**SARDAR PATEL INSTITUTE OF TECHNOLOGY**
**DAA-LAB**

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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. Strassen's Matrix Multiplication is used to multiply two matrices, and it is better than Native matrix multiplication. due to the fact that Strassen's Matrix Multiplication has a complexity of around n^2.81 whereas usual multiplication's complexity is n^3. The reason for this is because the number of operations required in Strassen's Matrix Multiplication is less than in usual multiplication.