



High-Performance Computing Skills Platform  
and European Collaboration for Training

## **D4.1 – International HPC Summer School 2024**

### **European Report**

WP4: European Co-organisation of the International  
HPC Summer School

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## Executive Summary

The HPC SPECTRA project plays a pivotal role in advancing EuroHPC's training strategy by developing a comprehensive European HPC Training Platform and organising the International HPC Summer School (IHPCSS) for 2024 and 2025. This prestigious event, which began in 2010 as a collaboration between the EU and the US, has expanded its reach to include partners from Japan, Canada, Australia, and South Africa, making it a truly global initiative.

In 2024, the summer school was held in Kobe, Japan, hosted by the RIKEN Centre for Computational Science. The event attracted 89 participants, including 34 from Europe, who received financial support from the HPC SPECTRA project. The programme was designed to provide advanced training in HPC and Big Data Analytics while also fostering mentorship and interdisciplinary collaboration. Based on feedback from previous years, the schedule was adjusted to reduce intensity and allow for more free time, enhancing the overall participant experience.

The 2024 summer school saw a record number of applications, with 505 submissions, 269 of which were from Europe. Efforts to promote diversity were made, with structured mentorship programmes and a significant female representation among participants. The feedback from attendees was overwhelmingly positive, with over 95% rating the experience as successful. Mentorship and networking opportunities were particularly valued, and 92.8% of participants expressed interest in returning as mentors.

Key recommendations for future improvements include enhancing mentorship by broadening technical and career guidance, adjusting the schedule to reduce fatigue, and increasing gender diversity among mentors and speakers.

Looking ahead, the 2025 summer school will be hosted in Portugal, with Lisbon as the likely venue. Preparations are already underway, incorporating feedback from the 2024 event to refine the programme further. The call for applications is expected to open in late 2024 or early 2025. The IHPCSS series continues to strengthen global collaboration in computational science, fostering the next generation of HPC experts across disciplines and regions.

## List of Abbreviations

AI	Artificial Intelligence
CAE	Cyberinfrastructure Assessment and Evaluation (group)
CASTIEL 2	Project to coordinate the activities of the NCCs and CoEs at the European level
CoE	Centre of Excellence
COVID-19	Coronavirus Disease of 2019
CPU	Central Processing Unit
DEISA	Distributed European Infrastructure for Supercomputing Applications
EUMaster4HPC	European Master for High Performance Computing
EuroCC	National Competence Centres in the framework of EuroHPC
GPU	Graphics Processing Unit
ICHEC	Irish Centre for High-End Computing
IHPCSS	International HPC Summer School
JSC	Juelich Supercomputing Centre
JST	Japan Standard Time
JU	(EuroHPC) Joint Undertaking
MPCDF	Max Planck Computing and Data Facility
MPI	Message Passing Interface
NCC	National Competence Centre
OpenMP	Open Multi-Processing
PC	Project Coordinator
PMT	Project Management Team
PRACE	Partnership for Advanced Computing in Europe
RIKEN R-CCS	RIKEN Center for Computational Science
RZG	Rechenzentrum Garching
TBD	To Be Decided
USTUTT	University of Stuttgart
WP	Work Package



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## 1 Introduction

The HPC SPECTRA project addresses two main areas of priority in the EuroHPC JU's training strategy. Firstly, it aims to develop an EuroHPC Training Platform that promotes and advances European HPC training. Secondly, it collaborates with international partners to organise the 2024 and 2025 editions of the International HPC Summer School. This deliverable reports on the preparation, organisation, implementation and evaluation of the 2025 edition of the summer school.

The International HPC Summer School is not a new activity or collaboration but is a series of school that started 2010 [1]. Section 2 provides some background information about the series of summer schools, including its origins, nature and *modus operandi*. Section 3 covers the logistical aspects and preparations for the 2024 school, while Section 4 describes the application and selection process that was carried out with particular focus on European participants. Section 5 reports on the school's programme that encompasses technical, scientific and mentoring topics. Section 6 provides a brief on the implementation of the school, after which Section 7 and 8 provides an overview of the evaluation of the 2024 summer school as well as recommendations for improvements. Section 9 describes some of the interactions of the summer school with other activities. Finally, Section 10 covers some of the planning already taken place for the 2025 summer school.

