

ADIOS: Adaptable, Metadata Rich I/O Methods for Portable High Performance I/O



Jay Lofstead, Hasan Abbasi, Matthew Wolf, Fang Zheng, Karsten Schwan
CERCS/Georgia Institute of Technology
 Scott Klasky, Chen Jin, Steve Hodson
Oak Ridge National Laboratory



Motivating Examples

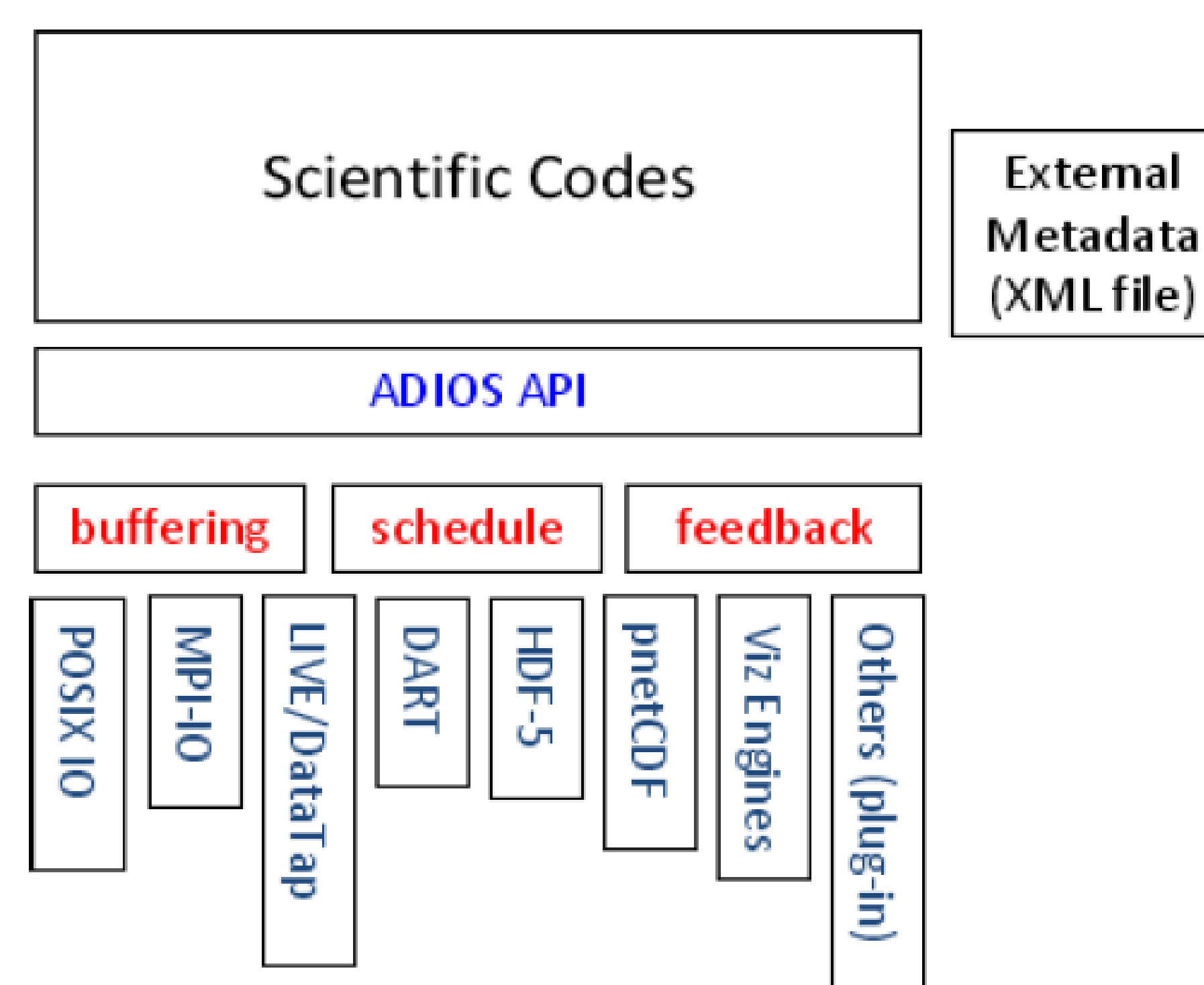
- **GTC (Fusion simulation):**
 - Generate tens of Tera-Bytes of data in a typical production run
 - Source code has changed 8 times for optimizing I/O
- **Chimera (Supernova simulation):**
 - parallel HDF5 delivers poor performance: ~20MB/sec

