

High Performance Computing

UNIVERSITÄT **BONN**



High Performance Computing (HPC) leverages the power of multiple, interconnected compute nodes and different CPU architectures to solve complex problems, often with large datasets. Some HPC clusters also include GPU or FPGA accelerators for specialized applications.

Typical applications include **large scale simulations, machine learning and data analysis**. In short, if your workstation can't do it, you might need an HPC system.

HPC can produce large datasets

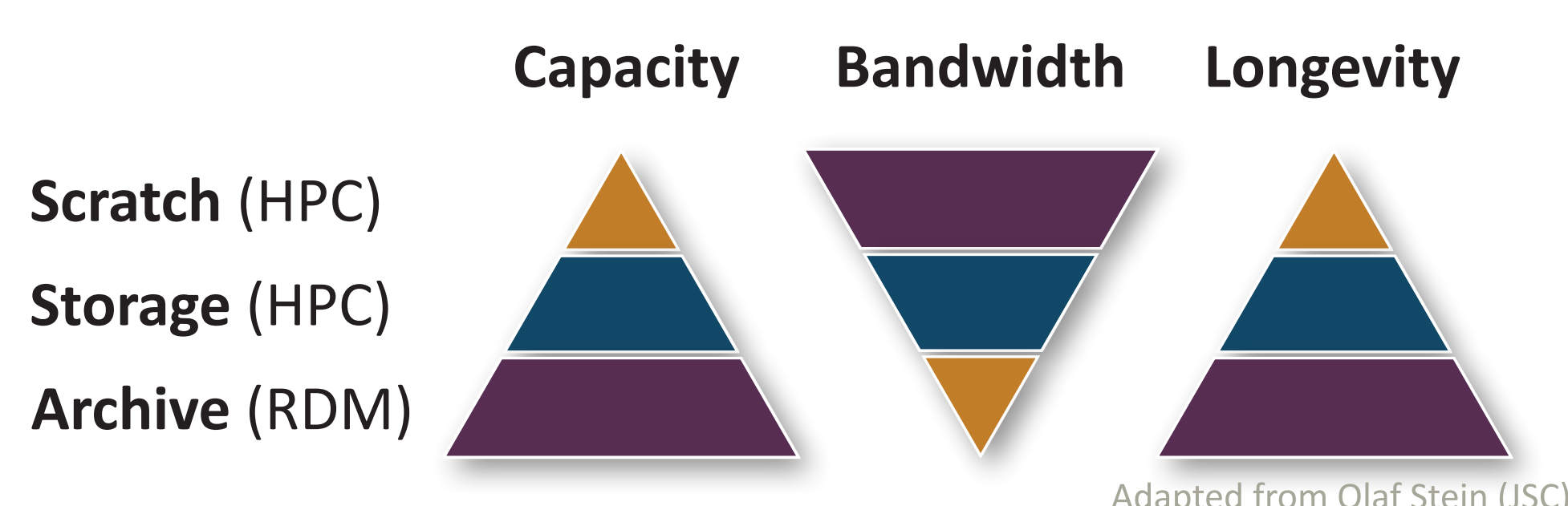
Analyses in HPC can produce **datasets in the tera- or petabytes**. Working with these efficiently requires a performant file system. Also, short- and long-term storage are important, but often neglected aspects. The size of these large datasets pose **significant challenges** to research data management systems.

How to tackle the data deluge?

Our challenge is to **create interplay** between:

- Research Data Service Center
- Scientific Council for RDM
- National Research Data Infrastructure (NFDI)
- HPC/A Lab and HPC team at computing center
- HPC users

Using the **storage hierarchy** in practice:



Adapted from Olaf Stein (JSC)

HPC infrastructure at the University of Bonn

The University offers **central HPC clusters** for researchers and students:

MPP cluster **Bonna**

2 240 CPU cores in 70 compute nodes
192 GB RAM per node to a total of 13.4 TB RAM
428 TB scratch storage, additional 2 TB per node

GPU cluster **Bender**

4 compute nodes with **4x NVIDIA A40** (48 GB)
384 GB RAM per node
2x480 GB local SSD storage
40 TB central HDD storage

Coming 2023: large cluster **Marvin**

18 432 CPU cores in 192 MPP nodes
24 large memory nodes with 2 TB RAM
5 very large memory nodes with 4 TB RAM
32 GPU nodes with 4x NVIDIA A100 (80 GB)
24 ML nodes with 8x NVIDIA A40 (48 GB)
5.6 PB storage



Universität Bonn / G. Hübl

These systems are maintained by the **HPC team** at the University computing center (Bender, Marvin) and Fraunhofer SCAI (Bonna).

Find out more at hpc.uni-bonn.de



The High Performance Computing & Analytics Lab

- Prof. Dr. Petra Mutzel:** Scientific director, computational analytics
- Dr. Michael Hübner:** Experimental high energy particle physics
- Dr. Bartosz Kostrzewa:** Extreme scale computing, lattice field theory
- Dr. Sven Mallach:** Mathematics, computer science
- Dr. Malte Petersen:** Bioinformatics, computational genomics
- Dr. Moritz Wolter:** Machine learning, artificial intelligence

The **High Performance Computing & Analytics (HPC/A) Lab** is the **central contact point for research projects involving HPC**, promotes **interdisciplinary collaboration** and coordinates interaction with the HPC administration team. It provides **advice and training** to researchers and students on specific application- and method-related problems, and refers contacts for potential **collaboration**.

The HPC@HRZ Team

The **HPC team at the University computing centre** manages and maintains the central HPC facilities, and is the contact point for all **technical questions and problems**. We especially focus on **user support and teaching of basic HPC related topics** in order to further enable the users to efficiently utilize the resources.

- Dr. Dirk Barbi:** Team leader, project management, Marvin procurement
- Michael Kuckertz:** Cluster configuration, system administration, Slurm
- Jan Steiner:** HPC workshops and courses, user support

(The team will reach its planned size of 7 members by April 2023)