

Our School

- Tsinghua University (established in 1911) is a research university located in Beijing, China.
- With its motto of Self-Discipline and Social Commitment, Tsinghua University describes itself as being dedicated to academic excellence, the well-being of Chinese society and to global development.
- Tsinghua University is consistently ranked as the top higher learning institution in mainland China.



Our Team

- Tsinghua Supercomputing team has seen great achievements even since it was founded. In 2012 and 2015, we won Overall Winner Award of ISC-HPCAC Student Cluster Competition. In 2013 and 2015, we won the Asia Student Supercomputer Challenge (ASC).
- We have practical experience under real work/research environment, e.g., Microsoft Research Asia, Cornell University, Carnegie Mellon University, University of California, Santa Barbara, etc.



Cluster Hardware Configuration

Item	Configuration	Comment
Chassis	Supermicro® SYS-1028GR-TRT 1U×8	
CPU	Intel® Xeon® E5 2699 v3×2×8	2 per node
Memory	Samsung® M393A2G40DB0-CPB 16GB×8×8	quad-channel, 2133MHz DDR4, 128GB per node
Power Supply	Supermicro® PWS-1K66P-1R ×2×8	2 PS per node
Accelerator	Nvidia® Tesla® K80×5	
Storage	Intel® Pro 2500 120G×8 Intel® Pro 2500 240G×2 on head node	Two 240G SSDs for backup storage
Infiniband	Mellanox® EDR 100Gb/s InfiniBand adapter	
Ethernet	On board Intel® 10-Gigabit X540-AT2	Management & monitor



Team Work

- One student with rich experience in configuration is designated to hardware and software configuration, which provide an available environment for others to test applications.
- Other team members are given about equal amount of work, for example, one application for one student.



- After a period of independent work, a team discussion will be held where everyone reports progress and current concerns.
- With the help of the team intelligence, most obstacles prove to be trivial and sometimes new ideas come out to make a breakthrough in the program performance.

Optimization Strategy



Intel® VTune™ Performance Profiler



Intel® C++ Compiler in Intel® Parallel Studio XE



Intel® MPI Library



Mellanox® HPC-XTM™



View & Modify codes



GPU



Talk with advisor



Parameter Tuning



Discussion & Brainstorm

- Try Different Configuration. For example, CPU vs. GPU and different versions of MPI.
- Application Profile Analysis & Parameter Tuning, use tools such as VTune to analyze the characteristics and bottlenecks of applications. Then tune parameters such as the number processors, IO, etc.
- Read and Modify Codes.

Why We Will Win

- Our team has been well prepared for team collaboration.
- Our hardware and software configuration are well-designed.
- We have a broad understanding of different applications on cluster.

Acknowledgement

- We thank Unisplendour Corporation Limited (UNIS) for sponsoring our team.
- We also thank Mellanox, Intel and Paratera for supporting us in this competition.