University of Petroleum and Energy Studies
SoCS
Semester 4, 2020-2024
Data Communication and Computer Networks

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Batch: B-5(H)

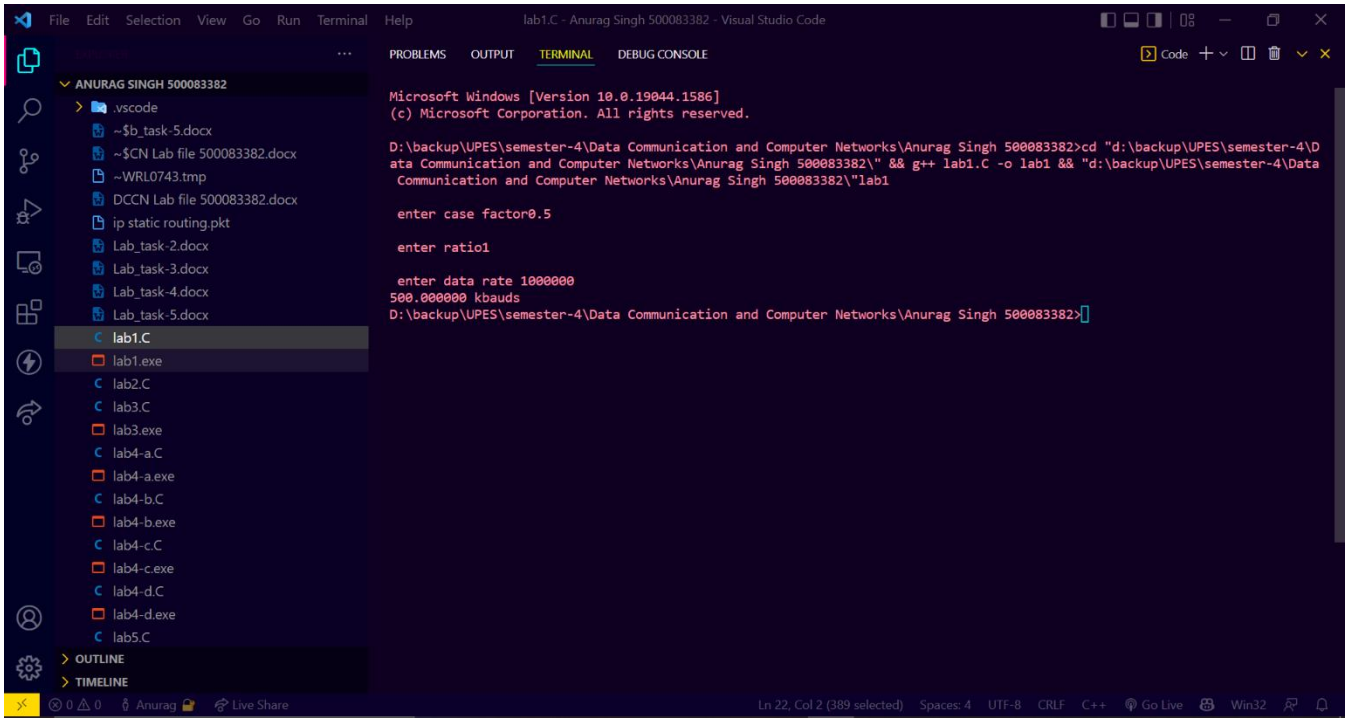
Lab-1

Title: Design a program to calculate baud rate

Code:

```
#include <stdio.h>
int baud(float c, float N, int r)
{
   return c * N * (1 / r);
}

int main()
{
   int r;
   float N, c, S;
   printf("\n enter case factor");
   scanf("%f", &c);
   printf("\n enter ratio");
   scanf("%d", &r);
   printf("\n enter data rate ");
   scanf("%f", &N);
   S = baud(c, N, r);
   printf("%f kbauds", S / 1000);

   return 0;
}
```

Screenshot:



Lab-2

Title: Design a program to calculate baud rate by taking values from text file and writing output into other text file.

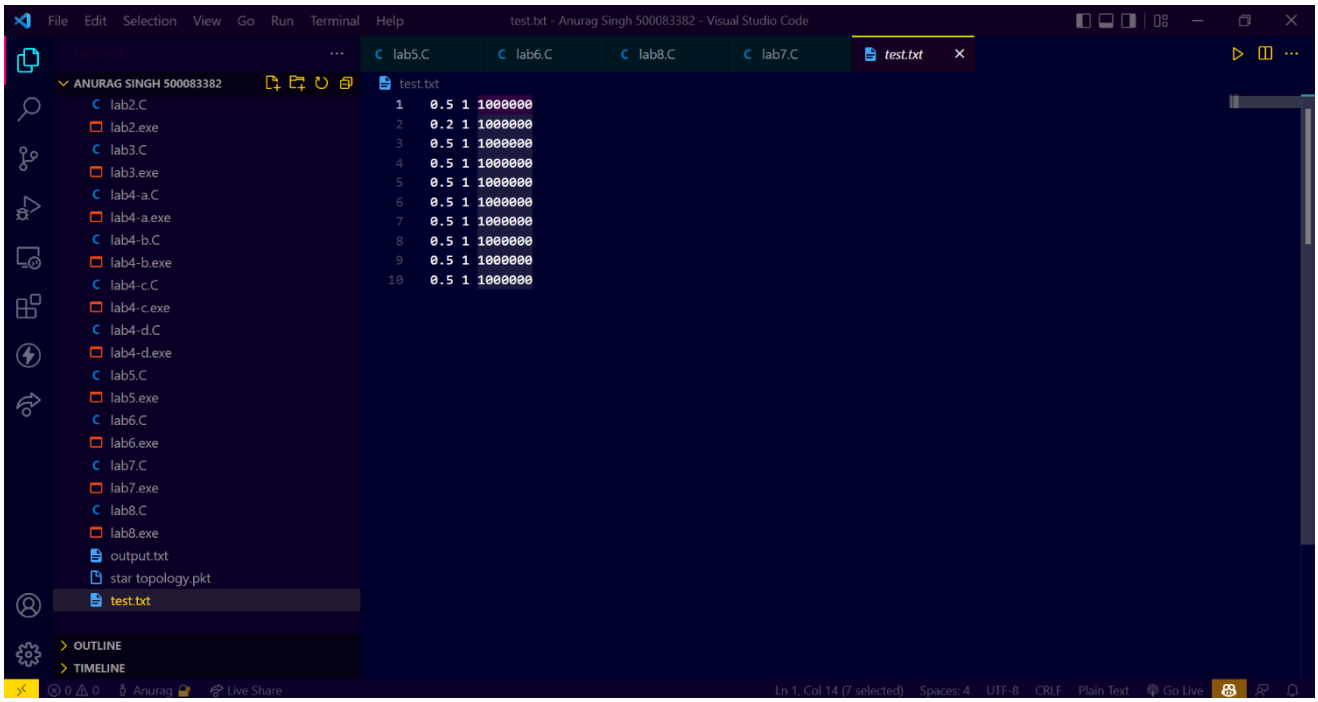
Code:

```
#include <stdio.h>


int main()
{
   int r;
   float N, c, S;
   FILE* ptr;
   FILE* ptr1;
```

