रुस्तमजी प्रौद्योगिकी संस्थान

Rustamji Institute of Technology

ISO9001:2015 Certified (An Institute of Border Security Force)

Lab File for

CS605 (Data Analytics Lab)

Submitted by

Adarsh Singh Kushwah (0902CS211004)

B.Tech , Computer Science & Engineering 6th Semester

(2021-2025 batch)

Subject Teacher

Jagdish Makhijani, Ass. Prof.

File Checked By

Mr. Yashwant Pathak

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

RUSTAMJI INSTITUTE OF TECHNOLOGY , BSF , TAKENPUR

INDEX

Submitted By- Adarsh Singh Kushwah(0902CS211004)

***COURSE OUTCOMES*:-**

CO1-. Explain the basic concepts of switching and finite automata theory & languages.

CO2.- Relate practical problems to languages, automata, computability and complexity.

CO3.- Construct abstract models of computing and check their power to recognize the languages.

CO4.- Analyse the grammar, its types, simplification and normal form.

CO5.- Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6.- Develop an overview of how automata theory, languages and computation are applicable in engineering application.

Practical:-01

Design a program for creating a machine that accept three consecutive 1's.

Course Outcome:-

Demonstrate analytical thinking and intuition for problem solving in the related areas.

Code:-

```
# include<iostream>
usingnamespacestd;
intmain(){
   cout<<"Input a binary string : ";
    stringonce;
    cin>>once;
    boolans=0;
    for(inti=0;i<once.length()-2;i++){
        if(once[i]=='1'&&s[i+1]=='1'&&s[i+2]=='1'){
        ans=1;
        break;
        }
    }
    if(ans){
        cout<<"string accepted "<<endl;
    }
    else{
        cout<<"string not accepted"<<endl;
    }
    return0;
}
```

Output:-

Submitted By- Adarsh Singh Kushwah(0902CS211004)

Practical:-02

Design a program for creating a machine that always ending with 101.

Course Outcome:-

Demonstrate analytical thinking and intuition for problem solving in the related areas.

Code:-

```
# include<iostream>
usingnamespacestd;

intmain(){
     cout<<"Input a binary string : ";
    stringstr;
    cin>>str;
    intn=str.length()-1;
    for(inti=0;i<=n;i++){
        if(str[i]=='0'||str[i]=='1'){
            ;
        }
        else{
            cout<<"invalid string ";
            return0;
        }
    }

    if(str[n]=='1'&&str[n-1]=='0'&&str[n-2]=='1'){
        cout<<"string accepted"<<endl;
    }
    else{
        cout<<"string not accepted"<<endl;
    }
    return  0;
}
```


Submitted By- Adarsh Singh Kushwah(0902CS211004)

OUTPUT:-

PS C:\Users\HP\Downloads> cd "c:\Users\HP\Downloads\" ; if ($?) { g++ toc.cpp -o toc } ; if ($?) { .\toc }

Input a binary string : 10101

string accepted

Practical:-03

Design a program for mode 3 machine.

Course Outcome:-

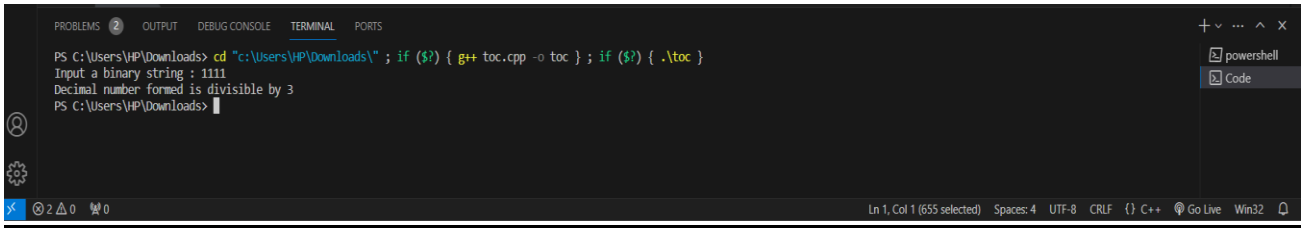
Demonstrate analytical thinking and intuition for problem solving in the related areas.

