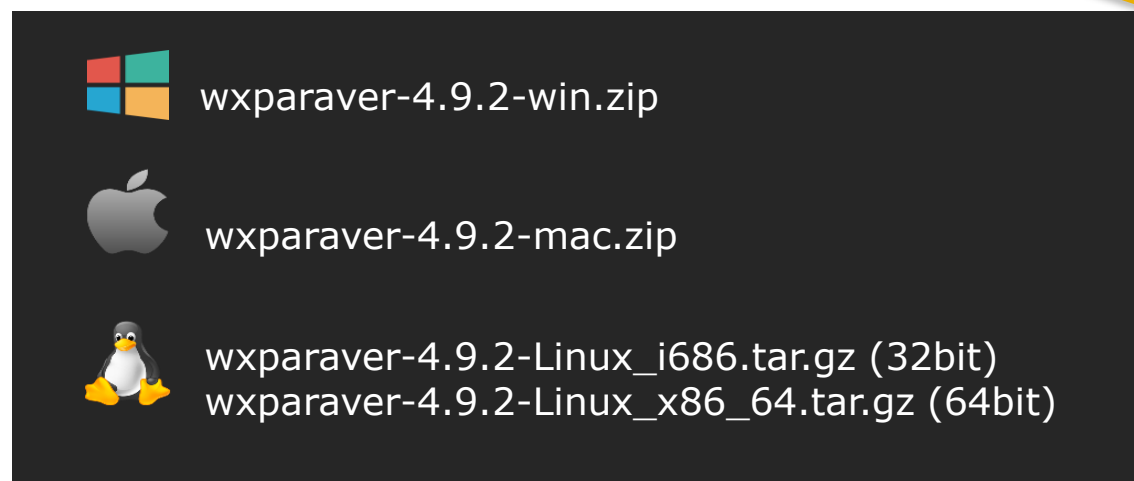


Paraver Installation

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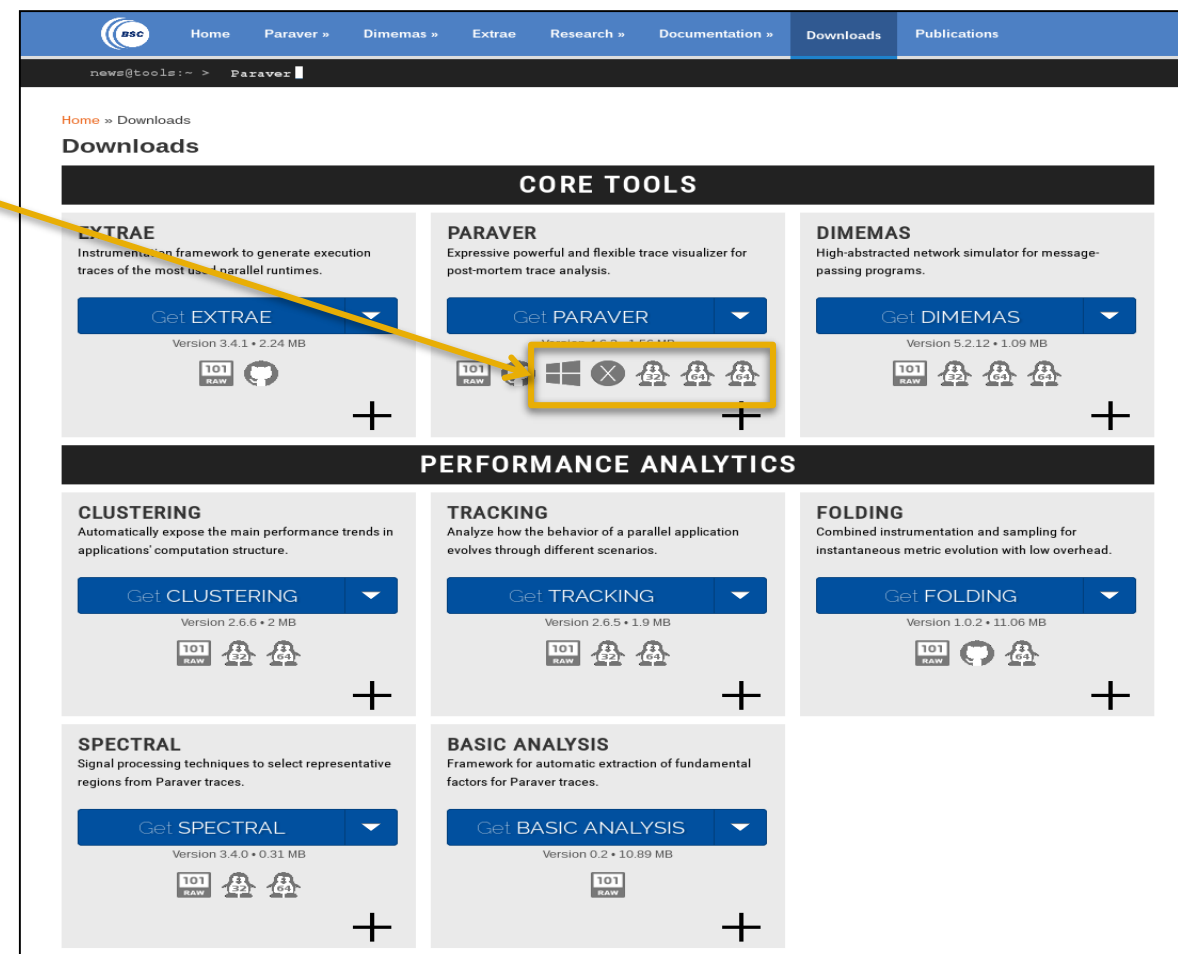
Install Paraver in your laptop

