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Modeling Allocation of Heterogeneous Storage Resources on HPC Systems

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Modeling the Allocation of Heterogeneous Storage Resources on HPC Systems

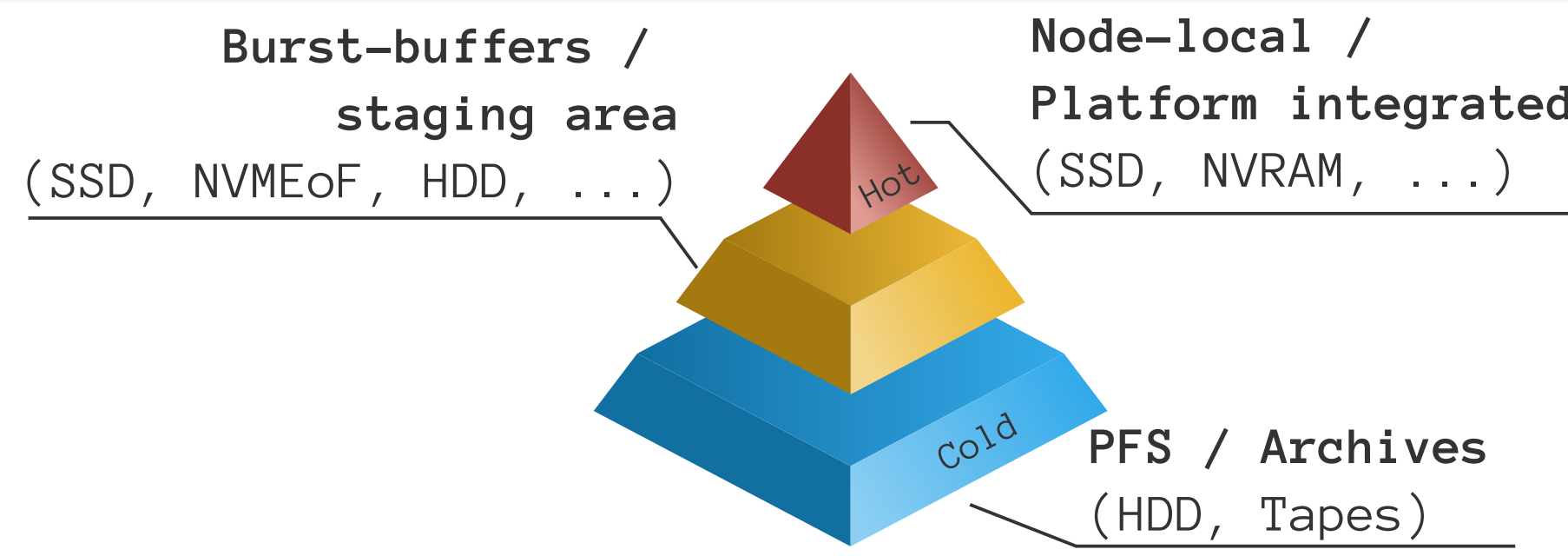
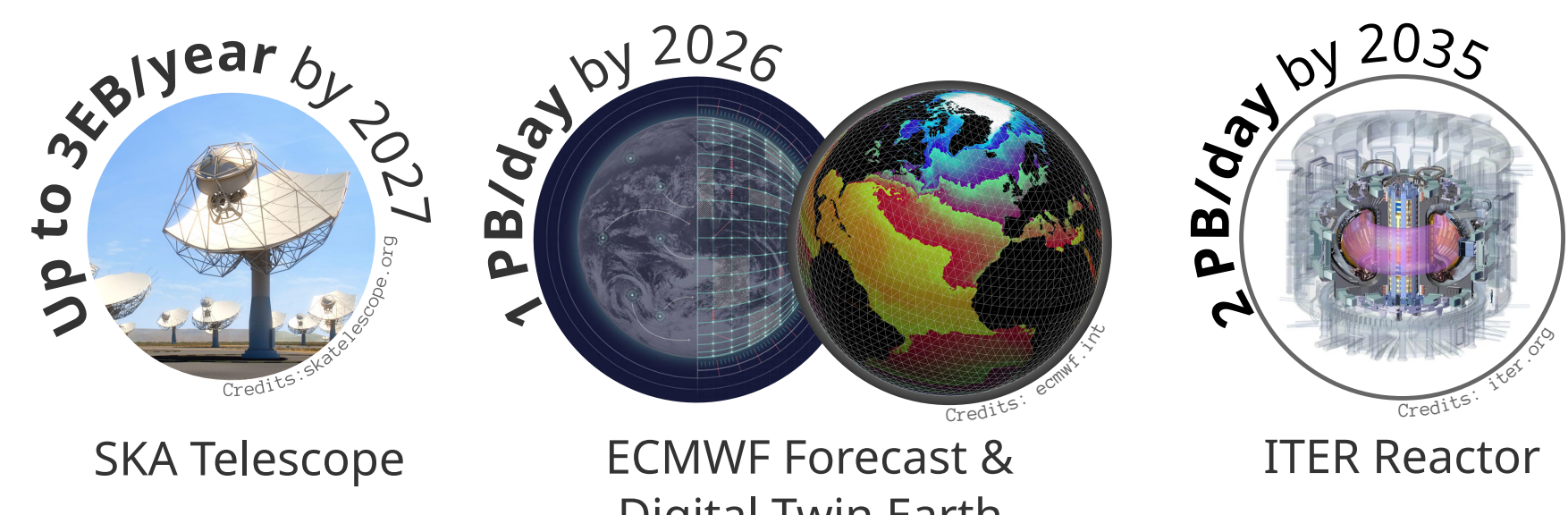
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