ADIOS

Middleware for a data intensive world

Update for NSF HEC FSIO

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Collaborators

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Componentization

- Data format and layout
- Data output
- Data services

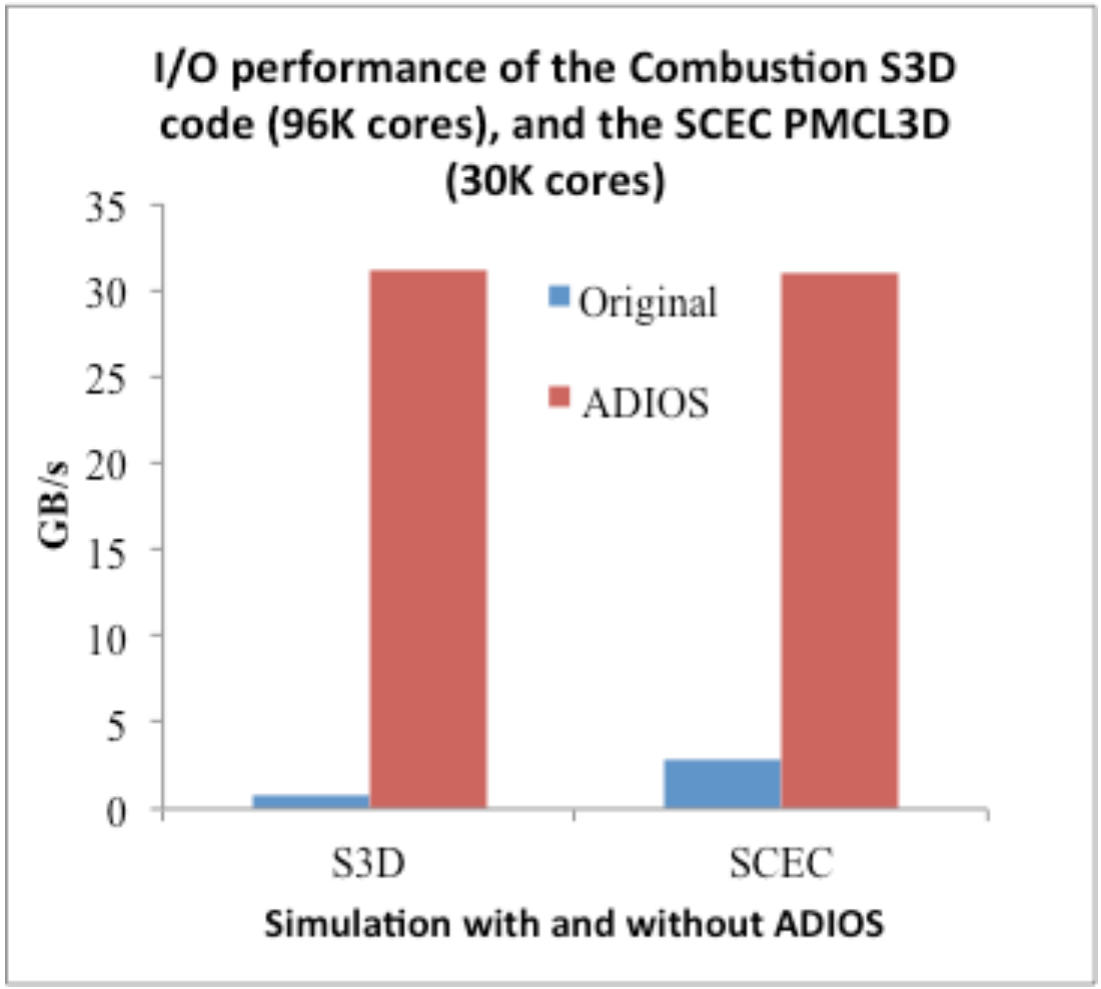
Some Notable Applications

- Fusion
  - XGC1
  - GTC
  - GTS
  - GTC-P
  - Pixie3D
  - M3D
  - GEM
- Combustion
  - S3D
- Relativity
  - PAMR
- Nuclear Physics
  - Nuclear Physics
- Astrophysics
  - Chimera
  - Flash