## 2 Background to the International HPC Summer Schools

The International HPC Summer School series was originally conceived as the EU-US Summer School in 2010, which was held in Acireale, Italy. It was a collaboration between the DEISA2 project [2] in Europe and the TeraGrid project [3] in the U.S. to assemble some of the best scholars from both partner regions to learn about state-of-the-art topics in HPC, common challenges across scientific disciplines, as well as to provide mentoring through leading scientists and HPC experts, and to foster networking and international exchange among participants. On the European side, the collaboration was initiated and led by Dr. Hermann Lederer from the Max Planck Computing and Data Facility (MPCDF) [4], formerly known as RZG (Rechenzentrum

Garching), from 2010 until 2022. MPCDF continues to play a lead role in co-organising the summer school series.

Since 2010, the summer school continued to take place on an annual basis (apart from the 2020 school which had to be cancelled due to abrupt travel restrictions caused by the COVID-19 pandemic). The collaboration has expanded throughout the years to include additional partners such as Japan (joined 2013), Canada (joined 2014), Australia (joined 2023) and South Africa (joined 2024); hence the name of the school was renamed to the “International HPC Summer School” in 2013. Financial support for European participants to the school have also transitioned from the DEISA2 project to PRACE (Partnership for Advanced Computing in Europe) [5] from 2011 to 2023. The HPC SPECTRA project had been tasked to co-organise the 2024 and 2025 schools, including provision of support for European participants.

Since the establishment of this summer school series, an ongoing organising committee, whose members include staff from all collaborative partners from different countries/regions, has been responsible for overseeing the various aspects of the school, e.g. logistics, application calls, selection of participants, the scientific, technical and mentoring programmes. This organising committee meets regularly, from September of every year, to plan for the next edition of the summer school (typically June/July of the following year).

Historically, the founding European and U.S. partners each send approximately 30 students to the summer school. The addition of new partners such as Japan and Canada have involved increasing the total number of participants by up to <10 participants per new partner. The organising committee had been careful not to increase the overall number to be over 80-100, as there was a consensus that a much larger cohort of participants would negatively affect their experience from the school as well as posing logistical challenges.

*Table 1. Locations of the International HPC Summer School series since 2010.*

Year	Host City	Host Country
2010	Acireale	Italy
2011	Lake Tahoe	U.S.
2012	Dublin	Ireland
2013	New York City	U.S.
2014	Budapest	Hungary
2015	Toronto	Canada
2016	Ljubljana	Slovenia
2017	Boulder	U.S.
2018	Ostrava	Czechia
2019	Kobe	Japan
2020	[cancelled due to COVID-19]	
2021	Online	
2022	Athens	Greece
2023	Atlanta	U.S.
2024	Kobe	Japan
2025	TBD	Portugal

### 3 Logistical Organisation

The organising committee is composed of staff from HPC centres, national labs, research and third level institutions from the collaborating partner regions. The committee is responsible for overall management of the summer school from year to year. There is also a programme committee which is responsible for the design and evolution of the school's programme annually, taking into account participant feedback and the latest developments in HPC. Other special/working groups have also been established, e.g. making adjustments to improve mentoring, changes to technical/practical instructions. Members of staff from the "sponsor" organisations of the summer school, i.e. those who are responsible for financial support of the school from the different countries and regions, are duly included in the organising committee and take part in regular meetings. In the case for Europe, those from the

HPC SPECTRA project (who provides financial and organisation support) and MPCDF (who continues to provide organisation support as a founding institution) are represented in the organising committee as well as other institutions such as the Juelich Supercomputing Centre (JSC), who is involved in the programme committee.

For each edition of the summer school, a new website is created to disseminate information about the school, e.g. announcement of the call for applications, the school's agenda, travel guidelines, the code of conduct and contact details. The 2024 school's website is hosted at <https://ss24.ihpcss.org/> [6]. On top of this, there is an “umbrella” website, <https://www.ihpcss.org/> [1] which provides some general information about the series of schools since 2010. Both the 2024 school website and the umbrella website have been administered and hosted by a partner of the HPC SPECTRA project, which also takes lead responsibility for updating its contents.

### 3.1 Selection of Hosting Site

Historically, the host venue of the summer school (Table 1) has alternated between partner locations in Europe and North America (Canada and the U.S.). However, the 2019 school was successfully held in Kobe, Japan.

In September 2023 the organising committee unanimously accepted the offer from the RIKEN Centre for Computational Science (R-CCS) to host the 2024 edition of the school in Kobe, Japan. The team from RIKEN R-CCS in 2019 [7] had had experience and successful with hosting the summer school and catered for 80+ participants from Canada, Europe, Japan and the U.S., including 30 European students from 12 countries. In a post-event survey, 97% or respondents found the school to be well organised. The location of Kobe, near Osaka, is also accessible via a diverse range of international flights, catering for participants from different continents.

