Sri Lanka Institute of Information Technology

Foundations of Algorithms – IE2072

Submitted by:

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Date of submission: 29 / 05 / 2021

Q1 Source code :

Source code developed using C++ language

```
#include<iostream>

#include <bits/stdc++.h>

using namespace std;

#include<stdlib.h>

#include<vector>


//declaring functions

void vecprint(vector<string> &pp);

void create_combination(string num, vector<string>&result, string
pac[], int c, string l);

vector<string> comb(string num);



int main()

{

   //declaring variables

   string num;
```

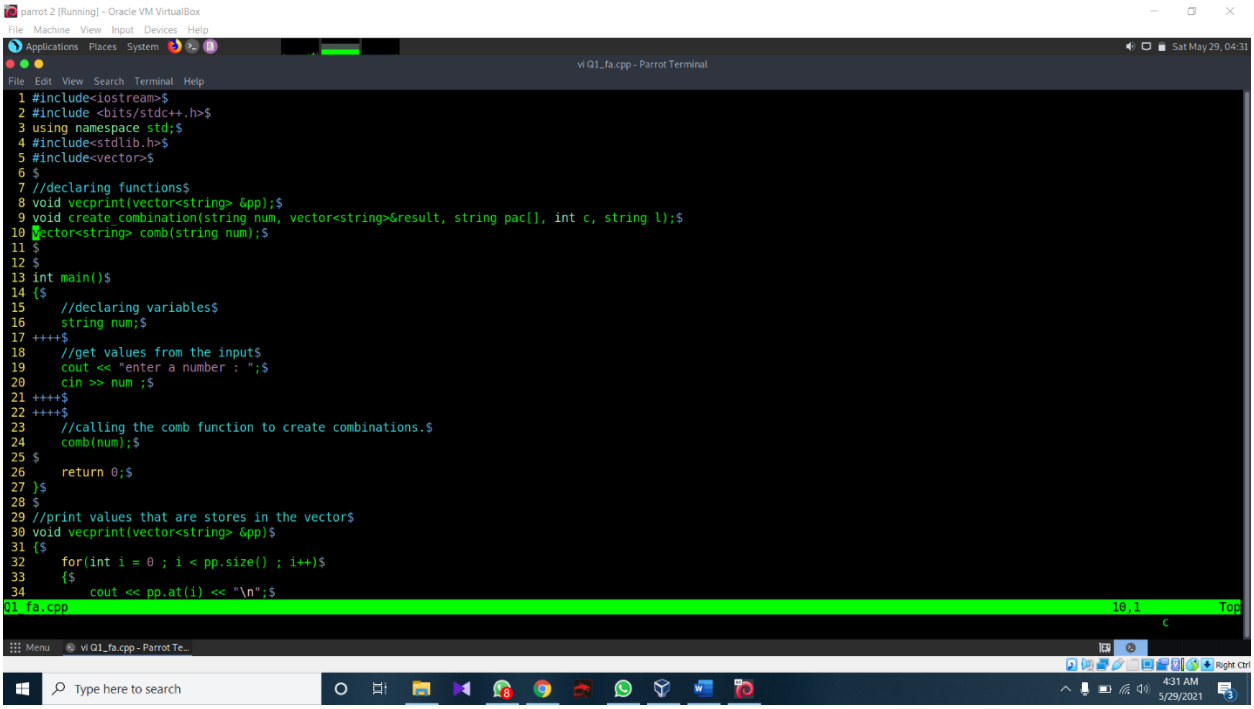
```
    //get values from the input
    cout << "enter a number : ";
    cin >> num ;



    //calling the comb function to create combinations.
    comb(num);


    return 0;
}


//print values that are stores in the vector
void vecprint(vector<string> &pp)
{
    for(int i = 0 ; i < pp.size() ; i++)
    {
        cout << pp.at(i) << "\n";


    }
```

