/* B2: Write a program to implement: Recursive Descent Parsing with back tracking (Brute Force Method)

(a) $S \rightarrow aaSaa \mid aa$

(b) $S \rightarrow aaaSaaa \mid aa$

(c) $S \rightarrow aaaaSaaaa \mid aa$

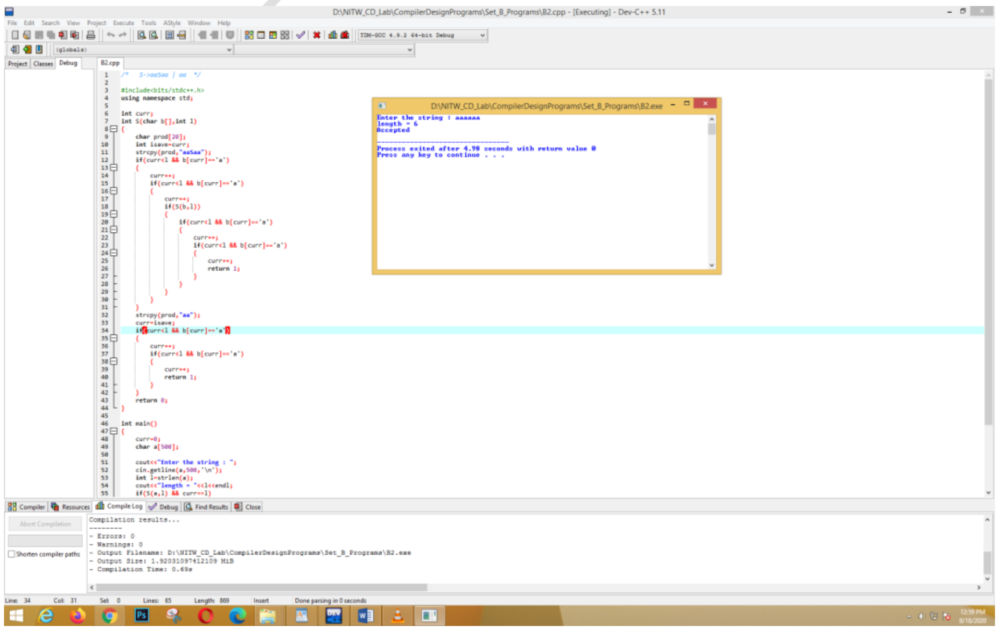
(d) $S \rightarrow aaaSaaa \mid \text{aSa} \mid aa$

Record the tracing and submit the video to show it is using Backtracking and working with other alternatives. */

File: B2.cpp

```
/*   S->aaSaa | aa  */

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

int curr;
//??
int S(char b[],int l)
{
      //match with aa
      char prod[20];
      int isave=curr;
      strcpy(prod,"aaSaa");
      if(curr<l && b[curr]=='a')
      {
            curr++;
            if(curr<l && b[curr]=='a')
            {
                  curr++;
                  //recursive call to match S
                  if(S(b,l))
                  {
                        if(curr<l && b[curr]=='a')
                        {
                              curr++;
                              if(curr<l && b[curr]=='a')
                              {
                                    curr++;
                                    return 1;
                              }
                        }
                  }
            }
      }
      //match with aa
      strcpy(prod,"aa");
      curr=isave;
      if(curr<l && b[curr]=='a')
```

```
		{
			curr++;
			if(curr<l && b[curr]=='a')
			{
				curr++;
				return 1;
			}
		}
		return 0;
	}

	int main()
	{
		curr=0;
		char a[500];

		cout<<"Enter the string : ";
		cin.getline(a,500,'\n');
		int l=strlen(a);
		cout<<"length = "<<l<<endl;
		if(S(a,l) && curr==l)
		{
			cout<<"Accepted\n";
		}
		else
		{
			cout<<"Not Accepted\n";
		}
		return 0;
	}
```


D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2.cpp - [Executing] - Dev-C++ 5.11

