

# LearnHPC

## Scalable HPC Training

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# The European context - EuroHPC Joint Undertaking

- Developing a pan-European supercomputing infrastructure (including 2 in top 5 of TOP500)
- Supporting research and innovation activities:
  - developing a European supercomputing ecosystem,
  - stimulating a technology supply industry,
  - making supercomputing resources **available** to a large number of public and private users, including small and medium-sized enterprises
- €1.1 billion for the period 2018-20
- For 2021-2033, proposed budget of €8 billion
- Expectation:
  - Resources will be open to all but access will be competitive
  - Of the 32 countries, those with an HPC “culture” will have an implicit advantage

# The European context - HPC Education and Training

- 2018 technical report by European Commission's science and knowledge service
- “Academic offer and demand for advanced profiles in the EU - Artificial Intelligence, High Performance Computing and Cybersecurity”

**TABLE 1. OVERVIEW OF ACADEMIC OFFER IN THE EU, 2018**

Domain	Number of tracked programmes			% of each domain over total programmes in any domain
	All levels	Bachelor	Master	
AI	2,054	765	1,289	3.9%
HPC	1,102	369	733	2.1%
CS	1,179	532	647	2.3%
<b>Total nr of programmes in AI, HPC and CS</b>	3,472	1,339	2,133	



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# HPC Education and Training Crisis?

- **UK had 62% of all EU HPC Programmes\***
- Spending money on hardware is “easy”, but hardware investment lifetime in HPC is 5 years
- Bootstrapping that investment so that you see the impact in your IP and SMEs is hard
  - Need a lot of people who can leverage, improve and contribute to these kinds of infrastructures
  - Importing expertise is not a sustainable/desirable option (including internal EU “brain drain”)
  - Need a talent identification/development/integration pipeline...or a very big pool of existing talent

*\* The report used an AI methodology that was acknowledged as heavily biased towards English language courses*

# LearnHPC

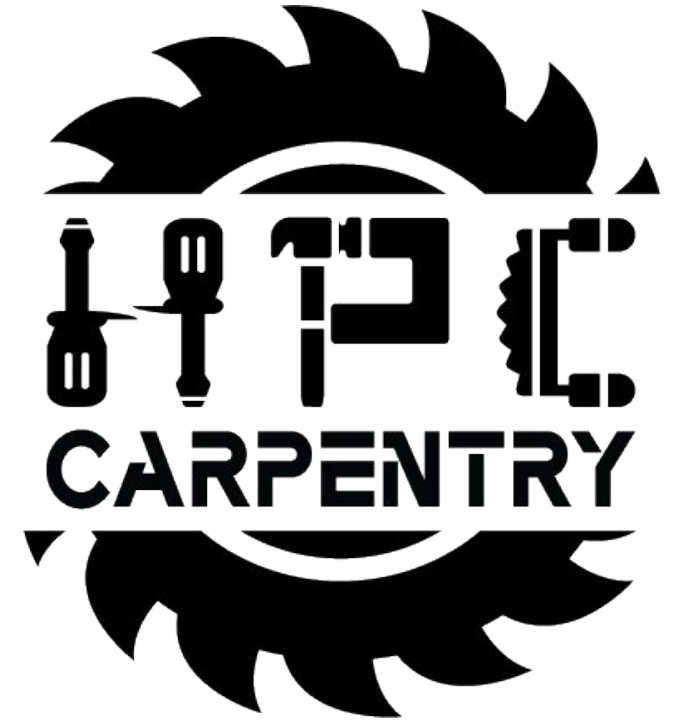
## Scalable HPC Training

- Cream always rises to the top...but first you have to get the milk in the bucket
- Personal experience, 10 years working on EU projects to develop/grow HPC user communities
  - 5 years in a geographic region (eastern Mediterranean, LinkSCEEM)
    - Roadshow
  - 5 years with a scientific community (material sciences, E-CAM HPC Centre of Excellence)
    - Extended Software Development Workshops
- If you want to serve 32 countries (in which there are 1000s of 3rd level institutions and about 400 million people), everything you do should be inherently scalable
- To cast a wide net, you need to address a lot of challenges
  - Technical: connectivity, hardware infrastructure, software infrastructure, configuration
  - Pedagogical: material and instructors

# LearnHPC is a mash-up of other projects

...where the credit is really due

# Magic Castle



With resources provided by:



# Cloud-based clusters

“

*Why would you use a ‘toy’ cluster when you can give them a training course on the real thing?*

”



# Cloud-based clusters

- “Real” systems come with strict security requirements and plenty of bureaucracy for the instructor/learner
  - These are all intimidating barriers to the learning experience (particularly for beginners)
- If I run a German HPC centre, would I seriously consider running training courses for arbitrary European institutions and companies?
- Cloud-based clusters are unencumbered
  - Bring them up, take them down, throw them away
  - Can agree in advance that nothing there is considered secure
- Cloud-based clusters don't have to be toys
  - Successfully tested with infiniband fabric on Azure and EFA fabric on AWS
  - Can be configured to run with scalable file systems (e.g., Lustre)
- Cloud-based clusters are reproducible, and reproducible means scalable (e.g. event specific)

# What is the status?

- LearnHPC does not have funded man-power
- LearnHPC does have (a limited amount of) funded compute resources
  - Thank you FenixRI and AWS!
- Plan is to check relative stability of the platform and work with EESSI to make sure the training course use cases can function with their stack
- (Tentatively) Planned courses
  - Multiple instances of “Introduction to High-Performance Computing” from HPC Carpentry
  - “Running LAMMPS on HPC systems”
  - Other use cases as they arise

# Demo!

# Thank you!

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# HEADLINE

## Subline

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# HEADLINE

Subline



Bildunterschrift



Bildunterschrift