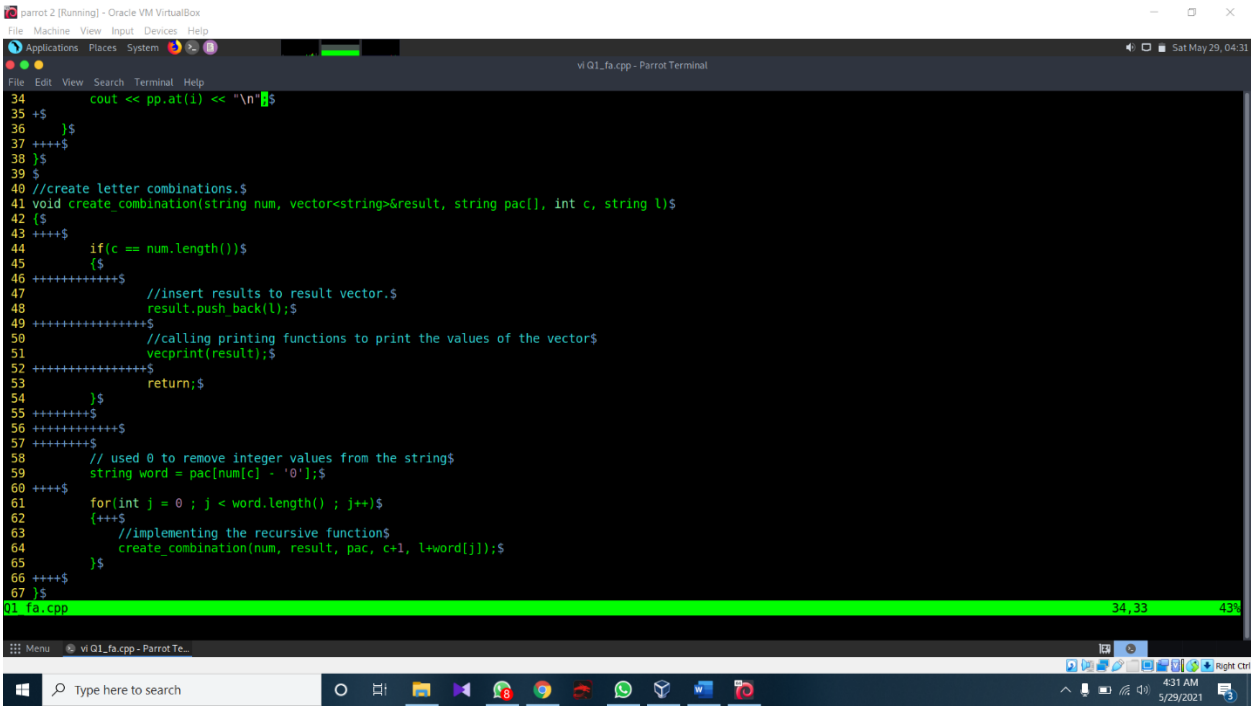
```
}


//create letter combinations.

void create_combination(string num, vector<string>&result, string
pac[], int c, string l)

{


    if(c == num.length())

    {


        //insert results to result vector.

        result.push_back(l);


        //calling printing functions to print the values of the vector

        vecprint(result);


        return;

    }
```

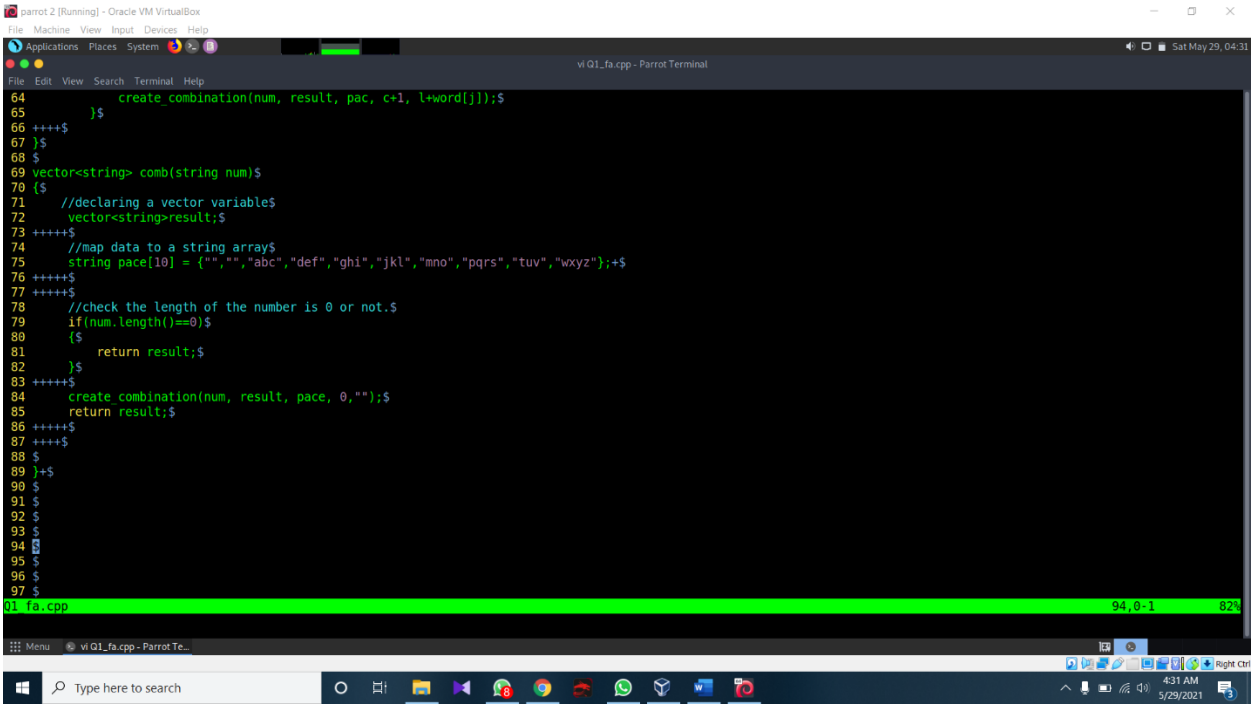
```
        // used 0 to remove integer values from the string
        string word = pac[num[c] - '0'];

        for(int j = 0 ; j < word.length() ; j++)
        {
            //implementing the recursive function
            create_combination(num, result, pac, c+1, l+word[j]);
        }

}

vector<string> comb(string num)
{
    //declaring a vector variable
     vector<string>result;

     //map data to a string array
     string pace[10] =
{"","","abc","def","ghi","jkl","mno","pqrs","tuv","wxyz"};
```

```
    //check the length of the number is 0 or not.
    if(num.length()==0)
    {
        return result;
    }

    create_combination(num, result, pace, 0,"");
    return result;



}
```

