

allinea



Leaders in parallel software development tools

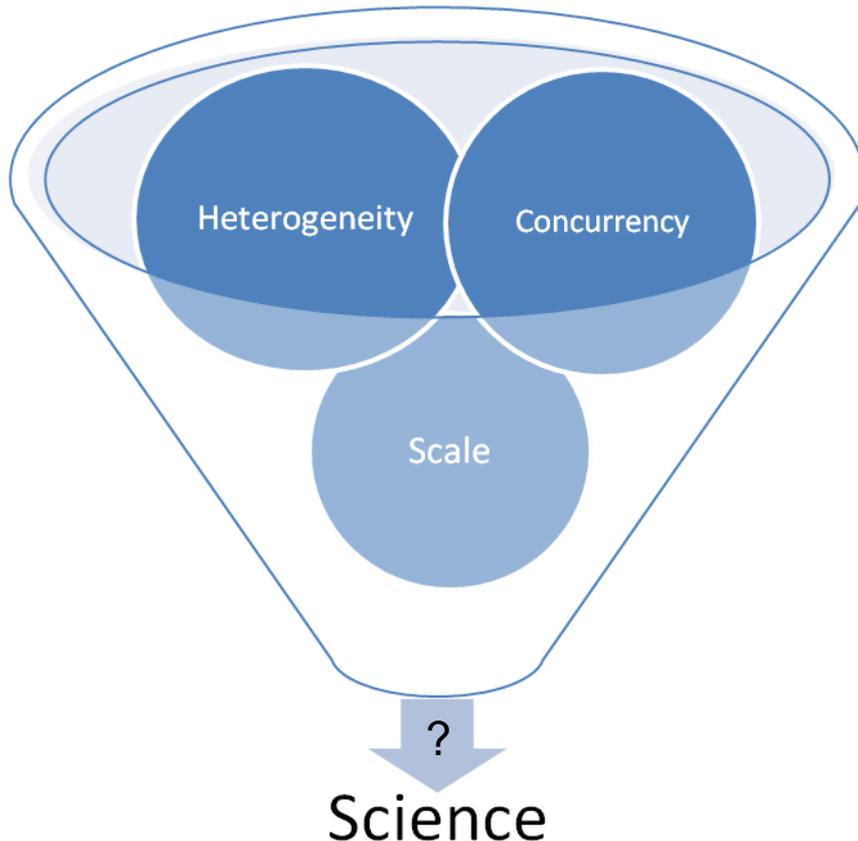
Allinea Unified Environment

Allinea's unified tools for debugging and profiling HPC
Codes

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Today's Challenge



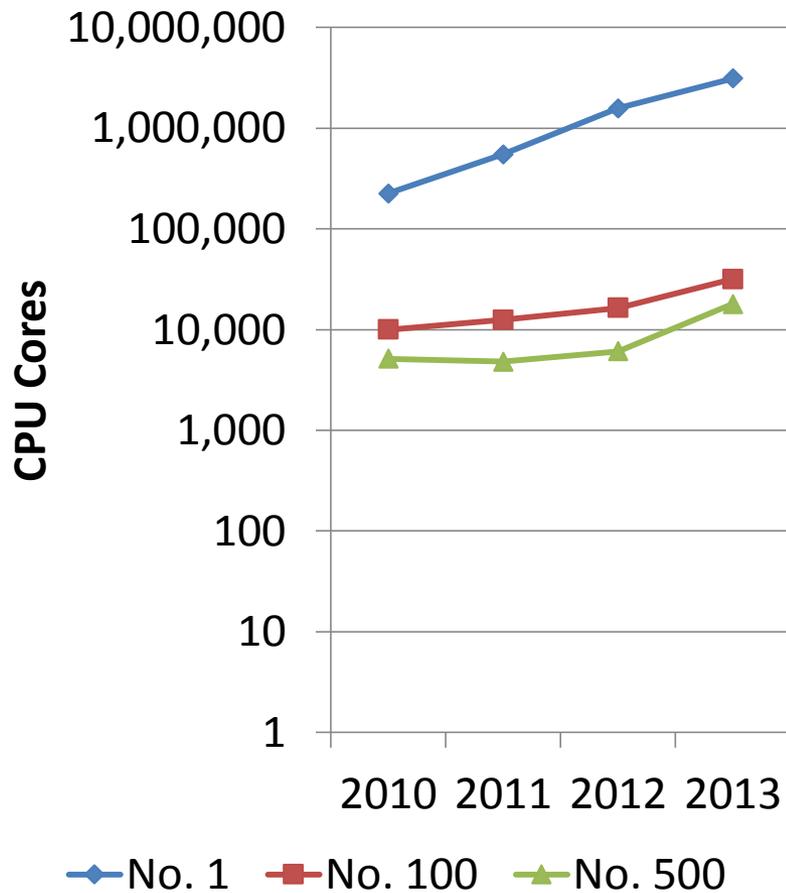
Q: What is the impact of current trends in HPC on your application?

