USN: 1RV17CS024

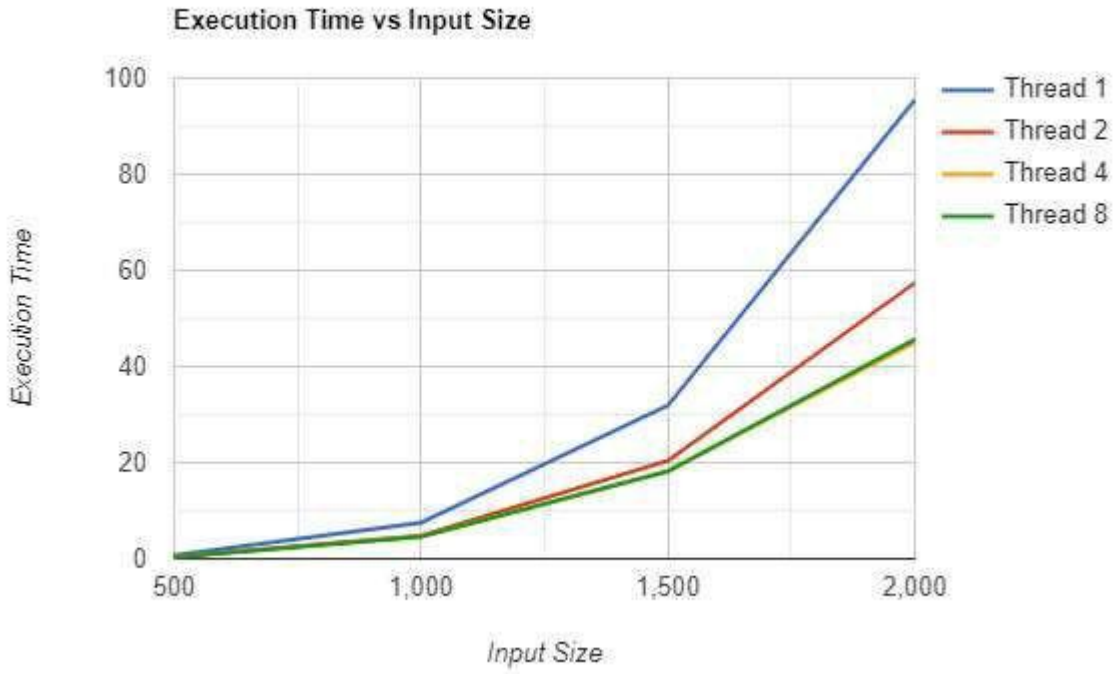
PADP Lab Program 2

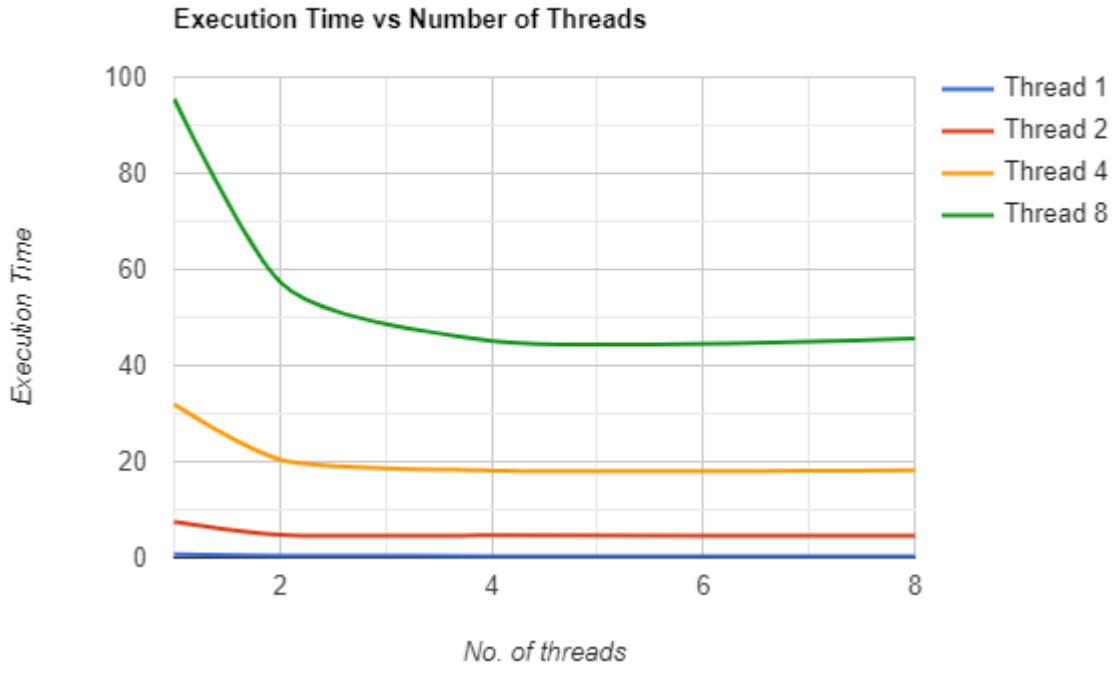
OUTPUT:

```
rohit@Rohit: /mnt/c/Users/rohit/Desktop
rohit@Rohit:/mnt/c/Users/rohit/Desktop$ gcc -fopenmp program1.c
rohit@Rohit:/mnt/c/Users/rohit/Desktop$ ./a.out
The execution time are
Size            1                       2                       4                       8
500             0.730816                0.455516                0.366475                0.355699
1000            7.508006                4.772518                4.644519                4.624295
1500            31.902657               20.430988               18.176569               18.223291
2000            95.489820               57.381326               45.100949               45.635601
rohit@Rohit:/mnt/c/Users/rohit/Desktop$ gcc -fopenmp matrix.c
```

```
rohit@Rohit: /mnt/c/Users/rohit/Desktop
rohit@Rohit:/mnt/c/Users/rohit/Desktop$ gcc -fopenmp matrix.c
rohit@Rohit:/mnt/c/Users/rohit/Desktop$ gcc -fopenmp matrix.c
rohit@Rohit:/mnt/c/Users/rohit/Desktop$ ./a.out
Enter the number of rows and columns of first matrix
3 3
Enter the elements of first matrix
1 1 2
0 2 1
1 2 1
Enter the number of rows and columns of second matrix
3 3
Enter the elements of second matrix
1 0 1
0 1 1
1 2 1
Product of entered matrices:-
3       5       4
1       4       3
2       4       4
rohit@Rohit:/mnt/c/Users/rohit/Desktop$
```