For the HPC SPECTRA project, it was anticipated that one of the school would be held in Europe, while the other would be held in other partner regions, e.g. North America, Japan. So while the 2024 school was decided to be held in Japan, it was indicated to the organising committee at an early stage that Europe would volunteer to host the 2025 edition of the school.

## 3.2 Meetings

For the past decade or so, the organisation of each summer school (typically held in June/July) often commenced in September/October of the previous year. This allows time to reflect on feedback from the previous school, as well as making sure key logistical targets are met, e.g. ascertaining the host venue, working with local institutions of the host country, funding arrangements, key timelines with the first milestone often being the announcement of the call for applications. Hence the organising committee met online approximately every two weeks from September 2023 to prepare for the 2024 school. This also included a face-to-face meeting of the organising committee at the SC23 conference in Denver, U.S.

## 3.3 Financial Support for European Participants

For the 2024 summer school, financial support (e.g. travel, accommodation and catering costs) for European participants were managed and covered by the HPC SPECTRA project, via the Project Coordinator's (PC) budget. This means that most flights were organised for European participants, from selected students to mentos and European instructors, via a designated travel agent associated with the PC's host institution. Costs for accommodation, catering and social programmes of the school were also paid directly from the PC to the relevant Japanese suppliers or service providers where possible. This meant that direct provision of financial support to European participants (i.e. direct reimbursement of costs), mostly for third parties outside of the HPC SPECTRA project, had been kept to a minimum but for a handful of European participants.

## 4 Application and Selection of Participants

The call for application for the International HPC Summer Schools have typically been announced in November/December of the preceding year. The organisers have generally strived to announce the call as early as possible, to attract the attention of students before they have made plans for the summer. The other reason is to provide a 1-2 month window for accepting applications, after which at least a month is normally required for the review and selection process to be conducted by each of the partner countries/regions independently. Both successful and unsuccessful applicants

are then notified, with successful participants given a roughly 2-week window to register, as well as a waiting list of a handful of applicants selected in case any of the successful applicants drop out or cannot make it to the school. Importantly, because some students need to apply for a VISA in order to participate in the school, notification of successful candidates by March, if not earlier, is necessary to provide sufficient time for the VISA application process.

#### 4.1 Call for Applications

In December 2023, the call for application for the International HPC Summer School 2024 was announced. Information about the call as well as the online application form were made available on the school's website.

The text and online form for the call for applications have remained relatively consistent from previous years. It focuses on obtaining the following information from the applicants:

- Basic personal details
- Academic status and background
- Research areas and interests
- Motivation to participate in the summer school
- Experience with programming, computational science and HPC
- Dissemination and extra-curricular activities

The call for application was disseminated by the partners to their own networks, email distribution lists, as well as on social media. In Europe, the call was disseminated to the National Competence Centres (NCCs) and the Centres of Excellence (CoEs) via the EuroCC 2 and CASTIEL 2 projects; the NCCs and CoEs were asked in turn to promote the call for applications in their own countries.

By the deadline of 31 January 2024, a record number of 269 European applications was received, out of a total of 505 applications for the entire school. The European applications were received from 22 countries (based on the countries of the applicants' institutional affiliation) and included 53 female applications (approx. 20% of those who provided feedback on gender).

A number of complaints were received with regards to the European eligibility criteria, which had to adhere to wordings included in the HPC SPECTRA project call text and Grant Agreement, where eligible participants must be affiliated with an European institution (based in one of the EuroHPC JU associated countries) as well as being a national of one of the associated countries.

## 4.2 Selection Process

European applications were reviewed by a panel of 9 European expert reviewers from different European HPC centres and institutions. Most of these experts have reviewed applications for the previous summer schools, while two were recruited in 2024 to deal with the relatively large volume of applications.

Application reviewers were given guidelines for the process, where it emphasise that selection should be aimed at students who will benefit most from the school to expand their HPC (and AI) knowledge, contributing to their computational research. The evaluation of the candidates are mainly based on 4 main criteria:

- Scientific/technological reasons for participation
- That the summer school can contribute to advancing research goals
- Engagement in code development rather than the use of application codes
- Experience with HPC/AI programming (on CPUs and GPUs)

Each application is scored and assigned a recommendation from the reviewers:

- Excellent and strongly recommended (e)
- Very good and recommended, if there is room (v)
- Good, but not recommended (g)
- Not suitable for the school (n)

Candidates assigned the (e) and (v) categories are given indicative rankings by the reviewers. An adjudication meeting was held in early March 2024 in order to resolve the relative rankings and merits of the top candidates taking into account diversity (gender, institutional and geographical distribution). There was an initial allocation of 32 European places, agreed among the international partners to keep the overall total manageable, see Section 2. Hence the selection process resulted in 32 successful

candidates being selected, with 8 additional ones placed on a waiting list. Applicants were notified of the outcome from the selection process on 19 March 2024. Successful candidates were invited to formally register to participate in the school. Subsequently, an additional 2 European places were allocated, upon agreement with other partners.

