

Lab 11

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Code:

```
/*
Name   : Prasanna Natarajan
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Inputs  : A vector p of length N
Outputs : Matrices with correct order of multiplication specified by brackets
*/

#include<stdio.h>
#include<stdlib.h>
#include<limits.h>

#define N 8

//Global variables
int m[N+1][N+1];
int s[N][N];
void matrixChainOrder(int p[]);

int main(){

    int p[N] = {20, 10, 5, 35, 45, 5, 10, 15}; //vector p
    matrixChainOrder(p);
    int i,j;
    //printing m
    for(i=0;i<N;i++){
        for(j=0;j<N;j++){
            printf("%d ",m[i][j]);
        }
        printf("\n");
    }
    printf("\n");
    //printing s
    for(i=0;i<N;i++){
        for(j=0;j<N;j++){
            printf("%d ",s[i][j]);
        }
        printf("\n");
    }
}
```

```

        //printing the optimal multiplication
        printOptimalParens(1,N-1);
    }

void matrixChainOrder(int p[]){
    int i;
    int n = N-1;
    for(i=0;i<=n;i++){
        m[i][i] = 0;
    }

    int l;
    for(l=2;l<=n;l++){
        for(i=1;i<=n-l+1;i++){
            int j = i+l-1;
            m[i][j] = INT_MAX;
            int k;
            for(k=i;k<j;k++){
                //printf("i = %d ,j = %d\n",i,j);
                int q = m[i][k] +m[k+1][j]+(p[i-1]*p[j]*p[k]);
                //debug print
                //printf("%d + %d + (%d*%d*%d)\n",m[i][k],m[k+1][j],p[i-1],p[j],p[k]);
                if(q<m[i][j]){
                    m[i][j] = q;
                    s[i][j] = k;
                    //printf("s[%d][%d] = %d\n",i,j,s[i][j]);
                }
            }
        }
    }
}

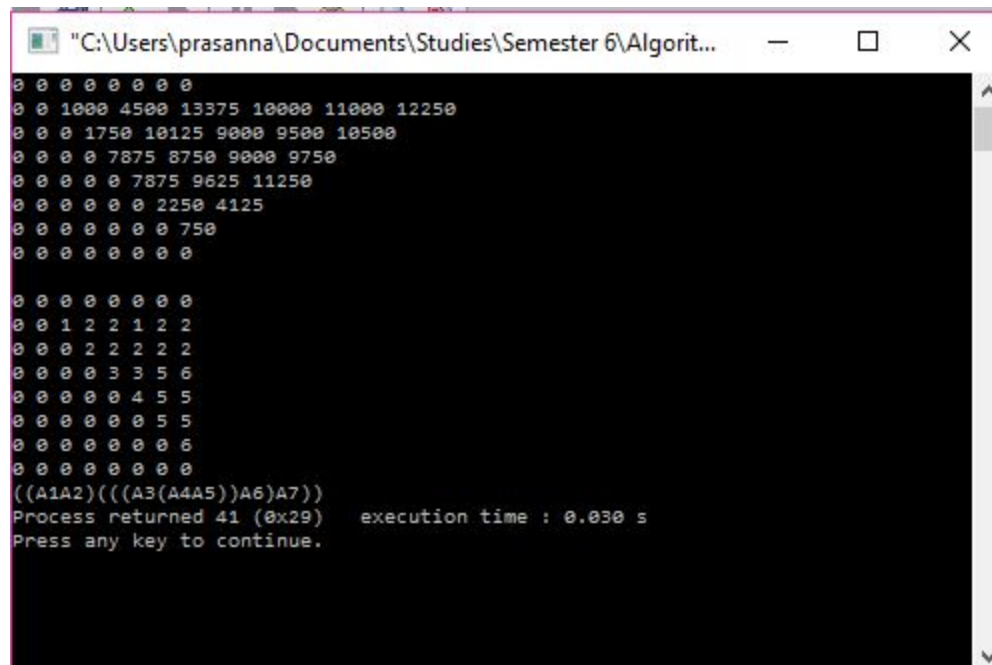
void printOptimalParens(int i, int j){
    if(i==(j)){
        printf("A%d",i);
    }

    else{
        printf("(");
        printOptimalParens(i,s[i][j]);
        printOptimalParens(s[i][j]+1,j);
        printf(")");
    }
}

```

}

Screenshot:



The screenshot shows a Windows command prompt window with the title bar "C:\Users\prasanna\Documents\Studies\Semester 6\Algorit...". The window contains the following text:

```
0 0 0 0 0 0 0
0 0 1000 4500 13375 10000 11000 12250
0 0 0 1750 10125 9000 9500 10500
0 0 0 0 7875 8750 9000 9750
0 0 0 0 0 7875 9625 11250
0 0 0 0 0 0 2250 4125
0 0 0 0 0 0 0 750
0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0
0 0 1 2 2 1 2 2
0 0 0 2 2 2 2 2
0 0 0 0 3 3 5 6
0 0 0 0 0 4 5 5
0 0 0 0 0 0 5 5
0 0 0 0 0 0 0 6
0 0 0 0 0 0 0 0

((A1A2)(((A3(A4A5))A6)A7))
Process returned 41 (0x29)    execution time : 0.030 s
Press any key to continue.
```