



Science and  
Technology  
Facilities Council

Hartree Centre

# ExaTePP WP2: Training

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# Upcoming Events Hosted by Hartree Centre

## 20<sup>th</sup>- 21<sup>st</sup> May Workshop

### On the trail to Exascale and Scalable AI

- Outline to the HPC roadmap, together with the latest scalable AI approaches.
- Present current, state-of-the-art and impactful key areas and introduce software libraries and frameworks that have been developed.
- Throughout the workshop, case studies will be shared to show how they have been used in a variety of projects. The audience will have access to these teams to discuss their experiences.



# Upcoming Events Hosted by Hartree Centre

## 22<sup>nd</sup>- 24<sup>th</sup> May School Hybrid Algorithms, Parallel Libraries and GPU programming

### Further mathematical concepts on communication avoiding and hybrid algorithms

- Key characteristics of communication-avoiding algorithms and how these affect scalability.
- Key UQ approaches and the latest advances in parallel libraries development.

### Introduction to GPU programming

- Knowledge and hands-on experience in developing software applications for processors with massively parallel computing resources.



# May 2024 School: Learning Outcomes

## Hybrid Algorithms & Libraries

- Understand the importance of communication-avoiding algorithms
- Ability to scope and present solution to a given problem employing the techniques and methods from this module.
- Why using library routines is usually better than writing your own code - even for relatively simple operations.
- An appreciation of the how numerical libraries such as ScaLAPACK have evolved as the underlying hardware has changed.
- How the design of current numerical library routines extracts optimal performance from modern architectures.

## GPU programming

- Write code to be executed by a GPU accelerator
- Expose and express data and instruction-level parallelism in C/C++ applications using CUDA
- Utilize CUDA-managed memory and optimize memory migration using asynchronous prefetching
- Leverage command line and visual profilers to guide your work
- Utilize concurrent streams for instruction-level parallelism
- Write GPU-accelerated CUDA C/C++ applications, or refactor existing CPU-only applications, using a profile-driven approach

# Presential and Hybrid attendance

- Preference will be given to project partners for the 35 places of the face-to-face
  - Breakfast, lunch, coffee breaks and 1<sup>st</sup> day social dinner are covered by the project
- **Numbers of participants from each partner required**
- Further remote attendance places will also be available for registration from the wider community.

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# Upcoming Events hosted by Hartree Centre

## October School

### HPC and Exascale Computing

#### Performance Analysis

- Gain a deeper understanding of analysing the performance of High-Performance HPC applications

#### Portability to Exascale

- The latest on standardisation of programming models to be used across different architectures.

#### Multi-GPU programming

- Scaling CUDA C++ Applications to Multiple Nodes

#### Discuss

- Which week in October is best suited?
- The proposed program is 4.5 to 5 days long, we can omit a topic and reduce to 3 days.
- 35 face-2-face places , same mode of delivery and catering arrangement



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# Hartree Centre Training Portal

[hartreetraining@stfc.ac.uk](mailto:hartreetraining@stfc.ac.uk)



# The Hartree Centre Training Portal

[Home Page \(stfc.ac.uk\)](http://stfc.ac.uk)



