Investigating **Allocation** of **Heterogeneous Storage Resources** on HPC Systems

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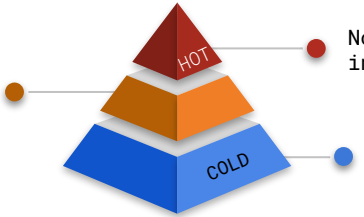
"Overly simplified" Context

Credits: skatelescope.org



Burst-buffers, scratch/staging area (SSD, NVMeoF, HDD, …)

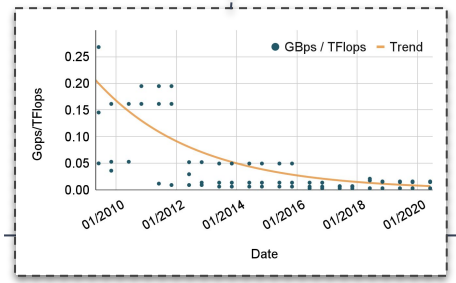
Node-local / Platform integrated (SSD, NVRAM, …)

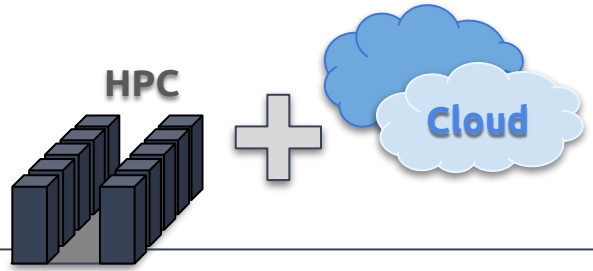
PFS (HDD) / **Tapes**

- **Data deluge** from new large-scale scientific workflows
- ↗ PFlops ↘ TBps

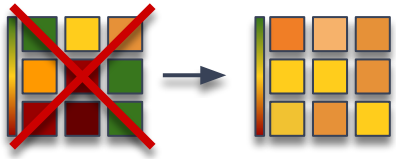
- **Deep storage hierarchy**
- New underlying **technologies**
- **Hybrid platforms / workflows**

↗ Complexity and underutilization

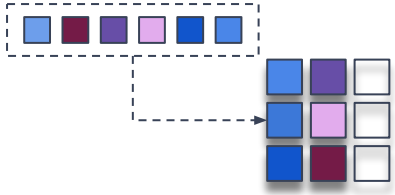




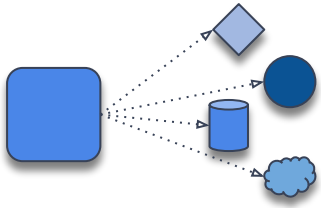
What can we do about it?



Efficient and **fair** use of storage resources



Provisioning data
Scheduling resources



Dealing with **heterogeneity**

- ➔ Design of **scheduling algorithms for storage allocations**
- ➔ Abstraction of **storage infrastructures**
- ➔ **Simulation** of storage allocations

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Heterogeneous:

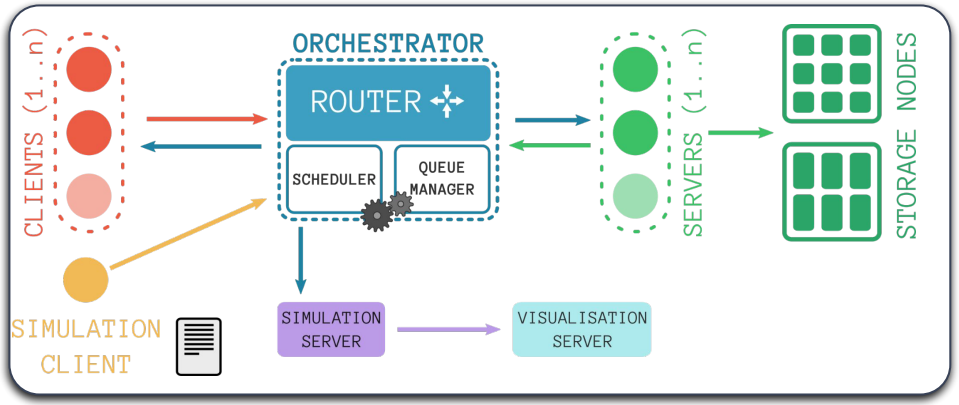
- ➔ **Hardware devices**
- ➔ **Storage tiers**
- ➔ **Platforms**

= Enable **dynamic allocation of storage resources**

→ Towards **malleability** / **elasticity** of storage

Our answer : StorAlloc

Testbed v0.0.1a1-r1+wip



Simulation of storage-aware job scheduler

- ➔ Easy implementation of new scheduling algorithms
- ➔ Representation of diverse storage technologies
- ➔ Detailed simulation metrics

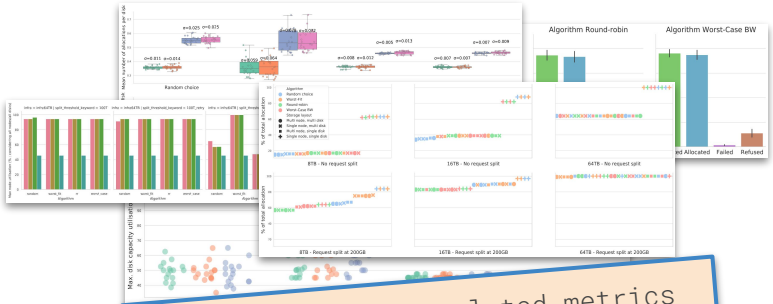
In situ visualisation of resource usage!

python

- How ? -

- Python3
- DES library
- Darshan IO traces input
- Coffee

bokeh SimPy ØMQ



Detailed storage-related metrics for post-simulation analysis!

Inria

And then ?

🚧 Room for **improvement**…

- **Getting rid of DES simulation ;** Integration with state of the art simulation framework ?
- Support for **hybrid platforms**.

- **Turn it into a real scheduler** that could be tested at scale.
- Buy more **coffee** ☕.

📜 **Paper submitted to Heteropar 2022**
"StorAlloc: A Simulator for Job Scheduling on Heterogeneous Storage Resources" **(on HAL)**

🐱 **Github repository:**
https://github.com/hephtaicie/storalloc

📧 **Contacts:**
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😀 Thanks to François Trahay and the Per3s committee for giving me a chance to present my work for the first time !

📊 Find me in the **poster session** right after this talk for all questions :)