



High performance tools to debug, profile, and analyze your applications

## Allinea Forge Highlights and What's New in Version 6

Beau Paisley

[bpaisley@allinea.com](mailto:bpaisley@allinea.com)









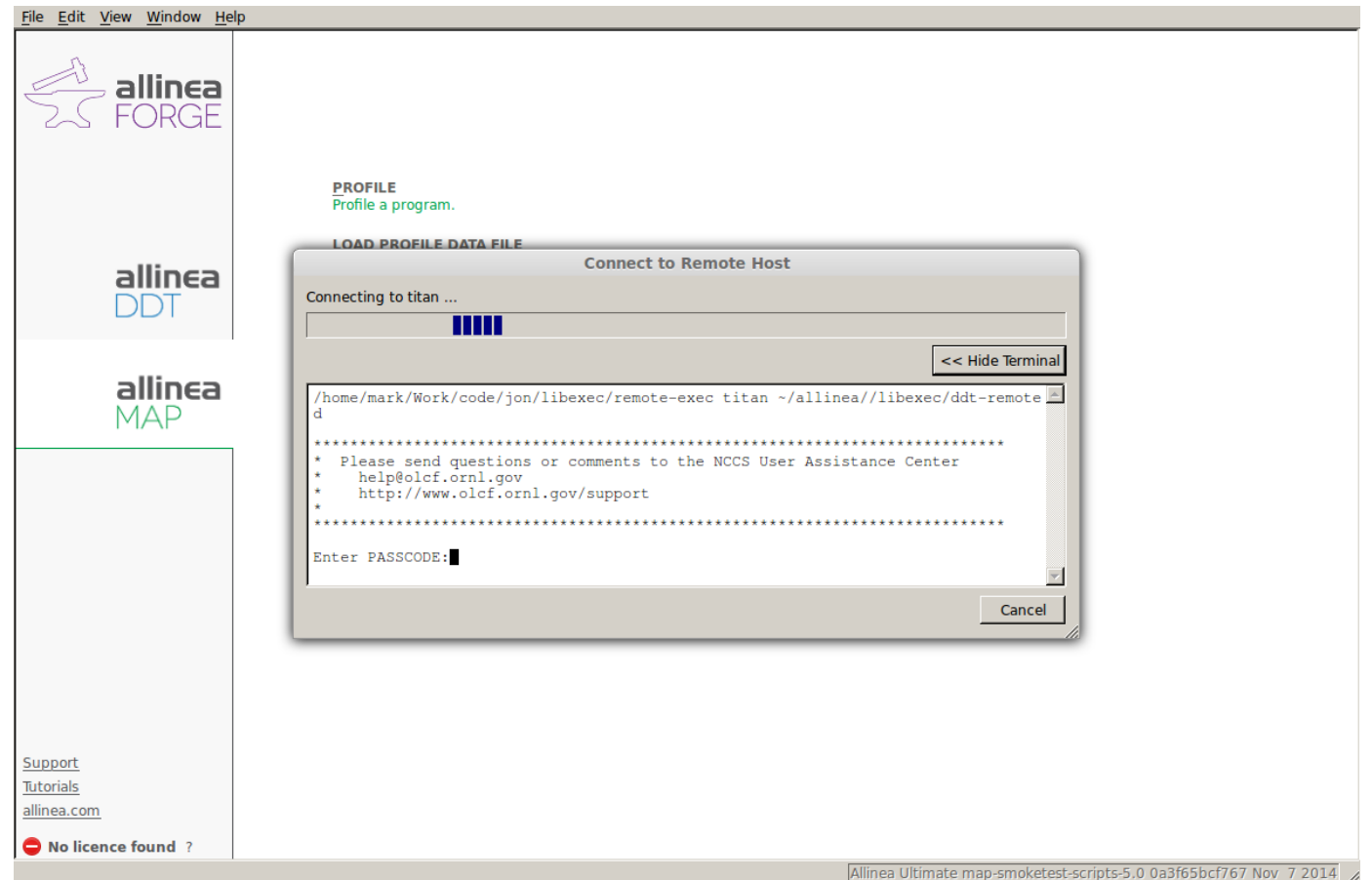
## Some Favorite Features that are Underutilized ...