Ultimately, a total of 34 successful candidates participated in the school who are affiliated with 15 European countries, including 12 (approx. 35%) female candidates. The final numbers were reached after a couple of cancellations and replacement by candidates from the waiting list.

## 5 Programme

The summer school's programme has evolved over the years but its main overarching objectives below have remained more or less consistent, which are:

- Expand the knowledge of the attendees about HPC and its application in multiple fields of science and engineering.
- Provide mentoring opportunities that would benefit students' professional careers, beyond scientific and technical topics, e.g. career developments, dealing with changes and maintaining balance.
- Foster new collegial friendships and partnerships, nationally and internationally, among instructors, mentors and participants.

The programme committee is responsible for making adjustments to the summer school programme, typically based on participant feedback from previous years but also emerging trends in HPC, e.g. the incorporation of large-scale data analytics into the programme a few years ago.

For the 2024 summer school, the programme committee was responsible for making a number of changes compared to previous years. One of the key driver was that there was a general feeling among the 2023 summer school participants that the programme was somewhat overwhelming, with a mix of technical & scientific instructions/talks, mentoring programme, poster sessions and social events tightly condensed into a week. As seen below in Section 5.1, some accommodations have been made to create more free time for participants to create a less hectic agenda, while attempting to

minimise any compromise in the topics and skills being taught at the school. The full, final programme of the 2024 school can be found in Annex 12 as well as the school's website [6].

## 5.1 Technical and Scientific Topics

The technical and scientific topics taught at the summer school have been drawn up to familiarise students in computational sciences with major state-of-the-art aspects of HPC and Big Data Analytics, with the expectation that the students would come from heterogeneous scientific and engineering backgrounds. The following are some of the topics which have been regular features in the summer school's programme, including the one in 2024:

- HPC and Big Data challenges in major scientific disciplines
- Shared-memory programming
- Distributed-memory programming
- GPU programming
- Performance analysis and optimisation on modern CPUs and GPUs
- Software engineering
- Numerical libraries
- Big Data analytics
- Deep learning
- Scientific visualisation

Instructions for these topics are provided by computational scientists and HPC technologists, invited to the school by the programme committee, from all the respective partner regions across different continents.

The first two days of the school involved parallel tracks where participants are requested to choose one of the following:

- An introduction to shared-memory parallelism and accelerator programming: which focuses on single-node programming and provides techniques to parallelise codes over multiple CPUs, as well as potential offloading of work to GPUs. It is aimed at those who are relatively new to parallel programming. It is taught using OpenMP with teaching material available in C and Fortran.

- Advanced distributed-memory programming: which focuses on multi-node programming with the MPI library. It is aimed at students with MPI experience to learn more advanced techniques to write efficient, scalable programs for large HPC systems, such as advanced usage of collective operations and MPI derived datatypes. The teaching materials are based on C, C++ and Fortran.

In 2024, one of the significant changes to the agenda was to remove the traditional scientific talks (given by scientists which span different domains) to be replaced by panel sessions where scientists from different backgrounds discuss the major HPC challenges relevant to their domain, reflecting on similarities and differences. Another panel session is focused on the future of HPC for scientific communities. Along with dropping the talks surrounding access to partner infrastructures from the agenda, this allowed for a more streamlined schedule where participants have slightly more free time.

Another aspect of the summer school which continued to be one of the most popular is the electronic poster sessions where participants are obliged to bring along an “electronic” poster, i.e. a presentation or visualisation on a laptop, to the school. Participants are divided into 4 groups, where each group is expected to show their posters on either the Monday or Tuesday evenings of the school, co-located with meals provided by the school. It creates an excellent forum for the international students to get to know one another, learn about HPC techniques being used across different domains and foster new thinking and collaborations. The poster sessions have remained to be one of the most popular sessions of the school in 2024.

## 5.2 Mentoring

The mentoring programme represents one of the more unique aspects of the International HPC Summer School series compared to others, which typically focuses mainly on technical/scientific topics and instructions. Apart from talks and instructions on HPC programming, tools, techniques and best practices, the summer schools, including the 2024 edition, also aimed to achieve the following:

- Provide an opportunity for participants to connect with peers around the world, and to practice their networking skills.