GRAPH:


Execution Time vs Input Size
100
80
60
40
20
0
500
1,000
1,500
2,000
Execution Time
Input Size
Thread 1
Thread 2
Thread 4
Thread 8


Execution Time vs Number of Threads
100
80
60
40
20
0
2
4
6
8
Execution Time
No. of threads
Thread 1
Thread 2
Thread 4
Thread 8

CODE:

```
#include<omp.h>
#include<stdio.h>
#include<stdlib.h>
int main(){
int it=1;
printf("The execution time are\nSize\t\t1\t\t\t2\t\t\t4\t\t\t8\n");
while(it<=4){
int r = 500*it, c = 500*it, i, j, sum =0, k;
//dynamically allocate arrays
int **arr1 = (int **)malloc(r * sizeof(int *));
for (i=0; i<r; i++)
arr1[i] = (int *)malloc(c * sizeof(int));
int **arr2 = (int **)malloc(r * sizeof(int *));
for (i=0; i<r; i++)
arr2[i] = (int *)malloc(c * sizeof(int));
int **arr3 = (int **)malloc(r * sizeof(int *));
for (i=0; i<r; i++)
arr3[i] = (int *)malloc(c * sizeof(int));
for(i = 0;i < r; i++)
for(j = 0;j < c; j++)
arr1[i][j] = rand()/r;
for(i = 0;i < r; i++)
for(j = 0;j < c; j++)
arr2[i][j] = rand()/r;
double x = omp_get_wtime();
for(i = 0;i < r; i++)
for(j = 0;j < c; j++)
for(k = 0;k < r; k++)
arr3[i][j] += arr1[i][k] * arr2[k][j];
double y = omp_get_wtime();
printf("%d\t\t",r);
printf("%lf\t\t", y-x);
for(int p=2;p<=8;p=p*2)
{
double x = omp_get_wtime();
omp_set_num_threads(p);
#pragma omp parallel for private(j, k)
for(i = 0;i < r; i++)
for(j = 0;j < c; j++)
{
arr3[i][j]=0;
for(k = 0;k < r; k++)
arr3[i][j] += arr1[i][k] * arr2[k][j];
}
double y = omp_get_wtime();
printf("%lf\t\t", y-x);
}
printf("\n");
it++;
}
return 0;
}
```

Matrix Multiplication:

```
#include <stdio.h>
int main()
{
int m, n, p, q, c, d, k, sum = 0;
int first[10][10], second[10][10], multiply[10][10];

printf("Enter the number of rows and columns of first matrix\n");
scanf("%d%d", &m, &n);
printf("Enter the elements of first matrix\n");
for (  c = 0 ; c < m ; c++ )
for ( d = 0 ; d < n ; d++ )
scanf("%d", &first[c][d]);
printf("Enter the number of rows and columns of second matrix\n");
scanf("%d%d", &p, &q);
if ( n != p )
printf("Matrices with entered orders can't be multiplied with each other.\n");
else
{
printf("Enter the elements of second matrix\n");
for ( c = 0 ; c < p ; c++ )
for ( d = 0 ; d < q ; d++ )
scanf("%d", &second[c][d]);
for ( c = 0 ; c < m ; c++ )
 {
for ( d = 0 ; d < q ; d++ )
     {
for ( k = 0 ; k < p ; k++ )
{
sum = sum + first[c][k]*second[k][d];
}
```

```
multiply[c][d] = sum;
sum = 0;
      }
    }

printf("Product of entered matrices:-\n");
for ( c = 0 ; c < m ; c++ )
    {
for ( d = 0 ; d < q ; d++ )
printf("%d\t", multiply[c][d]);

printf("\n");
    }
  }

return 0;
}
```