Welcome to ESC@SESAME 2026

Second School on Efficient Scientific Computing
@SESAME - Jordan

F. Giacomini - INFN

Our warmest welcome, also on behalf of

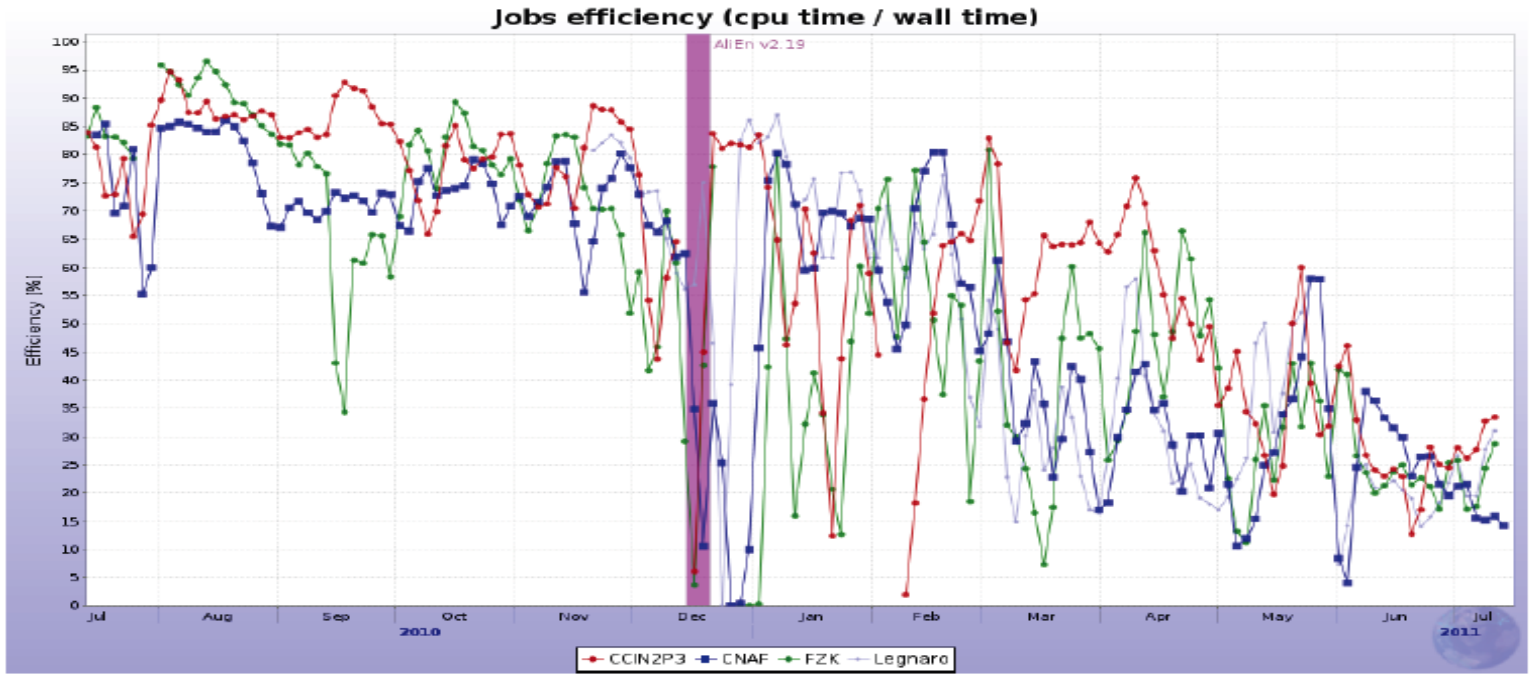
- **SESAME**, the host laboratory
- **INFN**, the Italian Institute for Nuclear Physics
  - CNAF and Padova sites, providing most of the support
- The lecturers and their Institutions (**INFN-CNAF** and **CERN**)