- Download a binary for your OS
 - <https://tools.bsc.es/downloads>



Download links for Paraver binaries:

- wxparaver-4.9.2-win.zip (Windows)
- wxparaver-4.9.2-mac.zip (Mac)
- wxparaver-4.9.2-Linux_i686.tar.gz (32bit)
- wxparaver-4.9.2-Linux_x86_64.tar.gz (64bit)



Screenshot of the Paraver website showing the Downloads section. The website is titled "Paraver" and features a navigation menu with links to Home, Paraver, Dimemas, Extrae, Research, Documentation, Downloads, and Publications. The main content area is divided into two sections: "CORE TOOLS" and "PERFORMANCE ANALYTICS".

CORE TOOLS

- EXTRAE**: Instrumentation framework to generate execution traces of the most used parallel runtimes. Version 3.4.1 • 2.24 MB. Download button: Get EXTRAE.
- PARAVER**: Expressive powerful and flexible trace visualizer for post-mortem trace analysis. Version 4.9.2 • 1.99 MB. Download button: Get PARAVER. A yellow box highlights the download button and the icons for Windows, Mac, Linux 32bit, and Linux 64bit.
- DIMEMAS**: High-abstracted network simulator for message-passing programs. Version 5.2.12 • 1.09 MB. Download button: Get DIMEMAS.

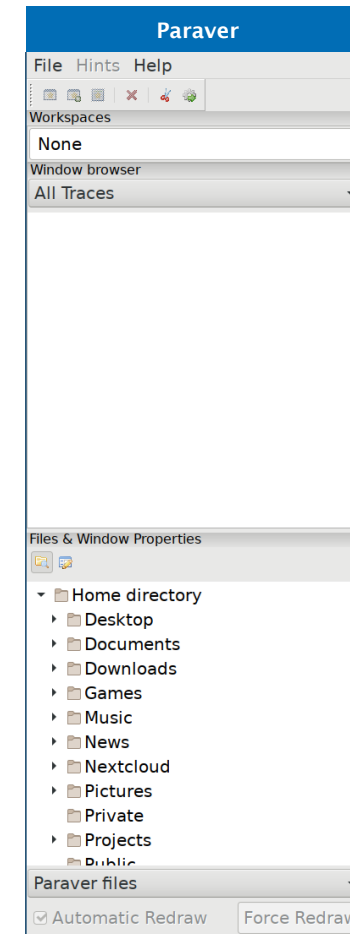
PERFORMANCE ANALYTICS

- CLUSTERING**: Automatically expose the main performance trends in applications' computation structure. Version 2.6.6 • 2 MB. Download button: Get CLUSTERING.
- TRACKING**: Analyze how the behavior of a parallel application evolves through different scenarios. Version 2.6.5 • 1.9 MB. Download button: Get TRACKING.
- FOLDING**: Combined instrumentation and sampling for instantaneous metric evolution with low overhead. Version 1.0.2 • 11.06 MB. Download button: Get FOLDING.
- SPECTRAL**: Signal processing techniques to select representative regions from Paraver traces. Version 3.4.0 • 0.31 MB. Download button: Get SPECTRAL.
- BASIC ANALYSIS**: Framework for automatic extraction of fundamental factors for Paraver traces. Version 0.2 • 10.89 MB. Download button: Get BASIC ANALYSIS.