Update Highlights

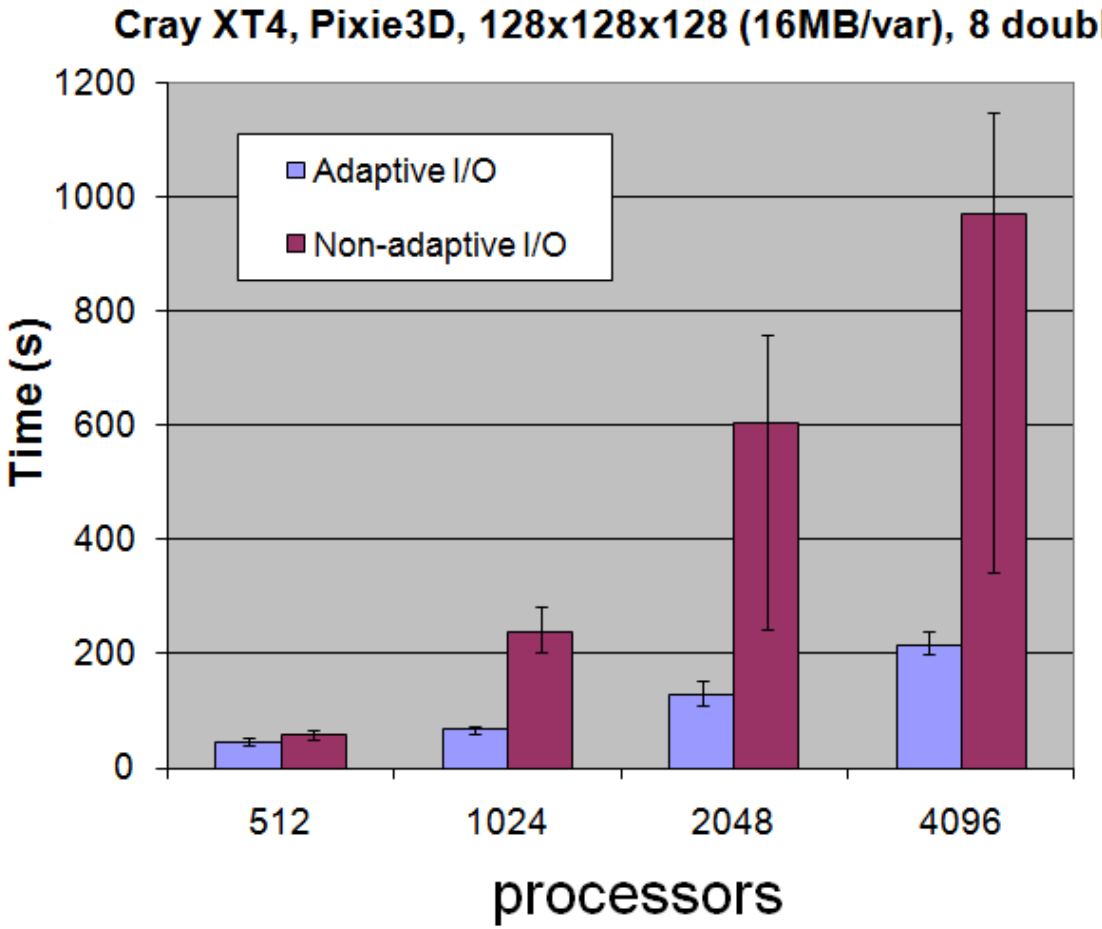
- Write optimizations
- Improving data organization for reads
- New staging advances

