A national initiative of the Department of Science and Innovation and implemented by the CSIR.

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

CSIR
Touching lives through innovation

NATIONAL INTEGRATED CYBERINFRASTRUCTURE SYSTEM
CHPC

HPC Ecosystems Project

Embracing Online Education for HPC System Administrator Training

SIGHPC Education Global Seminar Series

March 2023

Bryan Johnston
Senior Technologist
ACE Lab
CHPC, South Africa

bjohnston@ace-lab:[~]$ whoami

HPC Recipient

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

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

- *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

Georgia Tech

"Dear BrYan"

HPC Ecosystems Project Overview

South Africa - most descriptive country name!

ISC 2021

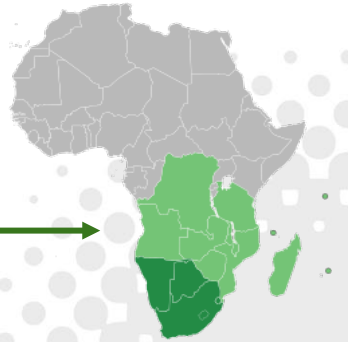
CENTRE FOR HIGH PERFORMANCE COMPUTING

NATIONAL SUPERCOMPUTING FACILITY

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

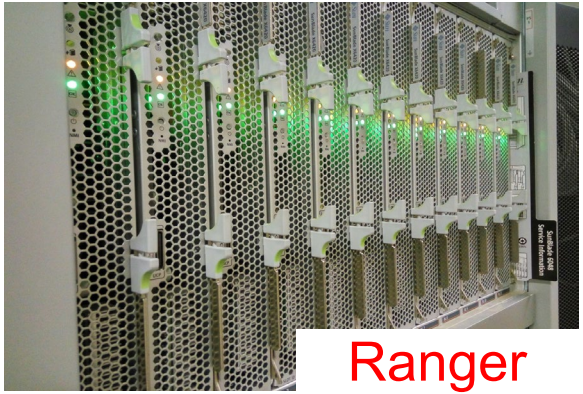
… FOR RESEARCH COMMUNITY

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



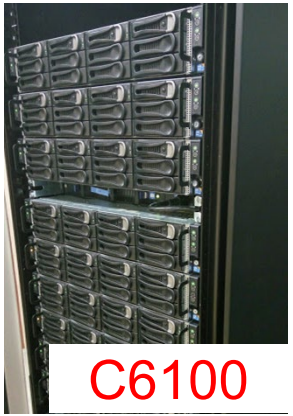
and Innovation and implemented by the CSIR

ISC 2021



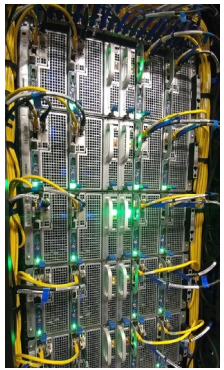
Ranger

Cambridge



C6100

HPC Ecosystems Project



Stampede

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

CHPC Technical Team

- Themba Hlatshwayo
- Zama Mtshali
- Zintle Sanda

Research / Academic Support

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

CHPC Operations Support

- Funeka Mafani
- Lesley Fredericks
- Nox Moyake
- Dr. Ricardo Harry

	GLOBAL (17)	LOCAL (~17)
TACC Ranger	5	6
Cambridge M1000e	1	1
CHPC C6100	2	5
TACC Stampede	9	3 (+2)

HPC Ecosystems Project Overview

How it happens

HPC Ecosystems Project - READINESS

*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 Overview

HPC Ecosystems Project – WHY WAIT?

