

# allinea

SCALE TO NEW HEIGHTS

*Development Tools for HPC &  
Multicore applications*

## Allinea Software (UK)



- Allinea Software is offering next generation tools for parallel application development from HPC to the desktop & embedded applications
  - Traditionally for clusters, SMPs and MPPs
  - Focus on usability and scalability
- First **Grid Ready software development products** for Scalar and Parallel applications
  - **Allinea DDT** Distributed Debugging Tool
  - **Allinea OPT** Optimization & Profiling Tool
- Powerful, scalable, intuitive, easy to use, cross platform
- **Leicester, Vanderbilt universities, IFP, Total, Caspur, IDRIS, AWE, Cineca, Bristol, ICHEC, Dresden, Aston, Cerfacs, Jülich, CEA, HLRS, Oxford, Lawrence Livermore, Nottingham, University, EADS, DLR** : part of our customers' list – (**bold are IBM's**)
- Now starting in North America

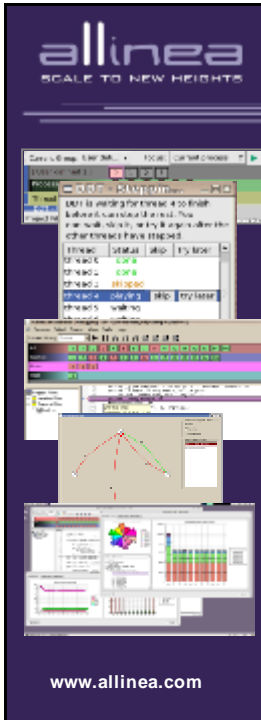
# DDT

## Distributed Debugging Tool

## DDT: Distributed Debugging Tool

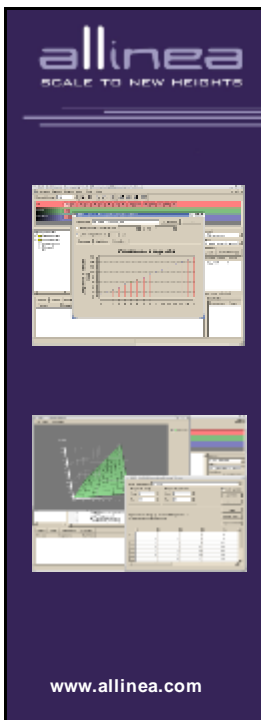


- **A mature, powerful & highly intuitive tool**
  - Traditional focus has been HPC
- **Cross-Platform:**
  - Linux, Solaris (Sparc & x86-64), AIX
  - Absoft, IBM, Intel, PGI, PathScale, Sun, compilers
  - EM64T, x86-64, IA64, Power, UltraSparc architectures
  - Across most MPI / OpenMP implementations
  - Support for all major scheduling systems



## DDT: Distributed Debugging Tool

- **Scalar features**
  - Advanced F95, C, C++ support including: STL, namespaces, virtual functions, templates
  - Advanced Fortran 90, 95 and 2003 support including modules, allocatable data, pointers and derived types
- **Multiple Thread & OpenMP features**
  - Control actions by Individual or Groups of Threads
- **MPI Features**
  - Control actions by Individual or Groups of Processes
  - Visualize message queues



## ... and lots more

- **Cross process / thread comparison**
- **Visualize multidimensional data**
  - 3D OpenGL array viewer (stereo !)
  - From 2D viewer to new multidimensional viewer
- **Advanced user-defined data display**
  - Program DDT to display your data using your software!

## Memory Debugging

The screenshot shows the Allinea Memory Debugger interface. It includes a file explorer on the left, a central workspace with a memory dump and a stack trace, and a right-hand pane with a bar chart showing memory usage. Callout boxes point to specific features:

- Check your current memory usage and where memory was allocated:** Points to the left-hand pane showing a file tree.
- Check your overall memory usage:** Points to the central workspace showing a memory dump and a stack trace.
- Locate where memory was allocated:** Points to the right-hand pane showing a bar chart of memory usage.
- Stop immediately on reads beyond array end and common errors:** Points to a dialog box in the center of the interface.