Image of source code






parrot 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places System
Sat May 29, 04:31
vi Q1_fa.cpp - Parrot Terminal
File Edit View Search Terminal Help
64 create_combination(num, result, pac, c+1, l+word[j]);$
65 }$
66 ++++$
67 }$
68 $
69 vector<string> comb(string num)$
70 {$
71 //declaring a vector variable$
72 vector<string>result;$
73 +++++$
74 //map data to a string array$
75 string pace[10] = {"","","abc","def","ghi","jkl","mno","pqrs","tuv","wxyz"};+$
76 +++++$
77 +++++$
78 //check the length of the number is 0 or not.$
79 if(num.length()==0)$
80 {$
81 return result;$
82 }$
83 +++++$
84 create_combination(num, result, pace, 0,"");$
85 return result;$
86 +++++$
87 ++++$
88 $
89 }+$
90 $
91 $
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94 $
95 $
96 $
97 $
Q1 fa.cpp 94,0-1 82%
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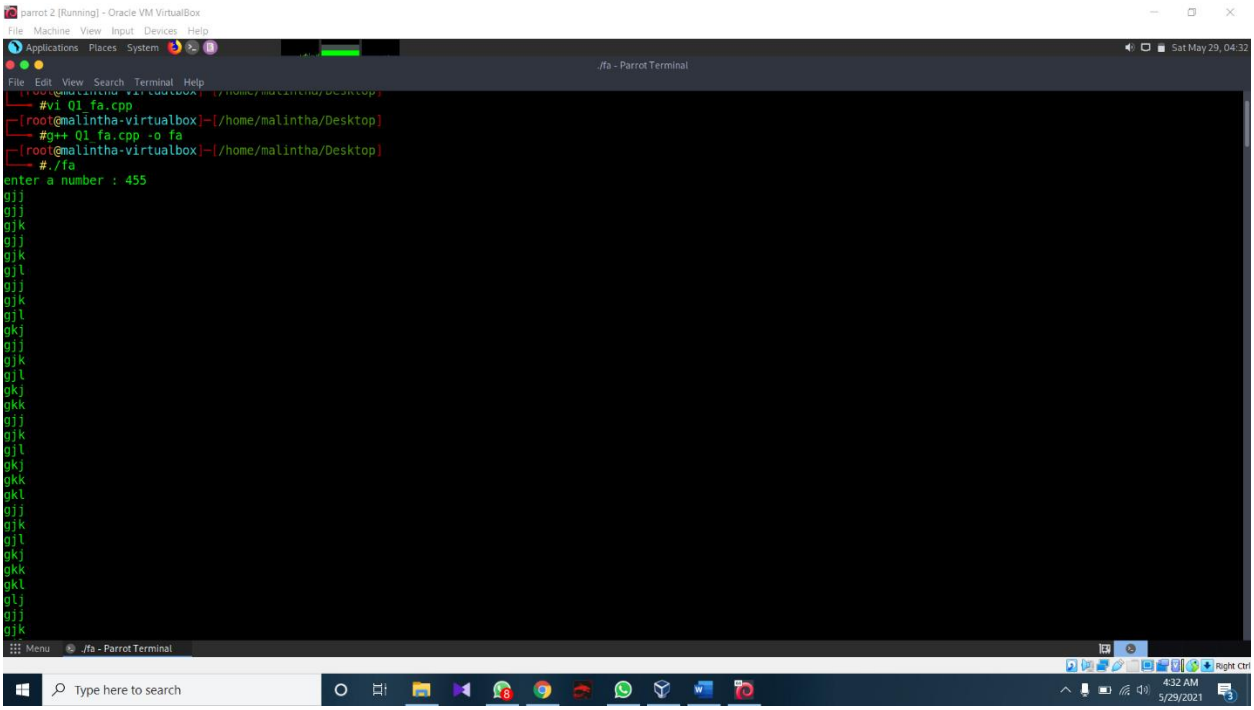
Output of Q1


