Extreme Scale Resilience Home

The Argonne National Laboratory/MCS/Extreme Scale Resilience group covers fault tolerance and resilience for HPC simulations and data analytics at extreme scale

Lead: Franck Cappello, ANL

Topics and people

- **Multi-level Checkpoint / Restart**: Bogdan Nicolae, Leonardo Bautista Gomez (Postdoc now at BSC), Franck Cappello
  - Main project: VeloC (ECP)
- **Lossy compression**, Sheng Di, Franck Cappello.
  - Main projects: EZ (ECP), CODAR (ECP)
- **Silent soft errors/data corruptions detectors and compression**: Sheng Di, Franck Cappello
  - Main project: Aletheia (NSF)
- **Failure characterization and prediction**: Sheng Di, Rinku Gupta, Franck Cappello
  - Main project: Catalog (DOE ASCR)
- **Failure modeling and fault tolerance optimizations**: Sheng Di
- **Fault tolerant protocols**: F. Cappello

Main collaborators: Marc Snir (ANL and UIUC), Jon Calhoun (Clemson), Bill Kramer (UIUC), Bogdan Nicolae (IBM Dublin), Thomas Ropars (EPFL), Amina Guermouche (UVSQ), Frederic Vivien (Inria), Yves Robert (LIP), Satoshi Matsuoka (Titech), Mitsuhisa Sato (U. Tsukuba), Osman Unsal (BSC), Leonardo Bautista Gomez (BSC)

Tools and software

- **SZ (Error Bounded Lossy Compressor for floating point data sets)**
- **Zchecker (An lossy data compression assessment tool)**
- **AID (Adaptive Impact-Driven Detection) library for SDC detection**
- **FTI** (operational prototype): Fault Tolerance Interface for multi-level checkpoint/restart (in memory checkpointing, checkpointing on remote nodes, erasure encoding, etc.)
- **HELO/ELSA** (operational prototypes): System event clustering and Failure predictor
- **MPIICH-HFT** (prototype under development): Fault tolerant MPI with hierarchical fault tolerant protocol

Main collaborative activities

- **Illinois-Inria-ANL-BSC-JSC-Riken-UTK Joint Laboratory on Petascale Computing**

Recent Publications (from 2013)

8. S. Di, H. Guo, E. Pershey, M. Snir, F. Cappello, **Characterizing and Understanding HPC Job Failures over The 2k-day Life of IBM BlueGene/Q System**, IEEE/IFIP 49th International Conference on Dependable Systems and Networks (IEEE DSN19), Portland, USA, 2019.