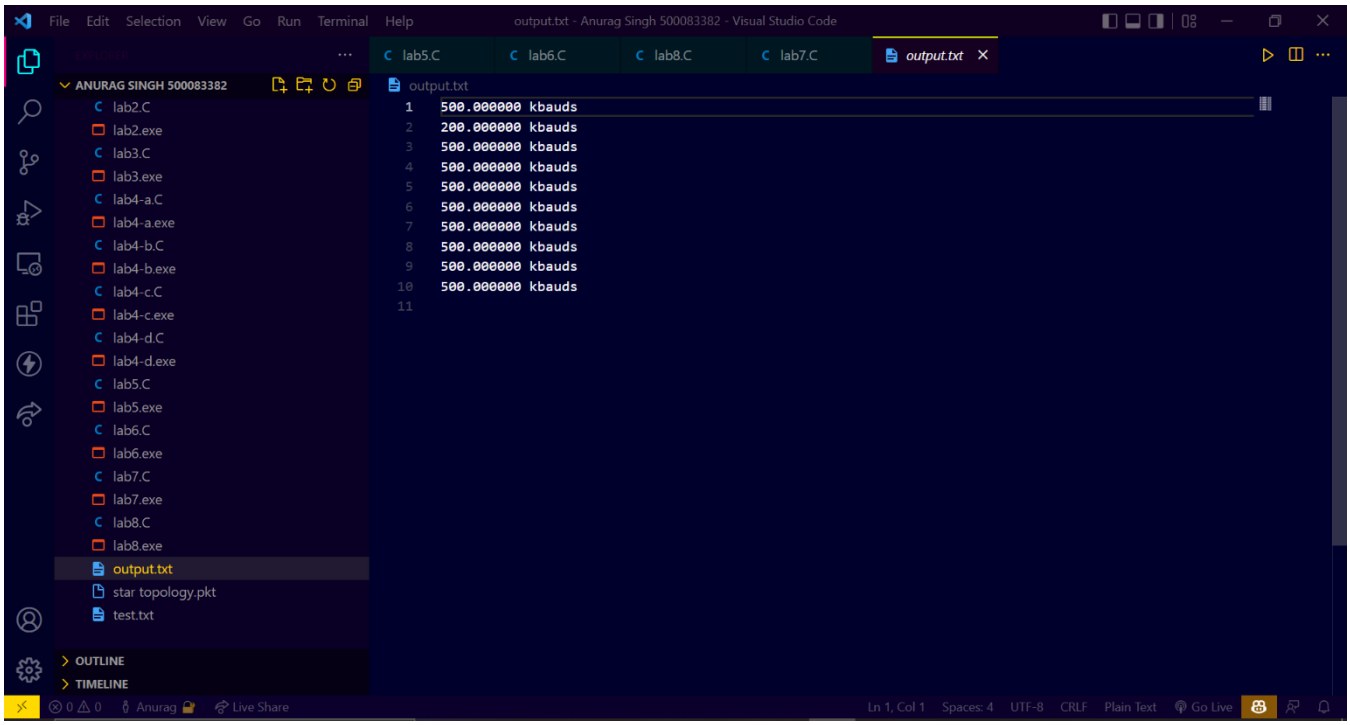
```
    char ch;


    ptr = fopen("test.txt", "r");
    ptr1 = fopen("output.txt","w");

    if (NULL == ptr) {
        printf("file can't be opened \n");
    }

    while (feof(ptr)); {
        for(int i=0;i<10;i++){

        fscanf(ptr, "%f", &c);
        fscanf(ptr, "%d", &r);
        fscanf(ptr, "%f", &N);
        S=c * N * (1 / r);
        printf("%f kbauds", S / 1000);
        fprintf(ptr1,"%f kbauds \n",S/1000);

        }


    }
    fclose(ptr);

    return 0;
}
```

Screenshot:

Input File:



Output File:



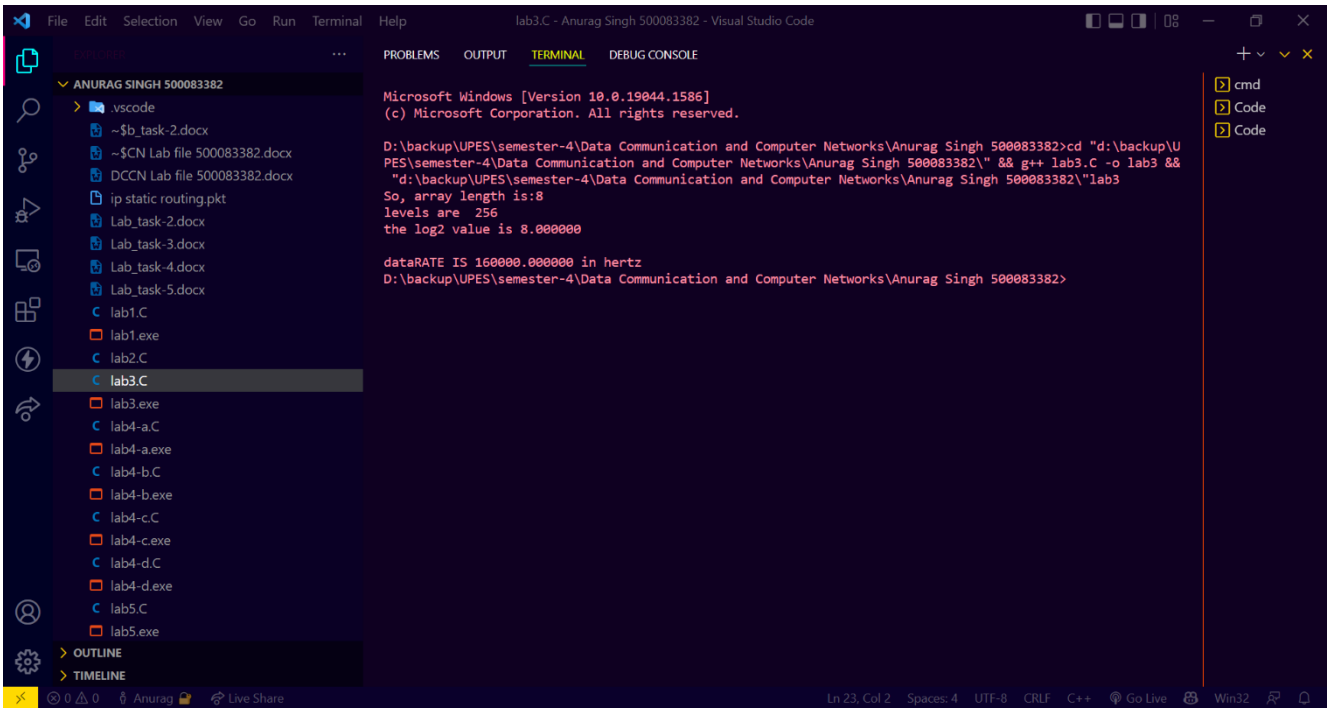
Lab-3

Title: Design a program to calculate data rate

Code:

```
#include<stdio.h>
#include <math.h>
int main()
{

   int length;
   double levels;
   int arr[] = {1, 1, 0, 0, 0, 0, 1, 0};
   length = sizeof(arr) / sizeof(int);
   printf("So, array length is:%d\n", length);
   int result = pow(2, length); // 2^levels
   printf("levels are  %d\n", result);

   double Log = log2(result);
   printf("the log2 value is %lf\n", Log);

   double h = 10000;
   double datarate = 2 * h * Log;
   printf("\ndataRATE IS %lf in hertz", datarate);



   return 0;
}
```