Write Improvements



- Throughput improvements

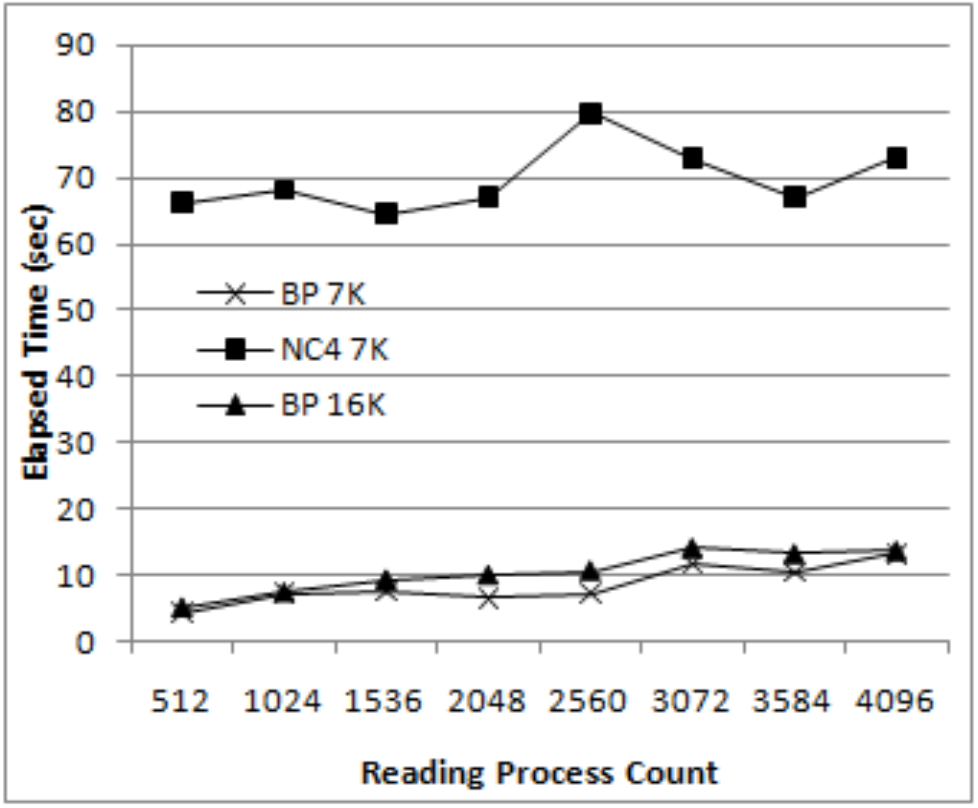
Write Improvements

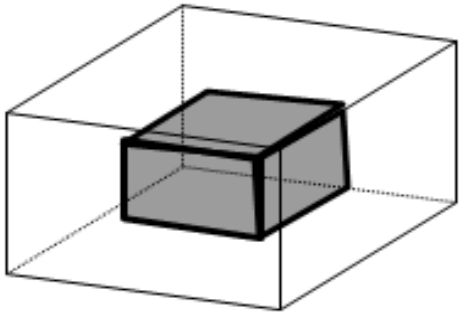


- Variability Improvement

Jay Lofstead, Fang Zheng, Qing Liu, Scott Klasky, Ron Oldfield, Todd Kordenbrock, Karsten Schwan, Matthew Wolf. "Managing Variability in the IO Performance of Petascale Storage Systems". in SC 2010

