ExaNeSt

European Exascale System Interconnect and Storage

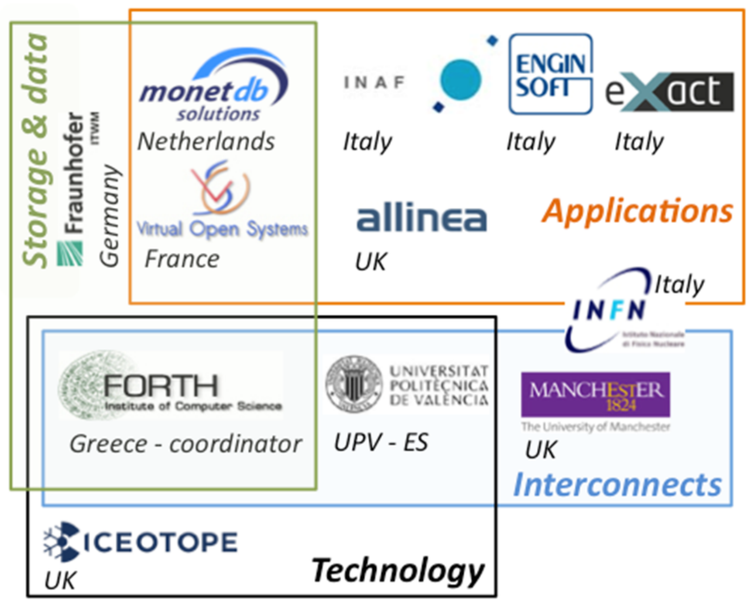
FORTH, Allinea, EngiinSoft, eXact Labs, Fraunhofer, Iceotope, INFN, INAF, MonetDB Solutions, University of Manchester, University of Valenica, Virtual Open Systems

Objectives - Approach

Objectives

- **Interconnects**
  - ☞ Low-latency, unified compute & storage traffic
- **Storage**
  - ☞ Fast, distributed, in-node non-volatile memory
- **Applications**
  - ☞ Real applications: scientific computing, data analytics
- **System Packaging Technology**
  - ☞ Compact, fully-immersed liquid cooling technology

Co-Design Approach



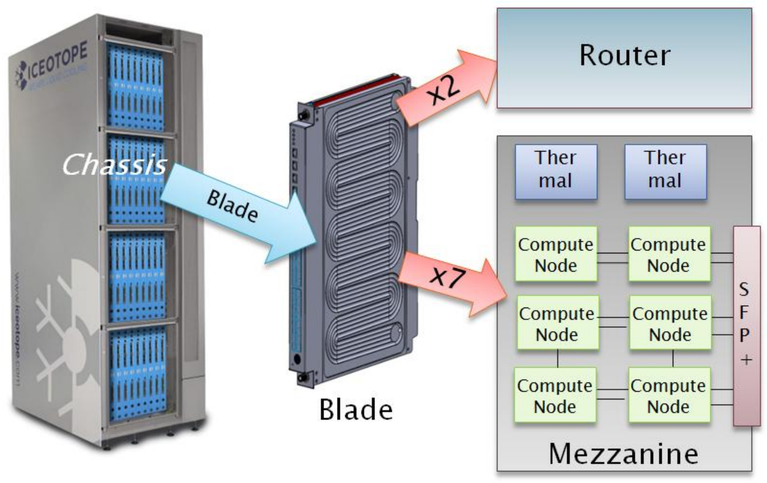
Prototype to be built:

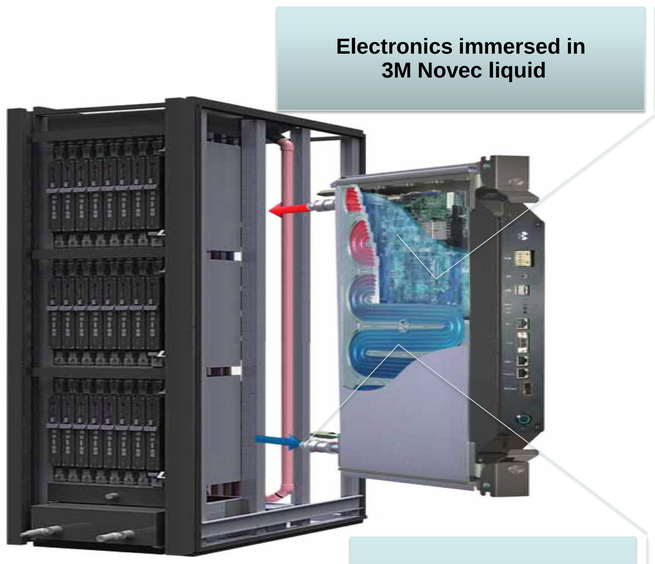
- ✓ 1000+ ARMv8 cores
- ✓ 100+ M.2 SSD's
- ✓ 4TB+ of DDR4
- ✓ UNIMEM Address Space
- ✓ Shared I/O