TDM-GCC 4.9.2 64-bit Debug

B2.cpp

```
/*   S->aaSaa | aa   */

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

int curr;
int S(char b[],int l)
{
	char prod[20];
	int isave=curr;
	strcpy(prod,"aaSaa");
	if(curr<l && b[curr]=='a')
	{
		curr++;
		if(curr<l && b[curr]=='a')
		{
			curr++;
			if(S(b,l))
			{
				if(curr<l && b[curr]=='a')
				{
					curr++;
					if(curr<l && b[curr]=='a')
					{
						curr++;
						return 1;
					}
				}
			}
		}
	}
	strcpy(prod,"aa");
	curr=isave;
	if(curr<l && b[curr]=='a')
	{
		curr++;
		if(curr<l && b[curr]=='a')
		{
			curr++;
			return 1;
		}
	}
	return 0;
}

int main()
{
	curr=0;
	char a[500];

	cout<<"Enter the string : ";
	cin.getline(a,500,'\n');
	int l=strlen(a);
	cout<<"length = "<<l<<endl;
	if(S(a,l) && curr==l)
```

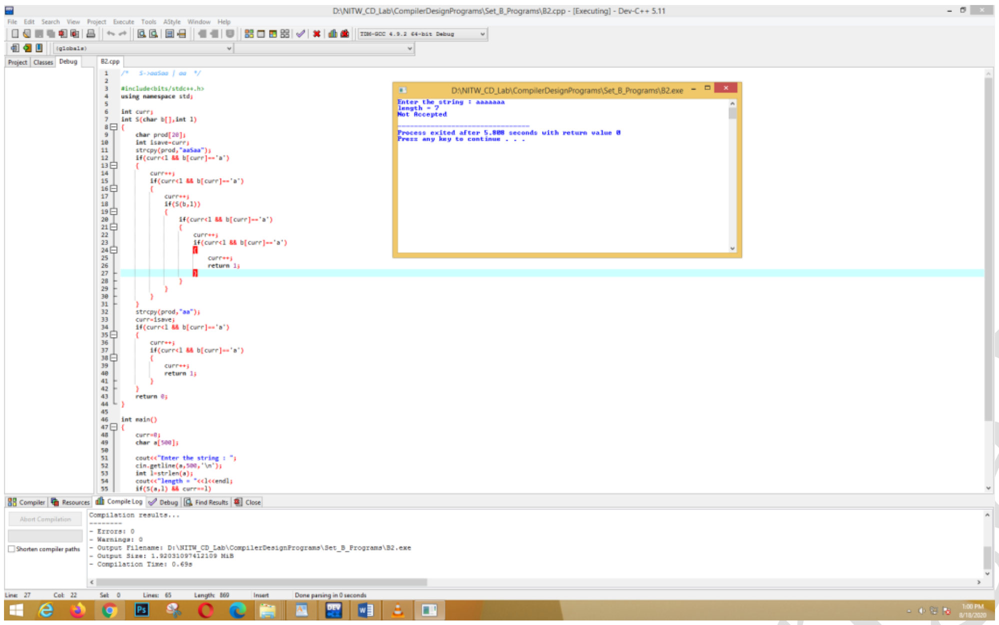
D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2.exe

```
Enter the string : aaaaaa
length = 6
Accepted

--------------------------------
Process exited after 4.98 seconds with return value 0
Press any key to continue . . .
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2.exe
- Output Size: 1.92031097412109 MiB
- Compilation Time: 0.69s
```

Line: 34   Col: 31   Sel: 0   Lines: 65   Length: 869   Insert   Done parsing in 0 seconds

File Edit Search View Project Execute Tools AStyle Window Help
(globals)
Project Classes Debug
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths


D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Debug
(globals)
Project Classes Debug
B2.cpp
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths
Line: 27 Col: 22 Sel: 0 Lines: 65 Length: 869 Insert Done parsing in 0 seconds

```
/*   S->aaSaa | aa   */

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

int curr;
int S(char b[],int l)
{
    char prod[20];
    int isave=curr;
    strcpy(prod,"aaSaa");
    if(curr<l && b[curr]=='a')
    {
        curr++;
        if(curr<l && b[curr]=='a')
        {
            curr++;
            if(S(b,l))
            {
                if(curr<l && b[curr]=='a')
                {
                    curr++;
                    if(curr<l && b[curr]=='a')
                    {
                        curr++;
                        return 1;
                    }
                }
            }
        }
    }
    strcpy(prod,"aa");
    curr=isave;
    if(curr<l && b[curr]=='a')
    {
        curr++;
        if(curr<l && b[curr]=='a')
        {
            curr++;
            return 1;
        }
    }
    return 0;
}

int main()
{
    curr=0;
    char a[500];

    cout<<"Enter the string : ";
    cin.getline(a,500,'\n');
    int l=strlen(a);
    cout<<"length = "<<l<<endl;
    if(S(a,l) && curr==l)
```

