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BRANCH:	Computer engineering
BATCH:	A
SUBJECT:	DAA
EXPT NO:	3
AIM:	Experiment on Recurrence relation. (To find multiplication of two matrix by strassen's matrix multiplication algorithm.)

ALGORITHM:	Algorithm Strass(n, x, y, z)
	
	begin
	If n = threshold then compute
	C = x * y is a conventional matrix.
	Else
	Partition a into four sub matrices a00, a01, a10, a11.
	Partition b into four sub matrices b00, b01, b10, b11.
	Strass (n/2, a00 + a11, b00 + b11, d1)
	Strass (n/2, a10 + a11, b00, d2)
	Strass (n/2, a00, b01 – b11, d3)
	Strass (n/2, a11, b10 – b00, d4)
	Strass (n/2, a00 + a01, b11, d5)
	Strass (n/2, a10 – a00, b00 + b11, d6)
	Strass (n/2, a01 – a11, b10 + b11, d7)
	
	C = d1+d4-d5+d7 d3+d5
	d2+d4 d1+d3-d2-d6
	
	end if
	return (C)
	end.

PROGRAM:	`#include<stdio.h>`
	`#include<stdlib.h>`
	
	`void strassenmul(int a[2][2],int b[2][2]){`
	`int s[10],p[7],c[2][2];`
	
	`s[0]= b[0][1]-b[1][1];`
	`s[1]= a[0][0]+a[0][1];`

```
    s[2]= a[1][0]+a[1][1];
    s[3]= b[1][0]-b[0][0];
    s[4]= a[0][0]+a[1][1];
    s[5]= b[0][0]+b[1][1];
    s[6]= a[0][1]-a[1][1];
    s[7]= b[1][0]+b[1][1];
    s[8]= a[0][0]-a[1][0];
    s[9]= b[0][0]+b[0][1];

    p[0]= a[0][0]*s[0];
    p[1]= s[1]*b[1][1];
    p[2]= s[2]*b[0][0];
    p[3]= a[1][1]*s[3];
    p[4]= s[4]*s[5];
    p[5]= s[6]*s[7];
    p[6]= s[8]*s[9];

    c[0][0]= p[4]+p[3]-p[1]+p[5];
    c[0][1]= p[0]+p[1];
    c[1][0]= p[2]+p[3];
    c[1][1]= p[4]+p[0]-p[2]-p[6];

    printf("\nThe Resultant Matrix is :\n");
    for(int i=0;i<2;i++){
        for(int j=0;j<2;j++){
            printf("%d ",c[i][j]);
        }
        printf("\n");
    }
}

void main(){
    int arr[2][2], arr2[2][2];
    printf("\nEnter the 1st 2x2 matrix for
Multiplication: ");
    for(int i=0;i<2;i++){
        for(int j=0;j<2;j++){
            scanf("%d",&arr[i][j]);
        }
    }
    printf("Enter the 1st 2x2 matrix for Multiplication:
");
    for(int i=0;i<2;i++){
        for(int j=0;j<2;j++){
            scanf("%d",&arr2[i][j]);
```

```
        }
    }
    printf("\nThe Entered 1st Matrix is :\n");
    for(int i=0;i<2;i++){
        for(int j=0;j<2;j++){
            printf("%d ",arr[i][j]);
        }
        printf("\n");
    }
    printf("The Entered 1st Matrix is :\n");
    for(int i=0;i<2;i++){
        for(int j=0;j<2;j++){
            printf("%d ",arr2[i][j]);
        }
        printf("\n");
    }
    strassenmul(arr,arr2);
}
```

RESULT:

```
PS D:\c programming> cd "d:\c programming\DAA\" ; if ($?) { gcc expt3.c

 Enter the 1st 2x2 matrix for Multiplication: 5 6 7 12
 Enter the 1st 2x2 matrix for Multiplication: 30 3 5 15

 The Entered 1st Matrix is :
 5 6
 7 12
 The Entered 1st Matrix is :
 30 3
 5 15

 The Resultant Matrix is :
 180 105
 270 201
PS D:\c programming\DAA>
```

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.