USERS

- Research
- Teaching

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

R…search
* S… …tific Computing
…utational Science
…ce
…ge of HPC use

…aching
* HPC curriculum
* S…dent 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

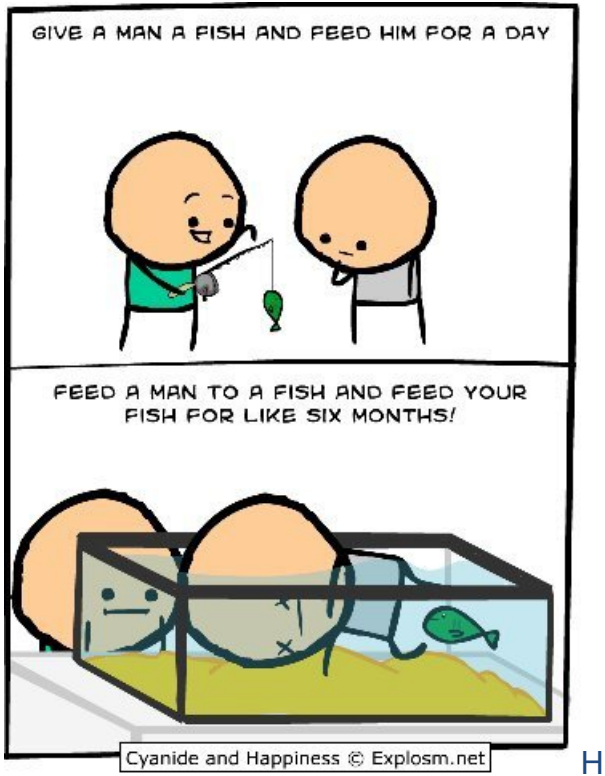
openHPC

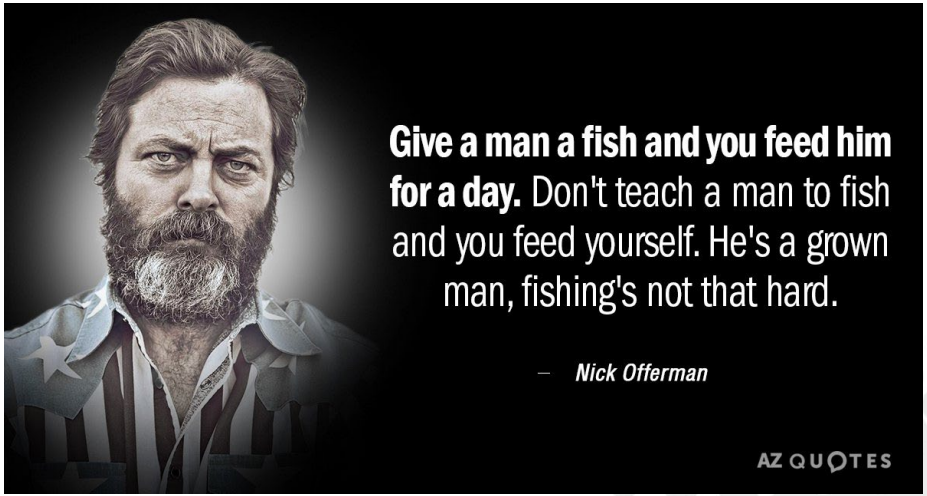
HPC Ecosystems Project Overview

On-site Training (pre-COVID19)

HPC Ecosystems Project Overview

REPEAT train.site() UNTIL 1==2





ONLINE TRAINING

Moved Training Online in 2020
(influenced by …)