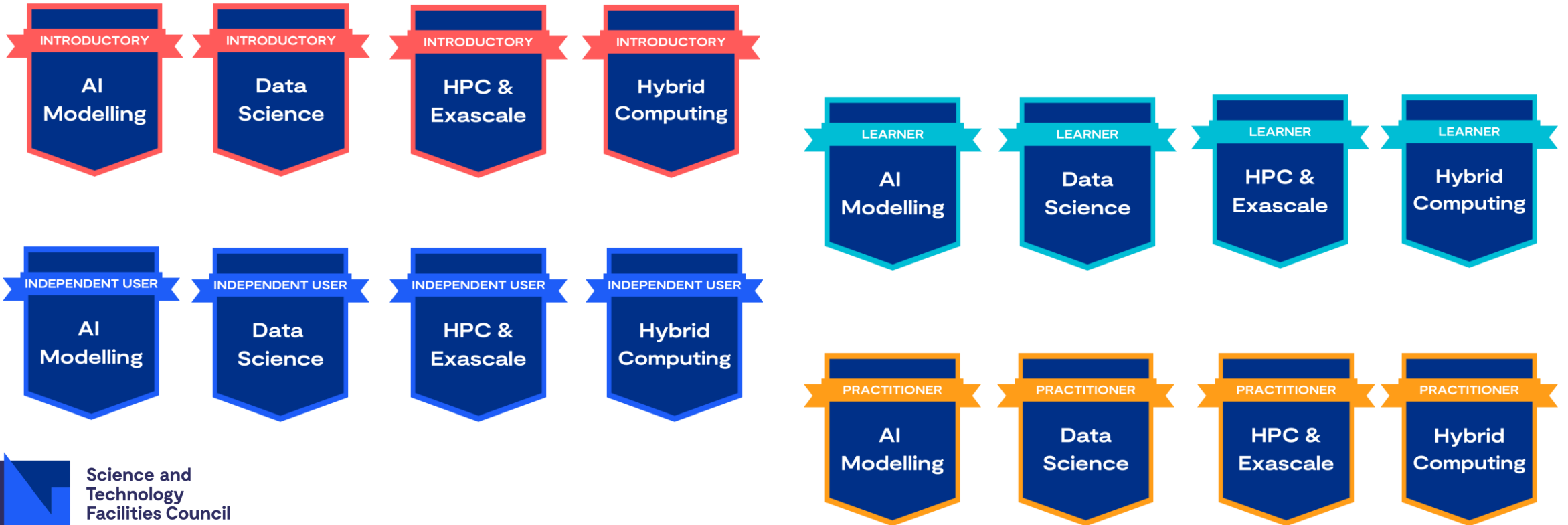
# Hartree National Centre for Digital Innovation (HNCDI)

"The expertise available at Hartree will provide the foundations for the creation of a fertile environment for knowledge exchange and training"



# Badges

- Badges are awarded for the different streams and levels
- Awarded after the course and based on criteria of completion
- These can be added to social media to help attendees to highlight their skills



# Engagement and Publications

- Poster Session for the attendees
- Proceedings e-publication from STFC with ISBN



# Self-Paced Courses Catalogue

- ▶ Artificial Intelligence and Modelling (7)
- ▶ Data Science (4)
- ▶ Emerging Technologies (4)
- ▶ High Performance and Exascale Computing (6)
- ▶ Software Engineering (8)



# Training Catalogue Themes

- **Artificial Intelligence and Modelling**

These topics will inform the generation of real-time decision-making insights from data helping you to innovate, speed up processes and boost efficiency. From predictive maintenance to intelligent automation and the optimisation of tools and processes, our courses will walk you through how to embed these efficiently into your organisation.

- **HPC & Exascale Computing**

Access to more powerful computing resources can increase productivity and speed up your calculations. Using a combination of theory and practical exercises, our courses will show you how to speed up your calculations and work at scale, so you use HPC more effectively and decide on the resources you need to maximise efficiency and value for your business.

- **Software Engineering**

These courses cover the increasingly wide range of software engineering topics such as cloud, data engineering, IoT, data analysis workflows and data visualisation. They will guide you through current and future trends, show the latest tools and help you de-mystify jargon to understand how the latest technologies can benefit your organisation.

- **Emerging technologies**

Our courses will help you to explore emerging digital technologies like quantum computing. They will guide you through current and future trends, show the latest tools become more familiar with the terminology and algorithms used and help you to see how their use can be of benefit to your organisation.

# Practical sessions + Q & A

23 January 2024	Practical Guide to Quantum Computing
30 January 2024	Fundamentals of Performance Analysis
01 February 2024	Practical Guide to IoT
16 February 2024	Fundamentals of Quantum Computing
20 February 2024	Practical Guide to Cloud Computing
08 March 2024	Practical Guide to Data Engineering
28 March 2024	Fundamentals of Neural Networks and Deep Neural Networks
18 April 2024	Fundamentals of Parallel Computing
09 May 2024	Fundamentals of Exascale Computing
14 May 2024	Fundamentals of Reinforcement Learning
28 May 2024	Practical Guide to Uncertainty Quantification



# HPC system specific training

## Hartree Centre Driving Licence Test

You will now answer 22 multiple-choice questions and you need to get over 95% to be successful.

You will see your results at the end of the quiz and get a chance to review your answers.

Please note that some compulsory questions are an automatic fail.

You can take the test as many times as you like. When successful you will be awarded with the Hartree Centre Driving Licence badge that will be added to your profile. This will then allow you to be able to access Hartree Centre's Scafell Pike supercomputer

Please click the button when ready to start.



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[Start Hartree Centre  
Driving Licence](#)







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# Questions?

If we cannot provide immediate answers, we will make these available with the mentimeter feedback.



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# Thank you

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