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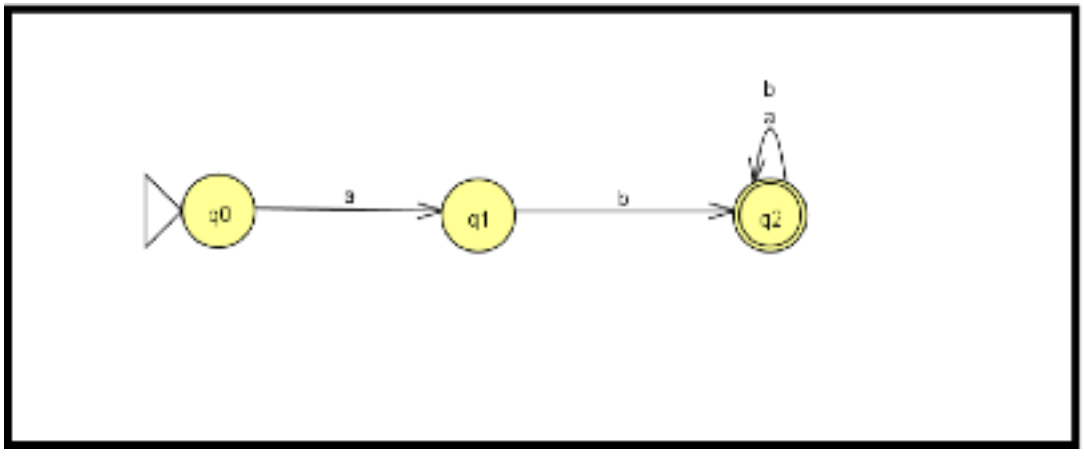
ASSIGNMENT - 04

2.Consider the string on {a,b} defined by the requirements below . For each, construct an accepting NDFA.

i) Design an NDFA for all strings over {a, b} start with ‘ab’.

Ans:- State diagram



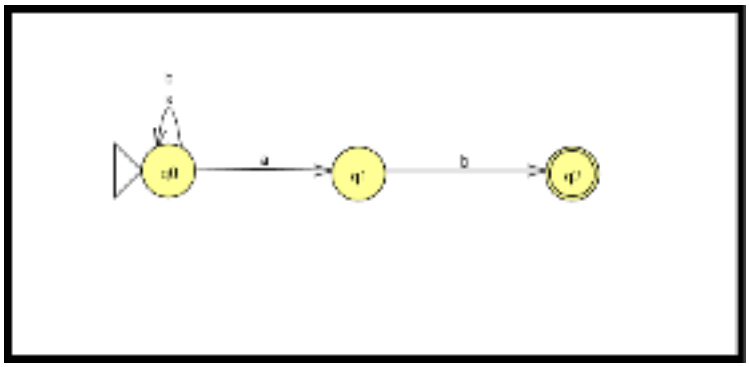
CODE:-

```
#include<bits/stdc++.h>
```

```
using namespace std;
bool solve(string str)
{
int n = str.size();
if(n<2)
return false;
if(str[0]=='a' && str[1]=='b')
{
        return true;
}
 return false;
}

int main()
{
string str;
cin>>s;
cout<<(solve(s)?"ACCEPT":"REJECT")<<endl;

return 0;
 }
```

ii) Design an NDFA for all strings over {a, b} end with ‘ab’.

ANS:- State diagram



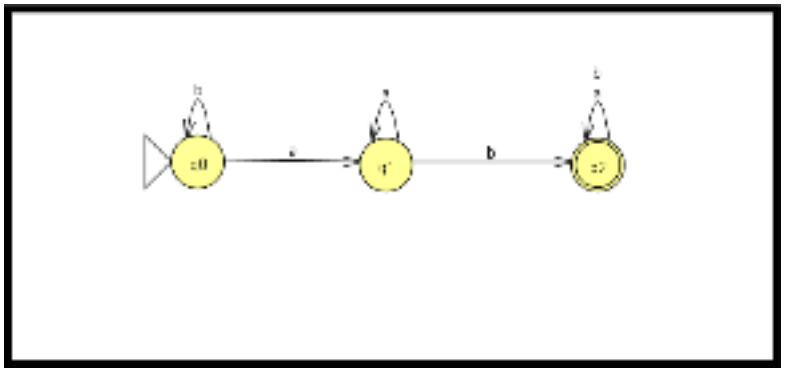
CODE : -

```
#include<bits/stdc++.h>
 using namespace std;
  bool solve(string str)
  {
    int n=str.size();

    if(n<2)
        return false;

    if(str[n-2]=='a' && str[n-1]=='b')
    {
        return true;
    }
```

```
    return false;
}

int main()
{
   string str;
   cin>>str;
cout<<(solve(str)?"ACCEPT":"REJECT")<<endl;

return 0;
 }
```

