LAB5: left recursion removal

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Write a program to implement left recursion removal algorithm.

Input of program- Grammar with possibly direct or indirect recursion.

Output of program- Equivalent grammar without the recursion problem.

## **Left Recursion-**

* A production of grammar is said to have **left recursion** if the leftmost variable of its RHS is same as variable of its LHS.
* A grammar containing a production having left recursion is called as Left Recursive Grammar.

### **Example-**

  A->Ab|c|d

Code:

#include<stdio.h>

#include<string.h>

void findans(char arr[]);

int main(){

int n,i,j,kd=0,l=0,t;

char p[10],q[10],tp1[20],tp2[20];

printf("enter number of production:");

scanf("%d",&n);

if(n>1){

printf("enter %d production rule:\n",n);

scanf("%s",p);

scanf("%s",q);

int len1=strlen(p);

int len2=strlen(q);

char l1=p[0];

char l2=q[0];

tp2[l]=p[0];

l++;

tp2[l]=p[1];

l++;

tp2[l]=p[2];

l++;

for(i=3;i<len1;i++){

if(p[i]==l2){

int n=i+1;

while(p[n]!='|' && p[n]!='\0'){

tp1[kd]=p[n];

kd++;

n++;

}

tp1[kd]='\0';

for(j=3;j<len2;j++){

while(q[j]!='\0' && q[j]!='|'){

tp2[l]=q[j];

l++;

j++;

}

for(t=0;t<strlen(tp1);t++){

tp2[l]=tp1[t];

l++;

}

tp2[l]='|';

l++;

}

i=n;

}

else if(p[i]!=l2){

tp2[l]=p[i];

l++;

}

}

tp2[l]='\0';

findans(tp2);

}

else{

printf("enter production rule\n");

scanf("%s",p);

findans(p);

}

return 0;

}

void findans(char str[]){

int i,j=0,t=0,len,l;

char first[20],sec[20];

len=strlen(str);

l=str[0];

for(i=3;i<len;i++){

if(str[i]==l){

int c=i+1;

while(str[c]!='|' && str[c]!='\0'){

first[j]=str[c];

j++;

c++;

}

first[j]='|';

j++;

i=c;

first[j]='\0';

}

else if(str[i]!=l){

int n=i;

while(str[n]!='\0' && str[n]!='|'){

sec[t++]=str[n];

n++;

}

sec[t++]='|';

i=n;

sec[t]='\0';

}

}

printf("Grammar after removing left recursion is: \n");

printf("%c->",l);

for(i=0;sec[i]!='\0';i++){

if(sec[i]!='|')

printf("%c",sec[i]);

else

printf("%c'|",l);

}

printf("\n");

printf("%c'->",l);

for(i=0;first[i]!='\0';i++){

while(first[i]!='|'){

printf("%c",first[i]);

i++;

}

printf("%c'|",l);

}

printf("0");

}

Output:





