

ASC15 Q&A Update (Mar 10 - Mar 17)

Dear participants of ASC15:

The ASC15 committee has grouped answers for those new questions posted so far (**Gridding, NAMD and Other General Enquiries**). The details are as follows for your reference.

ASC15 Committee

Mar, 2015.

Part 1 Gridding (Please pay attention to those Highlighted

Questions with Red)

Question 1:

Dear Organizer:

I am a team member from asc060. About gridding optimization, I have two questions to ask:

1. Within the scope of the program results in error (less than $1E-12$) could add Benchmark.h "Value" type definitions by `std::complex <double>` is changed to `double`?
2. In the optimization process, found that sorts the data samples can achieve the goal of optimization. While 3.2 million to sort data only to test 1.15s. But I am having doubts about the location of the sort code, I think this part of the program's initialization section, should be placed in the init function of a Benchmark comparison suitable (running time is not the gridding), but the official description says only core function `gridKernel` function only needs to be optimized. I think the core without changing the calculation (convolution) case, the data some preprocessing would achieve better results. Ask the organizers allow data preprocessing in the init function (sort), but that time is not counted: gridding running time?

Answer:

Hi,

The answer can be found from contest notification which listed below,
“... All the modifications of the program should be within the region that we measure the running time ...”

“...The optimization methods that are used in the kernel function must be independent of the initial conditions...”

So, you are not allowed to modify the types of those variables which are defined outside that region, and also you should put your sorting code inside that region.

Please make sure that your modification should be independent of the initial conditions, which means if we change the initial conditions -- like initializing the image part of the complex arrays with non-zero values -- your code should also be correct.

Question 2:

In the ASC games, I asked about the parallelization of code procedure, how could I modify the program?

For example, can I use my plural class to replace his plural class?

While using the plural class, according to the code, only using real number part, can I change it to the real class?

Hope you can answer it, thank you!

Oh by the way... if it cannot directly replaced by a real number to a complex number arithmetic. Can be real and imaginary parts of a complex array of two arrays of real numbers, which makes it easy to quantify ...

And what's the MIC card memory ... I didn't find those books online and did not elaborate on the way ... Only saying memory is not too big.

Answer:

Hi,

You can make all the modifications you want, but please do strictly obey the rules that have been given in the preliminary contest notification.

You can write your own classes, but please make sure "... **All the modifications of the program should be within the region that we measure the running time...**", which is given in the notification.

You can not just compute the real part of the working array, because "... **The optimization methods that are used in the kernel function must be independent of the initial conditions...**"

You can make all the modifications you want, but please do strictly obey the rules that have been given in the preliminary contest notification.

The memory size of a MIC on the remote platform is 8GB.

Question 3:

In order to take into account the robustness of our code, we want to know about a few questions (mainly about your test):

1. In your testing process, input.dat file parameters will change, if you change, then what?

Range of random numbers will change in the 2.randnum.dat file, in accordance with the random number generator function Benchmark.cc to generate this file

3. we would like to know the main Board with the Intel Xeon model of Phi, and roughly how much available memory of Xeon Phi?

At preliminary reviews of the code during a test run, would change the original input.dat file and dataset file randnum.dat. (For example: If your input.dat cellsize parameters changed in size, can cause we won't be able to run)

Answer:

Hi,

Your optimization methods must be independent of the initial conditions, because "...The optimization methods that are used in the kernel function must be independent of the initial conditions...", as it has been mentioned in the contest notification.

It means that if we change the initial conditions, like the image part of the work array is initializing with nonzero values, or some input parameters are changed, your code should also get the correct results.

It seems that your code is very sensitive about the initial conditions. If it is, you have violated the rules given in the contest notification. Please modify your code and make sure you **do not** violate any rules given in the notification.

Question 4:

Hello, after we submitted code, when you end up judging the correctness of our code, I want to know do you change data randnum.dat file, and in accordance with what rules changes (such as the amount of data or a large RADIUS and so on) there is input.dat file parameters can be changed? And what parameters to change? That you judge us by how code is independent of the initial conditions?

