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EXPERIMENT- 3

- **AIM:** To find multiplication of two matrix by strassen's matrix multiplication algorithm

- **ALGORITHM:**

AlgorithmStrass(n,x,y,z)

Begin

If $n \leq \text{threshold}$ then compute

$C = x * y$ is a conventional matrix.

Else Partition a into four sub matrices $a_{00}, a_{01}, a_{10}, a_{11}$.

Partition b into four sub matrices $b_{00}, b_{01}, b_{10}, b_{11}$.

Strass($n/2, a_{00}+a_{11}, b_{00}+b_{11}, d_1$)

Strass($n/2, a_{10}+a_{11}, b_{00}, d_2$)

Strass($n/2, a_{00}, b_{01}-b_{11}, d_3$)

Strass($n/2, a_{11}, b_{10}-b_{00}, d_4$)

Strass($n/2, a_{00}+a_{01}, b_{11}, d_5$)

Strass($n/2, a_{10}-a_{00}, b_{00}+b_{11}, d_6$)

Strass($n/2, a_{01}-a_{11}, b_{10}+b_{11}, d_7$)

$C = d_1 + d_4 - d_5 + d_7$
 $C = d_1 + d_4 - d_5 + d_7$

endif return(C)

End

- **CODE:**

```
#include <stdio.h>
#include <time.h>
int main()
{
int a[100][100], b[100][100], c[100][100], i, j;
int m1, m2, m3, m4, m5, m6, m7;

printf("Enter the 4 elements of first matrix: ");
for (i = 0; i < 2; i++)
for (j = 0; j < 2; j++)
scanf("%d", &a[i][j]);

printf("Enter the 4 elements of second matrix: ");
for (i = 0; i < 2; i++)
for (j = 0; j < 2; j++)
scanf("%d", &b[i][j]);

printf("\nThe first matrix is\n");
for (i = 0; i < 2; i++)
{
printf("\n");
for (j = 0; j < 2; j++)
printf("%d\t", a[i][j]);
}

printf("\nThe second matrix is\n");
for (i = 0; i < 2; i++)
{
printf("\n");
for (j = 0; j < 2; j++)
printf("%d\t", b[i][j]);
}
```

```

clock_t start, end;
double cpu_time_used;
start = clock();

m1 = (a[0][0] + a[1][1]) * (b[0][0] + b[1][1]);
m2 = (a[1][0] + a[1][1]) * b[0][0];
m3 = a[0][0] * (b[0][1] - b[1][1]);
m4 = a[1][1] * (b[1][0] - b[0][0]);
m5 = (a[0][0] + a[0][1]) * b[1][1];
m6 = (a[1][0] - a[0][0]) * (b[0][0] + b[0][1]);
m7 = (a[0][1] - a[1][1]) * (b[1][0] + b[1][1]);

c[0][0] = m1 + m4 - m5 + m7;
c[0][1] = m3 + m5;
c[1][0] = m2 + m4;
c[1][1] = m1 - m2 + m3 + m6;

printf("\nAfter multiplication using \n");
for (i = 0; i < 2; i++)
{
    printf("\n");
    for (j = 0; j < 2; j++)
        printf("%d\t", c[i][j]);
}

end = clock();
cpu_time_used = ((double)(end - start)) / CLOCKS_PER_SEC;
printf("\nStressen's time : %d\n", cpu_time_used);
return 0;
}

```

- **RESULT:**

```
Enter the 4 elements of first matrix: 5
6
7
12
Enter the 4 elements of second matrix: 30
3
5
15

The first matrix is

5      6
7      12
The second matrix is

30     3
5      15
After multiplication using

180    105
270    201
```

- **CONCLUSION:**

IN THIS EXPERIMENT I STUDIED THE IMPLEMENTATION OF STRASSEN'S MATRIX MULTIPLICATION ALGORITHM. THIS ALGORITHM IS BASED ON DIVIDE AND CONQUER ALGORITHM.