Why a School like ESC

- the idea of a School on Efficient Scientific Computing was conceived in the context of **High Energy Physics experiments**
- HEP has long relied heavily on computing, since long
  - for many years the **scale of the resources** required by HEP experiments was such that the host laboratory's computing centers were **well able to cope** with the core computing data processing needs
    - the **UA1/2** experiments that discovered the Z and W bosons at CERN were good examples
  - the model started to **break down** at the end of the last century when experiments, such as the BaBar experiment at the SLAC B-factory, had to deal with a **huge amount of data** and the computing power eventually had to be scaled up by **more than an order of magnitude** compared to the initial estimates
- the investment required began to **grow very significantly**
- for the first time it was deemed necessary **to outsource the processing of the data** stored on tape to an external center

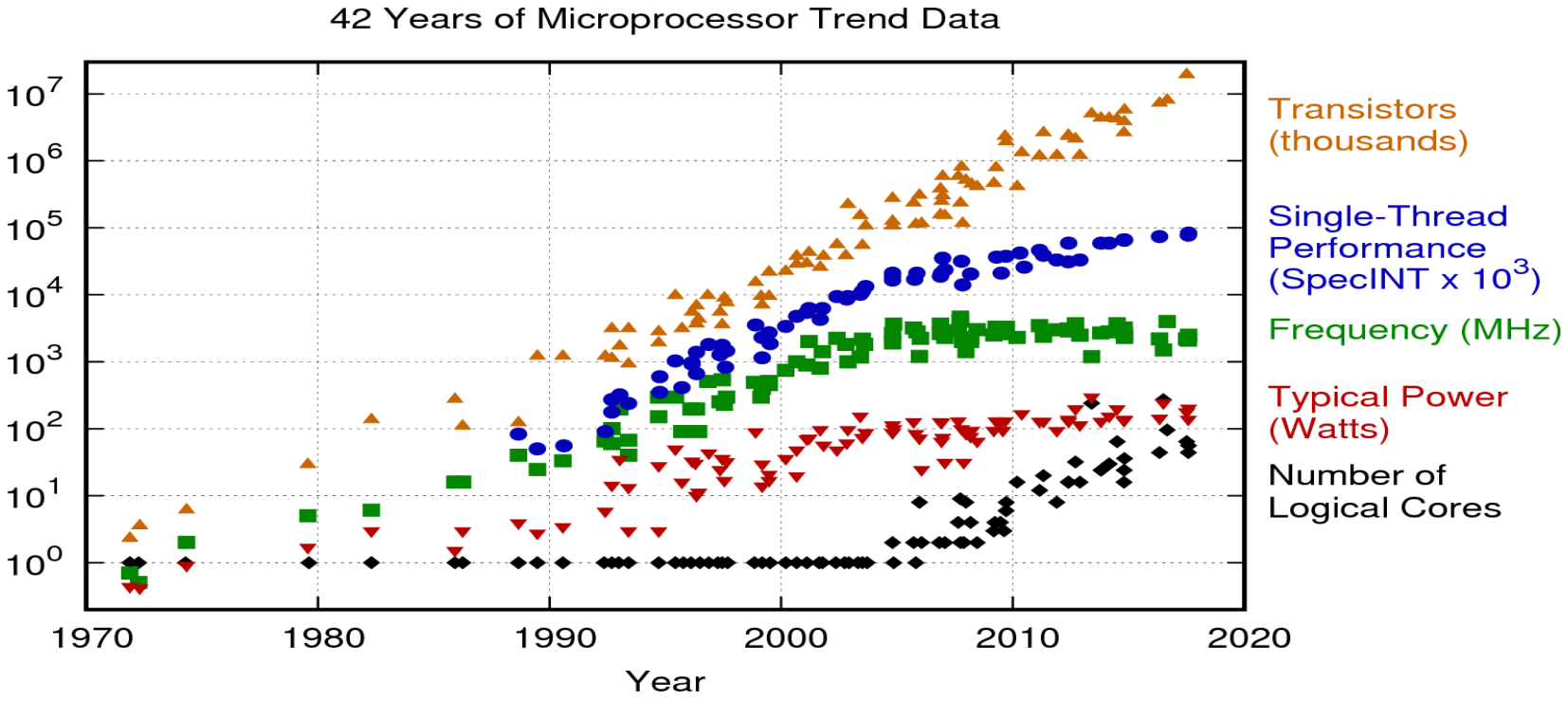
In addition…

- the **complexity** of the computational model and implementations also increased, sometimes producing unexpected results…