Install Paraver

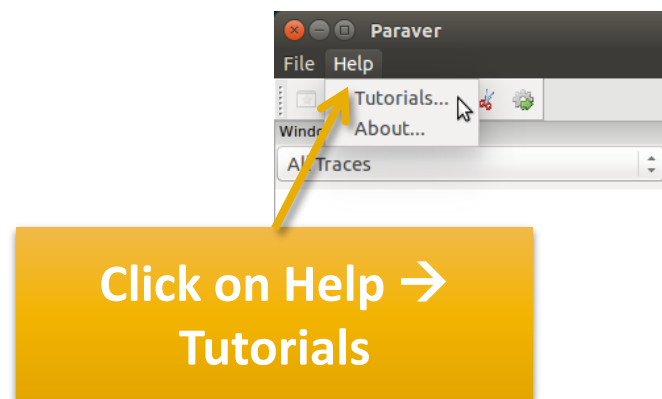
- Uncompress downloaded package
- Rename the folder:
 - wxparaver-4.9.2-* → paraver
- Start Paraver:
 - Linux: Run the command:

```
laptop$ paraver/bin/wxparaver
```
 - Windows: Double-click on paraver/wxparaver.exe
 - MAC: Double click on paraver/wxparaver.app

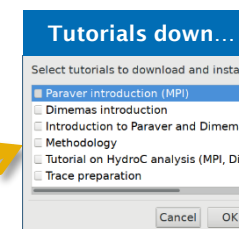
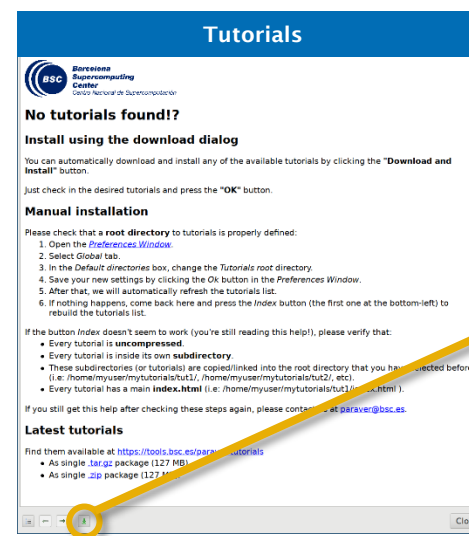