- Connecting with the client
- Version control integration
- Reverse connect
- Debugging logbook
- Offline debugging
- Regression Testing
- Profiling Energy and Power Usage



# HPC means being able to work productively on remote machines

-  Linux
-  OS/X
-  Windows
-  Multiple hop SSH
-  RSA + Cryptocard
-  Uses server license



# Our Tools Integrate with Version Control Systems

The screenshot displays a debugger interface with several panels:

- Project Files:** A tree view showing the project structure, including 'Sources' and 'External Code'. The file 'wave\_openmp.c' is selected.
- Code Editor:** Shows the source code for 'wave\_openmp.c'. The current line is 227, which is highlighted in blue. The code includes a loop for 'j' from 1 to 'npoints', a conditional check for 'global endpoints', and a swap operation: `oldval = values; values = newval;`.
- Threads:** A panel at the top left showing four threads (1, 2, 3, 4). Thread 1 is selected.
- Locals:** A panel on the right showing the current line's local variables: 'oldval' with value '0x7fff531c010' and 'values' with value '0x7fff5abe010'.
- Stacks:** A panel at the bottom left showing the call stack. The current frame is 'update (wave\_openmp.c:227)'. Other frames include 'main (wave\_openmp.c:354)' and 'omp\_in\_final'.
- Change Set:** A yellow tooltip window is open over line 227, displaying version control information: 'changeset: 1:95f85f0e4dda', 'tag: tip', 'user: Mark O'Connor <mark@allinea.com>', 'date: Fri Nov 07 11:37:23 2014 +0100', and 'summary: Swap arrays directly via their pointers instead of copying each element; this takes longer than the calc...'
- Evaluate:** A panel at the bottom right showing the current expression and its value: 'newval' (0x7fff4b7a010), 'oldval' (0x7fff531c010), and 'values' (0x7fff5abe010).

# Reverse Connect Simplifies Batch System Integration

The screenshot displays the Allinea DDT (Allinea Forge 5.1-43629) interface. The main window shows the 'Allinea DDT' section with a 'Remote Launch' dropdown menu set to 'Off'. A 'Reverse Connect Request' dialog box is open, displaying the following information:

- Reverse Connect Request**
- Information icon: A new Reverse Connect request is available from beau:4201 for Allinea DDT.
- Command Line: -connect
- Question: Do you want to accept this request?
- Buttons: Help, Accept, Reject

In the background, a terminal window shows the command `ddt -connect` being executed. The system tray at the top right indicates the time is 12:15 PM and the user is 'Beau'. The bottom right corner of the Allinea Forge window shows the version 'Allinea Forge 5.1-43629'.

# Debug with the Scientific Method

The screenshot shows the Allinea DDT - Allinea Forge 5.0.1 [Trial Version] interface. The main window displays the source code for 'cstartmpi.c' with a breakpoint set at line 96. The Logbook shows the program's execution timeline, including the addition of a breakpoint and the current state of the process. The Locals and Evaluate panels provide details on the current state of variables and the value of the expression 'argc'.

**Logbook**

Time	Ranks	Message
0:00	0-3	Launching program /home/bpaisley/demo/ddt/cstartmpi/cstartmpi.exe at Tue May 19 11:12:58 2015 Executable modified on Mon May 18 08:39:06 2015
0:03	0-3	Startup complete.
0:03	n/a	Select process group All
0:03	0-3	Add breakpoint for cstartmpi.c:164
0:03	n/a	Add Expression to Evaluate: argc
0:19	n/a	Hypothesis 1
0:27	0-3	Run to line 96 in cstartmpi.c
0:27	0-3	Process stopped in main (cstartmpi.c:96)

**Stacks**

Processes	Function
0-3	main (cstartmpi.c:96)