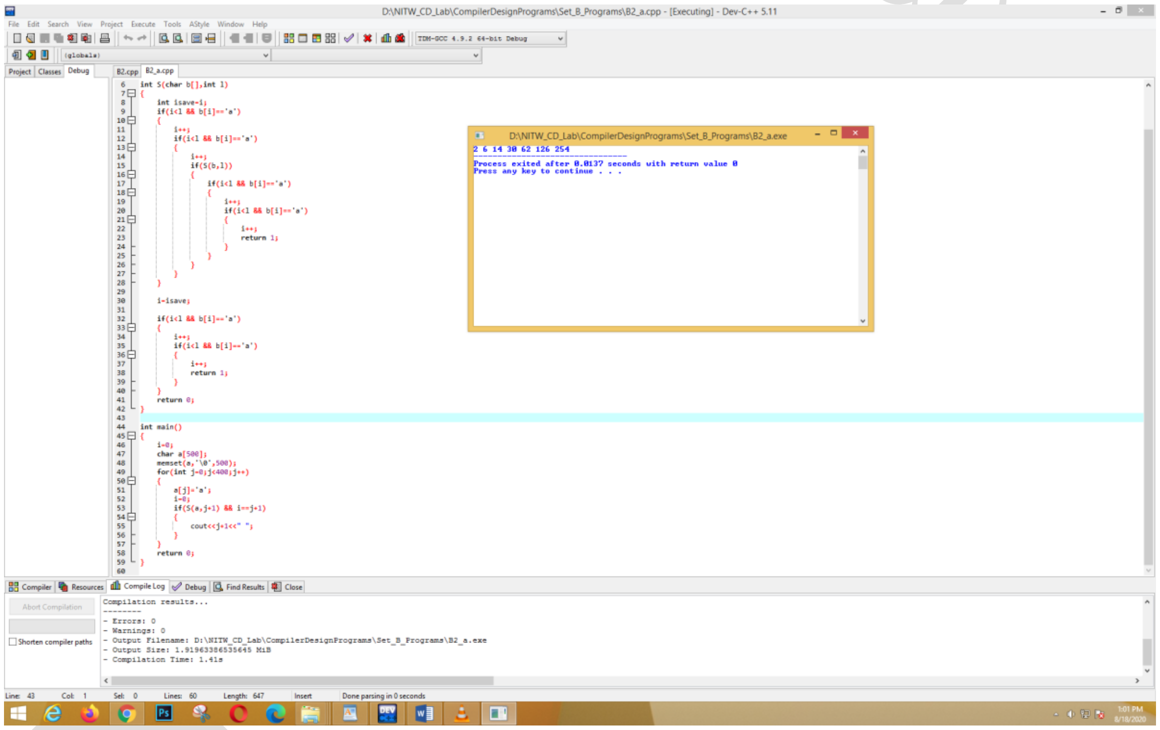
D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2.exe

```
Enter the string : aaaaaaa
length = 7
Not Accepted

--------------------------------
Process exited after 5.808 seconds with return value 0
Press any key to continue . . .
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2.exe
- Output Size: 1.92031097412109 MiB
- Compilation Time: 0.69s
```

File: B2_a.cpp

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

int i;
//??
//tries all possible centres recursively and try to match the
string
int S(char b[],int l)
{
	int isave=i;
	//match with aa
	if(i<l && b[i]=='a')
	{
		i++;
		if(i<l && b[i]=='a')
		{
			i++;
			//match with S recursively
			if(S(b,l))
			{
				//match with aa
				if(i<l && b[i]=='a')
				{
					i++;
					if(i<l && b[i]=='a')
					{
						i++;
						return 1;
					}
				}
			}
		}
	}

	i=isave;
	//match with middle aa
	if(i<l && b[i]=='a')
	{
		i++;
		if(i<l && b[i]=='a')
		{
			i++;
			return 1;
		}
	}
	return 0;
}

int main()
{
        i=0;
        char a[500];
        memset(a,'\0',500);
        for(int j=0;j<400;j++)
        {
                a[j]='a';
                i=0;
                if(S(a,j+1) && i==j+1)
                {
                        cout<<j+1<<" ";
                }
        }
        return 0;
}
```



D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_a.cpp - [Executing] - Dev-C++ 5.11