- Highlight and showcase different career options (from academia, research/national labs, to industry)
- Provide career development guidance

There are two types of mentors at the 2024 summer school:

- Near-peer mentors are returning students who have previously attended the summer school. They understand intimately the challenges of being a graduate student and have some experience with taking the next step. They provide valuable close-hand advice as well as often being a source of inspiration for the schools' participants.

On the European side, 3 returning mentors were selected to participate in the 2024 school, out of 40 European returning mentor applications. The call for returning mentors was held over March-April 2024 by the school's mentoring committee. The 3 European returning mentors participated in the 2014, 2016 and 2018 International HPC Summer Schools; two of whom have pursued careers in HPC-related industry based in Europe while the other works at a large European research centre.

- Staff mentors are those individuals who are involved in organising, instructing and presenting at the summer school, i.e. typically more experienced in their careers. In the case of the latter, almost all presenters/instructors of the summer school are expected (and do) stay for the entire duration of the school to act as mentors for students for both technical and non-technical topics.

Table 2 shows the official mentoring activities that took place at the 2024 International HPC Summer School. It can be seen that mentoring is introduced at the very beginning of the school – from experience it is important that this aspect is explained to everyone, from mentors to mentees, from the beginning in order to set expectations and provide instructions. Each mentor is assigned 3-4 mentees, which is based on a matching process upon completion of a mentoring interest survey conducted prior to the school. The mentoring groups are assigned based on responses from matching surveys. While the mentor-mentee matching process is an attempt to find suitable/compatible mentors for mentees, it is not an exact science and the organisers encourage all mentees to speak to other mentors beyond those assigned to them.

It is apparent from the activities that the summer school encourages mentoring in non-technical areas such as:

- Career planning and progression
- Ways to reduce feelings of isolation
- Help with returning after a career break
- Advice about obtaining a work-life balance
- Networking
- Support for coping with personal issues, e.g. disabilities, caring responsibilities, along side a professional career
- Development of new skills such as leadership or public speaking

*Table 2. Mentoring sessions timetable.*

Day	Time (JST)	Activity
<b>Sunday</b>	18:00	Introduction to Mentoring and Overview
<b>Monday</b>	10:30 – 10:50	Staff and Returning Mentor introductions
	11:35 – 12:30	Career Paths Talk & Returning mentor lightning talks
	12:30 – 13:30	Lunch in mentor groups & goal setting for the week
<b>Wednesday</b>	11:30 – 12:30	One-on-ones in mentor groups
<b>Thursday</b>	11:30 – 12:30	Resource Fair
<b>Friday</b>	09:45 – 10:45	Career Breakout Groups <ul style="list-style-type: none"> <li>- Resume review</li> <li>- Presentation skills</li> <li>- Networking with an elevator pitch</li> <li>- Interview tips</li> </ul>
<b>Afterwards</b>		Stay in touch with email, Slack, LinkedIn

## 6 Implementation

Over 7-12 July 2024, the International HPC Summer School took place in Kobe, Japan at the Ariston Hotel. As mentioned above, 34 European participants took part in the school along with 3 returning mentors and 9 instructors/presenters/organising staff from Europe. They were joined by 55 participants from other partner countries/regions at the school along with other returning mentors and instructors/presenters/organising staff. The organisation of the school went smoothly without any major incidents. Figure 1 shows a group photo of most of the participants at the 2024 including returning mentors as well as instructors, presenters and organising staff. As indicated below (Section 7), focus groups were held during the school (students were invited to join these groups at the event, coinciding with lunch/free time) along with surveys which went out towards the end of the school in order to obtain feedback from the school's participants.



Figure 1. Group photo of participants at the International HPC Summer School 2024.

## 7 Evaluation & Feedback

The International HPC Summer School 2024 evaluation team was led by Julie Wernert, from the Cyberinfrastructure Assessment and Evaluation (CAE) group at Indiana University's Pervasive Technology Institute, in collaboration with Matthias Brust from the University of Luxembourg, representing HPC SPECTRA. The evaluation methodology employed multiple data sources to gather feedback, including surveys and focus group interviews. This multi-pronged approach provided a robust understanding of participants' experiences and perspectives, offering insight into both the strengths and areas for improvement within the program. The full spectrum of findings are detailed in the official IHPCSS 2024 evaluation report (awaiting final sign-off at time of producing this deliverable).

### 7.1 Participant Surveys

The evaluation team administered pre-event and post-event surveys to capture participant expectations, demographic information, and final feedback on the programme experience. Response rates were high, with over 80% of students completing each survey. Key findings from the post-event survey revealed that nearly 100% of participants considered the summer school experience successful, with many noting it had exceeded their initial expectations. Additionally, students highly rated the programme's organisational structure, health and safety measures, and opportunities for international networking, citing these as particularly valuable aspects of their experience.