parrot 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places System
Sat May 29, 04:32
./fa - Parrot Terminal
File Edit View Search Terminal Help
#vi Q1_fa.cpp
[root@malintha-virtualbox]-[/home/malintha/Desktop]
#g++ Q1_fa.cpp -o fa
[root@malintha-virtualbox]-[/home/malintha/Desktop]
#./fa
enter a number : 455
gjj
gjj
gjk
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gjk
gjl
gjj
gjk
gjl
gkj
gjj
gjk
gjl
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gkk
gjj
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gjl
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gjj
gjk
Menu
./fa - Parrot Terminal
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Q2 Source code

```
#include <stdio.h>
#include<iostream>
#include<string.h>
using namespace std;

//declaring the function
bool checker(string s, string p);
bool checkchars(string s);
bool checkpattn(string p);

int main()
{
    //declaring variables
    string s,p;

    //inserting inputs for string and pattern.
    cout << "please enter the string : ";
    cin >> s;
```

```
    cout << "enter the pattern : ";

    cin >> p;


    // validating the user inputs by callin checkchars and checkpattn functions.

    if(checkchars(s) == 1 || checkpattn(p) == 1 || p[0] == '*' || s.length() < 0 || s.length() > 20 || p.length() < 0 || p.length() > 30)

    {


            cout << "invalid input";


                return -1;

    }




    else

    {

         //calling the checker function to check wheather the number is match for the pattern

        if(checker(s,p) == 0)
```

```
        {
            cout << "False \n";
        }

        else
        if(checker(s,p) == 1)
        {
            cout << "True \n";
        }



    }

        return 0;
}


//check the pattern matches the string
bool checker(string s, string p)
```

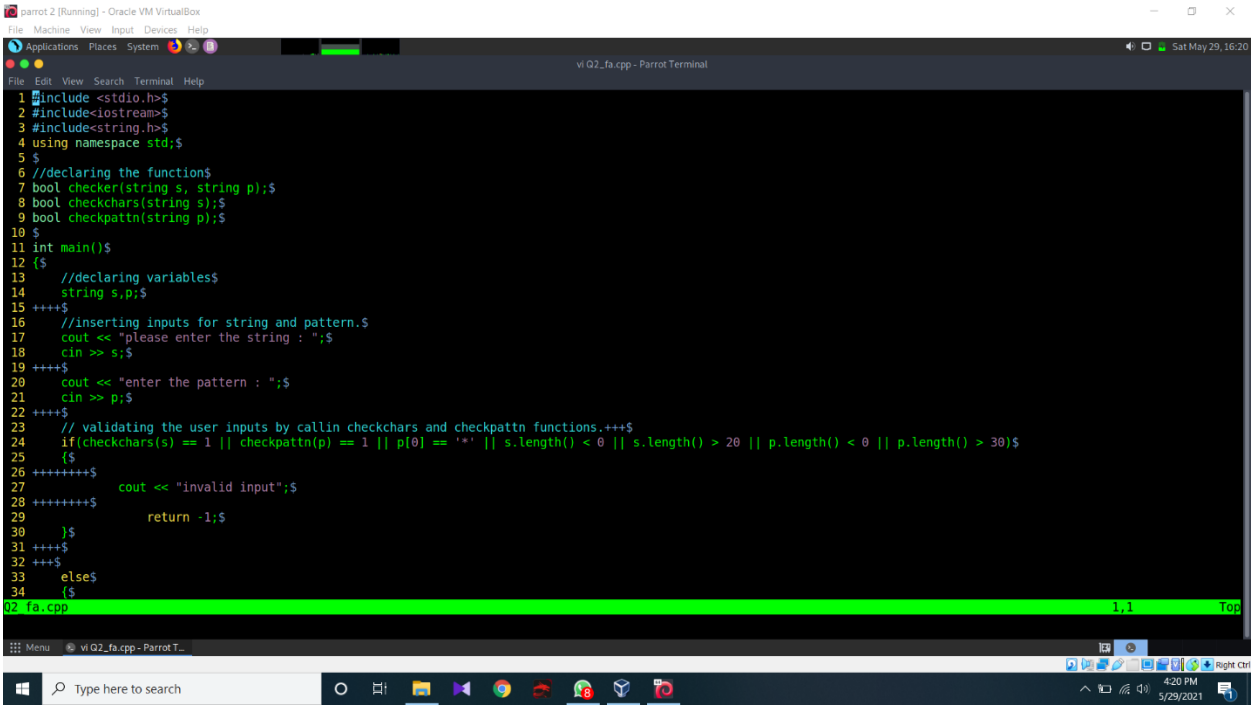
```
{
    if((p.size() > 1) && p[1] == '*')
    {
        //check recursive function is true
        if(checker(s,p.substr(2)))
        {

            return true;



        }

        if((p[0] == '.'||p[0] == s[0]) && s.length() > 0)
        {
            //implementing recursive function
            return checker(s.substr(1),p);
        }

        return false;
```