Screenshot:



Lab-4

Title: Design program using array and pointer

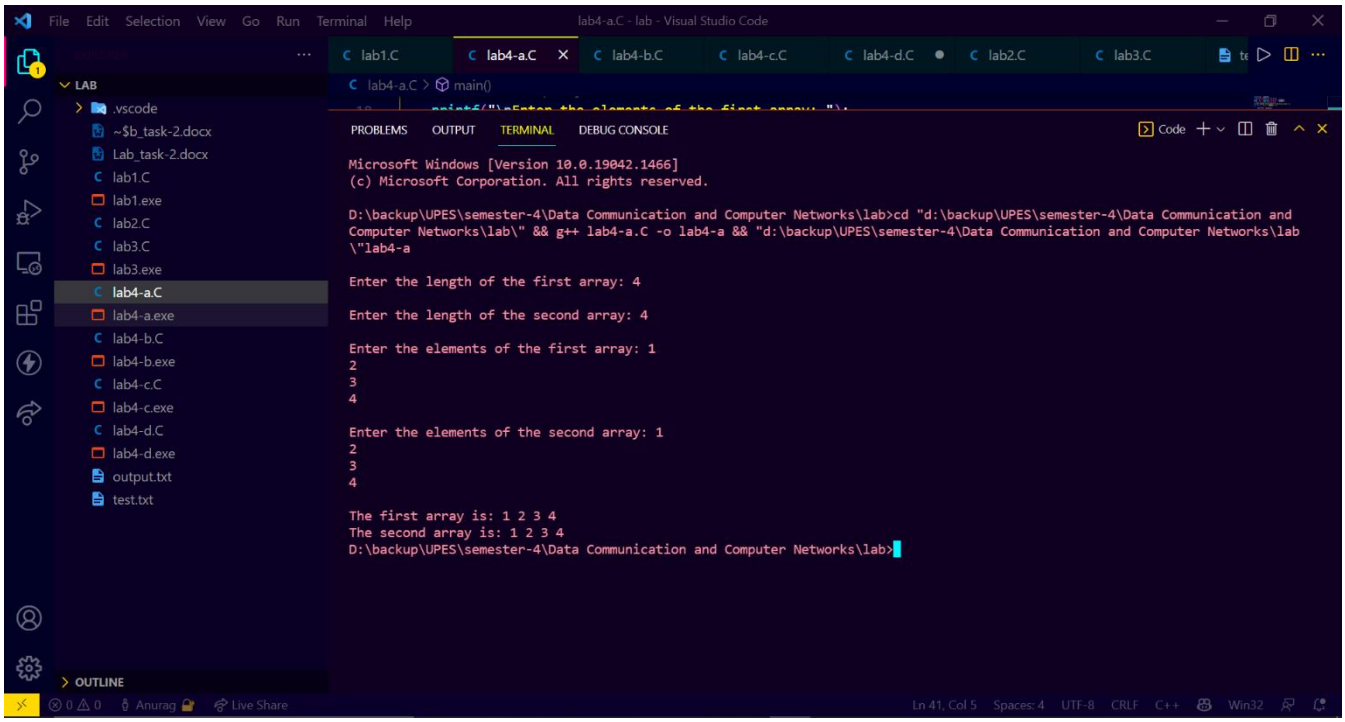
1. Define two array and store and traverse the array

Code:

```
#include <stdio.h>
#include<malloc.h>
int main()
{
   // Define two pointer array to store the input data
   int *arr1 = NULL;
   int *arr2 = NULL;
   // Take the input from the user
   int length1, length2;
   printf("\nEnter the length of the first array: ");
   scanf("%d", &length1);
   printf("\nEnter the length of the second array: ");
   scanf("%d", &length2);
```

```
    // Allocate memory for the array
    arr1 = (int *)malloc(sizeof(int) * length1);
    arr2 = (int *)malloc(sizeof(int) * length2);
    // Take the input from the user
    printf("\nEnter the elements of the first array: ");
    for (int i = 0; i < length1; i++)
    {
        scanf("%d", &arr1[i]);
    }
    printf("\nEnter the elements of the second array: ");
    for (int i = 0; i < length2; i++)
    {
        scanf("%d", &arr2[i]);
    }
    // Print the input data
    printf("\nThe first array is: ");
    for (int i = 0; i < length1; i++)
    {
        printf("%d ", arr1[i]);
    }
    printf("\nThe second array is: ");
    for (int i = 0; i < length2; i++)
    {
        printf("%d ", arr2[i]);
    }



    return 0;

}
```

Screenshot:



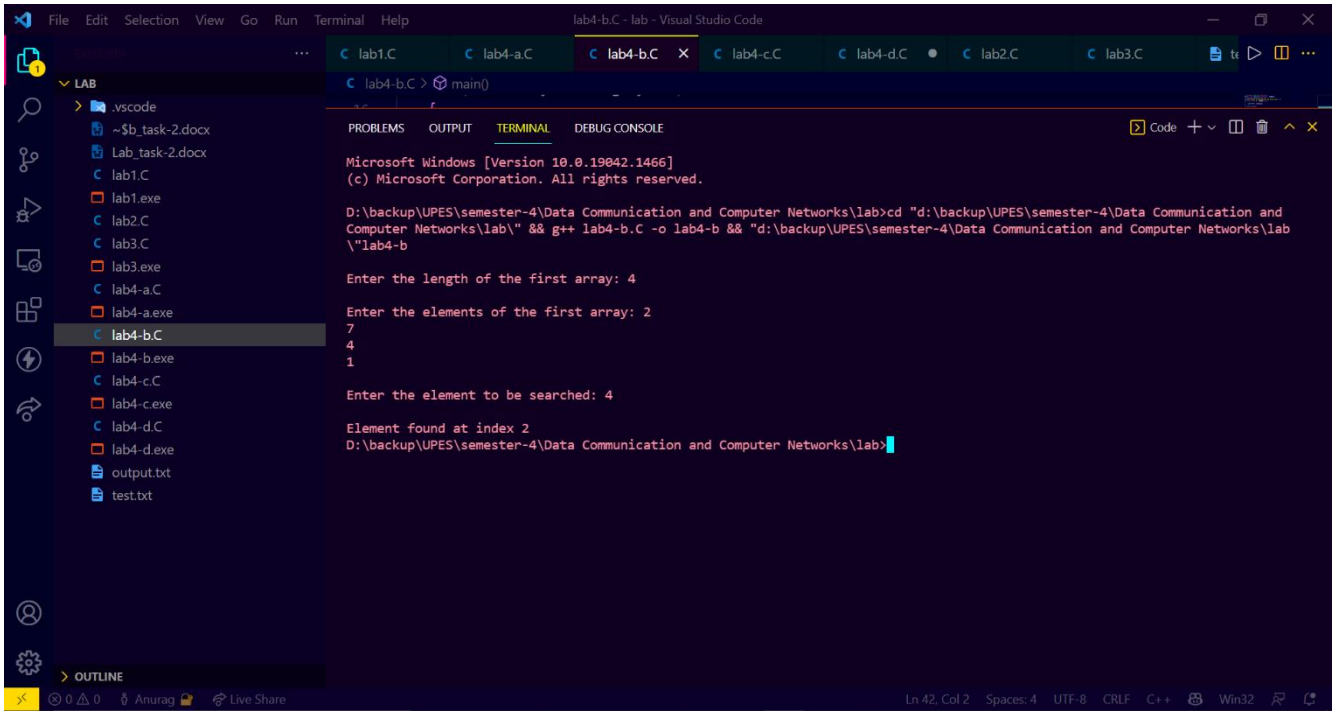
2. Find the element inside the array

Code:

```
#include<stdio.h>
#include<malloc.h>
int main()
{
   // find element in pointer array
   int *arr1 = NULL;
   // Take the input from the user
   int length;
   printf("\nEnter the length of the first array: ");
   scanf("%d", &length);
   // Allocate memory for the array
   arr1 = (int *)malloc(sizeof(int) * length);
   // Take the input from the user
   printf("\nEnter the elements of the first array: ");
   for (int i = 0; i < length; i++)
   {
      scanf("%d", &arr1[i]);
   }
   // search element
   int element;
   printf("\nEnter the element to be searched: ");
```

```
    scanf("%d", &element);
    int flag = 0;
    for (int i = 0; i < length; i++)
    {
       if (arr1[i] == element)
       {
          printf("\nElement found at index %d", i);
          flag = 1;
          break;
       }
    }
    if (flag == 0)
    {
       printf("\nElement not found");
    }



    return 0;

}
```

Screenshot:

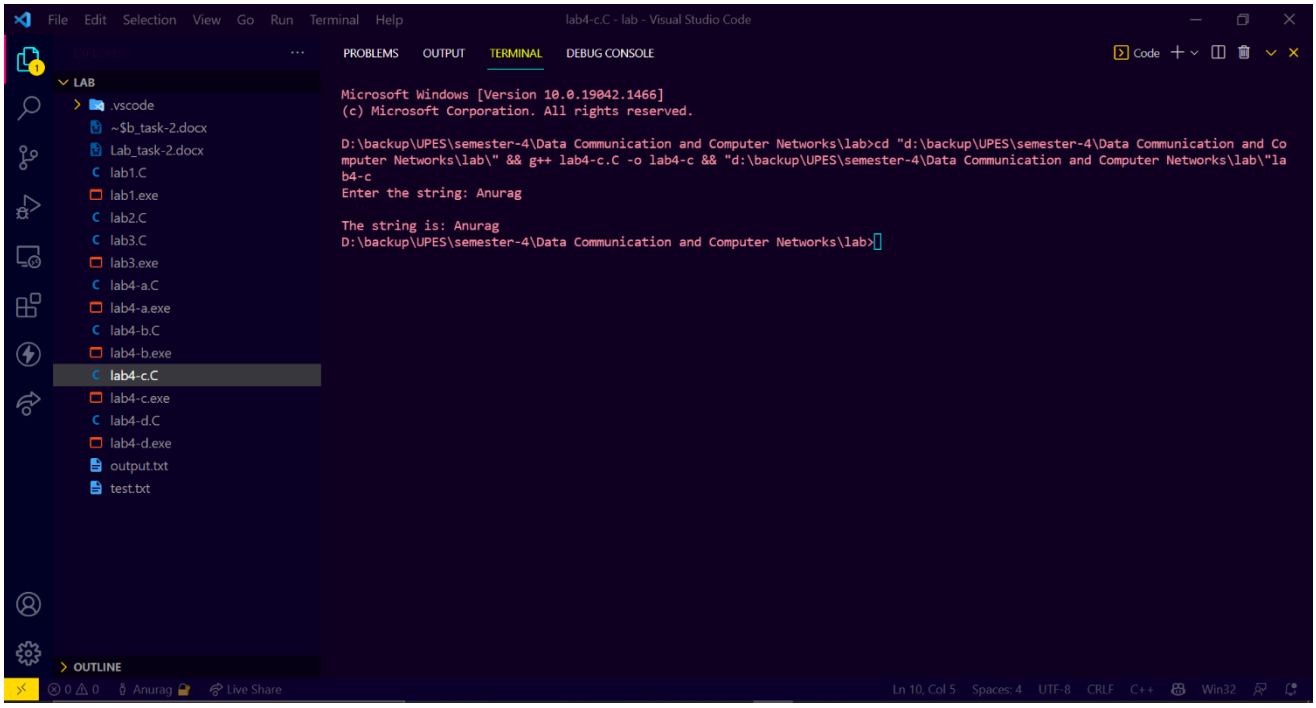


3. Program for reading and writing string

Code:

```
#include<stdio.h>

int main()
{
   // string writing and reading
   char str[100];
   printf("Enter the string: ");
   scanf("%s", str);
   printf("\nThe string is: %s", str);


   return 0;
}
```

Screenshot:



