

# Welcome

*thematic*  
CERN  
School of Computing



Sveučilište u Splitu  
University of Split



# Welcome to the Thematic School

**Alberto Pace**

# Opening Session

- **Welcome addresses**
  - Ivica Pulijak (Local Organizer)
  - Damir L alas (Vicedean of FESB)
- **School Introduction**
- **Followed by the Inaugural Scientific Lecture from prof. Claude Charlot (Ecole Polytechnique, France)**

# The CERN School of Computing

- **Aims at creating a common culture in scientific computing among young scientists and engineers involved in particle physics or other sciences, as a strategic direction to favor mobility and to facilitate the development of large computing-oriented transnational projects.**
  - <http://cern.ch/csc>
- **Participants come from worldwide laboratories and universities with typically of 15 to 30 different nationalities (60 different nationalities over the past 10 years).**
  - <http://cern.ch/csc/alumni>

## ... but also

- **To help bridge the gap between computing and science**
  - Computing is today the main technology used by many sciences to boost their research productivity
- **The unprecedented technological evolution in computing has profited directly to several scientific research project, in particular in high energy physics**
- **It is therefore essential that:**
  - Physicists understand and master computing as the main tool for their research
  - Computer scientists understand the science object of the investigation to deliver computing services that meet the needs of the research project
- **Hence: The CERN School of computing !**

# In addition: Knowledge Transfer

- **Another aim of the school is**
  - to transfer to academic, institutional and industrial circles in Member States and other countries, CERN skills and know-how in computing and ICT.
  - These skills and know-how, find direct or potential applications in all spheres of the society (as exemplified with the Web, developed by CERN and now, the Grid).

# The CERN School of computing

- **The Main School**

- Two weeks, 60 participants
- The school tackles multiple topics all associated on how to handle computing in large scientific projects.

- **The Inverted school**



- At regular CSCs, the sum of the knowledge of the students exceeds the one of lecturers teaching, and that it is frequent to find in the room real experts on particular topics. This is the idea behind **iCSC**.
- At the end of each school, we call students present to make proposals. When we receive sufficient proposals of appropriate quality, we organize an inverted school.

- **The Thematic school (this school)**

# The Thematic School

- **Goes more in depth on a particular topic**
  - This year, 2<sup>nd</sup> Edition
  - “Future high-throughput scientific computing”
- **Shorter duration: one week (5 days of tuition)**
- **Limited participation: 24 participants**
- **Clear goals**
  - Academic dimension
  - Theory and practice
  - Networking and socialization



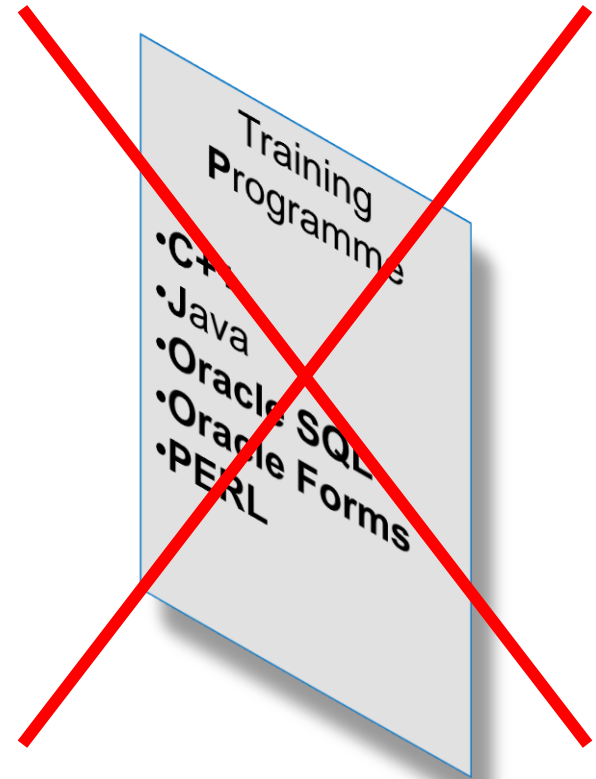
# Academic dimension

- **The tCSC ...**
  - It is not a conference
  - few lecturers
    - Improved consistency
  - Not a place for lecturers to present their work, promote their projects



