HPC Ecosystems Project
Embracing Online Education for HPC System Administrator Training

SIGHPC Education Global Seminar Series
March 2023

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Senior Technologist
ACE Lab
CHPC, South Africa
HPC Recipient

○ Principal Technician, UKZN
  Research & Advanced Computing
  May 2013 - May 2016

○ 192 core Sun HPC (Ranger chassis)
  ■ SysAdmin Training
  ■ Student Cluster Competition
  ■ TACC & SC’15

HPC Project Lead

○ Senior HPC Technologist, CHPC
  ○ Project Lead: HPC Ecosystems
  ○ ACE Lab
  ○ June 2016 – present

○ MS Computer Science
  (Computing Systems)
  Georgia Tech, USA
  OMSCS Programme

“Dear BrYan”

HPC Ecosystems Project Overview
South Africa - most descriptive country name!
CENTRE FOR HIGH PERFORMANCE COMPUTING

NATIONAL SUPERCOMPUTING FACILITY
- 1PF system
- (just recently) formerly Top500
- Largest HPC System in Africa (YMMV)

... FOR RESEARCH COMMUNITY
- South African Academic Institutions & Research Facilities
- Southern Africa Community partners
- SKA partner countries
HPC Ecosystems Project Overview

Ranger

Cambridge

Stampede

HPC Ecosystems Project

C6100
HPC Ecosystems Team @ CHPC (18+1)

Advanced Computer Engineering (ACE) Lab
- David Macleod (Principal Engineer)
- Eugene de Beste (Senior Technologist)
- Lara Timm (Engineer)
- Mmabatho Hashatsi (Engineer)
- Nyameko Lisa (Senior K/A)
- Sean February (Senior Technologist)
  acelab@chpc.ac.za

Research / Academic Support
- Dr. Charles Crosby
- Mr. Inus Scheepers
- Dr. Mthetho Sovara
- Mr. Samuel Mathekga
- Dr. Werner Janse van Rensburg

CHPC Technical Team
- Themba Hlatshwayo
- Zama Mtshali
- Zintle Sanda

CHPC Operations Support
- Funeka Mafani
- Lesley Fredericks
- Nox Moyake
- Dr. Ricardo Harry
HPC Ecosystems Project Overview

<table>
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<tr>
<th></th>
<th>GLOBAL (17)</th>
<th>LOCAL (~17)</th>
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<tr>
<td>TACC Ranger</td>
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<td>CHPC C6100</td>
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<td>5</td>
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<tr>
<td>TACC Stampede</td>
<td>9</td>
<td>3 (+2)</td>
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Update of HPC Ecosystems sites as of 202205
How it happens
To implement a **successful deployment** of HPC Ecosystems Resource/s, a site requires:

**INFRASTRUCTURE**
- Power & Cooling
- Network Connectivity
- Datacentre
  - Sound-proofing
  - Ancillary Equipment
  - Security

**USERS**
- Research
- Teaching
- Computationally-driven Research
  - HPC curriculum
  - Student Cluster Competition

**SUPPORT**
- Technical
- Leadership
- System Administrators
  - Scientific Computing & Linux

HPC Ecosystems Project - READINESS
HPC Ecosystems Project – WHY WAIT?

**USERS**

- Research
- Teaching

**# Computationally-driven Research**
**# HPC curriculum**
**# Student Cluster Competition**

**BUT WHY WAIT TO BEGIN THE TRAINING??**

HPC Ecosystems Project Overview
The Traditional HPC Ecosystems Model

- Hardware Ready
- Site Assessment
- Site Deployment
- Site Training
On-site Training (pre-COVID19)

HPC Ecosystems Project Overview
REPEAT train.site() UNTIL 1==2

Give a man a fish and feed him for a day.

Feed a man to a fish and feed your fish for like six months!

Cyanide and Happiness © Explosm.net

HPC Ecosystems Project Overview

Give a man a fish and you feed him for a day. Don't teach a man to fish and you feed yourself. He's a grown man, fishing's not that hard.

— Nick Offerman
ONLINE TRAINING

Moved Training Online in 2020 (influenced by …)

HPC Ecosystems Project (for SysAdmins)

- OpenHPC Virtual Labs
- HPC SysAdmin Workshops
TAKING EDUCATION & TRAINING ONLINE

LOWER OVERHEAD

• **Cost:** not funding participants

• **Logistics:** not hosting a F2F workshop

• **Workload:** long-term, can re-run online course relatively easily.

SCALABILITY

• **Size:** can accommodate larger groups

• **Frequency:** can run programs in parallel / quick succession / on-demand etc.

• **Repeatable!**
PRINCIPLES LEARNED FROM OMSCS

Accessibility
• Data “lite”
• Offline availability
• Closed-Captions

User Friendly
• Good UX
• FAQ / Support Resources

Flexibility
• Accommodating

Replayability
• Participants can repeat lessons

Compatibility
• Multiple devices & OS support
ONLINE EDUCATION STRATEGIES

Drop-out / Disengagement
• Regular Office Hours
• Encourage Collaboration
• Incentivise Participation

Confusion / Overwhelming
• Community chat
• Advice & Tips for online learning

Life Happens
• Be understanding!
• Make it manageable!
• BE HUMAN!!
Implementation
Videos

Accessible
- Downloadable
- Zero-rated
- Captions

Replayable

Compatible

User Friendly

Flexible
- On Demand
Virtual Labs

Accessible
- Off-line
- Opensource (GitLab)
- Low Resource Requirement

Replayable

Compatible
- VirtualBox

User Friendly
- YMMV :-)

Flexible
- On Demand
- Transferable to Production

HPC Ecosystems Project Overview
Formal Workshops

Accessible
- FREE

Replayable
- Quarterly :)

Compatible
- Web-clients

User Friendly
- YMMV :-)

Flexible
- LMS and Slack
- 1-2 weeks for 15 hours of work

HPC Ecosystems Project Overview
FEEDBACK:
YOU ARE NOT YOUR USER!
HPC Ecosystems Project – DO IT!

OpenHPC 101 (hpc-ecosystems.gitlab.io)

YouTube: 'hpc ecosystems 101 openhpc'

HPC Ecosystems Slack: https://tinyurl.com/sighpc-join-ecosystems-slack

HPC Ecosystems Google Group: http://tinyurl.com/SADC-HPC-Apply

NICIS CHPC Events: events.chpc.ac.za
HPC Ecosystems Project - Acknowledgements

- HPC Ecosystems Project Team
- HPC Ecosystems Project Community Partners
- Texas Advanced Computing Center (TACC)
- University of Cambridge
- STEM-Trek
- EPCC & PRACE
- OpenHPC
THANK YOU!
(and stay safe)

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HPC Ecosystems Project Overview