Internships with NSCC

PROJECT CRAY

Portable Raspberry Pi Supercomputer for HPC Education & Outreach

How To Apply

Send your CV, academic transcript and a brief introduction to **recruit@nscc.sg** with the subject line: **Internship Application - [Your Name] [Project Title]**

Please include your intended internship period within the email. Our team will be in touch with shortlisted candidates.

The Challenge

High performance computing (HPC) can often feel abstract and intimidating to the general public and non-technical staff.

To demystify supercomputing and spark excitement within the wider community, we need a tangible, visually engaging way to illustrate core HPC concepts.

We are looking to build a "miniature supercomputer" using a Raspberry Pi cluster. This portable system will serve as a powerful educational and outreach tool, bridging the gap between complex supercomputing architectures and everyday understanding.

What You Will Do

You will take end-to-end ownership of building, configuring, and testing this mini HPC cluster. Your key responsibilities will include:

- **Hardware Assembly & Configuration:** Take charge of physically building, wiring, and networking the Raspberry Pi cluster to ensure it is robust and portable for demonstrations.
- **Systems Evaluation:** Architect the software stack by deploying and analysing the pros and cons of different tools, including various operating systems, job schedulers (e.g. Slurm), parallel file storage solutions, and networking protocols.
- **Benchmarking & Architectural Analysis:** Run application benchmarks on the newly built cluster to practically evaluate and document the architectural differences and performance trade-offs between x86 and ARM-based processors.
- **Interactive Demonstration:** Design and implement a captivating visual test case to clearly illustrate common HPC bottlenecks (such as network latency, I/O constraints, or CPU limits) to a non-technical audience. You can achieve this through software (e.g. real-time monitoring dashboards) or hardware integrations (e.g. programming LED arrays to light up based on compute and network activity).

What You Will Deliver

A fully functional, easily portable Raspberry Pi cluster equipped with an interactive demonstration, ready for live public exhibitions. Alongside the physical cluster, you will deliver clear, comprehensive documentation that includes step-by-step how-to guides and a detailed comparative analysis of the different systems and tools you tested.

Required Qualifications

- Currently pursuing a degree in Computer Science, Information Systems, Electrical Engineering, or a related field
- Hands-on experience with **Linux administration** and shell scripting
- Basic understanding of **computer networking** fundamentals (IP addressing, routing, SSH)
- A tinkerer's mindset: enthusiastic about working with physical hardware and microcontrollers

Bonus / Preferred Skills

- Previous experience working with Raspberry Pis or other single-board computers
- Familiarity with job scheduling software (e.g. Slurm, PBS)
- Basic knowledge of parallel/distributed file systems or cluster computing concepts