

Our Team

Filled with passion, we are a team very interested and involved in the world of high performance computing. We are dedicated and we have an unstoppable desire to excel in the field and show the world that the raw talent that exists in Colombia can truly make a difference.



Fig. 1: EAFIT team

This will be the third time that a team from Universidad EAFIT will compete in the student cluster competition. Two years ago we were part of a joint EAFIT-Purdue team, the last year we participated as an independent team, and this will be the second time for us to go on our own. All of the experience that we acquired has carried over into our new team, making us not only extremely well prepared but also extremely motivated to outdo ourselves. All the members of our team come from very different backgrounds, but all of them share a common set of values, stemming from the values and virtues instilled in all of us by the University. These experiences, coupled to a constant exposure to different branches of Computer Science, will prepare our team for an extremely productive and fulfilling career.

Our Hardware

The GPU remains a specialized processor, and its performance in workload computations offers a faster output than a regular CPU could achieve. However "speeding up" by means of Graphic Processor Units could compel to make an entire analysis slower if either of its components efficiency becomes improved by using a Central Processing Unit, and the favoured part has a significant impact in the overall task.

To preserve the output's integrity and maintain the overall system and applications performance balanced we have opted to test some of the main applications gpu-based implementations and measure they behavior; endeavoring to devise the most reliable CPU-GPU efficiency correlation possible, in such a way that the avobementioned affair becomes as far as possible from taking place amid the competition.

- **CPU:** Dual-socket 10-core Power8335-GCA 3,4 GHz processors
- **Memory:** 264 GB of RAM memory
- **Storage:** ST1000NX0313 - Seagate HDD 1TB
- **Network Adapters:**
 - Infiniband controller: Mellanox Technologies MT27700 Family with Single ConnectX-4 CX455A-QSFP Adapter compatible with VPI.
 - 4 x Broadcom Corporation NetXtreme BCM5719 Gigabit Ethernet PCIe (rev 01) x 4
- **Coprocessors:** 4 x NVIDIA Corporation GK210GL [Tesla K80] (rev a1) with 12 GB memory

Why our team will win

- We've studied, as deeply as we've been able to, each and every one of our applications, and we've done our best to optimize them and to make them as stable as we can on our hardware.
- Our will to become victorious, combined with the skills we've been building all this year, are going to give us the victory.

How we prepared ourselves

- As a team, we've prepared with the utmost dedication, holding weekly team meetings, working every time we've had available in order to learn as much as we can from the apps.



Fig. 2: Weekly meetings

- In order to balance the workload, but spread the knowledge, we've assigned each team member two of the applications, and, in doing so, we've assured a great sense of camaraderie and a shared sense of responsibility for each app.

	Paraview	John The Ripper	ParConnect	HPCG	HPL
Luis Miguel Mejia				•	•
Daniel Salazar			•	•	
Santiago Suarez Perez	•				•
Alejandro Salgado	•				
Johan Yepes		•	•		
Tomas Felipe Llano		•			

Fig. 3: Workload distribution

Optimizing the apps

Being a team whose core is based on mutual communication and discussion, we devised a quite simple yet effective strategy for optimizing our applications: we split the workload of every application between two team members, and, as such, every decision, every analysis of a compilation result or allinea run has been discussed thoroughly. Therefore, every decision is born out of consensus, which without a doubt, is far more important than anything else we could've done.

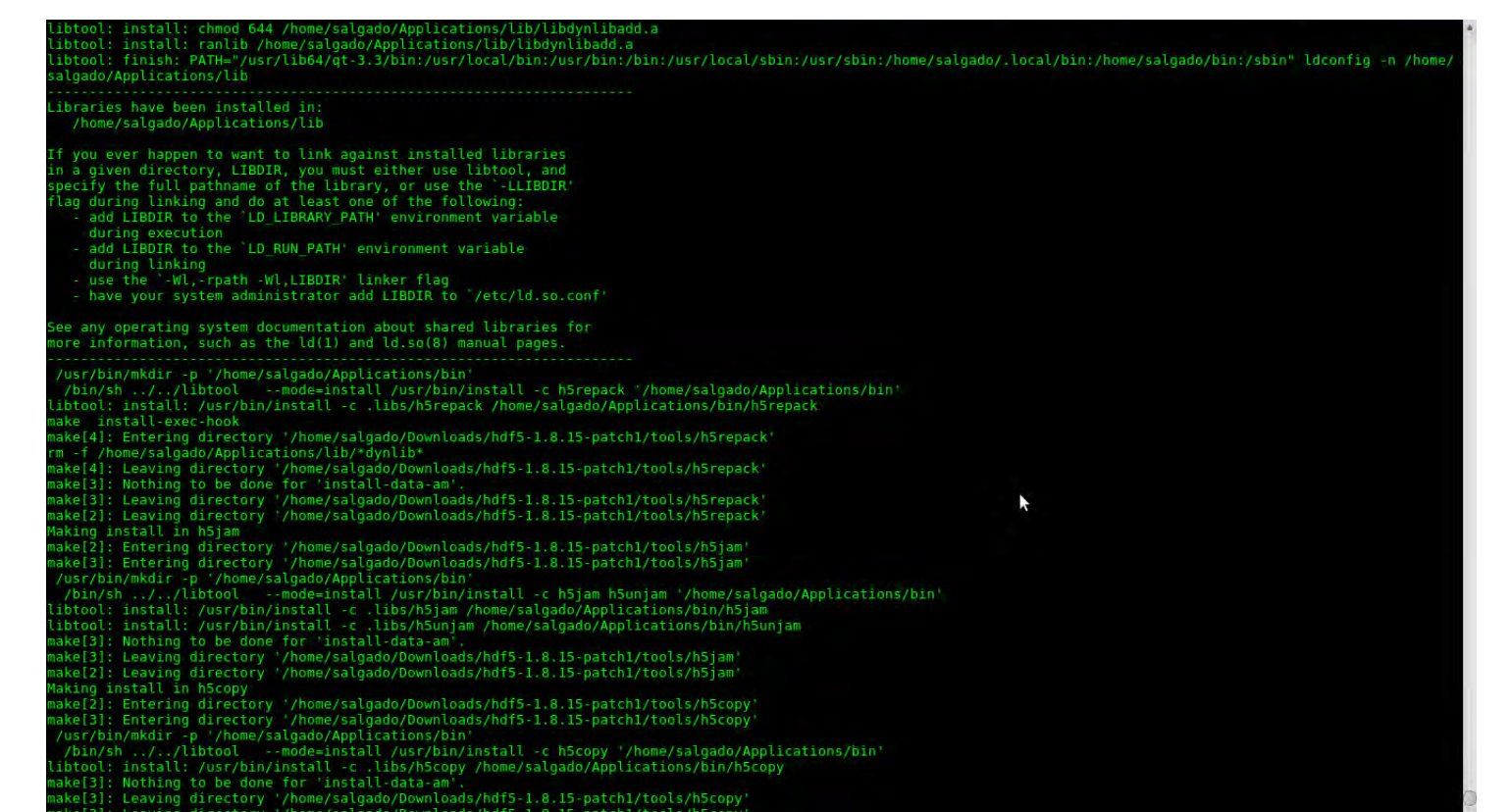


Fig. 4: Applications

Since we're working on an IBM cluster, we decided that using IBM compilers would be our best choice for optimizing. XLC, ESSL, and Spectrum were part of our tests for every app, getting results and comparing to GNU compilers and linear algebra libraries. Other tool we've used for this has been Allinea, which has proven itself to be absolutely vital to understanding how our applications behave, and how we could make them behave as we desire.