Contributing HPC Skills to the HPC Certification Forum

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Outline

1. The Program
2. Contributing
The HPC Certification Program

Goals

- Fine-grained standardizing HPC knowledge representation
  - What competences exist, how are they defined?
  - Puzzle of competences for everyone (practitioners, students)
  - Supporting navigation and role-specific knowledge maps

- Establishing international certificates attesting knowledge

Important!

- We do not compete with content providers
- We do not intent to create a curriculum

This talk is about contributing to the knowledge representation
The **HPC Certification Forum**

The HPC-CF is the central authority for the development of the program

**Organization Details**

- An independent international body
- Organized into
  - Steering board
  - Full members with voting rights
  - Associate members
  - Collaboration with e.g., SIGHPC Education Chapter

**Responsibilities**

- Curating and maintaining the skill tree and certificates
- Providing tools and ecosystem around the competences
Example High-Level Skill

- **Name:** SLURM Workload manager
- **Id:** USE4.2.2-B
- **Background:** SLURM is a widely used open-source workload manager providing various advanced features.

**Aim:**
- comprehend and describe the basic architecture of SLURM and its tools
- use relevant tools to run and monitor (parallel) applications

**Learning outcomes**

- run interactive jobs with salloc, a batch job with sbatch
- explain the architecture of SLURM, i.e., the role of slurmd, srun
- explain the function of the tools: sacct, sbatch, salloc, ...
- explain time limits and the benefit of a backfill scheduler
- see [https://www.hpc-certification.org/wiki/](https://www.hpc-certification.org/wiki/)
The Program

Contributing

Content of the Certification Program

- **A skill** defines background, objectives, learning outcomes
- **The skill tree** organizes the competences as hierarchical skills
- Certificates bundle several skills into attestable unit

**Figure:** Top-levels of the skill tree (We are working on ADM and BDA branches)
High-Level Editing

- Webpage with Markdown version controlled in Git
  - GitHub: [https://github.com/HPC-certification-forum/skill-tree](https://github.com/HPC-certification-forum/skill-tree)

- Editing a MindMap, the structure of Skills
  - Synchronized with the skill tree in Git
  - Uses the OpenSource tool Freemind

- Discussion on our Slack

- We welcome any contribution via either channel
  - Pull requests are also welcome
K-B HPC Knowledge

Background
The theoretical knowledge of HPC provides the background to understand how supercomputers and HPC environments operate. This enables practitioners to effectively use such environments.

Aims
- To provide background knowledge that is relevant for all other branches.
- To provide theoretical background to judge the behavior and efficiency of systems.
- To provide technical understanding of HPC systems

Outcomes
- Explain the hardware, software, and operation of HPC systems
- Construct and judge simple performance models for systems and applications
- Understand that there are performance frontiers
- Explain why it is a special challenge to achieve good speedups and good efficiencies if the number of processing elements is steadily increased
- Compare different paradigms for the parallelization of applications
- Construct and execute an HPC workflow on an HPC system
- Comprehend job scheduling principles
- Apply a cost model to compute the costs for running a workflow on an HPC system