

TABLE OF CONTENTS

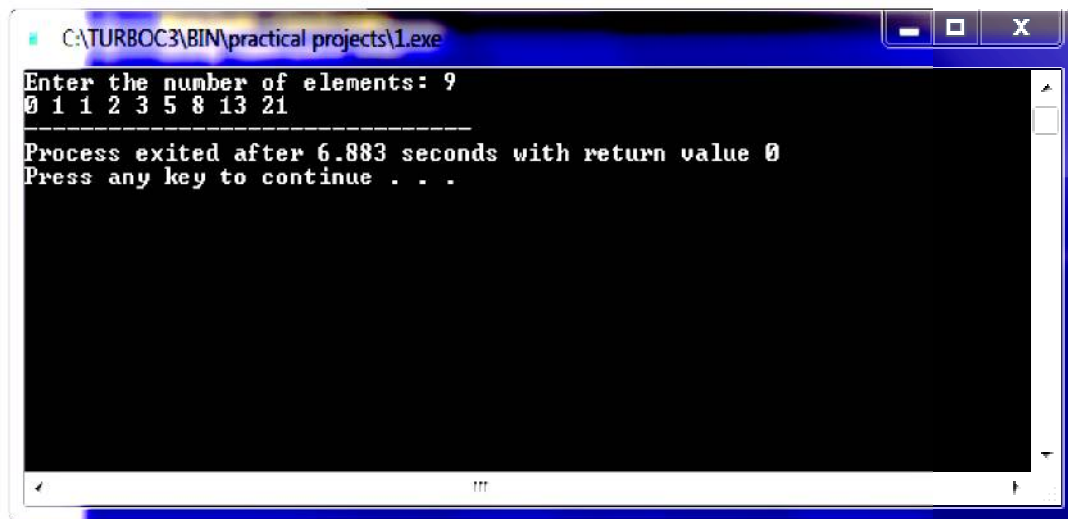
Program 1:- To print Fibonacci series	3
Program 2:- To check a number is prime or not	4
Program 3:- To check a number is palindrome or not.....	5
Program 4:- To find the factorial of a number.....	6
Program 5:- To check the number is Armstrong no. Or not	7
Program 6:-To print sum of digits of a number	8
Program 7:- To reverse a number	9
Program 8:- To multiply two matrix.....	10
Program 9:-To convert decimal no. Into binary no.	12
Program 10:-To print the number in character.....	13
Program 11:- To print alphabet triangle.....	15
Program 12:- To print Fibonacci triangle.....	16
Program 13:- To check a year is leap year or not.....	17
Program 14:-To print multiplication table	18
Program 15:- To find the roots of an quadratic equations.....	19
Program 16:use of friend function	20
Program 17:Operator overloading of +	21
Program 18:use of templates.....	22
Program 19:Use of friend class	23
Program 20:Exception handling.....	24
Program 21:Program to Check Prime Number using a for loop.....	25
Program 22: Program to print half pyramid using alphabets.....	26
Program 23 : Program to Find Factorial of a Number.....	27
Program 24 : To find GCD of two numbers.....	28
Program 25: Program to reverse a number	29
Program 26: to find Armstrong no. Between two no.....	30
Program 27: Find average using arrays	32
Program 28 :Bubble Sort Algorithm.....	33
Program 29: Program to generate a random string.....	35
Program 30: Multiple Inheritance in Java	36
Program 31: Compare two strings	37
Program 32: Calling One Constructor from another.....	38
Program 33 : Simple Calculator using Java switch Statement	39
Program 34: Adding Two Matrices	41
Program 35: Multipling Two Matrices.....	42
Program 36: Check if a string contains a substring using contains()	43
Program 37: Method overriding in Java Inheritance.....	44

Program 38: use of instanceof operator	45
Program 39:Use of generic class	46
Program 40:Exception handling in java	47
Program 41: use of create command.....	48
Program 42: Use of insert	49
Program 43: use of update.....	50
Program 44: Delete command	51
Program 45: Alter command	52
Program 46: Line drawing algorithm.....	53
Program 47: Brsenham's line drawing algorithm.....	54
Program 48: Bresenham's Circle drawing	55
Program 49: Circle drawing.....	57
Program 50: Drawing of ellipse.....	58

PROGRAM 1:- TO PRINT FIBONACCI SERIES

```
#include <iostream>
using namespace std;
int main()
{
    int n1=0,n2=1,n3,i,number;
    cout<<"Enter the number of elements: ";
    cin>>number;
    cout<<n1<<" "<<n2<<" "; //printing 0 and 1
    for(i=2;i<number;++i) //loop starts from 2 because 0 and 1 are already printed
    {
        n3=n1+n2;
        cout<<n3<<" ";
        n1=n2;
        n2=n3;
    }
    return 0;
}
```

Output:-



PROGRAM 2:- TO CHECK A NUMBER IS PRIME OR NOT

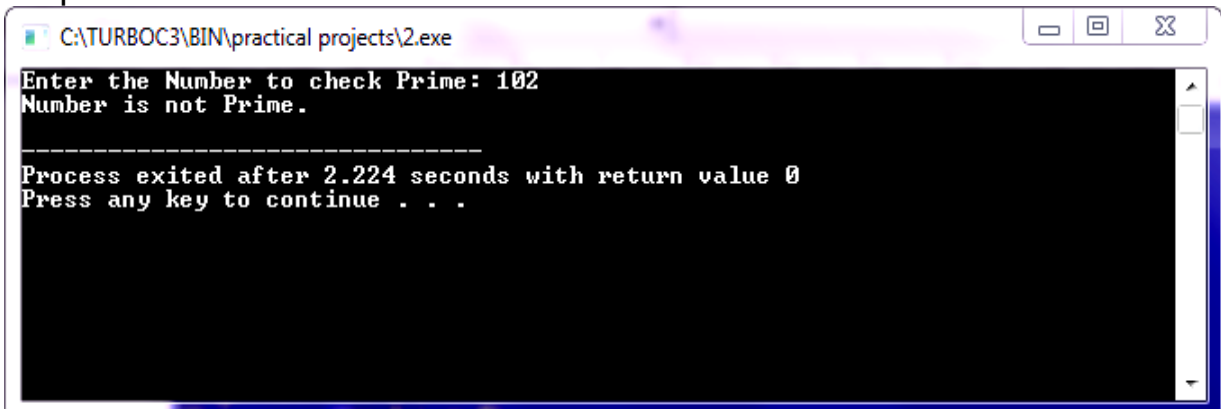
```
#include <iostream>
using namespace std;
int main()
{
    int n, i, m=0, flag=0;
    cout << "Enter the Number to check Prime: ";
    cin >> n;
    m=n/2;
    for(i = 2; i <= m; i++)
    {
        if(n % i == 0)
        {
            cout<<"Number is not Prime."<<endl;
            flag=1;
            break;
        }
    }
    if (flag==0)
    cout << "Number is Prime."<<endl;
    return 0;
}
```

Output 1:-



The screenshot shows a console window titled "C:\TURBOC3\BIN\practical projects\2.exe". The output text is: "Enter the Number to check Prime: 103", "Number is Prime.", followed by a separator line, "Process exited after 4.272 seconds with return value 0", and "Press any key to continue . . .".

Output 2:-



The screenshot shows a console window titled "C:\TURBOC3\BIN\practical projects\2.exe". The output text is: "Enter the Number to check Prime: 102", "Number is not Prime.", followed by a separator line, "Process exited after 2.224 seconds with return value 0", and "Press any key to continue . . .".

PROGRAM 3:- TO CHECK A NUMBER IS PALINDROME OR NOT

```
#include<iostream>
using namespace std;
int main()
{
int n,r,sum=0,temp;
cout<<"Enter the Number=";
cin>>n;
temp=n;
while(n>0)
{
r=n%10;
sum=(sum*10)+r;
n=n/10;
}
if(temp==sum)
cout<<"Number is Palindrome.";
else
cout<<"Number is not Palindrome.";
return 0;
}
```

Output:-

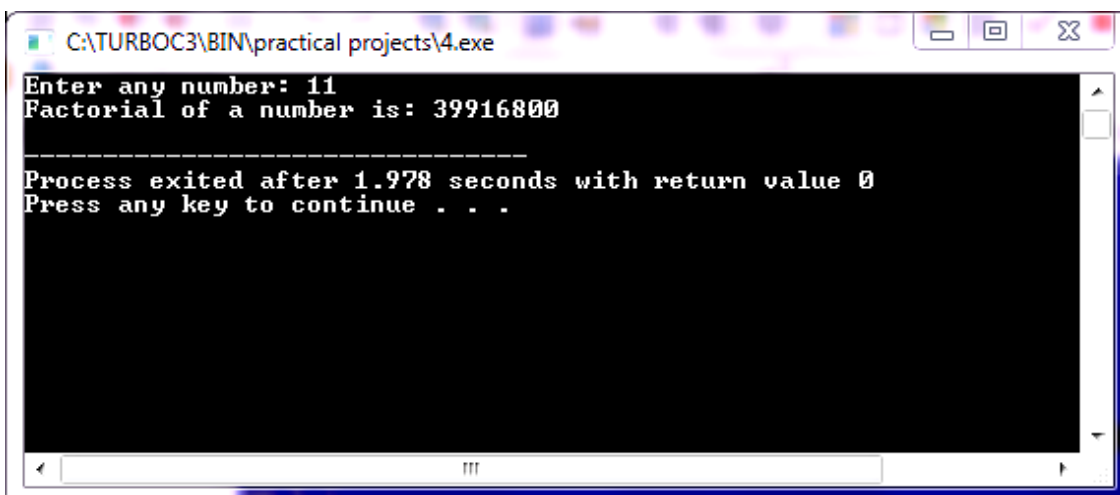


```
C:\TURBOC3\BIN\practical projects\3.exe
Enter the Number=111
Number is Palindrome.
-----
Process exited after 3.269 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 4:- TO FIND THE FACTORIAL OF A NUMBER

```
//factorial program using recursion
#include<iostream>
using namespace std;
int main()
{
    int factorial(int);
    int fact,value;
    cout<<"Enter any number: ";
    cin>>value;
    fact=factorial(value);
    cout<<"Factorial of a number is: "<<fact<<endl;
    return 0;
}
int factorial(int n)
{
    if(n<0)
        return(-1); /*Wrong value*/
    if(n==0)
        return(1); /*Terminating condition*/
    else
    {
        return(n*factorial(n-1));
    }
}
```

Output:-

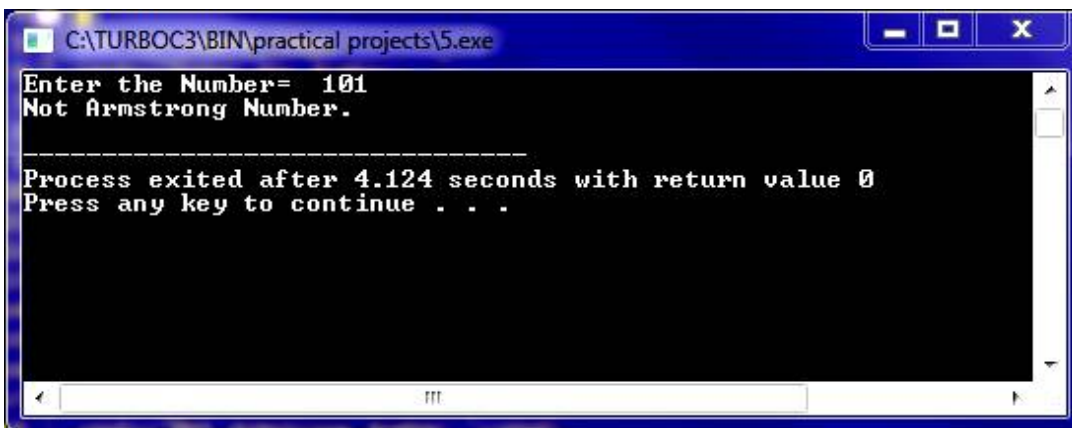


```
C:\TURBOC3\BIN\practical projects\4.exe
Enter any number: 11
Factorial of a number is: 39916800
-----
Process exited after 1.978 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 5:- TO CHECK THE NUMBER IS ARMSTRONG NO. OR NOT

```
//Armstrong no.
#include <iostream>
using namespace std;
int main()
{
int n,r,sum=0,temp;
cout<<"Enter the Number= ";
cin>>n;
temp=n;
while(n>0)
{
r=n%10;
sum=sum+(r*r*r);
n=n/10;
}
if(temp==sum)
cout<<"Armstrong Number."<<endl;
else
cout<<"Not Armstrong Number."<<endl;
return 0;
}
```

Output:-

A screenshot of a TurboC++ console window. The title bar shows the file path "C:\TURBOC3\BIN\practical projects\5.exe". The console text shows the program's execution: it prompts "Enter the Number= ", the user enters "101", and the program outputs "Not Armstrong Number.". Below this, a status message reads "Process exited after 4.124 seconds with return value 0" followed by "Press any key to continue . . .". The console has a black background with white text and a blue border.

PROGRAM 6:-TO PRINT SUM OF DIGITS OF A NUMBER

```
//sum of digits
#include <iostream>
using namespace std;
int main()
{
int n,sum=0,m;
cout<<"Enter a number: ";
cin>>n;
while(n>0)
{
m=n%10;
sum=sum+m;
n=n/10;
}
cout<<"Sum is= "<<sum<<endl;
return 0;
}
```

Output:-



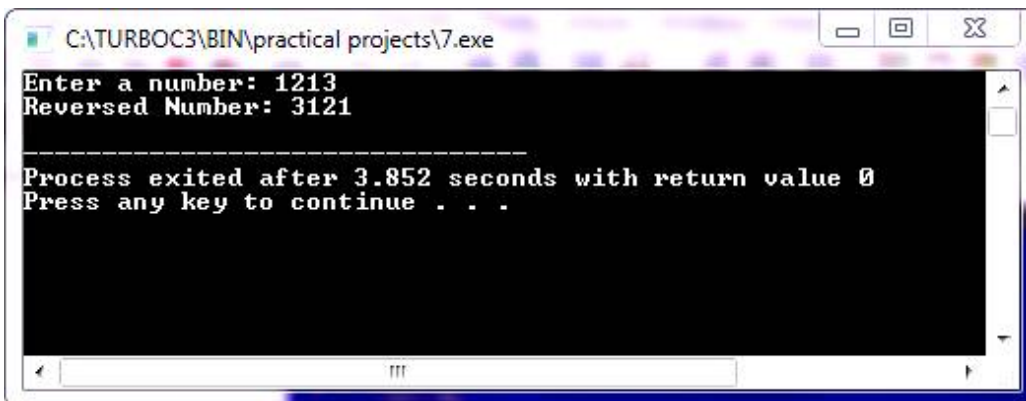
```
C:\TURBOC3\BIN\practical projects\6.exe
Enter a number: 1221
Sum is= 6

-----
Process exited after 4.676 seconds with return value 0
Press any key to continue . . .
```


PROGRAM 7:- TO REVERSE A NUMBER

```
//reverse no.
#include <iostream>
using namespace std;
int main()
{
    int n, reverse=0, rem;
    cout<<"Enter a number: ";
    cin>>n;
    while(n!=0)
    {
        rem=n%10;
        reverse=reverse*10+rem;
        n/=10;
    }
    cout<<"Reversed Number: "<<reverse<<endl;
    return 0;
}
```

Output:-

A screenshot of a Turbo C++ console window. The title bar shows the file path "C:\TURBOC3\BIN\practical projects\7.exe". The console output is as follows: "Enter a number: 1213", "Reversed Number: 3121", followed by a horizontal line, "Process exited after 3.852 seconds with return value 0", and "Press any key to continue . . .". The console has a black background with white text. The window has standard Windows-style controls (minimize, maximize, close) in the top right corner and a scrollbar on the right side.

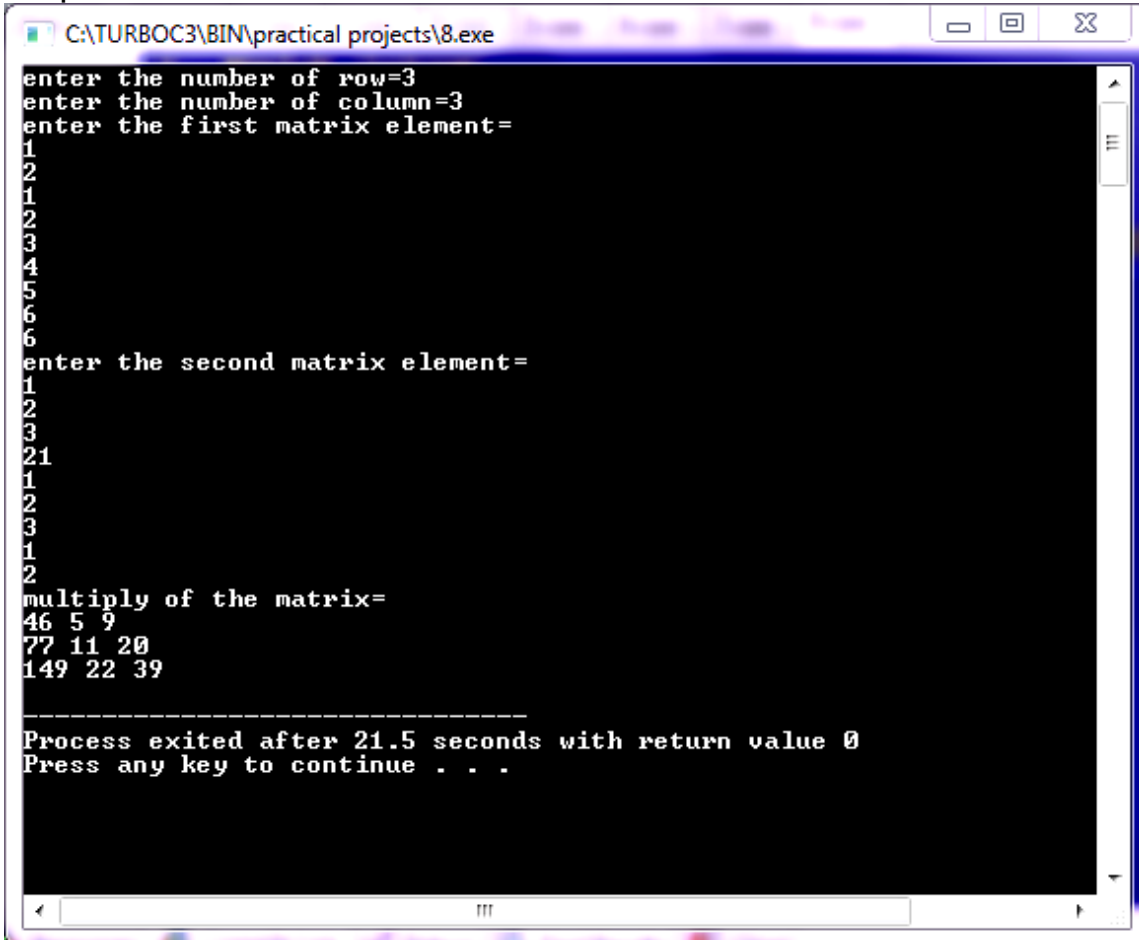
```
C:\TURBOC3\BIN\practical projects\7.exe
Enter a number: 1213
Reversed Number: 3121
-----
Process exited after 3.852 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 8:- TO MULTIPLY TWO MATRIX

```
//matrix multiplication
#include <iostream>
using namespace std;
int main()
{
int a[10][10],b[10][10],mul[10][10],r,c,i,j,k;
cout<<"enter the number of row=";
cin>>r;
cout<<"enter the number of column=";
cin>>c;
cout<<"enter the first matrix element=\n";
for(i=0;i<r;i++)
{
for(j=0;j<c;j++)
{
cin>>a[i][j];
}
}
cout<<"enter the second matrix element=\n";
for(i=0;i<r;i++)
{
for(j=0;j<c;j++)
{
cin>>b[i][j];
}
}
cout<<"multiply of the matrix=\n";
for(i=0;i<r;i++)
{
for(j=0;j<c;j++)
{
mul[i][j]=0;
for(k=0;k<c;k++)
{
mul[i][j]+=a[i][k]*b[k][j];
}
}
}
//for printing result
for(i=0;i<r;i++)
{
for(j=0;j<c;j++)
{
cout<<mul[i][j]<<" ";
}
cout<<"\n";
}
```