# Not a training session

- No replicate of common training available at home institutes
- Focus on persistent knowledge, less on knowhow



# Knowledge versus Knowhow

- A key concept in Education sciences

Knowledge	Knowhow
Articulated to <b>other knowledge</b> of the learner	Generally <b>stand-alone</b> information
By nature, when taken by the learner, <b>different</b> between learners	Initially, the <b>same</b> for every learner
<b>Transferable</b> , adaptable to other environments	Transfer requires effort
When taken by the learner, <b>persistent</b>	Will be <b>forgotten</b> if not practiced
Requires <b>related knowledge pre-exist</b>	Limited pre-requirements

# The tCSC is a summer university

- Selected topics are most relevant in Scientific Computing for High Energy Physics
- No drastic change from one year to the other, programme relatively stable (like at University)
- Always a partnership with an University. This school:
  - University of Split
  - FESB



**Sveučilište u Splitu**  
University of Split



**UNIVERSITY OF SPLIT FACULTY OF ELECTRICAL ENGINEERING,  
MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE**

**But what is that gives the most value to the school ?**

# THE PARTICIPANTS!

Why ?

# Let's have a look at who we have in the room ...

# Let's have a look at who we have in the room ...

- **24 participants, 19 nationalities**
  - Austrian , British, Croatian, Czech, Danish, Dutch, Australian, Finnish, French, German, Indian, Italian, Norwegian, Polish, Portuguese, Romanian, Spanish, Swiss, Ukrainian.
- **21 % female (5/24)**
- **21 institutes !!**

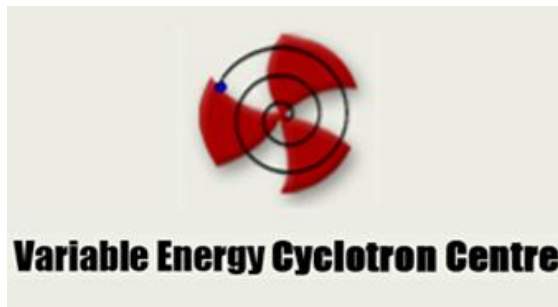


# Participants from 21 institutes

- **ADI Agencia de Inovacao (Portugal),**
- **CERN (Switzerland),**
- **Technische universität München (Germany),**
- **CNRS (France),**
- **Technical University Prague (Czech Republic),**
- **DESY (Germany),**
- **FESB (Croatia),**
- **Helsinki Institute of Physics (Finland),**
- **HEPHY Vienna (Austria),**
- **KTH Royal Institute of Technology (Sweden),**
- **National Academy of Sciences (Ukraine),**
- **National Centre for Nuclear Research NCBJ (Poland),**
- **National Technical University of Ukraine (Ukraine),**
- **Nikhef (Netherlands),**
- **Tata Inst. of Fundamental Research (India),**
- **Istituto Nazionale di Fisica Nucleare INFN (Italy),**
- **Universite Montpellier II (France),**
- **University of Mainz (Germany),**
- **University of Manchester (UK),**
- **Warsaw University of Technology (Poland)**



ROYAL INSTITUTE OF TECHNOLOGY

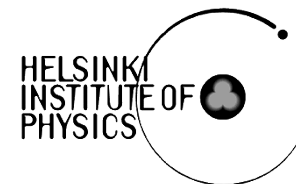
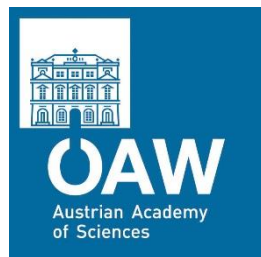


JOHANNES GUTENBERG UNIVERSITÄT MAINZ



National Technical University of Ukraine

Laboratoire Leprince-Ringuet



**So ...**

**We have quite some diversity**

**But is this valuable?**

# Excerpts from your reference letters

- Mr. xxxx is productive, extremely knowledgeable (in both breadth and depth), furthermore, I suspect that his presence will enrich your school, given his broad experience outside of physics computing.
- Mr. xxxx is familiar with basics of applied mathematics, in particular stationary iterative schemes for linear equation systems as they arise from elliptic partial systems. Furthermore, a sound understanding of C++ implementation idioms, basics of software engineering, as well as the interplay of numerical kernels with state-of-the-art hardware was essential. Recent tasks of his include handwritten, optimised kernels with a special focus on recent vector architectures into context with the emerging field of stencil compilers for scientific computations.