Georgia Tech

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

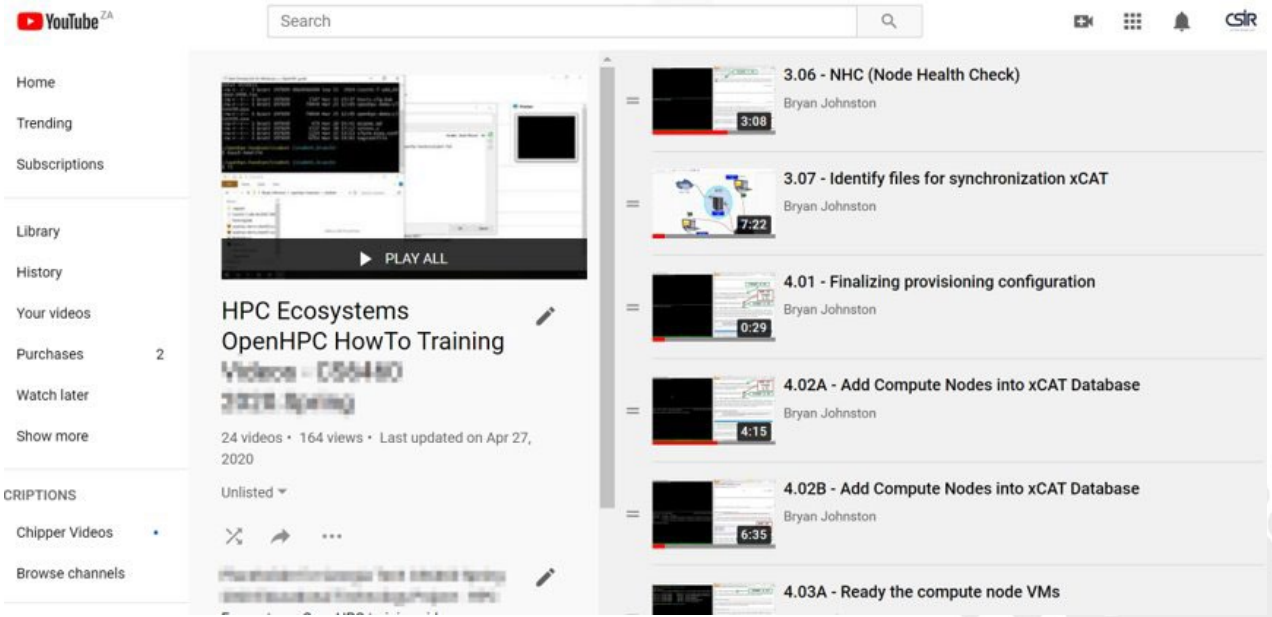
Accessible
- Downloadable
- Zero-rated
- Captions

Replayable

Compatible

User Friendly

Flexible
- On Demand



Virtual Labs

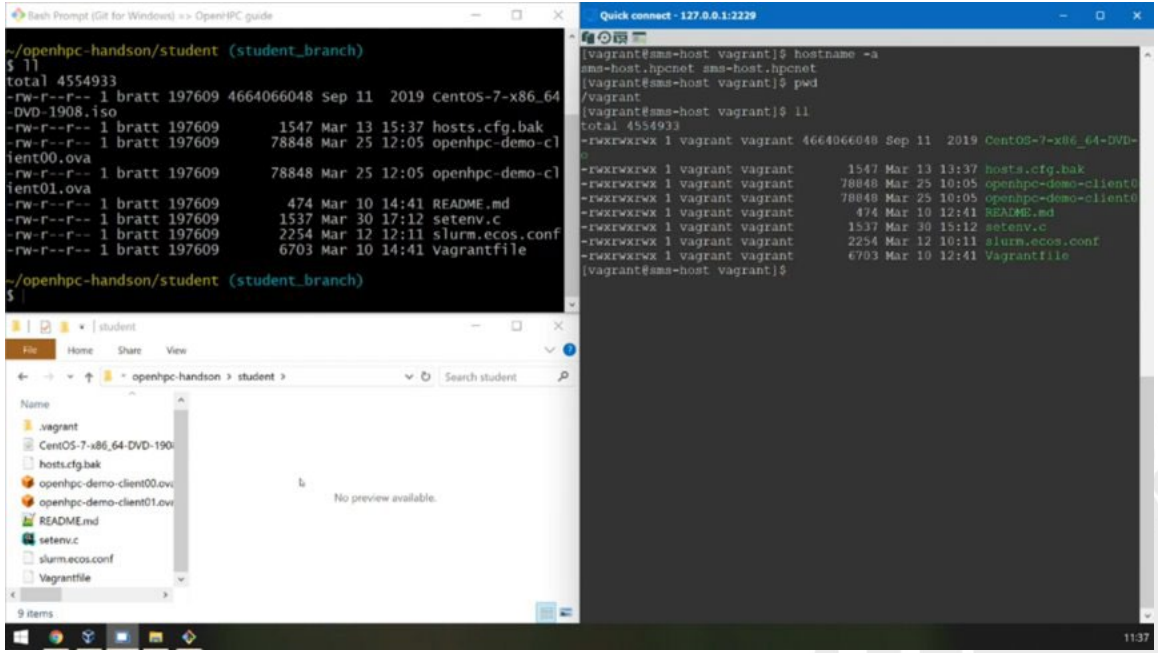
Accessible
- Off-line
- Opensource (GitLab)
- Low Resource Requirement