Project Goals

- Simple, Uniform API for I/O in scientific code
- Rich Metadata annotation
- Capture best practice in I/O for target platform
- Runtime selection of I/O methods without changing source code
- Portable High performance I/O across leading high-end computing platforms

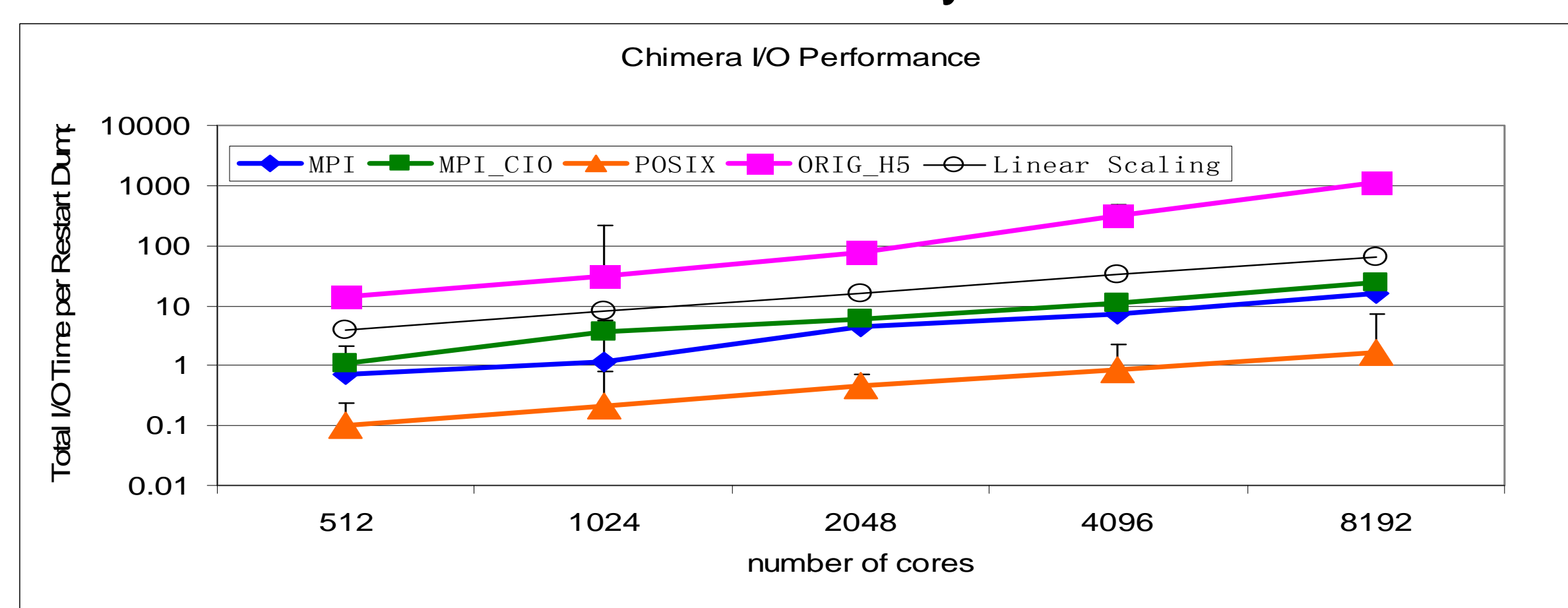
ADIOS: Adaptable Input/Output System

- A simple set of API for reading and writing variables, arrays, and meshes: open, write/read, close
- An external XML file for metadata annotation
- Well-tuned transport methods (POSIX, MPI IO, pHDF5, Datatap, DART, etc.)
- Selection of I/O methods by editing XML file – no need to change and re-compile source code!
- Free hooks into visualization and workflow systems through the data flows
- Built-in buffering, tagging, scheduling to achieve high performance
- BP file : Portable, binary file format; easy to convert to other formats (HDF5, NetCDF)



Performance Evaluation

Chimera on ORNL's Cray XT4



GTC on ORNL's Cray XT4

