

# *Inverted* CERN School of Computing 2018

5-8 March - CERN IT Amphitheatre

## *Lectures and hands-on exercises on:*

Algorithm Complexity  
Data Structures  
Identity Federation

Blockchain  
Decentralized Consensus  
Medical Imaging

Backend System  
Data Analysis  
Parallel Programming



<http://indico.cern.ch/e/iCSC-2018>

*Sebastian Lopienski*  
*CERN School of Computing director*

All good things come to an end...



The logo for the inverted CERN School of Computing (iSc) features a lowercase 'i' in red and 'Sc' in teal, with a light grey drop shadow effect.

**CERN**  
School *of* Computing **2018**

Back in  
2005...

- ✓ Have you ever heard of **Enterprise Computing**, is it relevant to physics computing?
- ✓ Do you know what **Design Pattern** is?
- ✓ Are you sure the software you write has no **security holes**?
- ✓ Are you sure that you know and master **modern debugging** tools?
- ✓ Do you know how to design (effectively) a **database schema**?
- ✓ What is the secret to writing an efficient **SQL** query?
- ✓ What is database **performance tuning**, why is it perceived as magic and how to tame it?
- ✓ Do you know how to read an **execution plan**?
- ✓ How does **Google** News work?
- ✓ Do you know, in practice how to expose your application as a **Web Service**?
- ✓ Are you sure your **Web Services** are **secure**?

All the answers at iCSC

iCSC  
CERN  
School of Computing

**inverted** CSC-2005

"Where students turn into teachers"



23-25 February 2005, CERN\*

- ▶ Data Management and Data Bases
- ▶ Advanced Software Development and Engineering
- ▶ Web Services in Distributed Computing

- a novel idea prototyped in 2005
- a three-day series of lectures proposed and delivered by selected students
- advanced topics, rarely taught at CERN before

Lecturers - all former CSC2004 students

<b>Paolo Adragna</b>	University of Siena
<b>Miguel Anjo</b>	CERN
<b>Ioannis Baltopoulos</b>	Imperial College
<b>Gerhard Brandt</b>	University of Heidelberg
<b>Giovanni Chierico</b>	CERN
<b>Brice Copy</b>	CERN,
<b>Michal Kwiatek</b>	CERN
<b>Ruben Leivas Ledo</b>	CERN
<b>Sebastian Lopienski</b>	CERN
<b>Petr Olmer</b>	CERN
<b>Zornitsa Zaharieva</b>	CERN

"Where  
students  
turn into  
teachers"

# Inverted CSC 2018

We encouraged lecturers to propose hands-on exercises

Received **13 proposals of lectures and exercises** for a total of **43 (25+18) hours** by students from:

- CSC 2017 (*Madrid, Spain*)
- **t**CSC 2017 (*Split, Croatia*)
- CSC 2015 (*Kavala, Greece*)

**9 proposals** retained – **20 (13+7) hours**

# Inverted Schools

1. <b>iCSC 2005:</b>	3 days	11 lecturers	16 hours
2. <b>iCSC 2006:</b>	2.5 days	6 lecturers	12 hours
3. <b>iCSC 2008:</b>	2.5 days	5 lecturers	12 hours
4. <b>iCSC 2010:</b>	1.5 days	7 lecturers	8 hours
5. <b>iCSC 2011:</b>	1.5 days	6 lecturers	6 hours
6. <b>iCSC 2013:</b>	1.5 days	4 lecturers	7 hours
7. <b>iCSC 2014:</b>	1.5 days	5 lecturers	9 hours
8. <b>iCSC 2015:</b>	2 days	5 lecturers	10 hours
9. <b>iCSC 2016:</b>	3 days	10 lecturers	16 hours
10. <b>iCSC 2017:</b>	2.5 days	6 lecturers	12 hours
11. <b>iCSC 2018:</b>	3.5 days	8 lecturers	19 hours

# Academic topics

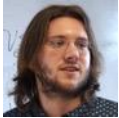
(iCSC is not a conference!)



