

Addressing the HPC Skills Shortage Through Learning Pathways and Visible Infrastructure

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1

Demand for Research Computing Infrastructure / HPC roles

- Software, data and computation are now key aspects of research across almost all fields
- The last ~10 years have seen accelerating growth in demand for technical professionals within the research community
- The rapid adoption of AI/Machine Learning and related technologies in research is further increasing demand
- Demand is high across the research software, research data and research computing infrastructure areas but the latter is a particular challenge

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2

The HPC Skills Shortage

- Many existing HPC professionals have learnt their skills “on-the-job”, often developing them over many years
- Current demand for HPC skills means this is not sustainable
- We need better infrastructure for delivering skills but we also need the people to deliver those skills to!
- Many of us working in research organisations see anecdotal evidence of the challenge of recruiting HPC experts
- A 2022 techUK article [1] highlighted that:

“There is currently a shortage of skilled HPC professionals in the UK which will ultimately limit the supply of HPC capacity.”...also adding that this...”...can be attributed to the lack of understanding regarding career pathways into HPC.” [1]

[1] F. Chowdhury. HPC & Skills: Bridging the Gap. *techUK*, Nov 2022. <https://www.techuk.org/resource/hpc-skills-bridging-the-gap.html>

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3

Understanding the Challenges

- We are involved in work across a set of projects trying to better understand and address challenges around skills and careers for research technical professionals in HPC, software and data
 - UNIVERSE-HPC – www.universe-hpc.ac.uk
 - STEP-UP – step-up.ac.uk
 - DRIFT (DRI Skills for Facilitators and Teams)
 - SCALE-UP
- Our focus is on two core areas that I’m going to look at:
 - **Learning pathways**
 - **“Visible High Performance Computing”**

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4

Learning Pathways

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5

Learning pathways

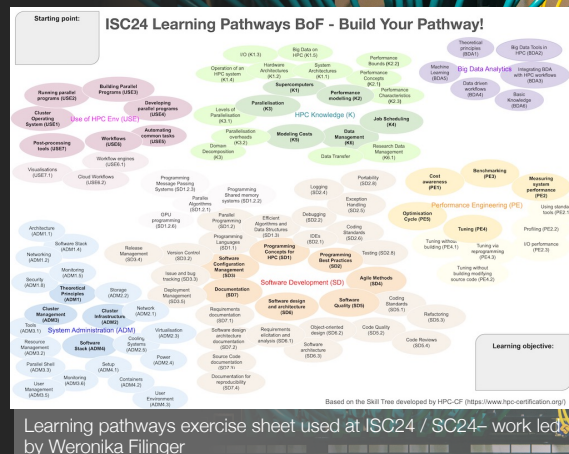
- Developing routes to help people understand how to develop their skills from one stage to another.
- Challenges:
 - Do “standard” learning paths actually exist?
 - People in different roles have a different “starting point”
 - Many learning pathways are bespoke
 - Different learning approaches and methods are more effective at different skill levels
 - (plus many more!)

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6

Learning pathways

- Current work
 - Led through through the UNIVERSE-HPC project (now finished) and the DRIFT/CHARTED projects
 - Engaging with the community to understand their experiences, suggestions and opportunities around learning pathways and methods
 - BoF sessions at ISC / SC



7

“Visible High Performance Computing”

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8

Visible HPC

- Series of work building on the lack of visibility of modern HPC infrastructure – linked to activities under multiple projects
- Many research institutions used to have HPC hardware on-site – visits to data centres / machine rooms were common
- Anecdotal evidence suggests such opportunities inspired many of the current community of HPC professionals
- Many existing research HPC experts developed their skills when research students, helping to manage local clusters/servers
- Most infrastructure is now remote and “invisible”
- Working in a terminal connected to a server in the next room or the world's largest supercomputer looks similar!

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9

Visible HPC

- The Visible HPC programme is aiming to make cluster computing hardware visible again for a new generation of future HPC professionals
- Initial work: development of a portable Raspberry Pi cluster
- Aim to mimic HPC infrastructure as far as practical – multiple nodes, enterprise switch, distributed, parallel storage infrastructure, based around standard cluster tooling
- Developing training material to be taught using the cluster
- Provide opportunities for people at institutions without local HPC infrastructure to access the training
- Future opportunity: Bid to host a training cluster through the SCALE-UP NetworkPlus project

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10

Visible HPC Cluster Build

Current status: The cluster is currently undergoing initial, reduced-scale installation and testing and is awaiting deployment of the full complement of compute nodes.

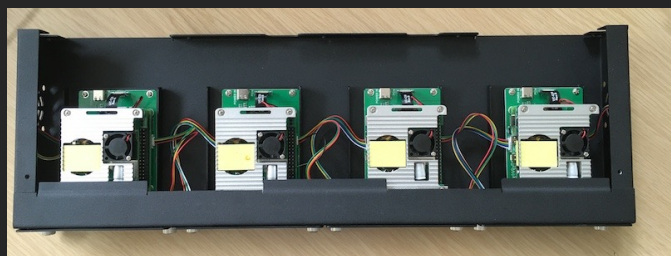
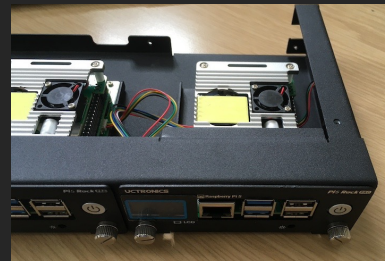
Right and Below Right:
1U compute node rack
unit showing compute
nodes installed.



Above: Portable cluster rack case



Right: Rack case showing trial installation of PDU, switch and 1U compute node unit



11

Thank you Questions?

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UK Research
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12