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Leaders in parallel software development tools

Debugging OpenSHMEM Applications with DDT

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Agenda

- Introduction to DDT
- Demonstration

About Allinea

- HPC development tools company
  - Flagship product Allinea DDT
    - The scalable parallel debugger
      - Record holder for debugging software on largest machines
      - Production use at extreme scale – and desktop
    - Wide customer base
      - Blue-chip engineering, government and academic research
      - Strong collaborative relationships with customers and partners
  - Allinea MAP profiling tool
    - Focus on ease of use, low overhead, low configuration

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Debugging is hard

"Debugging is twice as hard as writing the code in the first place. Therefore, if you write the code as cleverly as possible, you are, by definition, not smart enough to debug it."

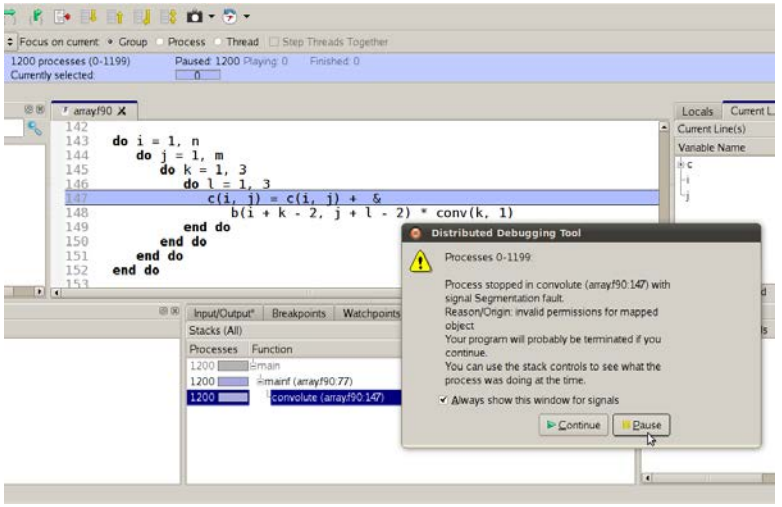
— Brian Kernighan

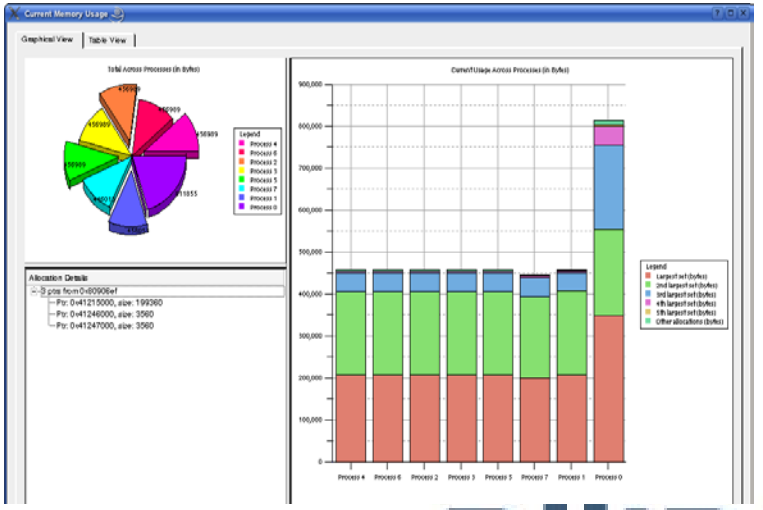
Debugging at scale

- More processes
  - More difficult to control
  - Managing communication
  - Which process contains my bug?
- More data
  - printf debugging quickly becomes unmanageable

Allinea DDT in a nutshell

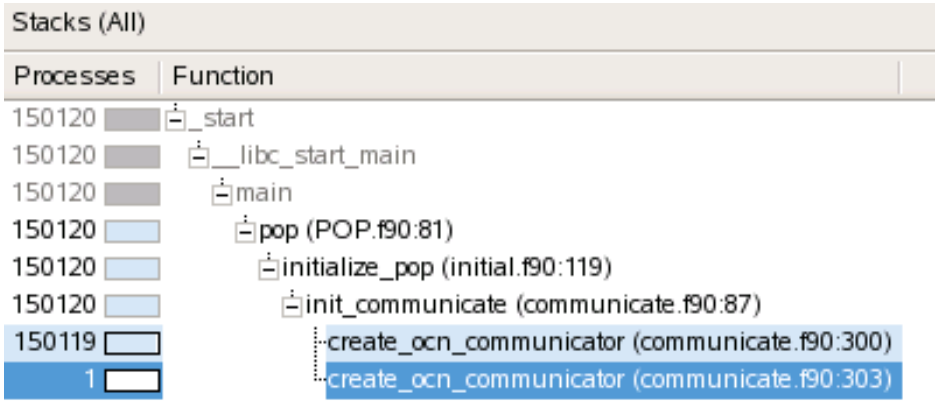
- Graphical source level debugger for
  - Parallel, multi-threaded, scalar or hybrid code
  - C, C++, F90, Co-Array Fortran, UPC, CUDA
- Strong feature set
  - Memory debugging
  - Data analysis
- Managing