Addressing Reads

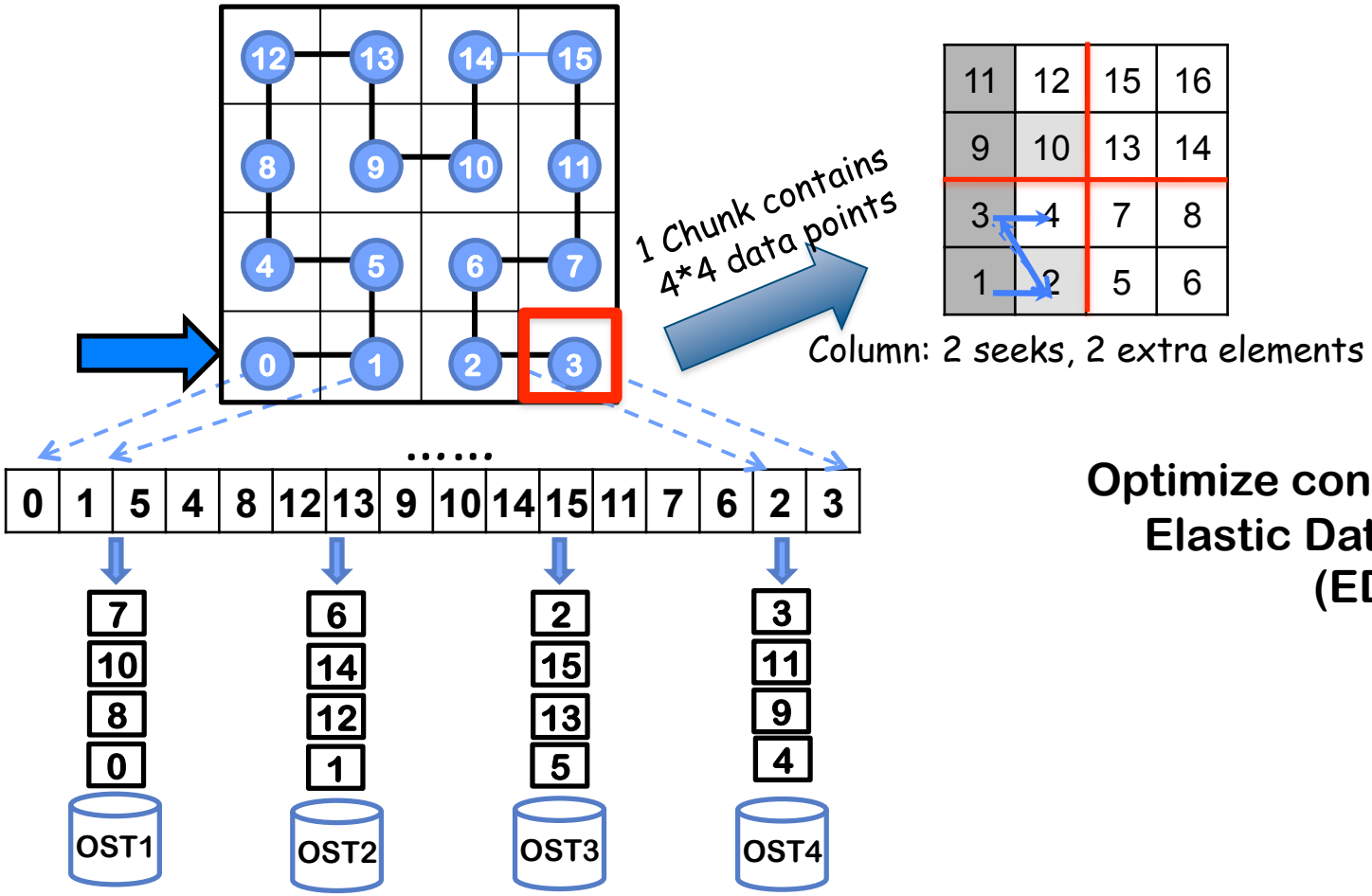




Address reads by using the BP log based file format

Jay Lofsetad, Milo Polte, Garth Gibson, Scott Klasky, Karsten Schwan, Ron Oldfield, Matthew Wolf, "Six Degrees of Scientific Data: Reading Patterns for Extreme Scale Science IO" in the Proceedings of HPDC'11

