EE 382C/361C: Multicore Computing **Fall 2016**

Exam 2 Practise 1: Nov 29

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1.1 Question 1

Which of the following statements about the shared and global memory in CUDA is True?

1. Shared memory is smaller and faster than global memory
2. Shared memory is on-chip and global memory is off-chip
3. Global memory exists for the entire application, while shared memory only exists for the kernel
4. All of the above

Solution: D

1.2 Question 2

Define the Opacity consistency condition:

Solution: An execution of a multiprocess program satisfies the opacity consistency condition if all the committed transactions and the read prefix of each aborted transaction appear as if they have been executed one after then other, this sequential order being in agreement with their real-time occurrence order.

1.3 Question 3

To implement SRSW atomic multi-value register, if the getvalue() operation does not do backward scan, the register can result in being a regular register, show an example:

Solution: Assume that concurrent with two writes (w[1] and w[4]), a reader performs two read operations. Since the initial value of A[1] is false, the first read may read A[4] as the first bit to be true. This can happen as follows. The reader reads A[1], A[2], A[3] as false. Before it reads A[4], the writer sets A[1] to be true and subsequently set A[4] to be true. Therefore, the first reader reads the value 4. The second reader reads the A[1] to be true before the first writer cleans it. Then, the first reader gets the newest value, however, the second reader gets the old value, which makes the register become regular.

1.4 Question 4

What is the time complexity and work complexity of doubly logarithmic height tree algorithm for solving max value problem of a given array?

Solution: T(n) = O(log log n), W(n) = O(n log log n)

1.5 Question 5

How to solve the ABA caused by using CAS for lock-free linked list?

Solution: Using pointer_t (counter). In Java, we can use AtomicStampedReference.

1.6 Question 6

True or False: For serial/sequential single-core algorithm, the timing complexity is equal to the work complexity?

Solution: True

1.7 Question 7

What is the advantage of employing fine-grained lock technique for closed address hashing?

Solution: For resize purpose, it performs the same as coarse-grained locking as it locks the each bucket in the order. However, it achieve much higher parallelism for contains(), add(), and remove() operations.

1.8 Question 8

What is the most popular Hashing operation among contains(), add(), and remove()?

Solution: contains()