Developing a sustainable future for HPC and Research Software Engineering skills

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Training Pathways and Structures

ISC24 BoF Session

ISC High Performance
The HPC Event.

This session is organised in collaboration with
UNIVERSE HPC

Introduction: Session Organisers

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Introduction: Overview

Introduction (10-15 minutes)

- What are training pathways and why do we need them?
- Challenges
- Other efforts and activities in this area

Interactive activity (20 minutes)

- Build your pathway

Discussion and feedback (20 minutes)

Introduction: Background

- The demand (and need) for HPC skills is now greater than ever
- Developing these skills can be challenging and time-consuming
- Knowing what to learn, in what order and to what level is not obvious
- Potential HPC developers now come from a wider range of different research and technical backgrounds than ever before

What are learning pathways?

- Learning pathways define “skill routes”
- They provide guidance of:
  - what to learn
  - in what order
  - to reach a given training goal
- They link together groups of skills in a coordinated manner
- They may not be linear!
- May involve revisiting a given topic at different skill levels

Why do we need learning pathways?

- To address the demand for HPC expertise, we need more structured training options
- They offer an important alternative to an ad hoc training approach
- Pathways provide structure to support learners *and* trainers
- Can also support effective development of training material
- Practitioners increasingly coming from a wider range of technical/research backgrounds
    - Training routes/needs are much more complex

Challenges

- Different starting / end points => paths increasingly bespoke?
- Skill space is more complex than ever
  - Multiple languages
  - Multiple tools
  - Heterogeneous hardware
- Links with industry training structures / pathways
- What training materials exist? Are they compatible?
- Generic or specific pathways?

Designing Your Pathway

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Interactive exercise

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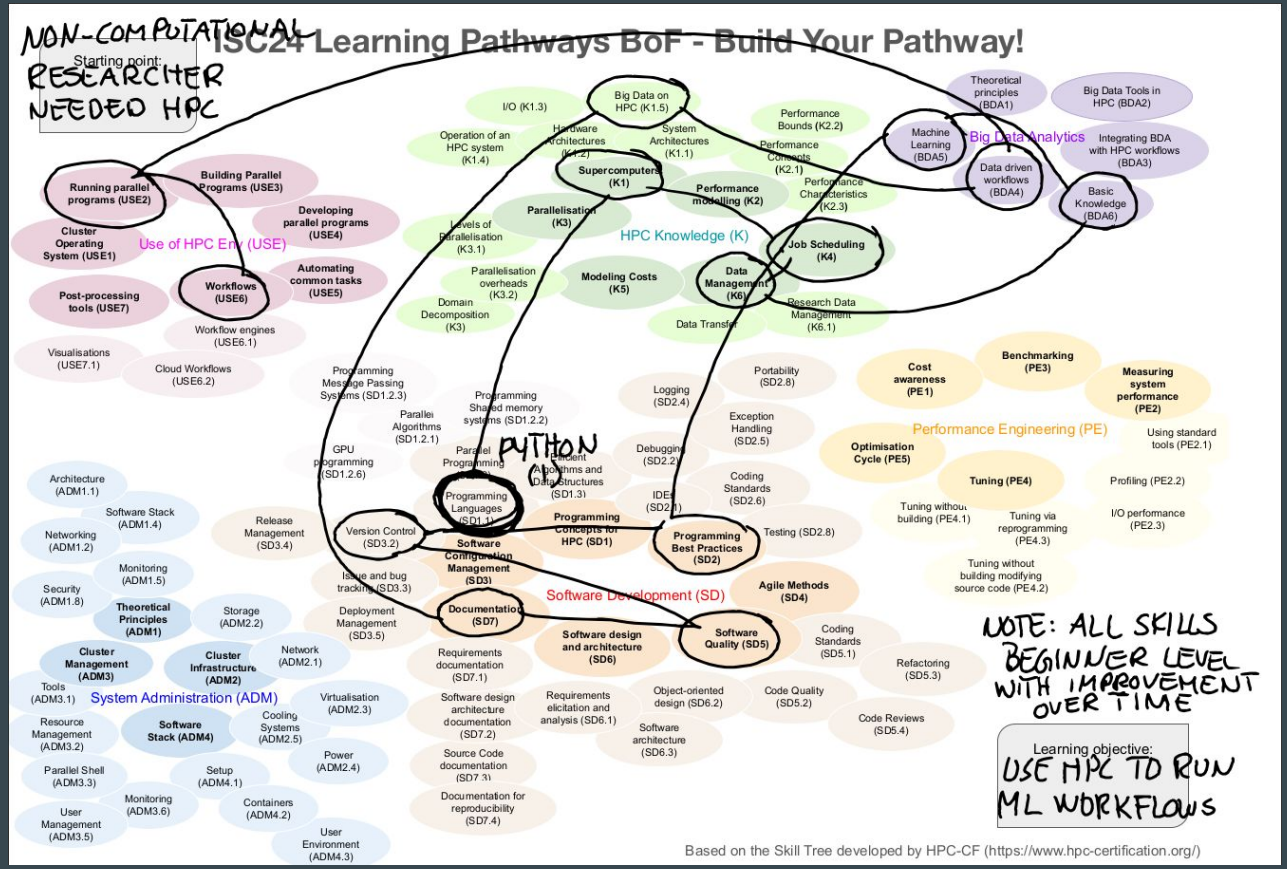
Exercise structure

