

CSE 340 Bütünleme

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I. QUESTION (15 POINTS)

Given an odd number N , write the parallel method

```
int three_primes(int N)
```

which checks if N can be expressed as the sum of three prime numbers. For example, 21 can be written as the sum of three prime numbers 7, 7, and 7; 37 can be written as the sum of three prime numbers 7, 7 and 23.

II. QUESTION (15 POINTS)

Solve the same problem in Question 1 using manager and worker paradigm.

III. QUESTION (15 POINTS)

A parallel program executes in 142 seconds on 24 processors. Through benchmarking it is determined that 9 seconds is spent performing initializations and cleanup on one processor. During the remaining 133 seconds all 24 processors are active. What is the scaled speedup achieved by the program?

IV. QUESTION (15 POINTS)

Write a parallel function

```
void fibonacci(int* local, int p, int id)
```

which checks if the numbers in overall array satisfy the Fibonacci property with three elements or not ($a[i] + a[i + 1] + a[i + 2] = a[i + 3]$). Processor 0 will print the result. Assume that all processors have n/p elements of the array with name *local*.

V. QUESTION (20 POINTS)

Write a parallel function that finds the median (the middle element when sorted) of an integer array containing only numbers between 1 and 10. Assume that all processors have n/p elements of the array with name *local*.

```
void medianArray(int* local, int N, int p, int id)
```

VI. QUESTION (20 POINTS)

Write the parallel function

```
void msg(int p, int id)
```

which sends the elements in a file 'a.txt' in the processor 0 in the following way: Processor 0 will get p element, processor 1 will get $p - 1$ elements, ..., processor $p - 1$ will get 1 element. Assume that the number of elements in the file 'a.txt' is $p(p + 1)/2$. (Do not use MPI_Send and MPI_Recv. Use one of the Scatter, Gather, AlltoAll functions)