The pre- and post-event surveys had high response rates (92.6% and 83.3%, respectively). In the post-event survey:

- **95.7%** of students rated their summer school experience as successful.
- **88.6%** believed the skills gained would significantly contribute to their research.
- **98.6%** of respondents felt the summer school was well organised.
- **98.6%** felt that health and safety precautions were sufficient.
- **53.6%** found the challenge level neutral, while **23.1%** found it difficult.

These surveys highlighted that students valued networking and mentoring opportunities highly, though there were suggestions for more unstructured networking time to allow organic discussions.

## 7.2 Focus Groups

Focus groups, held during the Summer School, provided an informal yet structured setting for students to voice their thoughts on specific programme components, including mentoring and hands-on sessions. Participants praised the structured yet flexible environment, which fostered networking and engagement opportunities. They also noted areas where the programme could improve, such as introducing more opportunities for unstructured interactions and accommodating diverse levels of experience with programming topics. The focus group feedback, presented in an anonymised format to protect participant confidentiality, helped shape several of the official evaluation report's recommendations for enhancing future programme efficacy.

The focus groups captured qualitative insights, with comments noting satisfaction with mentorship and organisational details but suggesting improvements in pacing and event structure:

- Participants appreciated structured breaks, which facilitated informal networking.
- Some students reported fatigue from extended, densely scheduled sessions in the first two days due to jetlag, indicating a need for pacing adjustments.

Students also appreciated diverse mentorship, even when mentors weren't directly in their field, as this broadened exposure to career-relevant soft skills and insights.

## 7.3 Instructor Surveys

Mentor and instructor feedback was collected via post-event surveys, with a response rate exceeding 75%. The feedback indicated high satisfaction levels with the mentor-student matching process, but highlighted areas for improvement, such as the need for more comprehensive pre-event preparation and resources for mentors. Several mentors suggested that additional support or training could be beneficial, especially when addressing sensitive topics that might arise during mentoring sessions. This

feedback underscored the importance of equipping mentors with the skills and guidance needed to engage effectively with students from diverse backgrounds.

The post-event mentor survey showed:

- **77.3%** found mentoring sessions highly useful.
- **87.1%** were satisfied with mentor interactions, but **20%** of mentors felt they hadn't received sufficient preparation for the role.
- **92.8%** of students indicated willingness to return as mentors.

Feedback emphasised a need for expanded mentor preparation resources, particularly regarding handling students' mental health issues, which some mentors found challenging to address effectively .

## 8 Recommendations

The evaluation findings led to actionable recommendations designed to refine the program's structure and enhance the participant experience. Notable recommendations include:

- **Enhance Core Strengths:** Focus on mentoring, networking, and hands-on sessions while limiting general presentations. Include more interactive sessions tailored to students' technical skill levels.
- **Refine Mentorship Framework:** Introduce a group mentoring structure where mentors guide small groups on varied technical and career topics. This model allows broader perspectives and builds a dynamic, accessible mentorship environment.
- **Improve Gender Balance:** Despite progress in student cohort gender balance, mentor and leadership representation could improve. Recruitment strategies should focus on achieving gender diversity among mentors and presenters.
- **Adjust Programme Pacing:** Consider shorter days initially, allowing students to acclimate and engage more fully. Scheduling adjustments could address concerns around jetlag and intensive scheduling.

- **Prepare Mentors Thoroughly:** Expand training to include guidance on sensitive mentoring topics, including mental health awareness, to help mentors better support students' diverse needs.

## 9 Interaction with Other Activities

### 9.1 Exploring Synergy with EUMaster4HPC Summer Schools

Representing HPC SPECTRA, Matthias Brust from the University of Luxembourg has actively participated in EUMaster4HPC [8] meetings to explore synergies, particularly with the EUMaster4HPC Summer Schools. He attended the EUMaster4HPC Summer School 2024 [9] in Ostrava to gain relevant insights into the event's execution and experience, allowing him to observe first hand the impacts of programmatic differences between IHPCSS and the EUMaster4HPC summer schools. These observations enabled sharing of valuable insights with EUMaster4HPC colleagues at the University of Luxembourg.

