

Experiment No.	3
Aim	Experiment based on divide and conquers approach(Strassen's Matrix Multiplication)
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Aim: Perform multiplication of two matrices using Strassen's Matrix Multiplication Algorithm.

Algorithm:

1. Start
2. Input two random matrices a and b
3. Display the two matrices
4. Create 10 numbers(s1,s2..s10) such that each is the sum or difference of two elements of the matrices a or b.
5. Compute 7 matrix elements product using the above formed numbers.
6. Compute the desired matrix elements c[0][0], c[0][1],c[1][0] and c[1][1].
7. Display matrix c.
8. Stop

Program:

```
#include<stdio.h>
#include<stdlib.h>

int main(){
int a[2][2],b[2][2],c[2][2];
int n=2;
for(int i=0;i<n;i++){
for(int j=0;j<n;j++){
a[i][j]=rand()%10;
}
}

for(int i=0;i<n;i++){
for(int j=0;j<n;j++){
b[i][j]=rand()%10;
```

```

}
}

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

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

int s1=b[0][1] -b[1][1];
int s2=a[0][0] +a[0][1];
int s3=a[1][0] +a[1][1];
int s4=b[1][0]-b[0][0];
int s5=a[0][0]+a[1][1];
int s6=b[0][0]+b[1][1];
int s7=a[0][1]-a[1][1];
int s8=b[1][0]+b[1][1];
int s9=a[0][0]-a[1][0];
int s10=b[0][0]+b[0][1];

int p1=a[0][0]*s1;
int p2=s2*b[1][1];
int p3=s3*b[0][0];
int p4=a[1][1]*s4;
int p5=s5*s6;
int p6=s7*s8;
int p7=s9*s10;

c[0][0]=p4 + p5 - p2 + p6;
c[0][1]=p1+p2;
c[1][0]=p3+p4;
c[1][1]=p5+p1-p3-p7;

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

```

```
printf("\n");  
}  
  
return 0;  
}
```

Output and Observation:

```
PS C:\Users\RIYA\Desktop\All_Coding_programs\SEM4Lab> cd "c:\Users\RIYA\Desktop\  
trassen.c -o strassen } ; if ($?) { .\strassen }  
Matrix A is:  
1 7  
4 0  
Matrix B is:  
9 4  
8 8  
Matrix C is:  
65 60  
36 16  
PS C:\Users\RIYA\Desktop\All_Coding_programs\SEM4Lab> |
```

The matrix product computed by normal matrix multiplication and the one computed by strassen's algorithm are equal.

Conclusion:

After performing the above experiment, I got to know how to perform matrix multiplication using strassen's algorithm. I also verified the result obtained by strassen's matrix multiplication with actual matrix multiplication performed manually on notebook.