```
}  
return 0;  
}
```

Output:-

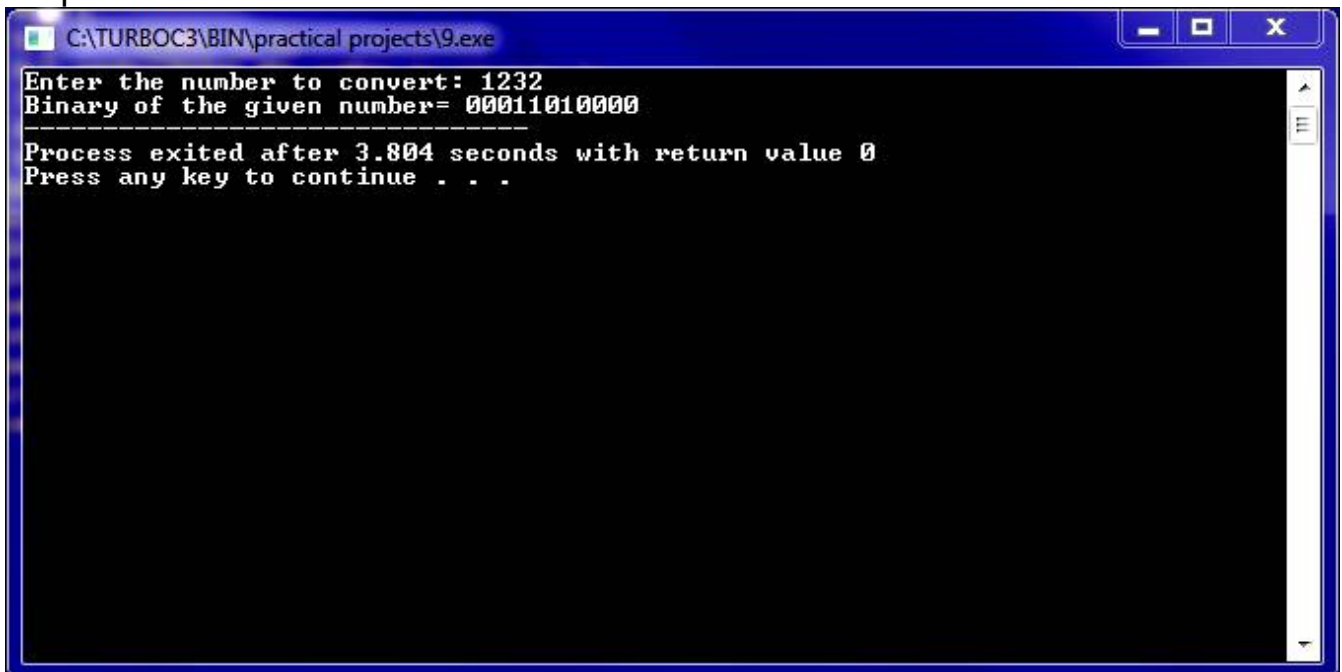


```
C:\TURBOC3\BIN\practical projects\8.exe  
enter the number of row=3  
enter the number of column=3  
enter the first matrix element=  
1  
2  
1  
2  
3  
4  
5  
6  
6  
enter the second matrix element=  
1  
2  
3  
21  
1  
2  
3  
1  
2  
multiply of the matrix=  
46 5 9  
77 11 20  
149 22 39  
  
-----  
Process exited after 21.5 seconds with return value 0  
Press any key to continue . . .
```

PROGRAM 9:-TO CONVERT DECIMAL NO. INTO BINARY NO.

```
//decimal to binary
#include <iostream>
using namespace std;
int main()
{
    int a[10], n, i;
    cout<<"Enter the number to convert: ";
    cin>>n;
    for(i=0; n>0; i++)
    {
        a[i]=n%2;
        n= n/2;
    }
    cout<<"Binary of the given number= ";
    for(i=i-1 ;i>=0 ;i--)
    {
        cout<<a[i];
    }
}
```

Output:-



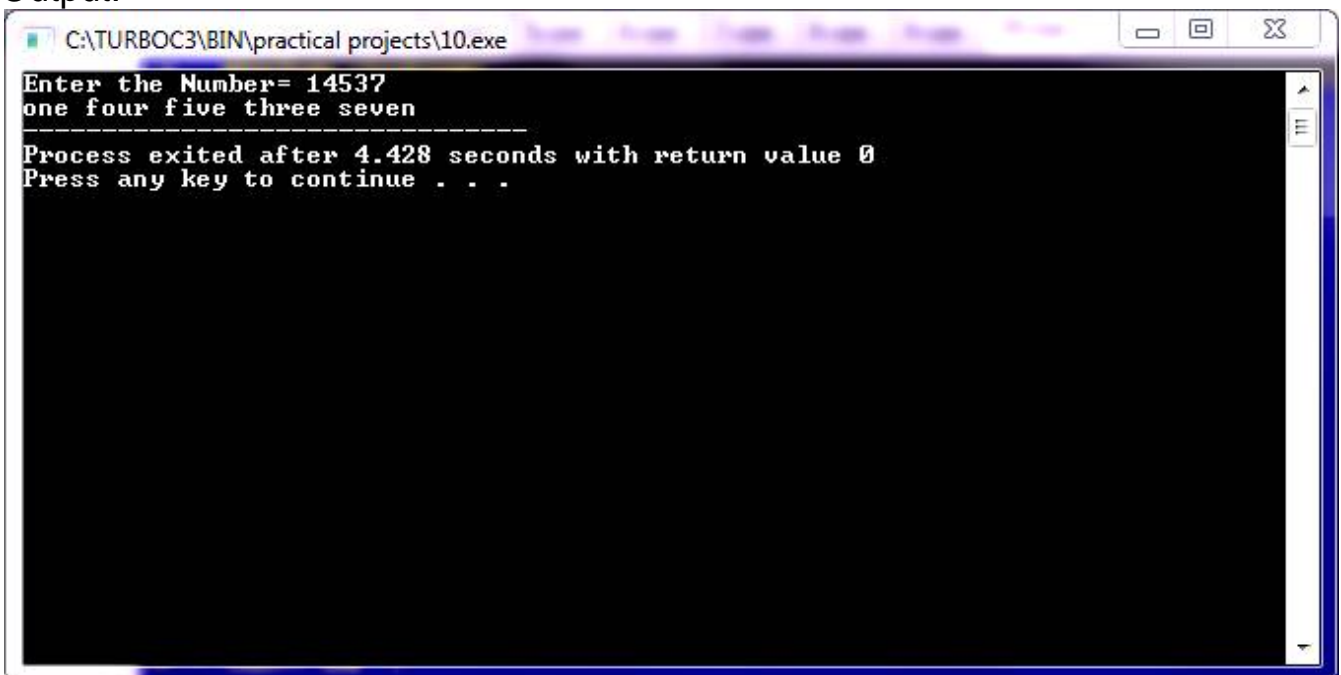
```
C:\TURBOC3\BIN\practical projects\9.exe
Enter the number to convert: 1232
Binary of the given number= 00011010000
Process exited after 3.804 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 10:-TO PRINT THE NUMBER IN CHARACTER

```
//print no..  
#include <iostream>  
using namespace std;  
int main()  
{  
long int n,sum=0,r;  
cout<<"Enter the Number= ";  
cin>>n;  
while(n>0)  
{  
r=n%10;  
sum=sum*10+r;  
n=n/10;  
}  
n=sum;  
while(n>0)  
{  
r=n%10;  
switch(r)  
{  
case 1:  
cout<<"one ";  
break;  
case 2:  
cout<<"two ";  
break;  
case 3:  
cout<<"three ";  
break;  
case 4:  
cout<<"four ";  
break;  
case 5:  
cout<<"five ";  
break;  
case 6:  
cout<<"six ";  
break;  
case 7:  
cout<<"seven ";  
break;  
case 8:  
cout<<"eight ";  
break;  
case 9:  
cout<<"nine ";
```

```
break;
case 0:
cout<<"zero ";
break;
default:
cout<<"tttt ";
break;
}
n=n/10;
}
}
```

Output:-

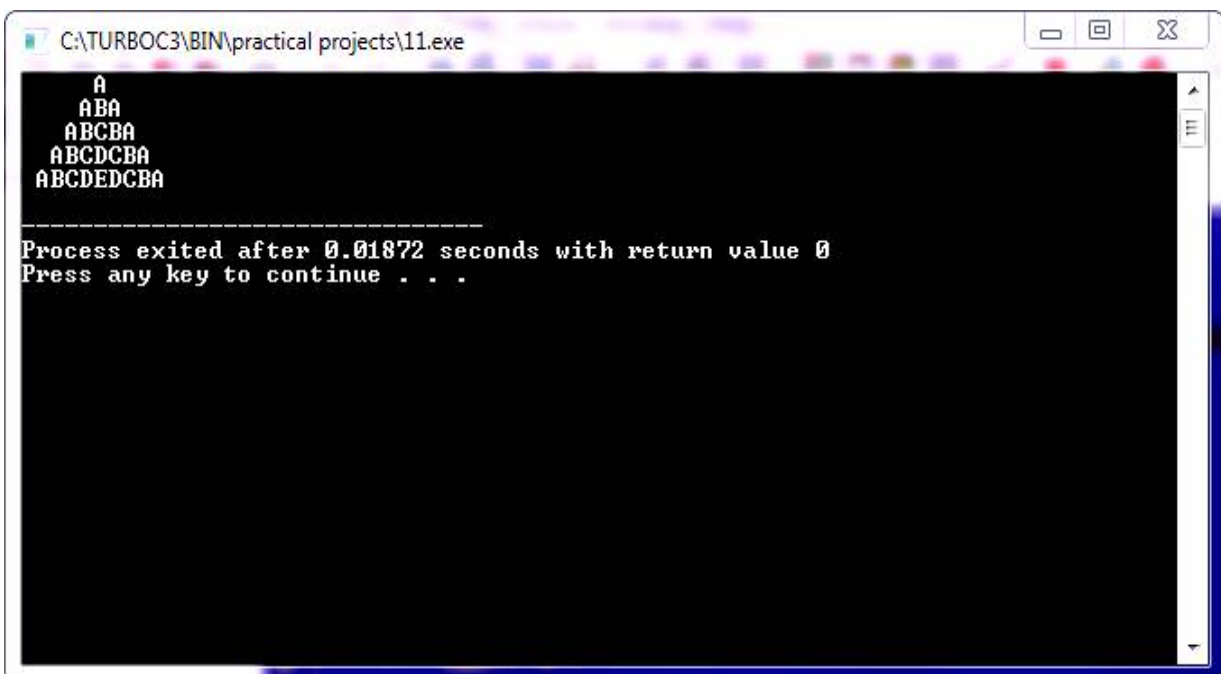
A screenshot of a TurboC++ console window. The title bar shows the file path "C:\TURBOC3\BIN\practical projects\10.exe". The console text is as follows:
Enter the Number= 14537
one four five three seven

Process exited after 4.428 seconds with return value 0
Press any key to continue . . .
The console background is black with white text. There are standard window controls (minimize, maximize, close) in the top right corner of the title bar.

PROGRAM 11:- TO PRINT ALPHABET TRIANGLE

```
//to print alphabey triangle
#include <iostream>
using namespace std;
int main()
{
char ch='A';
int i, j, k, m;
for(i=1;i<=5;i++)
{
for(j=5;j>=i;j--)
cout<<" ";
for(k=1;k<=i;k++)
cout<<ch++;
ch--;
for(m=1;m<i;m++)
cout<<--ch;
cout<<"\n";
ch='A';
}
return 0;
}
```

Output:-



```
C:\TURBOC3\BIN\practical projects\11.exe

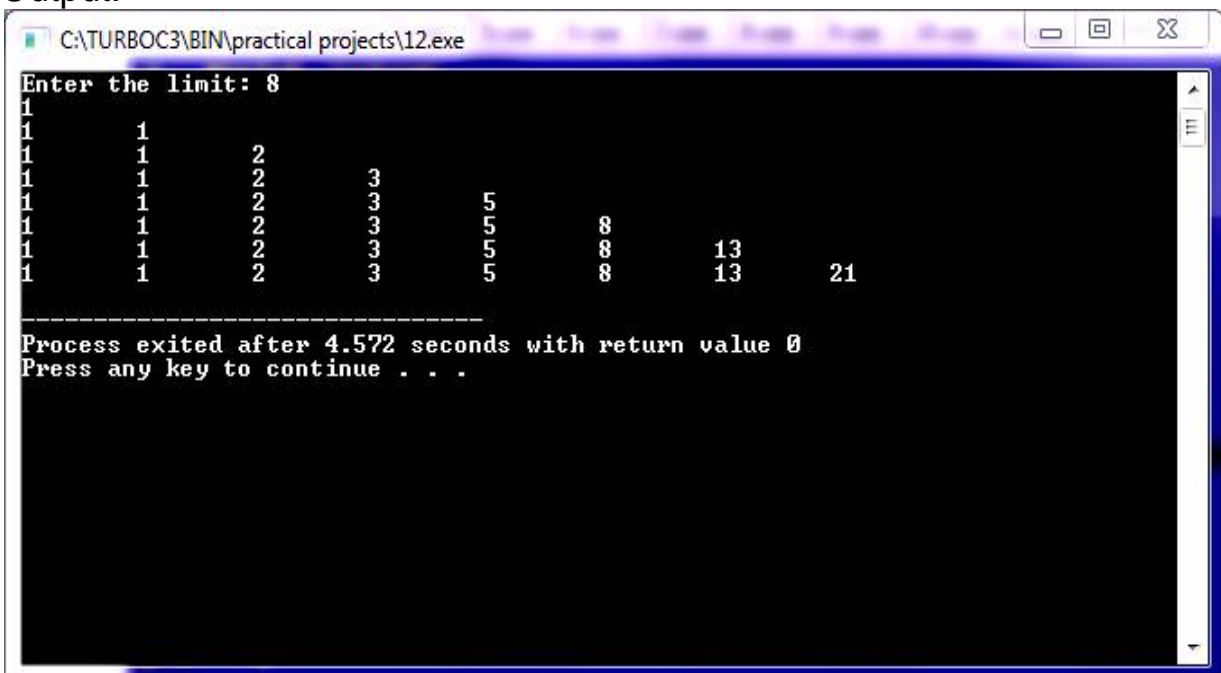
  A
 ABA
ABCBA
ABCDcba
ABCDEDCBA

-----
Process exited after 0.01872 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 12:- TO PRINT FIBONACCI TRIANGLE

```
//Fibonacci triangle
#include <iostream>
using namespace std;
int main()
{
int a=0,b=1,i,c,n,j;
cout<<"Enter the limit: ";
cin>>n;
for(i=1; i<=n; i++)
{
a=0;
b=1;
cout<<b<<"\t";
for(j=1; j<i; j++)
{
c=a+b;
cout<<c<<"\t";
a=b;
b=c;
}
cout<<"\n";
}
return 0;
}
```

Output:-



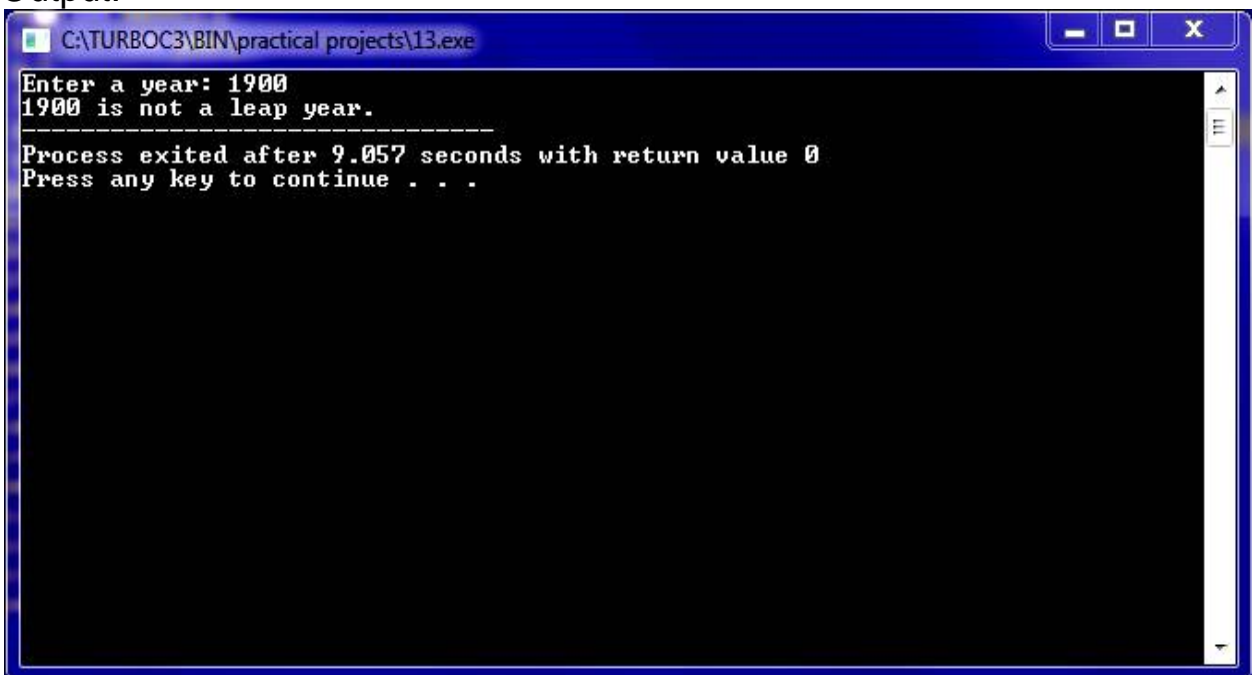
```
C:\TURBOC3\BIN\practical projects\12.exe
Enter the limit: 8
1
1 1
1 1 2
1 1 2 3
1 1 2 3 5
1 1 2 3 5 8
1 1 2 3 5 8 13
1 1 2 3 5 8 13 21
-----
Process exited after 4.572 seconds with return value 0
Press any key to continue . . .
```


PROGRAM 13:- TO CHECK A YEAR IS LEAP YEAR OR NOT

```
//leap year
#include <iostream>
using namespace std;
int main() {
int year;
cout << "Enter a year: ";
cin >> year;
if (year % 4 == 0) {
if (year % 100 == 0) {
if (year % 400 == 0)
cout << year << " is a leap year.";
else
cout << year << " is not a leap year.";
}
else
cout << year << " is a leap year.";
}
else
cout << year << " is not a leap year.";

return 0;
}
```

Output:-



```
C:\TURBOC3\BIN\practical projects\13.exe
Enter a year: 1900
1900 is not a leap year.
-----
Process exited after 9.057 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 14:-TO PRINT MULTIPLICATION TABLE

```
//create multiplication table
#include <iostream>
using namespace std;

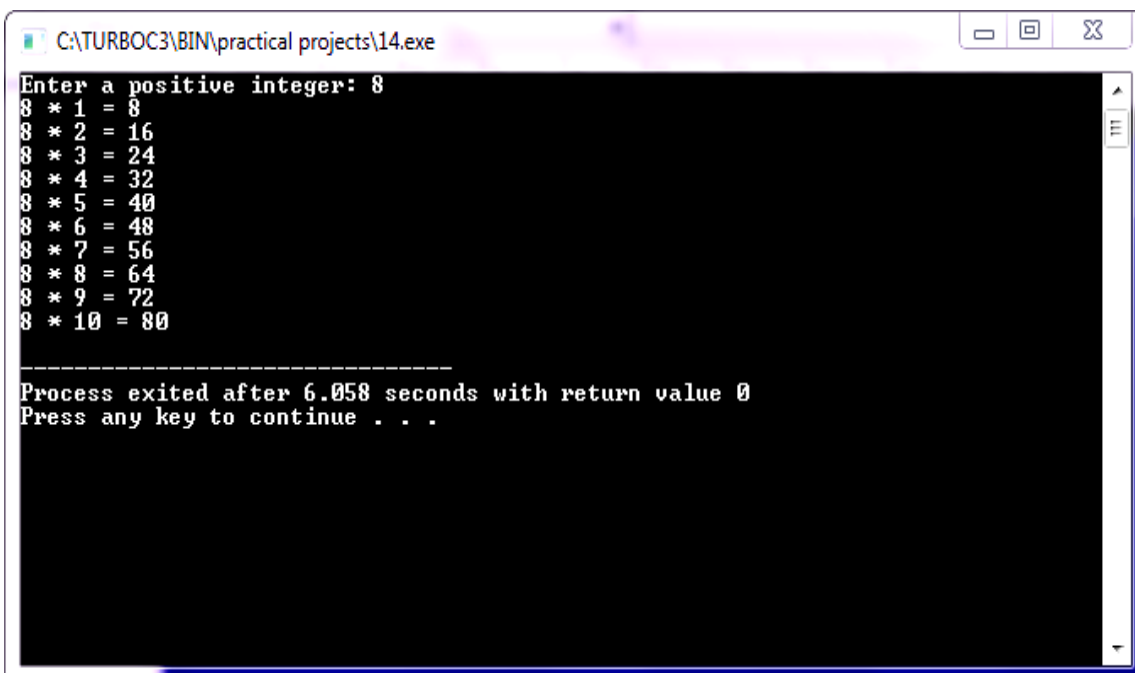
int main()
{
    int n;

    cout << "Enter a positive integer: ";
    cin >> n;

    for (int i = 1; i <= 10; ++i) {
        cout << n << " * " << i << " = " << n * i << endl;
    }

    return 0;
}
```

