

INAF HPC SCHOOL - BASIC

Luca Tornatore, I.N.A.F.

2025 INAF Course on HPC - Basic Module



September, 22nd - 26th, OACT, Catania

Welcome

Welcome at the Basic Module of the HPC INAF School 2025 edition

hosted from 22nd to 26th of September by the
Observatory of Catania.

Welcome

Let's express our gratitude to the LOC

Alessandro Costa

Fabio Vitello

Salvo Scavo

that has co-organised the course, all the logistics and
the set-up of the cluster PLEIADI @ OACT

Welcome

Your teachers and instructors will be

Luca Tornatore

David Goz

Giovanni Lacopo

Antonio Ragagnin

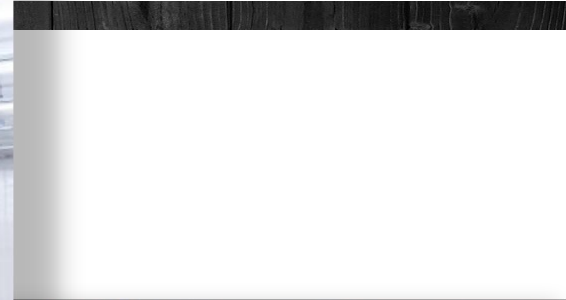
Giuliano Taffoni

from OATS (Trieste)

What you're gonna learn this week ?



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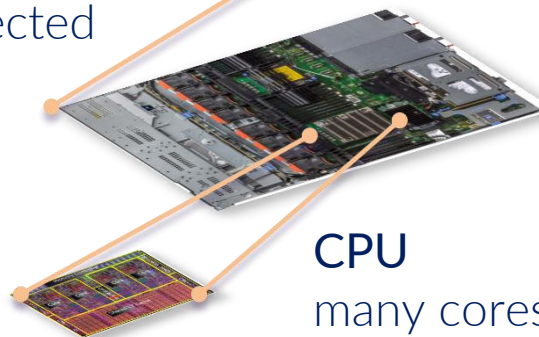
HPC platform



~100
interconnected
racks



RACK
~100 of
interconnected
nodes



NODE
multiple CPUs (2-4)
multiple GPUs (2-8)
multiple FPGAs
multiple Vector Acc.

CPU
many cores



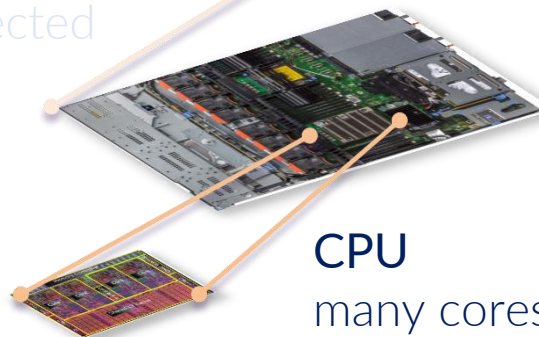
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What you're gonna learn this week ?

The INAF school is (being) planned to be modular

BASIC HPC single node

Modern Architecture
Code Optimization
Multi-threading
Debugging
Profiling

Introduction, fundamental
concepts, toolbox to exploit
a **single node**
1 week

BASIC HPC multi node

MPI
Message Passing

toolbox to exploit
multiple nodes in
distributed memory
3 days

Advanced HPC

Advanced MPI
Advanced OpenMP

more **sophisticated**
parallelism and
algorithms, scaling at
thousands of nodes
4 days

GPUs

~3 days

Advanced profiling

~3 days

What you're gonna learn this week ?

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Profiling

Introduction, fundamental
concepts, toolbox to exploit
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BASIC HPC multi node

We are here

toolbox to exploit
multiple nodes in
distributed memory

Advanced HPC

Advanced MPI
Advanced OpenMP

more sophisticated
parallelism and
algorithms, scaling at
thousands of nodes

GPUs

**Advanced
profiling**

The plan of the week

	22/9 MONDAY	23/9 TUESDAY	24/9 WEDNESDAY	25/9 THURSDAY	26/9 FRIDAY
	<i>CPU architecture & code optimization</i>	<i>Parallelism & Intro to OpenMP</i>	<i>OpenMP</i>	<i>OpenMP / Profiling & Debugging</i>	<i>Profiling & Debugging</i>
09:00	Welcome Address		OpenMP	OpenMP	Debugging
09:30		Intro to parallel computing			
10:00	CPU Arch. & Optimization		exercises	exercises	exercises
10:30					
11:00	break	break	break	break	break
11:30			OpenMP		Conclusions
12:00	exercises	Intro to OpenMP		Profiling	exam
12:30			exercises		
13:00					
13:30	LUNCH BREAK	LUNCH BREAK	LUNCH BREAK	LUNCH BREAK	
14:00					
14:30					
15:00	CPU Arch. & Optimization	OpenMP	OpenMP	exercises	
15:30					
16:00	break	break	break	break	
16:30					
17:00				exercises	
17:30	exercises	exercises	exercises	Debugging	
18:00					
18:30				exercises	

The (temporary) repo

https://github.com/lucatornatore/INAF_HPC_School_2025

Before starting

If some of you has any issue in accessing the cluster

`pleiadi.oact.inaf.it`

with the user name and ssh key, please at the coffee break ask either Fabio Vitello or Salvo Scavo.

Your user name is **hpcschool\$NN**

that's all, have fun



“So long
and thanks
for all the fish”