During an EUMaster4HPC team meeting on 19 September, 2024, he presented findings from his involvement in organising and evaluating the IHPCSS 2024. This meeting, along with subsequent discussions, has focused on multiple facets for enhancing the organisation and execution of next year's EUMaster4HPC Summer School. Current discussions emphasise establishing best practices for HPC Summer School organisation, with particular focus on the following key topics:

- Organisational strategies and procedures
- Establishing procedure on summer school programme development
- Elements and extension of the summer school mentoring programme
- Focus on compatibility of summer school evaluation methods and metrics to, *inter alia*, increase consistency

This exchange will have an impact on the planning of upcoming summer schools. In turn, the input HPC SPECTRA can bring in to IHPCSS from the EUMaster4HPC summer school experience, will further broaden the international collaborative HPC network, enabling summer school participants of both schools to benefit from resources and

knowledge across programs, and facilitating a more global exchange of expertise and ideas.

## 9.2 Certification Opportunities

Although certification have not been requested in participant feedback nor discussed in depth among the organising committee, the HPC SPECTRA project is examining the potential to offer formal certificates of completion at the IHPCSS and/or other similar summer schools. Certification might be beneficial for those seeking accredited training in HPC. Furthermore, the IHPCSS programme that encompasses many of the important topics in HPC, could provide the foundation to develop a small-scale certification framework for HPC skills. The development of such a certification framework would likely require coordination among partner institutions to establish clear learning outcomes, validation/assessment processes which may expose further areas of collaboration (e.g. standardisation) amongst the international HPC community.

## 10 Planning for the 2025 School

During the IHPCSS 2024, the partner organisations had discussions on potential hosting locations for the 2025 edition. While several candidate cities were raised – there was an understanding that European cities which have never hosted the school be prioritised – and their suitability and merits considered, e.g. proximity to an international airport with good connections to flights from different continents, cost considerations, it was proposed that Portugal (potentially Lisbon) would be an excellent location to host the 2025 school. Having flagged this proposal with the EuroHPC Joint Undertaking, who is the granting authority for HPC SPECTRA, the organising committee approached colleagues from Portugal (those who are also involved in the Portuguese National Competence Centre (NCC) to seek a formal collaboration to host the 2025 school in Portugal. By November 2024, it was confirmed that Portugal (location to be fully confirmed but likely Lisbon) would be the European host of the International HPC Summer School 2025.

Since September 2024, the organising committee has held meetings roughly every fortnight to begin preparations for the 2025 school. Some of the issues discussed were findings and recommendations drawn up by the evaluation committee from the 2024

school, preparations for the launch of the call for applications, funding situations of partner countries/regions, etc. It is expected that the call for applications for the 2025 school will be opened some time in Dec 2024 or Jan 2025.

## 11 References

- [1] International HPC Summer School series website: <https://www.ihpcss.org/>
- [2] Lederer, H. DEISA2: supporting and developing a European high-performance computing ecosystem (2008). *J. Phys.: Conf. Ser.* 125:011003.
- [3] Description of TeraGrid project on Wikipedia:  
<https://en.wikipedia.org/wiki/TeraGrid>
- [4] Max Planck Computing and Data Facility website: <https://www.mpcdf.mpg.de/>
- [5] Partnership for Advanced Computing in Europe (PRACE) website:  
<https://prace-ri.eu/>
- [6] International HPC Summer School 2024 website: <https://ss24.ihpcss.org/>
- [7] International HPC Summer School 2019 website: <https://ss19.ihpcss.org/>
- [8] EUMaster4HPC project website: <https://eumaster4hpc.uni.lu/>
- [9] EUMaster4HPC Summer School 2024 website:  
<https://eumaster4hpc.uni.lu/summer-school-2024/>

## 12 Agenda of IHPCSS 2024

Table 3 shows the agenda of the International HPC Summer School 2024, which is also reflected on the school’s website.

*Table 3. International HPC Summer School 2014 agenda.*

<b>Sunday July 7</b>	
16:00	<b>Registration opens</b>
	<b>Student Orientation</b> (general information, introduction to mentoring)
18:00	<b>Introduction to Programming Challenge</b>
	<b>Staff Orientation</b>
19:00 – 21:00	<b>Welcome Reception</b>
<b>Monday July 8</b>	
07:00	<i>BREAKFAST</i>
09:00	<b>Welcome from Local Hosts</b>
09:10	<b>Summer School Overview &amp; Local Logistics</b>
09:20	<b>KEYNOTE by Prof. Satoshi Matsuoka, Director, RIKEN R-CCS</b>
10:00	<i>BREAK</i>
10:30	<b>Staff Introductions</b>
10:50	<b>Summary of Programming Tracks (how to choose) &amp; Parallel Programming Methodologies</b>  <i>Maciej Cytowski, Pawsey</i>
	<b>Career Paths</b>  <i>Elsa Gonsiorowski, LLNL</i>
11:35	<b>Returning Mentor Career Lightning Talks</b>  <i>LUNCH</i> (in mentor groups)
12:30	Testing of course accounts
14:00	<b>Parallel Programming: OpenMP for CPUs</b>  <i>Ludovic Capelli, EPCC</i>
	<b>Parallel Programming: MPI</b>  <i>Andrew Kirby, Univ. Wyoming</i>
15:30	<i>BREAK</i>
16:00	<b>Parallel Programming: OpenMP for CPUs</b>
	<b>Parallel Programming: MPI</b>