Q: How can you make your science run well on the available system?

A: Development.

Development implies both fixing problems and optimizing the computation.

Machine Size Growth



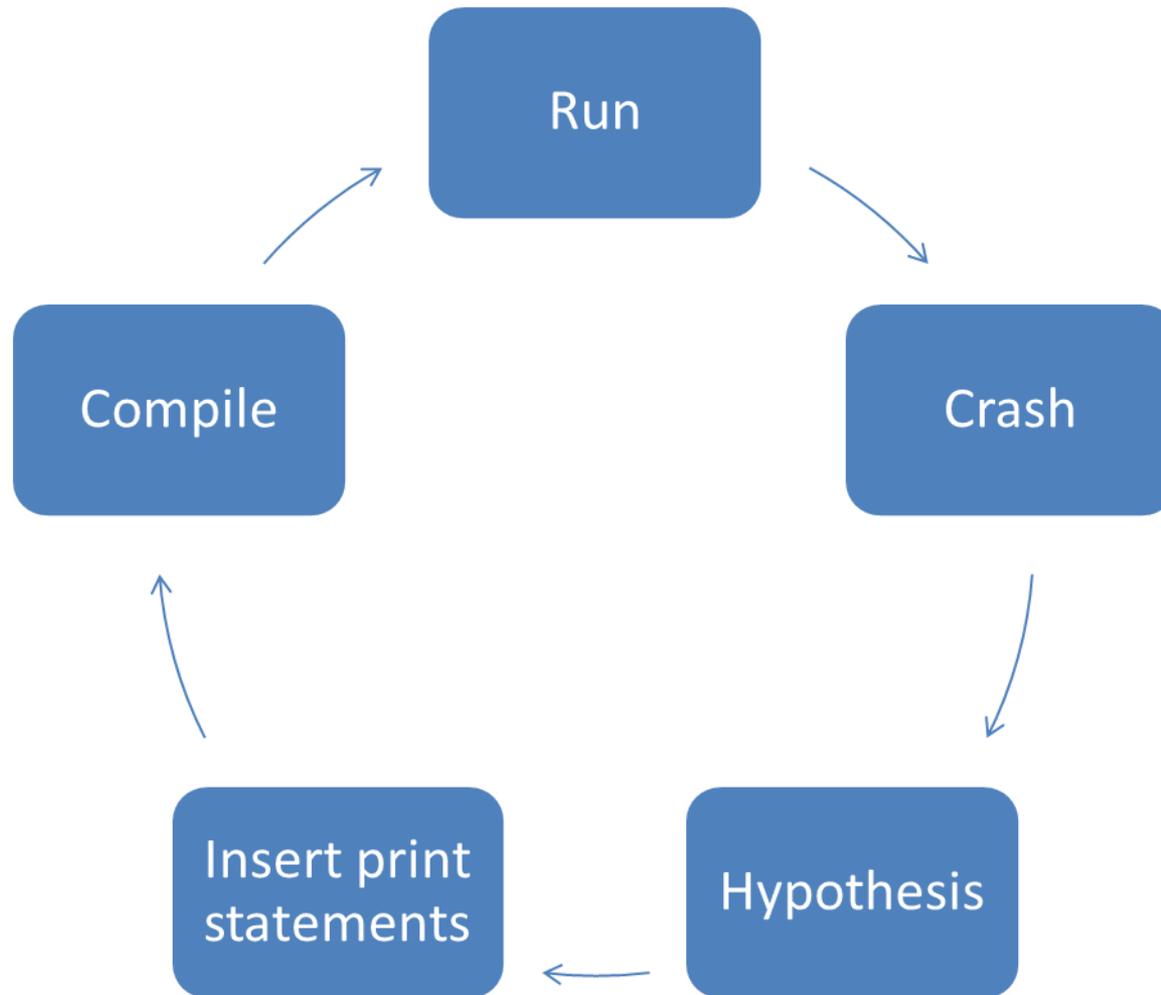
Machine sizes are exploding

Software scale grows as machines grow

Compilers Can't do it All, ...

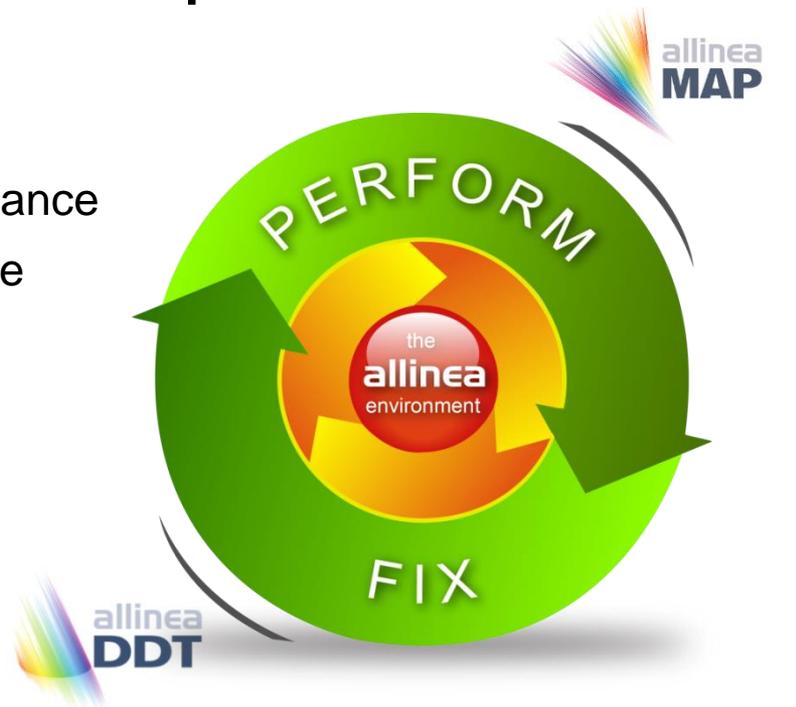
```
mg.f(2432): (col. 10) remark: loop was not vectorized: not inner loop.
mg.f(2431): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(993): (col. 13) remark: LOOP WAS VECTORIZED.
mg.f(992): (col. 10) remark: loop was not vectorized: not inner loop.
mg.f(991): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(243): (col. 7) remark: loop was not vectorized: existence of vector dependence.
mg.f(993): (col. 13) remark: LOOP WAS VECTORIZED.
mg.f(992): (col. 10) remark: loop was not vectorized: not inner loop.
mg.f(991): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(753): (col. 13) remark: loop was not vectorized: vectorization possible but seems inefficient.
mg.f(762): (col. 13) remark: loop was not vectorized: vectorization possible but seems inefficient.
mg.f(749): (col. 10) remark: loop was not vectorized: not inner loop.
mg.f(746): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(993): (col. 13) remark: LOOP WAS VECTORIZED.
mg.f(992): (col. 10) remark: loop was not vectorized: not inner loop.
