Delivering Digital Skills across the Digital Divide

An accessible self-paced on-demand HPC virtual training lab.

NICIS NATIONAL INTEGRATED CYBERINFRASTRUCTURE SYSTEM CHPC

An initiative of the HPC Ecosystems Project:
Bryan Johnston, Lara Timm, Mabatho Hashatsi

Advanced Computer Engineering (ACE) Lab,
Centre for High Performance Computing (CHPC),
Council for Scientific and Industrial Research (CSIR), South Africa.

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OVERVIEW

Digital Skills and the Digital Divide

Developing the HPC workforce is recognised as a priority in the global HPC community. The digital divide – a gap between those with seamless access to technology and those without – is a complex issue in Africa and other Resource Constrained Environments (RCE's), rooted in factors including infrastructure, policy, economics, and education.

To deliver digital skills across this digital divide requires innovative solutions; ones that focus on technology access, sustainability, and inclusive and scalable development. Our solution is a virtual HPC lab that bridges this divide to provide vital digital skills. Through immersive HPC system administration training using a **replicable**, **accessible**, **self-hosted** virtual HPC lab, we are able to foster **inclusion** by empowering anyone with a computer to participate in the global HPC community.

Target Audience

The virtual lab was initially facilitated training to target countries in the Africa HPC Ecosystems Project, but over time has reached a global audience of HPC trainers, HPC System Administrators, and the HPC-curious out there.
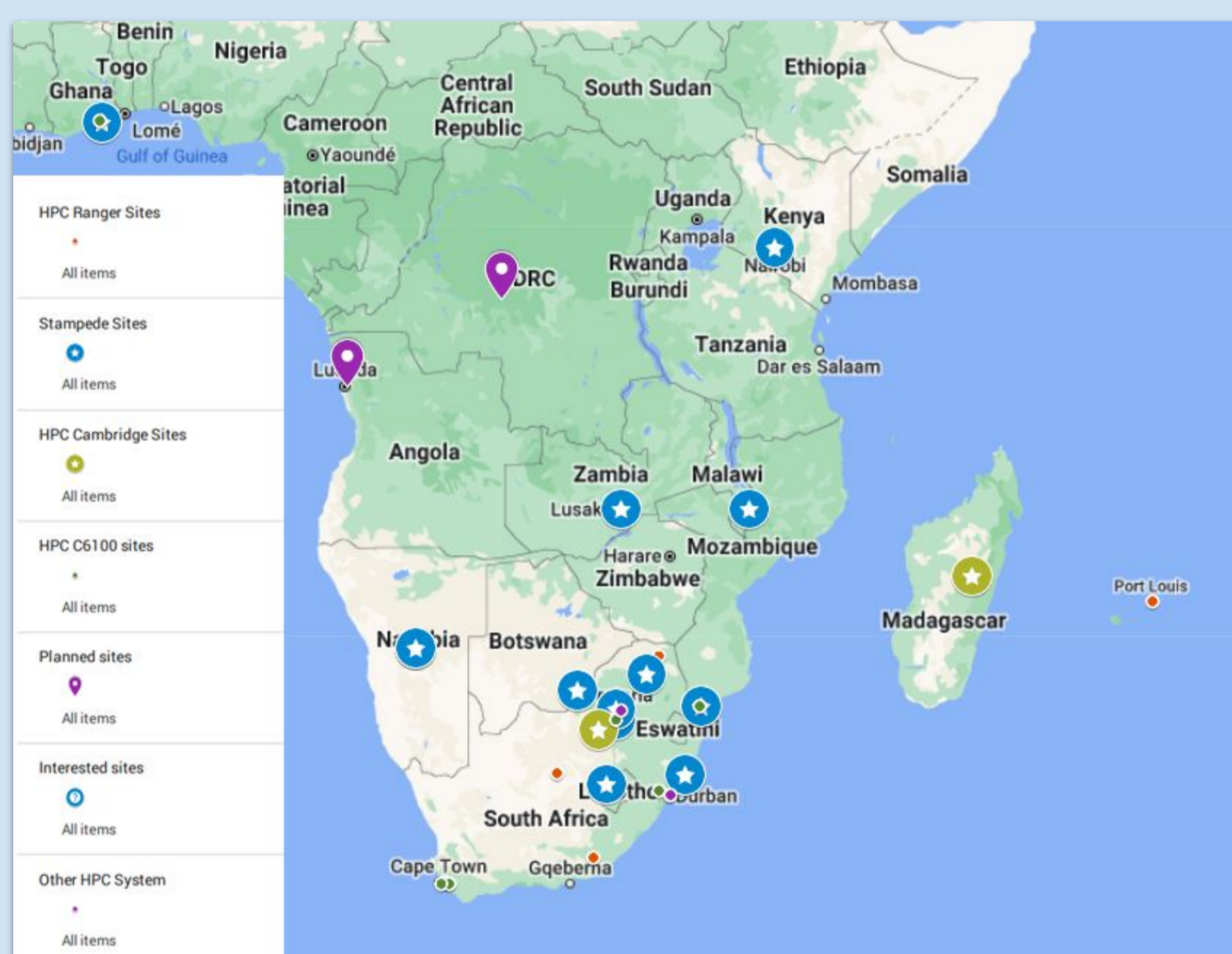
Project Team's original audience in Africa

