Description (Thread application)

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The using of condition variable

Based on the requirement, the program should wait while the maximum threads are created until the specified condition is signaled. So the condition variable is chosen to be used in the program. The following question is about what is the specified condition. The condition is that while one of the active threads finished its job. In other words, the signal will be sent while all multiples of one number (i.e. 2) is struck out in the calling thread- strike out (). Moreover, the calling of pthread_cond_signal() should be after calling pthread_cond_wait(), hence, another condition check is added before the signal is send.

Critical section

There are two mutex locks in the program, named “condition_mutex” and “buffer_mutex” respectively. Firstly, the program should not allow more than 1 thread to access the buffer at the same time; therefore, the buffer_mutex is used to protect the data. Secondly, as mentioned in the first point, the condition variable is used to determine when a new thread could be created. It needs a mutex to lock the routine (i.e. main thread) before the signal is received. So the buffer_mutex is used.

Placement of rsleep ( )

The function of the call rsleep() is to test the situation while the thread order is changed. So, there are two requirements for the placement of this function call. Firstly, it should be outside of the buffer_mutex lock. Secondly, it should have function which can slow down one of the process.

Trial division

We do not need to run our loop until the end of the given number. A cofactor pair must have one bigger than the result of “sqrt (n)” and one smaller than its result. So, running the loop until the value of “sqrt (n)” will be enough. In other words, if there is no a factor before square root of n, it also will not appear after it. This method will make the program a lot more computationally efficient.

Thread Argument Passing

The program has used the structure to pass multiple arguments from the main thread to the created thread (i.e. strike out ()). Although we found that it is not necessary to use it in this case because there is a relationship between the two arguments that are passed by using structure, we still decide to keep this structure for program extension reason.