12:02:10 From Cho, Yongsung to Everyone: When will the test questions and quiz questions error scores be corrected?

Definitely! Still working on it.

12:02:44 From Satyajit Kamble to Everyone: Hello, I had a question about project 7A. How do we compile OpenGL and OpenCL together?

You just compile them together. If you are using VS, use the supplied .zip file. It has the OpenCL and the OpenGL .h files and libraries already there.

12:04:19 From Ebert, Victoria to Everyone: We only do either 7A or 7B right? Or is it both?

Do one, but not both. Or, do both, get credit for one. 😊

12:05:34 From Beniamin Condrea to Everyone: You only need to do 1, but I believe for 7A you must have a dedicated GPU

That's correct, although something like the Intel Integrated Chipset will work as well as long as it has OpenCL and OpenGL drivers installed. That is, it doesn't have to be a discrete GPU card.

12:06:39 From Kao, Wei-Chen to Everyone: Can I say computing elements is so called "threads"?

Processing Elements are the hardware ("CUDA Cores" in Nvidia-speak). The threads are the software that runs on that hardware.

12:33:04 From Kao, Wei-Chen to Everyone: so we cannot send a integer and a float at the same time, right?

Yes, the end of the MPI notes shows you how to create your own “MPI struct”.

12:35:51 From Ricardo Wu to Everyone: What are the tags again in MPI command?

They are just integers you choose to uniquely identify the purpose for a given transmission. I use characters (e.g., ‘R’).

12:36:40 From Pemberton, Jordan E to Everyone: You mentioned not to Bcast from both boss node and rx nodes. Is that for the lifetime of the program, or a certain scope?

You can Bcast from any node. It’s just typically done from the BOSS.

12:39:08 From Patrick Sullivan to Everyone: Is that an additional buffer to the socket’s rx/tx buffers?

Presumably, but I don’t know for sure. I’ve been told that MPI layers on top of sockets.

12:43:24 From Milan Donhowe to Everyone: would snd_count and rcv_count ever be different?

I can’t think of a good reason myself, but there must be one since they created that possibility.
12:43:51 From Jacob Eckroth(He/him/his) to Everyone: just in case you want to cast a char to an unsigned 8 bit integer

Or an int to a float, or a float to a double, etc. If it came to that, I think I would try to do the conversion myself.

12:46:52 From Stachura, Ryan to Everyone: Why does Scatter need a receive type? Isn't that what Gather should do?

Remember that a call to MPI_Scatter does a send from the BOSS node and a receive on all other nodes. It is one of those calls, like MPI_Bcast, that synchronizes both sending and receiving in the same call.

Similarly, a call to MPI_Gather does a send from all the other nodes and a receive on the BOSS node.

12:47:51 From Stachura, Ryan to Everyone: So to receive information FROM an MPI_Scatter call, you still call MPI_Scatter?

Yes. I would have called it MPI_Scatter_Send_And_Receive( ).

12:48:47 From Stachura, Ryan to Everyone: I assume the functions work that way because of the buffers

Yes.

12:57:40 From Pemberton, Jordan E to Everyone: Does the left-right communication happen before each CPU node computes anything? Or is this after almost everything is computed and we just need the border elements? (Jordan's partner Cat)

Yes. In this code, at least, the nodes transmit L and R so that the other nodes can use them in the second derivative computation.

13:00:06 From Stachura, Ryan to Everyone: How do you make sure you have received all of the information necessary before computing?

There is a way to check it in the status return. I didn’t put it in this code.

13:03:26 From Pemberton, Jordan E to Everyone: Could you just send each node each other node’s overlap in advance? then you could avoid all the left-right communication. Or is this assuming that would be too memory intensive?

The problem is that the Left and Right elements that you need to complete your calculations live on other computer systems. Essentially we are sending those values “in advance”, right before they are actually needed.

13:06:27 From Stachura, Ryan to Everyone: Why can’t the computer figure out the blocklengths, displacements, and types?

The computer can’t. By the time the computer sees the executable, the entire struct is just 0’s and 1’s. But, the compiler can. Instead of:

```
int displacements[ ] = { 0, 4, 8, 12 };
```

we could have said:

```
int displacements[ ] = { offsetof(point,pointSize), offsetof(point,x), offsetof(point,y), offsetof(point,z) };`
13:09:35 From Patrick Sullivan to Everyone: About those calls, they are synchronous right? Like a recipient machine will block until it receives something?

Once the recipient machine executes the MPI_Scatter call, it blocks waiting for that value, which it knows is coming because the exact same MPI_Scatter call also did the sending.

13:10:44 From Ricardo Wu to Everyone: so it's designed in this way because of synchronization, simply put in this way

Yes, well said.

13:11:48 From Stachura, Ryan to Everyone: So what happens if the "boss" sends using Scatter, but none of the others call the Scatter function? Will the boss block forever?

Good question. I will try it and report back on Wednesday.

13:21:39 From Pemberton, Jordan E to Everyone: When running MPI, is the cluster already running an MPI job manager that's aware of all the nodes for distributing tasks to nodes? And is it running on all nodes, or is there a single MPI leader job-scheduler?

Good point! I should have commented on this at the start. You can't just walk into the Kelley student computer lab and start running MPI jobs on all those machines. An MPI cluster must have an MPI server installed on it and have it start running at boot time. That is, the MPI sockets need something to connect to.

13:23:05 From Pemberton, Jordan E to Everyone: Understood, thank you! So the server software is running on all nodes? Does it have any built-in fault tolerance for a node failing?

Yes, there is an MPI server running on all nodes. As prevalent as MPI is in the supercomputing world, I would think that there has been a huge effort to build fault tolerance into it.

13:23:57 From Shen, Nuocheng to Everyone: How to use C shall in visual studio 2019 on windows. I need to do some setting in VS or I run some command in windows cmd call Script.csh.

Windows doesn’t (natively) run csh scripts. It does run Powershell and can be convinced to run bash.

13:24:16 From Matsumoto, Nicholas to Everyone: For project 7B for the plot.csv that is output by the program how is it determined by which shift amount was the sign wave graph produced? I thought that all the shifts just got added together

All the values for shift=1 get added together into sumshifts[1], then all the values for shift=2 get added together into sumshifts[2], etc. The graph you will plot is sumshifts[i] versus i.

14:25:07 From Kao, Wei-Chen to Everyone: By the way, when is our final exam?

Check the Test #2 Review, the last item in the list of Notes on the Resources Page. All is revealed there!