To make life harder

- At the beginning of this century, the free ride on CPU power came to an end



Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten
New plot and data collected for 2010-2017 by K. Rupp

The ESC School

- The conception of the ESC school was motivated by the awareness that the **efficient use of computing resources** in our field
  - had to be **taken seriously**, given the level of computing investment required
  - was not always **well understood and properly addressed**
  - was becoming **increasingly challenging**, in particular due to
    - the **physical constraints** on scalar performance increases
    - necessity to exploit Moore's Law anyway, with **new and more complex processor architectures:**
      - many cores, coprocessors, GPU, vector units, etc.
- From 2009 we have organized the **ESC School** in the Bertinoro Univ. Center (Italy)
  - ex Bishop Fortress

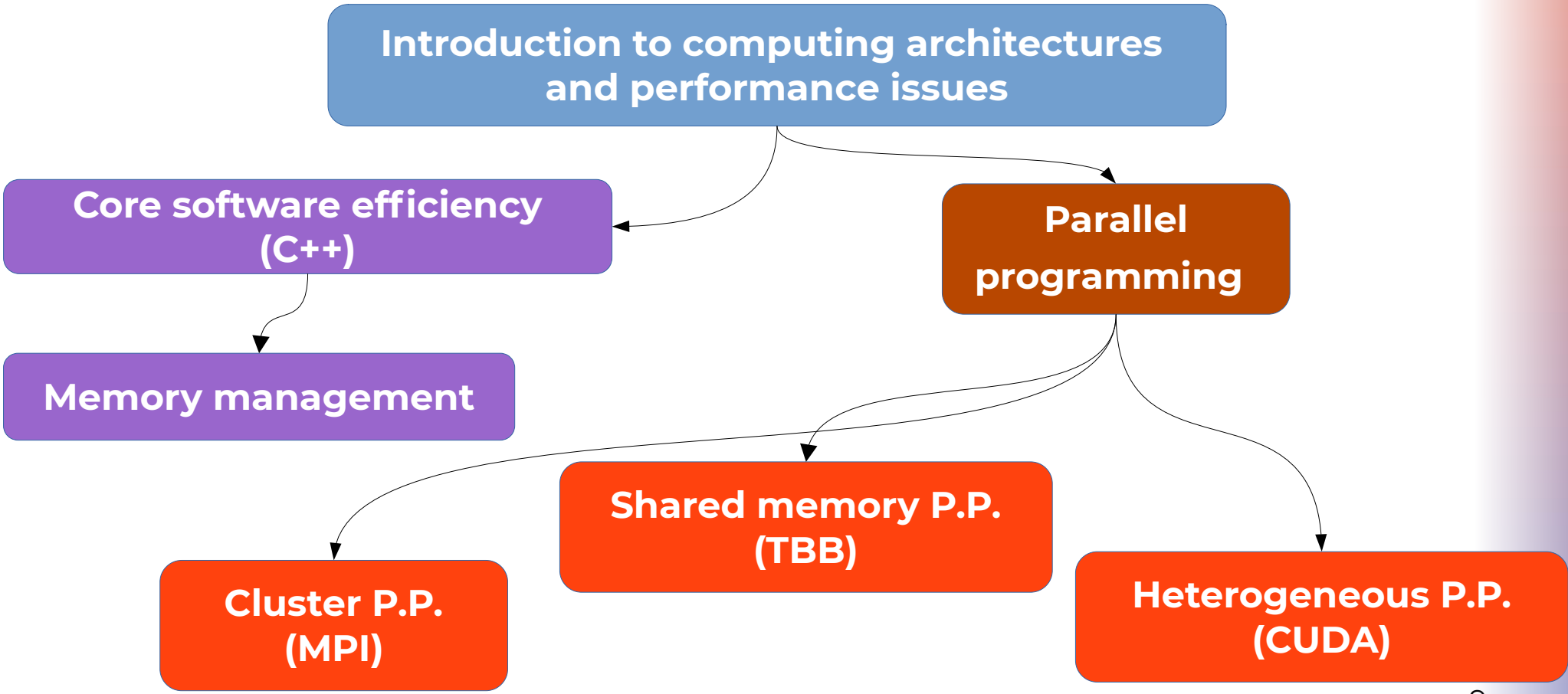
From Bertinoro to Sesame

- In the past we have received several requests to attend the Bertinoro School from candidates outside Europe, particularly from **North Africa and the Middle East**
- In some cases, the applicant was **able to come**.
  - as was the case with our Sesame colleague **Mustafa** Alzu'bi in 2012
  - In other cases, unfortunately, it **was not possible** for the interested people to come, mostly for bureaucratic and economic reasons
- So we started to think that, maybe, we could make it easier for the students to participate by organising the school **closer to where they live**

From Bertinoro to SESAME (I)

- looking at **possible locations** for the School, SESAME sticked out as the ideal place:
  - an **international laboratory** exploiting the scientific potential of a third-generation Synchrotron Light Source
  - a community of **Members states (Cyprus, Egypt, Iran (Islamic Republic of), Israel, Jordan, Pakistan, Palestine, and Türkiye)** and Observers states (countries in the Middle East and other regions worldwide), developed under the auspices of UNESCO
  - first major **international center of excellence** in the region
  - well **equipped guest house** with nice lecture room
  - strong existing collaboration with **INFN** and **CERN**
- the enthusiasm of **Andrea Lausi**, the Sesame Scientific Director, in supporting the idea, convinced us that we had found the right place
- it then took some efforts to iron out the burocratic details, eventually leading to an MoU signed by INFN and Sesame