# Excerpts from your reference letters

Mr xxxx has successfully completed a first prototype of template method of one geometrical shape, demonstrating clearly the portable coding method proposed and identifying advantages and limitation of the approach. He has shown the ability to absorb quickly the essential elements of complex software and an excellent understanding of the complex interactions of C++ features including templates and inheritance. He has also demonstrated drive and inventiveness, and the ability to create clear, well engineered code

- In his work, xxxx has successfully mastered a steady progression of new technologies, including experiment workflow management systems (esp Condor), IaaS platforms (eg Openstack), image building and management systems, contextualization frameworks and fabric monitoring (eg Ganglia). Beyond successfully evaluating and demonstrating aspects of these technologies, he has shown a notable awareness of how all these components could fit together architecturally and what compromise and advantages follow from different technology choices

# Excerpts from your reference letters

- In his work, Mr xxxx has successfully certified, configured and made operationally functional new grid site CIS-NCBJ, providing computing and storage resources for the LHCb experiment at CERN.
- I am confident that xxxx has very good potential to do well in HEP computing. If possible, we would like him to take up bigger and more important roles in the context of CMS computing efforts which always need skilled personnel. Thus, I feel the exposure of xxxx to the tCSC will be very beneficial for him.
- Compared to other Ph.D. students, xxxxx is clearly out-standing, certainly being among the top 10% of all Ph.D. students. Since his Ph.D. work is a direct application of computer architecture and networking for high data-throughputs, being the main topic of the 2nd Thematic CSC 2014, he would greatly benefit from attending the School.

- He contributed to the study of math and algebra libraries, leading to the decision to replace CLHEP with Eigen in ATLAS reconstruction. He helped redesigning the tracking EDM which showed up in his studies as problematic because of its overly involved C++ design that caused inefficient memory usage and prevented automatic code optimisation, including vectorisation. In parallel to this code analysis and optimisation work xxxx started investigating how the track reconstruction could be modified to make it suitable for multi-processing. Current tracking strategies in ATLAS are highly sequential and novel algorithmic ideas are needed to optimally use future many core architectures.!!
- Xxxx is a highly motivated and skilful student. Over the first year of his thesis work he has contributed several studies on code analysis and optimisation, concurrent programming, compilers and processing techniques to the ATLAS Software project. The program of the 2nd thematic CERN School of Computing covers exactly the subjects and technologies that are of direct relevance for the thesis work of xxxx. Participation in the school will give him the deeper knowledge and required overview of modern programming techniques that he requires for his thesis work. I therefore would be delighted if his application would be accepted and he would be given the opportunity to participate in this school !

# Excerpts from your reference letters

Xxxx has already implemented the sequential version of the track nder, and thus is familiar with large-scale software systems such as the Belle II (Kek Japan) analysis framework, the C++ programming language and various avors of the Linux operating system. The school is a wonderful opportunity for him to learn more about high-performance computing and parallel programming. I am sure that he and his work will greatly benet from the attendance of the school.

- xxxx's contributions to ATLAS are too many to list. Some examples of his achievements are being the driving force in ATLAS behind the alignment of the inner tracking detectors and implementing improvements to the electron reconstruction which led to great improvements in the energy resolution for electrons undergoing bremsstrahlung. His technical skills, his sharp mind, his friendly demeanor and his outstanding leadership qualities has led to xxxx being selected for several leadership positions in ATLAS, and he is currently a member of the physics coordination group overseeing the whole ATLAS physics program.



