HPC Certification Forum
Towards building an HPC workforce in Africa

HPCCF
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ACE Lab

HPCFF 202005
CENTRE FOR HIGH PERFORMANCE COMPUTING

NATIONAL SUPERCOMPUTING FACILITY

- 1PF system
- (just recently) formerly Top500
- Largest HPC System in Africa

... FOR RESEARCH COMMUNITY

- South African Academic Institutions & Research Facilities
- Southern Africa Community partners
- SKA partner countries

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ACTIVITIES: DEVELOPING AN HPC WORKFORCE IN AFRICA

- RESEARCH SUPPORT
- SUMMER & WINTER SCHOOLS
- STUDENT CLUSTER COMPETITION
- HPC ECOSYSTEMS

(ACE Lab)
ACTIVITIES: DEVELOPING AN HPC WORKFORCE IN AFRICA

- RESEARCH SUPPORT
- SUMMER & WINTER SCHOOLS

facilitate advancements in research & optimisations

(ACE Lab)
ACTIVITIES: DEVELOPING AN HPC WORKFORCE IN AFRICA

- RESEARCH SUPPORT
- SUMMER & WINTER SCHOOLS

- Intro. to Scientific Computing
- Tools for HPC (~SWC)
- Parallel Programming
- Effective Cluster Usage

(ACE Lab)

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ACTIVITIES: DEVELOPING AN HPC WORKFORCE IN AFRICA

Outreach for U/G’s

Compete Internationally

STUDENT CLUSTER COMPETITION

CHPC Team Profile

Location: Cape Town, South Africa


(ACE Lab)

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ACTIVITIES: DEVELOPING AN HPC WORKFORCE IN AFRICA

HPC System Deployments in Africa

HPC System Administrators

HPC ECOSYSTEMS

HPC Ecosystems
HPC System Deployments
(2019-05)

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CHALLENGES &
LESSONS LEARNED

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Participants
Expect “everything”
# basic Linux intro
# basic programming
# cluster usage 101

Valuable time lost in class spent evaluating class ability & adjusting content delivery

Trainers
Expect “readthedocs”
# core competencies
(it’s on the application form!)

Gap in expectations
Difficult to “raise the bar” when OpenMP and MPI classes include participants with no programming background (let alone experience on HPC system).

Participants
Expect “everything”
# basic Linux intro
# basic programming
# cluster usage 101

Trainers
Expect “readthedocs”
# core competencies
(it’s on the application form!)
Valuable time lost in class spent evaluating class ability & adjusting content delivery.

**CHALLENGES & LESSONS LEARNED**

**WINTER SCHOOL**

### Programming

- HPC experience

### Linux

- Pre-requisites
  - Gap in expectations
  - Participants expect “everything”
  - # basic Linux intro
  - # basic programming
  - # cluster usage 101

- Trainers expect “readthedocs”
  - # core competencies (it’s on the application form!)

**AN HPC CERTIFICATION PREREQUISITE CLARIFIES EXPECTATIONS & REQUIREMENTS BEFOREHAND**
CHALLENGES & LESSONS LEARNED

- **If it’s free**, someone will take it.
- **A zero cost** can supersede rational & necessary time to prepare.
- Leadership’s misunderstanding of what an HPC resource is confounds any useful allocation / adoption of scarce HPC resources.

- Site-assigned HPC SysAdmins vary widely in experience & background. Systems may arrive & sit idle for months while SysAdmins learn core skills.

**Valuable time lost.**
CHALLENGES & LESSONS LEARNED

HPC ECOSYSTEMS

PRE-REQUISITES

- If it’s free, someone will take it.
- A zero cost can supersede rational & necessary time to prepare and understand.
- Leadership’s misunderstanding of what an HPC resource is confounds any useful allocation / adoption of scarce HPC resources.
- Site-assigned HPC SysAdmins vary widely in experience & background.
- Systems may arrive & sit idle for months while SysAdmins learn core skills.

# SysAdmin XP
# HPC knowledge
# Linux (!!!)

AN HPC CERTIFICATION PREREQUISITE CLARIFIES EXPECTATIONS & REQUIREMENTS BEFOREHAND

Valuable time lost.

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Unequal Conditions

Some teams lack onsite expertise to mentor them & they rely on one week school for the bulk of their support for the entire competition.

Limits on Outreach

No capacity for ACE Lab to expand outreach beyond 20 teams with onsite Intro to HPC training.
CHALLENGES & LESSONS LEARNED

UNEQUAL CONDITIONS

Some teams lack onsite expertise to mentor them & they rely on one week school for the bulk of their support for the entire competition.

LIMITS ON OUTREACH

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SCC CURRICULUM WELL-SUITED FOR OUTSOURCING INTRO TO HPC SYSADMIN CERTIFICATION TO ENABLE MORE TIME TO FOCUS ON HPC BENCHMARKING & REACH LARGER AUDIENCE

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WHY AN HPC CERTIFICATION
WHY AN HPC CERTIFICATION

WINTER SCHOOL
Focus on important HPC skills & improving scientific computing

STUDENT CLUSTER COMPETITION
Reduce the bottleneck on introduction topics.
Reduce the workload for ACE Lab.
Expand the competition & outreach.

HPC ECOSYSTEMS
Focus on enabling scientific computing resources and deploying working systems.

GET TO THE SCIENCE

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FINAL THOUGHTS
FINAL THOUGHTS

● Know your audience *(what are we building from)*
  ○ What sort of experience & skills do they possess / require?

● Know your goals *(what are we building towards)*
  ○ What sort of skills should the audience gain at the end?
CHPC* HAS A DREAM

* Bryan, on behalf of CHPC, has a dream
### HIGH-LEVEL SAMPLE HPC CERTIFICATIONS

<table>
<thead>
<tr>
<th>Introduction to HPC</th>
<th>● What is HPC, why HPC, etc.</th>
<th>● Student Cluster Competition, HPC Ecosystems Candidates, HPC Users, Datacentre Managers, Institutional Leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPC System Administration</td>
<td>● Software Stack, Confirmed virtual cluster deployment</td>
<td>● HPC Ecosystems Candidates, Student Cluster Competition</td>
</tr>
<tr>
<td>Scientific Computing</td>
<td>● Job submissions, Introduction to Parallel Computing</td>
<td>● HPC Users, Student Cluster Competition</td>
</tr>
<tr>
<td>Parallel Computing &amp; Programming</td>
<td>● MPI code, OpenMP code</td>
<td>● HPC Users</td>
</tr>
</tbody>
</table>
THANK YOU! (and stay safe)

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