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A3: Elimination of Immediate Left Recursion using C

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CSE C

Program -

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#define MAXPROD 50
#define MAXLEN 20

void main()
{
	char grammar[MAXPROD][MAXLEN], prod[MAXLEN], temp[3];
	char symbol;
	int n, i, j, l, ptr, posn;
	int rec[MAXPROD], rec_c=0;

	// Input and Output of productions of the grammar

	printf("Enter total number of productions: ");
	scanf("%d", &n);
	printf("\nEnter the productions:\n");

	for(i=0; i<n; i++)
		scanf("%s", grammar[i]);

	// Checking whether the grammar is left recursive

	for(i=0; i<n; i++)
	{
		l = strlen(grammar[i]);
		if(grammar[i][0] == grammar[i][3])
			rec[rec_c++] = i;
	}

	/* Removing left recursion:
```

```
        1. A -> beta is already a production, we just have to append A' to the end of it
        2. Modifying A -> A(alpha) to A'->(alpha)A' can be done in-place
        3. Add new production A' -> e after this
*/

char epsilon[] = "->e";

for(i=0; i<rec_c; i++)
{
        posn = rec[i];
        strcpy(prod, grammar[posn]);
        l = strlen(prod);
        symbol = prod[0];

        for(j=0; j<n; j++)
        {
                if(j!=posn && grammar[j][0] == symbol)
                        break;
        }

        // new symbol
        temp[0] = symbol;
        temp[1] = '\'';
        temp[2] = '\0';

        strcat(grammar[j], temp);
        strcpy(grammar[posn], grammar[j]);

        grammar[j][1] = '\'';
        grammar[j][2] = '-';
        grammar[j][3] = '>';

        for(ptr=4; ptr<l; ptr++)
                grammar[j][ptr] = prod[ptr];
        grammar[j][ptr] = '\0';
        strcat(grammar[j], temp);

        grammar[n][0] = '\0';
        strcpy(grammar[n], temp);
        strcat(grammar[n], epsilon);
        n++;
}
printf("\nAfter Removing LR:\n");
for(i=0; i<n; i++)
```

```
                printf("%s\n", grammar[i]);

}

/* productions :
E->E|T
E->T
T->T&F
T->F
F->!F
F->t
F->f
*/
```

I/O Snapshot -

```
vanathi@vanathi-HP-Pavilion-x360: ~/Desktop/Semester 6/Compiler Design/Lab/A3
vanathi@vanathi-HP-Pavilion-x360:~/Desktop/Semester 6/Compiler Design/Lab/A3$ gcc a3_v3.c -o a
vanathi@vanathi-HP-Pavilion-x360:~/Desktop/Semester 6/Compiler Design/Lab/A3$ ./a
Enter total number of productions: 7

Enter the productions:
E->E|T
E->T
T->T&F
T->F
F->!F
F->t
F->f

After Removing LR:
E->TE'
E'->|TE'
T->FT'
T'->&FT'
F->!F
F->t
F->f
E'->e
T'->e
```