Code:-

```
# include<iostream>
usingnamespacestd;

intmain(){
    cout<<"Input a binary string : ";
    stringstr;
    cin>>str;
    intn=str.length()-1;
    for(inti=0;i<=n;i++){
        if(str[i]=='0'||str[i]=='1'){
            ;
        }
        else{
            cout<<"invalid string ";
            return0;
        }
    }

    intsum=0,
count=1;
    for(inti=n;i>=0;i--){
        int  temp=int(str[i]);
        sum+=(count*temp);
        count*=2;
    }
    if(sum%3==0){
        cout<<"Decimal number formed is divisible by 3"<<endl;
    }
    else{
        cout<<"input string isn't divisible by 3"<<endl;
    }
    return0;
}
```


Submitted By- Adarsh Singh Kushwah(0902CS211004)

OUTPUT : -



PS C:\Users\HP\Downloads> cd "c:\Users\HP\Downloads\" ; if ($?) { g++ toc.cpp -o toc } ; if ($?) { .\toc }

Input a binary string : 1111

Decimal number formed is divisible by 3

Practical:-04

Design a program for accepting decimal no divisible by 2n over the alphabet 0,1.

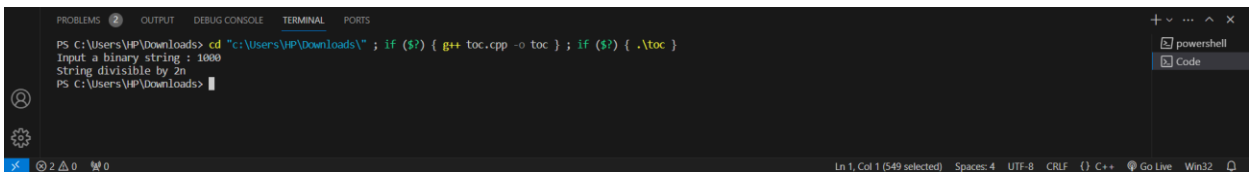
Course Outcome:-

Demonstrate analytical thinking and intuition for problem solving in the related areas.

Code:

```
# include<iostream>
usingnamespacestd;
//accepting a decimal number over the alphabet 0,1 divisible by 2n
intmain(){
  cout<<"Input a binary string : ";
    stringstr;
    cin>>str;
    intn=str.length()-1;
    for(inti=0;i<=n;i++){
        if(str[i]=='0'||str[i]=='1'){
            ;
        }
        else{
            cout<<"invalid string ";
            return0;
        }
    }
    if(s[n]=='1'){
        cout<<"String not divisible by 2n";
    }
    else{
        cout<<"String divisible by 2n";

    }
    return0;
}
```

Output:



Submitted By- Adarsh Singh Kushwah(0902CS211004)

```
PS C:\Users\HP\Downloads> cd "c:\Users\HP\Downloads\" ; if ($?) { g++ toc.cpp -o toc } ; if ($?)
{ .\toc }

Input a binary string : 1000

String divisible by 2n
```

Practical:-05

Design a program for creating a machine which accepts string having equal no of 1's and 0's.

Design a program for creating a machine which counts no of 1's and 0's in the given string.

Course Outcome:-

Demonstrate analytical thinking and intuition for problem solving in the related areas.

Code:

```
# include<iostream>
usingnamespacestd;
intmain(){
 cout<<"Input a binary string : ";
    stringstr;
    cin>>str;
    intn=str.length()-1;
    for(inti=0;i<=n;i++){
        if(str[i]=='0'||str[i]=='1'){
            ;
        }
        else{
            cout<<"invalid string ";
            return0;
        }
    }
    intones=0,
zeroes=0;
    for(inti=0;i<=n;i++){
        if(str[i]=='1')
        {
ones++;
        }
        else
        {
        zeroes++;
        }
    }
    cout<<"The number of 1's and 0's in the string is: "<<ones<<" and
"<<zeroes<<endl;
    if(ones==zeroes){
        cout<<"Since the number of one's and zero's are equal so the string is
accepted:"<<endl;
```


Submitted By- Adarsh Singh Kushwah(0902CS211004)

```
    }
    else{
        cout<<"Since the number of one's and zero's are not equal the STRING
ISN'T ACCEPTED "<<endl;
    }
    return0;
}
```

OUTPUT:

PS C:\Users\HP\Downloads> cd "c:\Users\HP\Downloads\" ; if ($?) { g++ toc.cpp -o toc } ; if ($?) { .\toc }

Input a binary string : 1100

The number of 1's and 0's in the string is: 2 and 2

Since the number of one's and zero's are equal so the string is accepted

Submitted By- Adarsh Singh Kushwah(0902CS211004)

Practical:-06

Design a program for creating a machine which counts no of 1's and 0's in the given string.

Course Outcome:-

Demonstrate analytical thinking and intuition for problem solving in the related areas.

