Welcome to Thematic CERN School of Computing

14-18 June 2021
Online

Scientific Software for Heterogeneous Architectures

http://indico.cern.ch/e/tCSC-spring-2021

Sebastian Lopienski
CERN School of Computing director
Introduction to CERN School of Computing
CERN’s mission

- Innovation
- Education
- Research

Uniting people

We are here

Discovery

Accelerating beams
(accelerators)

Detecting particles
(experiments)

Large-scale computing
(analysis)
A school with a long history

• The school was created in 1970
  – 42nd edition in 2019

• 2800 students of ~80 different nationalities have followed the school
  – usually 60-80 per year
  – alumni web site: https://cern.ch/CSC/history/alumni/

• The school has visited 22 countries
  – https://cern.ch/CSC/history/past-schools/
  – recent: Romania, Croatia, Israel, Spain, Belgium, Greece, Portugal, Cyprus
Bridging science and computing

• Technological evolution in computing empowers science
  – especially in data-intensive domains such as High Energy Physics
  – computing is the main strategy for many scientific fields
    to do research efficiently on a large scale

• It is nowadays essential that:
  – scientists master computing technologies
    as a main tool for their research
  – computer engineers understand the scientific needs
    in order to deliver computing services to research projects
Academic dimension

CERN School of Computing…

• is not a conference
  – lecturers do not present their work
  or promote their projects

• is not a training session
  – not a replication of training courses
  available at home institutes or online
  – focus on persistent knowledge,
  less on know-how
Thematic CSC spring 2021
Academic programme

https://indico.cern.ch/event/1017080/program

Theme: “Scientific Software for Heterogeneous Architectures”

– **Introduction lecture** “Preparing for the HL-LHC computational challenge” by Danilo Piparo (CERN)

– **Track 1**: Technologies and Platforms
  by Andrzej Nowak

– **Track 2**: Parallel and Optimised Scientific Software
  by Danilo Piparo (CERN)
  and Sebastien Ponce (CERN)
  exercises assisted by Arthur Hennequin (CNRS)

– **Track 3**: Programming for Heterogeneous Architectures
  by Dorothea vom Bruch (CPPM/CNRS)
  and Daniel Campora (University of Maastricht)
CSC Organizers

Joelma Tolomeo
Administrative Manager

Jarek Polok
Technical Manager

Sebastian Lopienski
Director
Participants (you!)

42 students invited

https://indico.cern.ch/event/1017080/page/21983-participants
School organization and logistics
Online school

https://indico.cern.ch/event/1017080/page/22013-school-guide
https://indico.cern.ch/event/1017080/page/22182-online-platforms

• **Active participation** throughout the whole week
  – attend all **classes**, taking **lecture quizzes**
  – contribute to **group assignments**, completing **exercises**
  – use **Mattermost chat** for discussions, questions, interactions with others
  – don’t plan to work in parallel during this week
  – block social media?

• **Zoom etiquette**
  – connect on time (or before!)
  – stay muted, video disabled (*except for group assignments*)
  – to ask a question, Raise Hand 🖐️ or write on the chat
The 8th **Thematic** CERN School of Computing (tCSC spring 2021) will take place on June 14-18, 2021 in an online format.

The theme of the School is "**Scientific Software for Heterogeneous Architectures**" - see the academic programme for more details.

The School is targeted at postgraduate (i.e. minimum of Bachelor degree or equivalent) students, engineers and scientists with a few years' experience in particle physics, in computing, or in related fields. We welcome applications from all countries and nationalities.