Our solution is a virtual HPC lab that is installed on a participant's local computer and persists indefinitely for ongoing experimentation and learning.

THE OLD TRAINING MODEL

Prior to the development of the digital training materials, our HPC system administrator training was performed onsite and face-to-face..

Limitations of the Old Training Model

- The **lack of available compute resources** to facilitate HPC training labs severely restricted opportunities for training at sites.

- The **lack of reach** beyond those present for onsite training at a particular site limited scale.

- The **limited support** for sites owing to a small Project team limited the availability of training.

- The **limited timeframe** for each training event affected the pace and longevity of the training outcomes.

THE VIRTUAL TRAINING LAB

Based on the OpenHPC Install Recipe, the virtual training lab teaches the fundamentals of deploying and managing an HPC cluster within a virtual environment. The software stack uses tools that are widely adopted and available in the HPC community, providing wide community support for the adopted tools.

Components of the Virtual Training Lab

- An online digital guide delivered through Git..
- Local Vagrant-managed VirtualBox cluster for automated deployment and repeatability.
- Supporting YouTube videos demonstrating the hands-on configuration of the virtual cluster.
- Access to other trainees and trainers during the virtual workshop via the implemented LMS.
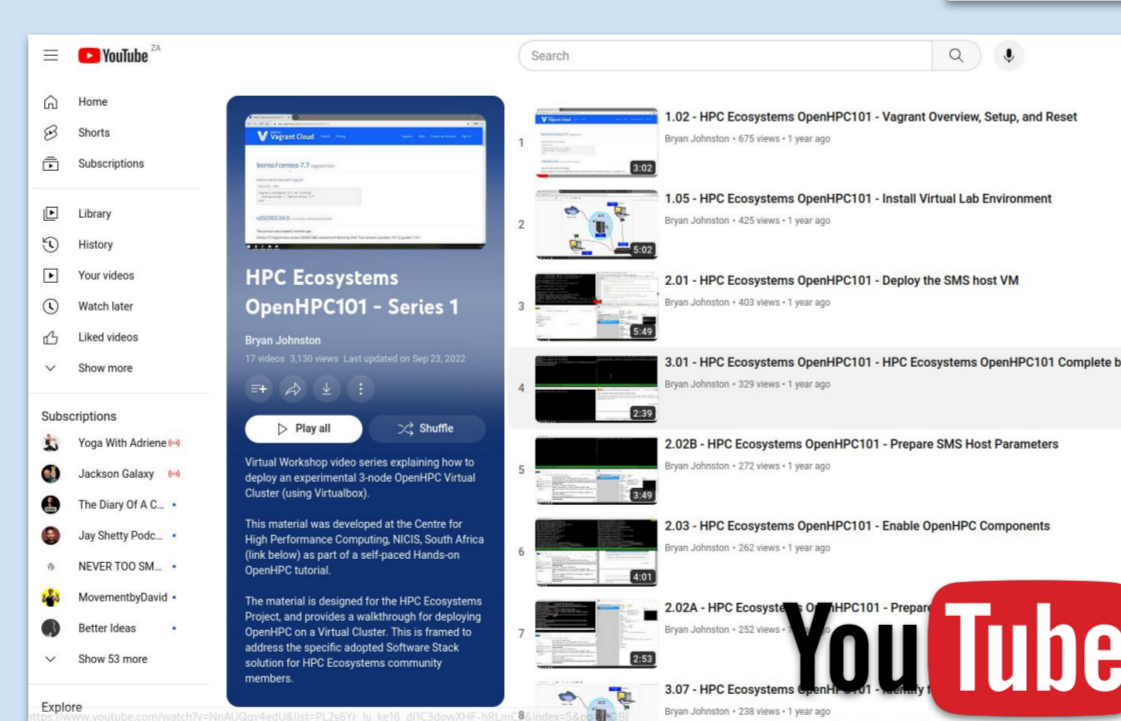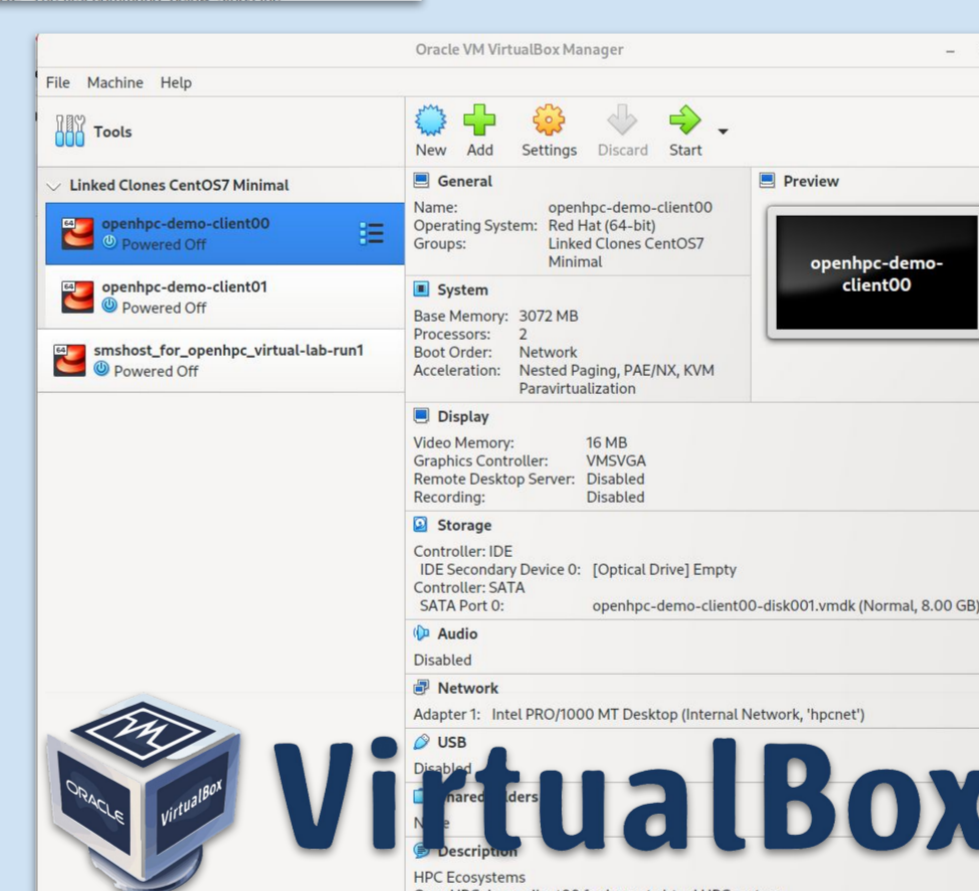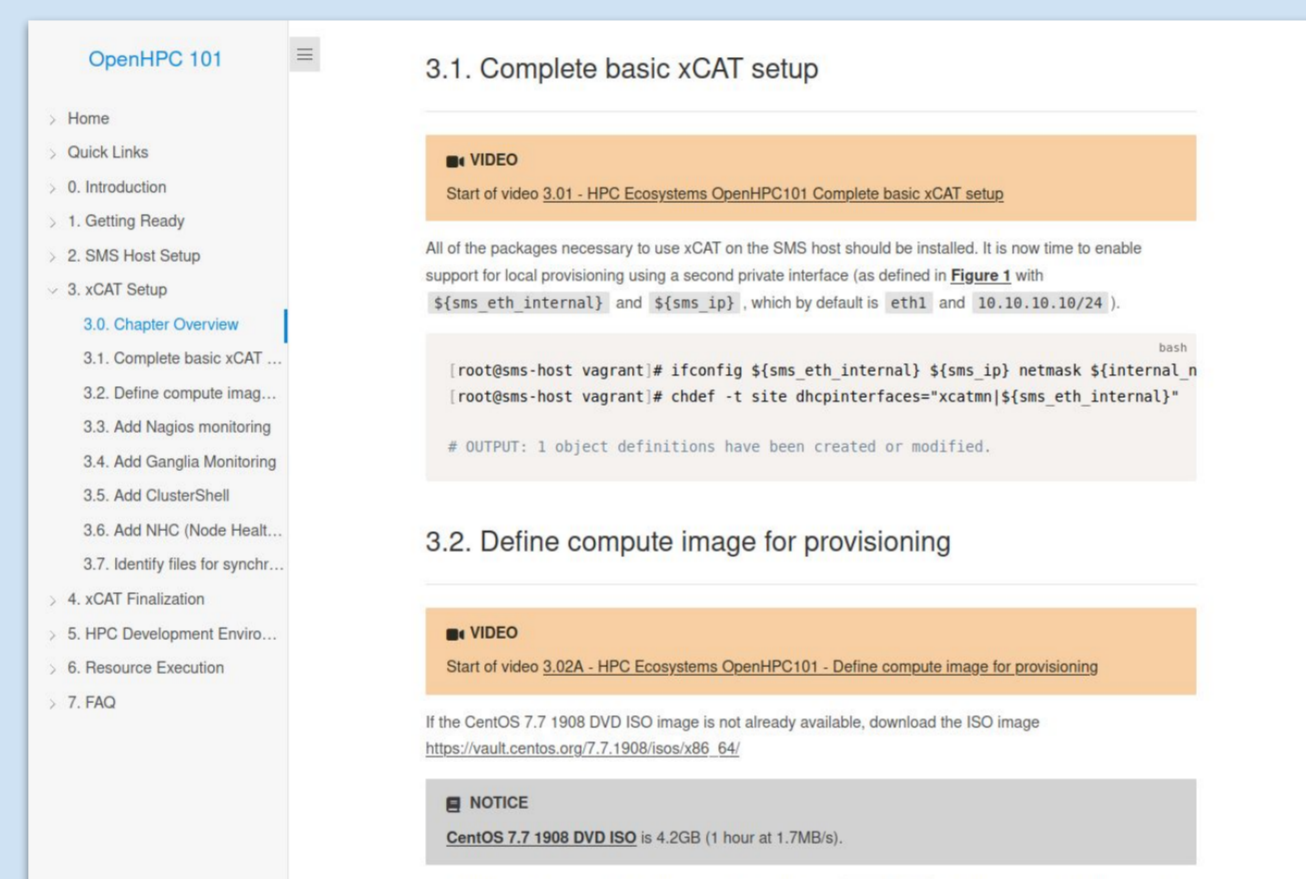
Advantages of the Virtual Training Lab

