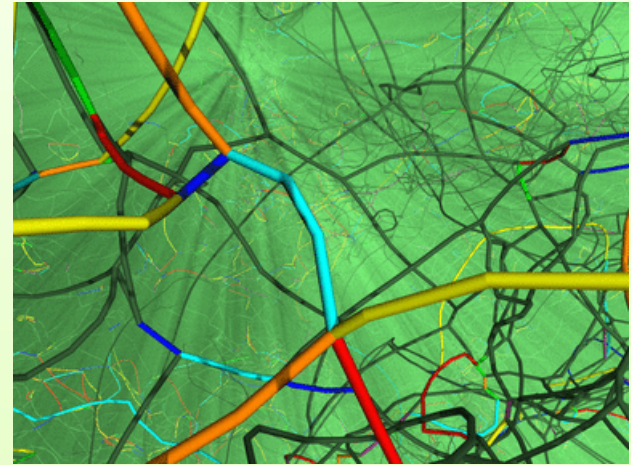# Coming Soon | A Toolset to Fight Non-deterministic Bugs at Scale

Dong H. Ahn, Chris Chambreau, Ignacio Laguna, Greg Lee, Kento Sato, and Martin Schulz (LLNL)
Simone Atzeni, Ganesh Gopalakrishnan and Zvonimir Ramarić (Univ. of Utah)
Joachim Protze (RWTH Aachen University)

Lawrence Livermore National Laboratory

Not all bugs are created in equal!

- LLNL's multiphysics code for laser simulation with over 1M LOC – Non-deterministic crashes w/ a threaded solver

- Above certain optimization levels and certain scales (8K MPI processes)

- **Cost scientists months …**

- ParaDiS – Non-deterministic fatal conditions when scaled to tens of thousands of processes

- **Impacted science for 1 year…**

Pruner aims at providing a reproducibility toolset to fight the harmful effects of non-determinism

```
$ srun -n 128 ./tst
    = 0.24512003

$ srun -n 128 ./tst
    = 0.24511999

$ srun -n 128 ./tst
    error: Segfault

$ srun -n 128 ./tst
    = 0.24512000
```

- **Reproducibility**
  - The ability to repeat program executions with the same results or the same behavior

- **Many sources of non-determinism hamper this ability**

- **Greater challenges: non-determinism in concurrency scheduling**

- **Project Pruner**
  - Provide a scalable reproducibility tool set

Coming soon, pruning toolset to detect and control targeted sources of non-determinism

- **Archer** - Scalable and accurate OpenMP data race detector

- **ReMPI** - Scalable record and replay for MPI

- **NINJA** – a novel noise injection tool to expose unintended message races and significant complement ReMPI

- **FLiT** – floating point litmus tester from Utah which allows to test and quantify floating-point non-determinism induced by different compilers and compiler flags

In the process of assembling these components into a GitHub organization at https://github.com/PRUNER with a Q1/2017 GA release goal

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