```
int S(char b[],int l)
{
    int isave=i;
    if(i<l && b[i]=='a')
    {
        i++;
        if(i<l && b[i]=='a')
        {
            i++;
            if(S(b,l))
            {
                if(i<l && b[i]=='a')
                {
                    i++;
                    if(i<l && b[i]=='a')
                    {
                        i++;
                        return 1;
                    }
                }
            }
        }
    }

    i=isave;

    if(i<l && b[i]=='a')
    {
        i++;
        if(i<l && b[i]=='a')
        {
            i++;
            return 1;
        }
    }
    return 0;
}

int main()
{
    i=0;
    char a[500];
    memset(a,'\0',500);
    for(int j=0;j<400;j++)
    {
        a[j]='a';
        i=0;
        if(S(a,j+1) && i==j+1)
        {
            cout<<j+1<<" ";
        }
    }
    return 0;
}
```

D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_a.exe

```
2 6 14 30 62 126 254
--------------------------------
Process exited after 0.0137 seconds with return value 0
Press any key to continue . . .
```

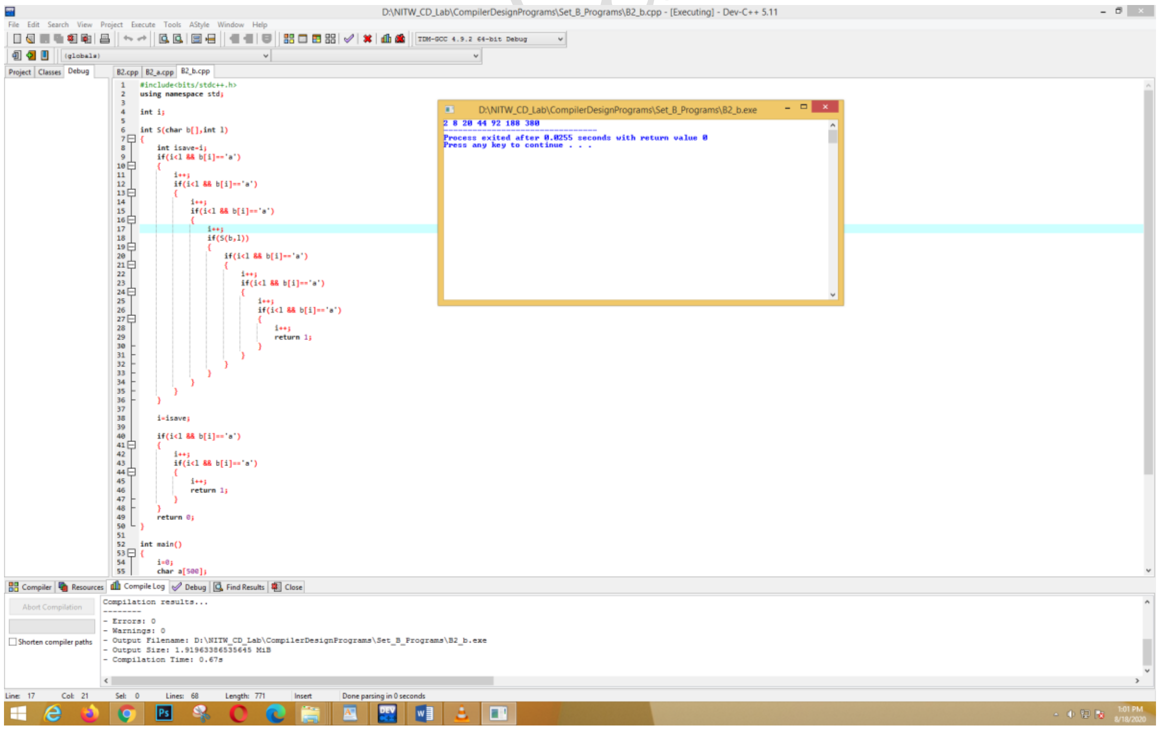
```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_a.exe
- Output Size: 1.91963386535645 MiB
- Compilation Time: 1.41s
```

Line: 43 Col: 1 Sel: 0 Lines: 60 Length: 647 Insert Done parsing in 0 seconds

File: B2_b.cpp

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

int i;
//??

//checks for grammer S->aaaSaaa | aa
//tries all possible centres recursively and try to match the
string
int S(char b[],int l)
{
	int isave=i;
	//match with aaa
	if(i<l && b[i]=='a')
	{
		i++;
		if(i<l && b[i]=='a')
		{
			i++;
			if(i<l && b[i]=='a')
			{
				i++;
				//match with S recursively
				if(S(b,l))
				{
					//match with aaa
					if(i<l && b[i]=='a')
					{
						i++;
						if(i<l && b[i]=='a')
						{
							i++;
							if(i<l && b[i]=='a')
							{
								i++;
								return 1;
							}
						}
					}
				}
			}
		}
	}

	i=isave;
	//match with middle aa
	if(i<l && b[i]=='a')
	{
		i++;
		if(i<l && b[i]=='a')
```

```
                {
                        i++;
                        return 1;
                }
        }
        return 0;
}

int main()
{
        i=0;
        char a[500];
        memset(a,'\0',500);
        for(int j=0;j<400;j++)
        {
                a[j]='a';
                i=0;
                if(S(a,j+1) && i==j+1)
                {
                        cout<<j+1<<" ";
                }
        }
        return 0;
}
```


