Data Enclaves for Scientific Computing

Ayaz Akram (yazakram@ucdavis.edu),
Venkatesh Akella, Jason Lowe-Power, and Sean Peisert

UC DAVIS UNIVERSITY OF CALIFORNIA

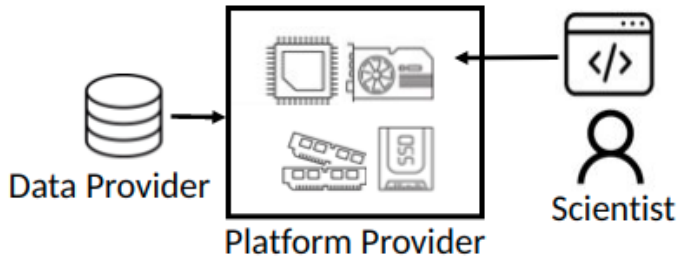
BERKELEY LAB

Problem

How to secure **data in use** at HPC centers?

- without significant performance degradation
- without large application changes
- supporting the sensor, edge, and HPC facility

Threat Model in HPC Centers



Trusted Execution Environments (TEEs) can help!

However, existing TEEs

- don't span across nodes, accelerators, or the edge
- incur high slowdowns for large data workloads
- have unsuitable programming model for HPC

Data Centric TEE -- DESC

We propose DESC that

- spans sensor → edge → HPC facility nodes
- focuses on data rather than compute
- requires minimal app changes
- does not require a full OS in the TCB