The International HPC Certification Program

https://www.hpc-certification.org/

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Abstract

The HPC community has always considered the training of new and existing HPC practitioners to be of high importance to its growth. The significance of training will increase even further in the era of Exascale when HPC encompasses even more scientific disciplines. This diversification of HPC practitioners challenges the traditional training approaches, which are not able to satisfy the specific needs of users, often coming from non-traditionally HPC disciplines and only interested in learning a particular set of skills. HPC centres are struggling to identify and overcome the gaps in users' knowledge. How should we support prospective and existing users who are not aware of their own knowledge gaps?

We started the establishment of the International HPC Certification program that aims to clearly categorize, define and examine HPC related skills. Oriented on the needs of practitioners, the program does not define a linear curriculum or interfere with content providers. Ultimately, we aim for the certificates to be recognized and respected by the HPC community and industry.

Seeded by the PeCoH Project

The HPC Certification Program was seeded by the Performance Conscious HPC (PeCoH) project* which aimed to create a lightweight HPC certification program. During the first year, it became apparent to broaden the scope and form an independent governance entity to sustain the effort and gain acceptance.
Please see the PeCoH poster nearby!

*:https://wr.informatik.uni-hamburg.de/research/projects/pecoh/

Competences and Skills

Various competencies are necessary to efficiently use HPC resources. A skill is a meaningful competence that comes with a **clear definition** of knowledge/practical ability, **levels of knowledge**, **relations to other skills**. An excerpt of the first levels of the skill-tree:
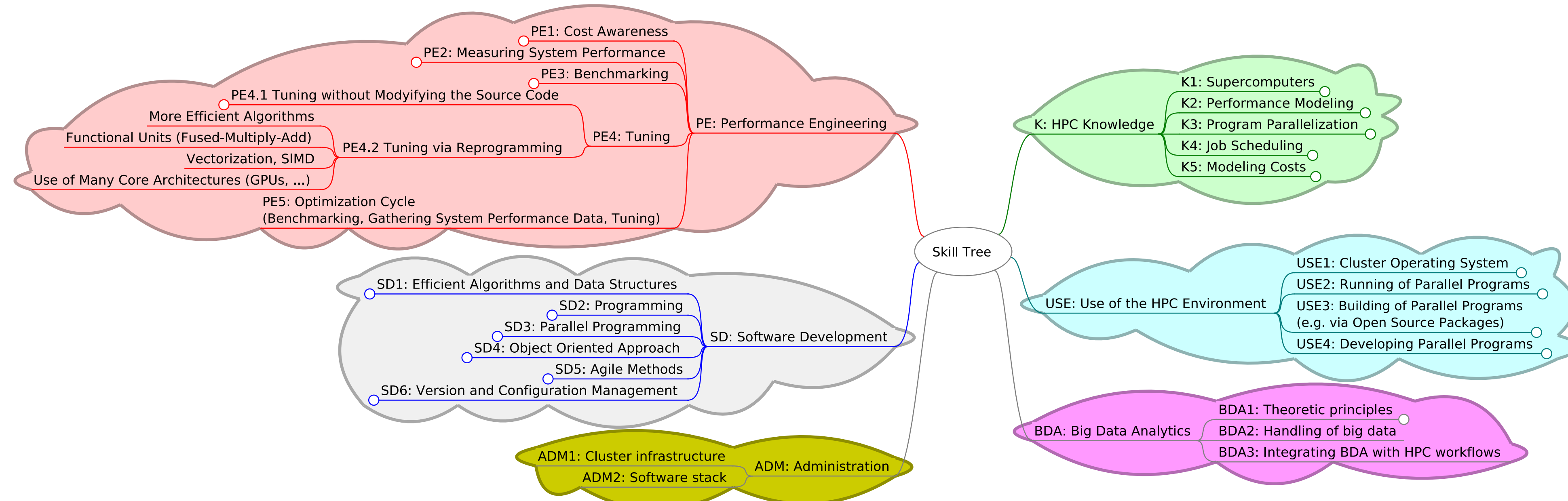
The skill-handbook is available in various representations on the webpage and on our GitHub.

Status

Organizational

- First, an initial mode of operation for the board was defined and a steering board was voted.
- Then, we developed a vision in the board.
- Now, management structures and rules are established.

**Responsibilities of the governance body**:

- Steering the program
- Curating the curriculum
- Performing the exams

It is **not** its duty to interfere with content!
We aim to preserve the teaching ecosystem.

Technical

- The skill-tree in version 0.5 is available.
- Skills are managed in Markdown and an XML document that is processed via XSLT into various representations.
- A flexible viewer has been created with Javascript; it can be re-used and configured – e.g., to highlight domain-relevant skills or linking teaching material.
- A prototype for a first online examination is developed and currently evaluated.
- Rules for the contribution of exam questions were established, this is the only non-open artifact under proprietary license.