D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_b.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Debug
(globals)
Project Classes Debug
B2.cpp B2_a.cpp B2_b.cpp
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths

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

int i;

int S(char b[],int l)
{
	int isave=i;
	if(i<l && b[i]=='a')
	{
		i++;
		if(i<l && b[i]=='a')
		{
			i++;
			if(i<l && b[i]=='a')
			{
				i++;
				if(S(b,l))
				{
					if(i<l && b[i]=='a')
					{
						i++;
						if(i<l && b[i]=='a')
						{
							i++;
							if(i<l && b[i]=='a')
							{
								i++;
								return 1;
							}
						}
					}
				}
			}
		}
	}

	i=isave;

	if(i<l && b[i]=='a')
	{
		i++;
		if(i<l && b[i]=='a')
		{
			i++;
			return 1;
		}
	}
	return 0;
}

int main()
{
	i=0;
	char a[500];
```

D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_b.exe

```
2 8 20 44 92 188 380
--------------------------------
Process exited after 0.0255 seconds with return value 0
Press any key to continue . . .
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_b.exe
- Output Size: 1.91963386535645 MiB
- Compilation Time: 0.67s
```

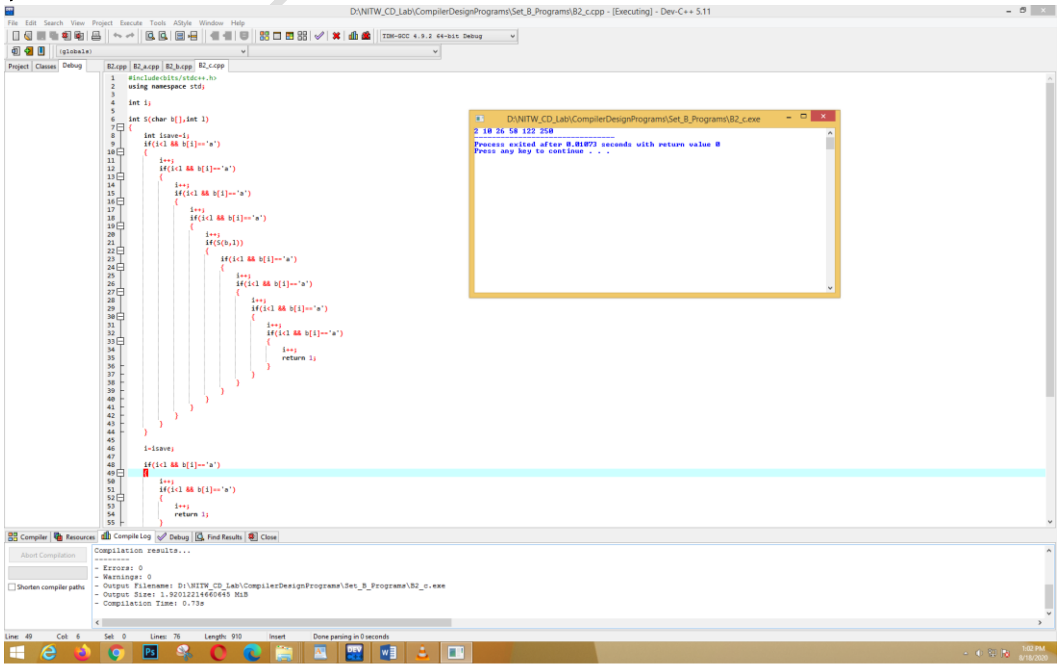
Line: 17 Col: 21 Sel: 0 Lines: 68 Length: 771 Insert Done parsing in 0 seconds

1:01 PM 8/18/2020

File: B2_c.cpp

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

//checks for grammer S->aaaaSaaaa | aa
//tries all possible centres recursively and try to match the
string
int S(char b[],int l)
{
    int isave=i;
    //match with aaaa
    if(i<l && b[i]=='a')
    {
        i++;
        if(i<l && b[i]=='a')
        {
            i++;
            if(i<l && b[i]=='a')
            {
                i++;
                if(i<l && b[i]=='a')
                {
                    i++;
                    //match with S recursively
                    if(S(b,l))
                    {
                        //match with aaaa
                        if(i<l && b[i]=='a')
                        {
                            i++;
                            if(i<l && b[i]=='a')
                            {
                                i++;
                                if(i<l && b[i]=='a')
                                {
                                    i++;
                                    if(i<l &&
b[i]=='a')

                                    {
                                        i++;
                                        return 1;
                                    }
                                }
                            }
                        }
                    }
                }
            }
        }
    }
```

```
        }

        i=isave;
        //match with middle aa
        if(i<l && b[i]=='a')
        {
                i++;
                if(i<l && b[i]=='a')
                {
                        i++;
                        return 1;
                }
        }
        return 0;
}

int main()
{
        i=0;
        char a[500];
        memset(a,'\0',500);
        for(int j=0;j<400;j++)
        {
                a[j]='a';
                i=0;
                if(S(a,j+1) && i==j+1)
                {
                        cout<<j+1<<" ";
                }
        }
        return 0;
}
```