**Current Stack**

**Locals**

Variable Name	Value
argc	1
argv	0x7fffffd698
beingWatched	32767
bigArray	
dest	0

**Evaluate**

Expression	Value
argc	1

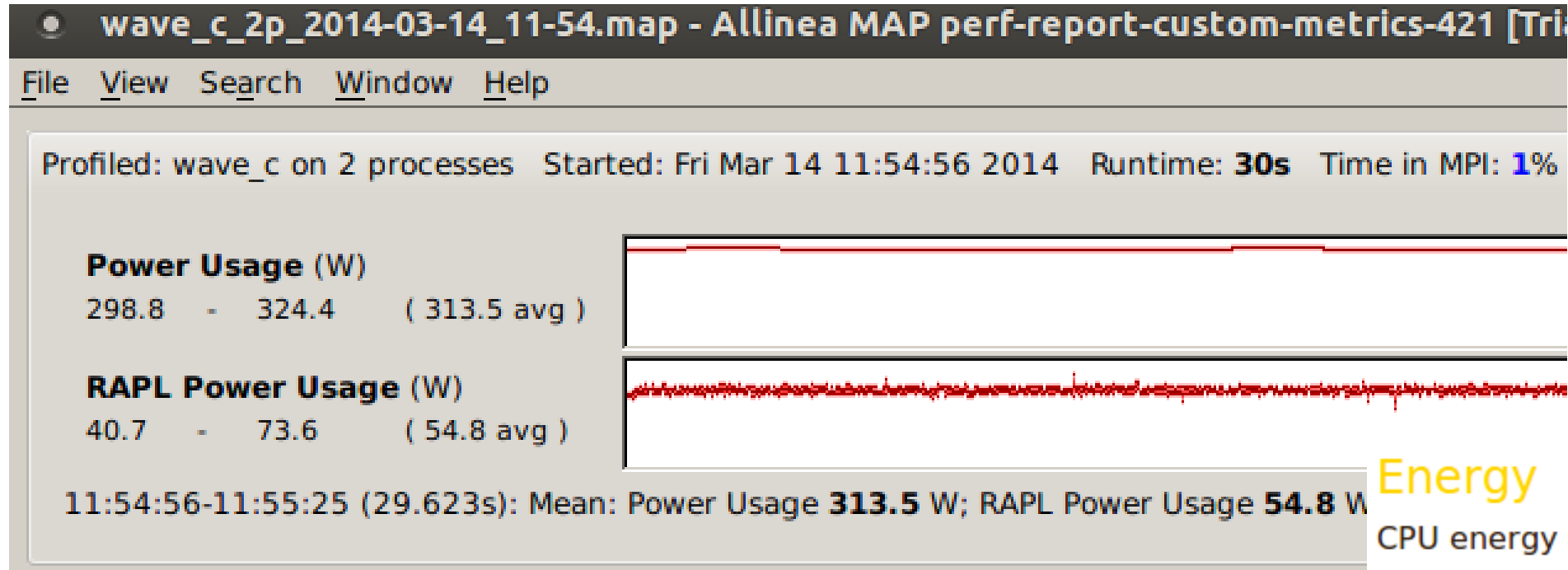
# Debugging While you Sleep

The screenshot shows a web browser window with the address bar containing the file path: `file:///home/bpaisley/demo/ddt/cstartmpi/report.html`. The page title is "debugging /home/bpaisley/demo/ddt/cstartmpi/cstartmpi.exe". Below the title, there are four tabs: "Messages", "Tracepoints", "Memory Leaks", and "Output". The "Messages" tab is selected.

Under the "Messages" tab, there are controls for "[+] Expand All" and "[-] Collapse All". Below these controls is a table with the following columns: "#", "Type", "Time", "Processes", and "Message".

#	Type	Time	Processes	Message												
1		0:00.000	0-3	Launching program /home/bpaisley/demo/ddt/cstartmpi/cstartmpi.exe at Wed May 6 11:34:30 2015 Executable modified on Mon Apr 27 13:22:13 2015												
2		0:01.649	0-3	Startup complete.												
3		0:01.655	n/a	Select process group All												
4		0:01.656	0-3	Add tracepoint for cstartmpi.c:109 Vars: x, y												
5		0:01.658	n/a	Add Expression to Evaluate: my_rank												
6		0:01.658	n/a	Add Expression to Evaluate: tables												
7				Additional Information <ul style="list-style-type: none"><li>▶ Stacks</li><li>▶ Current Stack</li><li>▼ Locals</li></ul> <table border="1"><thead><tr><th>Name</th><th>Value</th></tr></thead><tbody><tr><td>argc</td><td>1</td></tr><tr><td>argv</td><td>0x7fffffff548</td></tr><tr><td>beingWatched</td><td>32767</td></tr><tr><td>bigArray</td><td></td></tr><tr><td>dest</td><td>0</td></tr></tbody></table>	Name	Value	argc	1	argv	0x7fffffff548	beingWatched	32767	bigArray		dest	0
Name	Value															
argc	1															
argv	0x7fffffff548															
beingWatched	32767															
bigArray																
dest	0															

# Profiling Energy and Power Usage



## Energy

### CPU energy report:

Total energy	1796.22 J	
Peak power	67.00 W	
Average power	59.99 W	

### Whole system energy report:

Total energy	9180.01 J	
Peak power	320.00 W	
Average power	306.59 W	





## What's New in Version 6

- Deeper Profiling
  - Custom Metrics
  - View MAP Files without a license
  - New Platforms – ARMv8, POWER8, CUDA 7.5
- 
- Improved Memory Debugging
  - New Offline Features
  - New Platforms – ARMv8, POWER8, CUDA 7.5

**allinea**  
MAP

**allinea**  
DDT



# allinea

High performance tools to debug, profile, and analyze your applications

## Resources at allinea.com

<https://www.allinea.com/videos>

<https://www.allinea.com/blog>

<https://www.allinea.com/products/forge/download>