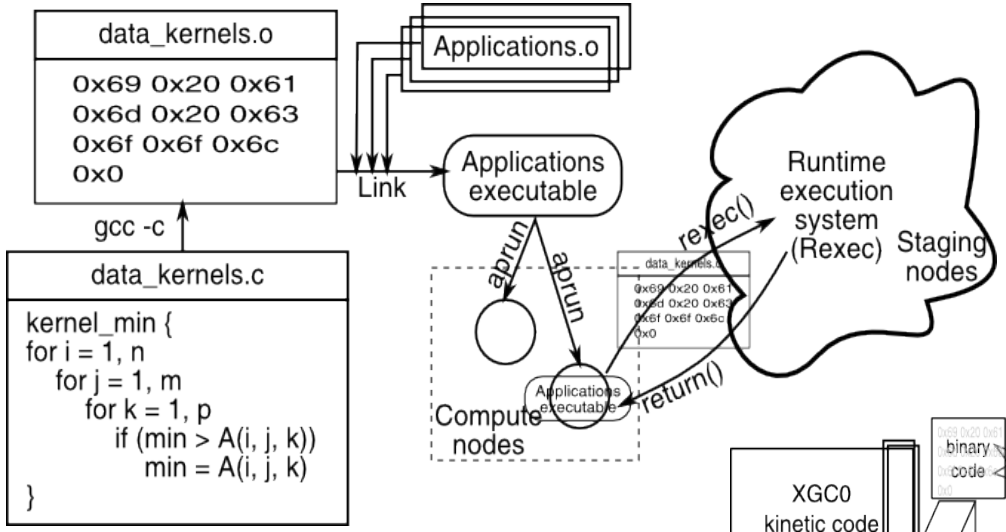
Addressing Reads



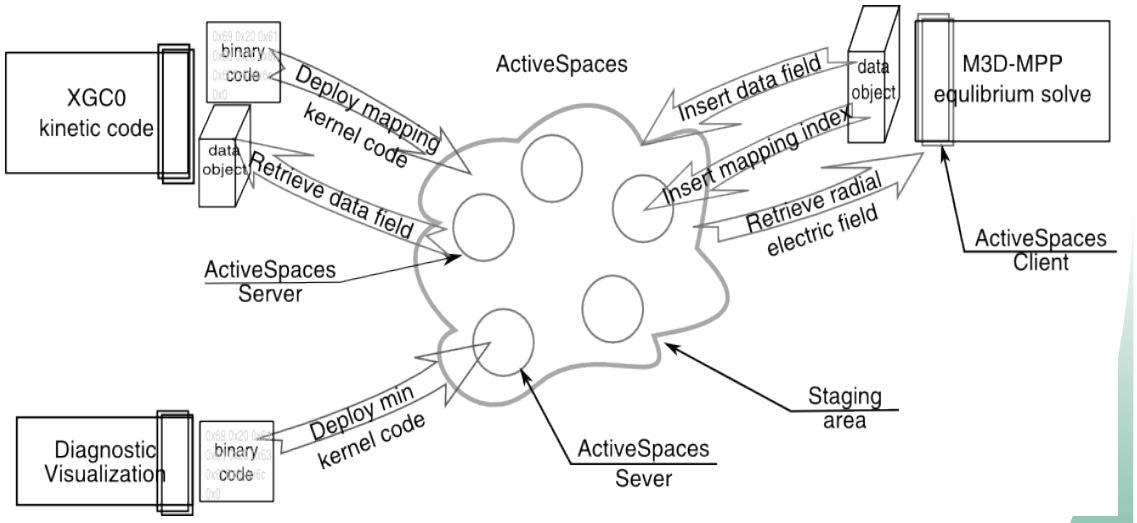
Optimize concurrency with Elastic Data Ordering (EDO)

Tian,Y., Klasky,S., Abbasi,H., Lofstead,J., Grout,R., Podhorszki,N., Liu,Q., Wang,Y., Yu,W. (2011). "EDO: Improving Read Performance for Scientific Applications Through Elastic Data Organization", to be presented at Cluster'11