In collaboration with ExaNoDe & ECOSCALE: FPGA Accelerators

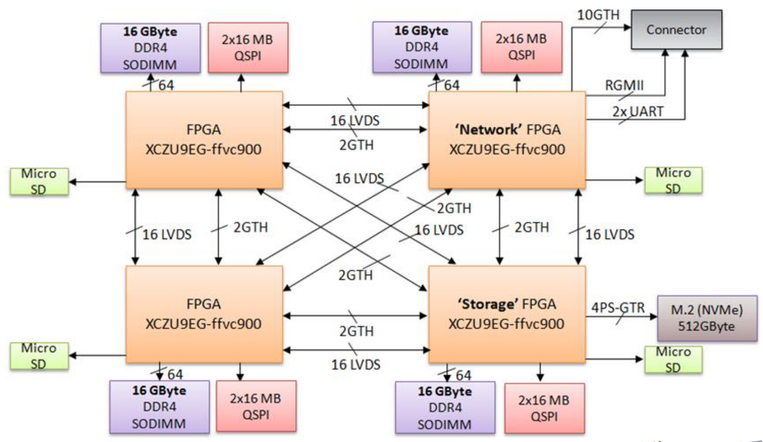
ExaNeSt Rack-Scale Prototype

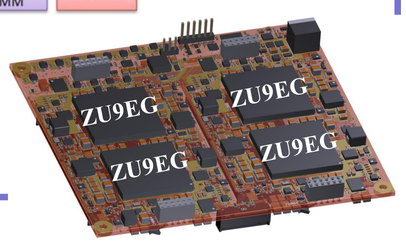
Cabinet – Blade – Mezzanine



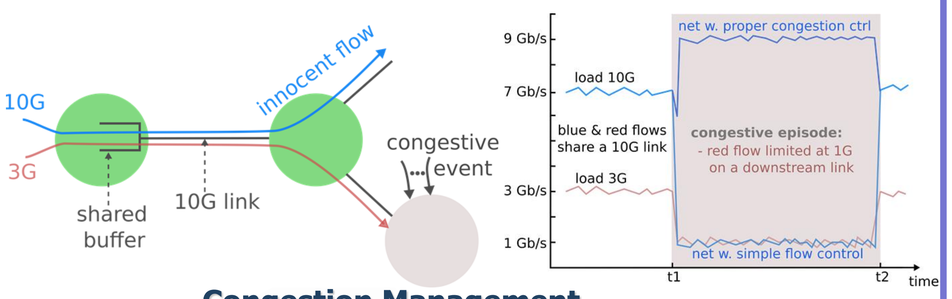


Compute Node (daughterboard)

