# The Fourth International School on Open Science Cloud (SOSC 2022)

**Second Bulletin, September 2022**

## School Information

The theme of the 4th edition of the international School on Open Science Cloud (SOSC) is **"Computing Models for Scientific Experiments"**. The aim of the School is to provide theoretical and practical training for students who are looking to develop their knowledge and skills on how to exploit data and computing resources for scientific applications, and how to use cloud-based infrastructures to support scientific workflows.

The School will be held in **Perugia, from 28 November to 2 December 2022.** It is organized by INFN, the Department of Physics of the University of Bologna, the Department of Physics and Geology, and the Department of Economics of the University of Perugia

The School is multi-disciplinary and targeted at postgraduate researchers including bachelor degree or equivalent in fields such as physics, statistics, computer science, biology, medicine, bioinformatics, engineering, computer vision, working at any research institute or University, with some experience and interest in data analysis, software/computing or on related topics. We welcome applications from all nationalities, and encourage all qualified persons to apply.

## Academic Program

The School programme, structured in both lectures and hands-on sessions, is organized over three tracks: 1) Fundamentals of software management and data handling, 2) Machine Learning methods and 3) Workflow Management.

The School will start with introductory lectures on the basic concepts behind a computing model for modern scientific experiments. These will be followed by an overview of software management topics, ranging from **code portability and customization based on containers** to **automated continuous integration and continuous delivery** concepts. Storage solutions and best practices will be shown, discussing, starting from user perspectives, the main features of **block storage, file storage and object storage**.

The programme will continue with a comprehensive overview of the **main Machine Learning / Deep Learning (ML/DL) models**, with a focus on basic concepts in machine learning, techniques to measure the performance of the algorithms, key ideas in the architecture of neural networks, design and implementation of models with widely-used toolkits and frameworks, basic skills to develop, deploy and maintain machine learning models in production, and more.

Finally, various approaches to the parallelization and distribution of workloads will be discussed, focusing on concrete solutions to **manage batch-like workloads**, as well as to exploit large amounts of distributed resources to execute code **interactively**.

The School will host a special event, based on live demos, on novel approaches to use FPGA (Field Programmable Gate Array) as Machine Learning accelerators.

The hands-on exercises on the topics presented during the lectures will allow students to learn and verify advanced concepts related to modern software ecosystems for Data Science and to application management in container-based distributed infrastructures, aimed to build a real computing model for scientific experiments.
Alongside the SOSC tradition, the School will foresee the development of personal projects. Data sets will be provided as well as track to address exploratory data analysis,feature engineering and machine learning as well as workload parallelization and distribution.

During the hands-on sessions, students will use, among others, Jupyter notebooks, NumPy, Pandas and Matplotlib, as well as several of the commonly used frameworks and libraries for ML/DL (e.g. scikit-learn, Tensorflow, Pytorch), together with tools like docker, docker-compose, Kubernetes, cloud storage such as S3, and framework like Dask, HTCondor.

# SOSC Certificate and Diploma

An attendance certificate will be provided to the students attending the whole School programme.
Upon successful completion of a project that will be assigned during the School, the School will also issue an official "SOSC School of Computing Diploma".
Each participant will receive a certificate with the complete list of the courses and the result of the evaluation. 6 ECTS will also be certified by the school. The credits obtained must then be validated by the respective universities of origin.

# Fees and Enrollment

The School has a registration fee that includes attendance to the lectures and to the hands-on labs, morning & afternoon coffee breaks, the social dinner and participation to the evening Focus talk on FPGA, with dinner included. Lunch, other dinners, accommodation and transfer to/from the School location is not included in the fee.

The registration fee structure is as follows:
- **Early bird** (until October 15): **€200** -
- **Full ticket** (until November 14): **€300** -

Details about Registration and Payment Method can be found [here](here)
Support for a limited number of applications is possible and can be requested directly to the School secretariat.

The **final application deadline for registrations is 14 November 2022**.

**If you have any issues with the registration or the payment please contact [sosc22-pc@lists.infn.it](mailto:sosc22-pc@lists.infn.it)**

# Additional Information

Participation is limited to 30 participants. In case there are more than 30 registration requests, the organizing committee will make a selection based on the scientific CV of the applicants, informing them of the results.

# Venue

**INFN Perugia,** Via Alessandro Pascoli, 23c, 06123 Perugia

Detailed information about the School, transportation, logistics and lectures are available at the following URL: [Travel & Accomodation](#)

# School Contact

School On Open Science Cloud 2022 - November 28th December 2nd 2022
SOSC22 URL: [https://web.infn.it/SOSC22](https://web.infn.it/SOSC22)

**The SOSC 2022 organizing committee**

Daniele Spiga - INFN Perugia
Davide Salomoni - INFN CNAF
Lucio Anderlini - INFN Firenze
Mirko Mariotti  - University of Perugia
Daniele Bonacorsi - University of Bologna
Livio Fanò - University of Perugia
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