Output:-



The screenshot shows a Turbo C++ IDE window titled "C:\TURBOC3\BIN\practical projects\14.exe". The output window displays the following text:

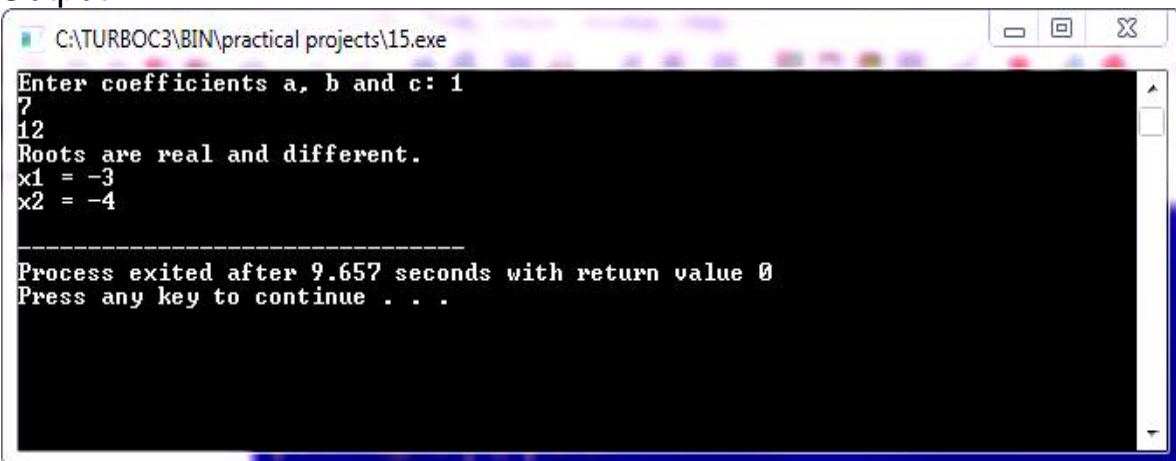
```
Enter a positive integer: 8
8 * 1 = 8
8 * 2 = 16
8 * 3 = 24
8 * 4 = 32
8 * 5 = 40
8 * 6 = 48
8 * 7 = 56
8 * 8 = 64
8 * 9 = 72
8 * 10 = 80

-----
Process exited after 6.058 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 15:- TO FIND THE ROOTS OF AN QUADRATIC EQUATIONS

```
#include <iostream>
#include <cmath>
using namespace std;
int main() {
float a, b, c, x1, x2, discriminant, realPart, imaginaryPart;
cout << "Enter coefficients a, b and c: ";
cin >> a >> b >> c;
discriminant = b*b - 4*a*c;
if (discriminant > 0) {
x1 = (-b + sqrt(discriminant)) / (2*a);
x2 = (-b - sqrt(discriminant)) / (2*a);
cout << "Roots are real and different." << endl;
cout << "x1 = " << x1 << endl;
cout << "x2 = " << x2 << endl;
}
else if (discriminant == 0) {
cout << "Roots are real and same." << endl;
x1 = -b/(2*a);
cout << "x1 = x2 =" << x1 << endl;
}
else {
realPart = -b/(2*a);
imaginaryPart = sqrt(-discriminant)/(2*a);
cout << "Roots are complex and different." << endl;
cout << "x1 = " << realPart << "+" << imaginaryPart << "i" << endl;
cout << "x2 = " << realPart << "-" << imaginaryPart << "i" << endl;
}
return 0;
}
```

Output:-



```
C:\TURBOC3\BIN\practical projects\15.exe
Enter coefficients a, b and c: 1
7
12
Roots are real and different.
x1 = -3
x2 = -4

-----
Process exited after 9.657 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 16:USE OF FRIEND FUNCTION

```
#include <iostream>

class B;

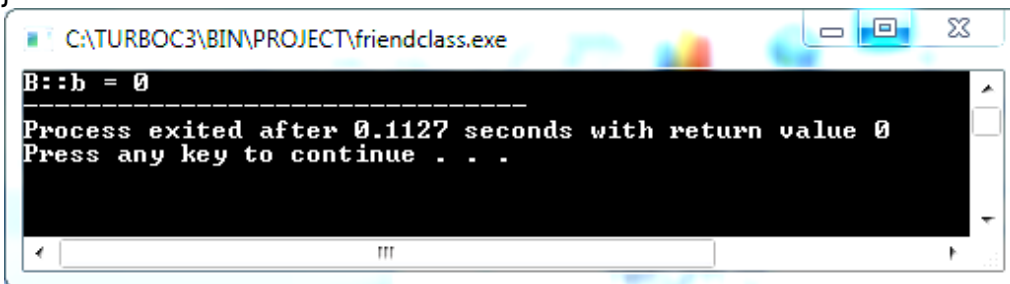
class A {
public:
    void showB(B&);
};

class B {
private:
    int b;

public:
    B() { b = 0; }
    friend void A::showB(B& x); // Friend function
};

void A::showB(B& x)
{
    // Since showB() is friend of B, it can
    // access private members of B
    std::cout << "B::b = " << x.b;
}

int main()
{
    A a;
    B x;
    a.showB(x);
    return 0;
}
```



PROGRAM 17: OPERATOR OVERLOADING OF +

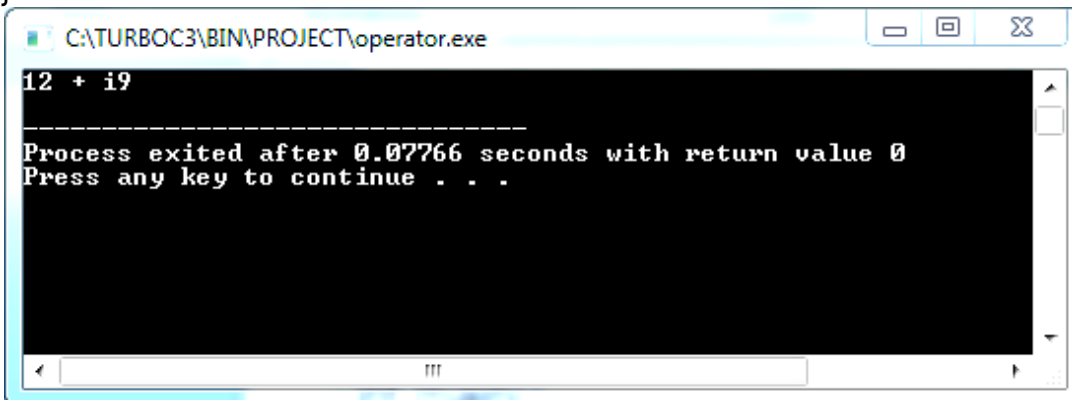
```
#include <iostream>
using namespace std;

class Complex {
private:
    int real, imag;
public:
    Complex(int r = 0, int i = 0) {real = r; imag = i;}

    // This is automatically called when '+' is used with
    // between two Complex objects
    Complex operator + (Complex const &obj) {
        Complex res;
        res.real = real + obj.real;
        res.imag = imag + obj.imag;
        return res;
    }

    void print() { cout << real << " + i" << imag << endl; }
};

int main()
{
    Complex c1(10, 5), c2(2, 4);
    Complex c3 = c1 + c2;
    c3.print();
}
```



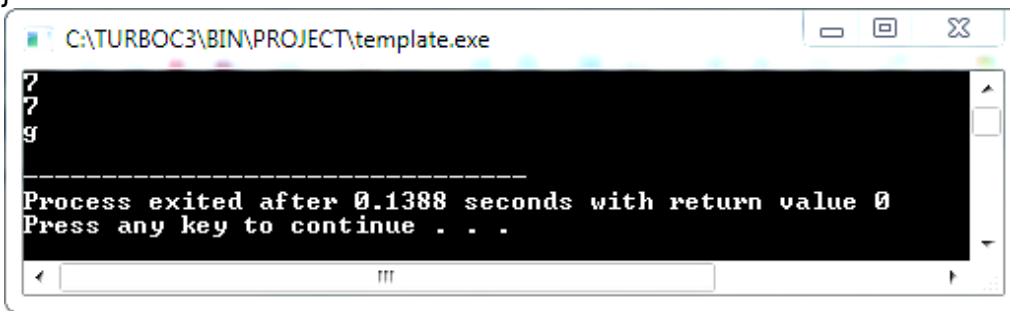
PROGRAM 18:USE OF TEMPLATES

```
#include <iostream>
using namespace std;

// One function works for all data types. This would work
// even for user defined types if operator '>' is overloaded
template <typename T>
T myMax(T x, T y)
{
    return (x > y)? x: y;
}

int main()
{
    cout << myMax<int>(3, 7) << endl; // Call myMax for int
    cout << myMax<double>(3.0, 7.0) << endl; // call myMax for double
    cout << myMax<char>('g', 'e') << endl; // call myMax for char

    return 0;
}
```



PROGRAM 19:USE OF FRIEND CLASS

// C++ program to demonstrate the working of friend class

```
#include <iostream>
using namespace std;
```

```
// forward declaration
class ClassB;
```

```
class ClassA {
    private:
        int numA;

        // friend class declaration
        friend class ClassB;

    public:
        // constructor to initialize numA to 12
        ClassA() : numA(12) {}
};
```

```
class ClassB {
    private:
        int numB;

    public:
        // constructor to initialize numB to 1
        ClassB() : numB(1) {}

        // member function to add numA
        // from ClassA and numB from ClassB
        int add() {
            ClassA objectA;
            return objectA.numA + numB;
        }
};
```

```
int main() {
    ClassB objectB;
    cout << "Sum: " << objectB.add();
    return 0;
}
```



PROGRAM 20: EXCEPTION HANDLING

```
#include<iostream>
using namespace std;
int main()
{
    int a,b,c;
    cout << "enter first number" << endl;
    cin >> a;

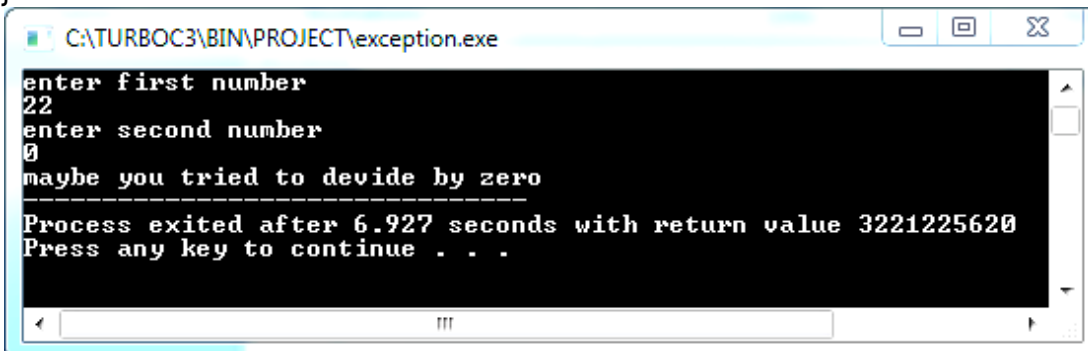
    cout << "enter second number" << endl;
    cin >> b;

    try{

        if(b == 0){

            throw "error";
            c = a/b;
        }
    }catch(...){

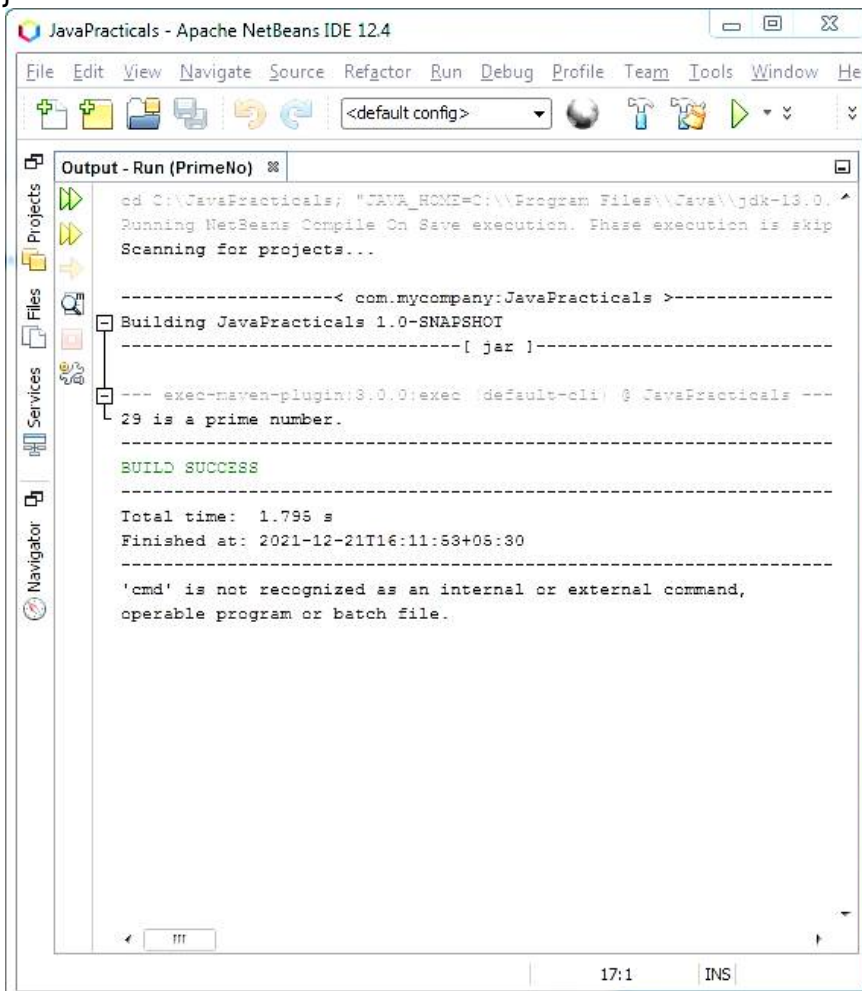
        cout << "maybe you tried to devide by zero";
    }
    c = a/b;
    cout << c;
}
```



```
C:\TURBOC3\BIN\PROJECT\exception.exe
enter first number
22
enter second number
0
maybe you tried to devide by zero
-----
Process exited after 6.927 seconds with return value 3221225620
Press any key to continue . . .
```

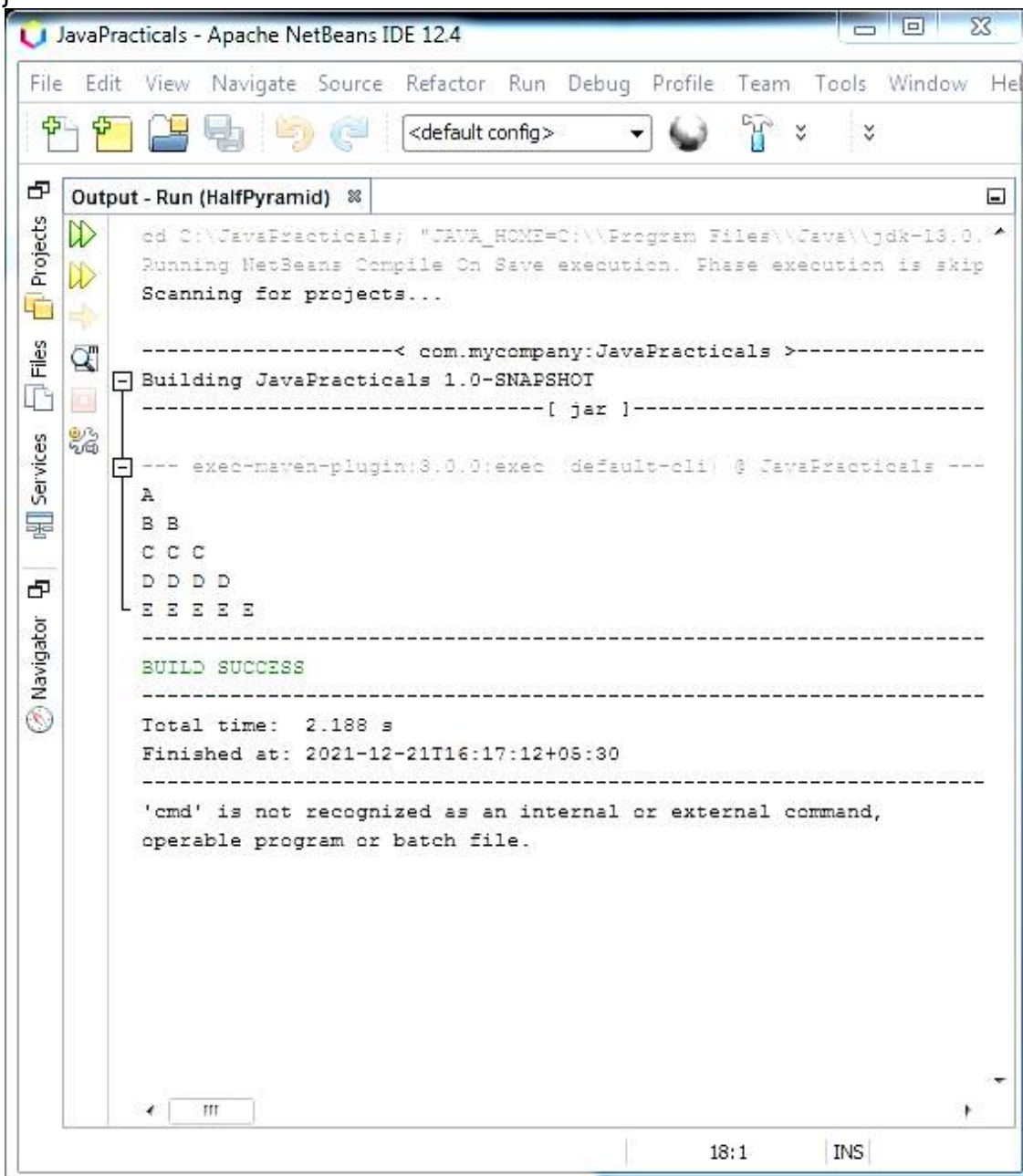

PROGRAM 21:PROGRAM TO CHECK PRIME NUMBER USING A FOR LOOP

```
public class Main {
public static void main(String[] args) {
int num = 29;
boolean flag = false;
for (int i = 2; i <= num / 2; ++i) {
// condition for nonprime number
if (num % i == 0) {
flag = true;
break;
}
}
if (!flag)
System.out.println(num + " is a prime number.");
else
System.out.println(num + " is not a prime number.");
}
}
```