- **Self-paced, self-explanatory, asynchronous**: make time when <u>you</u> have time.

- **Fully local:** localised to your personal computer.

- **Platform Agnostic:** Powered by Vagrant and VirtualBox. Trainees are not limited by their operating system.

- **Access to help:** Workshop coordinators and participants facilitate a community environment. Enables peer problem solving and collaboration.

- **Takeaway HPC environment:** the virtual cluster is free to keep, use, develop and build on after the conclusion of the virtual lab. It is possible to migrate the components to a production system!

REFLECTION

While the virtual training lab has made advancements in HPC training, it isn't an exhaustive solution to all the challenges related to HPC training:

- Skills required to maintain an operational HPC environment are beyond those involved in the deployment of an HPC cluster.

- There is additional work required to translate acquired skills to the physical deployment of systems with different configurations.

- The lab is not impervious to the typical obstacles associated with online / digital training, such as sustaining the initial motivation observed at the start of a workshop, user engagement, and the lack of exposure to physical assets.

NEXT STEPS

🚀 The virtual OpenHPC 2.x lab launched in 2023Q3, marking the start of a new journey into the next generation of OpenHPC training.

🔧 Expanding Horizons: Our team is hard at work, crafting additional HPC modules that seamlessly integrate with the foundational virtual 3-node cluster. Consider these modules as 'bolt-on' training courses, enhancing your skill set.

💡 Standalone Exploration: Dive into standalone training labs spotlighting diverse HPC Software Stack tools. Explore and master OpenOnDemand and more, amplifying your expertise in the realm of high-performance computing on your own terms!.

CONCLUSIONS

Shifting to digital content for HPC System Administrator training has broadened our reach and accelerated delivery. Participants globally have successfully deployed virtual HPC systems through our self-paced OpenHPC training labs. This approach bridges the digital divide not only in Africa but also in Resource Constrained Environments worldwide.

More Information