(!) This quiz has been re-graded; your score was affected.

Quiz-2 Sep 16

Due 17 Sep at 23:55 **Points** 20 **Questions** 8

Available 16 Sep at 10:00 - 19 Sep at 23:55 4 days Time limit 65 Minutes

Instructions

This quiz consists of 8 questions, which are MCQ (multiple choice) or MAQ (multiple answer) questions. It has 20 points. The quiz is open from 10:00 am Sep 16, and is due by midnight Sep 17. However, the quiz will be open until Sunday midnight to accommodate those students with special extensions. The time limit of the quiz is 65 minutes.

This quiz was locked 19 Sep at 23:55.

Attempt history

	Attempt	Time	Score	Re-graded
LATEST	Attempt 1	65 minutes	13 out of 20	14 out of 20

Score for this quiz: **14** out of 20 Submitted 17 Sep at 21:38 This attempt took 65 minutes.

```
Consider the following code segment:

......

int no_threads, thread_num;

omp_set_num_threads(16);

no_threads=omp_get_num_threads();

#pragma omp parallel

{
    thread_num=omp_get_thread_num();
    if(thread_num==0)
        printf("The number of threads: %d\n", no_threads);
```

```
What is the value of no_threads in the printf() statement?

B. 1

C. 16

A. 0

D. 8
```

```
Question 2 2 / 2 pts
```

What are the data attributes (e.g., *private, firstprivate, lastprivate, or shared*) of variables *result*, *i*, and *nthrds*, respectively, given the following code segment?

```
float result;
int i;
#pragma omp parallel
{
    float B;
    int id, nthrds;
    id = omp_get_thread_num();
    nthrds = omp_get_num_threads();
    for(i = id; i < nthrds; i+= nthrds) {
        B = big_job(i);
    }
    #pragma omp critical
        result += calc(B);
}
......</pre>
```

Shared variable: i, result; private variable: nthrds

, , , , , , , , , , , , , , , , , , , ,				
	O Private variable: (i, nthrds, result)			
	Firstprivate variable: result; private variable: i, nthrds			
Correct!	Shared variable: result; private variable: i, nthrds			

Question 3 1.5 / 3 pts

Which of the following for loop parallelizations is (or are) correct?

orrect answer

```
#pragma omp parallel for

for(int i=k; i<2*k; i++){
    a[i] = a[i] + a[i-k];
}

flag = 0;

#pragma omp parallel for

for(int i = 0; (i < n)&&(!flag); i++) {
    a[i] = 2.3 * i;
    if(a[i] < b[i])
        flag = 1;
}

#pragma omp parallel for

for(int i=1; i<100; i++)
    a[i] = i*a[i-1];</pre>
```

```
#pragma omp parallel for
for(i=0;i<n;i++){
    x[i]=a+i*h;
    y[i]=exp(x[i]);
}</pre>
```

Question 4

Original score: 2 / 3 pts Re-graded score: 3 / 3 pts

(!) This question has been re-graded.

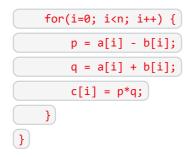
The serial and parallel implementations of a program are given below. Also we know that serial function gives the correct result. Which of the following statements is (or are) correct?

```
// correct serial code

void serial(float a[], float b[], float c[], int n) {
    float p,q;
    int i;
    for(i=0; i<n; i++) {
        p = a[i] - b[i];
        q = a[i] + b[i];
        c[i] = p*q;
    }
}

// parallel code

void parallel(float a[], float b[], float c[], int n) {
    float p,q;
    int i;
    #pragma omp parallel for shared(a,b,c,n,p,q) private(i) default(none)</pre>
```



The parallel function could give incorrect result., but not always.

orrect answer

The serial and parallel functions could produce the same results, but not always.

Correct!

✓

Changing the data scope of variables p and q from shared to private will give the same result as the serial function.

orrect answer

Changing the data scope of c from shared to firstprivate; as well as the data scope of variables p and q from shared to private in the parallel function will give the same result as the serial function.

Question 5

2 / 2 pts

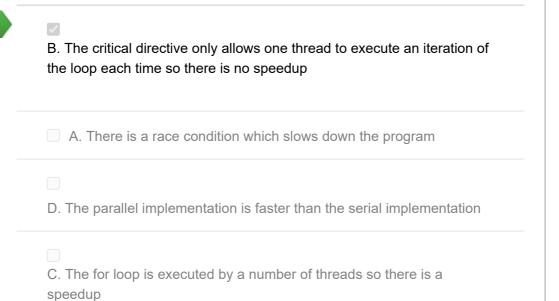
Compared to the serial implementation of the parallel code given below, which of the following is (are) true?

```
#pragma omp parallel for

for(int i=0; i<n; i++) {

    #pragma omp critical

    sum = sum+data[i];
}</pre>
```



2 / 2 pts **Question 6** Given the following program segment, int i, a; omp_set_dynamic(0); #pragma omp parallel num_threads(4) { a = 1; #pragma omp for firstprivate(a) lastprivate(a) for (i=0; i<12; i++) a = a + 2;} what is the value of a at the exit of the parallel region? Undetermined 25 5

7

Question 7 0 / 3 pts

The following listing gives the code segment of matrix multiplication, $C=A\times B$, where $C\in\mathbb{R}^{N\times N}$, $A\in\mathbb{R}^{N\times N}$, and $B\in\mathbb{R}^{N\times N}$.

We would like to add a **collapse** clause in the parallel code. Which of the following changes is (or are) correct?

orrect answer

Change #pragma omp for schedule(static,4) to #pragma omp for schedule(static,4) collapse(2);

ou Answered

The proposed changes are all wrong.

Change #pragma omp for schedule(static,4) to #pragma omp for schedule(static,4) collapse(3)

Change Line (#pragma omp parallel num_threads(NUM_THREADS)) to

#pragma omp parallel num threads(NUM THREADS) collapse(2)

Question 8 1.5 / 3 pts

The following listing gives the code segment of matrix multiplication, $C=A\times B$, where $C\in\mathbb{R}^{N\times N}$, $A\in\mathbb{R}^{N\times N}$, and $B\in\mathbb{R}^{N\times N}$.

Which of the following statements is (or are) correct?

Correct!

✓

If N = 16 and $NUM_{THREADS} = 8$, threads 0, 1, 2, 3 will each get 4 loop iterations from the outermost loop, and threads 4, 5, 6, 7 will get none.

Correct!

1

Assume N = 16 and NUM_THREADS = 3. The iteration i=14 in the outermost loop will be executed by thread 0.

ou Answered



When NUM_THREADS=4, the clause schedule(static, 4) in the for construct will result in balanced load among threads in the parallel region.

If N = 16 and NUM_THREADS = 8, each thread will get $N^3/4$ (assuming N^3 divides 4 exactly) loop iterations from the nested loop.

Quiz score: 14 out of 20