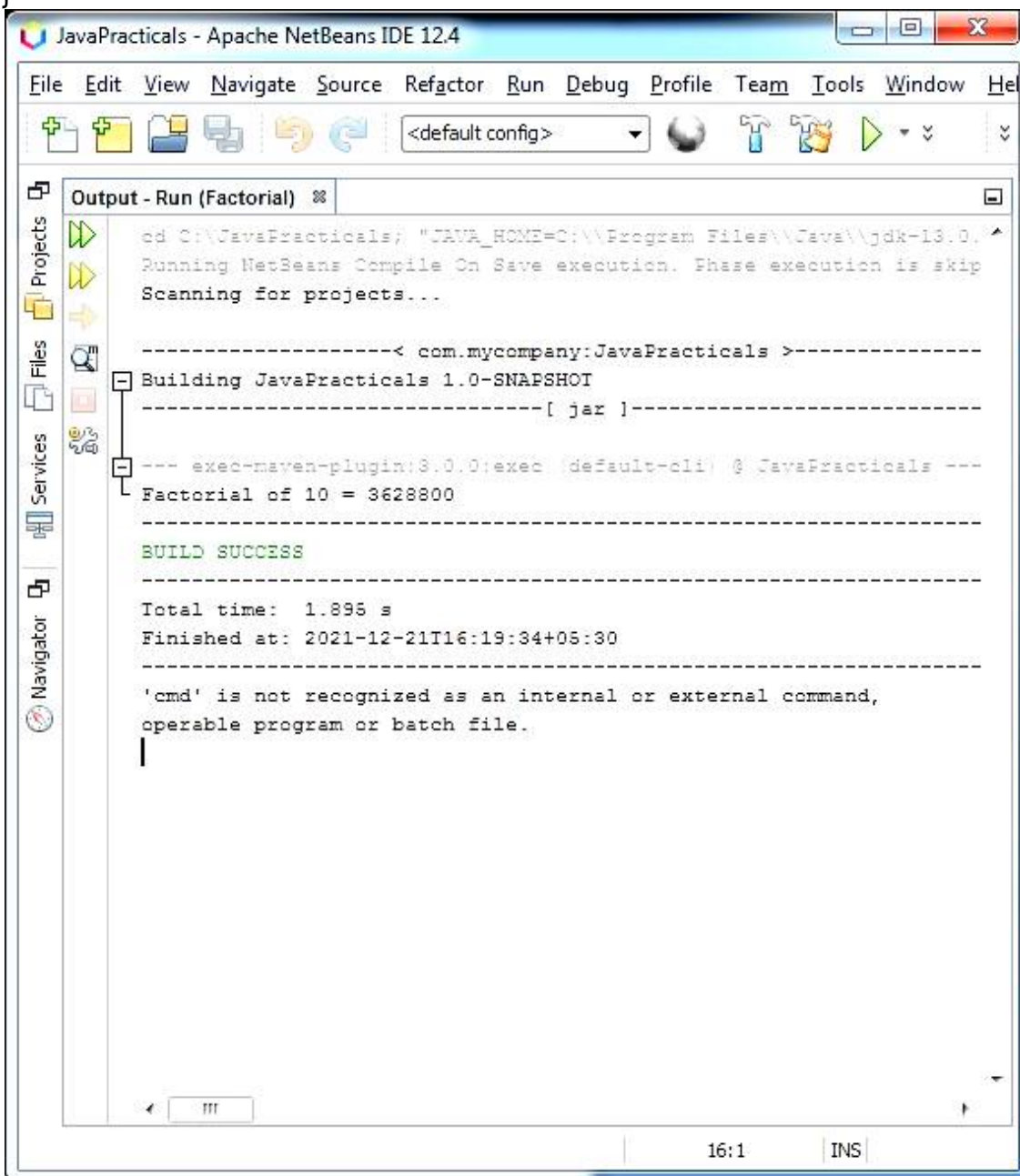
PROGRAM 22: PROGRAM TO PRINT HALF PYRAMID USING ALPHABETS

```
public class HalfPyramid {  
    public static void main(String[] args) {  
        char last = 'E', alphabet = 'A';  
        for (int i = 1; i <= (last - 'A' + 1); ++i) {  
            for (int j = 1; j <= i; ++j) {  
                System.out.print(alphabet + " ");  
            }  
            ++alphabet;  
            System.out.println();  
        }  
    }  
}
```



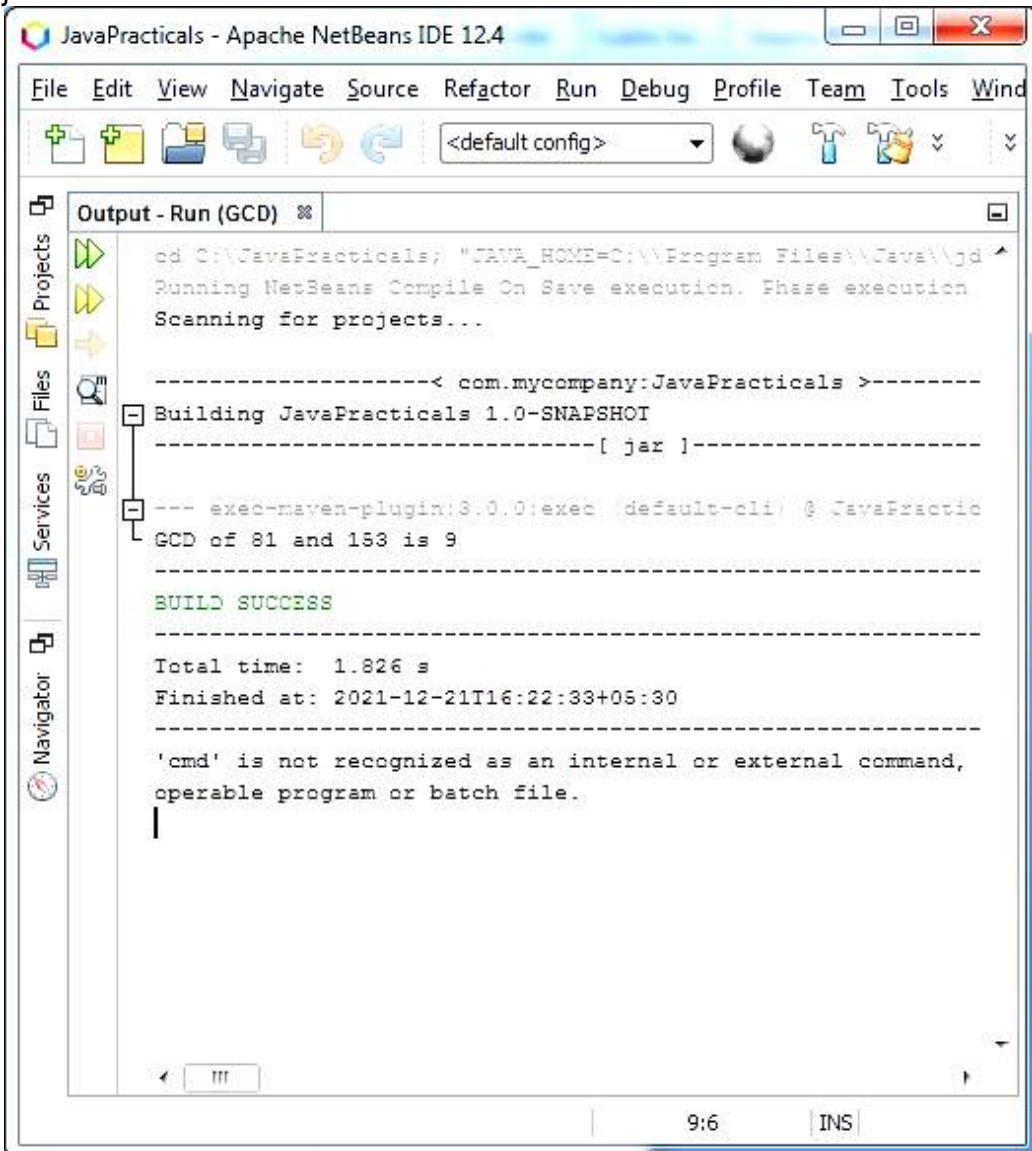
PROGRAM 23 : PROGRAM TO FIND FACTORIAL OF A NUMBER

```
public class Factorial {  
  
    public static void main(String[] args) {  
  
        int num = 10;  
        long factorial = 1;  
        for(int i = 1; i <= num; ++i)  
        {  
            // factorial = factorial * i;  
            factorial *= i;  
        }  
        System.out.printf("Factorial of %d = %d", num, factorial);  
    }  
}
```



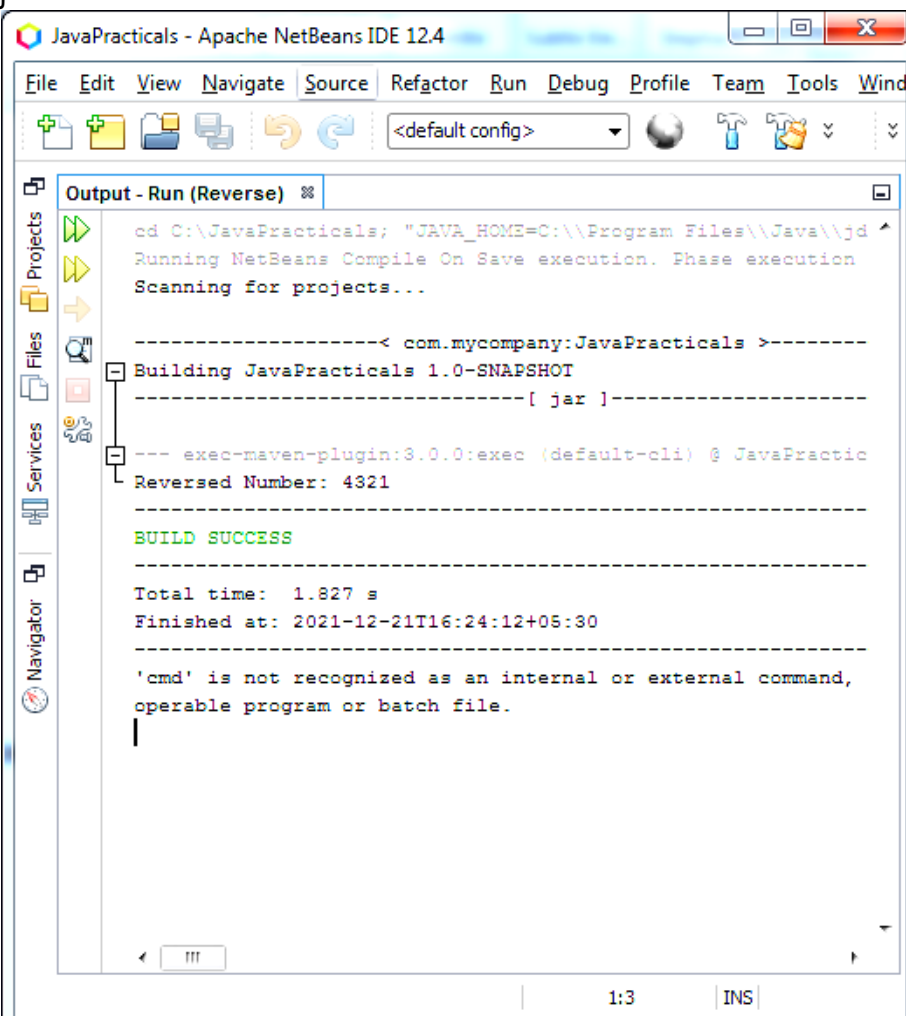
PROGRAM 24 : TO FIND GCD OF TWO NUMBERS

```
class GCD {
public static void main(String[] args) {
int n1 = 81, n2 = 153;
int gcd = 1;
for (int i = 1; i <= n1 && i <= n2; ++i) {
if (n1 % i == 0 && n2 % i == 0)
gcd = i;
}
System.out.println("GCD of " + n1 + " and " + n2 + " is " + gcd);
}
}
```



PROGRAM 25: PROGRAM TO REVERSE A NUMBER

```
class Reverse {  
public static void main(String[] args) {  
  
int num = 1234, reversed = 0;  
  
// run loop until num becomes 0  
while(num != 0) {  
  
// get last digit from num  
int digit = num % 10;  
reversed = reversed * 10 + digit;  
  
// remove the last digit from num  
num /= 10;  
}  
  
System.out.println("Reversed Number: " + reversed);  
}  
}
```



PROGRAM 26: TO FIND ARMSTRONG NO. BETWEEN TWO NO.

```
class Armstrong {
public static void main(String[] args) {

int low = 999, high = 99999;

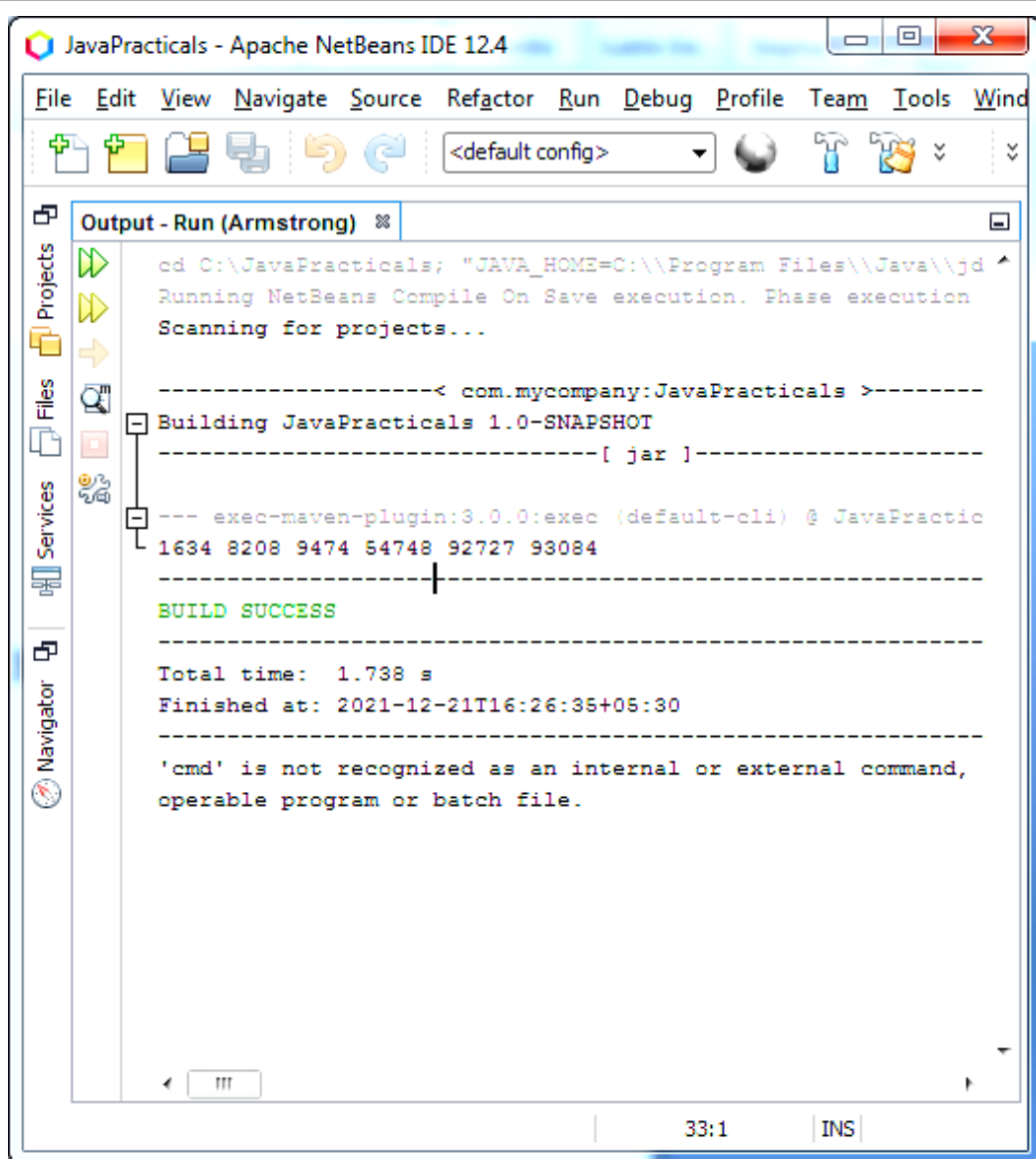
for(int number = low + 1; number < high; ++number) {
int digits = 0;
int result = 0;
int originalNumber = number;

// number of digits calculation
while (originalNumber != 0) {
originalNumber /= 10;
++digits;
}

originalNumber = number;

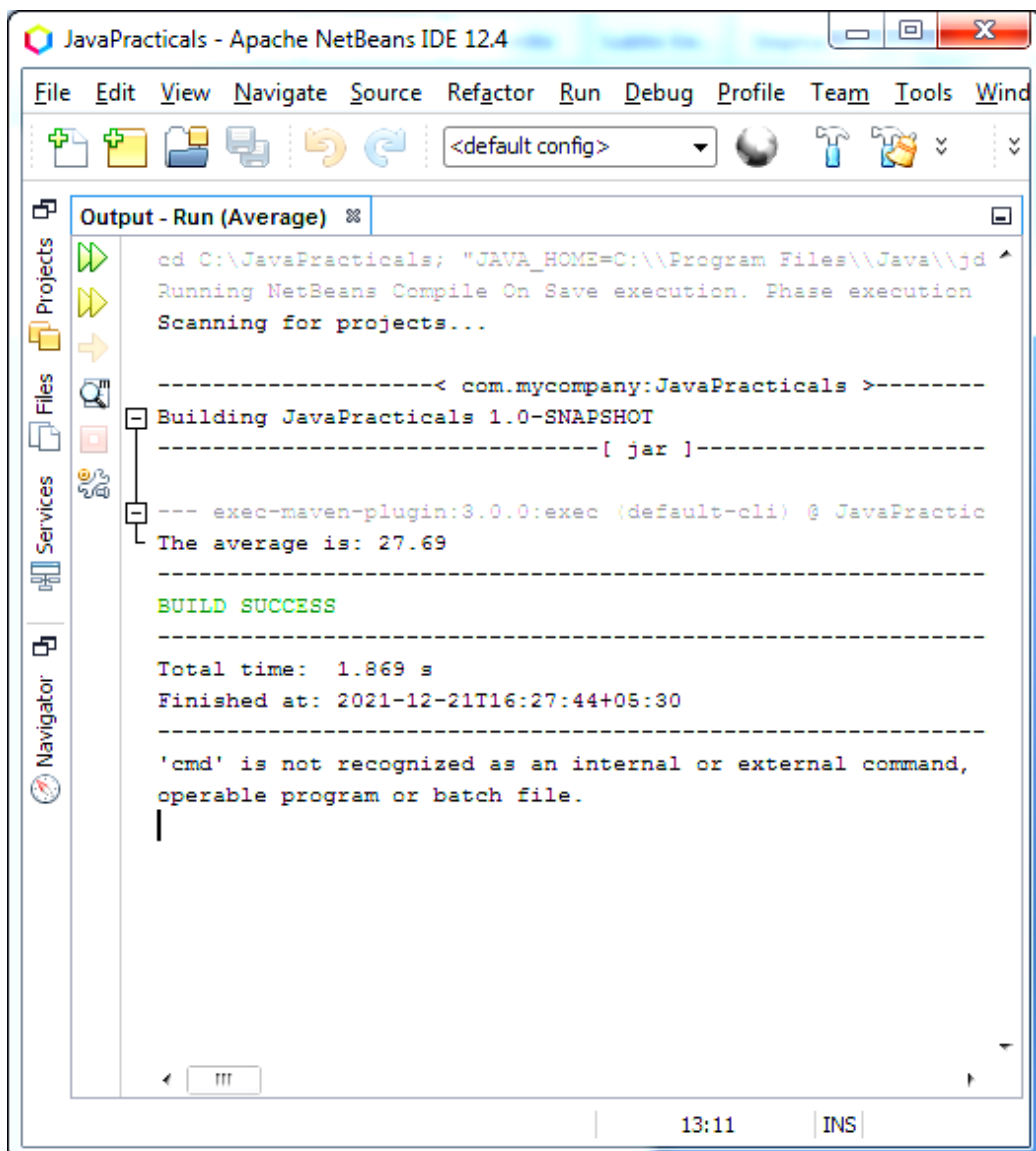
// result contains sum of nth power of its digits
while (originalNumber != 0) {
int remainder = originalNumber % 10;
result += Math.pow(remainder, digits);
originalNumber /= 10;
}

if (result == number) {
System.out.print(number + " ");
}
}
}
}
```