Backend Systems



Blockchain and Decentralized Consensus



Complexity and Data Structures



Bayesian Data Analysis



Identity Federation



Medical Imaging



Parallel Programming with OpenMP



Parallel Programming Patterns

# Schedule

<https://indico.cern.ch/event/671879/timetable/>

Monday, 5 March 2018	Tuesday, 6 March 2018	Wednesday, 7 March 2018	Thursday, 8 March 2018
	08:30 <b>Welcome coffee</b>	08:30 <b>Welcome coffee</b>	
	09:00 <b>Bayesian Data Analysis (lecture 1)</b> - Christian Graf	09:00 <b>Computing for Decentralized Systems (lecture 1)</b> - Alejandro Avilés	09:00 <b>Computing for Decentralized Systems (lecture 2)</b> - Alejandro Avilés
	10:00 <b>Algorithms and Data Structures (lecture 2)</b> - Lennaert Bel	10:00 <b>K.I.S.S. Parallel Coding (lecture 1)</b> - Gabriele Gaetano Fronze'	10:00 <b>Coffee</b>
	11:00 <b>Coffee</b>	11:00 <b>Coffee</b>	10:30 <b>K.I.S.S. Parallel Coding (exercise 1)</b> - Gabriele Gaetano Fronze'
	11:30 <b>Speeding up image reconstruction in computed tomography</b> - Victoria Tokareva	11:30 <b>From sequential to parallel programming with patterns</b> - Placido Fernandez Declara	11:30 <b>K.I.S.S. Parallel Coding (exercise 2)</b> - Gabriele Gaetano Fronze'
	12:30 <b>Lunch break</b>	12:30 <b>Lunch break</b>	12:30 <b>Lunch break</b>
13:15 <b>Welcome coffee</b>			
13:45 <b>A word from the IT Department Head</b>			
13:50 <b>Introduction to the Inverted CSC</b>			
14:00 <b>Algorithms and Data Structures (lecture 1)</b> - Lennaert Bel	14:00 <b>Bayesian Data Analysis (lecture 2)</b> - Christian Graf	14:00 <b>CERN Data Centre visit</b>	14:00 <b>Computing for Decentralized Systems (exercise 1)</b> - Alejandro Avilés
15:00 <b>Modern Backend Systems</b> - Georgios Voulgarakis	15:00 <b>Securing Distributed Research</b> - Hannah Short	15:00 <b>Coffee</b>	15:00 <b>Coffee</b>
16:00 <b>Coffee</b>	16:00 <b>Coffee</b>	15:30 <b>Algorithms and Data Structures (exercise 1)</b> - Lennaert Bel	15:30 <b>K.I.S.S. Parallel Coding (lecture 2)</b> - Gabriele Gaetano Fronze'
16:30 <b>Modern Backend Systems (exercise)</b> - Georgios Voulgarakis	16:30 <b>Securing Distributed Research (exercise)</b> - Hannah Short	16:30 <b>Algorithms and Data Structures (exercise 2)</b> - Lennaert Bel	16:30 <b>Closing remarks</b>



14:00 CERN Dat

#	Name	I want to take part in this visit
1	A	Yes
2	A	Yes
3	B	Yes
4	C	Yes
5	C	Yes
6	D	Yes
7	E	
8	E	
9	E	
10	F	
11	G	
12	G	Yes
13	H	Yes
14	I	Yes
15	J	Yes
16	J	Yes
17	J	Yes
18	J	Yes
19	L	Yes

Guess how many people came for 14:20 ...?

Start time:  
**If your first name starts with letter A to I - come at 14:00**  
**If your first name starts with letter J to Z - come at 14:20**  
(let's see how many people will get this wrong :-)

26	S	Yes
27	S	Yes
28	T	Yes
29	U	Yes
30	V	Yes
31	X	Yes
32	Y	Yes

# A **record** attendance

- 194 registrations from ~90 institutes in 30 countries
  - 164 with ...@cern.ch e-mail addresses; 29 with others
  - 20% females
  - IT department (44 people), BE department (36), CMS (24), ATLAS (14)
- 60 people at the opening (+ ~25 by webcast)
  - 30-60 people for each lecture
- Some people travelled to Geneva (by plane etc.) to attend iCSC!

# School opening



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Registration and more information:  
[www.cern.ch/iSc](http://www.cern.ch/iSc)

# "This is how you fish"

## The barrel, the fish, the rod...

```
public class ShapeService {  
    private ApplicationContext pool;
```

```
    public void init() {  
        // create pool  
        pool = Spring.run  
            (ApplicationConfig.class);  
    }
```

```
    public double findArea(String shape, ...) {  
        // inject the shape  
        Shape fishedOut = pool.getBean(shape);  
        return fishedOut.findArea(...);  
    }
```

```
public interface Shape {  
    public double findArea(...);  
}
```

→ Fish

```
//Our pool configuration where all the  
shapes are contained!  
public class ApplicationConfig {  
    @Bean
```

```
    public Shape rectangle(){  
        return new Rectangle(...);  
    }
```

```
    @Bean  
    @Lazy  
    public Shape circle(){  
        return new Circle(...);  
    }
```

← Seabass

```
public class Rectangle implements Shape {  
    public double findArea(...){  
        return ...;  
    }
```







