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Leaders in parallel software development tools

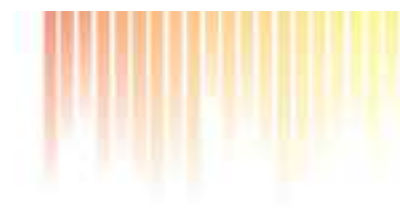
Allinea DDT Training day

Debug parallel codes efficiently and at-scale

|epcc|

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Agenda of the day



09:00 – 09:30 : Registration

09:30 – 10:00 : Presentation – Allinea environment

10:00 – 11:00 : Getting started

11:00 – 11:30 : Coffee Break

11:30 – 11:45 : GPU Debugging (demo only)

11:45 – 13:00 : Memory debugging

13:00 – 14:00 : Lunch

14:00 – 14:45 : Incorrect results

14:45 – 15:30 : Memory leaks

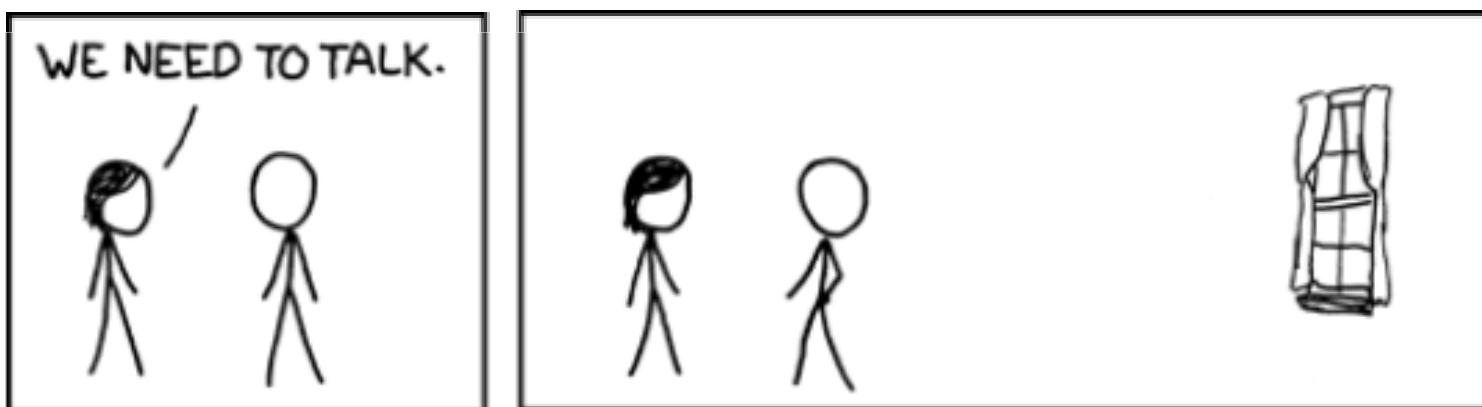
15:30 – 16:00 : Coffee Break

16:00 – 17:00 : Allinea MAP demo, free session – bring your own codes !