PROGRAM 27: FIND AVERAGE USING ARRAYS

```
public class Average {  
  
    public static void main(String[] args) {  
        double[] numArray = { 45.3, 67.5, -45.6, 20.34, 33.0, 45.6 };  
        double sum = 0.0;  
  
        for (double num: numArray) {  
            sum += num;  
        }  
  
        double average = sum / numArray.length;  
        System.out.format("The average is: %.2f", average);  
    }  
}
```

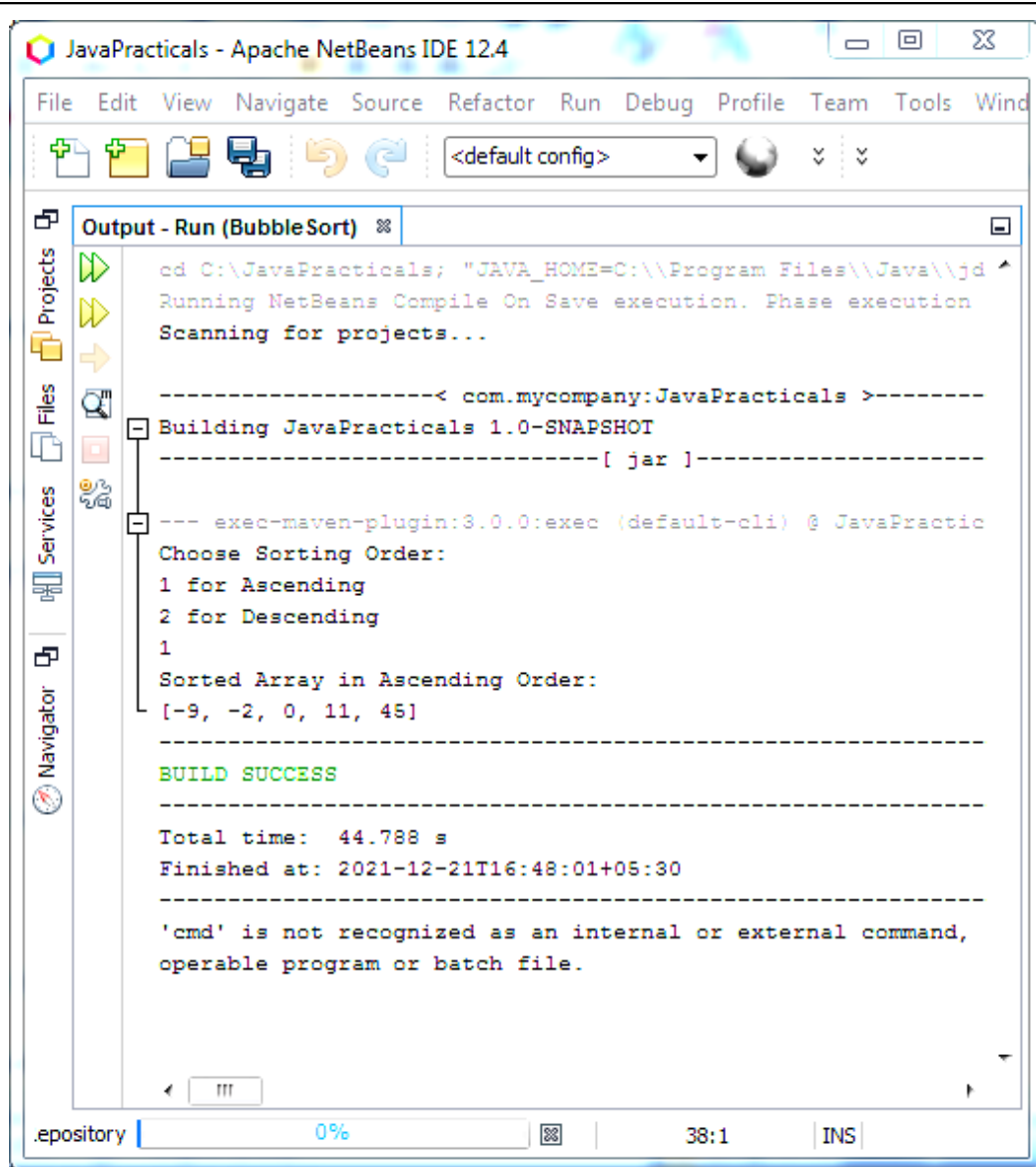


PROGRAM 28 :BUBBLE SORT ALGORITHM

```
import java.util.Arrays;
import java.util.Scanner;

class BubbleSort {
    Scanner input = new Scanner(System.in);
    void bubbleSort(int array[]) {
        int size = array.length;
        System.out.println("Choose Sorting Order:");
        System.out.println("1 for Ascending \n2 for Descending");
        int sortOrder = input.nextInt();
        for (int i = 0; i < size - 1; i++)
            for (int j = 0; j < size - i - 1; j++)
                if (sortOrder == 1) {
                    if (array[j] > array[j + 1]) {
                        int temp = array[j];
                        array[j] = array[j + 1];
                        array[j + 1] = temp;
                    }
                }
                else {
                    if (array[j] < array[j + 1]) {
                        int temp = array[j];
                        array[j] = array[j + 1];
                        array[j + 1] = temp;
                    }
                }
    }

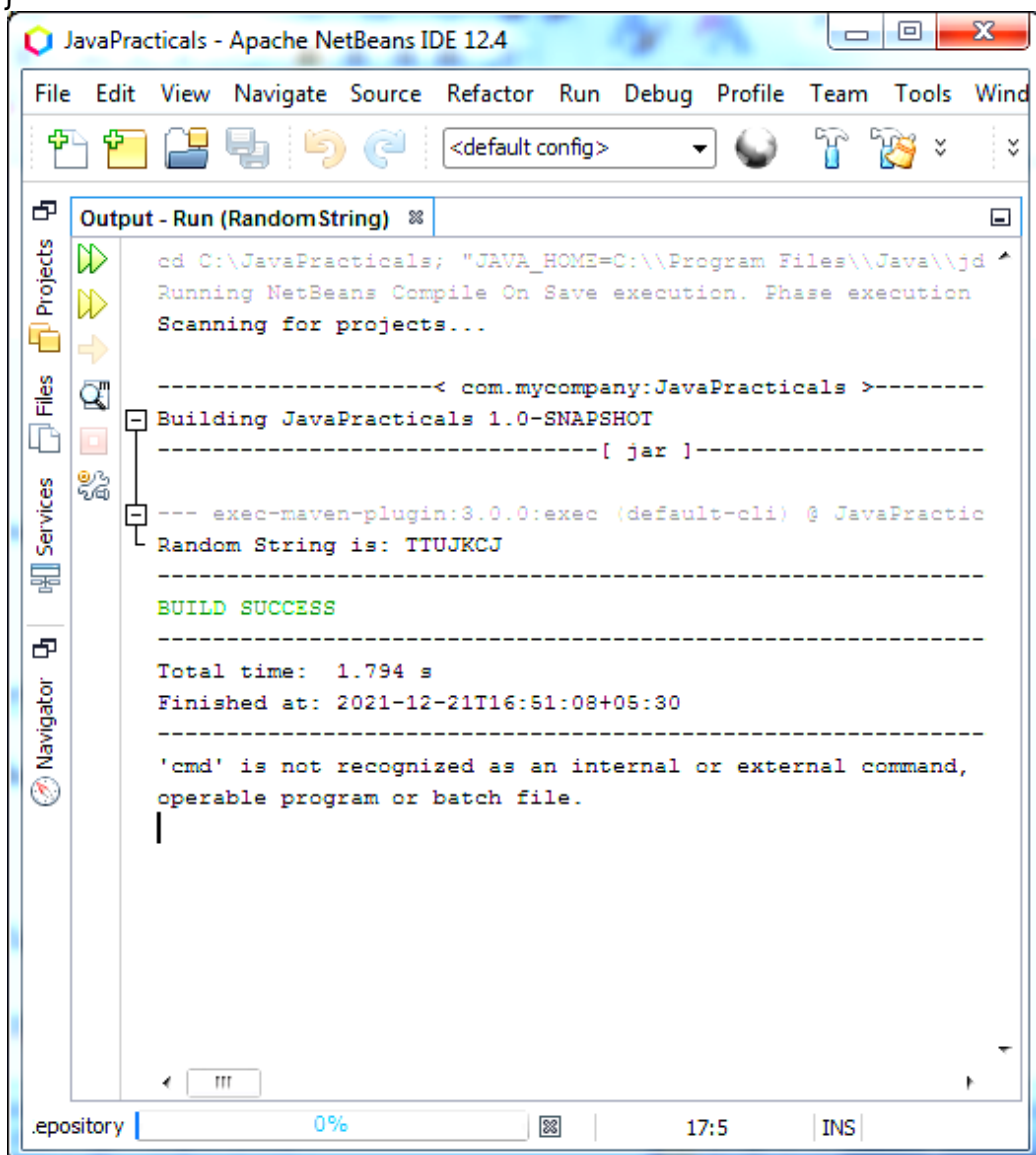
    public static void main(String args[]) {
        int[] data = { -2, 45, 0, 11, -9 };
        BubbleSort bs = new BubbleSort();
        bs.bubbleSort(data);
        System.out.println("Sorted Array in Ascending Order:");
        System.out.println(Arrays.toString(data));
    }
}
```



PROGRAM 29: PROGRAM TO GENERATE A RANDOM STRING

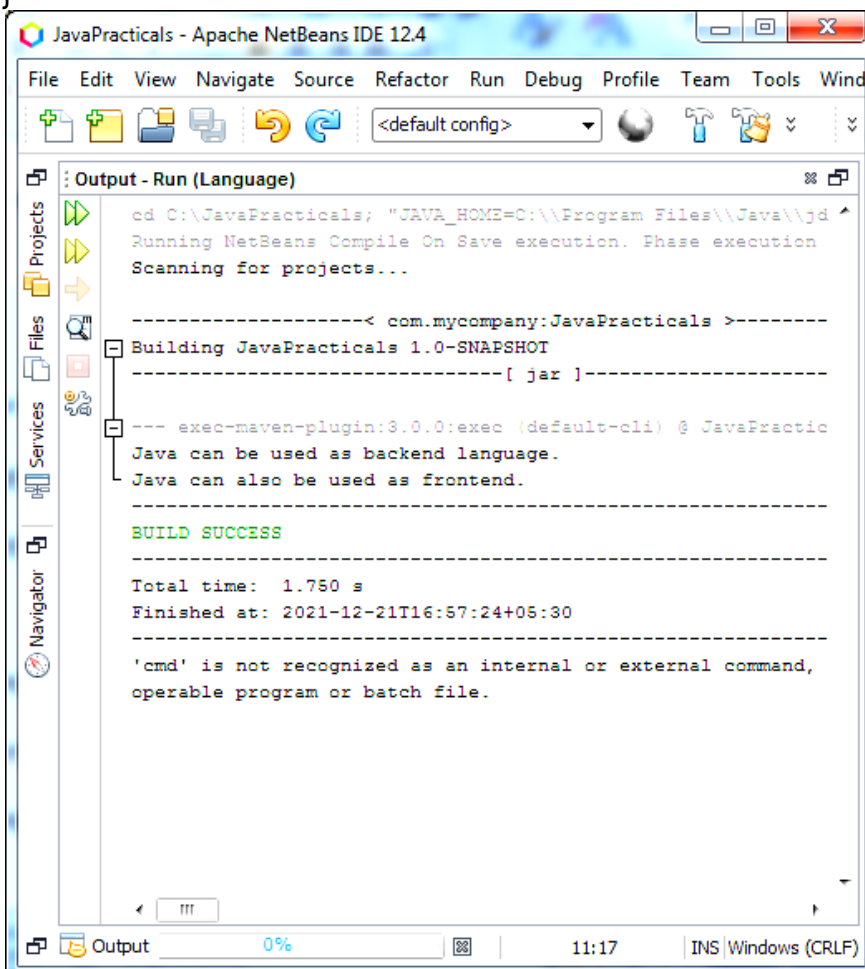
```
import java.util.Random;

class RandomString {
    public static void main(String[] args) {
        String alphabet = "ABCDEFGHIJKLMNOPQRSTUVWXYZ";
        StringBuilder sb = new StringBuilder();
        Random random = new Random();
        int length = 7;
        for(int i = 0; i < length; i++) {
            int index = random.nextInt(alphabet.length());
            char randomChar = alphabet.charAt(index);
            sb.append(randomChar);
        }
        String randomString = sb.toString();
        System.out.println("Random String is: " + randomString);
    }
}
```



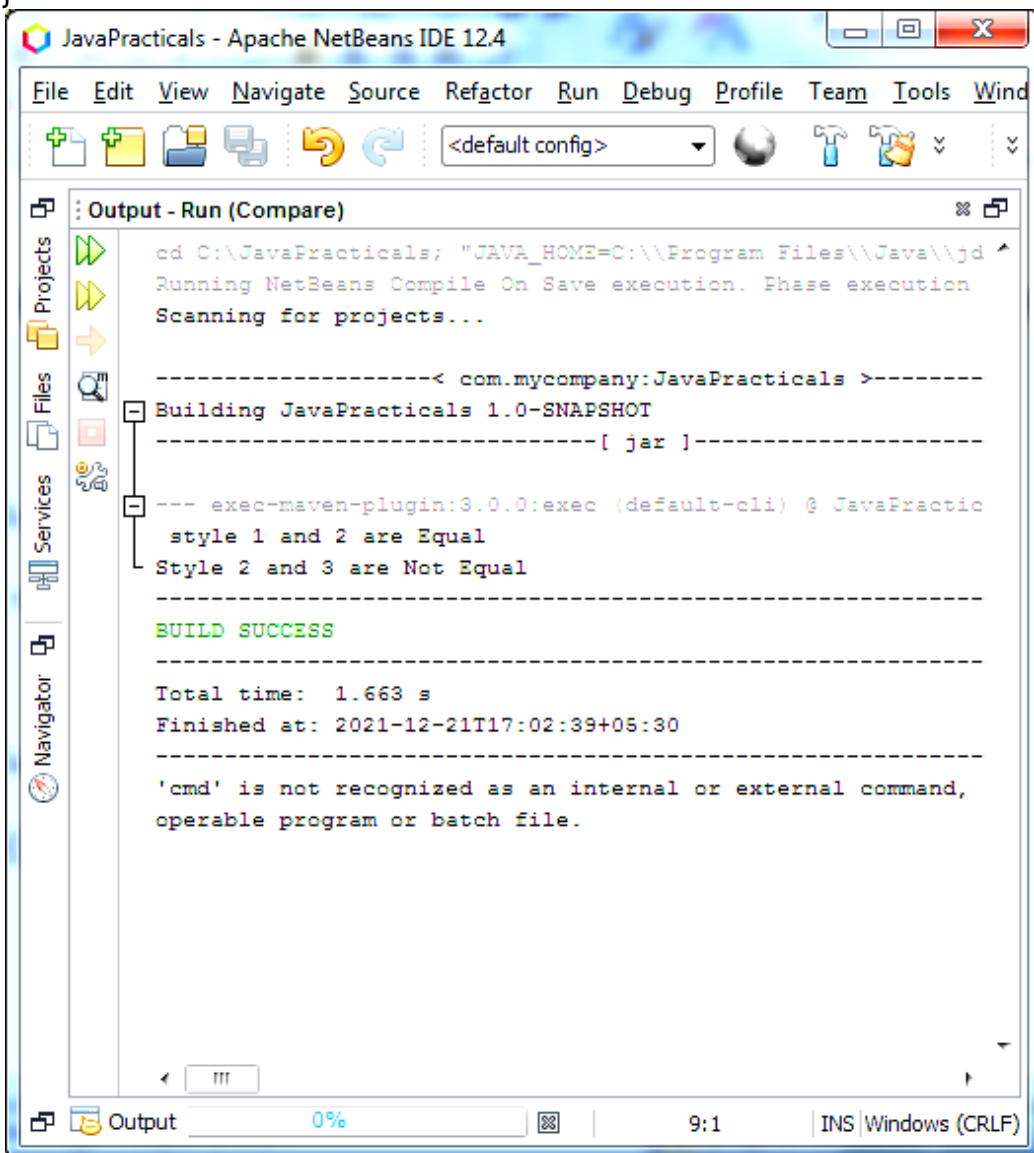
PROGRAM 30: MULTIPLE INHERITANCE IN JAVA

```
interface Backend {  
    public void connectServer();  
}  
  
class Frontend {  
    public void responsive(String str) {  
        System.out.println(str + " can also be used as frontend.");  
    }  
}  
  
class Language extends Frontend implements Backend {  
    String language = "Java";  
    public void connectServer() {  
        System.out.println(language + " can be used as backend language.");  
    }  
  
    public static void main(String[] args) {  
        Language java = new Language();  
        java.connectServer();  
        java.responsive(java.language);  
    }  
}
```



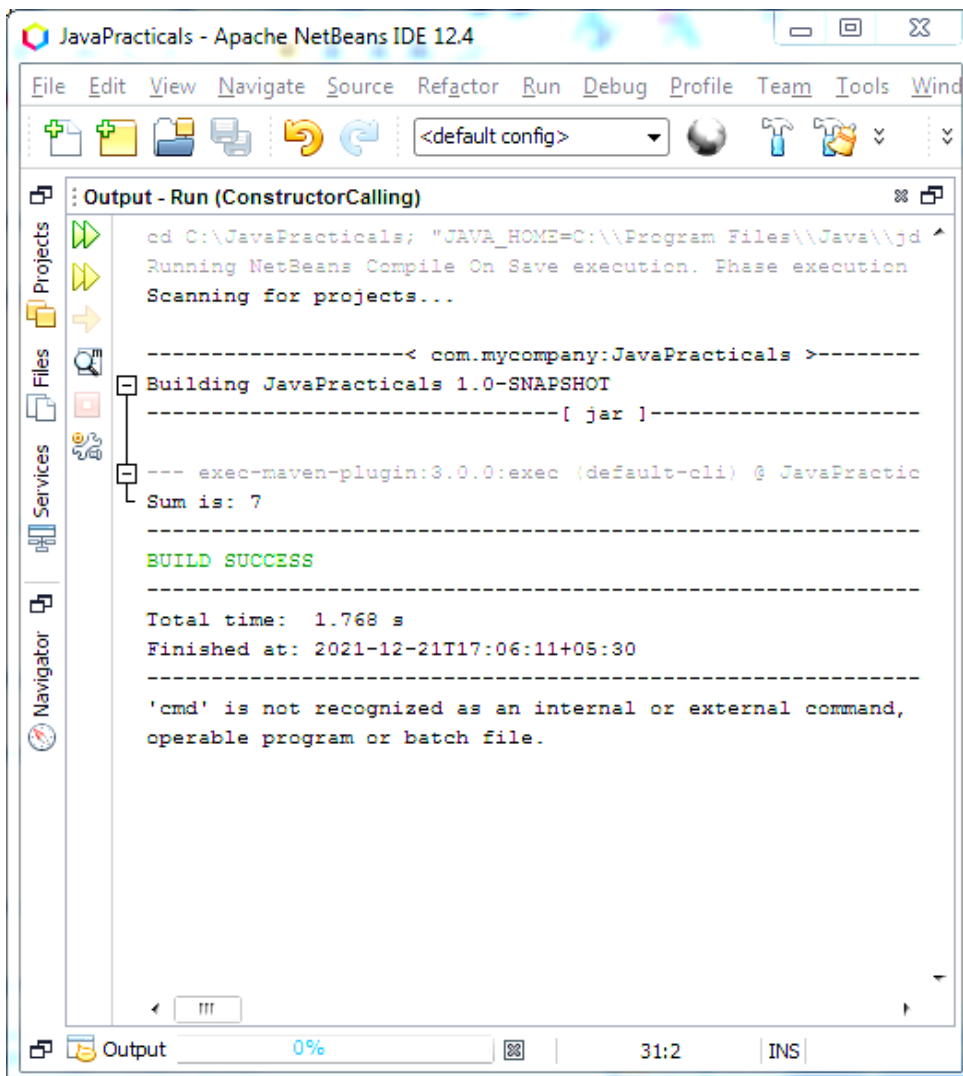
PROGRAM 31: COMPARE TWO STRINGS

```
public class Compare {  
    public static void main(String[] args) {  
        String style1 = "Bold";  
        String style2 = "Bold";  
        String style3 = "Hold";  
        if(style1 == style2)  
            System.out.println(" style 1 and 2 are Equal");  
        else  
            System.out.println("Style 1 and 2 are Not Equal");  
        if(style3 == style2)  
            System.out.println(" style 3 and 2 are Equal");  
        else  
            System.out.println("Style 2 and 3 are Not Equal");  
    }  
}
```