Answer:

Hi,

There are several different ways to check the independent of your code, like scrutiny your code or test your code with a new workload. It is very possible that a new workload will be designed to test your code. We will not issue the details of how we check your code before the contest review, because we think if you strictly obey the rules given in the contest notification, there is nothing to be worried about.

Question 5:

Hi:

If I define global variables at the beginning of the program.
such as:

```

#include <iostream>
#include <cmath>
#include <vector>
#include <algorithm>
#include <limits>
#include <omp.h>
#include <string.h>

#define CORE_NUM 24
using namespace std;
std::vector<Value> sum(4096*4096, Value(0.0));
#pragma omp threadprivate(sum)

```

Can I use the number of 4096?

How to calculate this part of the time?

I violated the following two rules yet?

1. The function named "gridKernel" is the kernel function, which is the only function

that is required to be optimized. The value of the "Gridding rate: (million grid points per second)", which will be outputted in the log file, is the only indicator of the performance. All the modifications of the program should be within the region that we measure the running time. There are two timers at the beginning and the end of this region respectively. The difference between the values of these two timers is the running time of the kernel, which will be used to compute the Gridding rate.

2. The optimization methods that are used in the kernel function must be independent of the initial conditions

Answer:

Hi,

We can't tell you how to program your code. We think the rules have been clearly introduced in the contest notification, please strictly obey those rules. If you want to define some variables, please make sure they must be included in the timing region, because "All the modifications of the program should be within the region that we measure the running time."

Question 6

Power consumption estimation:

Item	Name	Configuration
Server	Inspur NF5280M4	CPU: Intel Xeon E5-2670v3 x 2, 2.3Ghz, 12 co Memory: 16G x8, DDR4, 2133Mhz Hard disk: 300G SAS x 1

Power consumption estimation:
E5-2680v3 TDP 115W, memory nominal 7.5W, hard disk nominal 10W

the power consumption estimation in one node (inspur NF5280M4) is
 $115+7.5=122.5w$

or

$115*2+7.5*8=290w$

Answer: $115*2+7.5*8=290w$ is correct

Question 7

Every time I try to use MIC, this error pops out. And I use `_Offload_number_of_devices()` to check, there is zero MIC card detected. Could you please help me?

Answer: You should login the mic-cm node using the command `ssh mic-cm` to complete your work.

Question 8

As I increase the num of threads, the error increases too. Does that reflects the poor atomicity?

If it does, Does `#pragma SIMD` relieve the error caused by poor atomicity? Because using `#pragma SIMD` seems to lose some accuracy, which goes against intuition.

Are there further readings?

Answer: The error limit -- smaller than $1e-12$ -- is large enough to include the errors coming from the SIMD operations. Please check your program to make sure you are in the right way to make your optimization.

Question 9

I have finished the contest proposal, and I want to know how could I submit my proposal.

Answer:All teams should make their submissions to info@asc-events.org before 9:00 AM, March 19th, 2015 (UTC/GMT +8:00). The confirmation of your submission will be sent to you by email.

Question 10

Would like to ask a few questions:

1. NF5280M4 server that can be used by games to use the manual?
2. could you please give us the ipmitool command NF5280M4 Server table?
3. the contest has provided the optical drive?
4. the proposal in the Design of your HPC system, would be the last game configuration?

If not, when will it fill game configuration

Answer: 1. Refer to the NF5280M4 manual link

<http://www.inspur.com/lcjtww/443012/444624/447247/452123/498619/index.html>

2. The ipmitool command and 2.NF5280M4 Linux standard commands of the same
3. NF5280M4 no CD drive, please bring your own CD
4. Final configuration, see a few days after the final notice, the final field configuration is expected by May provide

Question 11

As I increase the num of threads, the error increases too. Does that reflects the poor atomicity?

If it does, Does #pragma SIMD relieve the error caused by poor atomicity?

Because using #pragma SIMD seems to lose some accuracy, which goes against intuition.

Are there further readings?

Answer: The error limit -- smaller than $1e-12$ -- is large enough to include the errors coming from the SIMD operations. Please check your program to make sure you are in the right way to make your optimization.