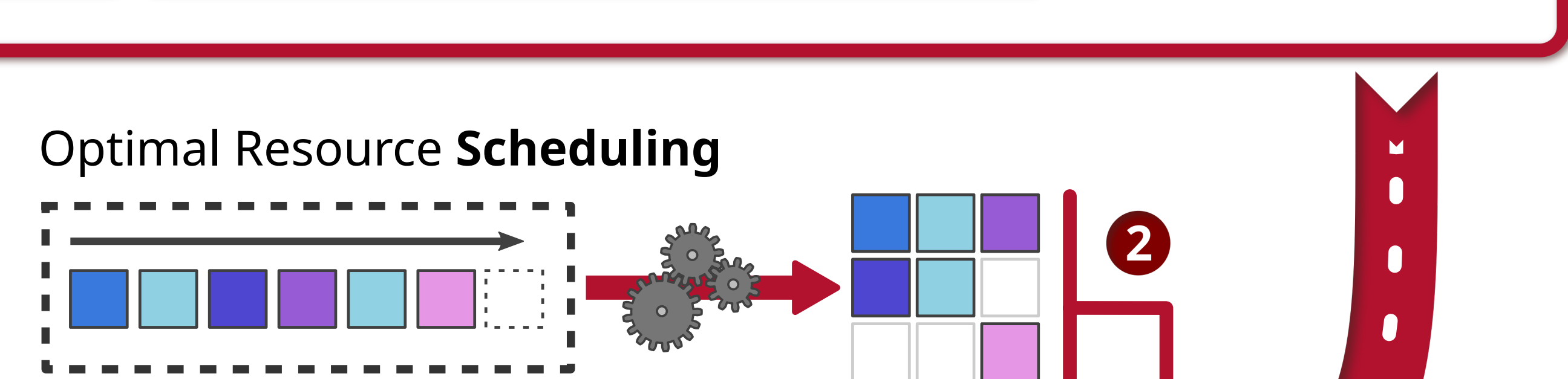
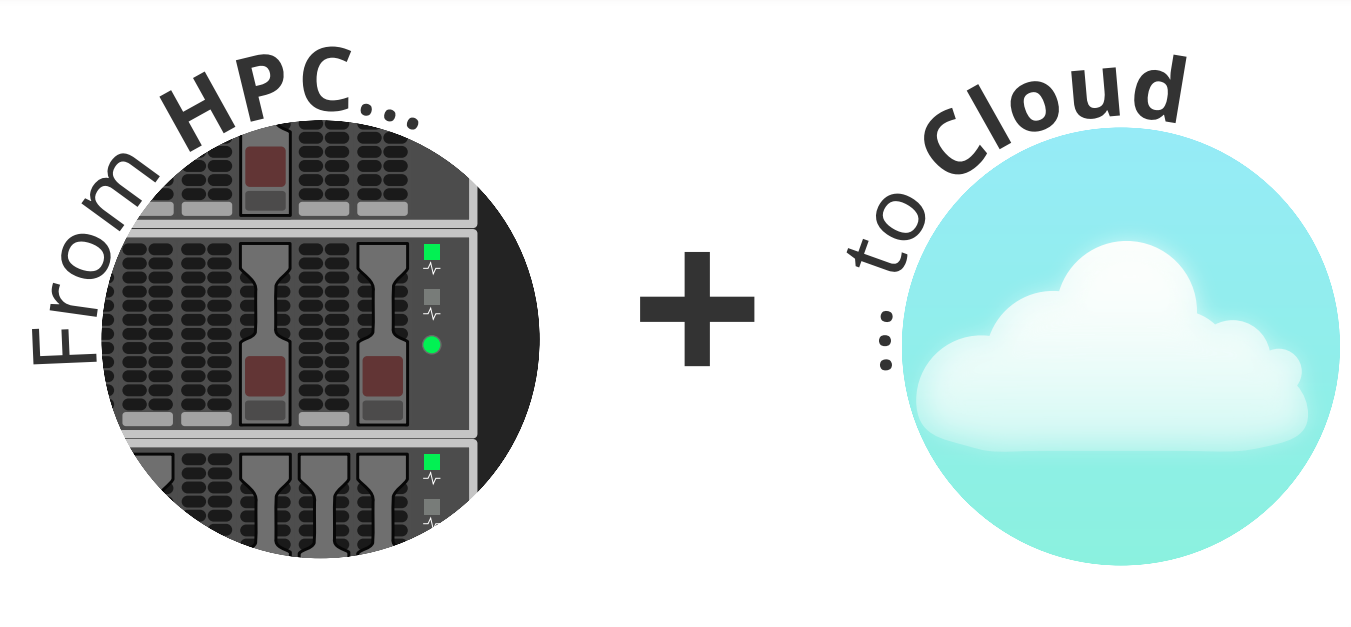
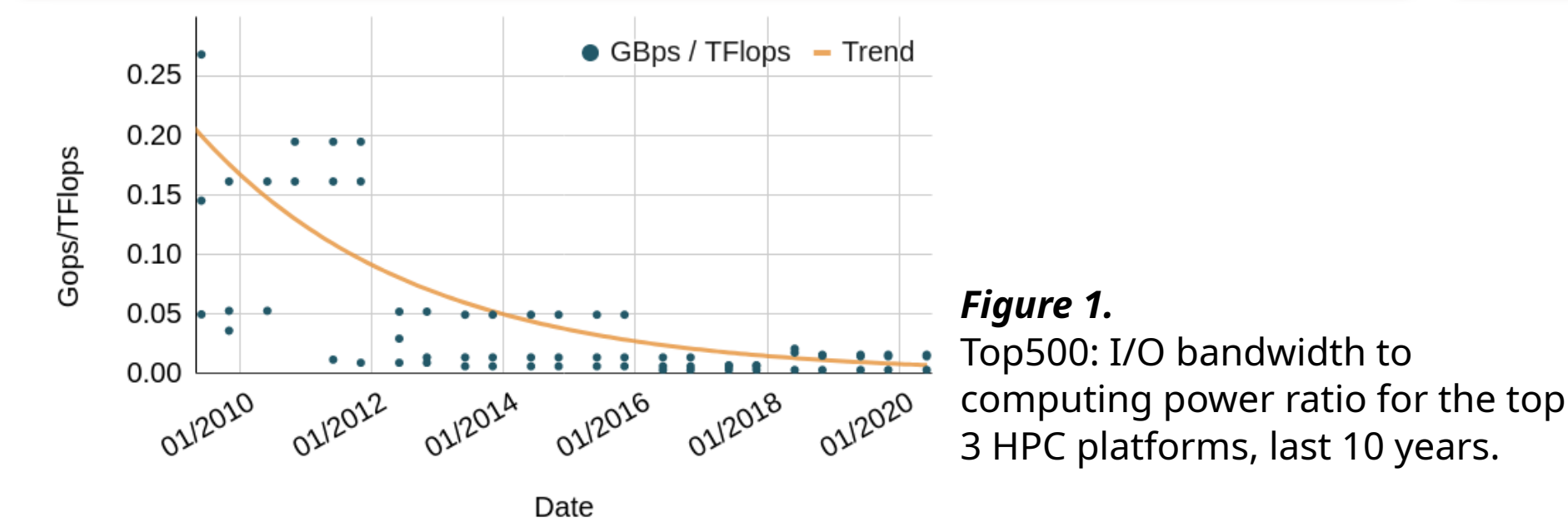
Advisors:
François Tessier - INRIA Rennes
Gabriel Antoniu - INRIA Rennes