Example certificate:
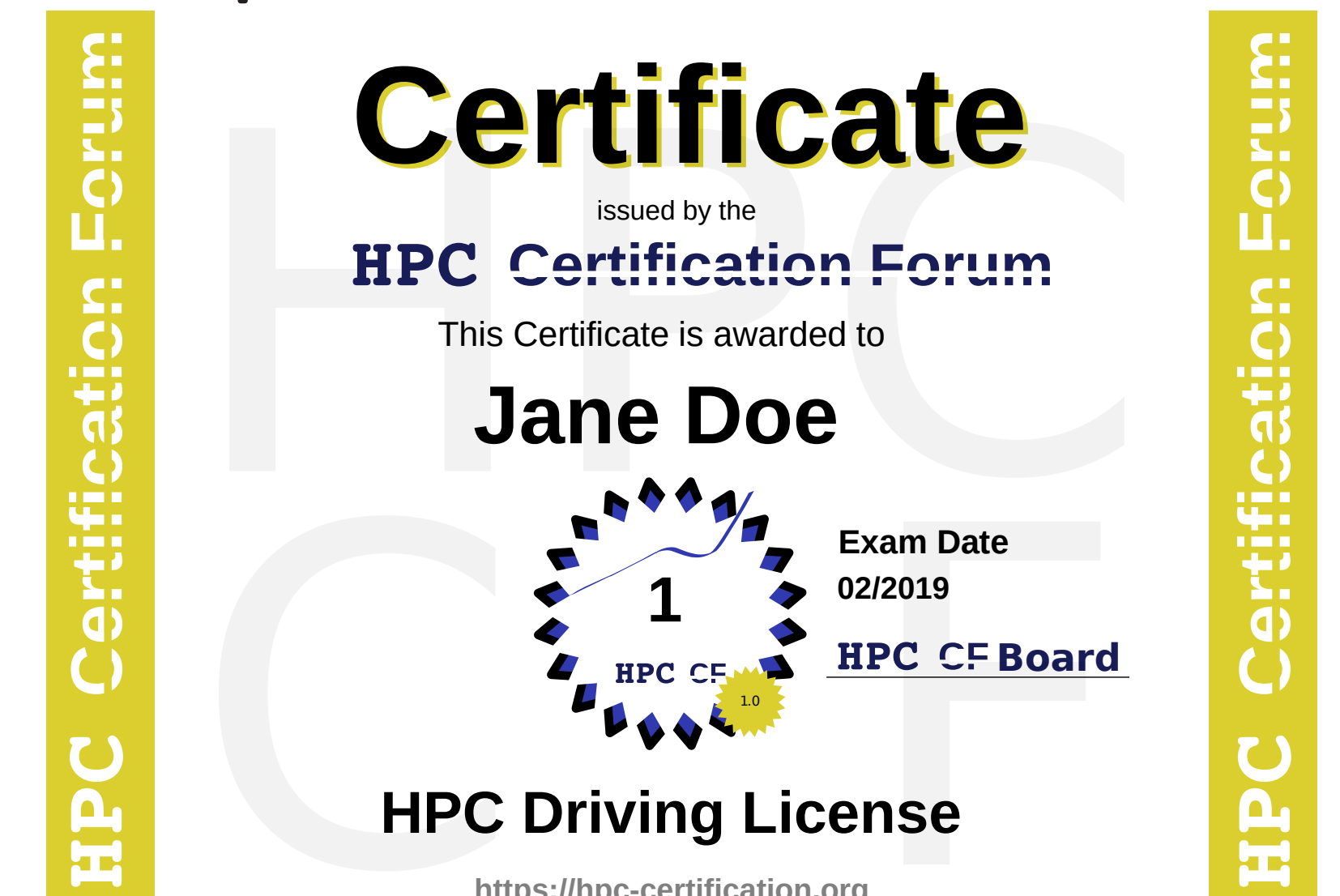
Benefits

HPC practitioners

- Increase motivation to participate: Certificates are recognized in CV
- Validate knowledge via tests
- Browse of relevant competences
- Identify recommended and required skills
- Compare teaching offers across sites

Data centers

- Increase sharing of teaching materials
- Documentation of taught skills simplified
- Identify missing teaching activities
- Tailor skill-tree specifically to users
- Correlate lack of skills with efficient use

Example Skill (Excerpt)

ID: USE4.2.1-B
Name: Workload manager introduction
Background
There is a wide range of different workload managers in use. This skill covers generic and widely used concepts.
Objectives
comprehend and describe the basic architecture and concepts of resource allocation for an HPC system
Outcomes
- comprehend the exclusive and shared usage model in HPC
- differentiate batch and interactive job submission
- comprehend the generic concepts and architecture of ...
- explain environment variables as a means to communicate
- explain the generic steps to run and monitor a single job

Get Involved!

This is an independent community-wide effort.

Who can join?
Anyone (person or organization) experienced or interested in HPC teaching and training.

What can we contribute?
There are various levels of contribution

- developing skill-tree scope and content
- becoming ambassador for the program
- steering of the governance body

Visit our website hpc-certification.org and join the Slack and mailing lists!

What does it cost to join?
It is free to join for everyone! However, for **full members** (with voting rights), we expect a minimum contribution to the overall program. Note that anyone joining will be listed on the public webpage!

Meetings:
A general assembly of members will occur at least twice a year – during ISC and SC. On a monthly basis, the program chair organizes a conference call via Slack, that shall be attended by the executive board but is open to members.

Providing teaching material:
Since the certification program itself curates the curriculum but does not provide teaching material, anyone is welcome to provide teaching material – we support branding of the material!

Next Steps

- Completing the definition of the skills for a skill tree 1.0 including learning outcomes
- Extending the tree with administrative and big-data skills
- Supporting organizations to use the HPC-CF classification
- Releasing the first online examination