Question 12

Gridding the third topic of the q into a serial program for parallel programs
Mount MIC cards for the first time, as well as on the MIC tab opens up memory so that your can place without putting time? That can be placed in the main function, not kernal function?

And the ability to use CPU+MIC mode of operation?

Answer: You can get answers from the contest notification. Please read it carefully.

Question 13

We don't find MPinc, LAdir, path, and cannot run entire HPCC tests

Answer: MPI path is :

MPdir = /home/opt/intel/impi/5.0.2.044

MPinc = -I\$(MPdir)/include64

MKL 路径为:

LAdir = /home/opt/intel

LAinc = \$(LAdir)/mkl/include

If you can not compile correctly, please refer to the error message check the correct configuration file.

Question 14

PBS before I submitted a number of tasks in the queue, simply call lspci, but they are stuck in the queue, both QSIG and qdel command does not work

Answer: We did some limits of job submission, a user-allows up to 2 operating in parallel, line 5 jobs.

Question 15

I saw two queues (MIC queues, and default) lspci shows results without a MIC card

Don't know which queue is MIC card?

And we need to determine if a node has a few MIC card

Answer: Please use the MIC queues, view the command lspci is MIC | grep -l Co-processor. Each MIC 1 MIC nodes installed card.

Question 16

At preliminary reviews of the code during a test run, would change the original input.dat file and dataset file randnum.dat. (For example: If your input.dat cellsize parameters changed in size, can cause we won't be able to run)

Answer: Your optimization methods must be independent of the initial conditions, because "...The optimization methods that are used in the kernel function must be independent of the initial conditions...", as it has been mentioned in the contest notification.

It means that if we change the initial conditions, like the image part of the work array is initializing with nonzero values, or some input parameters are changed, your code should also get the correct results.

It seems that your code is very sensitive about the initial conditions. If it is, you have violated the rules given in the contest notification. Please modify your code and make sure you **do not** violate any rules given in the notification.

Question 17

Q1: Hello, after we submitted code, when you end up judging the correctness of our code, I want to know is do you change data randnum.dat file, and in accordance with what rules changes (such as the amount of data or a large RADIUS and so on) there is input.dat file parameters can be changed? And what parameters to change? That you judge us by how code is independent of the initial conditions?

A1

There are several different ways to check the independent of your code, like scrutiny your code or test your code with a new workload. It is very possible that a new workload will be designed to test your code. We will not issue the details of how we check your code before the contest review, because we think if you strictly obey the rules given in the contest notification, there is nothing to be worried about.

Q2: If our code due to increased workload run time exceeds the machine's memory, and how this situation will be handled?

A2

The new workload will be not greater than the physical memory limit of CPU, but it may be greater than the memory size of MIC. You have to make sure your code can be running correctly on all the cases.

Question 18:

Third-ask in the topic into a serial program for parallel programs

Mount MIC cards for the first time, as well as on the MIC tab opens up memory so that your can place without putting time? That can be placed in the main function, not kernal function?

And the ability to use CPU+MIC mode of operation?

Answer:

Hi,

You can get answers from the contest notification. Please read it carefully.

Question 19:

Hi:

It has been mentioned in the notification After parallelization and optimization, the final program should be tested with the Workload1 case on **one** computing node in the CPU+MIC hybrid cluster (the remote testing platform) provided by the organization committee.

But.

Q19: Can we use 2 MIC cards for one job?

Answer:

Yes

In one node how use 2 MIC cards?

Can I use 3 CPU+MIC nodes for the problem?

Answer:

Hello,

There are several different questions in our contest, each of which may have different requirements. But for our gridding question, you are required to use only one node in the CPU+MIC hybrid cluster.

Question 20:

Yeah, it was first thing I have thought about, but I can't seems to find any mistakes in the source code.

Furthermore, I've successfully compiled and run this program on our university server. It has a similar configuration (cpu+mic).

The only significant difference I've found is that the compilers' versions are vary.

Our server has icpc version 15.0.0 and yours has 14.0.0.

The compiler warnings and the runtime errors are too hard to make sense of (see attached file) so I'm asking you to upgrade your compiler if it's possible or help us to decrypt the compiler messages so we could fix our source.

