From Zero to Hero: BUPT's First ASC Journey

A Guide to Preparation, Execution, and Teamwork

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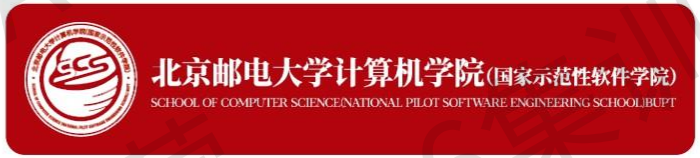
ASC26 Training Camp



Outline

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The Birth of BUPT Supercomputing Club

Members Fei Ren, Haoling Zhang, Kaicheng Yang, Qingyue Zhang, and Qian Xie

Advisor Prof. Shigang Li, School of Computer Science, BUPT.

Aug 2024 Founded the first-ever Supercomputing Club @ BUPT.

Dec 2024 Registered and participated in the ASC preliminary for the first time.

May 2025 Achieved BUPT's first appearance in the ASC World Finals.

Outline

Find the Right People

- **Cast a Wide Net:**
  - Host internal selection contests (e.g., HPCGame).
  - Scout talent from related circles (XCPC, CTF, AI labs).
- **Build a Pipeline:** Recruit and train junior students early.
- **Diversity is Key:** Aim for a mix of skills:
  - Scientific Computing / Physics
  - AI / Deep Learning
  - Computer Architecture / Networking
  - System Administration / Optimization

Make It Robust

- **Foster Trust & Synergy:** Team bonding is crucial. The leader must know each member's strengths.
- **Master Resource Management:** This competition tests management of:
  - **Manpower** (task allocation)
  - **Computing Power** (hardware access)
  - **Time & Effort** (schedule planning)
- **Clear Roles:** Define responsibilities (e.g., environment setup, documentation, primary solver).

Outline

Preliminary Round Strategy

- **Priority: Convenience & Familiarity.**
- **Strategy:** Use platforms your team knows best (e.g., local servers, cloud instances).
- **Flexibility:** Different problems can use different, tailored environments.
- **Tool:** Utilize containers (Docker/Singularity) for reproducible, isolated setups.

Finals Preparation

- **Maximize Compute Power:**
  - **Clone Cluster:** One system identical to the on-site hardware for precise optimization.
  - **Power Cluster:** A separate, more powerful system for heavy parallel scaling tests.
- **Goal:** Be ready to tune for both performance and efficiency on the exact final platform.

Outline

Step 1: Plan & Organize

- **Decode the Announcement:** Immediately divide tasks upon release.
- **Ownership Model:** One primary owner, 1 or 2 assistants per task.
  Collaboration > Solo effort.
- **Infrastructure Lead:** One person manages environment setup, dependencies, and containerization.
- **Document Religiously:** Primary owners must record all optimization steps, run results, and failures.

Step 2: Understand & Optimize

- **Read Deeply:** Study problem description, reference papers, and source code. Understand the **why** before the **how**.
- **Baseline First:** Run the unmodified benchmark to completion. Establish a performance baseline.
- **Profile, Don't Guess:** Use profilers (e.g., perf, nvprof, Intel VTune) to identify true bottlenecks (CPU, Memory, I/O, GPU).
- **Optimize Methodically:** Apply targeted optimizations (algorithmic, parallel, memory, instruction-level) based on profiling data.

Step 3: Report & Present

- **Divide to Write:** Primary owners draft their respective sections.
- **Unite to Polish:** The whole team reviews, revises, and unifies the final report. **Multiple proofreads are mandatory.**
- **Focus on Methodology:** Preliminary round judges focus on your approach and justification, not just absolute numbers (environments differ).
- **Respect Constraints:** Adhere strictly to new page limits. Concise, relevant writing is now part of the challenge.

Outline

The I/O Wall & Storage

- **Problem:** SATA disks are often too slow and too small.
- **Solution:** Bring your own NVMe SSDs.
- **Action Plan:** Design your storage architecture in advance (RAID 0, tmpfs, dedicated scratch space).

Power Capping

- **Key Skill:** Master BIOS power settings, CPU P-states, and Intel RAPL / AMD RAPL tools.
- **Preparation:** Conduct power consumption profiling and tuning on your practice cluster **before** the finals. Adapt to different profiles for different workloads.
- **Goal:** Achieve the best performance under the given power limit, per each problem's characteristics.

InfiniBand Troubles

- **On-Site Reality:** The provided IB switch is often unmanaged.
- **Be Prepared:** Know how to set up your own Subnet Manager.
- **Driver Advice:** Use Long-Term Stable (LTS) drivers for reliability.

Adaptability & Team Dynamics

- **Stuck on a Problem?** Don't tunnel-vision. Trust your leader to reallocate time and resources.
- **Team Conflict?** Stay calm. Focus on the common goal. Respect competition rules and referees.
- **Essentials Toolkit:** Bring screwdrivers, multi-outlet power strips, spare cables (Ethernet/DP), and anti-static gloves.

Outline

The True Challenge

- **ASC is a Holistic Test:**
  - **Technical Skill** (HPC, AI, System)
  - **Project Management** (Time, People, Hardware)
  - **Mental Fortitude** (Pressure, Uncertainty)
  - **Team Cohesion** (Communication, Trust)

- **The Winner's Edge:** Often goes to the most **prepared, resilient, and united** team.
- **Final Message:** Enjoy the journey. The skills and friendships forged here are the real prize.

Q&A


ASC
Intelligent Computing


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