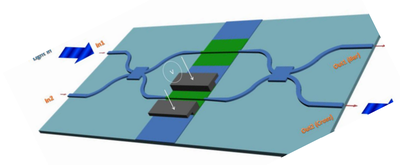




Interconnect



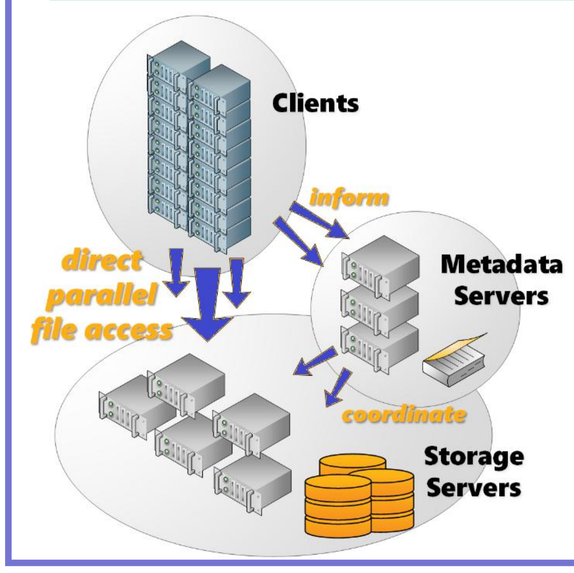
Congestion Management



Silicon Photonics

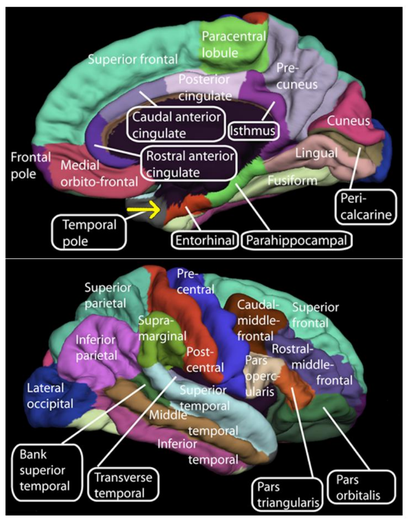
- **Multi-tiered Topologies**
- **Geographical Routing**
- **Low Latency Communication (APEnet)**

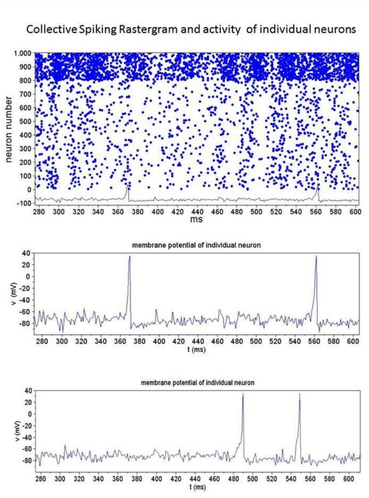
Storage



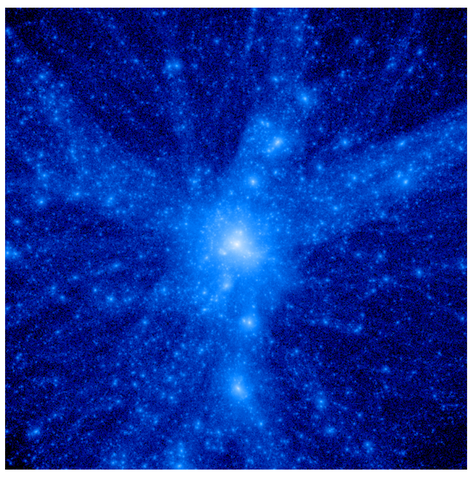
- **UNIMEM - PGAS**
- **BeeGFS Filesystem**
- **HPC Virtualization**
- **Profiling Tools**
- **Checkpointing**
- **Status Monitoring**
- **FPGA Acceleration**

Applications

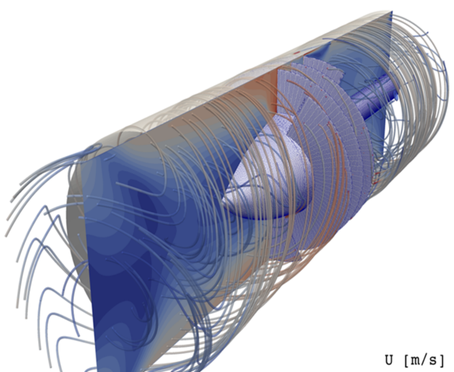




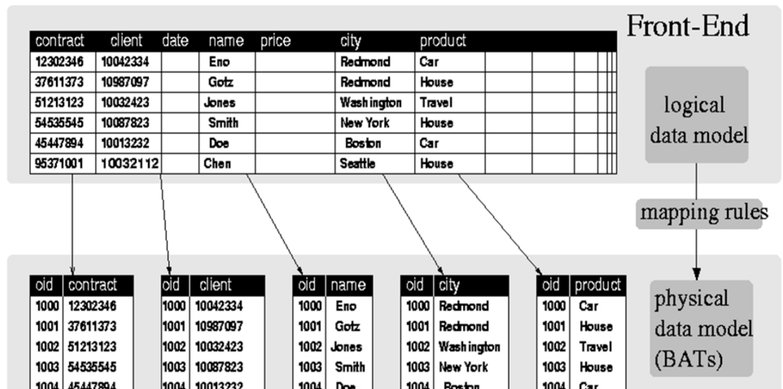
Brain simulation



Simulated Galaxy Cluster



Flow Simulation



In-Memory Data Analytics

THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION HORIZON 2020

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