Replayable

Compatible
- VirtualBox

User Friendly
- YMMV :-)

Flexible
- On Demand
- Transferable to Production



Formal Workshops

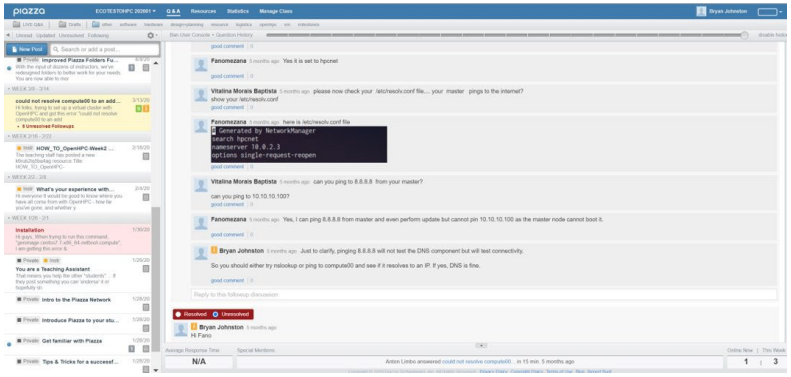
Accessible
- FREE

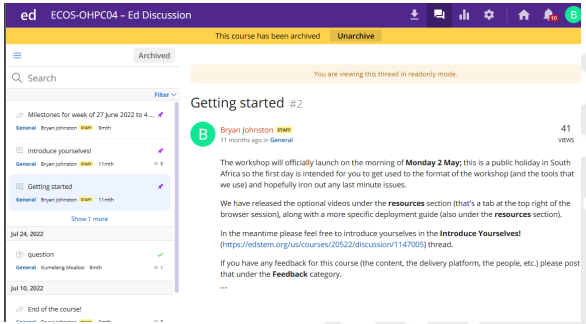
Replayable
- Quarterly :)

Compatible
- Web-clients

User Friendly
- YMMV :-)

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





NICIS
NATIONAL INTEGRATED CYBERINFRASTRUCTURE SYSTEM
CHPC

FEEDBACK:
YOU ARE NOT YOUR USER!

HPC Ecosystems Project – DO IT!

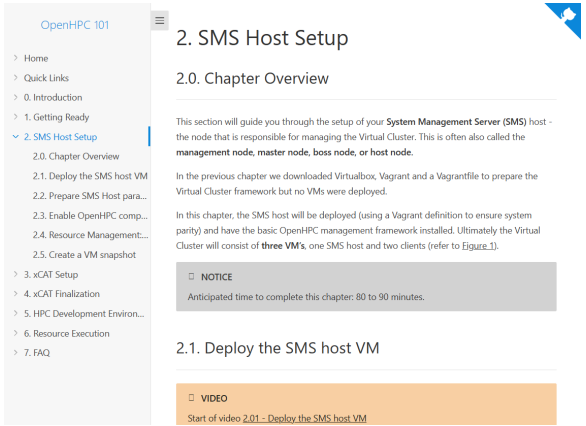
[OpenHPC 101 (hpc-ecosystems.gitlab.io)](hpc-ecosystems.gitlab.io)

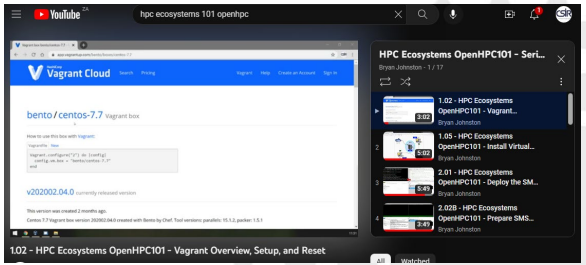
YouTube: 'hpc ecosystems 101 openhpc'

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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