The source code I'm talking about you can find in asc077/tConvolve directory.

Regards, Alex

Answer:

Hi,

The compiler has been updated to Version 15.0.1.133. Please check your code.

Regards,

Thanks.

Part 2 NAMD

Question 1:

What does the log files mean?

apoa1-out.coor apoa1-out.vel apoa1-out.xsc

or

The output on the screen:

such as

WRITING EXTENDED SYSTEM TO OUTPUT FILE AT STEP 500

WRITING COORDINATES TO OUTPUT FILE AT STEP 500

The last position output (seq=-2) takes 1.715 seconds, 1211.148 MB of memory in use

WRITING VELOCITIES TO OUTPUT FILE AT STEP 500

The last velocity output (seq=-2) takes 3.592 seconds, 1211.148 MB of memory in use

=====

WallClock: 82.237541 CPUTime: 82.237541 Memory: 1211.148438 MB

Program finished after 82.264072 seconds.

Answer: The log file is the output on the screen.

Question 2

The compressed file should at least include:

Log files of NAMD

What does the log files mean?

apoa1-out.coor apoa1-out.vel apoa1-out.xsc

or

The output on the screen:

such as

WRITING EXTENDED SYSTEM TO OUTPUT FILE AT STEP 500

WRITING COORDINATES TO OUTPUT FILE AT STEP 500

The last position output (seq=-2) takes 1.715 seconds, 1211.148 MB of memory in use

WRITING VELOCITIES TO OUTPUT FILE AT STEP 500

The last velocity output (seq=-2) takes 3.592 seconds, 1211.148 MB of memory in use

=====

WallClock: 82.237541 CPUTime: 82.237541 Memory: 1211.148438 MB

Program finished after 82.264072 seconds.

Answer: the output on the screen.

Part 3 General Enquiries

Question 1:

As I increase the num of threads, the error increases too. Does that reflects the poor atomicity?

If it does, Does #pragma SIMD relieve the error caused by poor atomicity?

Because using #pragma SIMD seems to lose some accuracy, which goes against intuition.

Are there further readings?

Answer:

Hi,

The error limit -- smaller than $1e-12$ -- is large enough to include the errors coming from the SIMD operations. Please check your program to make sure you are in the right way to make your optimization.

Question 2:

Today when I use "qsub mic.pbs" the remote platform is error(/tConvolve: symbol lookup error: /tConvolve: undefined symbol:

__offload_offload_call_count)

But I can run successfully just few hours ago. Can you help me with it.

Thank you very much!

Answer:

Hi,

The compiler has been updated to Version 15.0.1.133. Please recompile your code, and check it again.

Best Regards.

Question 3:

Today when I use "qsub mic.pbs" the remote platform is error(/tConvolve: symbol lookup error: ./tConvolve: undefined symbol: __offload_offload_call_count)

But I can run successfully just few hours ago. Can you help me with it.

Thank you very much!

jiawei fei (NUDT)

Answer:

Hi,

The compiler has been updated to Version 15.0.1.133. Please recompile your code, and check it again.

Best Regards.

Question 4:

Do I need to change the file mic.pds? And how to change?

Answer:

You have to make sure that the executable file of your code should be generated by the new compiler. So just "make clean" your source codes, and then "make" them. You don't need to modify the mic.pds file.

Question 5:

Hi.

Thank you a lot for the update, now our program has been compiled without any errors or warnings. BUT. There's another problem: it looks like any program that has a "pragma offload" section (i.e. tries to run offload code on the mic) crashes with the next runtime error:

offload error: cannot load library to the device 0 (error code 24)

./tConvolve: symbol lookup error: ./tConvolve: undefined symbol:

__offload_unregister_image

The compiled program, source code and pbs script can be found in asc077/tConvolve directory.

Answer:

Hi,

We have tested the platform with some samples provided by the compiler.

These samples run smoothly on the platform with the new compiler. So it is very likely that there are something wrong in your code, please check it.

Question 6:

Hi, we have some problems when we use the remote platform.

Answer:

Hi,

The compiler has been updated to Version 15.0.1.133 Build 20141023 since March 13, 2015. Please check your code.

Regards,