Going Forward with Staging

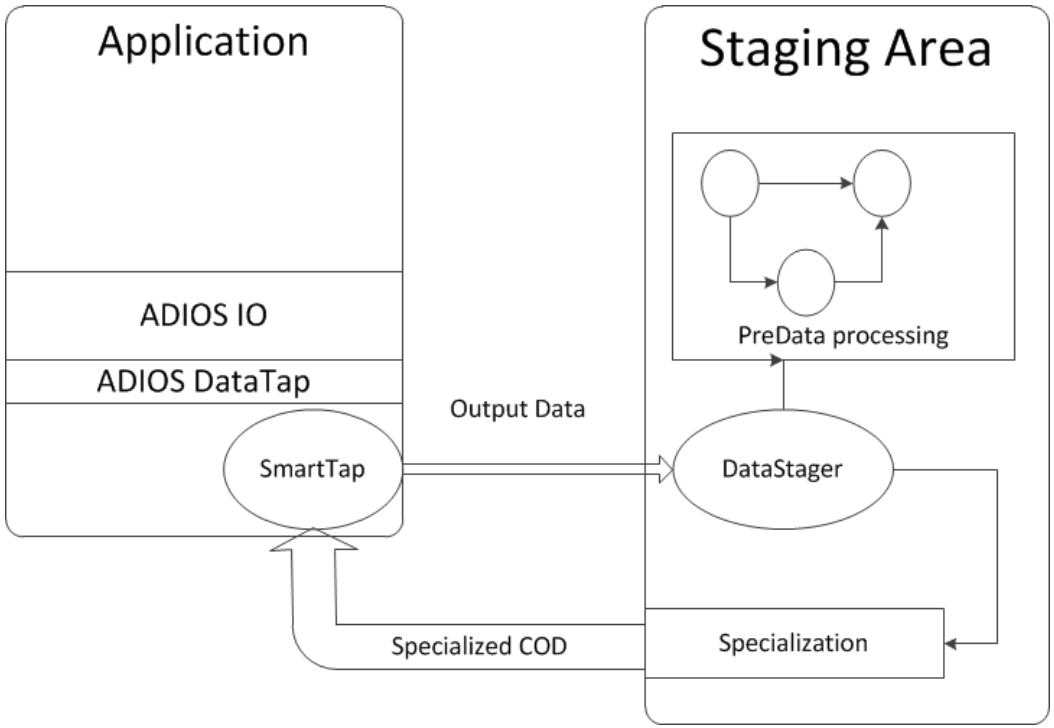


ActiveSpaces: Transparently moving application functionality to staging area



C. Docan, J. Cummings, S. Klasky, M. Parashar, "Moving the Code to the Data – Dynamic Code Deployment using ActiveSpaces", IPDPS 2011.