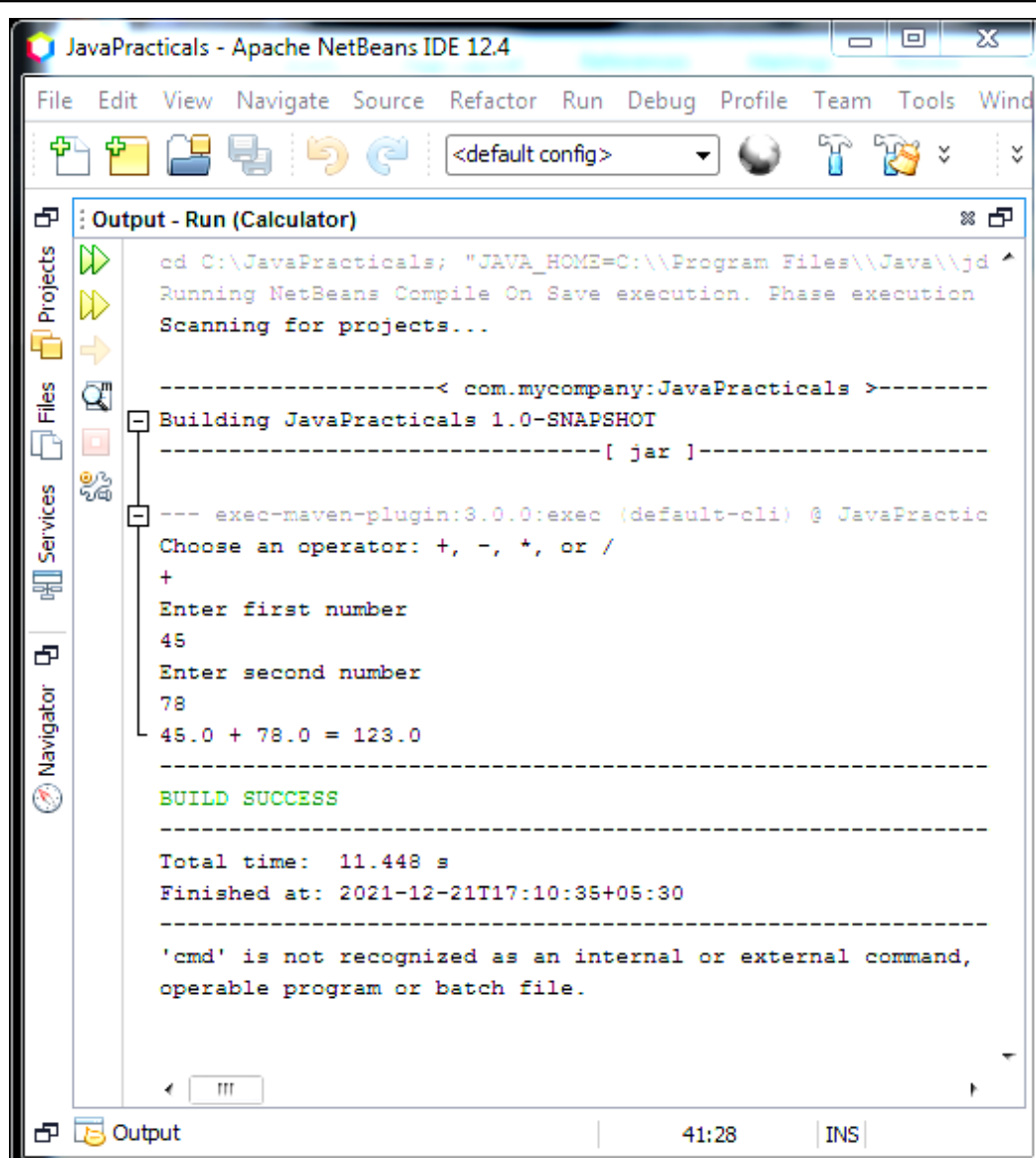
PROGRAM 32: CALLING ONE CONSTRUCTOR FROM ANOTHER

```
class ConstructorCalling {  
int sum;  
ConstructorCalling() {  
this(5, 2);  
}  
ConstructorCalling(int arg1, int arg2) {  
this.sum = arg1 + arg2;  
}  
void display() {  
System.out.println("Sum is: " + sum);  
}  
public static void main(String[] args) {  
ConstructorCalling obj = new ConstructorCalling();  
obj.display();  
}  
}
```



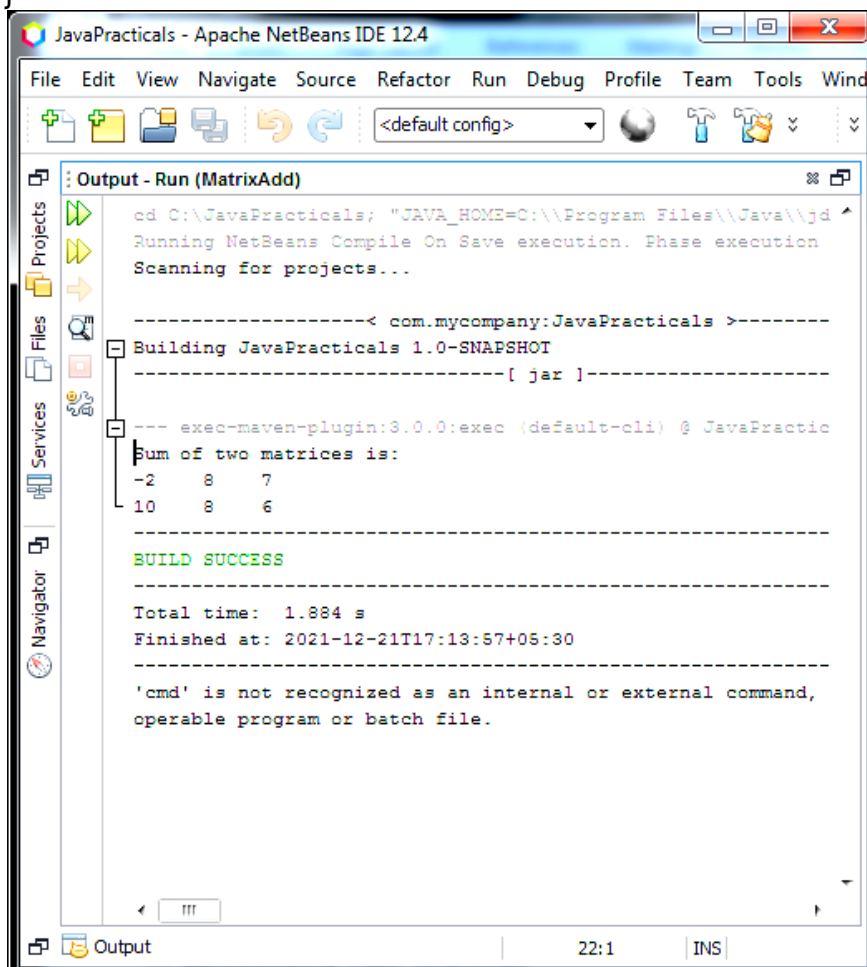
PROGRAM 33 : SIMPLE CALCULATOR USING JAVA SWITCH STATEMENT

```
import java.util.Scanner;
class Calculator {
public static void main(String[] args) {
char operator;
Double number1, number2, result;
Scanner input = new Scanner(System.in);
System.out.println("Choose an operator: +, -, *, or /");
operator = input.next().charAt(0);
System.out.println("Enter first number");
number1 = input.nextDouble();
System.out.println("Enter second number");
number2 = input.nextDouble();
switch (operator) {
case '+':
result = number1 + number2;
System.out.println(number1 + " + " + number2 + " = " + result);
break;
case '-':
result = number1 - number2;
System.out.println(number1 + " - " + number2 + " = " + result);
break;
case '*':
result = number1 * number2;
System.out.println(number1 + " * " + number2 + " = " + result);
break;
case '/':
result = number1 / number2;
System.out.println(number1 + " / " + number2 + " = " + result);
break;
default:
System.out.println("Invalid operator!");
break;
}
input.close();
}
}
```



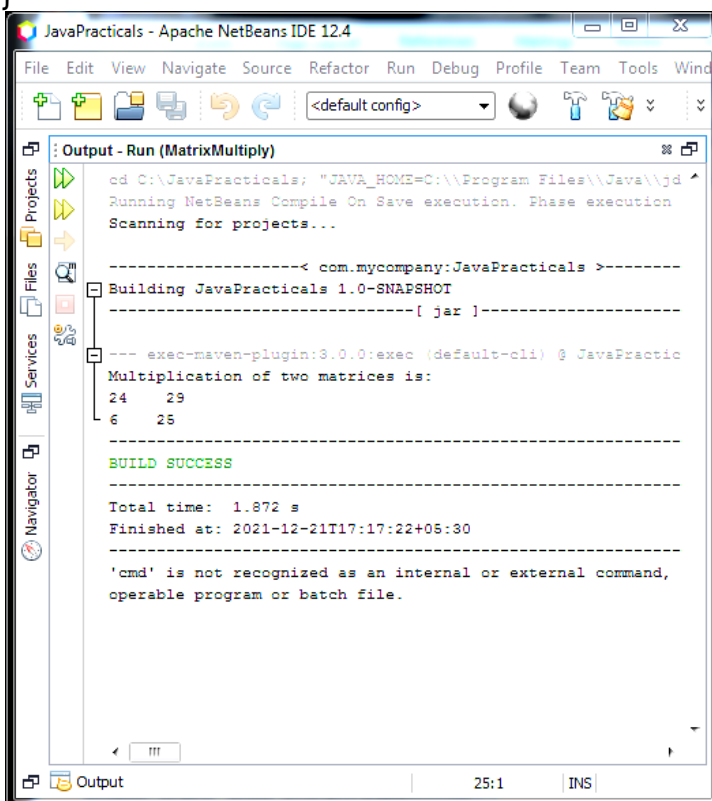
PROGRAM 34: ADDING TWO MATRICES

```
public class MatrixAdd {  
    public static void main(String[] args) {  
        int rows = 2, columns = 3;  
        int[][] firstMatrix = { {2, 3, 4}, {5, 2, 3} };  
        int[][] secondMatrix = { {-4, 5, 3}, {5, 6, 3} };  
        int[][] sum = new int[rows][columns];  
        for(int i = 0; i < rows; i++) {  
            for (int j = 0; j < columns; j++) {  
                sum[i][j] = firstMatrix[i][j] + secondMatrix[i][j];  
            }  
        }  
        System.out.println("Sum of two matrices is: ");  
        for(int[] row : sum) {  
            for (int column : row) {  
                System.out.print(column + " ");  
            }  
            System.out.println();  
        }  
    }  
}
```



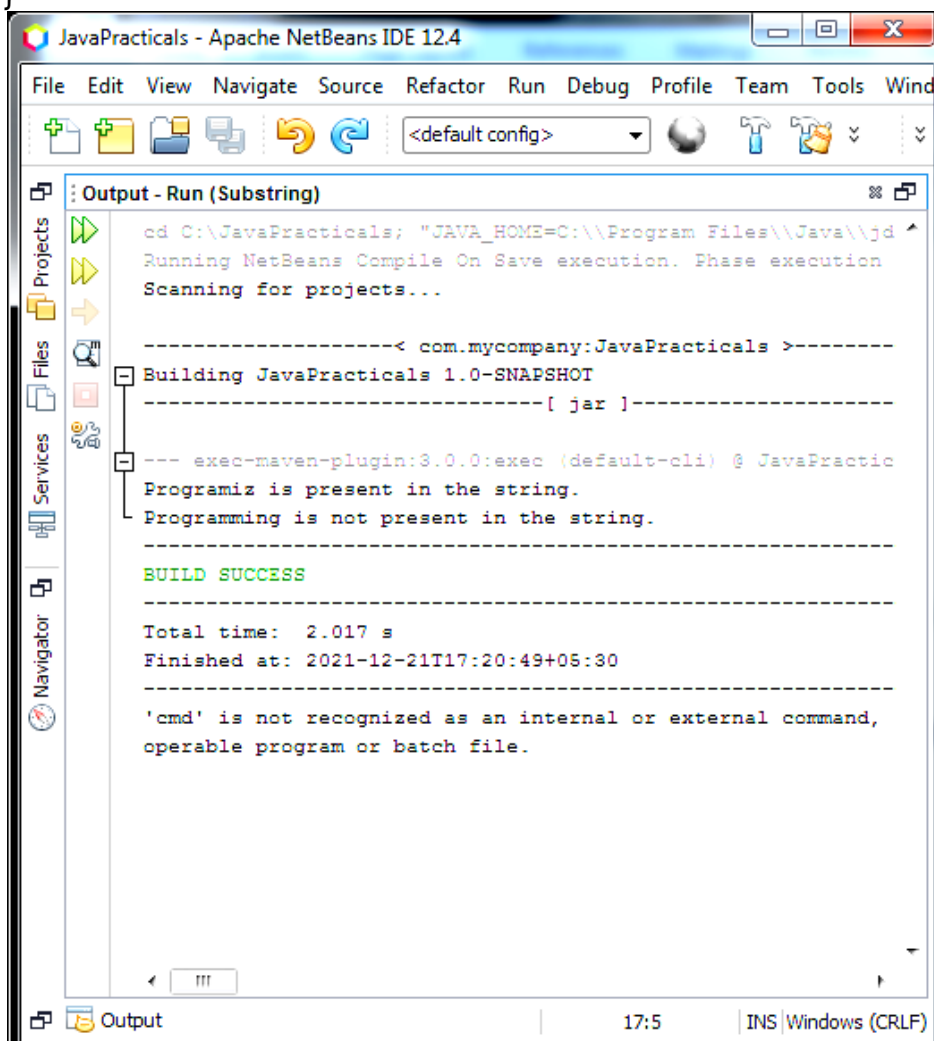
PROGRAM 35: MULTIPLYING TWO MATRICES

```
public class MatrixMultiply {
public static void main(String[] args) {
int r1 = 2, c1 = 3;
int r2 = 3, c2 = 2;
int[][] firstMatrix = { {3, -2, 5}, {3, 0, 4} };
int[][] secondMatrix = { {2, 3}, {-9, 0}, {0, 4} };
int[][] product = new int[r1][c2];
for(int i = 0; i < r1; i++) {
for (int j = 0; j < c2; j++) {
for (int k = 0; k < c1; k++) {
product[i][j] += firstMatrix[i][k] * secondMatrix[k][j];
}
}
}
System.out.println("Multiplication of two matrices is: ");
for(int[] row : product) {
for (int column : row) {
System.out.print(column + "  ");
}
System.out.println();
}
}
}
```



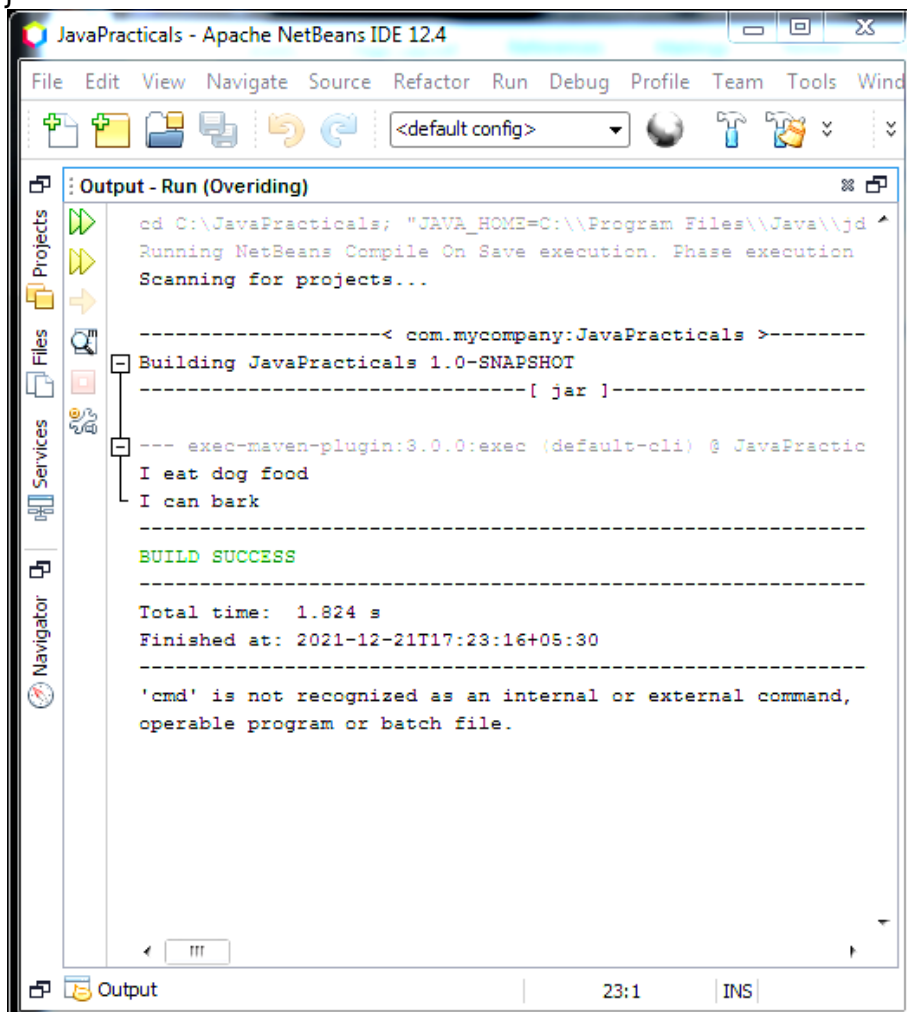
PROGRAM 36: CHECK IF A STRING CONTAINS A SUBSTRING USING CONTAINS()

```
class Substring {
public static void main(String[] args) {
String txt = "This is Programiz";
String str1 = "Programiz";
String str2 = "Programming";
boolean result = txt.contains(str1);
if(result) {
System.out.println(str1 + " is present in the string.");
}
else {
System.out.println(str1 + " is not present in the string.");
}
result = txt.contains(str2);
if(result) {
System.out.println(str2 + " is present in the string.");
}
else {
System.out.println(str2 + " is not present in the string.");
}
}
}
```



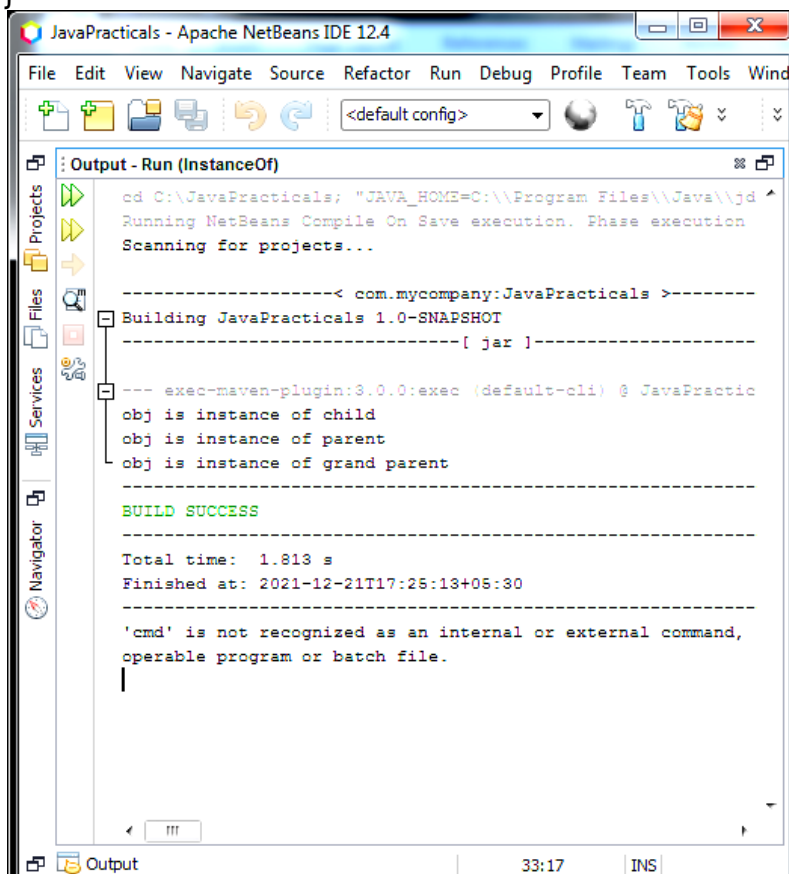
PROGRAM 37: METHOD OVERRIDING IN JAVA INHERITANCE

```
class Animal {  
    public void eat() {  
        System.out.println("I can eat");  
    }  
}  
  
class Dog extends Animal {  
    @Override  
    public void eat() {  
        System.out.println("I eat dog food");  
    }  
  
    public void bark() {  
        System.out.println("I can bark");  
    }  
}  
  
class Overiding {  
    public static void main(String[] args) {  
        Dog labrador = new Dog();  
        labrador.eat();  
        labrador.bark();  
    }  
}
```