CONTEXT AND MOTIVATIONS



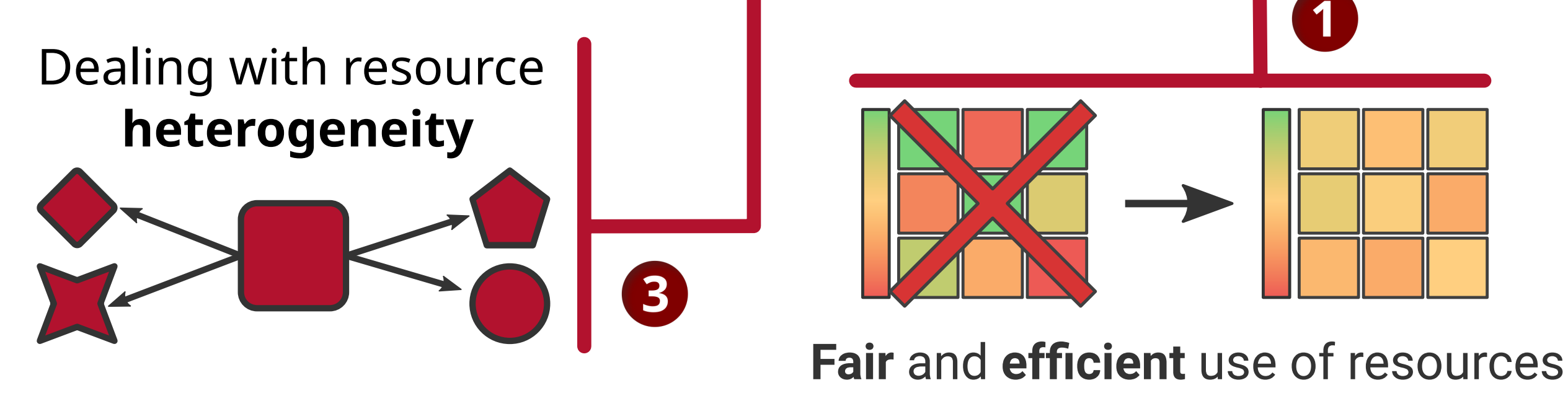
Examples:
Perlmutter 35PB all flash storage at NERSC (2021)
Aurora DAOS Storage with Intel Optane persistent memory at ALCF (2022)
Summit compute nodes with 1.6TB of NVRAM at OLCF (2018)



