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| **AIM:** | To find multiplication of two matrix by strassen's matrix multiplication algorithm. |
| **Program** | |
| **ALGORITHM/ THEORY:** | Algorithm Strass(n, x, y, z)<br><br>begin<br>If n = threshold then compute<br>C = x * y is a conventional matrix.<br>Else<br>Partition a into four sub matrices a00, a01, a10, a11.<br>Partition b into four sub matrices b00, b01, b10, b11.<br>Strass ( n/2, a00 + a11, b00 + b11, d1)<br>Strass ( n/2, a10 + a11, b00, d2)<br>Strass ( n/2, a00, b01 – b11, d3)<br>Strass ( n/2, a11, b10 – b00, d4)<br>Strass ( n/2, a00 + a01, b11, d5)<br>Strass (n/2, a10 – a00, b00 + b11, d6)<br>Strass (n/2, a01 – a11, b10 + b11, d7)<br><br>C = d1+d4-d5+d7 d3+d5<br>d2+d4 d1+d3-d2-d6<br><br>end if<br>return (C)<br>end. |

**PROGRAM:**

```
#include<stdio.h>
int main(){
  int a[2][2],b[2][2],c[2][2];
  int m1,m2,m3,m4,m5,m6,m7;

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

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

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

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

  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(int i=0;i<2;i++){
```

```
        printf("\n");
        for(int j=0;j<2;j++)
            printf("%d\t",c[i][j]);
    }

    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:**

We have used the strassen's multiplication method to find matrix multiplication. It is better to use this algorithm because it has better time complexity than divide and conquerer algorithm.