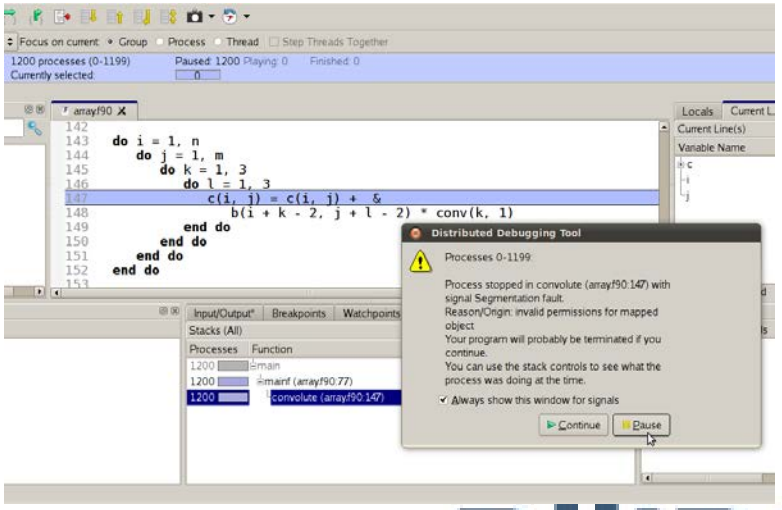




Fixing everyday crashes

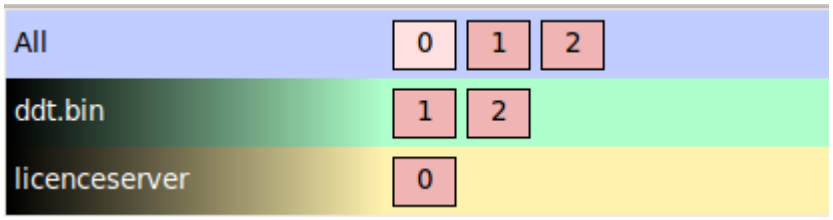
- Typical crash scenario:
  - Threads/processes can be anywhere
  - Too many to manually examine individually
- A good overview is important
  - Allinea DDT merges stacks from processes and threads into a tree

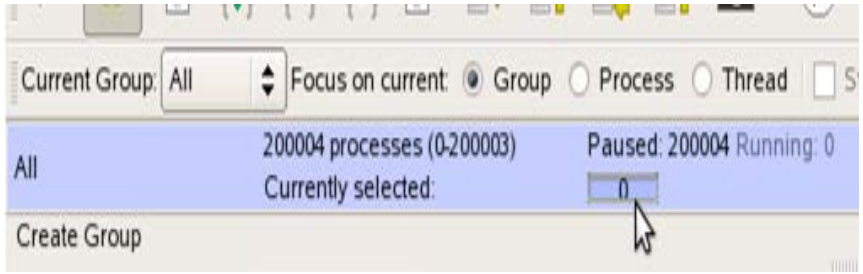


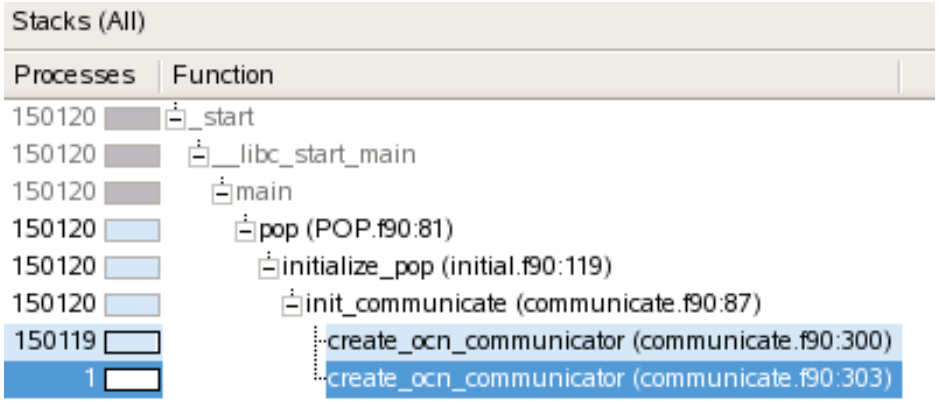


Process Control

- Interacting with application progress is easy with DDT
  - Step, breakpoint, play, or set data watchpoints based on groups
  - Change interleaving order by stepping/playing selectively
- Group creation is