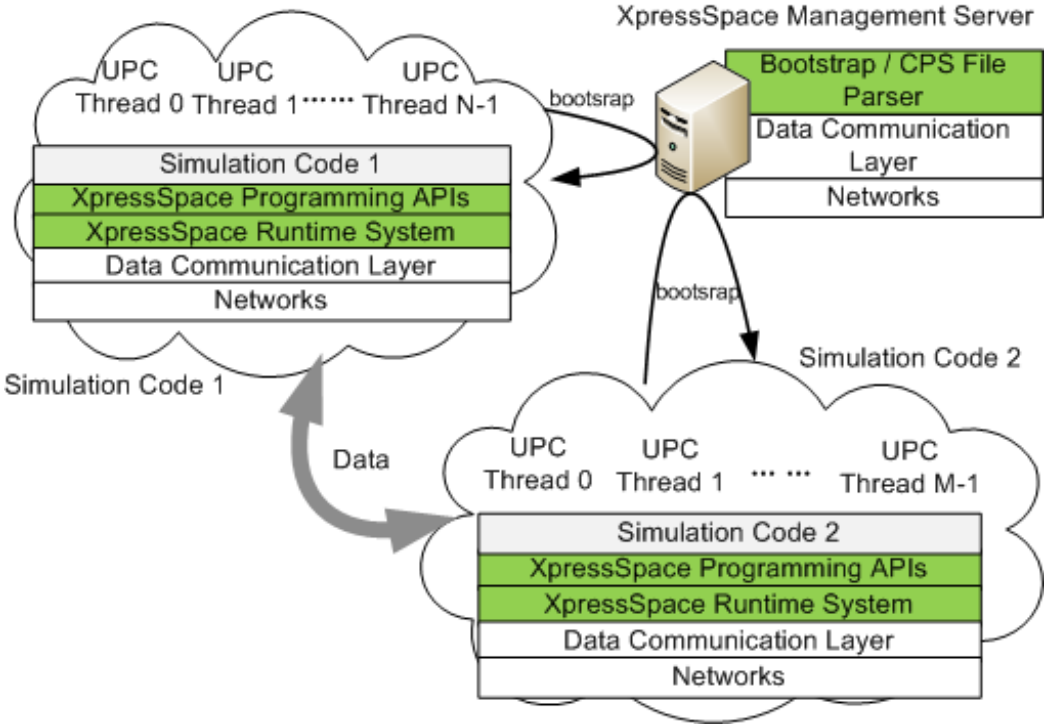
Going Forward with Staging

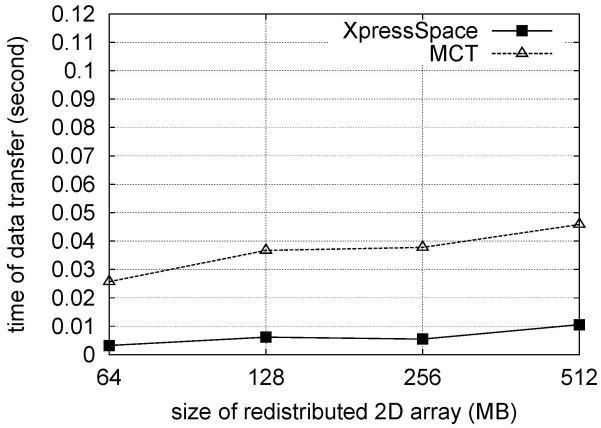


JITStager: Moving portions of the I/O pipeline to the application

H. Abbasi, G. Eisenhauer, S. Klasky, K. Schwan, M. Wolf. "Just In Time: Adding Value to IO Pipelines of High Performance Applications with JITStaging, HPDC 2011.

Going Forward with Staging





XpressSpace: Couple applications and do it fast and painlessly

F. Zhang, C. Docan, M. Parashar and S. Kalasky. "Enabling Multi-Physics Coupled Simulations within the PGAS Programming Framework". In CCGrid 2011

Other Updates

- In-situ indexing
  - J. Kim, H. Abbasi, C. Docan, S. Klasky, Q. Liu, N. Podhorszki, A. Shoshani, K. Wu, "Parallel In Situ Indexing for Data-Intensive Computing", LDAV 2011
- Feature Extraction
  - K. Wu, R. Sinha, C. Jones, S. Ethier, S. Klasky, K. L. Ma, A. Shoshani, M. Winslett, "Finding Regions of Interest on Toroidal Meshes", to appear in Journal of Computational Science and Discovery, 2011
- Compression
  - S. Lakshminarasimhan, N. Shah, Stephane Ethier, Scott Klasky, Rob Latham, Rob Ross, Nagiza F. Samatova, "Compressing the Incompressible with ISABELA: In Situ Reduction of Spatio-Temporal Data", Europar 2011.
- Performance Analysis
  - J. Logan, S. Klasky, H. Abbasi, et al., "Skel: generative software for producing I/O skeletal applications", submitted to Workshop on D^3Science, 2011.