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## New Features 2007

- **DDT 2.0 - released April 2007**
    - Multithreading, easy to control threads
    - Improved memory debugging
      - Illegal read/write instantly spotted
      - Even possible to continue after segfault
    - Extended signal information
    - Icons on the desktop!
  - **DDT 2.1 - released August 2007**
    - New message box when processes stop
    - Faster, improved multidimensional array viewing
    - New breakpoint setting box
      - Manually add breakpoints in files or functions
      - Support for pending breakpoints
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## New Architectures 2007

- **DDT IBM Cell BE (released)**
  - Fedora Core 6, IBM Cell SDK 2.1
  - IBM QS 20 or Sony Playstation 3
- **DDTLite (Q4 2007)**
  - Simplify development on the Microsoft® platform
  - Bringing features from DDT into Visual Studio®
- **DDT NEC SX8 (Q4 2007)**
  - Port of DDT backend to vector platform
  - Remote launch facility
- **DDT Cray XT4 (Q4 2007)**
  - HPC high end systems

# OPT

## Optimisation & Profiling Tool

## OPT Optimisation & Profiling Tool



- **A new approach to code optimization**
  - Emphasis on ease-of-use & scalability
  - Guides users through the optimization process
  - Initial focus on MPI applications
- **Cross-platform**
- **Grid ready**

## Optimizing in a Parallel Universe...

- **Traditional tracers**
  - Timelines: good for watching messages and memory accesses to pick out problems visually
  - But not (currently....) scalable!



- **Can log everything but...**
  - Vast quantities of data are generated
    - Analysis becomes an expert task
    - Is it really necessary?

## OPT



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- **Traditional features**

- Timeline shows local problems with sends/receives paired up



- **.. and new features**

- Callgraph shows problems
  - Linked with timeline
  - Variance, min/max, mean displays goodness
  - Highlights problem functions
- Charts show distribution of performance
  - Across processes
  - And statistical views

## ...Keep It Simple

- **Focus is the key**

- Too much visual information is a bad thing
- Too many tools is a bad thing

- **Good parallel tools should simplify things**

- Target the useful 90%
- Direct the user to the problem point

- **OPT embraces a top-down approach**

- See the “big picture” first
- Drill down successively for more information..
- Don't drown users in too much data
- Mixture of sampling and selective tracing

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## OPT



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- **Traditional features**

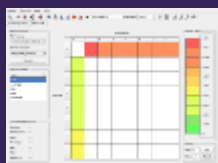
- Timeline shows local problems with sends/receives paired up

- **...and new features**

- Callgraph shows problems
  - Linked with timeline
  - Statistical values
  - Highlights problem functions
  - Aggregated gprof timing data
- Charts show distribution of performance
  - Across processes
  - And statistical views (bar/pie)



## ... and more



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- **Communication matrix**

- Shows communication patterns
- Ranks communication between processes

- **Compare multiple runs**

- With different algorithms
- Across different architectures
- Across increasing numbers of processors



## ...Keep It Simple

- **Focus is the key**
  - Too much visual information is a bad thing
  - Too many tools is a bad thing
- **Good parallel tools should simplify things**
  - Target the useful 90%
  - Direct the user to his performance problem
- **Embrace a top-down approach**
  - Call-graph first - see the “Big Picture”
  - Drill down successively for more information..
  - Don't drown non-expert users in their data

## How OPT works...

- **Under the hood**
  - Database back end
    - If data is vast, database should handle it
    - Easy to optimize when necessary
    - New capabilities are just new queries
  - Client/Server architecture
    - Web services interface
    - Thin client with small memory footprint
    - Client pulls only information needed over WAN/LAN/Internet
    - A real GRID tool?
- **MPIs, compilers....**
  - Most MPIs, all compilers

## New Features 2007

- **OPT 1.3.x - released July 2007**
  - Flat profile in call graph
  - Pruned call graph
  - C++ name demangling
  - Local Server feature
    - Simplify program start up
  - Addition of function level profiling
    - Adding gprof information to callgraph

## お問い合わせ

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

30日間のお試しライセンス有り  
上記 URL よりダウンロード可能