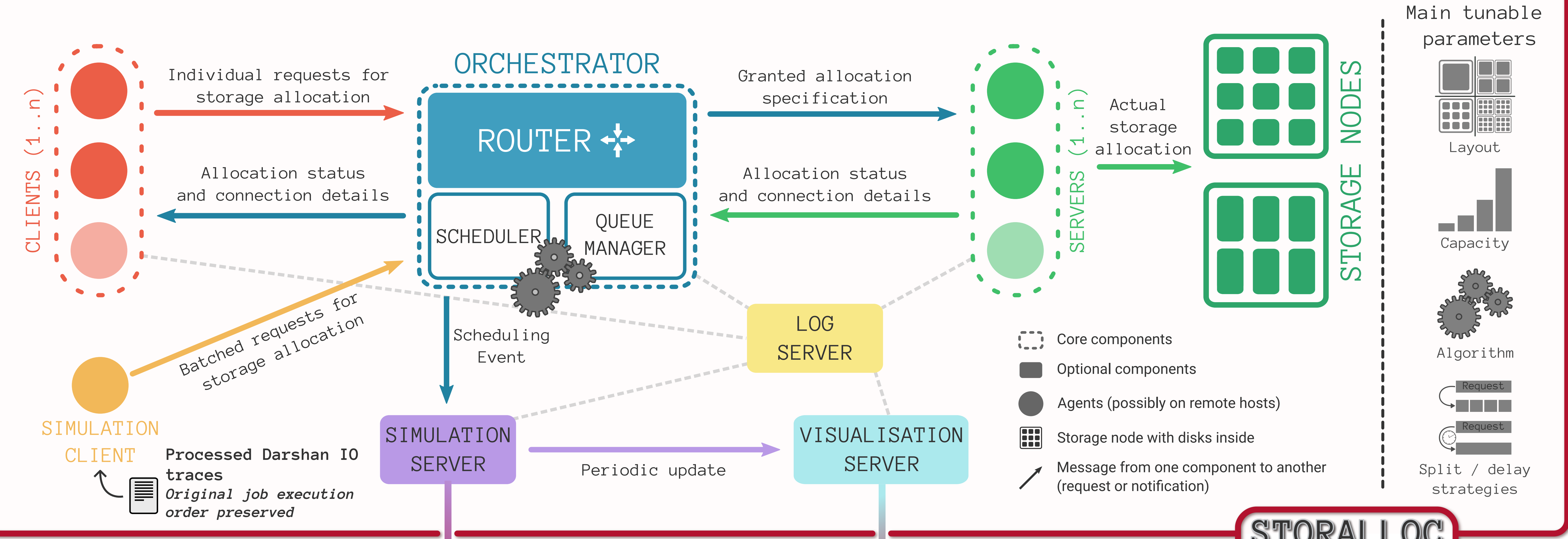
MAIN AXES OF WORK

WHAT DO WE AIM FOR?

