/* C5: Use YACC to generate Syntax tree for a given expression.*/

File: C5.y

```
%{
#include <math.h>
#include<ctype.h>
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
/*A structure inorder to store it's own value and left,right child indexes*/
struct tree_node
{
        char val[10];
        int lc;
        int rc;
};

int ind;
/*Nodes for syntax tree*/
struct tree_node syn_tree[100];
void my_print_tree(int cur_ind);
int mknode(int lc,int rc,char val[10]);

%}

/*declaring a digit named token.*/
%token digit

%%
/* print the tree after evaluating E */
S:E {  my_print_tree($1);  }
 ;
/*$$ is the current node's index after making the node*/
/* $n -> nth term's value in the expression */
E:E'+'T   {  $$= mknode($1,$3,"+"); ; }
 |E'-'T    {  $$= mknode($1,$3,"-"); ;}
 |T { $$=$1; }
 ;

T:T'*'F  { $$= mknode($1,$3,"*"); ; }
 |T'/'F { $$= mknode($1,$3,"/"); ;}
 |F {$$=$1 ; }
 ;

F:P'^'F { $$= mknode($1,$3,"^");}
 | P  { $$ = $1  ;}
;

P: '('E')' { $$=$2;  }
```

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```
 |digit {char buf[10]; sprintf(buf,"%d", yylval); $$ = mknode(-1,-1,buf);}

%%

int main()
{
 ind=0;
 printf("Enter an expression\n");
 yyparse();
 return 0;
}


yyerror()
{
 printf("NITW Error\n");
}
/* mknode function to create new tree node with it's value as val and left and
right child node's indices as lc and rc respectively*/
int mknode(int lc,int rc,char val[10])
{
    strcpy(syn_tree[ind].val,val);
    syn_tree[ind].lc = lc;
    syn_tree[ind].rc = rc;
    ind++;
    return ind-1;
}
/*my_print_tree function to print the syntax tree in DLR fashion*/
void my_print_tree(int cur_ind)
{       /*If it's null node,return*/
        if(cur_ind==-1) return;
        /*If,the node is a leaf node*/
        if(syn_tree[cur_ind].lc==-1&&syn_tree[cur_ind].rc==-1)
          printf("Digit Node -> Index : %d, Value : %s
\n",cur_ind,syn_tree[cur_ind].val);

        else
          printf("Operator Node -> Index : %d, Value : %s, Left Child Index : %d,
Right Child Index : %d \n",cur_ind,syn_tree[cur_ind].val,  syn_tree[cur_ind].lc,
syn_tree[cur_ind].rc);

        /*calling left child of the current node*/
        my_print_tree(syn_tree[cur_ind].lc);
        /*calling right child of the current node*/
        my_print_tree(syn_tree[cur_ind].rc);
}
```

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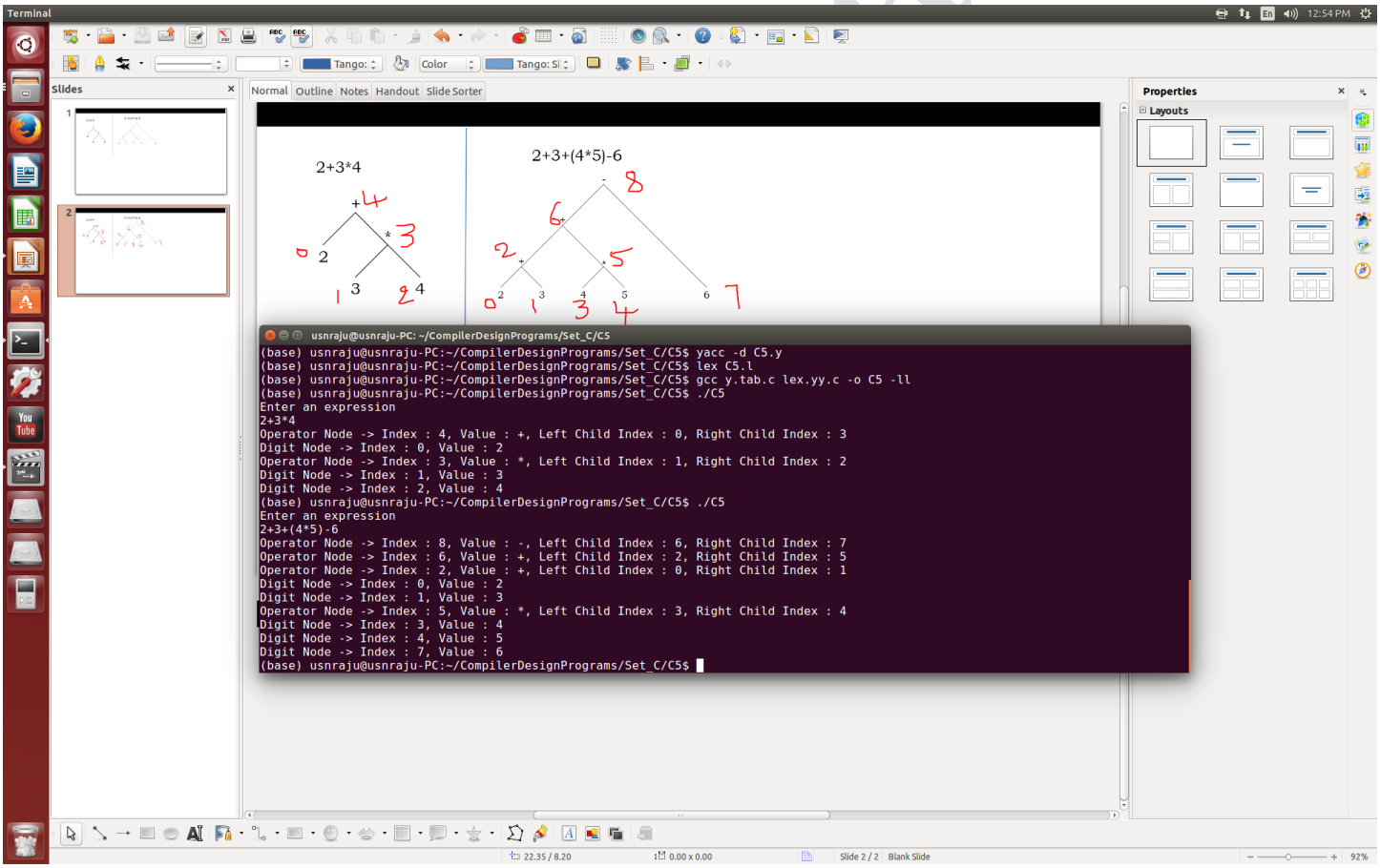
File: C5.l

```
%{
#include "y.tab.h"
 extern int yylval;

%}

%%
/*When the token is a number,return it*/
[0-9]+ {yylval=atoi(yytext); return digit;}
/*When the token is space or tab,return nothing*/
[\t]    ;
/*When the token is new line,return 0*/
[\n]    return 0;
/*When the token is none of the above,return the first character*/
.       return yytext[0];
%%
```



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