- in 2023 we had the honour to organized the first edition of the ESC@SESAME School
- and today, we are excited to continue this new adventure.

ESC@SESAME lecture plan



This week together

- thank you for preparing the **lightning talks**!
  - we have now to collect the slides; please **send them** to rossana.chiaratti@pd.infn.it by 2PM today
  - we look forward to hearing your presentations today and tomorrow

- there will be lot of **opportunities of interactions** for you this week, not only with each other but also with the lecturers
  - coffee breaks, lunch, dinner

School computing infrastructure

- our experience showed that:
  - **learning-by-doing** is the most effective way of learning
  - but it is also an **effective way of teaching**
  - guiding students to discover new notions and concepts by themselves
- therefore a **computing infrastructure** suitable for supporting hands-on activities has been setup for you
  - HPC cluster located at the CNAF INFN site
- there is a dedicated web site with instructions, teaching material and exercises: **https://infn-esc.github.io/sesame26/**
- some time is allocated this morning **to let you check** that your laptop is setup for supporting your work and that you have access to the resources and the services that are at your disposal
- you may not be able to send email via your usual e-mail client
  - one solution is to use a so called ssh tunnel, instructions will be provided later

Improving the School

- in the past, the **feedback we have received** from our students has always been very useful **in improving** the Bertinoro School, year after year
- there are two ways in which you can help us this time:
  - on Friday morning we will give you an opportunity to evaluate:
    - the **perceived quality** of various aspects of the School
      - via the **feedback questionnaire and a final discussion**
  - the **competences you have acquired**
    - through **a final test** you are invited to take, as an opportunity of self-assessment

Let's get started

- we are very excited to kick off this **second edition of ESC@SESAME**
- it will also be a great opportunity for us to **learn by doing**
  - we hope that everything will go smoothly
  - but we apologise, if this will not always be the case, despite the efforts of the entire ESC staff
- the best outcome for the School is that, as happened at the Bertinoro School, **today's participants** will become **tomorrow's ESC@SESAME lecturers**.

Have an efficient and fruitful week at ESC@SESAME

1 February 2026

F. Giacomini