Assignment- II

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Subject: Algorithms Lab

Problem:

Matrix Chain Multiplication   
1. Input should be taken from Keyboard  
2. Print the lower triangular matrix of m and s  
3. Print the optimal cost  
4. Print the parenthesized Matrices.

Solution:

#include <stdio.h>

#include <stdlib.h>

#include <limits.h>

void mcm(int p[], int n);

void parenthesizedMatrix(int i,int j,int n, int\* s,char name);

void printMatrix(int\* m,int\* s,int n);

int main()

{

int n,i;

printf("\n Enter size of matrix:");

scanf("%d",&n);

int arr[n];

for(i=0;i<n;i++)

scanf("%d",&arr[i]);

mcm(arr,n);

return 0;

}

void mcm(int p[], int n)

{

int i,j,l,k,a=0,cost=0;

int m[n][n],s[n][n];

for (i=1; i<n; i++)

m[i][i]=0;

for(l= 2;l< n;l++)

{

for (i=1; i<n-l+1; i++)

{

j= i+l-1;

m[i][j] = INT\_MAX;

for (k=i; k<=j-1; k++)

{

cost= m[i][k] + m[k + 1][j]+ p[i - 1]\*p[k]\*p[j];

if (cost< m[i][j])

{

m[i][j] = cost;

s[i][j] = k;

}

}

}

}

char name = 'A';

printf("\nOptimal Parenthesization is : ");

parenthesizedMatrix(1,n - 1,n,(int\*)s, name);

printf("\nOptimal Cost is : %d" ,m[1][n - 1]);

printf("\nLower triangular matrix:\n");

printMatrix((int\*)m,(int\*)s,n);

}

void parenthesizedMatrix(int i, int j, int n, int\* s, char name)

{

if (i == j) {

printf("%c",name);

return;

}

printf("(");

parenthesizedMatrix(i,\*((s+i\*n)+j),n,s,name);

parenthesizedMatrix(\*((s+i\*n)+j)+1,j,n,s,name);

printf(")");

}

void printMatrix(int\* m,int\* s,int n){

int i,j;

printf("\nCost matrix m:\n");

for(i=0;i<n;i++){

for(j=0;j<n;j++){

printf("%d ",\*((m+i)+j));

}

printf("\n");

}

printf("\nParanthesis matrix s:\n");

for(i=0;i<n;i++){

for(j=0;j<n;j++){

printf("%d ",\*((s+i)+j));

}

printf("\n");

}

printf("\nCost matrix m lower triangular matrix:\n");

for (i=0; i<n;i++)

{

for (j=0;j<n;j++)

{

if (i < j)

{

}

else

printf("%d ",\*((m+i)+j));

}

printf("\n");

}

printf("\nParanthesis matrix s lower triangle:\n");

for (i=0; i<n;i++)

{

for (j=0;j<n;j++)

{

if (i < j)

{

}

else

printf("%d ",\*((s+i)+j));

}

printf("\n");

}

}

Output:

