

**ROHIT RAJ**

**1RV17CS125**

**PADP**

**LAB PROGRAM: 11**

**Code:**

```
#include <math.h>

#include <string.h>

#include <openacc.h>

#include <sys/time.h>

#include <stdio.h>

#define NN 1024

#define NM 1024

float A[NN][NM];

float Anew[NN][NM];

int main(int argc, char** argv)

{

    int i,j;

    const int n = NN;

    const int m = NM;

    const int iter_max = 1000;

    const double tol = 1.0e-6;

    double error = 1.0;

    struct timeval tim;

    double t1, t2;

    memset(A, 0, n * m * sizeof(float));

    memset(Anew, 0, n * m * sizeof(float));

    for (j = 0; j < n; j++)

    {
```

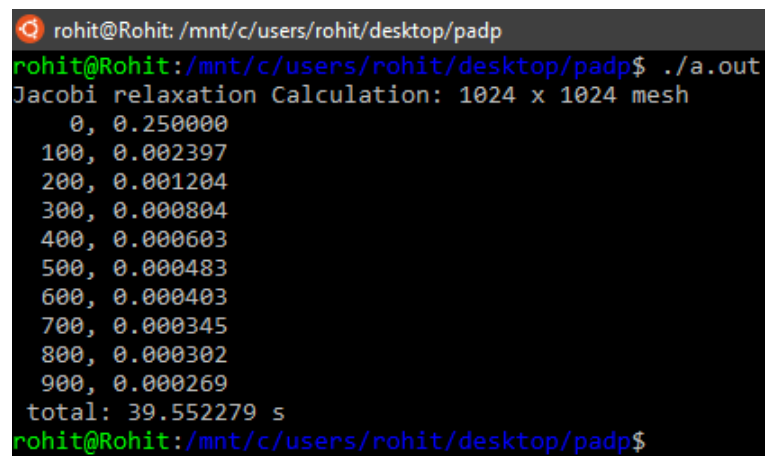
```

A[j][0] = 1.0;
Anew[j][0] = 1.0;
}
printf("Jacobi relaxation Calculation: %d x %d mesh\n", n, m);
//StartTimer();
gettimeofday(&tim, NULL);
t1=tim.tv_sec+(tim.tv_usec/1000000.0);
int iter = 0;
#pragma acc data copy(A, Anew)
while ( error > tol && iter < iter_max )
{
error = 0.0;
#pragma acc parallel loop reduction(max:error)
for( j = 1; j < n-1; j++)
{
for( i = 1; i < m-1; i++ )
{
Anew[j][i] = 0.25 * ( A[j][i+1] + A[j][i-1]
+ A[j-1][i] + A[j+1][i]);
error = fmax( error, fabs(Anew[j][i] - A[j][i]));
}
}
#pragma acc parallel loop
for( j = 1; j < n-1; j++)
{
for( i = 1; i < m-1; i++ )
{
A[j][i] = Anew[j][i];
}
}

```

```
}  
  
if(iter % 100 == 0) printf("%5d, %0.6f\n", iter, error);  
  
iter++;  
  
}  
  
gettimeofday(&tim, NULL);  
  
t2=tim.tv_sec+(tim.tv_usec/1000000.0);  
  
printf(" total: %f s\n", t2-t1);  
  
return 0;  
  
}
```

### OUTPUT:



A terminal window with a dark background and light-colored text. The prompt is 'rohit@Rohit: /mnt/c/users/rohit/desktop/padp'. The user enters './a.out'. The program outputs 'Jacobi relaxation Calculation: 1024 x 1024 mesh' followed by a list of iterations and errors. The final output is 'total: 39.552279 s'.

```
rohit@Rohit: /mnt/c/users/rohit/desktop/padp  
rohit@Rohit:/mnt/c/users/rohit/desktop/padp$ ./a.out  
Jacobi relaxation Calculation: 1024 x 1024 mesh  
0, 0.250000  
100, 0.002397  
200, 0.001204  
300, 0.000804  
400, 0.000603  
500, 0.000483  
600, 0.000403  
700, 0.000345  
800, 0.000302  
900, 0.000269  
total: 39.552279 s  
rohit@Rohit:/mnt/c/users/rohit/desktop/padp$
```