D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_c.cpp - [Executing] - Dev-C++ 5.11

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

int i;

int S(char b[],int l)
{
    int isave=i;
    if(i<l && b[i]=='a')
    {
        i++;
        if(i<l && b[i]=='a')
        {
            i++;
            if(i<l && b[i]=='a')
            {
                i++;
                if(i<l && b[i]=='a')
                {
                    i++;
                    if(S(b,l))
                    {
                        if(i<l && b[i]=='a')
                        {
                            i++;
                            if(i<l && b[i]=='a')
                            {
                                i++;
                                if(i<l && b[i]=='a')
                                {
                                    i++;
                                    if(i<l && b[i]=='a')
                                    {
                                        i++;
                                        return 1;
                                    }
                                }
                            }
                        }
                    }
                }
            }
        }
    }

    i=isave;

    if(i<l && b[i]=='a')
    {
        i++;
        if(i<l && b[i]=='a')
        {
            i++;
            return 1;
        }
```

D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_c.exe

```
2 10 26 58 122 250
--------------------------------
Process exited after 0.01073 seconds with return value 0
Press any key to continue . . .
```

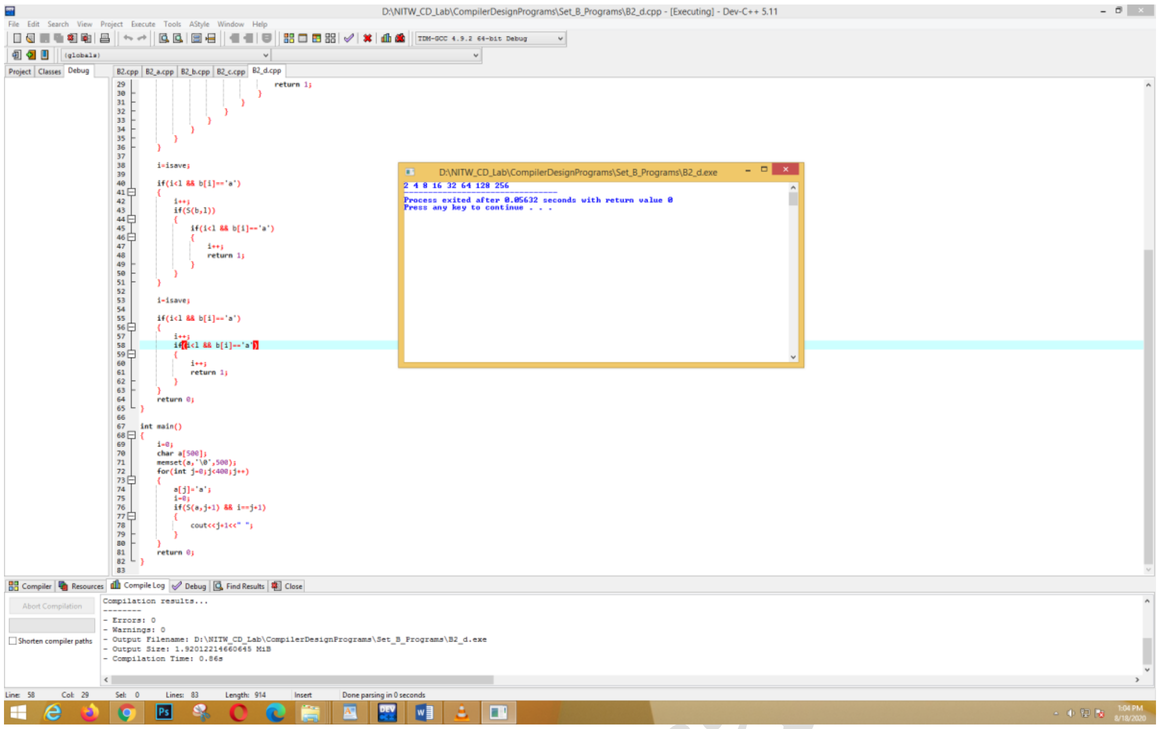
```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_c.exe
- Output Size: 1.92012214660645 MiB
- Compilation Time: 0.73s
```

Line: 49 Col: 6 Sel: 0 Lines: 76 Length: 910 Insert Done parsing in 0 seconds

File: B2_d.cpp

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

int i;
//??

//checks for grammer S->aaaSaaa | aSa | aa
//tries all possible centres recursively and try to match the
string
int S(char b[],int l)
{
	int isave=i;
	//match with aaa
	if(i<l && b[i]=='a')
	{
		i++;
		if(i<l && b[i]=='a')
		{
			i++;
			if(i<l && b[i]=='a')
			{
				i++;
				//match with S recursively
				if(S(b,l))
				{
					//match with aaa
					if(i<l && b[i]=='a')
					{
						i++;
						if(i<l && b[i]=='a')
						{
							i++;
							if(i<l && b[i]=='a')
							{
								i++;
								return 1;