iii) Design an NDFA for all strings over {a, b} having substring ‘ab’.

Ans:- State diagram

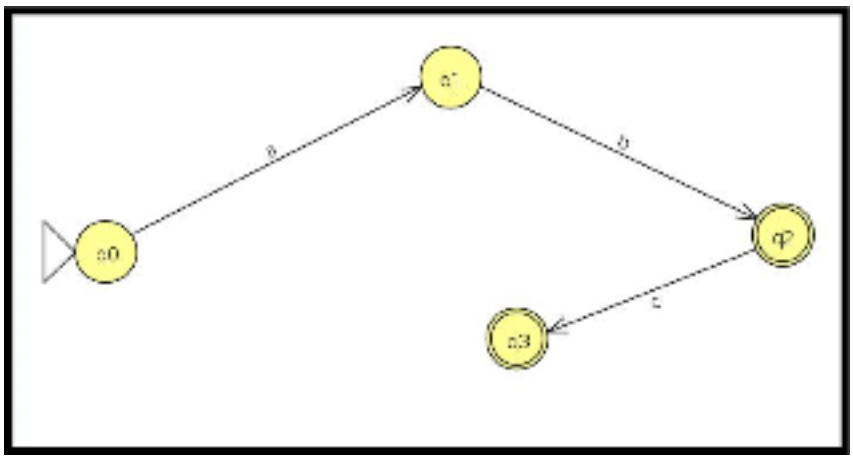


CODE :-

```
#include<bits/stdc++.h>
 using namespace std;
bool solve(string str)
{
   int n=str.size();
   if(n<2)
   return false;

   for(int i=0;i<n-1;i++)
   {
      if(str[i]=='a' && str[i+1]=='b')
         return true;
   }

   return false;
}

int main()
{
   string str;
   cin>>str;
  cout<<(solve(s)?"ACCEPT":"REJECT")<<endl;

  return 0;
}
```

3.Construct an NDFA over {a, b, c} that accepts the language {ab, abc}.

Ans:- State diagram



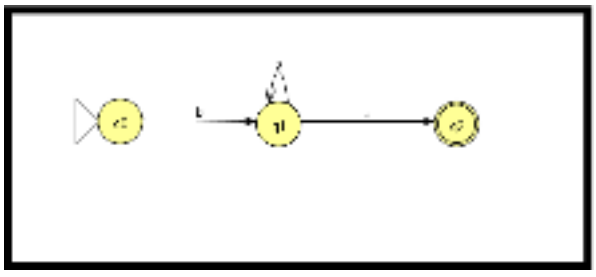
CODE :

```
 #include<bits/stdc++.h>
using namespace std;
 bool solve(string str)
 {
    int n=str.size();
    if(n>3 || n<=1)
    return false;

    if(str=="abc" || str=="ab")
    {
        return true;
    }

    return false;
}
```

```
int main()
{
    string str;
    cin>>str;
cout<<(solve(s)?"ACCEPT":"REJECT")<<endl;

return 0;
 }
```