# Excerpts from your reference letters

- Xxxx was appointed as a site administrator for the Bogolybov Institute for Theoretical Physics (BITP), Ukraine and subsequently as a regional expert for all Ukrainian computing sites providing CPU and storage resources for the ALICE experiment. Xxxx excelled at this function, quickly learning the complex site operation procedures and Grid software. Under her competent management, the computing resources were always operational. xxxx was also selected as a non-member state Summer Student at CERN and assigned to the ALICE Core offline team.

# Who are the tCSC participants ?

- ... you are young, diverse, you come from many countries, from different institutes ...
- ... you have all an incredible potential and a passion for both computing and science.
- You will work together one week to widen your skills but also and establish lifetime links between yourselves and across research institutes that will be useful throughout your entire career.
- **This is probably why you are here !**

# Who are you ?

- Adam
- Adrien
- Anthony
- Bianca-Cristina
- Brij Kishor
- Chiara
- Cristovao Jose
- Elvin
- Hao
- Henryk
- Jakob
- Johannes
- Jonas
- Jukka
- Katarzyna
- Lada
- Luc
- Marco
- Mehdi
- Miguel
- Oksana
- Pavlo
- Robert
- Wilco

# Introducing your coaches

- Andrzej



# Introducing your coaches

- Andrzej



- Danilo



- Sverre



- Claude



- Ivica



# Introducing your Local Organisers

- **Irena**
  - From Medils



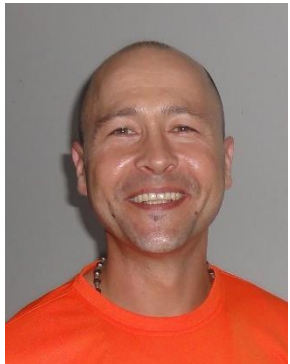
# Introducing your Local Organisers

- **Irena**
  - From Medils
- **Lilia**
  - From Medils



# Introducing your Local Organisers

- **Irena**
  - From Medils
- **Lilia**
  - From Medils
- **Tommy**
  - Cathering





# Introducing your Local Organisers

- **Irena**

- From Medils



- **Lilia**

- From Medils



- **Tommy**

- Cathering



- **Ivica**

- Chairman Local Organizing Committee



# Introducing your CERN Organisers

- Yasemin
  - School administrative manager



# Introducing your CERN Organisers

- **Yasemin**
  - School administrative manager
- **Giuseppe**
  - School technical manager,



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- **Yasemin**
  - School administrative manager
- **Giuseppe**
  - School technical manager,
- **Ivica**
  - Chairman of the CSC Advisory Committee



# Introducing your CERN Organisers

- **Yasemin**
  - School administrative manager
  
- **Giuseppe**
  - School technical manager,
  
- **Ivica**
  - Chairman of the CSC Advisory Committee
  
- **Myself, Alberto**
  - School director



# School Logistics

# School rule #1

- **You must always be on time**
  - If the schedule says the lecture starts at 9:00, you must have signed the presence form and be in the room before 9:00.
    - Presence forms will be removed at the scheduled start time.
  - If the schedule says the bus leaves at 9:00, the bus will leave at 9:00.
    - Not 9:05, nor 9:10.
    - The bus may leave late for many reasons which do **not** include waiting for missing participants



# School Rule #2

- **Your presence to the lectures and exercises is ...**
  - **MANDATORY**
  - You must sign the presence sheet after every breaks between lectures and exercise sessions
    - beginning of the day, after any coffee, lunch and sports break
- **The school also expects your presence to meals, dinners, coffee breaks. Up to the enddate of the school**
- **On the other hand, participation to social and sports events is ...**
  - **Optional**
  - However, **you must let us know** whether you participate or not

# School Rule #3

- **Wear your badge**



# School web site

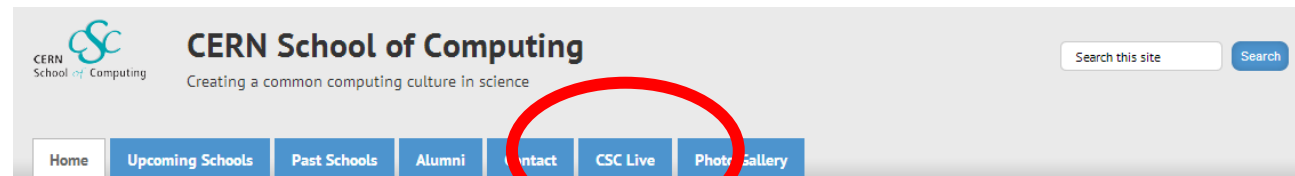
- **The CERN School of Computing**
  - <http://cern.ch/csc>
- **This School**
  - <http://indico.cern.ch/e/tcsc2014>

