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Experiment No.	3

AIM:	Experiment based on divide and conquer approach.

<table>
<tr><td colspan="2" align="center">Program 3</td></tr>
<tr><td>PROBLEM STATEMENT :</td><td>Strassen's Matrix Multiplication</td></tr>
<tr><td>ALGORITHM/ THEORY:</td><td>

Formulas for Strassen's matrix multiplication.

$D1 = (a11 + a22) * (b11 + b22)$

$D2 = (a21 + a22)*b11$

$D3 = (b12 – b22)*a11$

$D4 = (b21 – b11)*a22$

$D5 = (a11 + a12)*b22$

$D6 = (a21 – a11) * (b11 + b12)$

$D7 = (a12 – a22) * (b21 + b22)$

$C00 = d1 + d4 – d5 + d7$

$C01 = d3 + d5$

$C10 = d2 + d4$

$C11 = d1 + d3 – d2 – d6$

Here, C00, C01, C10, and C11 are the elements of the 2*2 matrix.

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PROGRAM:	

```c
C Experiment3.c ×

C: > Users > Admin > Desktop > SPIT > Sem4 > Praticals > DDA > C Experiment3.c > ⊙ main()
1    #include<stdio.h>
2
3
4    int main(){
5
6        //Matrix
7        int a [2] [2];
8        int b [2] [2];
9        int c [2] [2];
10
11       //Matrix input
12
13       printf("Enter 4 elements of matrix A:\n");
14       for(int i = 0; i < 2; i++){
15           for(int j = 0; j < 2; j++){
16               scanf("%d",&a[i][j]);
17           }
18       }
19
20       printf("Enter 4 elements of matrix B: \n");
21       for(int i = 0; i < 2; i++){
22           for(int j = 0; j < 2; j++){
23               scanf("%d",&b[i][j]);
24           }
25       }
26
27       //Printing matrix
28
29       printf("The A is: \n");
30       for(int i = 0; i < 2; i++){
31           printf("\n");
32           for(int j = 0; j < 2; j++){
33               printf("%d\t",a[i][j]);
34           }
35       }
36
37       printf("\nThe B is: \n");
```

```c
38          for(int i = 0; i < 2; i++){
39              printf("\n");
40              for(int j = 0; j < 2; j++){
41                  printf("%d\t",b[i][j]);
42              }
43          }
44
45          int m1, m2, m3, m4, m5, m6, m7;
46          m1 = (a[0][0] + a[1][1]) * (b[0][0] + b[1][1]);
47          m2 = (a[1][0] + a[1][1]) * b[0][0];
48          m3 = a[0][0] * (b[0][1] - b[1][1]);
49          m4 = a[1][1] * (b[1][0] - b[0][0]);
50          m5 = (a[0][0] + a[0][1]) * b[1][1];
51          m6 = (a[1][0] - a[0][0]) * (b[0][0] + b[0][1]);
52          m7 = (a[0][1] - a[1][1]) * (b[1][0] + b[1][1]);
53
54          c[0][0] = m1 + m4 - m5 + m7;
55          c[0][1] = m3 + m5;
56          c[1][0] = m2 + m4;
57          c[1][1] = m1 - m2 + m3 + m6;
58
59          printf("\nThe C is: \n");
60          for(int i = 0; i < 2; i++){
61              printf("\n");
62              for(int j = 0; j < 2; j++){
63                  printf("%d\t",c[i][j]);
64              }
65          }
66          return 0;
67
68      }
```

RESULT:	PROBLEMS OUTPUT DEBUG CONSOLE **TERMINAL** PS C:\Users\Admin\Desktop\SPIT\Sem4\Praticals\DDA> ./Experiment3 Enter 4 elements of matrix A: 1 2 3 4 Enter 4 elements of matrix B: 1 2 3 4 The A is: 1 2 3 4 The B is: 1 2 3 4 The C is: 7 10 15 22 PS C:\Users\Admin\Desktop\SPIT\Sem4\Praticals\DDA> ▮
CONCLUSION:	Successfully understood and implemented Strassen matrix multiplication.