National Tsing Hua University

QCT Quanta CLOUD TECHNOLOGY

➤ Introduction to NTHU

Our School
Located in Hsinchu Taiwan, National Tsing Hua University is a comprehensive research university offering a full range of degree program in science, technology, engineering, humanities, social science, and management. It consistently ranks as one of the best universities in East Asia.

Our Team
We are an amazing team composed of five senior students Tiffany, Bruce, Daren, Johnny, Andy, and one junior student Bobby.

All of our team members major in Computer Science. We are excited for having the opportunity to attend competitions as a team, and really interested in learning knowledge related to parallel programming, cluster environment setup, and HPC application optimization, etc. We all very look forward to SC15 and are ready to take on new challenges.

➤ Hardware Configuration

Our server is supported by Quanta Computer, a Taiwan–based computer vendor. Our system is optimized for both energy and performance, and equipped with InfiniBand and PCIe SSD.

Item	Configuration
Server	Quanta Grid D51BV-2U
CPU	Intel Xeon E5-2698 v3 x 2, 2.3Ghz, 16 cores (per node)
Memory	16G x 8, DDR4, 2133Mhz (per node)
Disk	SSD (per node), PCIe SSD x 2
Interconnect	Infiniband Mellanox ConnectX®-3 HCA card, FDR switch

➤ Preparation to SC15

Self Study
Besides self-study, we search help and resources from experts and scientists around the country. We visited the professor in the department of physics for MILC, discussed with researchers in Central Weather Bureau for WRF, and learned from other graduate students about Trinity. We even practice Repast HPC by writing simulation for fishes and birds.
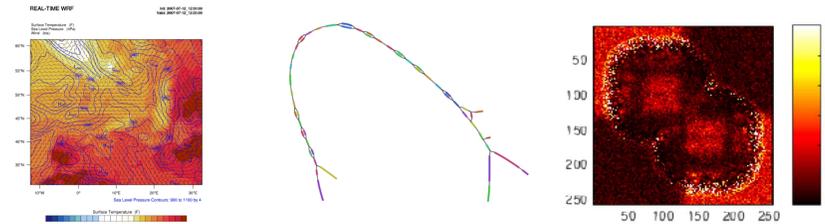
Weekly Meetings
A weekly meeting is scheduled for the past 6 months with our professors and coaches to discuss the things we learned and the problems we encountered. To improve our language skills, it is in "***English***" only. It is challenged, but fun!

Simulation Contest
Before coming to SC, our coaches arranged a simulation contest for us to test our study results and get familiar with the atmosphere of competition. So we can improve on our shortcoming in the last minute.

Visualization
Visualization is the best way to understand applications, so we install several visualization tools, and wrote our own visualization program for Repast HPC.
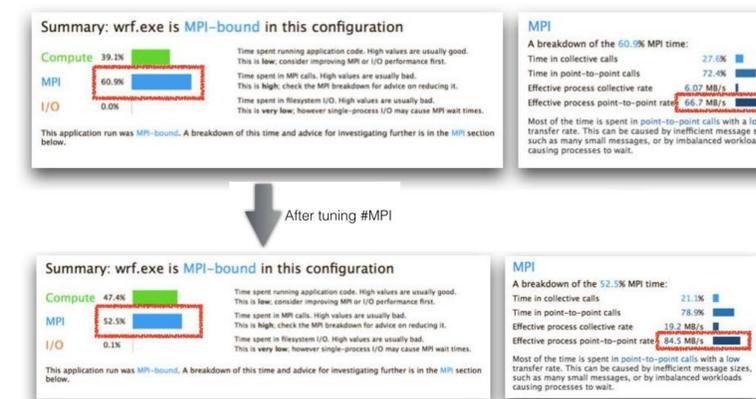

➤ Why We Will Win?

Preparation is a long road. But we all love what we do! Passion is the strength for supporting us.

Through courses and self-study, we learn the knowledge of supercomputing.

We sacrifice sleeping and leisure time in order to get a better performance!

We must think how to conduct experiments, analyze results, and optimize performance

Friendships make us form an tight bound between each other as a team!

We have participated in Taiwan Student Cluster Competition(TSCC) and win the championship!

➤ Strategy and Optimization Method

Allinea Report & Allinea Map
Profilers and tools help us understand application behavior and analyze performance bottleneck. It saves us a lot of time, and achieves better optimization result!
Take WRF for example: After tuning, the MPI part reduce 8% and the point-to-point transfer rate increase 26%!!

Time Prediction
The competition last only 57 hours! We must predict the running time of our applications, and make the best time management decision under the intense atmosphere of competition.
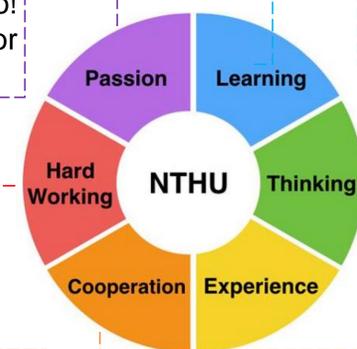
Power Consumption
Power is another constraint from the competition. To push for performance limit without over power budget, we dynamically adjust the clock speed of CPU and the fan speed of server. We also wrote a script to automate the control.

➤ Spirit & Faith

It is a Taiwanese snack named "be good" in Chinese. Its green color also matches the green light when server is stable. So by putting it on top of our servers, we believe it will keeps them in good condition! (If you want to have a taste for it, find us after the competition.)

He is a god in Taiwan. We bring him to all the competitions, and he brings us good luck!

SC15 Austin, Tx transforms.