# Keeping you informed – CSC Live

- All the communication between the school organizers and the participants will be made using the CSC Live web page
- You **MUST** read this page at least once a day in case you missed an announcement or a programme change



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Scientific Programme
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Weekly timetable
Lecturer's contributions
Lecturer's biographies
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Early Registration
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<b>CSC Live</b>
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Main School Organization
Site selection
Local Organizing Committee
Computing infrastructure
Sport programme
List of main schools
Inverted School Organization
Inverted School FAQ

## Welcome to the CERN School of Computing

The upcoming schools are:

- Thematic tCSC 2014 in June (registration is now closed)
- Main CSC 2014 main school in Braga, Portugal (registration is now closed)

### Upcoming Schools

Type	Website	Dates	Location	LINKS	Registration
		tCSC 2014 15 Jun to 21 Jun 2014	University of Split (FESB) ☉, Split, Croatia	<b>CSC Live</b> Web site Registration is closed	Gallery

→ ↻ 🏠 [csc.web.cern.ch/csclive/tCSC%202014](http://csc.web.cern.ch/csclive/tCSC%202014)

# tCSC 2014 Live

[CSC home](#) - [tCSC 2014 website](#) - [Schedule](#) - [Gallery](#) - [Add a new entry \(lecturers only\)](#)

15 Jun  
Edit

yhauser



## Internet Access

The exercise room will provide a desktop computer for each pair of students.

For personal laptops, tablets, phones and other wireless devices, Internet wireless access is available in the Medils Centre. The access code will be communicated to you on arrival.

13 Jun  
Edit



## Coming to the school on Sunday:

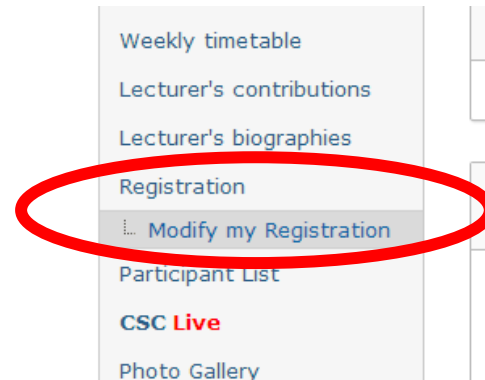
Public transportation from airport to the Main Bus Station: Croatia Airlines provides a bus directly from the airport exit station to the main bus station in Split, the ticket price being HRK 30 (approximately EUR 4).

Public transportation from Main Bus Station to MEDILS: The main bus station is located in the east part of the Split ferry harbor and is close to the main train station. From there one takes a 10 min walk to the western part of the harbor, near the St. Francis Church (Sveti Frane), where one can take two options:

