System Software and Operating Systems Laboratory

Installation Procedure:

1. **Sudo apt-get update**

To install Lex package:

Type the exact command (either of the two)

sudo apt-get install flex

OR

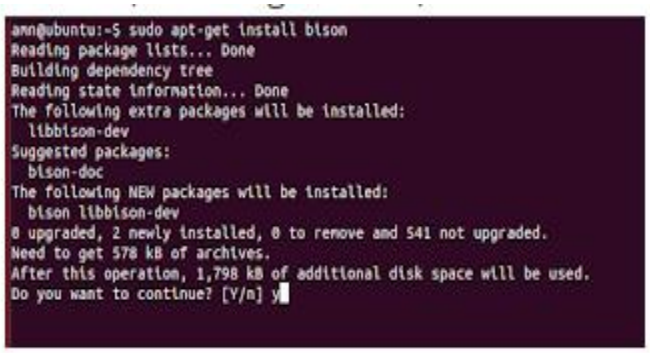
sudo apt-get install flex-old

Type 'y' when it asks for confirmation (see below image)

To install Yacc package:

sudo apt-get install bison

Type 'y' when it asks for confirmation (see image below)



SAMPLE PROGRAMS

1. **lex code to count the number of a's in the input**

```
%{
int c=0;          /* Global Variable */
%}
/* Rules Section */

%%
[a]       c++;
.         ;
%%

int main()
{
        yylex();
        printf("The no of a's in the given string  %d\n",c);
}
```

Execution Steps:

Lex <lexfilename.l>

cc lex.yy.c –ll

. /a.out

OUTPUT

aaabna (Press **Cntrl-D**)
The no of a’s in the given string 4

2. **lex code to count the number of lines, tabs and spaces used in the input**

```
%{
#include<stdio.h>
int lc=0, sc=0, tc=0, ch=0; /*Global variables*/
%}

/*Rule Section*/
%%
\n lc++; //line counter
([ ])+ sc++; //space counter
\t tc++; //tab counter
. ch++;  //characters counter
%%

int main()
{
        // The function that starts the analysis
        yylex();

        printf("\nNo. of lines=%d", lc);
        printf("\nNo. of spaces=%d", sc);
        printf("\nNo. of tabs=%d", tc);
        printf("\nNo. of other characters=%d\n", ch);

}
```

Execution Steps:

Lex <lexfilename.l>

cc lex.yy.c –ll

. /a.out

OUTPUT

```
Good Morning
No of lines = 1
No of spaces = 1
No of tabs = 0
No of characters = 11
```

3. **lex program to count number of words**

```
%{
#include<stdio.h>
#include<string.h>
int i = 0;
```

```
%}

/* Rules Section*/
%%
([a-zA-Z0-9])* {i++;} /* Rule for counting number of words*/

"\n" {printf("%d\n", i); i = 0;}
%%

int yywrap(void){}

int main()
{
        // The function that starts the analysis
        yylex();

        return 0;
}
```

Execution Steps:

Lex <lexfilename.l>

cc lex.yy.c –ll

. /a.out

OUTPUT

Hello Good Morning

3

LAB PROGRAMS

1 a. Write a LEX program to recognize valid arithmetic expression. Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately.

```
%{
#include<stdio.h>
int v=0,op=0,id=0,flag=0;
%}
%%
[a-zA-Z]+[0-9A-Za-z]* {id++;printf("\n Identifier:");ECHO;}
[\+\-\*\/\=] {op++;printf("\n Operartor:");ECHO;}
"(" {v++;}
")" {v--;}
";" {flag=1;}
.|\n {;}
%%
main()
{
printf("Enter the expression");
yylex();
if((op+1) ==id && v==0 && flag==0)
{
printf("\n Expression is Valid\n");
printf("Number of identifiers:%d\n",id);
printf("Number of operators:%d\n",op);
}
else
printf("\n Expression is Invalid\n");
}
```

Execution Steps:

Lex <lexfilename.l>

cc lex.yy.c –ll

. /a.out

Output:

Enter the expression

a+b Identifier: a

Operartor: +

Identifier:b

Number of identifiers is: 2

Number of operators is: 1

Expression is valid

b. Write YACC program to evaluate arithmetic expression involving operators: +, -, *, and /

LEX PART

```
%{
#include"y.tab.h"
extern yylval;
%}
%%
[0-9]+ {yylval=atoi(yytext);return num;}
[\+\-\*\/] {return yytext[0];}
[(] {return yytext[0];}
[)] {return yytext[0];}
. {;}
\n {return 0;}
%%
```

YACC PART

```
%{
#include<stdio.h>
```

```
#include<stdlib.h>
%}
%token num
%left '+"-'
%left '*"/'
%%
input:exp{printf("%d\n",$$);exit(0);}
exp:exp'+' exp{$$=$1+$3;}
|exp'-' exp{$$=$1-$3;}
|exp'*' exp{$$=$1*$3;}
|exp'/' exp{if($3==0) {printf("divide by zero\n");
exit(0);}
else
$$=$1/$3;}
|'('exp')' {$$=$2;}
|num {$$=$1;};
%%
int yyerror()
{
printf("error\n");
exit(0);
}
int main()
{
printf("Enter a expression: ");
yyparse();
}
```

Execution Steps:

Lex <lexfilename.l>

Yacc -d <yaccfilename.y>

```
cc lex.yy.c y.tab.c –ll
. /a.out
```

Output:

```
Enter an expression:
(2+3)*5+9
34
```