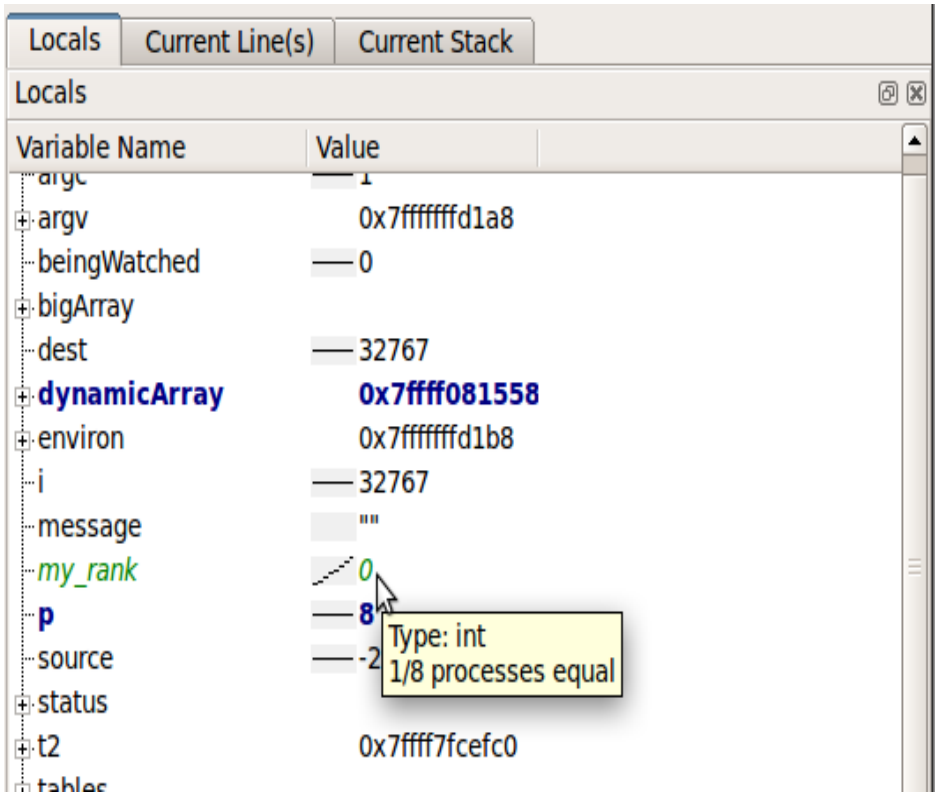






Viewing Data

- Clear need to see data
  - Too many variables to trawl manually
  - Allinea DDT compares data automatically
- Smart highlighting
  - Subtle hints for differences and changes
  - New: Now with



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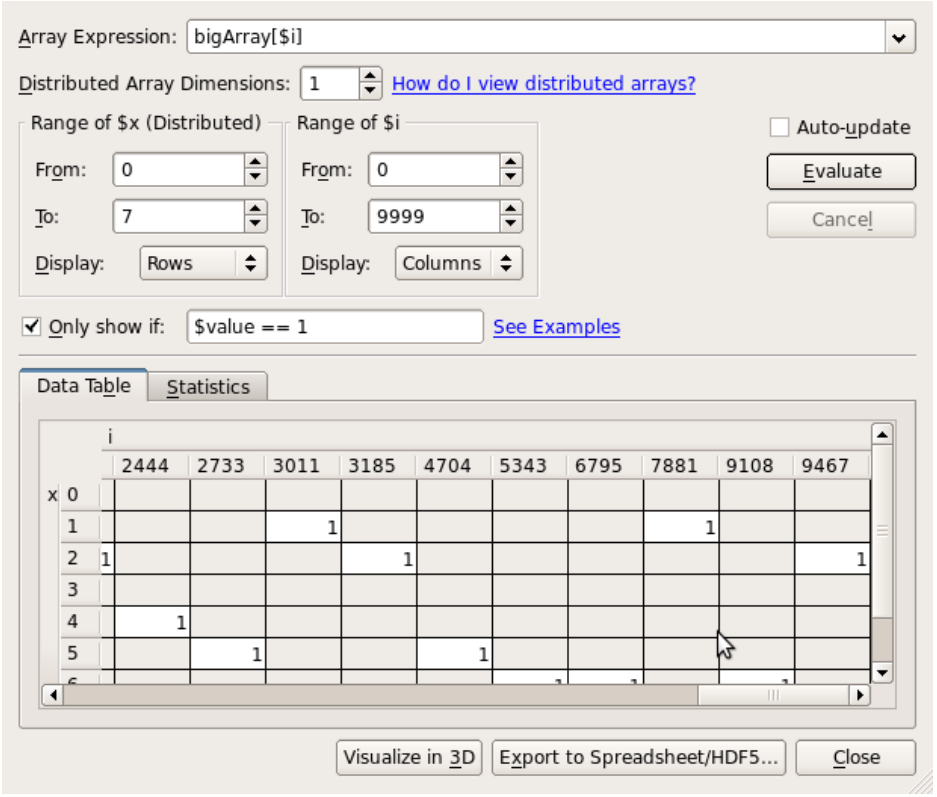
Large Array Support



- Browse arrays
- 1, 2, 3, … dimensions
- Table view
- Filtering
- Look for an outlier
- View arrays from multiple processes
- Search terabytes for rogue data – in parallel
- Export

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Demo

- Questions?
  - nick.forrington@allinea.com
- 30 day evaluation
  - http://www.allinea.com/products/trials/