EXIOS
Unified Exascale I/O System

Topics: Data management and Exploration, Programming

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Aims of the Project

Mission

Developing a novel I/O access paradigm to utilize exascale storage\(^1\)

Goals

- Provide semantical & domain-specific access
- Develop a unified I/O architecture
- Prototype an intelligent storage system
- Utilize heterogeneous I/O landscapes

\(^1\)Massive parallelism and highest data volume
Semantical & Domain-Specific Access

Providing a convenient interface

- Close to application semantics
- Natural data exploration
  - Direct support for complex inter-“file” I/O access
  - Support for different views based on scientific metadata
⇒ Capabilities beyond POSIX and hierarchical namespace

Enhanced storage system capabilities

- Native support for scientific data
- Integration of scientific metadata
Unified I/O Architecture

Unification into a modular architecture

- Fuse existing storage technologies
- Merge intermediate I/O layers

**Figure:** From layered architecture towards a modular architecture
Prototype an Intelligent Storage System

Intelligent storage

- Smart data placement
  - Replication / transformation / migration based on access patterns
- Performance-aware
  - Embedded performance estimation
  - Use the combination of storage technologies fitting best
- Query optimization

Development approach for the prototype

- Implementation: Leveraging existing solutions
- Climate science as the initial application driver
- Legacy support and ported applications / post-processing tools
EXIOS enables superior performance by

- Providing a better abstraction to scientific data
- Integrating intelligence into the storage
- Exploiting available information
- Combining expertise into a unified architecture
Community Effort

The acceptance of a novel access paradigm depends on the community!

- Integral collaborative approach & dissemination!
  - Initial collaboration: **EIOW/EOFS** and **seven SPPEXA projects**

![Collaboration and Dissemination Diagram]