



4. (1) (5 points) What is cluster computing? Explain.

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(2) (5 points) What are main advantages of cluster computing? Explain.

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(3) (5 points) What are main disadvantages of cluster computing? Explain.

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5. (1) (5 points) What is race condition? Explain.

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(2) (5 points) What is Amdahl's Law? Explain.

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6.(1) (5 points) What are main advantages of shared memory architecture? Explain.

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(2) (5 points) What are main disadvantages of shared memory architecture? Explain.

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7. (9 points) Project 1 is to do multi-threaded programming for computing the number of prime numbers between 1 and 200,000. The goal is to improve the performance by utilizing parallel processors.

One natural way to implement dynamic load balancing approach of our project 1 is to have a shared variable "number". Each thread repeats (i) reading the value of the variable "number", (ii) incrementing it, and (iii) testing whether the value is prime or not, and counting prime numbers. Since the variable "number" is shared among threads, the code accessing the variable should be specified as critical section.

Above approach will give almost perfect load balancing and generate correct result. However, this approach may have a serious problem in terms of performance.

(1) Is above approach scalable or not scalable?.

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(2) If your answer is "scalable", explain why. If your answer is "not scalable", explain why.

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