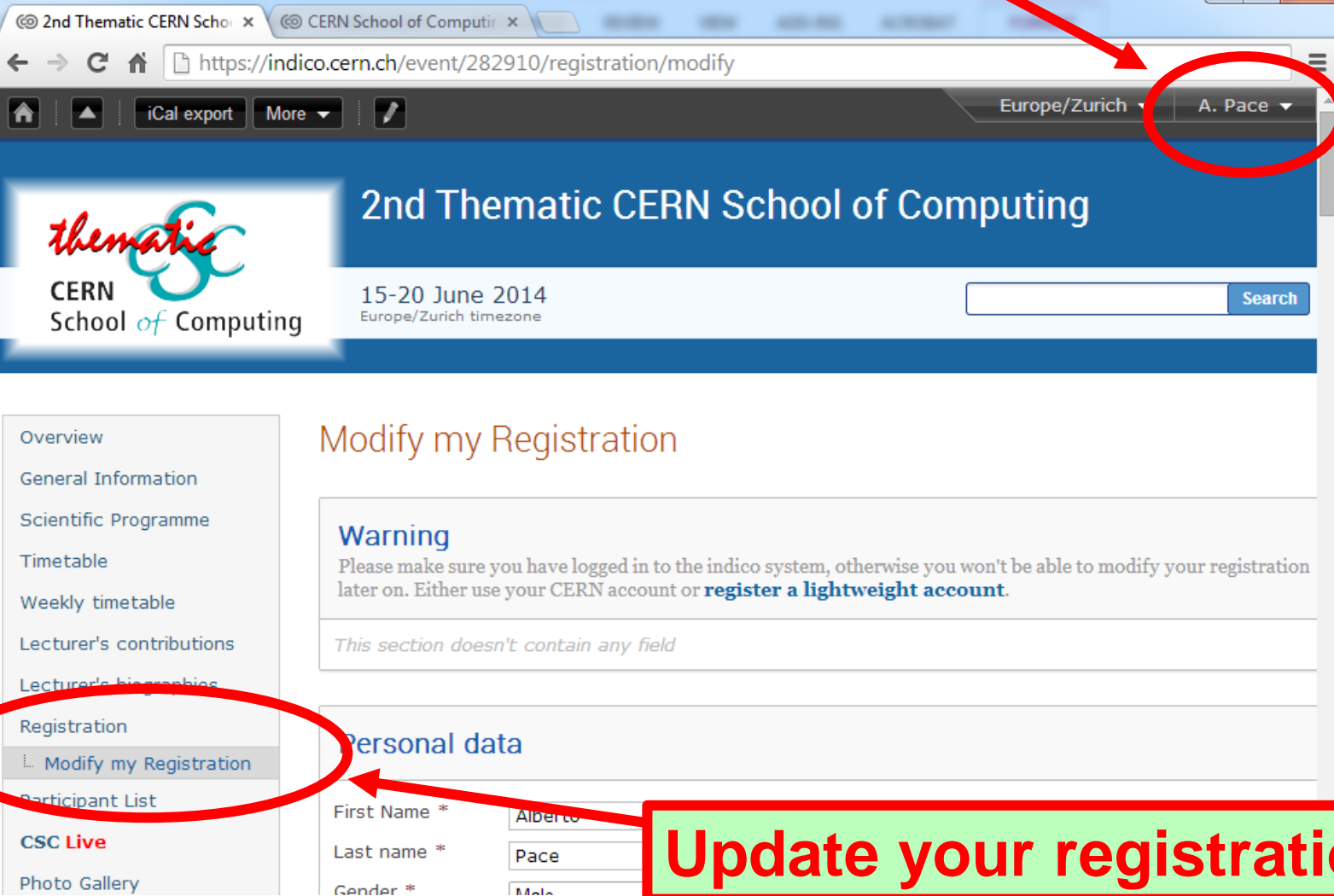
take a taxi; you would pay around HRK 50-60

# Ongoing surveys

- For the organization of social and sports events we may need to know your choice or if you participate
- We will ask you to answer to our question by modifying your registration form on the School web site
- You must login using the same email address that you have used to register at the school
  - <https://indico.cern.ch/event/282910/registration/modify>



Login with your email address



2nd Thematic CERN School of Computing

15-20 June 2014  
Europe/Zurich timezone

Europe/Zurich A. Pace

Warning  
Please make sure you have logged in to the indico system, otherwise you won't be able to modify your registration later on. Either use your CERN account or **register a lightweight account**.

*This section doesn't contain any field*

Personal data

First Name \* Alberto  
Last name \* Pace  
Gender \* Male

Registration  
Modify my Registration

Update your registration

# Photo Gallery

- **The School web site has a photo gallery**
  - You are encouraged to upload your best photos
  
- **Post only “appropriate” content**
  - The gallery is public
  - If you have any problem with photos of you being published on the photo gallery, let other participants know.
  - If you would like a **photo of you** to be removed from the gallery, ask directly to the person who published it to remove it.
  - If someone asks you to remove his/her photo that you have published, please do so.