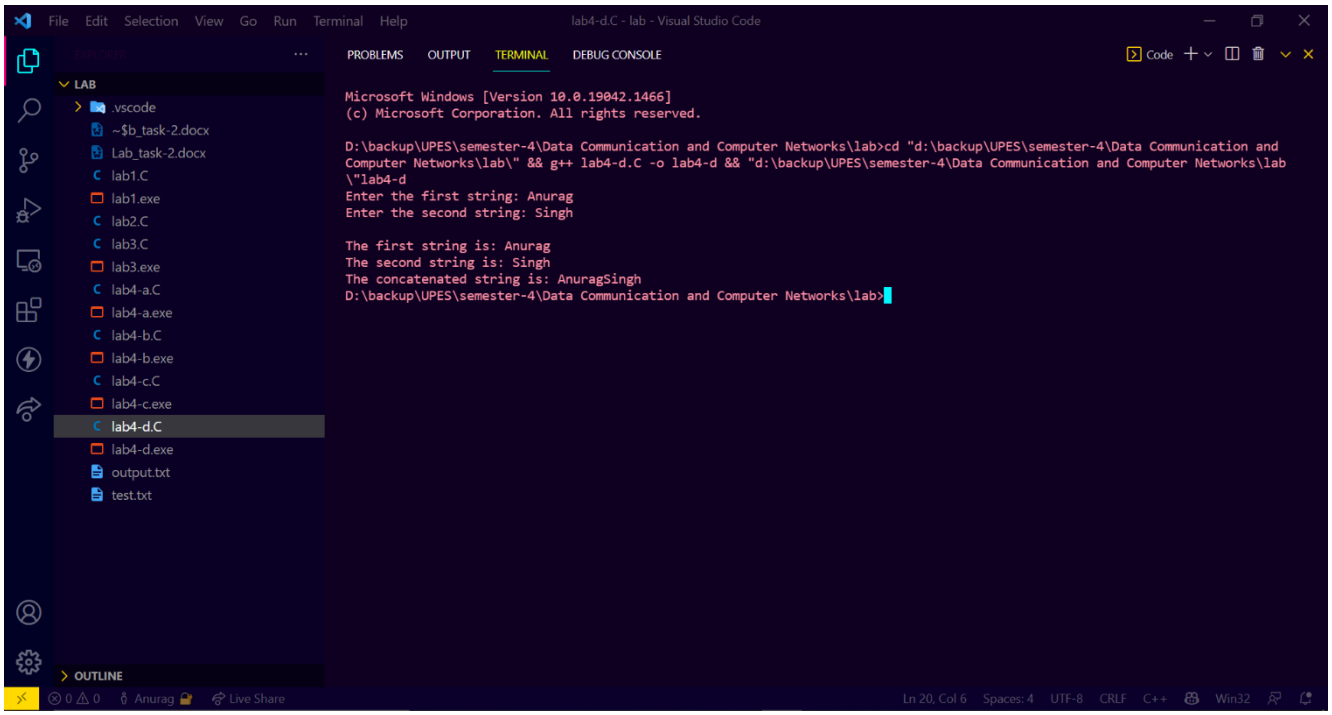
4. Add two string

Code:

```
#include<stdio.h>
#include<string.h>
int main()
{
   // add two  strings
```

```
    char str1[100];
    char str2[100];
    printf("Enter the first string: ");
    scanf("%s", str1);
    printf("Enter the second string: ");
    scanf("%s", str2);
    printf("\nThe first string is: %s", str1);
    printf("\nThe second string is: %s", str2);
    int length1 = strlen(str1);
    int length2 = strlen(str2);
    char str3[100];
    int i = 0;
    for (i = 0; i < length1; i++)
    {
        str3[i] = str1[i];
    }
    for (int j = 0; j < length2; j++)
    {
        str3[i] = str2[j];
        i++;
    }
    str3[i] = '\0';
    printf("\nThe concatenated string is: %s", str3);

    return 0;

}
```

Screenshot:



Lab-5

Task: Write a C program to implement bit stuffing and de-stuffing

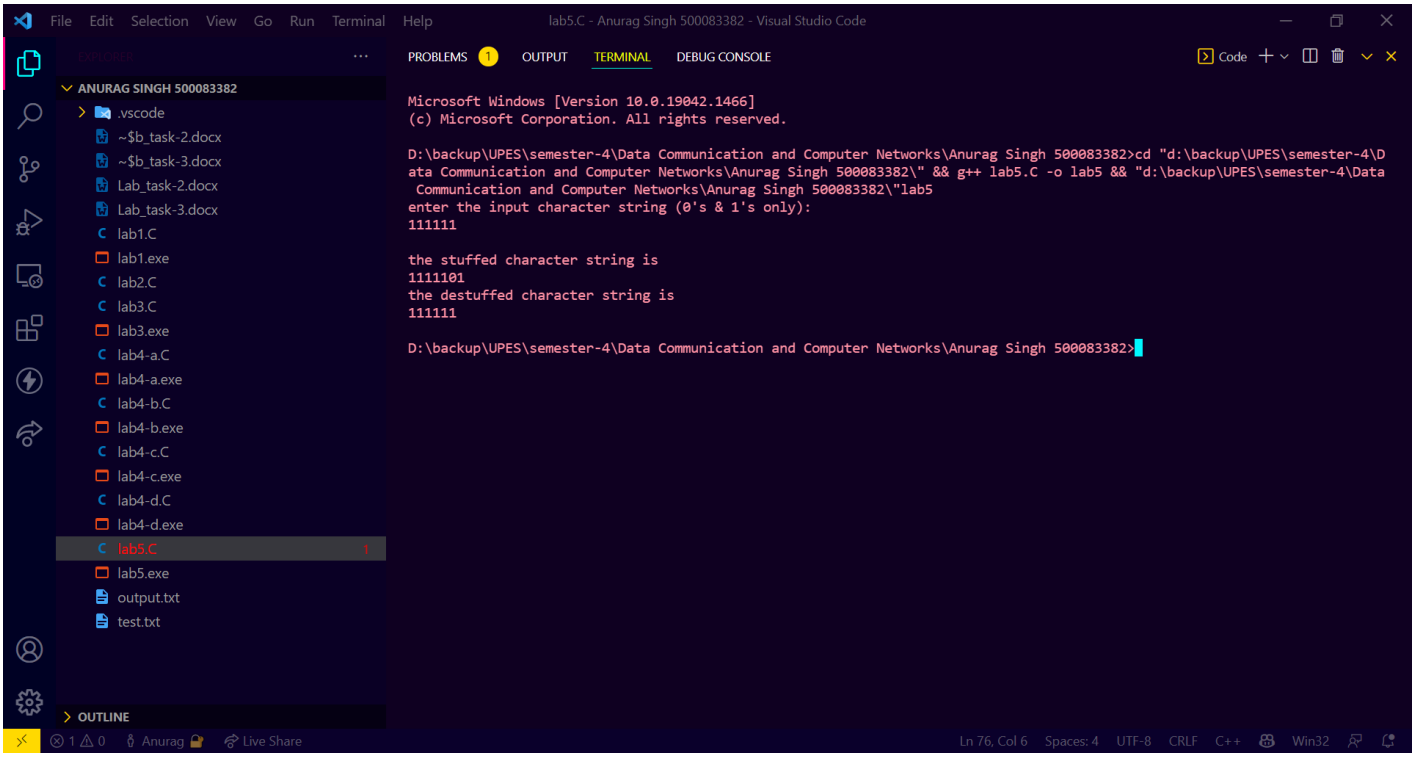
Code:

```
#include <stdio.h>
#include <stdlib.h>
#define MAXSIZE 100

int main()
{
   char *ptr1, *ptr2;
   char temp;
   char input[MAXSIZE];
   char stuff[MAXSIZE];
   char destuff[MAXSIZE];

   int c = 0;

   printf("enter the input character string (0's & 1's only):\n");
   scanf("%s", input);

   ptr1 = input;
```

```
ptr2 = stuff;

while (*ptr1 != '\0')
{
   if (*ptr1 == '0')
   {
     *ptr2 = *ptr1;
      ptr2++;
      ptr1++;
   }
   else
   {
      while (*ptr1 == '1' && c != 5)
      {
         c++;
         *ptr2 = *ptr1;
         ptr2++;
         ptr1++;
      }

      if (c == 5)
      {
         *ptr2 = '0';
         ptr2++;
      }
      c = 0;
   }
}
*ptr2 = '\0';
printf("\nthe stuffed character string is");
printf("\n%s", stuff);

ptr1 = stuff;
ptr2 = destuff;
while (*ptr1 != '\0')
{
   if (*ptr1 == '0')
   {
      *ptr2 = *ptr1;
      ptr2++;
      ptr1++;
   }
   else
   {
      while (*ptr1 == '1' && c != 5)
      {
         c++;
         *ptr2 = *ptr1;
         ptr2++;
         ptr1++;
```

```
            }
            if (c == 5)
            {
               ptr1++;
            }
            c = 0;
         }
      }
      *ptr2 = '\0';
      printf("\nthe destuffed character string is");
      printf("\n%s\n", destuff);
      return 0;
}
```

Screenshot:



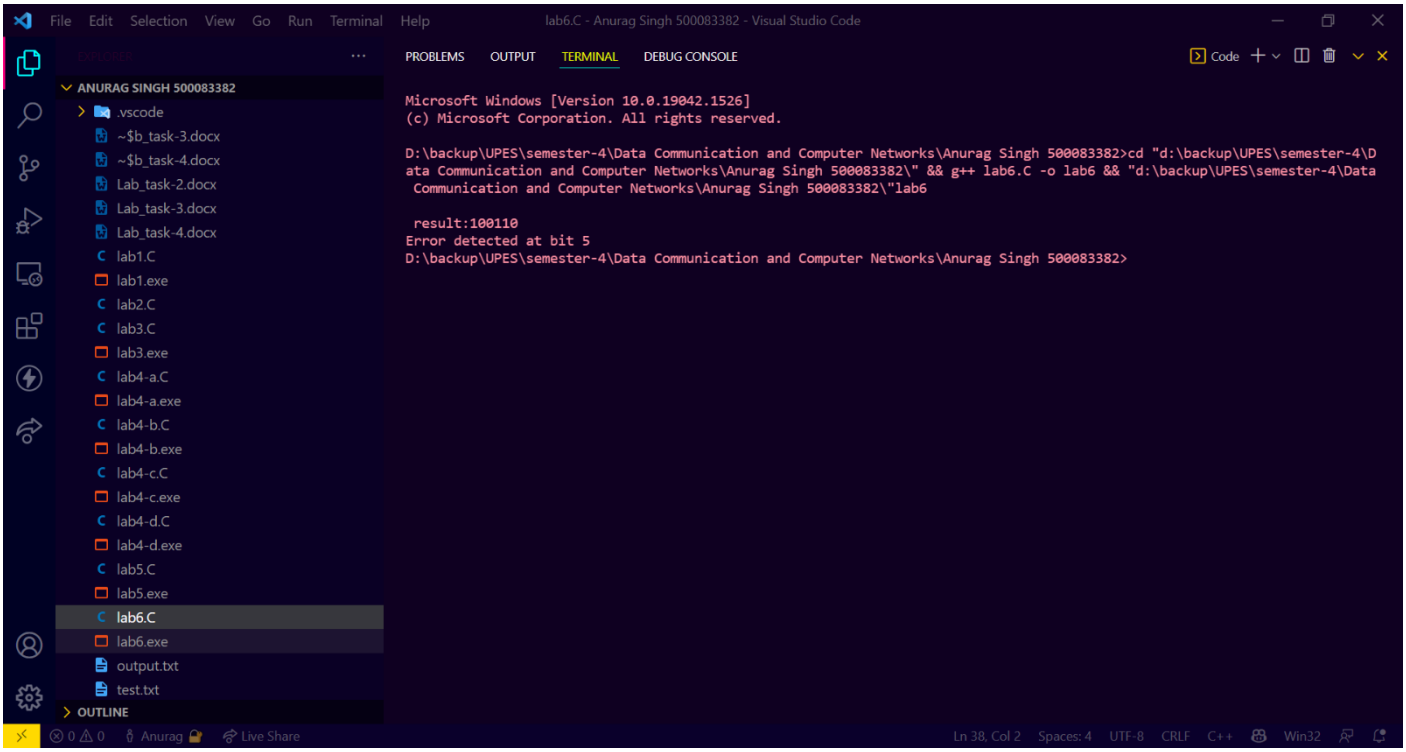
Lab-6

Task: Design a program for error detection using C program

Code:

```
#include <stdio.h>

int main()
{
   // design a program for error detection using c program

   int data[10]={1,0,1,1,0,1};
   int noise[10]={0,0,0,0,0,1};
   int result[10];

   // binary addition of data and noise
  int carry=0;
   for( int i = 0; i < 6; i++ )
   {
      int bitA = i < 6 && data[i] ? 1 : 0;
      int bitB = i < 6 && noise[i] ? 1 : 0;
      int sum = bitA + bitB + carry;
      result[i] = sum == 1 || sum == 3 ? 1 : 0;
      carry = sum > 1 ? 1 : 0;
   }
    result[ 6 ] = carry;
    printf("\n result:");
    for(int i=0;i<6;i++)
    {
        printf("%d",result[6-i]);
    }
    for(int i=0;i<6;i++){
        if(result[i]!=data[i]){
            printf("\nError detected at bit %d",i);
            break;
        }
    }


   return 0;

}
```

Screenshot:



Lab-7

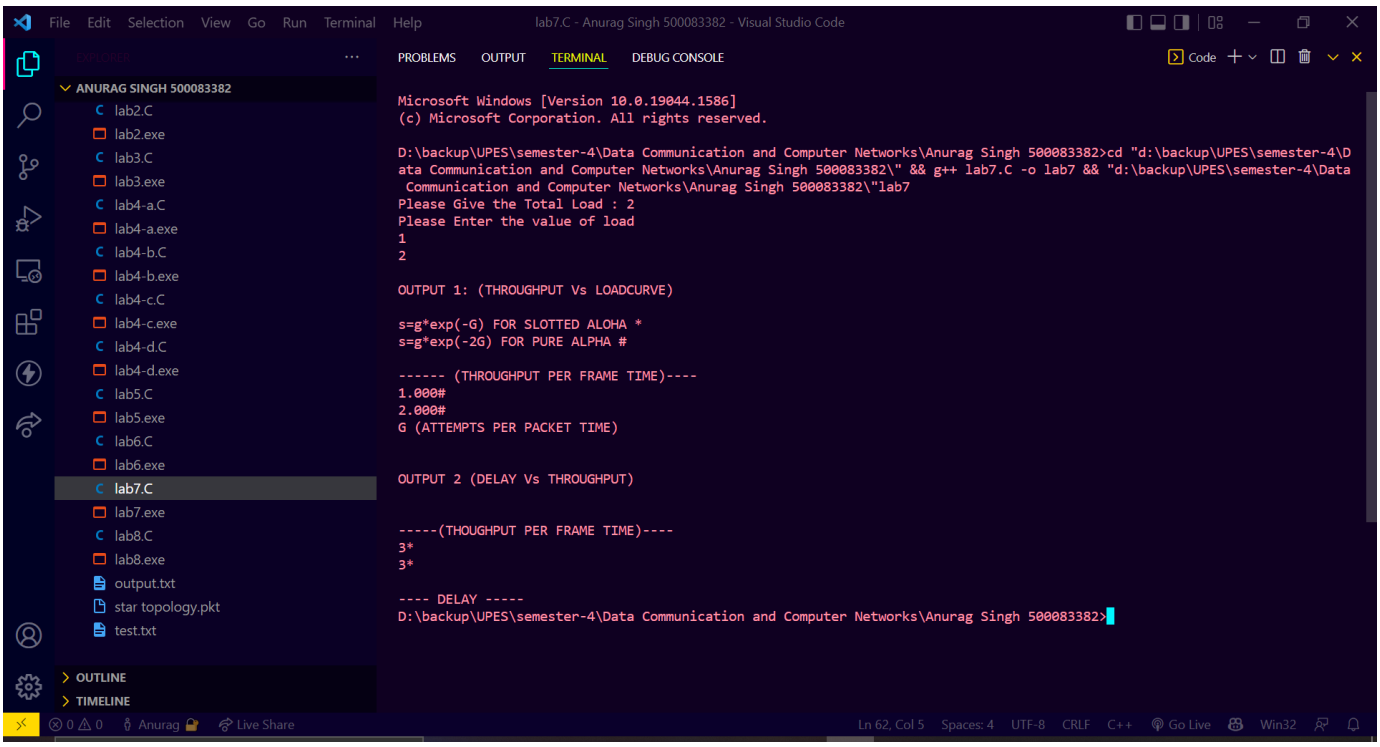
Task: Design a program for pure aloha protocol

Code

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


#define FRAME_TIME 250


int main()
{
float S1, S2, G, J, val[100];
int I, n, K, delay;
void wait();
clrscr();
printf("Please Give the Total Load : ");
scanf("%d", &n);
printf("Please Enter the value of load \n");
for (I=0; I<n; I++)
```

```
{
scanf("%f", &val[I]);
}
printf("\nOUTPUT 1: (THROUGHPUT Vs LOADCURVE)\n\n");
printf("s=g*exp(-G) FOR SLOTTED ALOHA * \n");
printf("s=g*exp(-2G) FOR PURE ALPHA #\n")
printf("\n------ (THROUGHPUT PER FRAME TIME)----\n");
for(K=0; K<n; K++)
{
G=val[K];
S1 = G * exp (-G);
S2 = G * exp(-2 * G);
printf("%1.3f", G );
for (I=0; I <=S1*20; I++)
{
printf(" ");
}
printf("*");
for(I=S2*20; I<=S2*75; I++ )
{
printf(" ");
}
printf("#\n");
}
printf("G (ATTEMPTS PER PACKET TIME) \n\n");
wait();
getch();
clrscr();
printf("\nOUTPUT 2 (DELAY Vs THROUGHPUT) \n\n");
printf("\n-----(THOUGHPUT PER FRAME TIME)----\n");
for(K=0; K<n; K++)
{
G=val[K];
S1 = G * exp (-G);
printf("3");
for (I=0; I <=S1*2.7; I++)
{
printf(" ");
}
printf("*\n");
}
printf("\n");
printf("---- DELAY -----");
wait();
getch();
clrscr();
}
void wait()
{
sound(440);
delay(300);
nosound();
}
```

Screenshot:



Lab-8

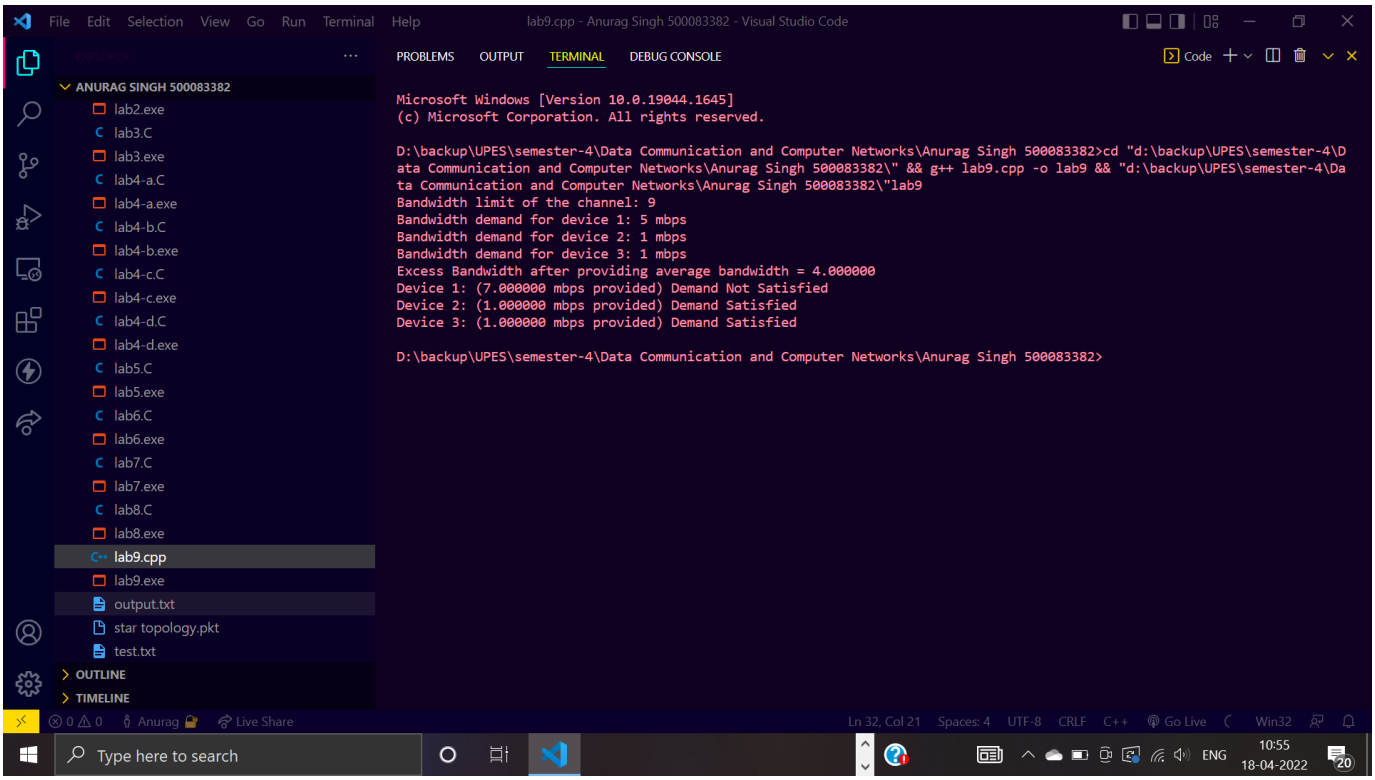
Task: Design a program for CSMA

Code:

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
#include <time.h>

int main() {
   srand(time(0));

   int deviceDemand[10], maxBandwidth = 9, numOfDevice = 3;
   float avgBandwidth = maxBandwidth / numOfDevice, bandwidthProvide[10];

   for (int i = 0; i < numOfDevice; i++) {
      deviceDemand[i] = rand() % 5 + 1;
   }

   printf("Bandwidth limit of the channel: %d\n", maxBandwidth);

   for (int i = 0; i < numOfDevice; i++) {
      printf("Bandwidth demand for device %d: %d mbps\n", i+1, deviceDemand[i]);
   }
```

```
    float excessBandwidth = 0, condition[10], count = 0;

    for (int i = 0; i < numOfDevice; i++) {
        if(deviceDemand[i] <= avgBandwidth) {
            bandwidthProvide[i] = deviceDemand[i];
            excessBandwidth += avgBandwidth - deviceDemand[i];
            condition[i] = 1;
        } else {
            bandwidthProvide[i] = avgBandwidth;
            condition[i] = 0;
            count++;
        }
    }

    printf("Excess Bandwidth after providing average bandwidth = %f\n", excessBandwidth);

    float BonusBandwidth = excessBandwidth/count;

    for (int i = 0; i < numOfDevice; i++) {
        if(condition[i] == 0) {
            bandwidthProvide[i] += BonusBandwidth;
        }
    }

    for (int i = 0; i < numOfDevice; i++) {
        if(deviceDemand[i] == bandwidthProvide[i]) {
            printf("Device %d: (%f mbps provided) Demand Satisfied\n", i+1, bandwidthProvide[i]);
        } else {
            printf("Device %d: (%f mbps provided) Demand Not Satisfied\n", i+1, bandwidthProvide[i]);
        }
    }
}
```

