf("Element not found\n");
    }
    return 0;
}
```

```
Element found at index: 2

--------------------------------
Process exited after 0.7782 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-32.exe
- Output Size: 128.638671875 KiB
- Compilation Time: 0.20s
```

40.



```c
#include <stdio.h>
#include <stdlib.h>

struct Node {
    int data;
    struct Node* next;
};

void insert_number(struct Node** head, int value) {
    struct Node* new_node = (struct Node*)malloc(sizeof(struct Node));
    new_node->data = value;
    new_node->next = *head;
    *head = new_node;
}

void print_list(struct Node* head) {
    struct Node* temp = head;
    while (temp != NULL) {
        printf("%d -> ", temp->data);
        temp = temp->next;
    }
    printf("NULL\n");
}

int main() {
    struct Node* head = NULL;

    insert_number(&head, 5);
    insert_number(&head, 10);
    insert_number(&head, 15);

    printf("List after insertion: ");
    print_list(head);

    return 0;
}
```

```
List after insertion: 15 -> 10 -> 5 -> NULL

--------------------------------
Process exited after 1.872 seconds with return value 0
Press any key to continue . . .
```

```
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\nagal\Documents\DAA\EXP-40.exe
- Output Size: 128.681640625 KiB
- Compilation Time: 0.17s
```