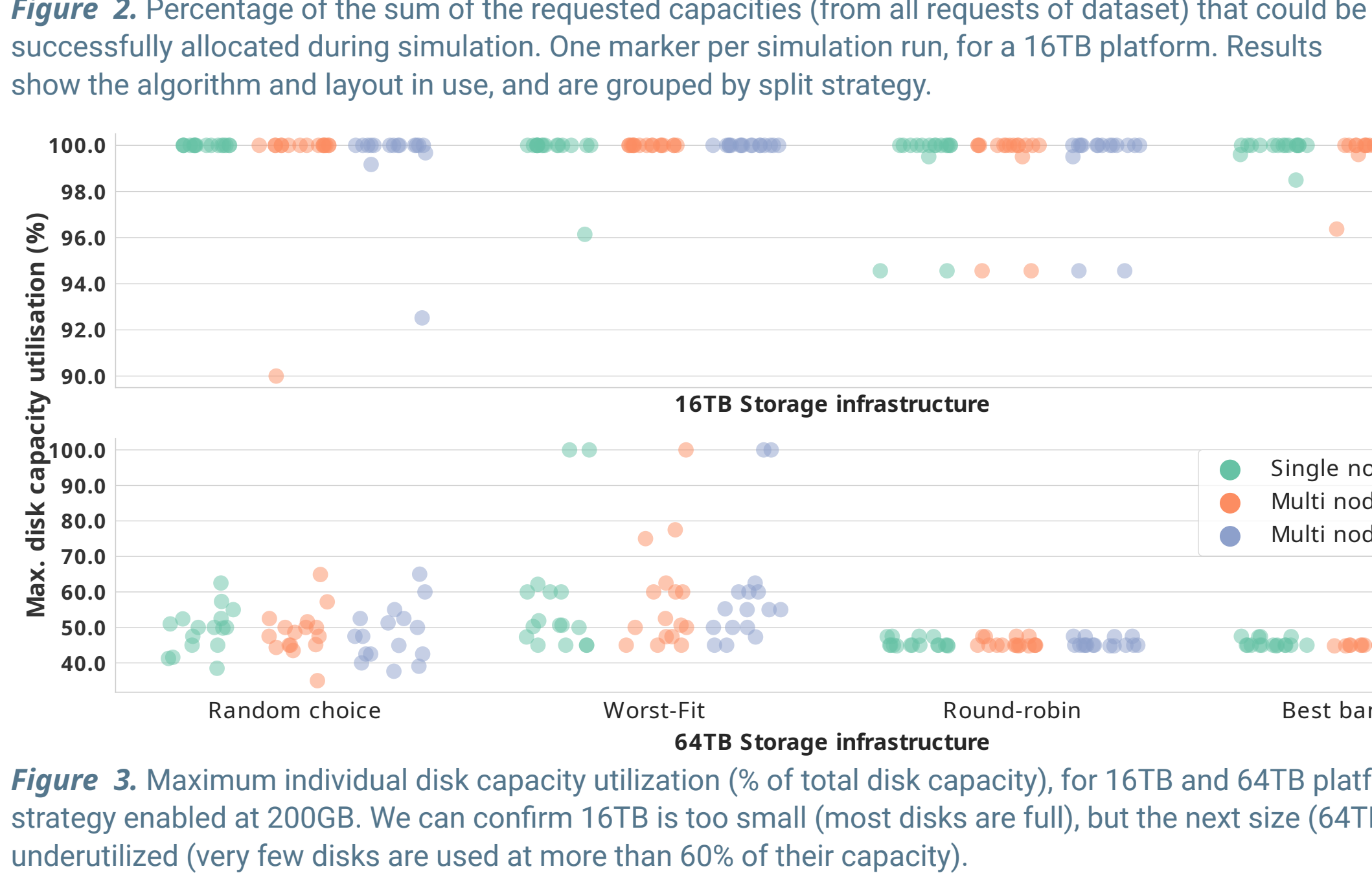
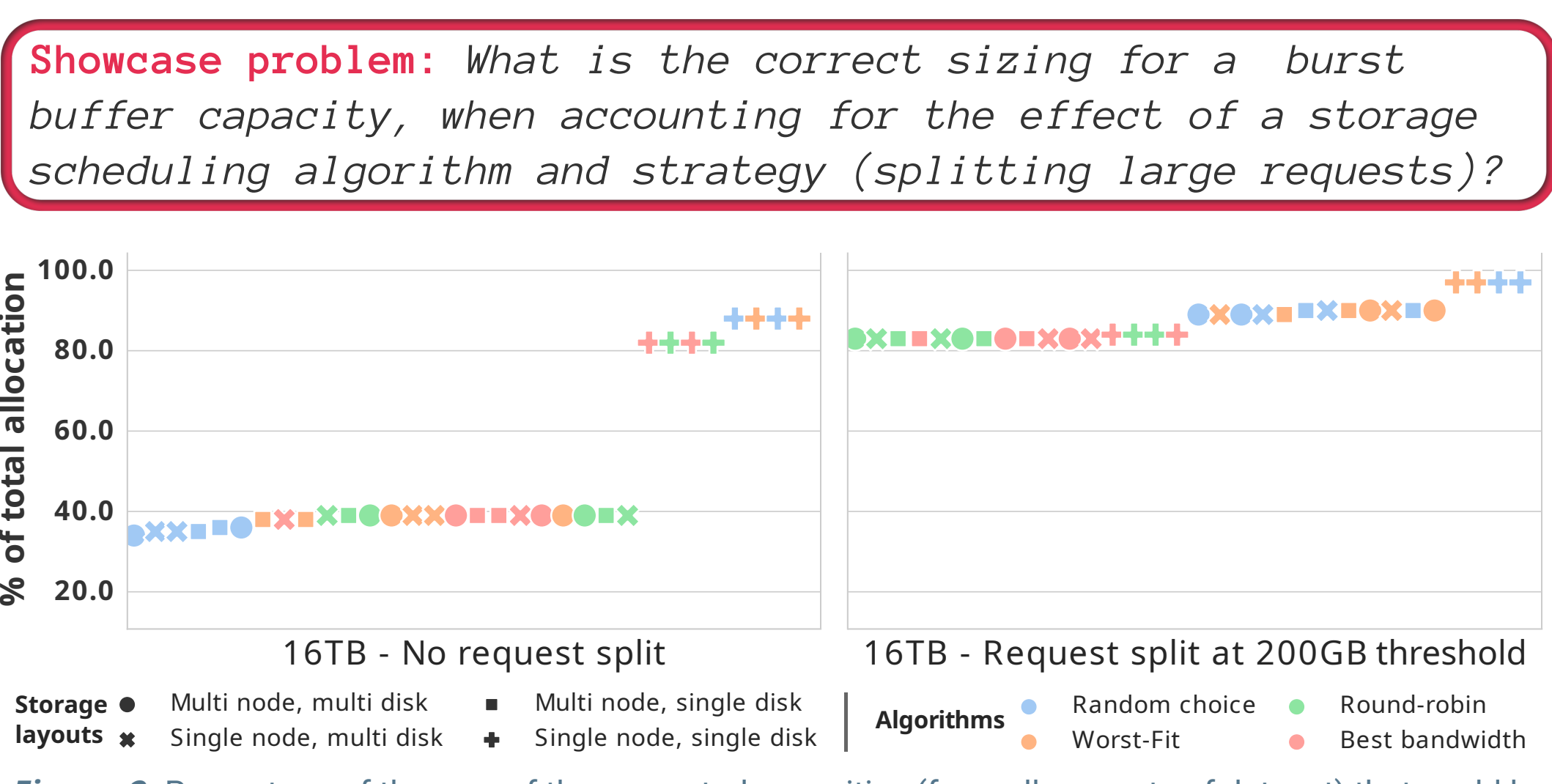
- Design of **scheduling algorithms** for storage allocations
 - **Representation** of heterogeneous storage infrastructures
 - Analysis of **storage related metrics**
- Enable dynamic allocation of heterogeneous storage resources (real or simulated)