Install Paraver

- Download tutorials



Tutorials window will pop-up



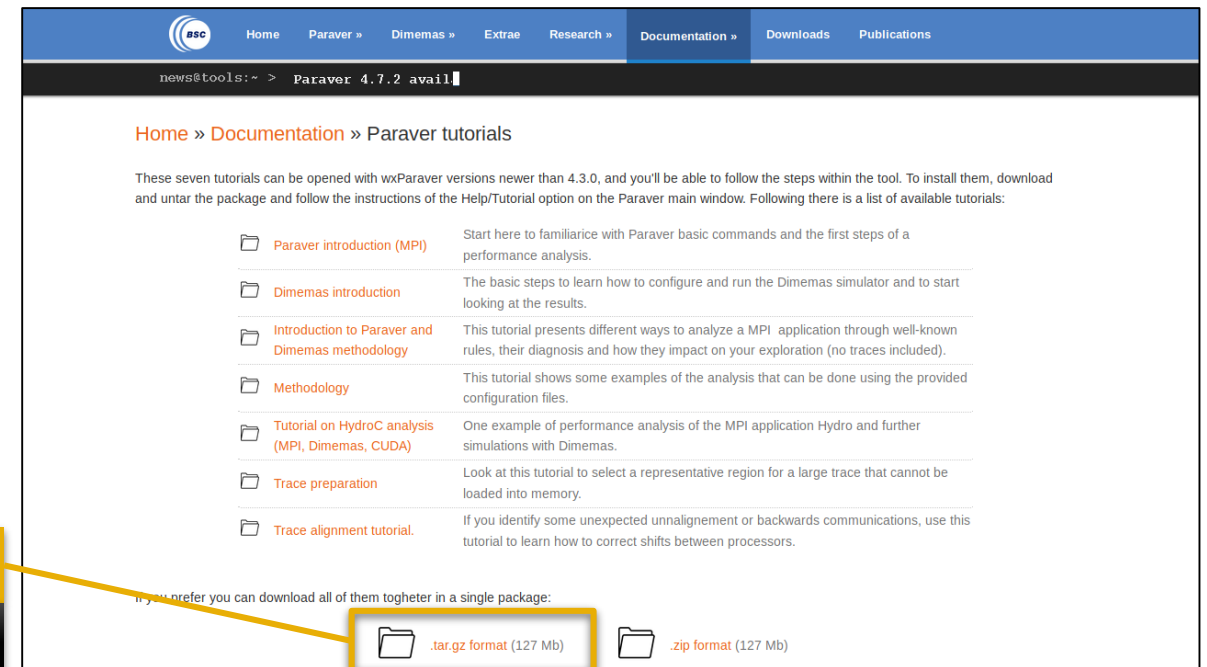
- Follow these tutorials by clicking on the hyperlinks and reading the explanations. When you click on a link, multiple views will open.

Install Paraver tutorials (alternative method)

- Download tutorials archive
 - <https://tools.bsc.es/paraver-tutorials>

All tutorials

```
paraver-tutorials-20150526.tar.gz
```



The screenshot shows the Paraver documentation page for version 4.7.2. The page title is "Home » Documentation » Paraver tutorials". Below the title, there is a paragraph explaining that seven tutorials are available for newer versions of wxParaver. A list of seven tutorials follows, each with a folder icon and a brief description:

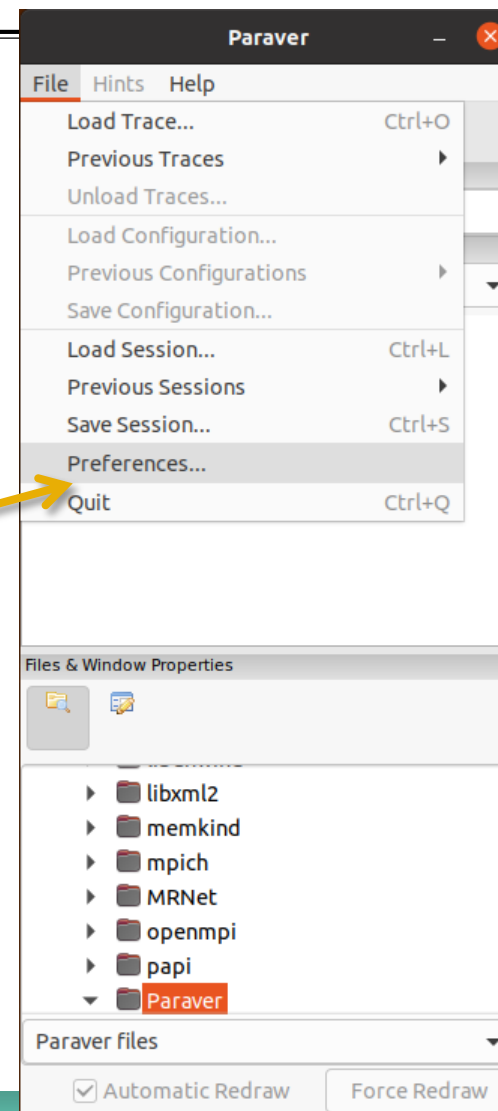
- Paraver introduction (MPI)**: Start here to familiarize with Paraver basic commands and the first steps of a performance analysis.
- Dimemas introduction**: The basic steps to learn how to configure and run the Dimemas simulator and to start looking at the results.
- Introduction to Paraver and Dimemas methodology**: This tutorial presents different ways to analyze a MPI application through well-known rules, their diagnosis and how they impact on your exploration (no traces included).
- Methodology**: This tutorial shows some examples of the analysis that can be done using the provided configuration files.
- Tutorial on HydroC analysis (MPI, Dimemas, CUDA)**: One example of performance analysis of the MPI application Hydro and further simulations with Dimemas.
- Trace preparation**: Look at this tutorial to select a representative region for a large trace that cannot be loaded into memory.
- Trace alignment tutorial**: If you identify some unexpected unalignment or backwards communications, use this tutorial to learn how to correct shifts between processors.

