

HPC

Experiment 2

Introduction to OpenMP

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Code:

Hello World:

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

int main(void) {
    #pragma omp parallel // you can add limiters by putting num_threads(n)
    {
        printf("Hello, World! from thread = %d\n", omp_get_thread_num());
    }
}
```

Matrix Addition:

```
#include <stdio.h>
#include <omp.h>
#include <stdlib.h>
#define MAX 2

int get_matrix(int [MAX][MAX]);

void main(void) {
    int A[MAX][MAX], B[MAX][MAX], C[MAX][MAX];
    int tid = 0, i = 0, j = 0;
    int *d, *e, *f;

    printf("Enter data for 4x4 matrix A: ");

    get_matrix(A);

    printf("Enter data for 4x4 matrix B: ");

    get_matrix(B);

    printf("A = ");
    for(i = 0; i < MAX; i++) {
        for(j = 0; j < MAX; j++) {
```

```

    printf("%d\t", A[i][j]);
}
printf("\n");
}
printf("B = ");
for(i = 0; i < MAX; i++) {
    for(j = 0; j < MAX; j++) {
        printf("%d\t", B[i][j]);
    }
    printf("\n");
}

```

```

d = (int*)A;
e = (int*)B;
f = (int*)C;

```

```

#pragma omp parallel num_threads(MAX * MAX)
{
    tid = omp_get_thread_num();
    f[tid] = e[tid] + d[tid];
}

```

```

printf("\nResult: \n");
for(i = 0; i < MAX; i++) {
    for(j = 0; j < MAX; j++) {
        printf("%d ", C[i][j]);
    }
    printf("\n");
}
}

```

```

int get_matrix(int arr[MAX][MAX]) {
    for(int i = 0; i < MAX; i++)
        for(int j = 0; j < MAX; j++)
            scanf("%d", &arr[i][j]);
}

```

Outputs:

```
hp@localhost ~/l/M/T/HPC (main)> ./e2_hello_world.out
Hello, World! from thread = 7
Hello, World! from thread = 6
Hello, World! from thread = 1
Hello, World! from thread = 8
Hello, World! from thread = 12
Hello, World! from thread = 15
Hello, World! from thread = 10
Hello, World! from thread = 11
Hello, World! from thread = 9
Hello, World! from thread = 2
Hello, World! from thread = 13
Hello, World! from thread = 4
Hello, World! from thread = 5
Hello, World! from thread = 0
Hello, World! from thread = 14
Hello, World! from thread = 3
```

```
hp@localhost ~/l/M/T/HPC (main)> time ./e2_matrix_addition.out
```

```
Enter data for 4x4 matrix A: 5
```

```
1
```

```
3
```

```
4
```

```
Enter data for 4x4 matrix B: 1
```

```
2
```

```
1
```

```
3
```

```
A = 5    1
```

```
3        4
```

```
B = 1    2
```

```
1        3
```

```
Result:
```

```
6 3
```

```
4 7
```

Executed in	8.60 secs	fish	external
usr time	1.88 millis	203.00 micros	1.68 millis
sys time	0.17 millis	166.00 micros	0.00 millis