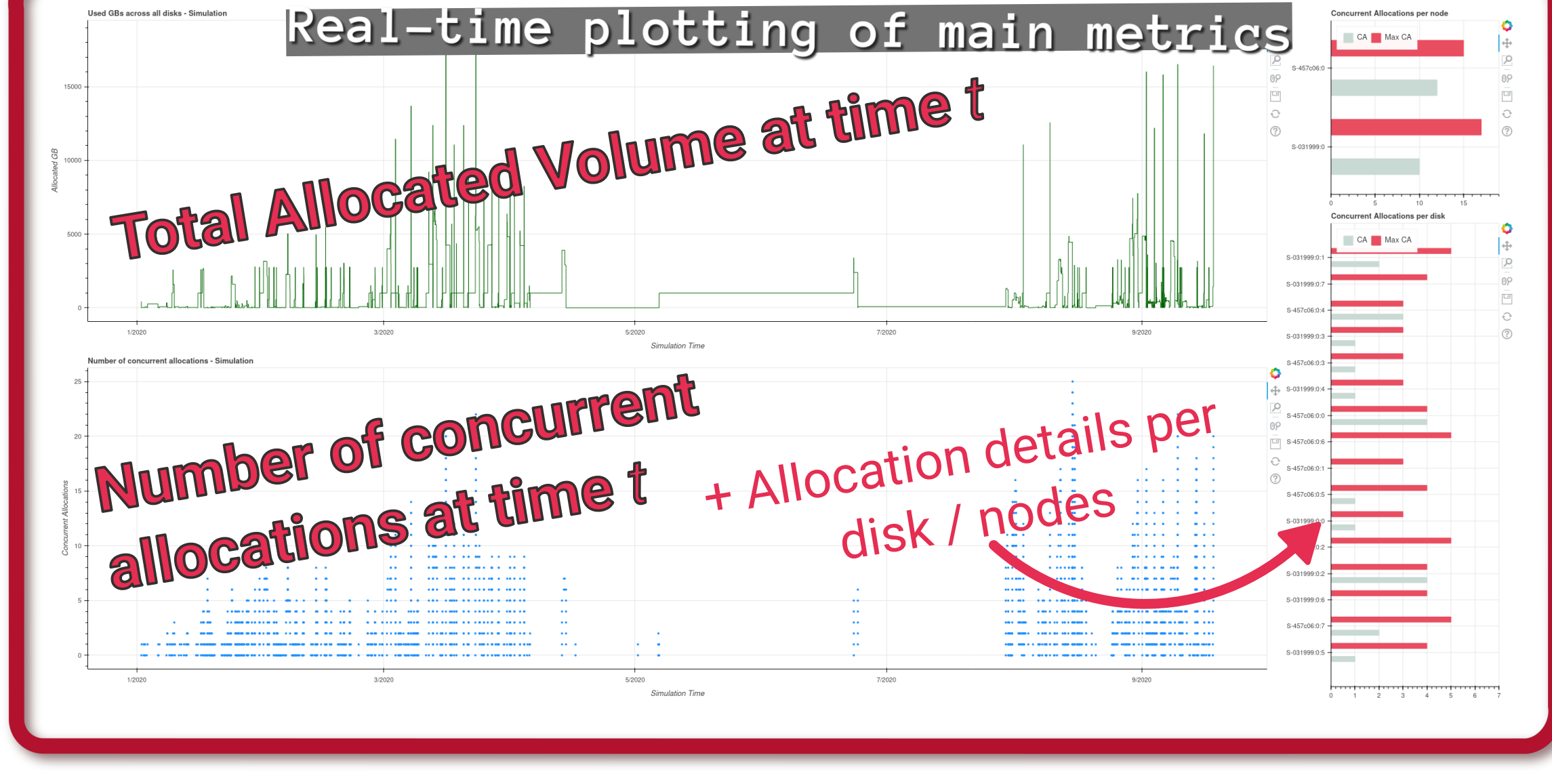
SOLUTION DESIGN



SIMULATION RESULTS

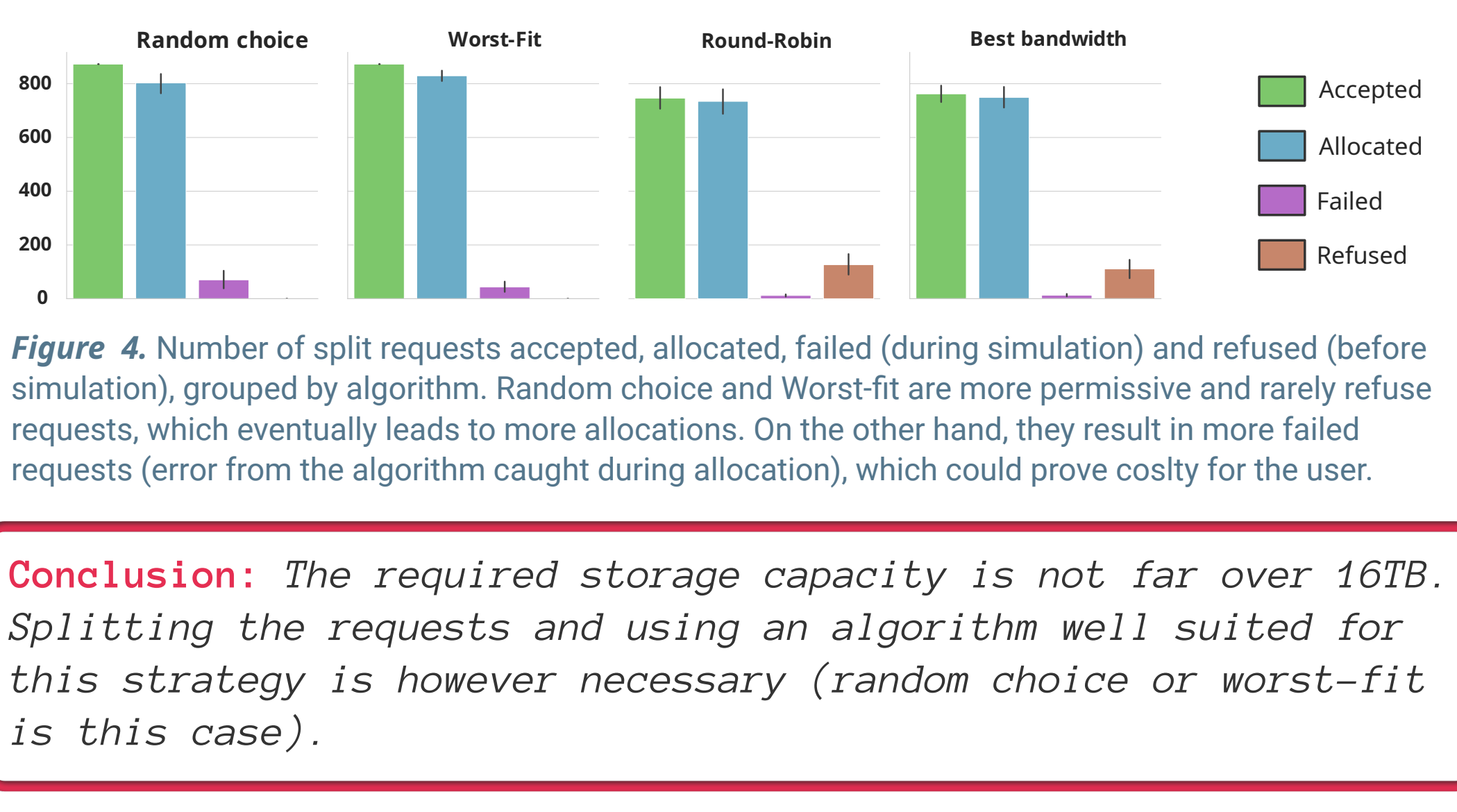


IN SITU VISUALISATION



Storage-aware job scheduler simulator

- Extensible with new algorithms
- Independent components design
- Common messaging interface
- Abstraction of heterogeneous storage hardware



IMPLEMENTATION

- Python3
 - SimPy SimPy (DES simulation)
 - ZMQ ZMQ (Messaging)
 - bokeh bokeh (Real-time plotting)
 - seaborn seaborn (Plotting)
 - Darshan (IO traces)
- GitHub [heptaicie/storalloc](https://github.com/heptaicie/storalloc)