# Photo Gallery



- Overview
- General Information
- Scientific Programme
- Timetable
- Weekly timetable
- Lecturer's contributions
- Lecturer's biographies
- Registration
- Modify my Registration
- Partners List
- CSC Live**
- Photo Gallery
- CSC main site




- HOME
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- Sport programme
- List of main schools
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- Inverted School FAQ

## Welcome to the CERN School of Computing

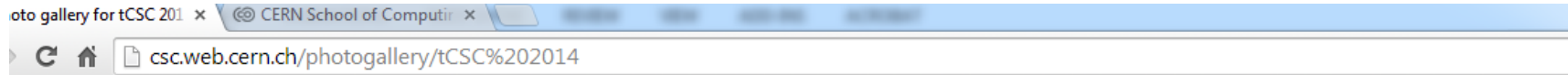
The upcoming schools are:

- Thematic tCSC 2014 in June (registration is now closed)
- Main CSC 2014 main school in Braga, Portugal (registration is now closed)

### Upcoming Schools

Type	Website	Dates	Location	Links	Registration
	tCSC 2014	15 Jun to 21 Jun 2014	University of Split (FESB) $\phi$ , Split, Croatia	<a href="#">CSC Live</a> <a href="#">Web site</a> <a href="#">Schedule</a> <a href="#">Gallery</a>	Registration is closed

# <http://csc.web.cern.ch/photogallery/tCSC%202014>



## Photo gallery for tCSC 2014

[CSC home](#) - [tCSC 2014 website](#) - [Schedule](#) - [CSC Live](#) - [Upload more photos](#)

### DATE PHOTO TAKEN

Is equal to ▼

E.g., 16-Jun-2014

### CATEGORY

- OPENING CEREMONY
- SCHOOL LIFE
- HOTEL
- EXCURSIONS
- SPORTS
- CLOSING CEREMONY

### PHOTO DESCRIPTION

Contains ▼

### DISPLAY ONLY MY PHOTOS

- Any - ▼

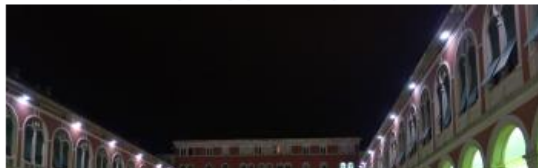
### AUTHOR FULL NAME

Contains ▼

Apply

tCSC 2014

[School location \(Split\)](#) (Edit/Del)



[School location \(Split\)](#) (Edit/Del)



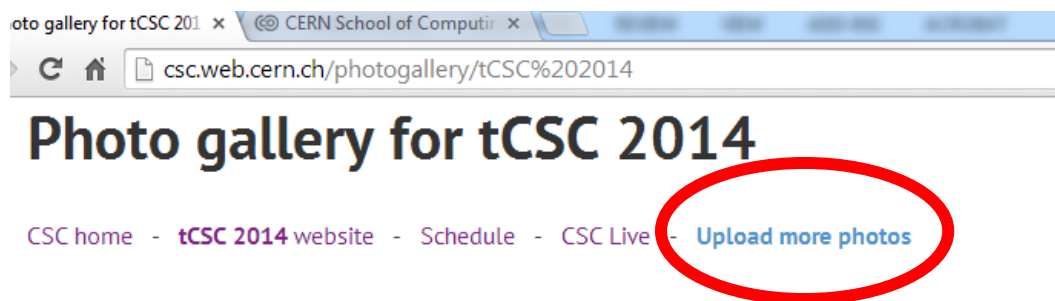
[School location \(Split\)](#) (Edit/Del)



# Photo Gallery

## (Important recommendations)

- To publish / upload a photo, you must login using your email address



- Ensure that the date/time of your camera is set correctly !
  - Do not upload photos from 1-Jan-2001
  - If you have a GPS, ensure that the GPS tag is correct
- Fill accurate Description, Date and Category
- You can aggregate multiple photos with the same description in a unique upload. Do so only when the description is common. Otherwise, uploads multiple times with relevant descriptions.
- Do not “Dump” your memory card on the CSC web site. Make a selection of your best photos worth sharing !