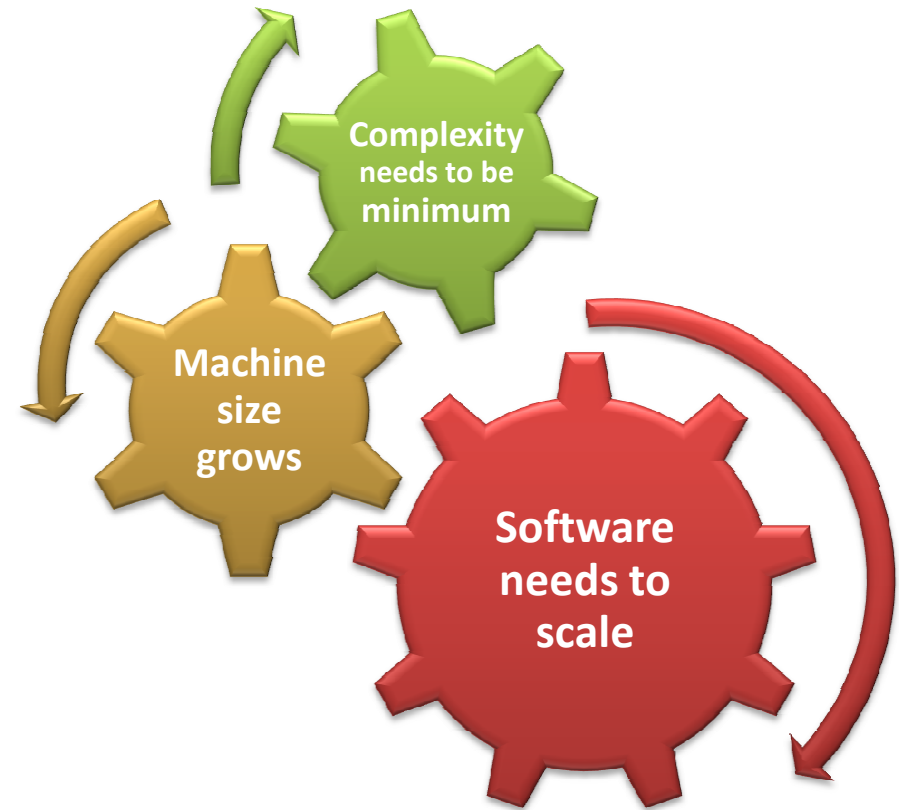
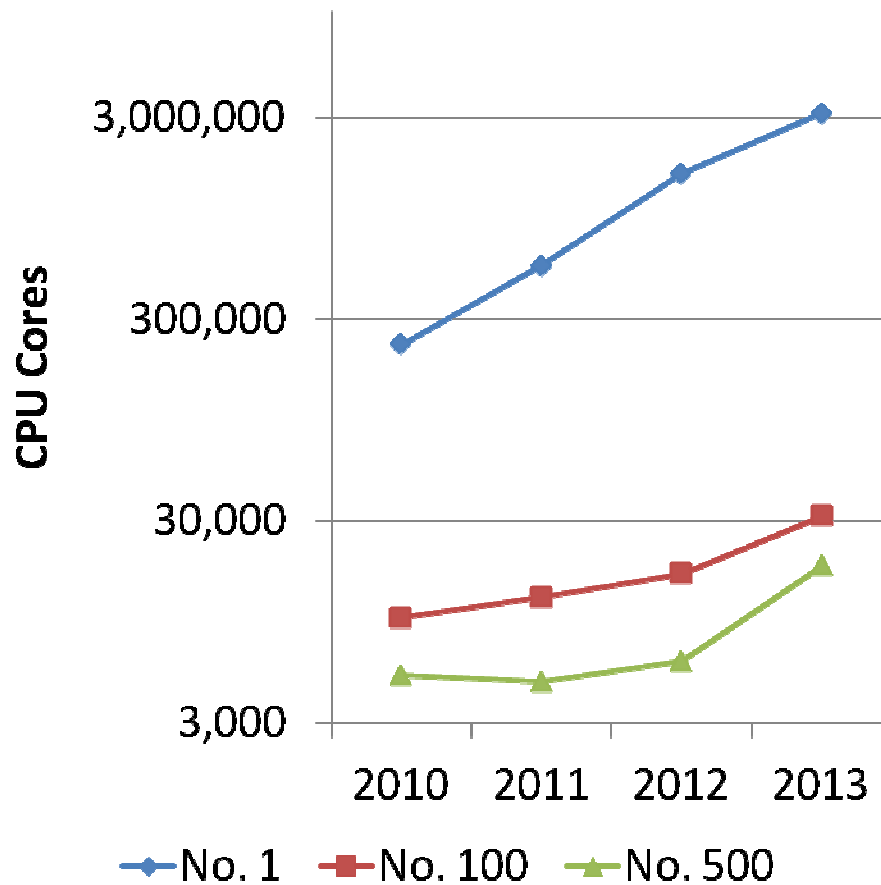
And now...