Due to the ongoing Covid-19 pandemic, this School is organised in an online format. Nevertheless, we aim at creating the usual rich, interactive learning experience, for which CERN School of Computing (CSC) is known since years.
School booklet

- Electronic version only
- Linked from school main page on Indico (at the bottom)
- Contains pictures and short biographies of all participants
Mattermost is your friend, too

https://mattermost.web.cern.ch/csc
https://indico.cern.ch/event/1017080/page/22182-online-platforms#mattermost
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Channels:

- A channel for each *Track*  
  – to discuss with the speakers and other students
- **Announcements** – official communications
- **Technical support**

(You can create more channels, public or private, or chat directly with other participants)

**Reminder**: please use “Reply” button

Sebastian Lopienski  5:19 PM
Do you prefer C++ or Python?
### Timetable

**https://indico.cern.ch/event/1017080/timetable/**

<table>
<thead>
<tr>
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Lecture quizzes (mandatory)

- After each lecture, go to lecture quizzes page and complete a simple test (2-3 questions)
- The goal is to confirm what you’ve learned – it’s for you only
- Once you select an answer, it will be highlighted in red or green, and additional explanations may appear

How much storage space do the LHC experiments need today to operate and securely save the raw data? *

- A few hundred Terabytes
- A few hundred Petabytes
- More than one Exabyte
- A few hundred Gigabytes

Submit
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Group assignments
(one session for each Track)

Part one (45 minutes)
• You will be split into 7 groups of 6 persons each (Zoom breakout rooms)
• You will be given a topic to discuss
  – everyone is expected to participate in the discussion, with cameras enabled
  – please use a shared document (e.g. on Codimd)
• Elect a chairperson (ensures that everyone can and does contribute, keeps track of time)
• … and a secretary (takes notes, and reports afterwards the outcome of the discussion)

Part two (45 minutes)
• Everyone gets back to the main Zoom room
• Each group reports briefly (5 minutes) on their discussion and conclusions
# Hands-on exercises

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# Hands-on exercises
(for Track 2 and Track 3)

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<tr>
<th>Time</th>
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<tr>
<td>14:00</td>
<td>Exercise introduction: Parallel …</td>
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<td>16:30</td>
<td>Exercise debriefing: Parallel and …</td>
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**Exercise introduction**

**Hands-on part**
- split into two Zoom breakout rooms
- a lecturer or a mentor in each room

**Exercise debriefing** (the next day)

Exercise instructions and materials published in Indico ([Track 2](#) and [Track 3](#))

Access to exercise environment – see [prerequisites](#) and [access details](#) pages
- use your CERN account
Student lightning talks (Wednesday at 15:50)

https://indico.cern.ch/event/1017080/contributions/4268654/

• A short talk (7-10 minutes) on a scientific or technical topic

• An informal opportunity for you to share your interest or passion
  – a technology, tool or service that you are using
  – your PhD research
  – experiment or project you're working on

• Still a few slots available → if interested, submit your proposal
  – talk to me on Mattermost (@slopiens) or by email (Sebastian.Lopienski@cern.ch)
  if you’re hesitating or not sure if your topic fits
Special evening lecture (Tuesday 19:00 - optional)

https://indico.cern.ch/event/1017080/contributions/4268656/

by Ivica Puljak (University of Split)
Exam (Friday at 15:30)
https://indico.cern.ch/event/1017080/contributions/4268646/

- Covering all lectures, except the Introduction and the Summary lectures
- Two questions per lecture → 22 questions
- Duration: 40 minutes
- Multiple choice questions: 4 answers possible – only one is correct

- The passing threshold is 50% of correct answers
- Rules:
  - you may consult materials (slides etc.)
  - you must not use external help, or communicate with other people
- Results will be sent by e-mail as soon as possible after the exam
Enjoy and profit from the school!

14-18 June 2021
Online

Scientific Software for Heterogeneous Architectures

http://cern.ch/csc
CSC Rule #3

Wear your badge

- Dehua Zhu
  ETHZ

- Surya Seetharaman
  CERN

- Arif Bayirli
  Bogazici University

- Ruchi Mishra
  Nicolaus Copernicus Astronomical Center

- Chloe Ransom
  University of Zurich

- Sebastian Templ
  HEPHY