At the bottom of the page, there is a note: "If you prefer you can download all of them together in a single package:". Below this note, there are two download options: ".tar.gz format (127 Mb)" and ".zip format (127 Mb)". The ".tar.gz format" option is highlighted with a yellow box, and a yellow arrow points from the "All tutorials" text to this box.

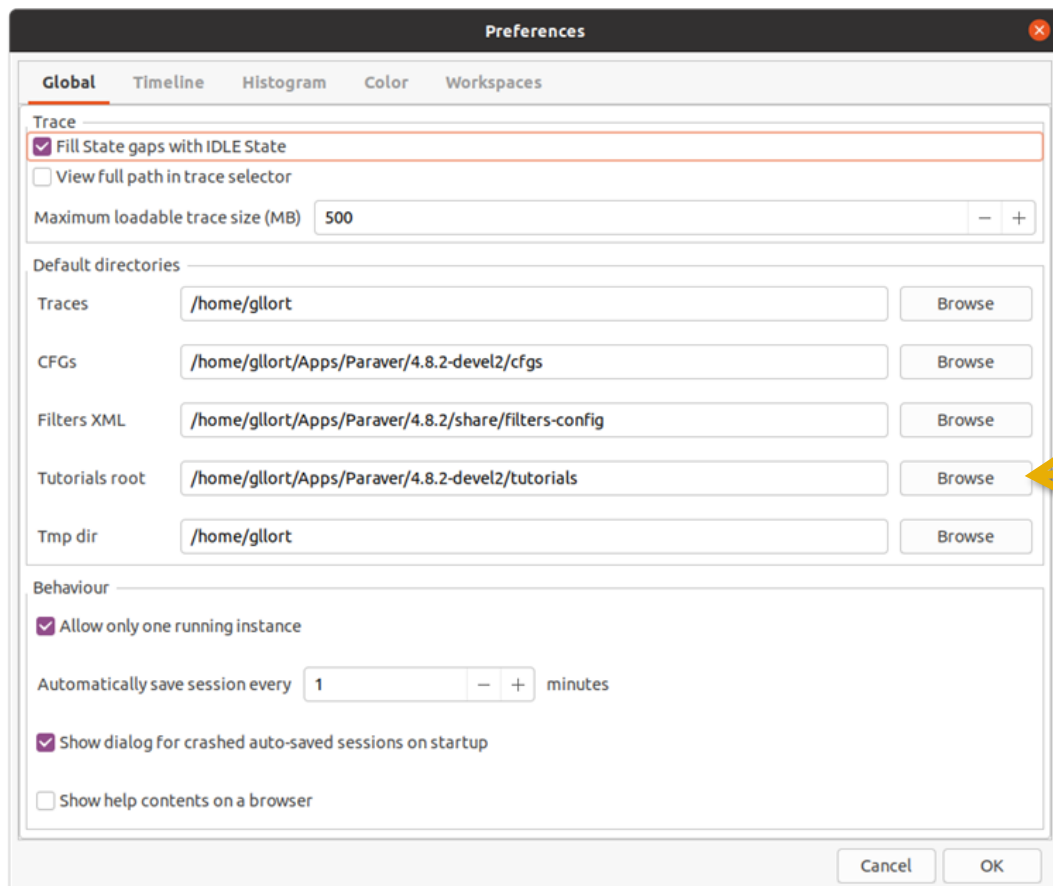
Install Paraver tutorials (alternative method)

- Uncompress downloaded package
- Rename the folders:
 - paraver-tutorials-20150526 → tutorials
- Start Paraver:
 - Linux: Run the command:

```
laptop$ paraver/bin/wxparaver
```
 - Windows: Double-click on paraver/wxparaver.exe
 - MAC: Double click on paraver/wxparaver.app
- Open File → Preferences



Install Paraver tutorials (alternative method)



- Setup the “Tutorials root” pointing to your folder “tutorials”

Click Browse and select your folder “tutorials”