PROGRAM 38: USE OF INSTANCEOF OPERATOR

```
class grand_parent{} //class grand parent
class parent extends grand_parent{} //class parent inherits child
class child extends parent{} //class child inherits parent
class InstanceOf{
public static void main(String args[]){
child obj=new child();
if(obj instanceof child){ //instance of return true of child class
System.out.println("obj is instance of child");
}
else{
System.out.print("obj is not instance of child");
}
if(obj instanceof parent){ //instance of return true also parent class
System.out.println("obj is instance of parent");
}
else{
System.out.println("obj is not instance of parent");
}
if(obj instanceof grand_parent){ //instance of return true also grand parent class
System.out.println("obj is instance of grand parent");
}
else{
System.out.print("obj is not instance of grand parent");
}
}
}
```



PROGRAM 39:USE OF GENERIC CLASS

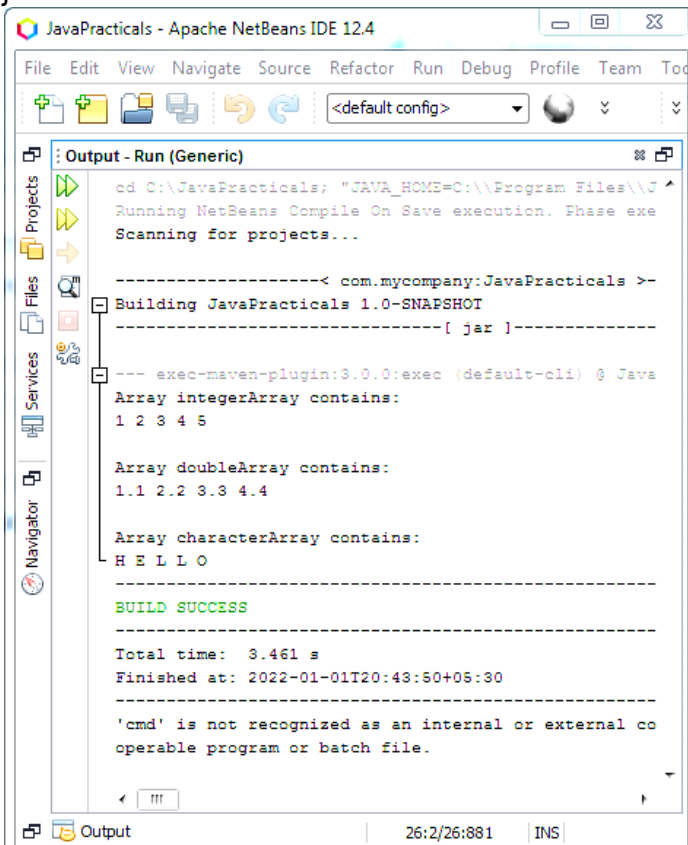
```
public class Generic{
    // generic method printArray
    public static < E > void printArray( E[] inputArray ) {
        // Display array elements
        for(E element : inputArray) {
            System.out.printf("%s ", element);
        }
        System.out.println();
    }

    public static void main(String args[]) {
        // Create arrays of Integer, Double and Character
        Integer[] intArray = { 1, 2, 3, 4, 5 };
        Double[] doubleArray = { 1.1, 2.2, 3.3, 4.4 };
        Character[] charArray = { 'H', 'E', 'L', 'L', 'O' };

        System.out.println("Array integerArray contains:");
        printArray(intArray); // pass an Integer array

        System.out.println("\nArray doubleArray contains:");
        printArray(doubleArray); // pass a Double array

        System.out.println("\nArray characterArray contains:");
        printArray(charArray); // pass a Character array
    }
}
```

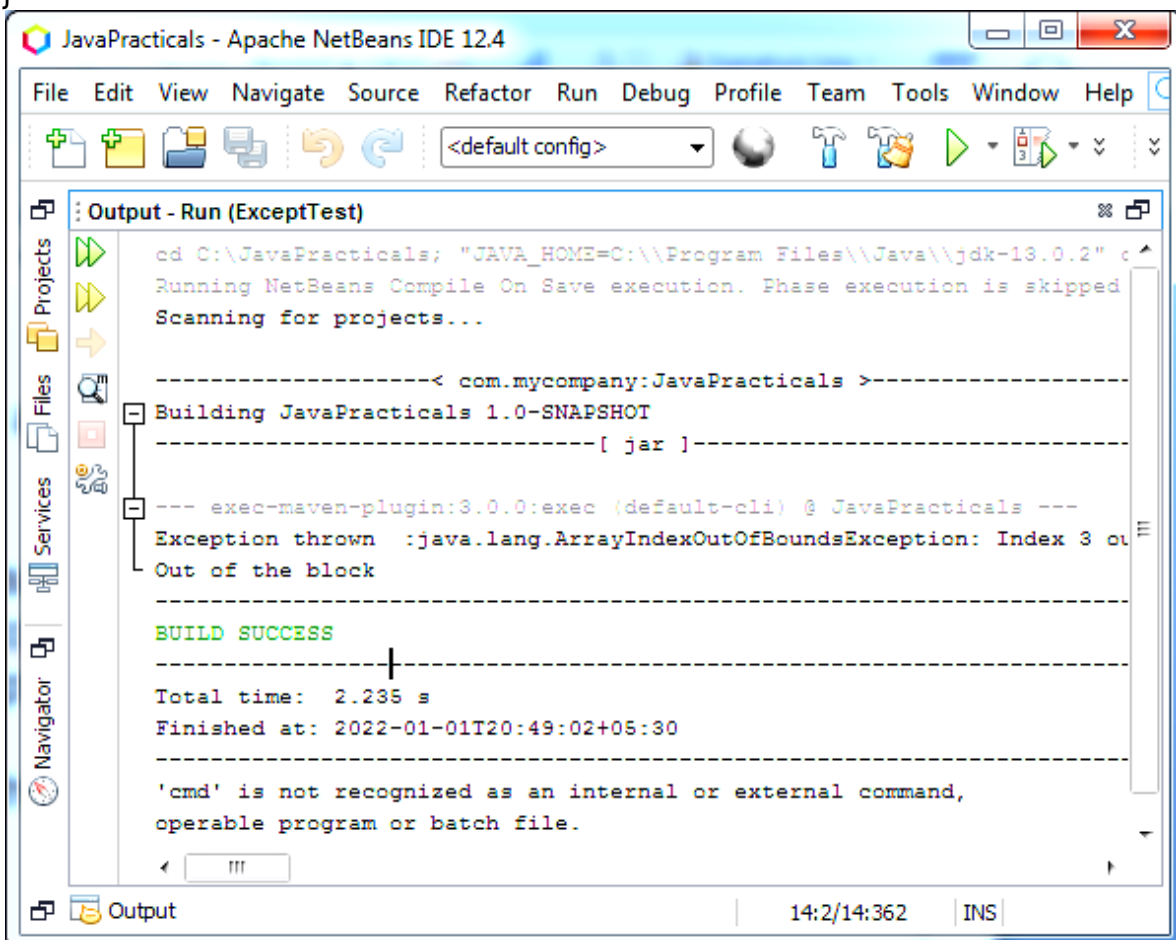


PROGRAM 40: EXCEPTION HANDLING IN JAVA

```
import java.io.*;

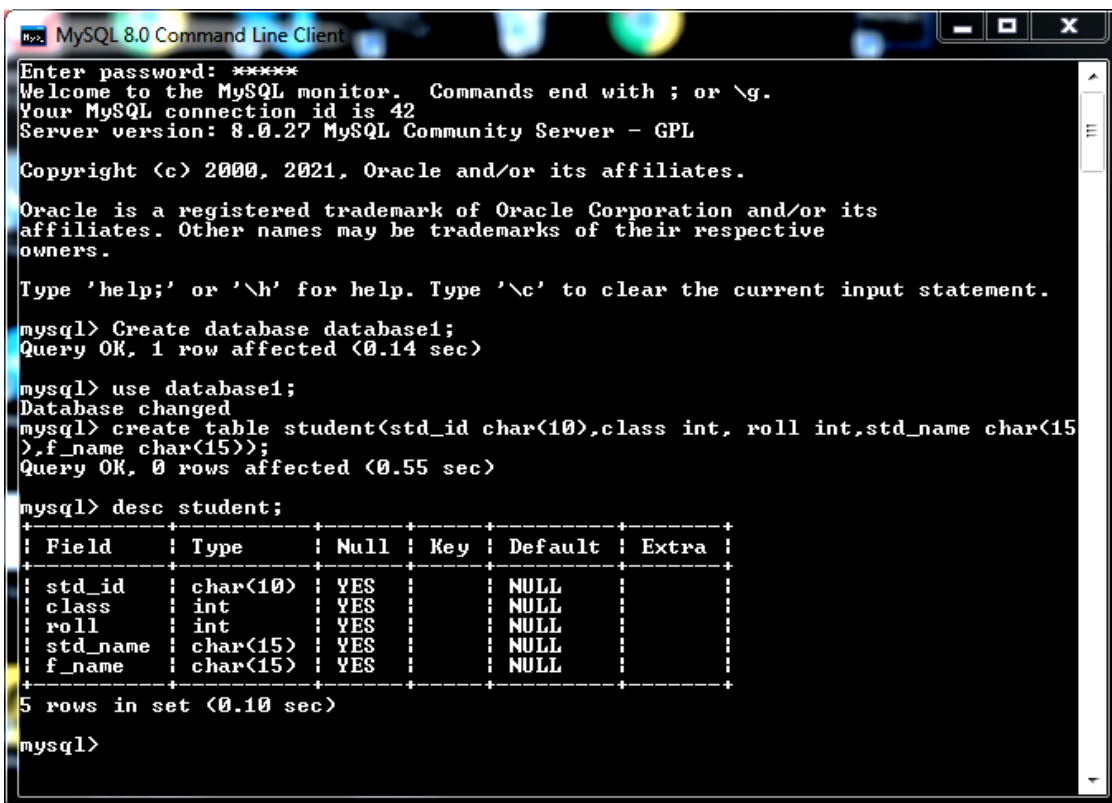
public class ExceptTest {

    public static void main(String args[]) {
        try {
            int a[] = new int[2];
            System.out.println("Access element three : " + a[3]);
        } catch (ArrayIndexOutOfBoundsException e) {
            System.out.println("Exception thrown : " + e);
        }
        System.out.println("Out of the block");
    }
}
```



PROGRAM 41: USE OF CREATE COMMAND

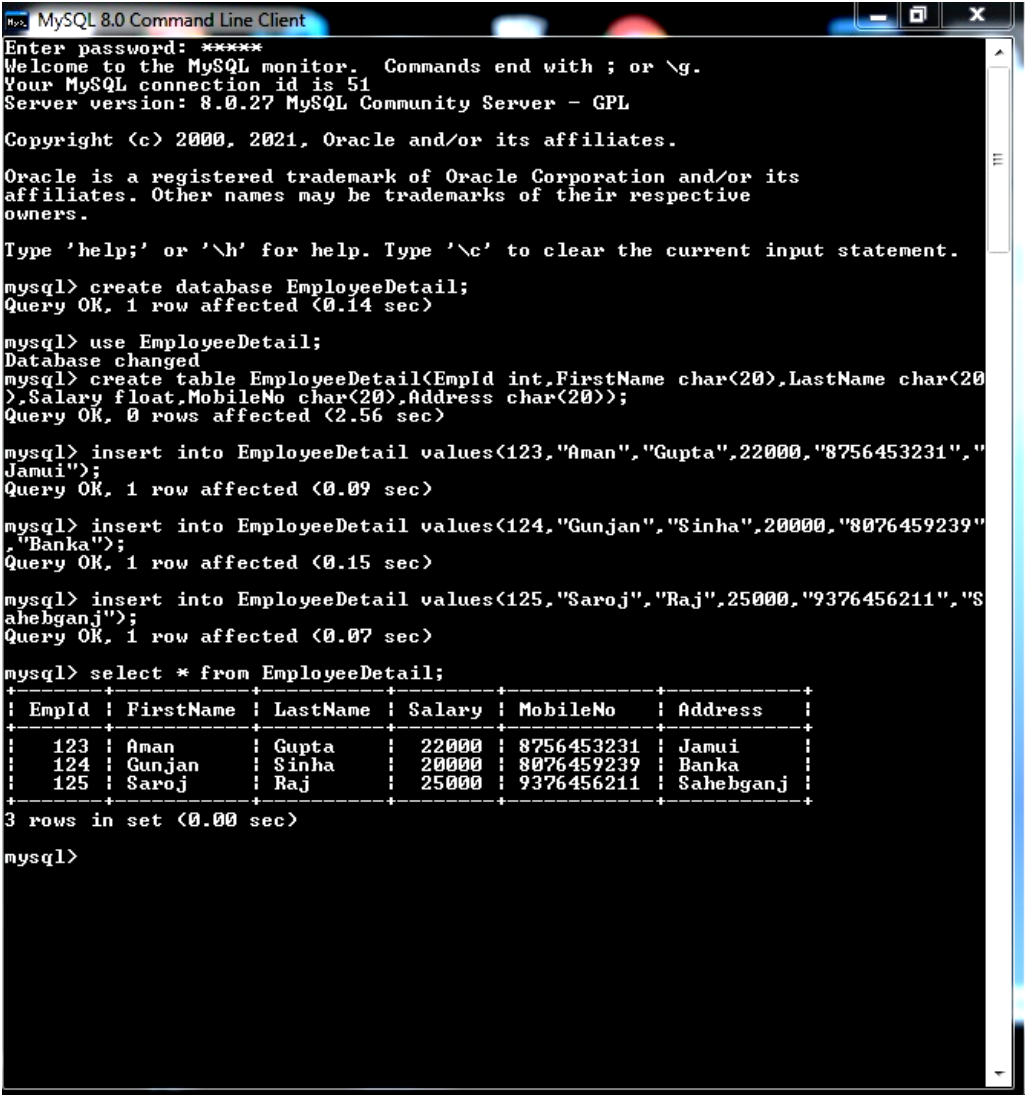
```
mysql> create database database1;  
mysql> use database1;  
mysql> create table student(std_id char(10),class int, roll int,std_name  
char(15),f_name char(15));  
mysql> desc student;
```



```
MySQL 8.0 Command Line Client  
Enter password: *****  
Welcome to the MySQL monitor.  Commands end with ; or \g.  
Your MySQL connection id is 42  
Server version: 8.0.27 MySQL Community Server - GPL  
Copyright (c) 2000, 2021, Oracle and/or its affiliates.  
Oracle is a registered trademark of Oracle Corporation and/or its  
affiliates. Other names may be trademarks of their respective  
owners.  
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.  
mysql> Create database database1;  
Query OK, 1 row affected (0.14 sec)  
mysql> use database1;  
Database changed  
mysql> create table student(std_id char(10),class int, roll int,std_name char(15  
>,f_name char(15));  
Query OK, 0 rows affected (0.55 sec)  
mysql> desc student;  
+-----+-----+-----+-----+-----+-----+  
| Field | Type | Null | Key | Default | Extra |  
+-----+-----+-----+-----+-----+-----+  
| std_id | char(10) | YES | | NULL | |  
| class | int | YES | | NULL | |  
| roll | int | YES | | NULL | |  
| std_name | char(15) | YES | | NULL | |  
| f_name | char(15) | YES | | NULL | |  
+-----+-----+-----+-----+-----+-----+  
5 rows in set (0.10 sec)  
mysql>
```


PROGRAM 42: USE OF INSERT

```
mysql> create database EmployeeDetail;
mysql> use EmployeeDetail;
mysql> create table EmployeeDetail(Empld int,FirstName char(20),LastName
char(20),Salary float,MobileNo char(20),Address char(20));
mysql> insert into EmployeeDetail
values(123,"Aman","Gupta",22000,"8756453231","Jamui");
mysql> insert into EmployeeDetail
values(124,"Gunjan","Sinha",20000,"8076459239","Banka");
mysql> insert into EmployeeDetail
values(125,"Saroj","Raj",25000,"9376456211","Sahebganj");
mysql> select * from EmployeeDetail;
```



```
MySQL 8.0 Command Line Client
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 51
Server version: 8.0.27 MySQL Community Server - GPL

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> create database EmployeeDetail;
Query OK, 1 row affected (0.14 sec)

mysql> use EmployeeDetail;
Database changed
mysql> create table EmployeeDetail(Empld int,FirstName char(20),LastName char(20),Salary float,MobileNo char(20),Address char(20));
Query OK, 0 rows affected (2.56 sec)

mysql> insert into EmployeeDetail values(123,"Aman","Gupta",22000,"8756453231","Jamui");
Query OK, 1 row affected (0.09 sec)

mysql> insert into EmployeeDetail values(124,"Gunjan","Sinha",20000,"8076459239","Banka");
Query OK, 1 row affected (0.15 sec)

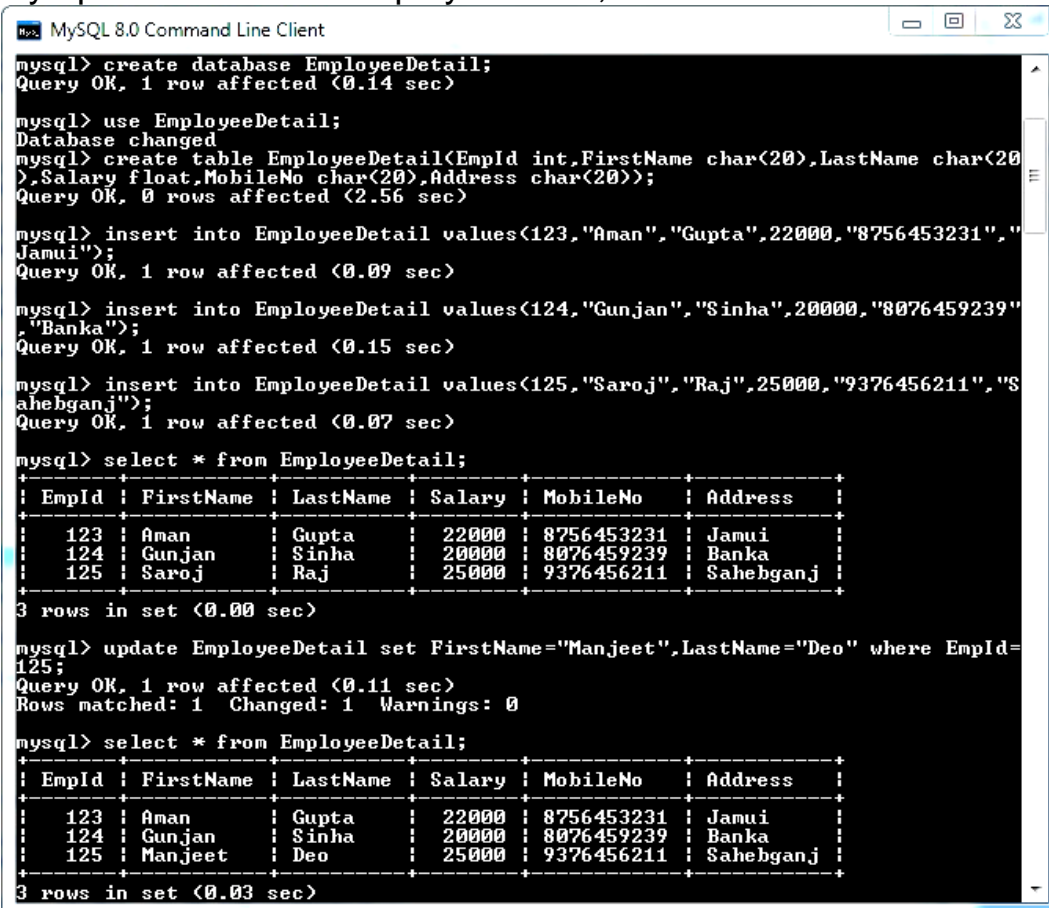
mysql> insert into EmployeeDetail values(125,"Saroj","Raj",25000,"9376456211","Sahebganj");
Query OK, 1 row affected (0.07 sec)

mysql> select * from EmployeeDetail;
+-----+-----+-----+-----+-----+-----+
| EmpId | FirstName | LastName | Salary | MobileNo | Address |
+-----+-----+-----+-----+-----+-----+
| 123   | Aman     | Gupta   | 22000  | 8756453231 | Jamui   |
| 124   | Gunjan   | Sinha   | 20000  | 8076459239 | Banka   |
| 125   | Saroj    | Raj     | 25000  | 9376456211 | Sahebganj |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql>
```