Code:

```
# include<iostream>
usingnamespacestd;
intmain(){
 cout<<"Input a binary string : ";
    stringstr;
    cin>>str;
    intn=str.length()-1;
    for(inti=0;i<=n;i++){
        if(str[i]=='0'||str[i]=='1'){
            ;
        }
        else{
            cout<<"invalid string ";
            return0;
        }
    }
    intones=0,zeroes=0;
    for(inti=0;i<=n;i++){
        if(str[i]=='1')
        {
        ones++;
        }
        else
        {
        zeroes++;
        }
    }
    cout<<"The number of 1's and 0's in the string is: "<<ones<<" and
"<<zeroes<<endl;
    if(ones==zeroes){
        cout<<"Since the number of one's and zero's are equal so the string is
accepted:"<<endl;
    }
    else{
        cout<<"Since the number of one's and zero's are not equal the STRING
ISN'T ACCEPTED "<<endl;
```


Submitted By- Adarsh Singh Kushwah(0902CS211004)

```
    }
    return0;
}
```

OUTPUT:-

PS C:\Users\HP\Downloads> cd "c:\Users\HP\Downloads\" ; if ($?) { g++ toc.cpp -o toc } ; if ($?) { .\toc }

Input a binary string : 1100

The number of 1's and 0's in the string is: 2 and 2

Since the number of one's and zero's are equal so the string is accepted

Practical:-07

Design a program to find 2's complement of a given Binary Number.

Course Outcome:-

Demonstrate analytical thinking and intuition for problem solving in the related areas.

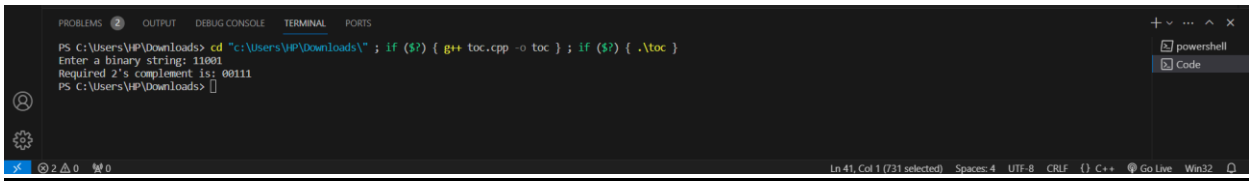
Code:-

```
# include<iostream>
usingnamespacestd;

stringOnecomplement(strings,intind){
    for(inti=0;i<=ind;i++){
        if(s[i]=='0'){
            s[i]='1';
        }
        else{
            s[i]='0';
        }

    }
    returns;
}

intmain(){
    cout<<"Enter a binary string: ";
    strings;
    cin>>s;
    for(inti=0;i<=s.length()-1;i++){
        if(s[i]=='0'||s[i]=='1'){
            ;
        }
        else{
            cout<<"invalid string ";
            return0;
        }
    }

   inti=s.length()-1;
   while(s[i]!='1'&&i>-1){
    i--;
   }
   s=Onecomplement(s,i-1);
   cout<<"Required 2's complement is: "<<s;
```


Submitted By- Adarsh Singh Kushwah(0902CS211004)

```
    return0;
}
```

OUTPUT:-



PS C:\Users\HP\Downloads> cd "c:\Users\HP\Downloads\" ; if ($?) { g++ toc.cpp -o toc } ; if ($?) { .\toc }

Enter a binary string: 11001

Required 2's complement is: 00111

Practical:-08

DAP which will increment the given binary no by 1.

Course Outcome:-

Demonstrate analytical thinking and intuition for problem solving in the related areas.

Code:-

```
#include<iostream>
usingnamespacestd;
intmain(){

    cout<<"Input a binary string : ";
    stringstr;
    cin>>str;
    intn=str.length()-1;
    for(inti=0;i<=n;i++){
        if(str[i]=='0'||str[i]=='1'){
            ;
        }
        else{
            cout<<"invalid string ";
            return0;
        }
    }
    if(str[n]=='1'){
        inti=n;
        while(i>-1&&str[i]!='0'){
            str[i]='0';
            i--;
        }
        if(i==-1){
            str='1'+str;
        }
        else{
            str[i]='1';
        }
    }
    else{
        str[n]='1';
    }
    cout<<"your +1 incremented string is: "<<str;
    return0;
}
```


Submitted By- Adarsh Singh Kushwah(0902CS211004)

OUTPUT:-

PS C:\Users\HP\Downloads> cd "c:\Users\HP\Downloads\" ; if ($?) { g++ toc.cpp -o toc } ; if ($?) { .\toc }

Input a binary string : 1001110

your +1 incremented string is: 1001111