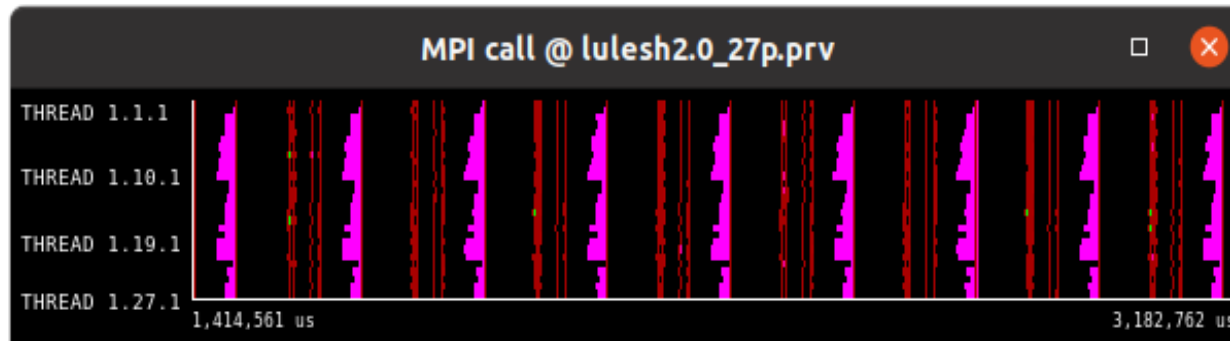
Paraver Introduction

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3 main views of Paraver (I)

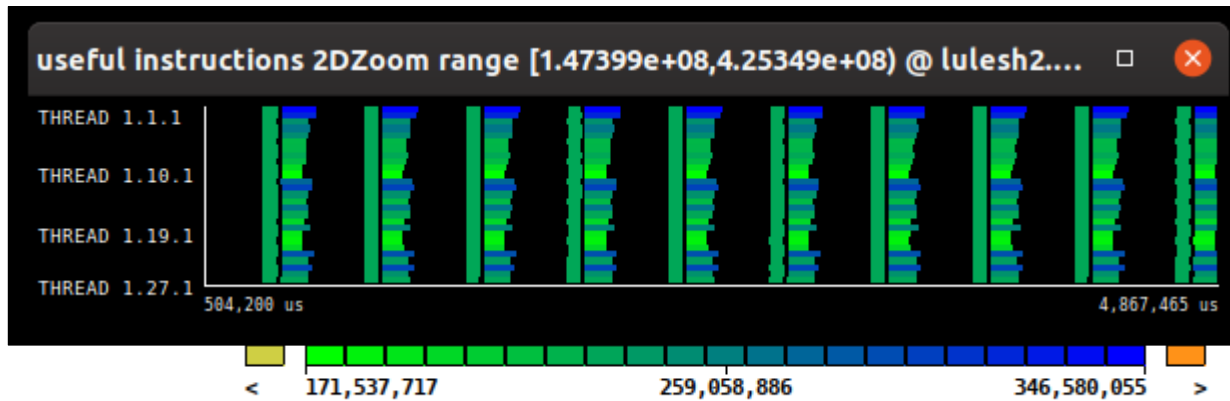
Timeline

Processes (and threads)



Code color
(e.g. 1 color for each MPI call)

- Outside MPI
- MPI_Isend
- MPI_Irecv
- MPI_Wait
- MPI_Waitall
- MPI_Barrier
- MPI_Reduce
- MPI_Allreduce
- MPI_Comm_rank
- MPI_Finalize



Gradient color
(e.g. from low
#instructions to
high
#instructions)

Time

3 main views of Paraver (II)

- Table (Profile)

The table can display a variety of statistics (e.g. % of time, # of calls, etc.) with gradient coloring showing from low values to high values

Processes (and threads)

Categories (e.g. MPI calls)