mg.f(991): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(2255): (col. 16) remark: loop was not vectorized: existence of vector dependence.
mg.f(2254): (col. 13) remark: loop was not vectorized: not inner loop.
mg.f(2251): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(2433): (col. 13) remark: LOOP WAS VECTORIZED.
mg.f(2433): (col. 13) remark: loop was not vectorized: not inner loop.
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mg.f(2431): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(2433): (col. 13) remark: LOOP WAS VECTORIZED.
mg.f(2433): (col. 13) remark: loop was not vectorized: not inner loop.
mg.f(2432): (col. 10) remark: loop was not vectorized: not inner loop.
mg.f(2431): (col. 7) remark: loop was not vectorized: not inner loop.
mg.f(527): (col. 7) remark: loop was not vectorized: nonstandard loop is not a vectorization candidate.
mg.f(552): (col. 7) remark: loop was not vectorized: nonstandard loop is not a vectorization candidate.
mg.f(1150): (col. 7) remark: loop was not vectorized: loop was transformed to memset or memcpy.
mg.f(1150): (col. 7) remark: loop was not vectorized: loop was transformed to memset or memcpy.
mg.f(1645): (col. 7) remark: loop was not vectorized: loop was transformed to memset or memcpy.
mg.f(1655): (col. 7) remark: loop was not vectorized: loop was transformed to me
```

Debugging in practice...



Allinea Unified Environment

- A modern integrated environment for HPC developers
- Supporting the lifecycle of application development and improvement
 - Allinea DDT : Productively debug code
 - Allinea MAP : Enhance application performance
 - Allinea Performance Reports: Characterize Application performance
- Designed for productivity
 - Consistent easy to use tools
 - Enables effective HPC development
- Improve system usage
 - Fewer failed jobs
 - Higher application performance



Alinea DDT

Fix software problems - fast

- **Graphical debugger designed for:**
 - C/C++, Fortran, UPC, CUDA, CUDA Fortran, OpenACC
 - Multi-threaded code
 - Multi-process code
 - Accelerated codes
 - GPUs, Intel Xeon Phi
 - Debugging 1 to 700k processes
- **Slash your time to debug :**
 - Reproduces and triggers your bugs instantly
 - Helps you to fix them as swiftly as possible
 - Helps you easily understand where issues come from quickly



Allinea DDT: Debugging that Scales



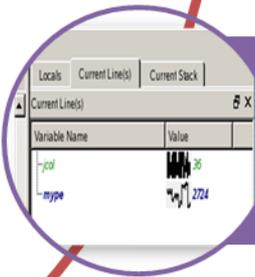
Where?

- Leaps to source automatically
- Powerful instantaneous memory debugging



How?

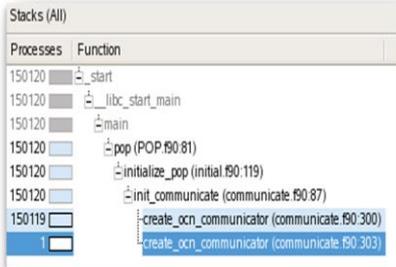
- Real-time data comparison and consolidation
- Identify outliers and unusual threads



Why?

- “Smart Highlighting” of differences and changes
- Sparklines comparing data across processes

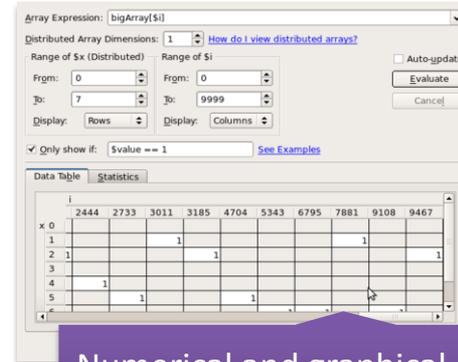
Top Features for HPC Debugging



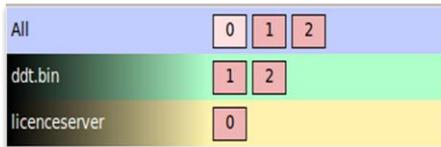
Parallel stack view



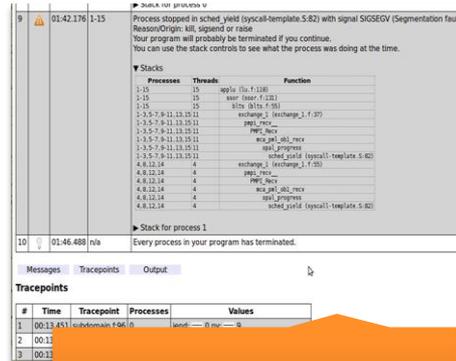
Automated data comparison: sparklines



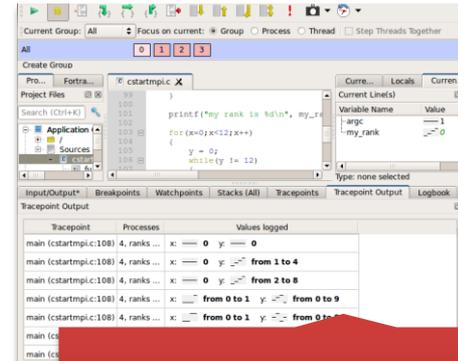
Numerical and graphical data visualization



Step, play, and breakpoints



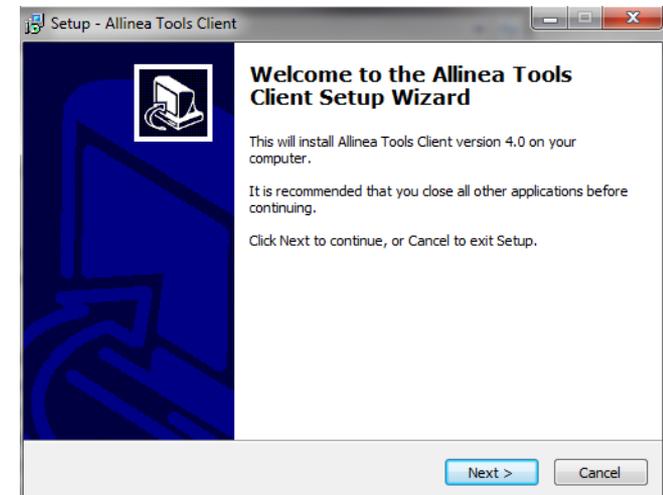
Offline debugging



Tracepoints

Remote Access Clients for Mac, Windows and Linux

- **Easier access to distant clusters**
 - Scalable debugging tree already cuts down network traffic
 - Secure low-latency debugging and profiling clients
- **Extends existing remote cluster support to cover**
 - No shared filesystem
 - Remote/local source-viewing
 - Support for multi-hop SSH and OTP systems
- **Allinea DDT feature set available remotely**
 - Linux, Windows and OS/X clients
 - Real native GUI – no ‘VNC’ or ‘X-forwarding’ lag



What Our Users are Saying



“My group routinely debugs code at over 100,000 processes using Allinea DDT. No other debugger comes close – obviously it’s a hit with users,” Oak Ridge National Laboratory



“Allinea’s experience and tools will make a big impact in the speed at which scientists can complete their research,” NCSA Blue Waters



“Previous experiences with other profilers had left us more confused than informed. Allinea MAP is the opposite.”

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Thank You

Try it out at:

<http://www.allinea.com/products/trials/>