Screenshot:


File Edit Selection View Go Run Terminal Help
lab9.cpp - Anurag Singh 500083382 - Visual Studio Code
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE
Code
ANURAG SINGH 500083382
lab2.exe
lab3.C
lab3.exe
lab4-a.C
lab4-a.exe
lab4-b.C
lab4-b.exe
lab4-c.C
lab4-c.exe
lab4-d.C
lab4-d.exe
lab5.C
lab5.exe
lab6.C
lab6.exe
lab7.C
lab7.exe
lab8.C
lab8.exe
lab9.cpp
lab9.exe
output.txt
star topology.pkt
test.txt
OUTLINE
TIMELINE
Microsoft Windows [Version 10.0.19044.1645]
(c) Microsoft Corporation. All rights reserved.
D:\backup\UPES\semester-4\Data Communication and Computer Networks\Anurag Singh 500083382>cd "d:\backup\UPES\semester-4\Data Communication and Computer Networks\Anurag Singh 500083382\" && g++ lab9.cpp -o lab9 && "d:\backup\UPES\semester-4\Data Communication and Computer Networks\Anurag Singh 500083382\"lab9
Bandwidth limit of the channel: 9
Bandwidth demand for device 1: 5 mbps
Bandwidth demand for device 2: 1 mbps
Bandwidth demand for device 3: 1 mbps
Excess Bandwidth after providing average bandwidth = 4.000000
Device 1: (7.000000 mbps provided) Demand Not Satisfied
Device 2: (1.000000 mbps provided) Demand Satisfied
Device 3: (1.000000 mbps provided) Demand Satisfied
D:\backup\UPES\semester-4\Data Communication and Computer Networks\Anurag Singh 500083382>
Anurag
Live Share
Ln 32, Col 21
Spaces: 4
UTF-8
CRLF
C++
Go Live
Win32
Type here to search
ENG
10:55
18-04-2022

Lab-9

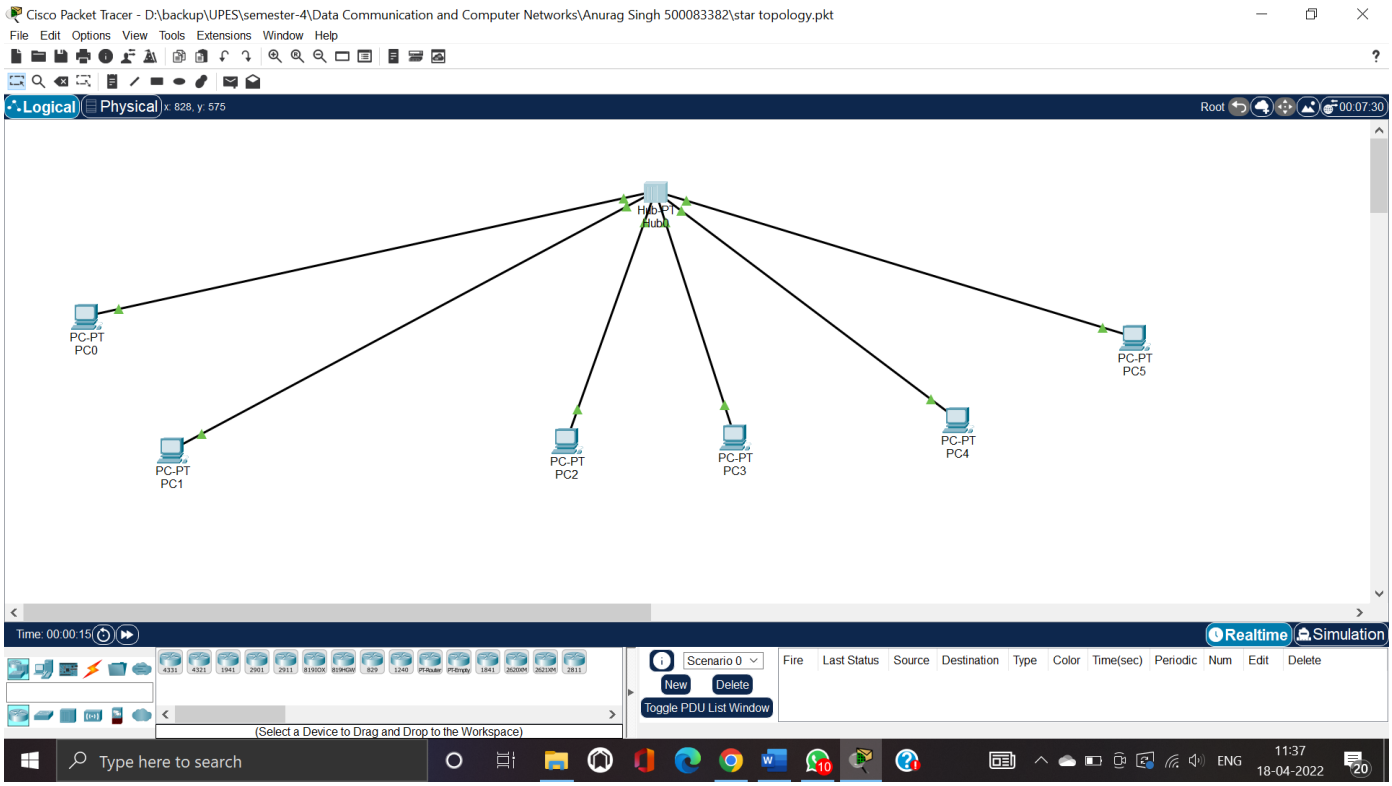
Task: Static Routing in Cisco Packet Tracer

Theory

In this network, a router and 6 PCs are used. Computers are connected with routers using a copper straight-through cable. After forming the network, to check network connectivity a simple PDU is transferred from PC0 to PC1. The network simulation status is successful. From this network, it can be observed that the router handles data transfers between multiple devices.

1. Procedure
2. Select the router and Open CLI.
3. Press ENTER to start configuring Router1.
4. Type enable to activate the privileged mode.
5. Type config t(configure terminal) to access the configuration menu.
6. Configure interfaces of Router1

Screenshot:



Lab-10

Topic: Cisco Packet Tracer - Static Routing

Theory

Routing is simply a process of choosing a route for delivering data to its destination. All hosts who can generate a routing table can do a routing. Routing process is needed when we are going to deliver packets of data to a network that isn't directly connected with the sender.

IP Addresses
PC0: 192.168.1.2
PC1: 192.168.1.3
PC2: 192.168.2.2
PC3:192.168.2.3
PC4:192.168.3.2
PC5: 192.168.3.3

Screenshot: