Computer Systems Assignment 2 — 2016

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Due Thursday, June 16

Submit in class on Thursday. Print your name clearly in both English and Chinese and print your student number.

Q0 [10] Suppose you want to find the sum of all the values in an array of length n. Show how this can be computed with n processors in time roughly proportional to $\log n$. Give the pseudocode for the algorithm. If you wish you may assume n is a power of 2.

Q1 [10] Suppose we represent a mutable set of numbers with the following subroutines.

```
/* Add i to the set */
void addNumber( int i )
/* Return 1 if the set contains i. Otherwise return 0. */
int contains( int i )
/* Return 1 if the set is empty. Otherwise return 1. */
int isEmpty()
/* Return any member of a nonempty set */
int anyMember()
/* Remove i from the set.*/
void remove(int i)
```

It is intended that this set will be shared by a number of threads. It is intended that the following code will obtain a member of the set and also remove that member from the set so that no other thread has the same member.

```
while( isEmpty() ) { wait a little while }
int n = anyMember() ;
remove( n ) ;
```

Is there a problem with this design? What is it? How could you fix it?