PROGRAM 43: USE OF UPDATE

```
mysql> create database EmployeeDetail;
mysql> use EmployeeDetail;
mysql> create table EmployeeDetail(EmpId int,FirstName char(20),LastName
char(20),Salary float,MobileNo char(20),Address char(20));
mysql> insert into EmployeeDetail
values(123,"Aman","Gupta",22000,"8756453231","Jamui");
mysql> insert into EmployeeDetail
values(124,"Gunjan","Sinha",20000,"8076459239","Banka");
mysql> insert into EmployeeDetail
values(125,"Saroj","Raj",25000,"9376456211","Sahebganj");
mysql> select * from EmployeeDetail;
mysql> update EmployeeDetail set FirstName="Manjeet",LastName="Deo"
where EmpId=125;
mysql> select * from EmployeeDetail;
```



```
MySQL 8.0 Command Line Client

mysql> create database EmployeeDetail;
Query OK, 1 row affected (0.14 sec)

mysql> use EmployeeDetail;
Database changed
mysql> create table EmployeeDetail(EmpId int,FirstName char(20),LastName char(20),Salary float,MobileNo char(20),Address char(20));
Query OK, 0 rows affected (2.56 sec)

mysql> insert into EmployeeDetail values(123,"Aman","Gupta",22000,"8756453231","Jamui");
Query OK, 1 row affected (0.09 sec)

mysql> insert into EmployeeDetail values(124,"Gunjan","Sinha",20000,"8076459239","Banka");
Query OK, 1 row affected (0.15 sec)

mysql> insert into EmployeeDetail values(125,"Saroj","Raj",25000,"9376456211","Sahebganj");
Query OK, 1 row affected (0.07 sec)

mysql> select * from EmployeeDetail;
+----+-----+-----+-----+-----+-----+
| EmpId | FirstName | LastName | Salary | MobileNo | Address |
+----+-----+-----+-----+-----+-----+
| 123 | Aman | Gupta | 22000 | 8756453231 | Jamui |
| 124 | Gunjan | Sinha | 20000 | 8076459239 | Banka |
| 125 | Saroj | Raj | 25000 | 9376456211 | Sahebganj |
+----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> update EmployeeDetail set FirstName="Manjeet",LastName="Deo" where EmpId=125;
Query OK, 1 row affected (0.11 sec)
Rows matched: 1 Changed: 1 Warnings: 0

mysql> select * from EmployeeDetail;
+----+-----+-----+-----+-----+-----+
| EmpId | FirstName | LastName | Salary | MobileNo | Address |
+----+-----+-----+-----+-----+-----+
| 123 | Aman | Gupta | 22000 | 8756453231 | Jamui |
| 124 | Gunjan | Sinha | 20000 | 8076459239 | Banka |
| 125 | Manjeet | Deo | 25000 | 9376456211 | Sahebganj |
+----+-----+-----+-----+-----+-----+
3 rows in set (0.03 sec)
```

PROGRAM 44: DELETE COMMAND

```
mysql> create database EmployeeDetail2;
mysql> use EmployeeDetail2;
mysql> create table EmployeeDetail2(Empld int,FirstName char(20),LastName
char(20),Salary float,MobileNo char(20),Address char(20));
mysql> insert into EmployeeDetail2
values(123,"Aman","Gupta",22000,"8756453231","Jamui");
mysql> insert into EmployeeDetail2
values(124,"Gunjan","Sinha",20000,"8076459239","Banka");
mysql> insert into EmployeeDetail2
values(125,"Saroj","Raj",25000,"9376456211","Sahebganj");
mysql> select * from EmployeeDetail2;
mysql> delete from EmployeeDetail2 where Empld=124;
mysql> select * from EmployeeDetail2;
```



```
MySQL 8.0 Command Line Client

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> create database EmployeeDetail2;
Query OK, 1 row affected (0.19 sec)

mysql> use EmployeeDetail2;
Database changed
mysql> create table EmployeeDetail2(Empld int,FirstName char(20),LastName char(2
0),Salary float,MobileNo char(20),Address char(20));
Query OK, 0 rows affected (2.15 sec)

mysql> insert into EmployeeDetail2 values(123,"Aman","Gupta",22000,"8756453231",
"Jamui");
Query OK, 1 row affected (0.15 sec)

mysql> insert into EmployeeDetail2 values(124,"Gunjan","Sinha",20000,"8076459239
","Banka");
Query OK, 1 row affected (0.12 sec)

mysql> insert into EmployeeDetail2 values(125,"Saroj","Raj",25000,"9376456211","
Sahebganj");
Query OK, 1 row affected (0.06 sec)

mysql> mysql> select * from EmployeeDetail2;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that
corresponds to your MySQL server version for the right syntax to use near 'mysql
> select * from EmployeeDetail2' at line 1
mysql> select * from EmployeeDetail2;
+-----+-----+-----+-----+-----+-----+
| Empld | FirstName | LastName | Salary | MobileNo | Address |
+-----+-----+-----+-----+-----+-----+
| 123   | Aman      | Gupta    | 22000   | 8756453231 | Jamui   |
| 124   | Gunjan    | Sinha    | 20000   | 8076459239 | Banka   |
| 125   | Saroj     | Raj      | 25000   | 9376456211 | Sahebganj |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> delete from EmployeeDetail2 where Empld=124;
Query OK, 1 row affected (0.10 sec)

mysql> select * from EmployeeDetail2;
+-----+-----+-----+-----+-----+-----+
| Empld | FirstName | LastName | Salary | MobileNo | Address |
+-----+-----+-----+-----+-----+-----+
| 123   | Aman      | Gupta    | 22000   | 8756453231 | Jamui   |
| 125   | Saroj     | Raj      | 25000   | 9376456211 | Sahebganj |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.02 sec)
```

PROGRAM 45: ALTER COMMAND

```
mysql> create database d2;
mysql> use d2;
mysql> create table student(std_id char(10),class int, roll int,std_name
char(15),f_name char(15));
mysql> desc student;
mysql> alter table student add mob_no int;
mysql> alter table student drop f_name;
mysql> alter table student modify class char(2);
mysql> desc student;
```

```
mysql> create database d2;
Query OK, 1 row affected (0.20 sec)

mysql> use d2;
Database changed
mysql> create table student(std_id char(10),class int, roll int,std_name char(15),f_name char(15));
Query OK, 0 rows affected (2.16 sec)

mysql> desc student;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| std_id | char(10) | YES | | NULL | |
| class | int | YES | | NULL | |
| roll | int | YES | | NULL | |
| std_name | char(15) | YES | | NULL | |
| f_name | char(15) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.33 sec)

mysql> alter table student add mob_no int;
Query OK, 0 rows affected (1.48 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> alter table student drop column f_name;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'student drop column f_name' at line 1
mysql> alter table student drop f_name;
Query OK, 0 rows affected (1.88 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> alter table student modify class char(2);
Query OK, 0 rows affected (4.39 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> desc student;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| std_id | char(10) | YES | | NULL | |
| class | char(2) | YES | | NULL | |
| roll | int | YES | | NULL | |
| std_name | char(15) | YES | | NULL | |
| mob_no | int | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.10 sec)
```

PROGRAM 46: LINE DRAWING ALGORITHM

```
#include <graphics.h>
#include <stdio.h>
#include <math.h>
#include <dos.h>

void main( )
{
float x,y,x1,y1,x2,y2,dx,dy,step;
int i,gd=DETECT,gm;

initgraph(&gd,&gm,"c:\\turbo3\\bgi");

printf("Enter the value of x1 and y1 : ");
scanf("%f%f",&x1,&y1);
printf("Enter the value of x2 and y2: ");
scanf("%f%f",&x2,&y2);

dx=abs(x2-x1);
dy=abs(y2-y1);

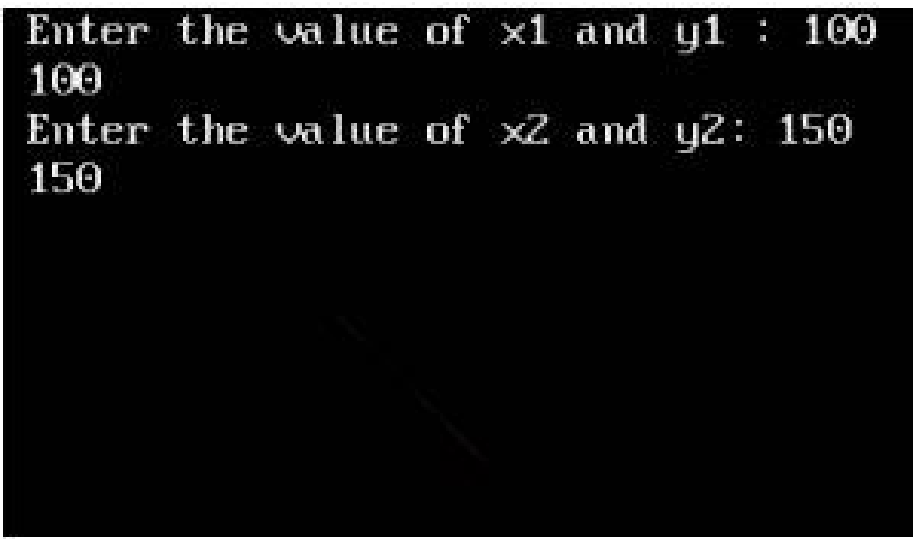
if(dx>=dy)
step=dx;
else
step=dy;

dx=dx/step;
dy=dy/step;

x=x1;
y=y1;

i=1;
while(i<=step)
{
putpixel(x,y,5);
x=x+dx;
y=y+dy;
i=i+1;
delay(100);
}

closegraph();
}
```

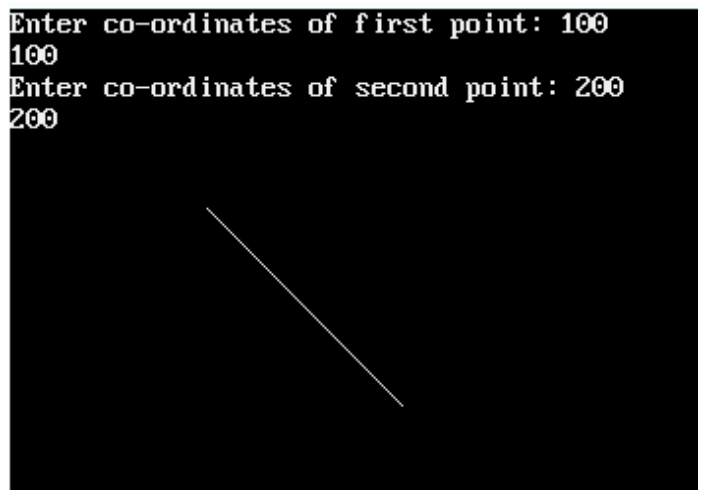


```
Enter the value of x1 and y1 : 100
100
Enter the value of x2 and y2: 150
150
```

PROGRAM 47: BRSENHAM'S LINE DRAWING ALGORITHM

```
#include<stdio.h>
#include<graphics.h>
void drawline(int x0, int y0, int x1, int y1)
{
    int dx, dy, p, x, y;
    dx=x1-x0;
    dy=y1-y0;
    x=x0;
    y=y0;
    p=2*dy-dx;
    while(x<x1)
    {
        if(p>=0)
        {
            putpixel(x,y,7);
            y=y+1;
            p=p+2*dy-2*dx;
        }
        else
        {
            putpixel(x,y,7);
            p=p+2*dy;}
        x=x+1;
    }
}
int main()
{
    int gdriver=DETECT, gmode, error, x0, y0, x1, y1;
    initgraph(&gdriver, &gmode, "c:\\turbo3\\bgi");
    printf("Enter co-ordinates of first point: ");
    scanf("%d%d", &x0, &y0);
    printf("Enter co-ordinates of second point: ");
    scanf("%d%d", &x1, &y1);
    drawline(x0, y0, x1, y1);
    return 0;
}
```

```
Enter co-ordinates of first point: 100
100
Enter co-ordinates of second point: 200
200
```



PROGRAM 48: BRESENHAM'S CIRCLE DRAWING

```
#include <graphics.h>
#include <stdlib.h>
#include <stdio.h>
#include <conio.h>
#include <math.h>

void EightWaySymmetricPlot(int xc,int yc,int x,int y)
{
    putpixel(x+xc,y+yc,);
    putpixel(x+xc,-y+yc);
    putpixel(-x+xc,-y+yc);
    putpixel(-x+xc,y+yc);
    putpixel(y+xc,x+yc);
    putpixel(y+xc,-x+yc);
    putpixel(-y+xc,-x+yc);
    putpixel(-y+xc,x+yc);
}

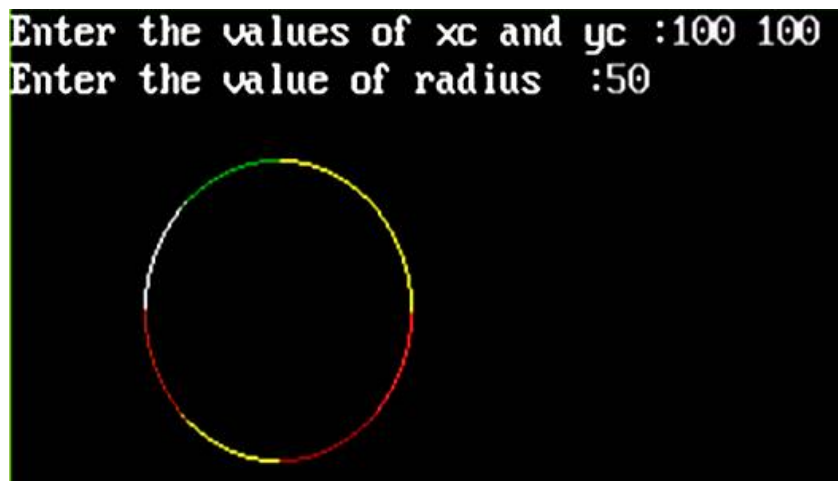
void BresenhamCircle(int xc,int yc,int r)
{
    int x=0,y=r,d=3-(2*r);
    EightWaySymmetricPlot(xc,yc,x,y);

    while(x<=y)
    {
        if(d<=0)
        {
            d=d+(4*x)+6;
        }
        else
        {
            d=d+(4*x)-(4*y)+10;
            y=y-1;
        }
        x=x+1;
        EightWaySymmetricPlot(xc,yc,x,y);
    }
}

int main(void)
{
    int xc,yc,r,gdriver = DETECT, gmode, errorcode;
    initgraph(&gdriver, &gmode, "C:\\TURBOC3\\BGI");

}
```

```
printf("Enter the values of xc and yc :");  
scanf("%d%d",&xc,&yc);  
printf("Enter the value of radius :");  
scanf("%d",&r);  
BresenhamCircle(xc,yc,r);  
  
getch();  
closegraph();  
return 0;  
}
```



PROGRAM 49: CIRCLE DRAWING

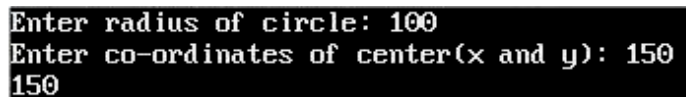
```
#include<iostream.h>
#include<graphics.h>
void drawcircle(int x0, int y0, int radius)
{
    int x = radius;
    int y = 0;
    int err = 0;
    while (x >= y)
    {
        putpixel(x0 + x, y0 + y, 7);
        putpixel(x0 + y, y0 + x, 7);
        putpixel(x0 - y, y0 + x, 7);
        putpixel(x0 - x, y0 + y, 7);
        putpixel(x0 - x, y0 - y, 7);
        putpixel(x0 - y, y0 - x, 7);
        putpixel(x0 + y, y0 - x, 7);
        putpixel(x0 + x, y0 - y, 7);
        if (err <= 0)
        {
            y += 1;
            err += 2*y + 1;
        }
        if (err > 0)
        {
            x -= 1;
            err -= 2*x + 1;
        }
    }
}

int main()
{
    int gdriver=DETECT, gmode, error, x, y, r;
    initgraph(&gdriver, &gmode, "c:\\turbo3\\bgi");

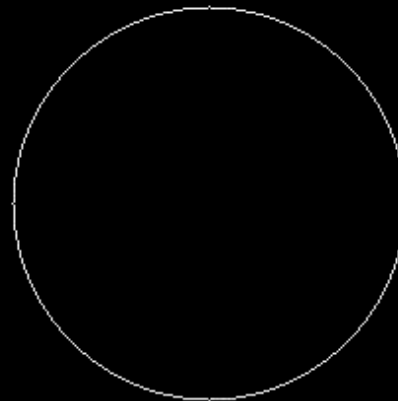
    cout<<"Enter radius of circle: ";
    cin>>r;

    cout<<"Enter co-ordinates of center(x and y): ";
    cin>>x>>y;
    drawcircle(x, y, r);

    return 0;
}
```



```
Enter radius of circle: 100
Enter co-ordinates of center(x and y): 150
150
```



PROGRAM 50: DRAWING OF ELLIPSE

```
#include<stdio.h>
#include<graphics.h>
#include<math.h>
#include<conio.h>
void main()
{
long d1,d2;
int i,gd,gm,x,y,x0,y0;
long rx,ry,rxsq,rysq,tworxsq,tworysq,dx,dy;
printf("Enter the X radius and Y radius of the ellipse:\n");
scanf("%ld%ld",&rx,&ry);
printf("\nEnter the center (x,y) of the ellipse:\n");
scanf("%d%d",&x0,&y0);
detectgraph(&gd,&gm);
initgraph(&gd,&gm,"c:\\turbo3\\BGI");
cleardevice();
rxsq=rx*rx;
rysq=ry*ry;
tworxsq=2*rxsq;
tworysq=2*rysq;
x=0;
y=ry;
d1=rysq-rxsq*ry+(0.25*rxsq);
dx=tworysq*x;
dy=tworxsq*y;
do
{
putpixel(x0+x,y0+y,15);
putpixel(x0-x,y0-y,15);
putpixel(x0+x,y0-y,15);
putpixel(x0-x,y0+y,15);
if(d1<0)
{
x=x+1;
y=y;
dx=dx+tworysq;
d1=d1+dx+rysq;
}
else
{
x=x+1;
y=y-1;
dx=dx+tworysq;
dy=dy-tworxsq;
d1=d1+dx-dy+rysq;
}
}
```

```

//delay(10);
}
while(dx<dy);
d2=rysq*(x+0.5)*(x+0.5)+rxsq*(y-1)*(y-1)-(rxsq*rysq);
do
{
putpixel(x0+x,y0+y,15);
putpixel(x0-x,y0-y,15);
putpixel(x0+x,y0-y,15);
putpixel(x0-x,y0+y,15);
if(d2>0)
{
x=x;
y=y-1;
dy=dy-tworxsq;
d2=d2-dy+rxsq;
}
else
{
x=x+1;
y=y-1;
dx=dx+tworysq;
dy=dy-tworxsq;
d2=d2+dx-dy+rxsq;
}
}
while(y>0);
getch();
closegraph();
}

```

Output:-

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC

Enter the X radius and Y radius of the ellipse:

22

44

Enter the center (x,y) of the ellipse:

22 55

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC

