



Asia Student
**Supercomputer
Challenge**

ASC¹⁵



Welcome to ASC Student Supercomputer Challenge 2015

ASC15 Committee

September, 2014

Contents

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- **Who We Are**
- **Why ASC Student Cluster Challenge**
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Challenge I, Application



The Transistor, 1947

Information Age



2010
33.86PFlops



The Engine (1712)

Industrial Age

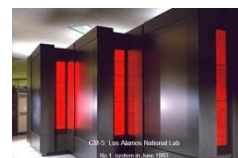


2010
2.57PFlops



Fire (400,000 BCE)

Agricultural Age



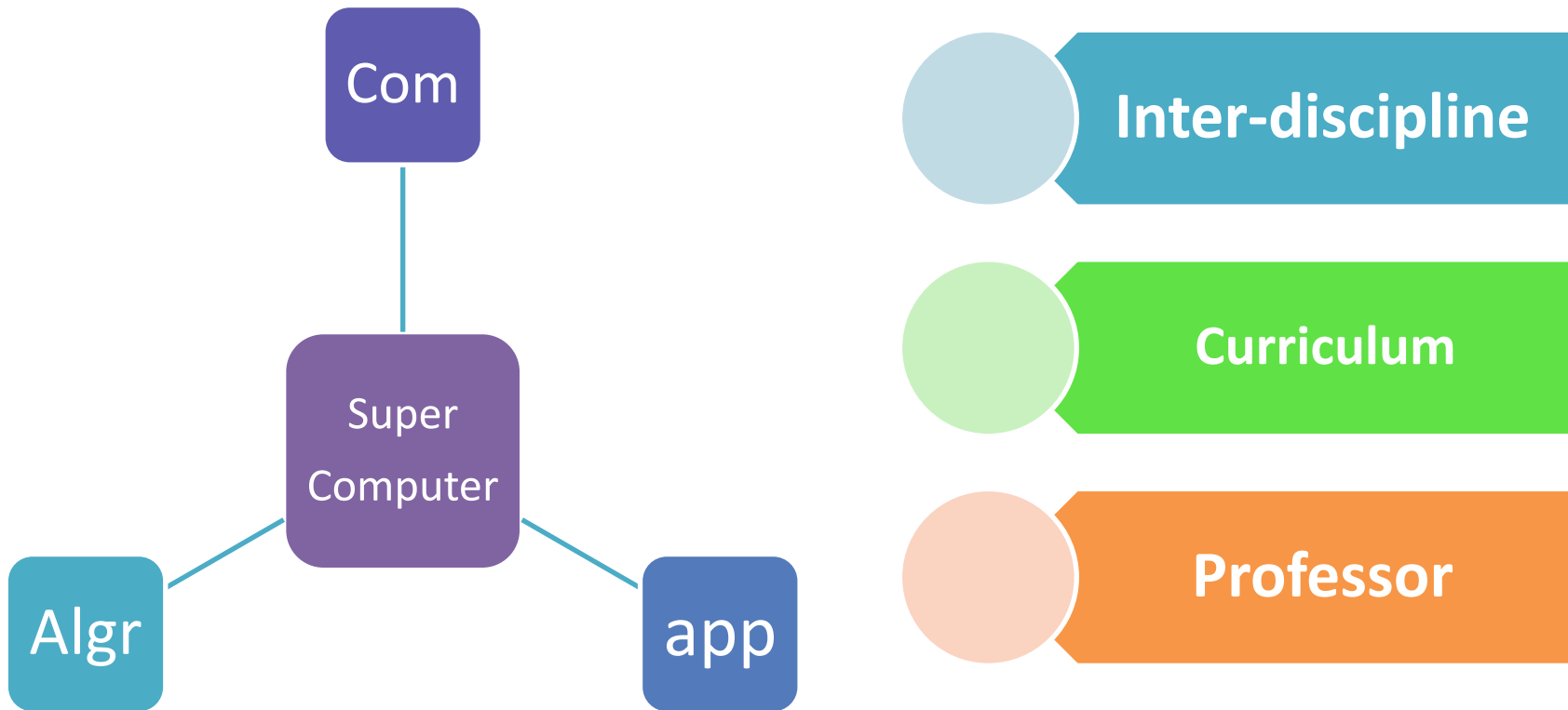
1993
59.7GFlops

- Big Hardware VS Big Software

100Pflops

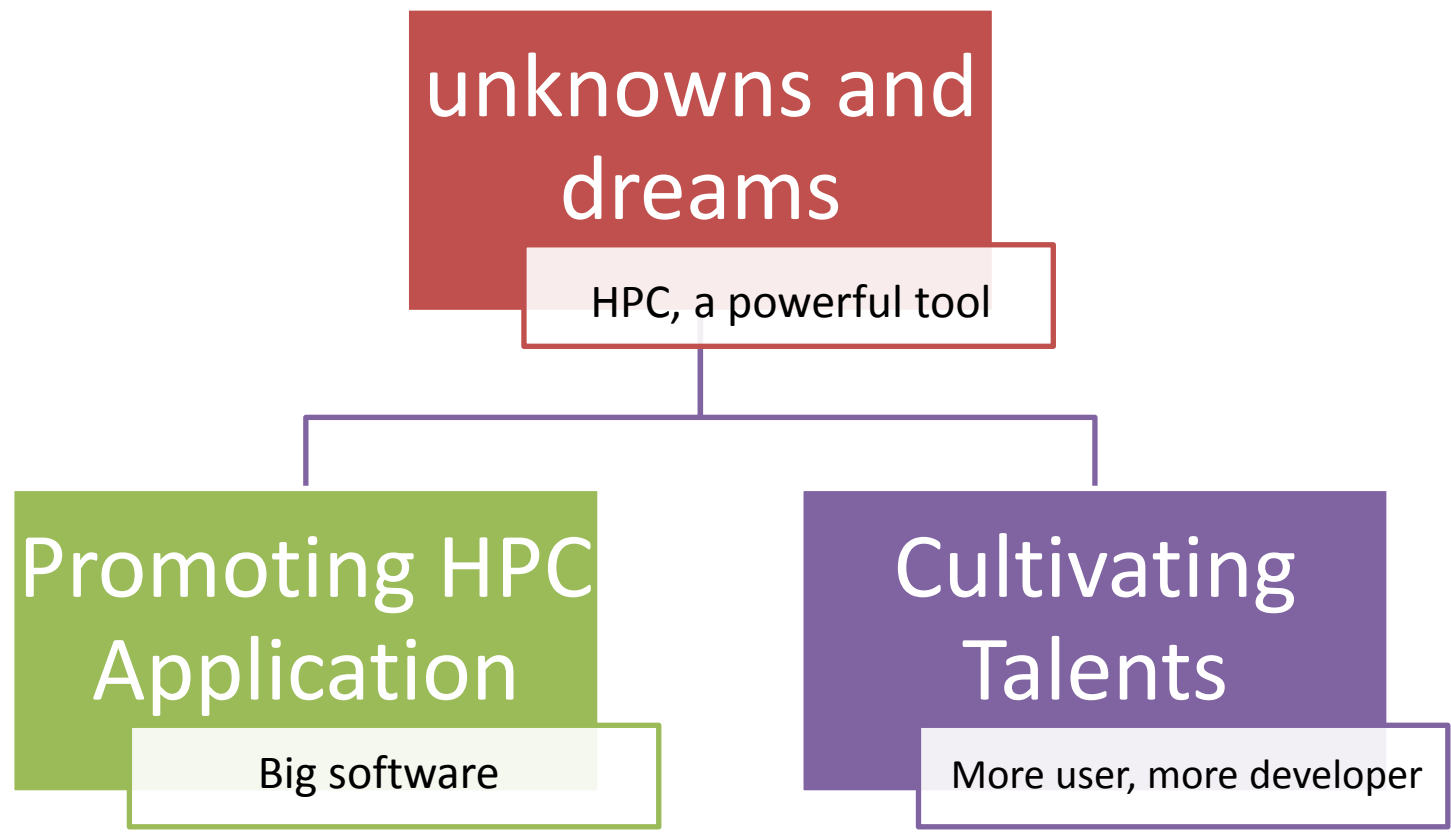
10Pflops

Challenge II, Talents



- **The first major of supercomputer kicks-off in 2014 at SUN YAT-SEN UNIVERSITY**

Goal



ASC Background

One of the top 3 competitions



Two most influential events on supercomputer.
SC leans to US; ISC leans to EU.

More people

200+ followers
80+ attendees
50+ Scientists

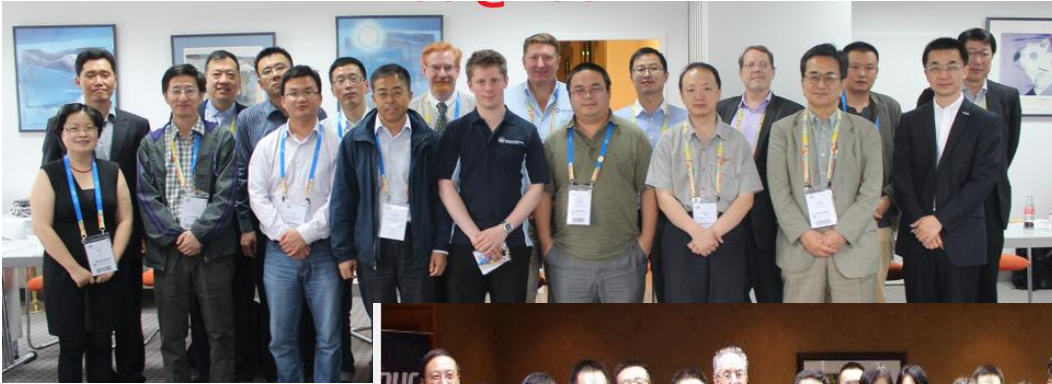
Top teams

NUS, Purdue U ,
Colorado U, HKPU,
CUHK, Mumbai U,
NTU, St. Petersburg
U, KAU, Tsinghua U,
HUST, SJTU

Toughest

For hardware and
app
Heterogeneous
computing
Rich workloads

Who We Are



- The scientists and students from the universities and institutes in China, Asia, and the world.

Why Supercomputing HPC+



Cloud computing



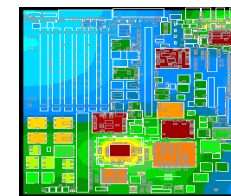
GPU cluster



Video rendering



Gene information



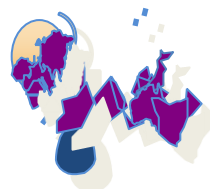
Chip design



Industrial design



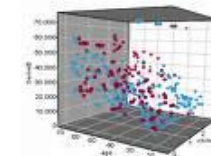
Enterprises informatization



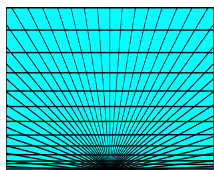
Aerospace



National defense and military



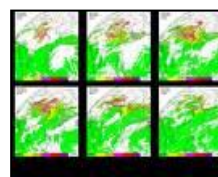
Data mining



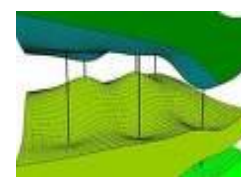
Numerical calculation



Commercial manufacture



Weather forecast



Petroleum exploration



Life science

- The versatile applications

Why Student Cluster Challenge

Opportunities for Student

- ✓ intense hands-on training
- ✓ true cases study
- ✓ acquainting with international peers
- ✓ exposure to higher education organization
- ✓ exposure to job providers

Why Student Cluster Challenge

Opportunities for University

- ✓ public exposure
- ✓ showing university culture
- ✓ training ability demonstration
- ✓ attracting international talents

Why Student Cluster Challenge

Opportunities for Society

- ✓ stimulating the development of new technology
- ✓ probabilize sustainable economy
- ✓ international understanding and communication
- ✓ educate next generation
- ✓ enhance the supercomputing community

What Have Been Accomplished



43 Teams in ASC13



82 Teams in ASC14

上海交通大學
SHANGHAI JIAO TONG UNIVERSITY

NANYANG
TECHNOLOGICAL
UNIVERSITY

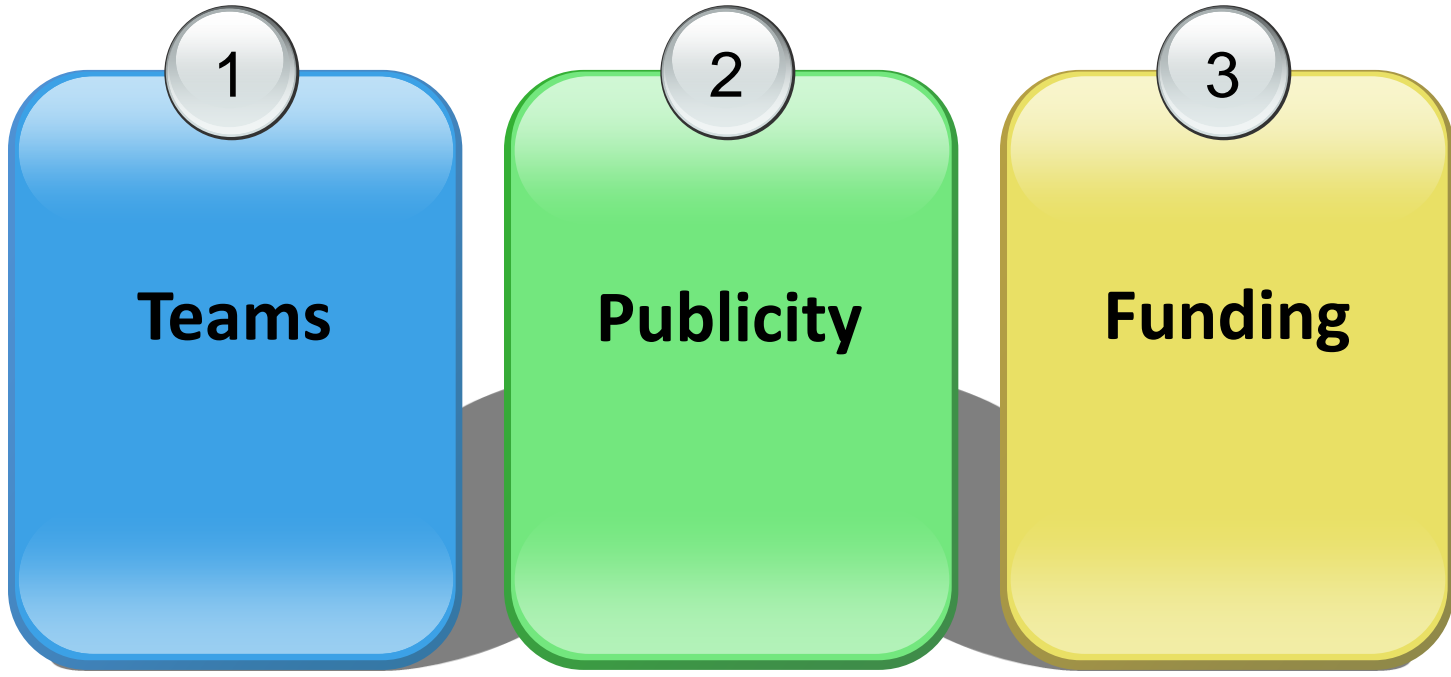
國立清華大學
National Tsing Hua University

清華大學
Tsinghua University

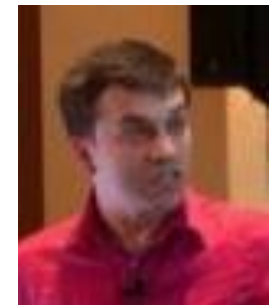
Previous Champions

- We can make you the next champion

Support Needed



Expert Committees



Evaluation Committees

Chair :

MO zeyao (Deputy Director)

评审委员会委员 :

ZHANG Linbo (Professor)

白文 (航空研究院 计算室主任)

JIN Zhong (Associate Prof.)

LUO Guoan (BGP)

ZHOU Tianjun (Professor)

KWAN Wing Keung (AD)

LIN Fangpang (Professor)

Institute of Applied Physics and Computational Mathematics

Institute of Computational Mathematics and
Scientific/Engineering Computing

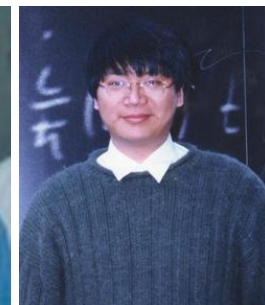
中国科学院超级计算中心
Supercomputing Center of Chinese Academy of Sciences

中国石油东方地球物理公司
BGP INC., CHINA NATIONAL PETROLEUM CORPORATION

中国科学院大气物理研究所
Institute of Atmospheric Physics, Chinese Academy of Sciences

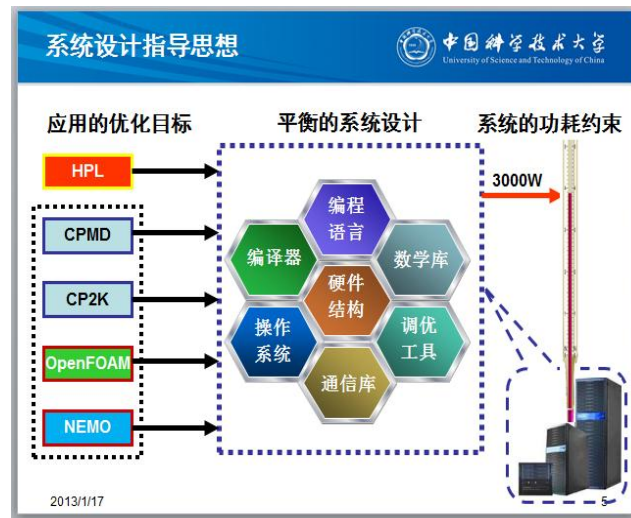
The University of Hong Kong

NAR Labs
National Applied Research Laboratories
National Center for
High-performance Computing



ASC14, Contents

- Preliminary contest
 - All teams shall submit a proposal with following contents:
 - 1. Supercomputer technology level of departments
 - 2. Competition organization situation of departments
 - 3. Technical proposal for the competition
- Final
 - Optimization
 - Application test
 - Presentation



Proposal for a National University of Defense Technology Team
Participating in the SC12 Student Cluster

Abstract
National University of Defense Technology is always at the first class in the world in system design, application and education of high performance computing. It not only successfully designed high performance computing systems such as FW-II and Tianhe-2A, but also cultivated a large number of high performance computing and application personnel. In the past two years, with the support of [logo], our vendor partner, undergraduate students from NUDT obtained a series of excellent results in both domestic and international student cluster competitions. They also won the qualification of SC12 final in SC12, this June in 2012, we will attend SC12 together with [logo] again. A cluster having more than 20000 GPUs will be constructed in which each node has two Intel X5650 CPUs and four Nvidia Tesla GPUs. Its peak performance reaches more than 3.4 PFLOPS and its dynamic power consumption is about 2.7MW.

L Team Members
In last November, with the great support of [logo] our vendor partner, we successfully attended the final competition of SC11 and won the second place in both Highest WR, performance and overall performance contest. In 2012, we will attend SC12 together with [logo] again.
Our team consists of six undergraduates and two advisors. The undergraduate student members are:

- Chen Zhenqun, Junior: He is the captain of our team because of his rich experience of HPC competitions. He attended SC11 and the first undergraduate high performance computing (HPC) competition in China this April. He will attend the competition held in SC12 this June.
- Wang Bo-qun, Junior
- Cheng Li, Junior
- Zhou Yang, Junior
- Zhou Wen-qun, Junior
- Liu Yong, Junior

Although most of our students have no experience in HPC competition, they attended other competitions and won prizes, as shown in Table 1. In these contests, they successfully exhibited their extraordinary abilities in finding and solving problems in system design, application development and optimization.

Table 1. Prizes obtained by our students.

ICPC: International Collegiate Programming Contest; MCM: Mathematical Contest in Modeling; IMC: Mathematical Contest.

Name	Prize
Chen Zhenqun	Silver Prize, ACM-ICPC, China.
Wang Bo-qun	Third Prize, Contest in Information Security, China.
Cheng Li	Silver Prize, ACM-ICPC, China; 2nd Prize, International MCM.
Zhou Yang	Silver Prize, ACM-ICPC, China; First Prize, International MCM.
Zhou Wen-qun	Second Prize, MCM, Hunan; Second Prize, MC, Hunan.
Liu Yong	Second Prize, MCM, China.

All preparation works will be directed by following two experienced professors:

- Prof. Zhang Chun-qiao
- Prof. Dou Yong

They successfully directed our undergraduate students attend SC11 and the first undergraduate HPC competition in China. They will also be the director of NUDT team to attend the competition in SC12. For SC12, they will be responsible for the guidance of cluster construction and application porting and application.

ASC14, 16 Finalists

Nanyang Technological University	Taiyuan University of Technology
Purdue University	Tsinghua University
University of Sao Paulo	Zhejiang University
Ural Federal University	Shanghai Jiaotong University
University of Miskolc	Beijing University of Aeronautics and Astronautics
Ulsan University of Science and Technology in Korea	Huazhong University of Science and Technology
The Hong Kong Polytechnic University	National University of Defense Technology
National Tsinghua University	SUN YAT-SEN University

ASC14, Awards

Champion : Shanghai Jiao Tong University

Runner up : Nanyang Technological University

HPL : SUN YAT-SEN University

e-Prize : Shanghai Jiao Tong University

Application innovation : Tsinghua University, Taiyuan University of Technology, Beijing University of Aeronautics and Astronautics, Shanghai Jiao Tong University



ASC15 Timeline

August	September	October	November	December	January	February	March	April	May	June	July
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Planning



Application



Start

Registration



Preliminary contest

Opening Ceremony



Final

12 months



Asia Student
**Supercomputer
Challenge**

ASC¹⁵



See You Soon in ASC15

ACS15 committee