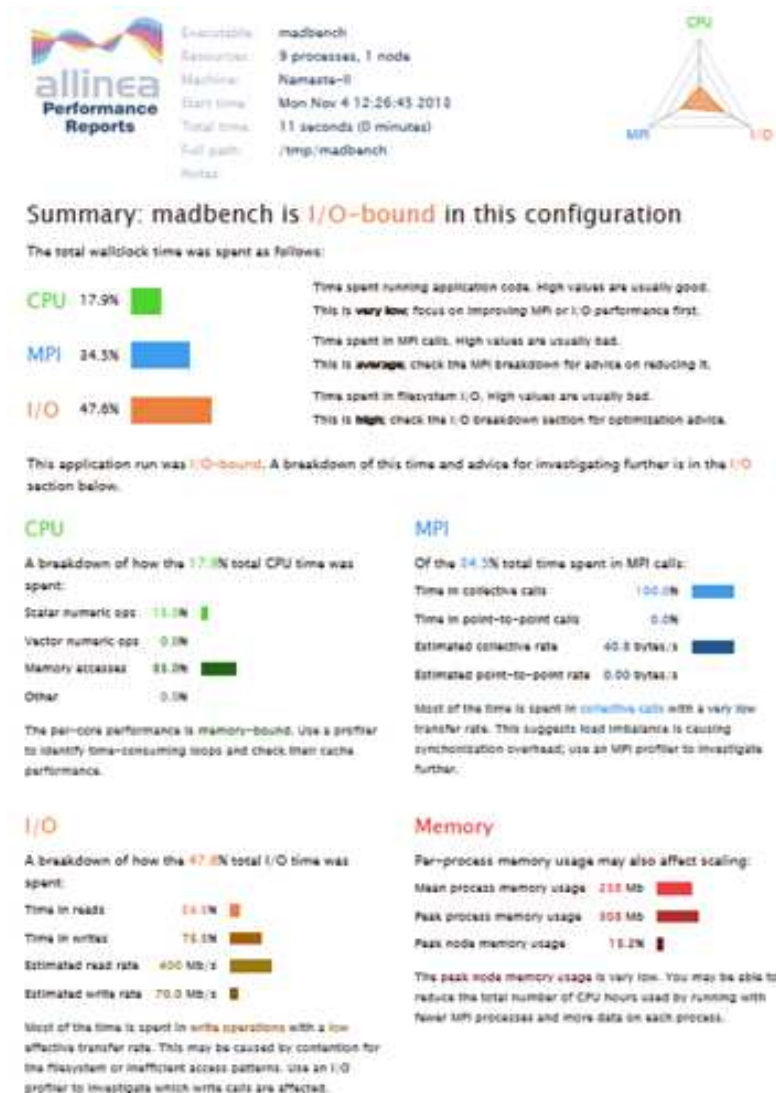
Let's talk about us!



New technologies, more parallelism



How does my application scale ?



No instrumentation needed

No source code needed

No recompilation needed

Less than 5% runtime overhead

Fully scalable

Run regularly – or in regression tests

Explicit and usable output

Need to dive into the code ?