4.Design an NDFA that accepts a language {$b^n a$ | n>=1}

Ans:- State diagram



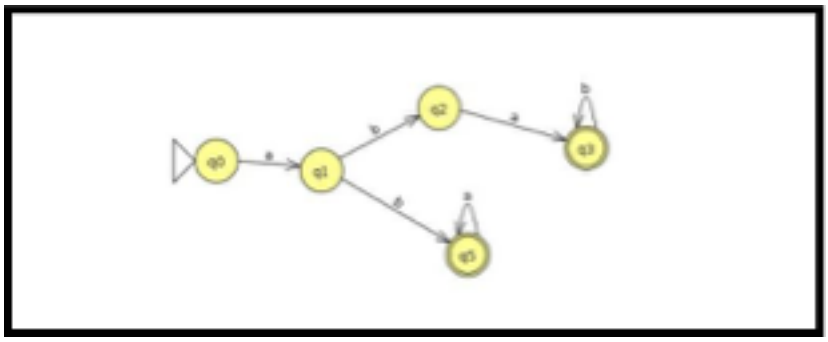
CODE :

```
#include<bits/stdc++.h>
 using namespace std;
```

```
 bool solve(string str)
 {
   int n=str.size();
   if(n<2)
   return false;
   for(int i=0;i<n-1;i++)
   {
      if(str[i]!='b')
      return false;
      if(str[n-1]!='a')
      return false;
   }

   return true;
}
int main()
{
   string str;
   cin>>str;
cout<<(solve(str)?"ACCEPT":"REJECT")<<endl;
 }
```

5.Design an NDFA with no more than five states for set {abab^n|n>=0} U {aba^n|n>=0}

Ans:- State diagram



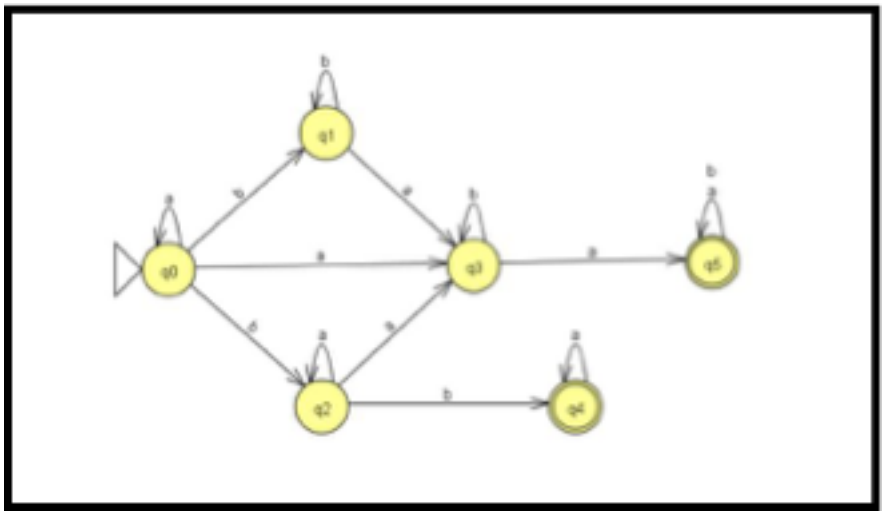
CODE :-

```
#include<bits/stdc++.h>
 using namespace std;
  bool solve(string str)
  {
    int n=str.size();
    if(n<2 || str[0]=='b' || str[1]=='a')
        return false;
    if(n==2 || (n==3 && s[2]=='a'))
        return true;
    if (n==3 && s[2]=='b')
        return false;

    for(int i=3;i<n;i++)
```

```
    {
    if(str[i]!=s[3])
        return false;
    }
    return true;
}

int main()
{
    string str;cin>>str;
     cout<<(solve(s)?"ACCEPT":"REJECT")<<endl;

     return 0;
}
```

6. Design an NDFA for all strings containing at least two a's or exactly two b's.

Ans:- State diagram



CODE :-

```
#include<bits/stdc++.h>
using namespace std;
bool solve(string str,int n)
{
	int counta=0;
	int countb=0;
	for(int i=0;i<n;i++)
	{
		if(counta && str[i]=='a')
			return true;
		if(str[i]=='a')
			counta++;
		if(str[i]=='b' && countb<4)
			countb++;
```

```
        }
        return cntb==2;
}

int main()
{
        string str;
        cin>>str;
        int n=str.size();
         cout<<(solve(str,n)?"ACCEPT":"REJECT")<<endl;

        return 0;
 }
```