	Outside MPI	MPI_Isend	MPI_Irecv	MPI_Wait	MPI_Waitall	MPI_Barrier	MPI_Reduce	MPI
THREAD 1.1.1	99.04 %	0.05 %	0.06 %	0.35 %	0.30 %	0.03 %	0.00 %	
THREAD 1.2.1	97.37 %	0.07 %	0.08 %	0.20 %	0.82 %	0.03 %	0.00 %	
THREAD 1.3.1	93.79 %	0.05 %	0.05 %	0.22 %	0.52 %	0.03 %	0.02 %	
THREAD 1.4.1	93.93 %	0.07 %	0.08 %	0.17 %	0.61 %	0.03 %	0.00 %	
THREAD 1.5.1	93.75 %	0.11 %	0.11 %	0.38 %	0.19 %	0.01 %	0.00 %	
THREAD 1.6.1	91.64 %	0.08 %	0.08 %	0.10 %	0.74 %	0.02 %	0.00 %	
THREAD 1.7.1	91.24 %	0.06 %	0.05 %	0.16 %	0.42 %	0.03 %	0.11 %	
THREAD 1.8.1	91.93 %	0.08 %	0.08 %	0.16 %	0.76 %	0.03 %	0.00 %	
THREAD 1.9.1	91.20 %	0.06 %	0.05 %	0.14 %	0.59 %	0.02 %	0.50 %	
THREAD 1.10.1	90.47 %	0.08 %	0.07 %	0.33 %	0.37 %	0.03 %	0.00 %	
THREAD 1.11.1	89.19 %	0.12 %	0.11 %	0.35 %	0.30 %	0.01 %	0.70 %	
THREAD 1.12.1	95.80 %	0.09 %	0.07 %	0.19 %	0.83 %	0.03 %	0.00 %	
THREAD 1.13.1	96.04 %	0.12 %	0.10 %	0.41 %	0.33 %	0.01 %	0.00 %	
THREAD 1.14.1	94.61 %	0.18 %	0.15 %	0.15 %	0.35 %	0.00 %	0.00 %	
THREAD 1.15.1	93.28 %	0.13 %	0.10 %	0.10 %	1.21 %	0.01 %	0.00 %	
THREAD 1.16.1	91.67 %	0.09 %	0.07 %	0.26 %	2.01 %	0.03 %	0.00 %	
THREAD 1.17.1	93.28 %	0.13 %	0.10 %	0.11 %	1.06 %	0.01 %	0.45 %	
THREAD 1.18.1	89.56 %	0.09 %	0.07 %	0.16 %	1.72 %	0.03 %	0.00 %	
THREAD 1.19.1	94.06 %	0.06 %	0.04 %	0.13 %	0.47 %	0.03 %	0.00 %	
THREAD 1.20.1	89.39 %	0.10 %	0.06 %	0.25 %	1.05 %	0.03 %	0.00 %	
THREAD 1.21.1	89.62 %	0.07 %	0.04 %	0.22 %	0.30 %	0.03 %	0.90 %	
THREAD 1.22.1	88.08 %	0.09 %	0.06 %	0.26 %	2.02 %	0.03 %	0.00 %	
THREAD 1.23.1	98.19 %	0.14 %	0.10 %	0.16 %	0.62 %	0.01 %	0.00 %	
THREAD 1.24.1	94.10 %	0.10 %	0.06 %	0.12 %	1.24 %	0.02 %	0.00 %	
THREAD 1.25.1	96.05 %	0.07 %	0.04 %	0.29 %	0.26 %	0.02 %	0.00 %	
THREAD 1.26.1	93.10 %	0.10 %	0.06 %	0.13 %	1.13 %	0.03 %	0.00 %	
THREAD 1.27.1	94.24 %	0.08 %	0.04 %	0.18 %	0.39 %	0.02 %	0.00 %	
Total	2,514.62 %	2.44 %	1.99 %	5.69 %	20.63 %	0.60 %	2.72 %	
Average	93.13 %	0.09 %	0.07 %	0.21 %	0.76 %	0.02 %	0.10 %	
Maximum	99.04 %	0.18 %	0.15 %	0.41 %	2.02 %	0.03 %	0.90 %	
Minimum	88.08 %	0.05 %	0.04 %	0.10 %	0.19 %	0.00 %	0.00 %	
StDev	2.79 %	0.03 %	0.03 %	0.09 %	0.51 %	0.01 %	0.24 %	
Avg/Max	0.94	0.50	0.49	0.52	0.38	0.72	0.11	