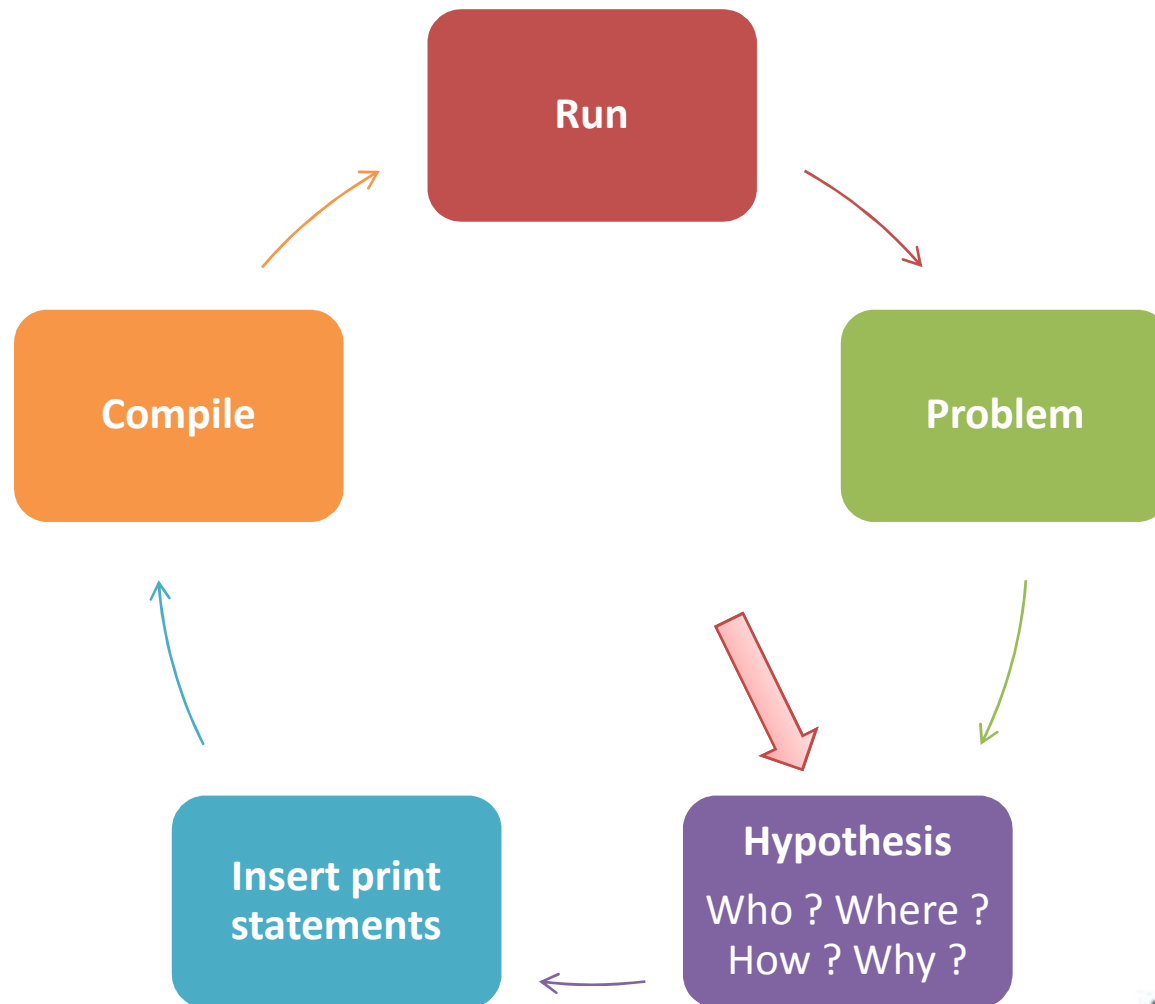


- A modern integrated environment for HPC developers
- Supporting the lifecycle of application development and improvement
 - Allinea DDT : Productively debug code
 - Allinea MAP : Enhance application performance
- Designed for productivity
 - Consistent easy to use tools
 - Fewer failed jobs
- Available at EPCC
 - Allinea DDT on 32,768 processes
 - Allinea MAP available as a trial at 8k processes