- Your chance to tell us about how you gained your technical skills
  - or the technical skills you would like to gain
  - or a more general path for gaining skills that you'd like to tell us about
- Taking the old-fashioned approach - a pen and paper exercise (more details in a minute)
- You're welcome to work individually or in small groups
- We'll have 20-25 minutes for undertaking this exercise

The exercise sheet and an example pathway



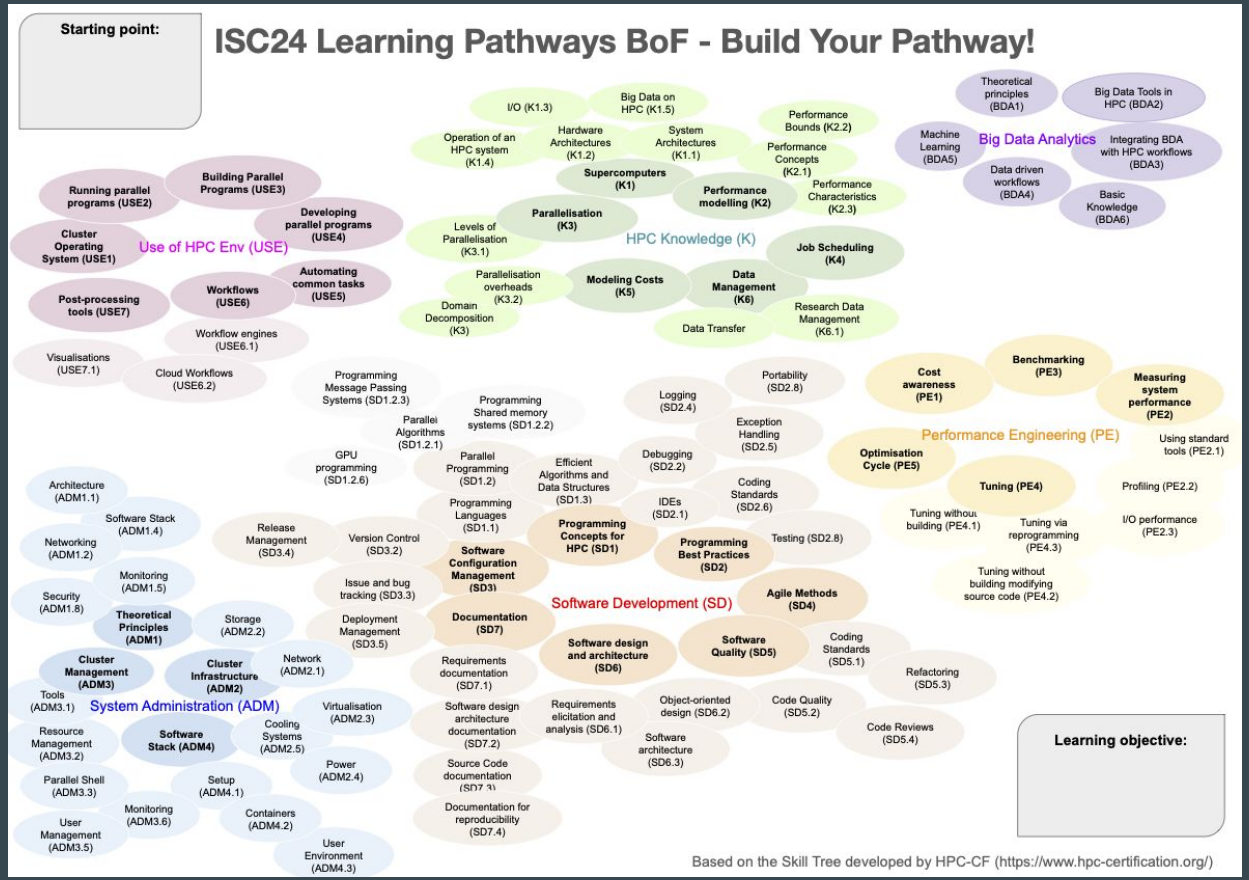
Pathway exercise: What you need to do

- **Starting point: Where is this pathway starting from?**
  - **(Any of the following:) Current role, skill level, experience, etc.**
- Learning objective: Where does the pathway aim to get to?
  - E.g. target role, technical capabilities, etc
- **The pathway:** Link the skills that need to be developed, in the order that you think fits best
  - Feel free to annotate
- Something missing? Feel free to add new skills / topics

Pathway exercise: Further points

- **Your pathway may not be linear - loops are fine!**
  - **e.g. revisiting the same topic at different skill levels**
- **Where practical, include skill levels or other detail**
  - You can use B, I, A to denote Beginner, Intermediate, Advanced
  - You can note programming language names or tool names in a skill box or on the links between nodes.
- If you want to add notes about how to read your pathway, feel free to write something on the back of the paper.
- Fill out the sheet in a way that works for you, anything goes!

Pathways exercise (~20 minutes)



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Part III: Discussion, Feedback and Next Steps

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Discussion: The pathway design process

- **How did you go about creating your pathway?**
  - **What were the drivers? End goal? Need/interest to learn specific individual skills? etc.**
- What challenges did you find with the pathways sheet?
  - Were many/most of the topics you were looking for present?
- **Missing data?**
  - Can this be done purely by linking skills or is there other data required that you think should be included? How could this be improved?

Discussion: What did you create?

- **Did you end up with something that you expected?**
- How much complexity is present?
- **Were you able to represent the detail you wanted?**
- **What issues or challenges did this exercise highlight for you when thinking about learning pathways?**

Feedback: Mentimeter survey

- Answer some of the questions about the design process

Go to

www.menti.com

Enter the code

1802 4317

Or use QR code

Next steps

- We plan to take forward our pathway design activities
- Work is being done within the UNIVERSE-HPC project and by a range of other groups
- Further sessions to build on the activity undertaken here:
  - PEARC24
  - SC24?
  - ...

Data collected from the community:

- ISC'23 BoF - Understanding Community Perspectives on HPC Skills and Training Pathways
  - Survey results from the session - https://zenodo.org/records/8321376
  - JOSCE - https://doi.org/10.22369/issn.2153-4136/15/1/9 (SC'23 workshop submission)
- SC'23 BoF - Pathfinding in HPC Education and Training
  - Building HPC Learning Pathways: Understanding our community (PEARC'24 long paper submission - Accepted)
  - Developing HPC Learning Pathways: Challenges and Recommendations (PEARC'24 short paper submission - Submitted)

Nominations Open - Educational Award For Outstanding Contribution to Computational Science Education

We are seeking nominations for candidates who have led projects or programs that have made significant contributions to computational science education, defined broadly to include all disciplines and all education levels.

The recipient will receive a $2000 cash award, and travel support to attend the SC conference.

Applications are due by **Friday June 28, 2024** at anywhere on earth.

More details at: https://sighpceducation.acm.org/events/award24_nominations/

Questions concerning award eligibility and nominations can be directed to award@sighpceducation.acm.org .

Thank you

Thanks for your participation,
thanks for engaging with the session and providing your insights,
thanks for being a great BoF audience 🙂

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Weronika Filinger, Jeremy Cohen & Anshu Dubey

+ our session organising colleagues who weren't able to join today

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