							}
						}
					}
				}
			}
		}
	}

	i=isave;
	//match with a
	if(i<l && b[i]=='a')
	{
		i++;
		//match with S recursively
```

```
            if(S(b,l))
            {
                  //match with a
                  if(i<l && b[i]=='a')
                  {
                        i++;
                        return 1;
                  }
            }
      }

      i=isave;
      //match with middle aa
      if(i<l && b[i]=='a')
      {
            i++;
            if(i<l && b[i]=='a')
            {
                  i++;
                  return 1;
            }
      }
      return 0;
}

int main()
{
      i=0;
      char a[500];
      memset(a,'\0',500);
      for(int j=0;j<400;j++)
      {
            a[j]='a';
            i=0;
            if(S(a,j+1) && i==j+1)
            {
                  cout<<j+1<<" ";
            }
      }
      return 0;
}
```


D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_d.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Debug
(globals)
Project Classes Debug
B2.cpp B2_a.cpp B2_b.cpp B2_c.cpp B2_d.cpp
Compiler Resources Compile Log Debug Find Results Close
Abort Compilation
Shorten compiler paths

```
                                return 1;
                            }
                        }
                    }
                }
            }
        }
    }

    i=isave;

    if(i<l && b[i]=='a')
    {
        i++;
        if(S(b,l))
        {
            if(i<l && b[i]=='a')
            {
                i++;
                return 1;
            }
        }
    }

    i=isave;

    if(i<l && b[i]=='a')
    {
        i++;
        if(i<l && b[i]=='a')
        {
            i++;
            return 1;
        }
    }
    return 0;
}

int main()
{
    i=0;
    char a[500];
    memset(a,'\0',500);
    for(int j=0;j<400;j++)
    {
        a[j]='a';
        i=0;
        if(S(a,j+1) && i==j+1)
        {
            cout<<j+1<<" ";
        }
    }
    return 0;
}
```

D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_d.exe

```
2 4 8 16 32 64 128 256
--------------------------------
Process exited after 0.05632 seconds with return value 0
Press any key to continue . . .
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: D:\NITW_CD_Lab\CompilerDesignPrograms\Set_B_Programs\B2_d.exe
- Output Size: 1.92012214660645 MiB
- Compilation Time: 0.86s
```

Line: 58 Col: 29 Sel: 0 Lines: 83 Length: 914 Insert Done parsing in 0 seconds