# Technical infrastructure

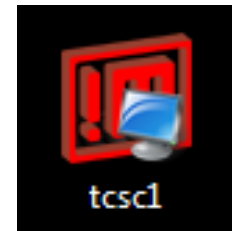


# Technical infrastructure

- **Client-server model**
- **Clients:**
  - Windows XP desktops located here
  - Or your own laptops
- **Servers: Linux boxes located at CERN Computer Centre**
  - 32 cores, no HT, Intel Xeon E5-2650 v2 @ 2.60GHz

# Access from the Windows desktops

- Login with username **summer**, password **school**
- Nomachine NX client available as an X server/terminal
  - You will find a `tcscN.nxs` config file,  $01 \leq N \leq 12$ , directly on your desktop
- Putty available for text-only ssh
  - Not pre-configured



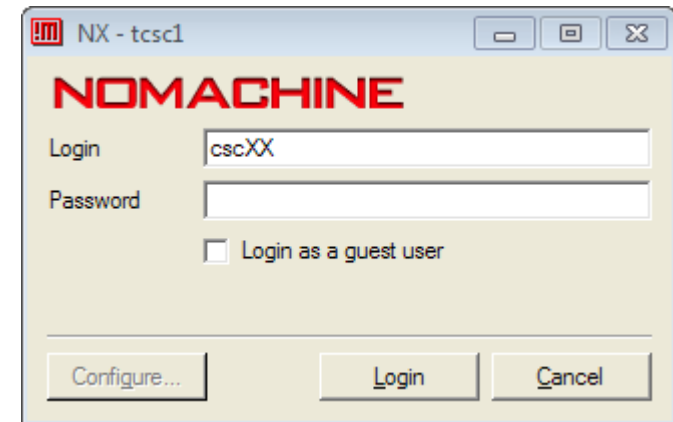


# Access from your laptop

- **The Nomachine NX client is available here:**  
<http://www.nomachine.com/download.php>
  - Or use your favourite ssh client in your laptop
- **Please take the NX configuration file from your assigned desktop**
  - Or do-it-yourself if you know NX
  - The CERN servers are named **cscnn.cern.ch**

# Access (continued)

- Use **cscMM** as username, **MM** between **01** and **24**, and same **password**.
  - Choose MM according to your alphabetical order
  - Change the password at your convenience
- All nodes have all accounts
- Once logged in, you have a full X terminal



# Access (continued)

csc01	BAAN HOFMAN, Wilco	csc13	LEGEARD, Luc
csc02	BELHAY, Mehdi	csc14	LETTENBICHLER, Jakob
csc03	CRISTESCU, Bianca-Cristina	csc15	MORLEY, Anthony
csc04	DE FINE LICHT, Johannes	csc16	RUBIO-ROY, Miguel
csc05	DEVRESSE, Adrien	csc17	SHADURA, Oksana
csc06	DOMINGUES CORDEIRO, Cristovao Jose	csc18	SINDRILARU, Elvin Alin
csc07	DUCHECKOVA, Lada	csc19	STACHYRA, Katarzyna
csc08	GIEMZA, Henryk	csc20	STRUTZ, Marco
csc09	JASHAL, Brij Kishor	csc21	SVIRIN, Pavlo
csc10	KOMMERI, Jukka	csc22	WEGRZYNEK, Adam
csc11	KUNZE, Jonas	csc23	YIN, Hao
csc12	LANGENBERG, Robert	csc24	ZAMPOLLI, Chiara

# Running the exercises

- **The systems are provided with Linux SLC6.5 and a performance-enabled 3.11 kernel**
- **The default compiler is gcc 4.9**
  - Installed in `/var/gcc-4.9.0` along with its libraries, system libraries in `/usr/lib64` are NOT compatible!
- **Your home directory is located on a rather small partition (~ 5 GB free), please use `/var/csc` (> 1 TB free) as a scratch area**
  - World-writable => be serious :-)

# Have a good time at tCSC 2014!

- **Feel free to ask me any (\*) questions, I'm around to help.**

***(\*) I don't know the gory details of the lectures and exercises as much as you (will) do!***



# End of School Introduction

**Inaugural Scientific Lecture from  
professor Claude Charlot  
(Ecole Polytechnique, France)**