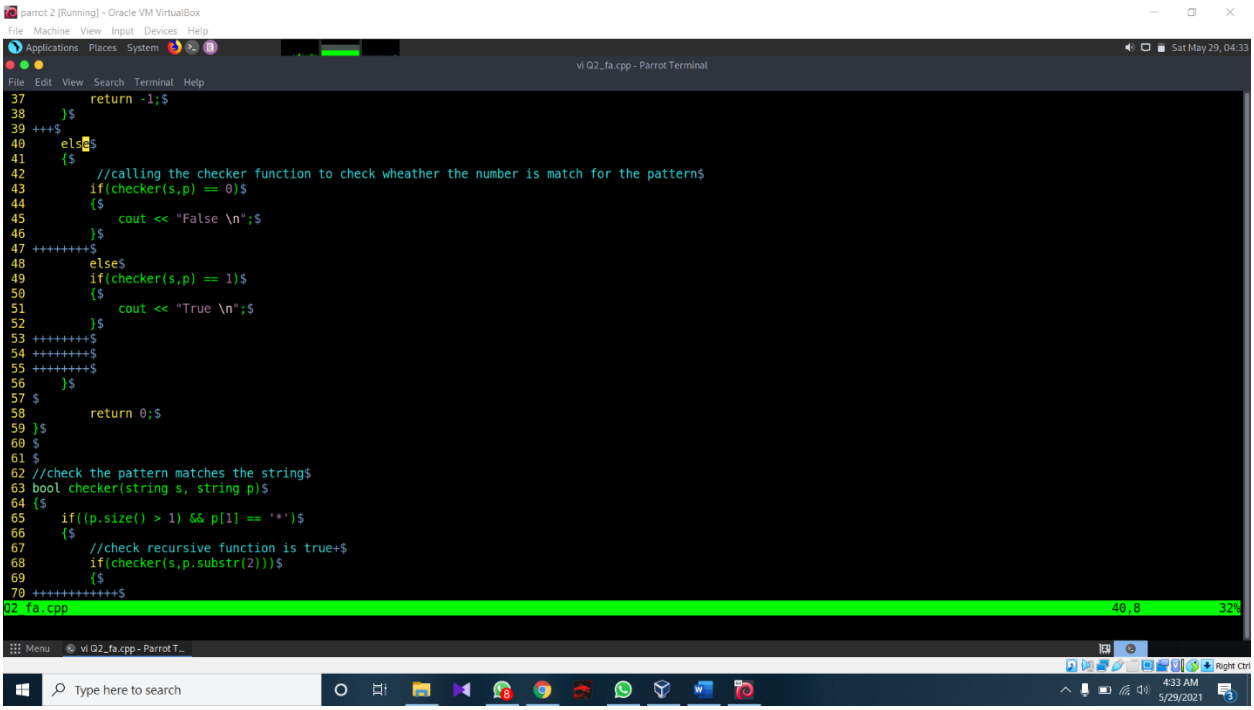
```
}


if(p.size() == 0)
{

    return s.size() == 0;


}


else
{
    if((p[0] == '.' || p[0] == s[0]) && s.size() > 0)
    {
        //substr - use to remove the check character of the string.
        //example : s = abb - s.substr(1) = bb
        //implementing the recursive function
```

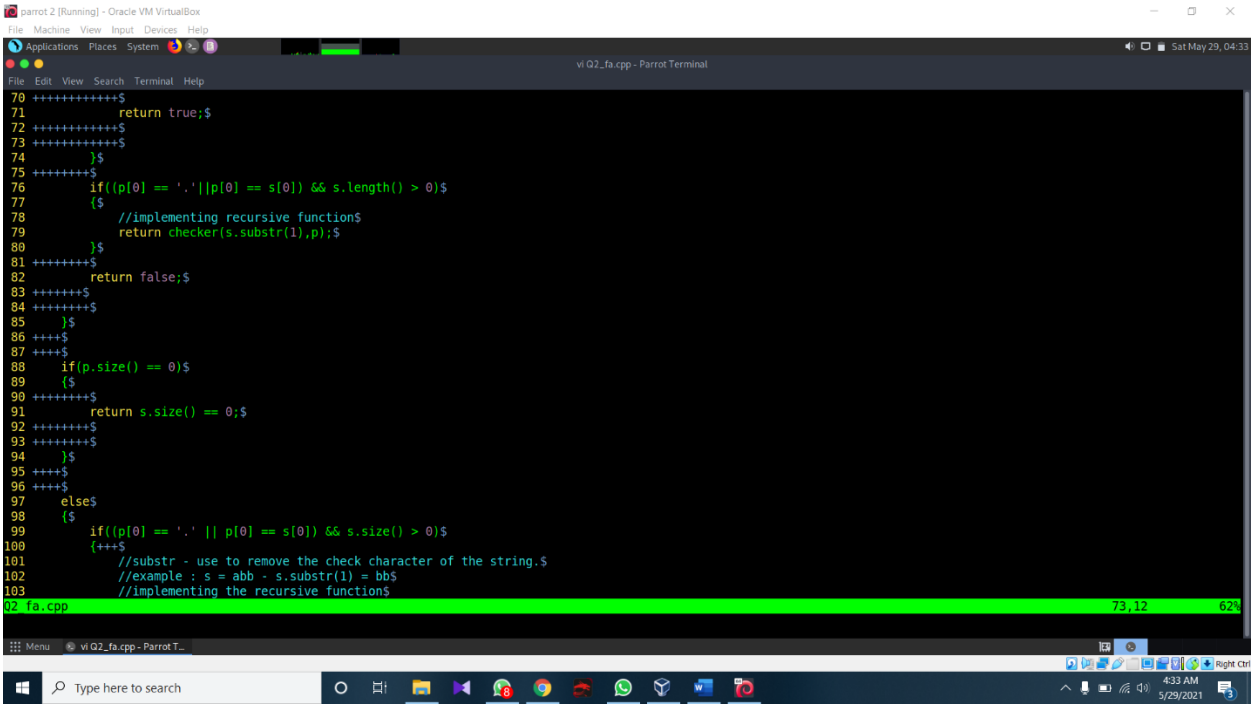
```
            return checker(s.substr(1),p.substr(1));
        }

        return false;


    }


}


//check all the character are in lowecase in the strings
bool checkchars(string s)
{
    for(int i = 0 ; i < s.length() ; i++)
    {
      if(s[i] < 97 || s[i] > 122)
      {
          return true;
```

```
        }


    }
}

//check all the character are in loewrcase in pattern
bool checkpattn(string p)
{
    for (int i = 0 ; i < p.length() ; i++)
    {
        if (isupper(p[i]) || isdigit(p[i]))
        {
            return true;
        }


    }


}
```

