## 2013.1 Multicore Computing Midterm Exam (April 22th 9am-10am)

supervisor	
signature	

)

) overhead

StudentID# : (	) .	Name: (	)
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You may answer in either F	Korean or English.		
• A (a.	ks (a)~(n) with the most appropriate ) for a group of threads or process until all other threads/processes reach	ses in the source code means any thread/proce	ess must stop at this
• (b. than one thread of execution	-	a shared resource that must not be concurrent.	ly accessed by more
• It is often told that conce (d.	urrency means (c. ) simultaneous processing.	) simultaneous processing an	nd parallelism means
• According to Amdahl's law by (e.	r, the speedup of a program using mu	ultiple processors in parallel computing is limite ).	d
• (f. resources (typically hardwa		system to increase total throughput under an	increased load wher
of transistors. But increasi	ing the clock frequency leads to grea	ssible by increasing the clock frequency and in ter (g. ) and (h. uency and increasing the number of cores per o	)
<ul> <li>What distinguishes grid co computing tends to be (i.</li> </ul>	omputing from conventional high perfo	ormance computing systems such as cluster co	omputing is that grid
companies verify		77 TTTT	•
<ul> <li>Threads belonging to the s</li> <li>(l.</li> </ul>	same process share ), (m.	), and (n.	)
2. (16 points) Fill out followin	ng blanks (a)~(h) with the most appro	opriate words.	
	Comparison between fine grain	system and coarse grain system	
fine	grain system	coarse grain system	
Low (a.	) ratio	High (b.	) ratio
relatively small amounts of		relatively large amounts of	

relatively easier to (g. ) relatively harder to (h. )

3. (12 points) Explain recent computer hardware trends that make multicore computing gain more and more importance. List at least three important trends.

(i) ( )

(ii) ( )

(iii) ( )

(d.

relatively low (f.

) overhead

(c.

relatively high (e.

4. (1) (5 points) What is cluster computing? Explain.	)
(2) (5 points) What are main advantages of cluster computing? Explain.	)
(3) (5 points) What are main disadvantages of cluster computing? Explain.	)
5. (1) (5 points) What is race condition? Explain.	)
(2) (5 points) What is Amdahl's Law? Explain.	)
6.(1) (5 points) What are main advantages of shared memory architecture? Explain.	)
(2) (5 points) What are main disadvantages of shared memory architecture? Explain.	)
7. (9 points) Project 1 is to do multi-threaded programming for computing the number of prime numbers between 1 and The goal is to improve the performance by utilizing parallel processors.	200,000.
One natural way to implement dynamic load balancing approach of our project 1 is to have a shared variable "number". Ea repeats (i) reading the value of the variable "number", (ii) incrementing it, and (iii) testing whether the value is prime or counting prime numbers. Since the variable "number" is shared among threads, the code accessing the variable should be as critical section.	not, and
Above approach will give almost perfect load balancing and generate correct result. However, this approach may have problem in terms of performance.	a serious
(1) Is above approach scalable or not scalable?.  ( )	
(2) If your answer is "scalable", explain why. If your answer is "not scalable", explain why.	