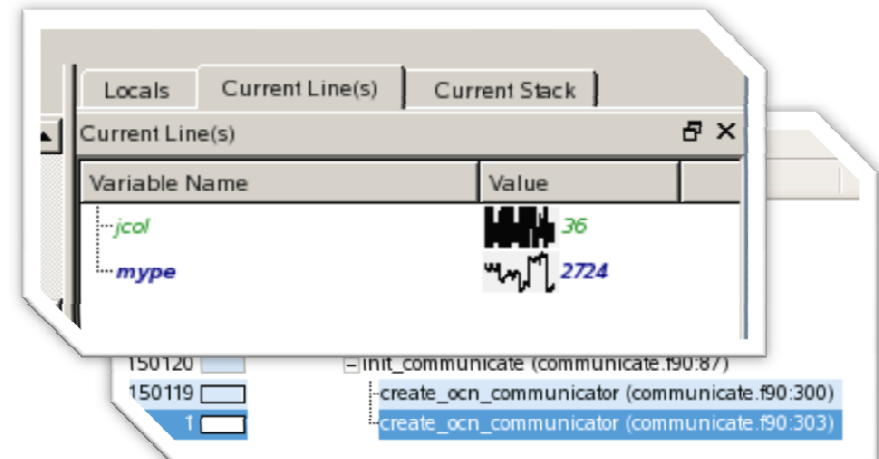
Debugging in practice

The usual method



Allinea DDT helps to understand

- **Who had a rogue behavior ?**
 - Merges stacks from processes and threads
- **Where did it happen?**
 - Allinea DDT leaps to source automatically
- **How did it happen?**
 - Detailed error message given to the user
 - Some faults evident instantly from source
- **Why did it happen?**
 - Unique “Smart Highlighting”
 - Coloring differences and changes
 - Sparklines comparing data across processes



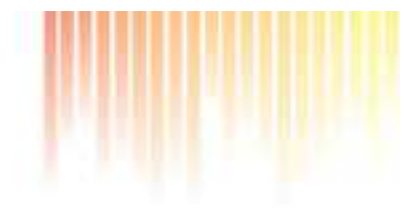
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Hands-on workshop

In the beginning was the Word



1- Connect to the front-end node :

```
$ ssh -Y <username>@login.archer.ac.uk
```

2- Get the training package

```
$ cp /path/to/archive/ddt-training.tar.gz ~/
```

3- Setup the environment

```
$ module load ddt
```

4- Read instructions

```
$ evince instructions.pdf
```

```
$ evince agenda.pdf
```

5- Modify your submission scripts and use aprun to run on Archer !

```
$ vi submission.job
```

```
$ qsub submission.job
```

Getting Started with Alinea DDT

10:00 – 11:00



- **Session 1 in training.pdf**
- **Example 1 : cstartmpi**
 - Start an MPI job with Alinea DDT
 - Discovering the GUI
 - Detect and correct straightforward crashes
 - How to replace print statements ?
 - Starting Alinea DDT in offline mode
- **Key commands in a nutshell :**
 - `$ vi submission_script.pbs`
 - `$ aprun -n 4 ./cstartmpi.exe arg1 arg2`
 - `$ ddt -n 4 ./cstartmpi.exe arg1 arg2`

Memory Debugging with Allinea DDT

11:45 – 13:00



- **Session 2 in training.pdf**
- **Example 2 : trisol**
 - Enable memory debugging
 - Enable guard pages
 - Resolve straightforward memory-related crashes

- **Key commands in a nutshell :**

```
$ vi Makefile          # you need to enable memory debugging !
```

```
$ aprun -n 4 ./trisol.exe
```

```
$ ddt -n 4 ./trisol.exe
```

Incorrect Results with Allinea DDT

14:00 – 14:45



- **Session 3 on training.pdf**
- **Example 3 : array**
 - Visualize arrays in a distributed environment
 - Filter and detect rogue values in parallel
 - Setup watchpoints
- **Key commands in a nutshell :**
 - `$ aprun -n 8 ./array`
 - `$ ddt -n 8 ./array`

Memory leaks with Allinea DDT

14:45 – 15:30



- **Session 4 on training.pdf**
- **Example 4 : mandel**
 - Analyze the current memory usage
 - Analyze memory allocations and statistics

- **Key commands in a nutshell :**

```
$ vi Makefile          # you need to enable memory debugging !
```

```
$ aprun -n 8 ./mandel
```

```
$ ddt -n 8 ./mandel
```

Free session

16:00 – 17:00



- Allinea MAP demonstration !
- Bring your own code !
- Try more of the exercises (optional exercises) !

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Thank you

Your contacts :

- Technical Support team :
- Sales team :

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