Image of source code






parrot 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
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Sat May 29, 04:33
vi Q2_fa.cpp - Parrot Terminal
File Edit View Search Terminal Help
70 ++++++++++++$
71 return true;$
72 ++++++++++++$
73 ++++++++++++$
74 }$
75 ++++++++$
76 if((p[0] == '.'||p[0] == s[0]) && s.length() > 0)$
77 {$
78 //implementing recursive function$
79 return checker(s.substr(1),p);$
80 }$
81 ++++++++$
82 return false;$
83 +++++++$
84 ++++++++$
85 }$
86 ++++$
87 ++++$
88 if(p.size() == 0)$
89 {$
90 ++++++++$
91 return s.size() == 0;$
92 ++++++++$
93 ++++++++$
94 }$
95 ++++$
96 ++++$
97 else$
98 {$
99 if((p[0] == '.' || p[0] == s[0]) && s.size() > 0)$
100 {+++$
101 //substr - use to remove the check character of the string.$
102 //example : s = abb - s.substr(1) = bb$
103 //implementing the recursive function$
Q2_fa.cpp 73,12 62%
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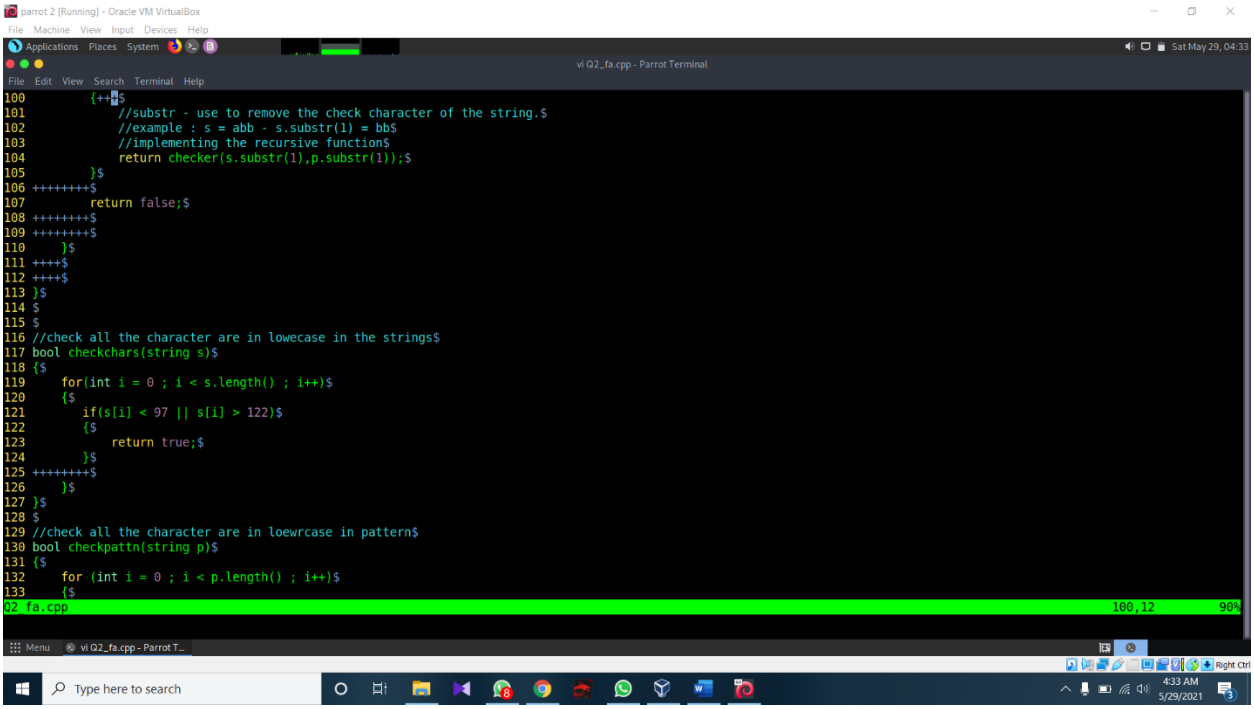
parrot 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places System
Sat May 29, 04:33
vi Q2_fa.cpp - Parrot Terminal
File Edit View Search Terminal Help
100 {++$
101 //substr - use to remove the check character of the string.$