Summary

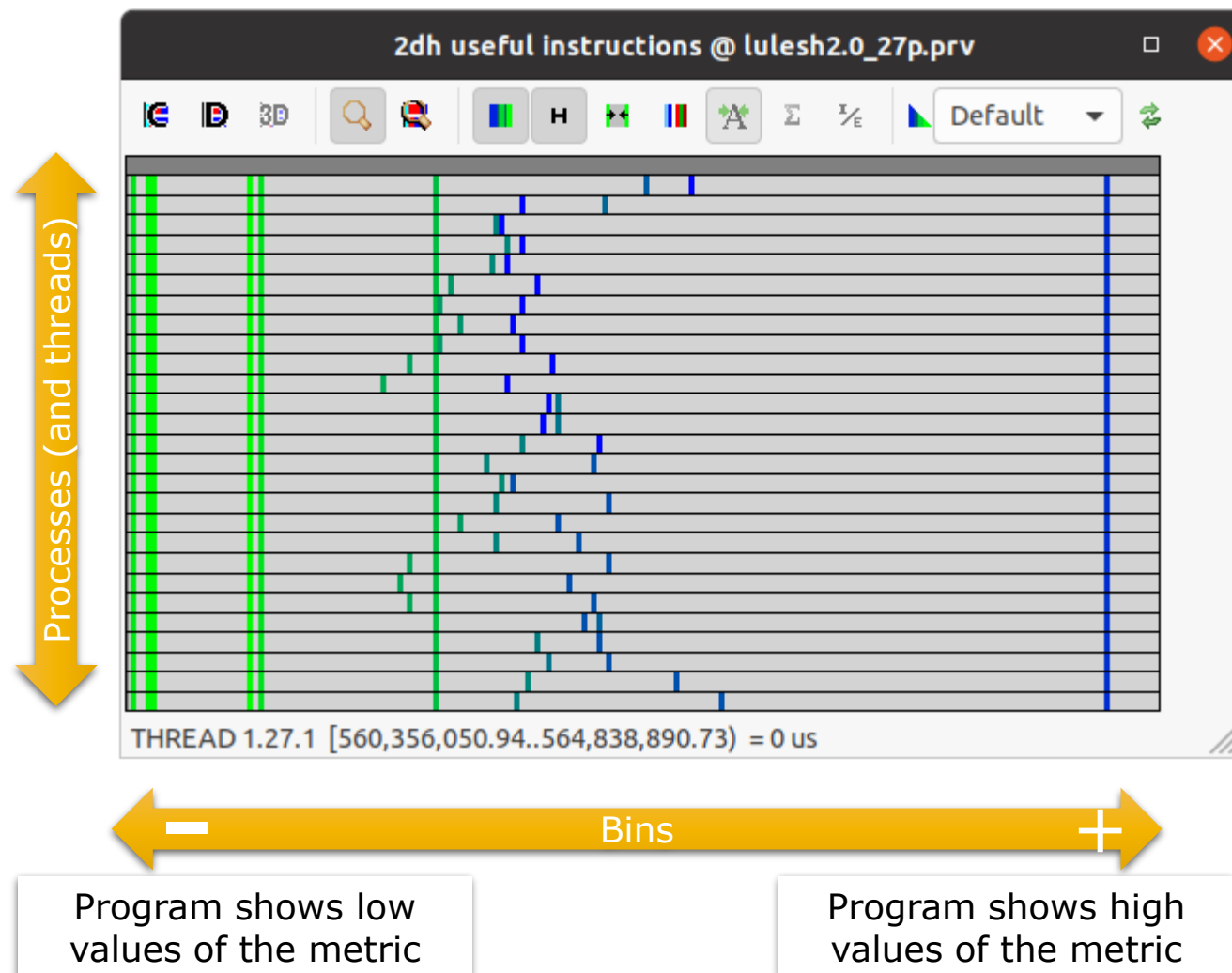
3 main views of Paraver (III)

■ Histogram

Displays continuous metrics (e.g. **instructions executed**, duration of computations, bytes sent/received, etc.)

Gradient color represents if the value for that behavior is **high** or **low**

General tip: straight lines are good (all processes show same behavior), while variabilities usually indicate imbalances



First steps with Paraver

- Follow tutorial number...
 - 1 → Explains basic navigation with the tool
 - 3 → Basic analysis methodology (first 4 bullets, Clustering and Dimemas part not covered)
 - 5 → Analysis methodology applied to a real application



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