CERN School of Computing 2023

Sunday 20 August 2023 - Saturday 2 September 2023

Delta Centre - University of Tartu

Academic Programme

The complete programme will offer over 50 hours of lectures and hands-on exercises. The programme is organized over three distinct tracks: Physics Computing, Software Engineering, and Data Technologies. In addition, guest lectures, student presentations and special evening talks will be organised.

(Please note that this programme may be subject to minor changes.)

Physics Computing

Introduction to Physics Computing

by Arnulf Quadt (University of Göttingen) 2h lectures foundations of particle physics introduction to the Standard Model event filtering calibration and alignment event reconstruction event simulation physics analysis data flow and computing resources

Data Science and Interactive Data Exploration

by Pere Mato (CERN) 2h lectures + 2h exercises introduction, data science tools using data from different sources non-numeric data

Data Analysis

by Toni Šćulac (University of Split) 4h lectures + 3h exercises introduction to data analysis probability density functions and Monte Carlo methods parameter estimation and confidence intervals hypothesis testing and p-value

Introduction to Machine Learning

Lukas Alexander Heinrich (Technische Universitat Munchen) 3h lectures + 3h exercises what is machine learning learning algorithm, loss function, optimisation overfitting and underfitting machine learning in HEP

Software Engineering

Tools and Techniques *by Pere Mato (CERN)* 2h lectures + 3h exercises introduction to software engineering test frameworks, memory checkers collaborating on complex software

Software Design in the Many-Cores Era

by Andrei Gheata (CERN) and Stephan Hageboeck (CERN) 4h lectures + 3h exercises Amdahl's and Gustafson's laws, data and task parallelism parallel programming in C++, concurrency and synchronisation performance and correctness - profiling and debugging multithreaded applications patterns for parallel software development

Creating Secure Software

by Sebastian Lopienski (CERN) 3h lectures + 3h exercises introduction to computer security security in different phases of software development web application security

Data Technologies

Data Management

by Alberto Pace (CERN) 5h lectures data workflow, storage models and technologies reliability and error correction practical cryptography: hash functions, symmetric and asymmetric encryption, digital signatures authentication, authorization and accounting: PKI, certificates, Kerberos, OpenID, OAuth etc. distributed hash tables, block storage, data replication, caching

Data and Storage Technologies

by Andreas J. Peters (CERN) 1h lecture + 3h exercises storage technologies: present and future data formats and access patterns optimizations in IO systems redundancy, cloud storage

Data Visualization

by Eamonn Maguire (Proton, Switzerland) 2h lectures + 2h exercises data visualization: theory and practical applications multi-dimensional data visualization

Additional lectures

Student lightning talks session

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