102 //example : s = abb - s.substr(1) = bb$
103 //implementing the recursive function$
104 return checker(s.substr(1),p.substr(1));$
105 }$
106 ++++++++$
107 return false;$
108 ++++++++$
109 ++++++++$
110 }$
111 ++++$
112 ++++$
113 }$
114 $
115 $
116 //check all the character are in lowecase in the strings$
117 bool checkchars(string s)$
118 {$
119 for(int i = 0 ; i < s.length() ; i++)$
120 {$
121 if(s[i] < 97 || s[i] > 122)$
122 {$
123 return true;$
124 }$
125 ++++++++$
126 }$
127 }$
128 $
129 //check all the character are in loewrcase in pattern$
130 bool checkpattn(string p)$
131 {$
132 for (int i = 0 ; i < p.length() ; i++)$
133 {$
Q2_fa.cpp 100,12 90%
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vi Q2_fa.cpp - Parrot T...
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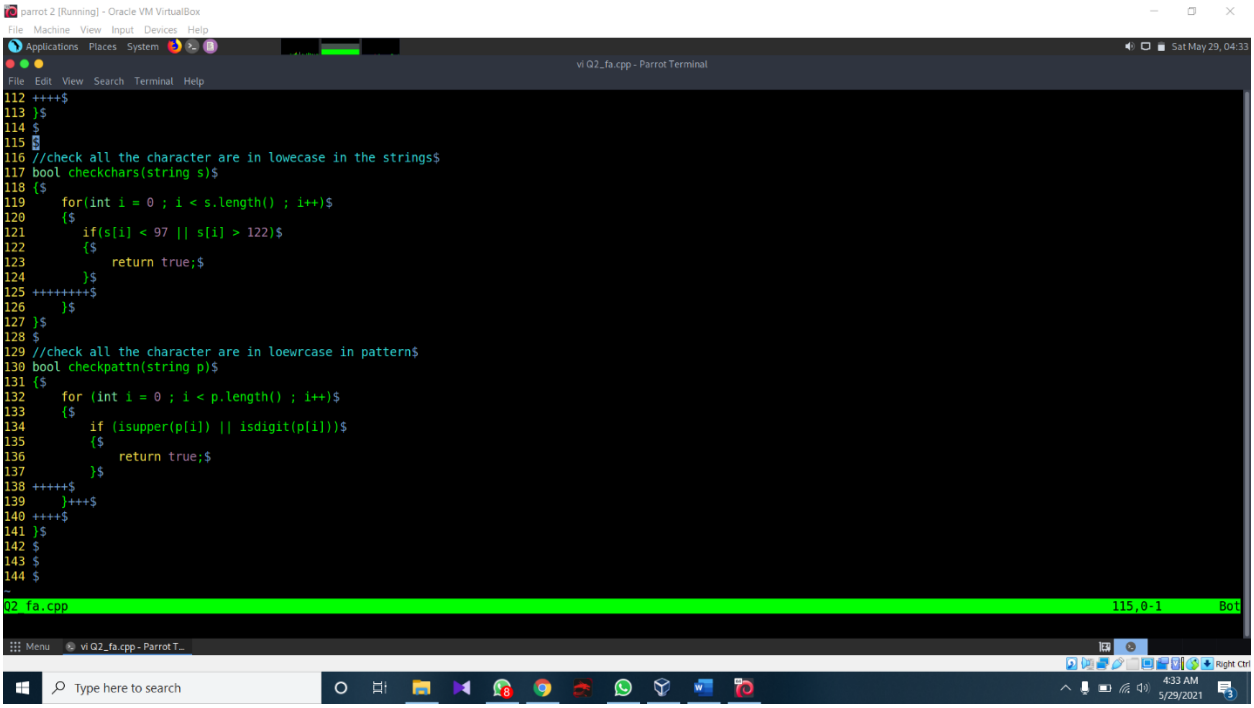
parrot 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places System
Sat May 29, 04:33
vi Q2_fa.cpp - Parrot Terminal
File Edit View Search Terminal Help
112 ++++$
113 }$
114 $
115 $
116 //check all the character are in lowecase in the strings$
117 bool checkchars(string s)$
118 {$
119 for(int i = 0 ; i < s.length() ; i++)$
120 {$
121 if(s[i] < 97 || s[i] > 122)$
122 {$
123 return true;$
124 }$
125 ++++++++$
126 }$
127 }$