	<i>Ludovic Capelli, EPCC</i>	<i>Andrew Kirby, Univ. Wyoming</i>
17:30	<i>BREAK</i>	
18:00 – 21:00	<b>Dinner followed by Poster Sessions</b>	
<b>Tuesday July 9</b>		
07:00	<i>BREAKFAST</i>	
08:50	<b>Message of the Day</b>	
09:00	<b>Parallel Programming: OpenMP for GPUs</b>	<b>Parallel Programming: MPI</b>
	<i>Ludovic Capelli, EPCC</i>	<i>Andrew Kirby, Univ. Wyoming</i>
10:30	<i>BREAK</i>	
11:00	<b>Parallel Programming: OpenMP for GPUs</b>	<b>Parallel Programming: MPI</b>
	<i>Ludovic Capelli, EPCC</i>	<i>Andrew Kirby, Univ. Wyoming</i>
12:30	<i>LUNCH</i>	
14:00	<b>Parallel I/O</b>	<b>Containers</b>
	<i>John Cazes, TACC</i>	<i>Sarah Beecroft, Pawsey</i>
14:45	<b>Panel: HPC Challenges in Your Scientific Work</b>	
16:00	<i>BREAK</i>	
16:30	<b>Software engineering</b>	
	<i>Erik Lindahl, Univ. Stockholm</i>	
17:30	<i>BREAK</i>	
18:00 – 21:00	<b>Dinner followed by Poster Sessions</b>	
<b>Wednesday July 10</b>		
07:00	<i>BREAKFAST</i>	
08:50	<b>Message of the Day</b>	
09:00	<b>HPC Python</b>	<b>Performance Analysis &amp; Optimization</b>
	<i>Ramses van Zon, Univ. Toronto</i>	<i>Ilya Zhukov, JSC</i>
11:00	<i>BREAK</i>	
11:30	<b>One-on-one mentor meetings</b>	
	[Mentoring programme]	
12:30	<i>LUNCH</i>	

	(Focus groups1)	
14:00	<b>Scientific Visualization</b>	<b>GPU Performance Analysis</b>
	<i>Eric Wernert, Indiana Univ.</i>	<i>Sebastian Kuckuk, FAU Erlangen-Nürnberg</i>
16:00	<b>Free time and evening</b>	
<b>Thursday July 11</b>		
07:00	<i>BREAKFAST</i>	
08:50	<b>Message of the Day</b>	
09:00	<b>Big Data /ML Overview</b>	
	<i>Bryon Gill, PSC</i>	
11:00	<i>BREAK</i>	
11:30	<b>Resource Fair</b>	
	[Mentoring programme]	
	<i>LUNCH</i>	
12:30	(Focus groups2)	
14:00	<b>Big Data / Machine Learning Hands-on</b>	<b>Software Engineering Hands-on</b>
	<i>Bryon Gill, PSC</i>	<i>Elsa Gonsiorowski, LLNL</i>
15:15	<i>BREAK</i>	
15:30	<b>Big Data / Machine Learning Hands-on</b>	<b>Programming Challenge Walkthrough for non-participants</b>
	<i>Bryon Gill, PSC</i>	<i>Ludovic Capelli, EPCC</i>
16:30	School ends	
17:00	<b>Social event and dinner</b>	
<b>Friday July 12</b>		
07:00	<i>BREAKFAST</i>	
08:45	<b>Group Photo</b>	
08:50	<b>Message of the Day</b>	
09:00	<b>Workflow Tools</b>	
	<i>Scott Callaghan, Univ. Southern California</i>	<b>Numerical Libraries</b>

09:45	<b>Career Breakouts</b>	<i>James Willis, SciNet HPC Consortium</i>
	[Mentoring programme]	
10:45	<i>BREAK</i>	
11:15	<b>Panel: Future of HPC</b>	
12:30	<b>Programming Challenge Awards</b>	
12:45	<b>Closing Session</b>	
	<i>LUNCH</i>	
13:00 – 14:00	<i>End of School</i>	
14:30	<b>Tour of Fugaku Supercomputer [optional]</b>	