128 $
129 //check all the character are in loewrcase in pattern$
130 bool checkpattn(string p)$
131 {$
132 for (int i = 0 ; i < p.length() ; i++)$
133 {$
134 if (isupper(p[i]) || isdigit(p[i]))$
135 {$
136 return true;$
137 }$
138 +++++$
139 }+++$
140 ++++$
141 }$
142 $
143 $
144 $
Q2 fa.cpp 115,0-1 Bot
Menu vi Q2_fa.cpp - Parrot T...
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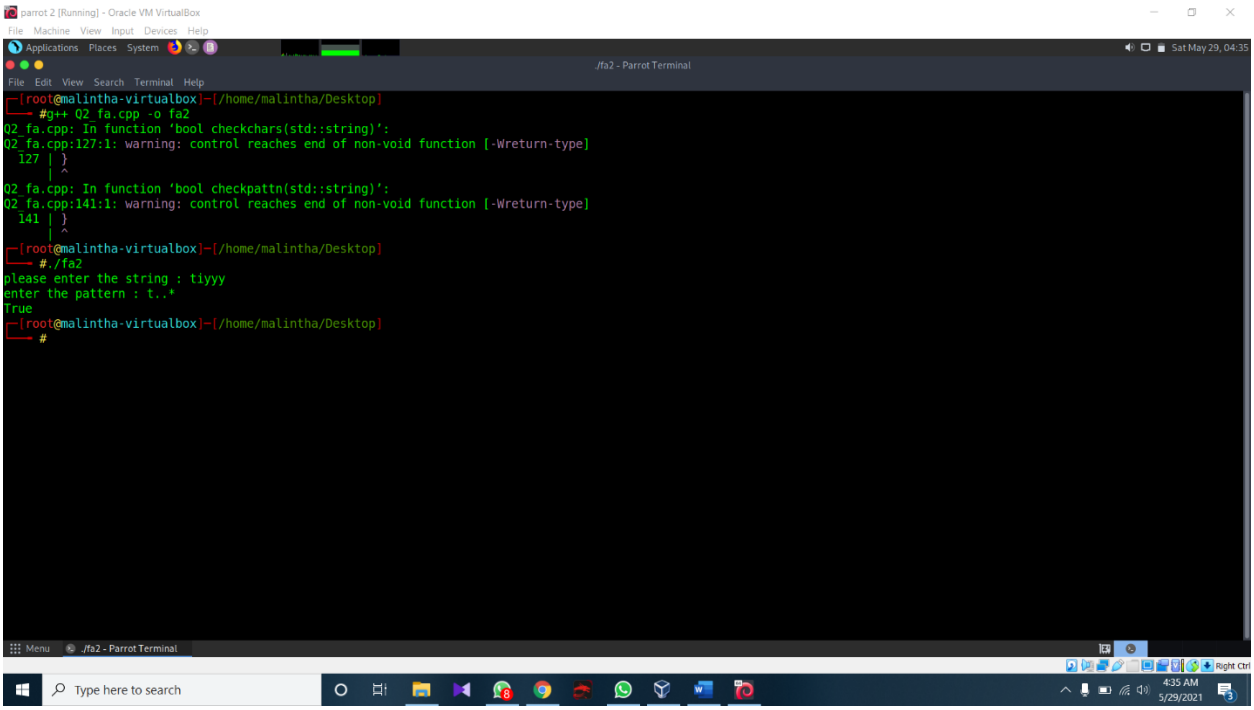
5/29/2021

Output of Q2


parrot 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places System
Sat May 29, 04:35
./fa2 - Parrot Terminal
File Edit View Search Terminal Help
┌─[root@malintha-virtualbox]─[/home/malintha/Desktop]
└──╼ #g++ Q2_fa.cpp -o fa2
Q2_fa.cpp: In function 'bool checkchars(std::string)':
Q2_fa.cpp:127:1: warning: control reaches end of non-void function [-Wreturn-type]
127 | }
| ^
Q2_fa.cpp: In function 'bool checkpattn(std::string)':
Q2_fa.cpp:141:1: warning: control reaches end of non-void function [-Wreturn-type]
141 | }
| ^
┌─[root@malintha-virtualbox]─[/home/malintha/Desktop]
└──╼ #./fa2
please enter the string : tiyyy
enter the pattern : t..*
True
┌─[root@malintha-virtualbox]─[/home/malintha/Desktop]
└──╼ #
Menu ./fa2 - Parrot Terminal
Type here to search
4:35 AM
5/29/2021