# Bitcoin coffee discussions



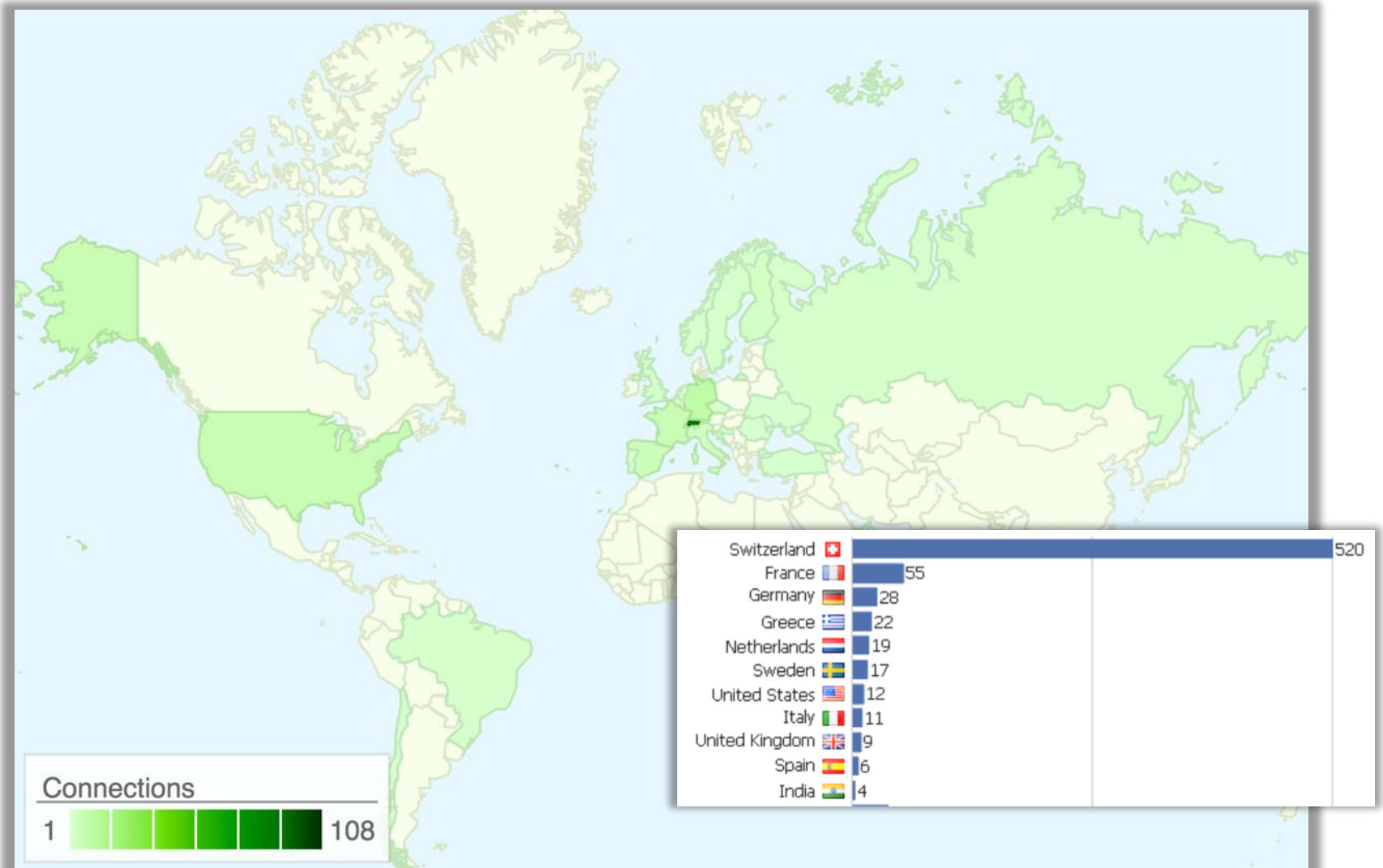






# A global event!

(connections via webcast and to Indico)



# iCSC booklet



Still 1 copy left... anyone?  
BTW, do you find paper booklets useful?

The logo for the CERN School of Computing (CSC) features a stylized, teal-colored monogram of the letters 'C' and 'S' intertwined. The 'C' is on the left and the 'S' is on the right, with their curves overlapping. The monogram has a subtle grey drop shadow.

**CERN**  
School *of* Computing **2018**

# Three CERN Schools of Computing

## CSC 2018



**Main school**

**1 Oct - 14 Oct 2018**

[Tel Aviv University](#) | Tel Aviv | Israel

*Applications will open in March 2018*

## tCSC 2018



**Thematic school**

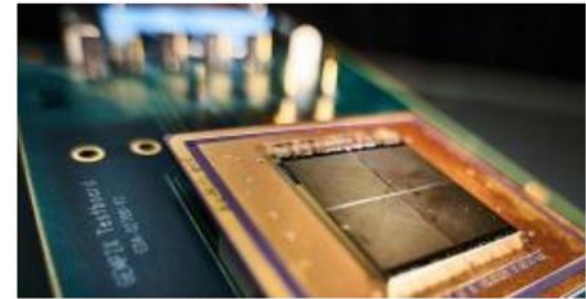
**3 Jun - 9 Jun 2018**

[MEDILS](#) | Split | Croatia

[School Website](#)

**APPLY NOW!**

## iCSC 2018



**Inverted school**

**5 Mar - 8 Mar 2018**

[CERN](#) | Geneva | Switzerland

[School Website](#)

*register*

*Thematic*  
CERN  
School of Computing

*High Throughput Distributed Processing of Future HEP Data*

3-9 June 2018  
Split, Croatia



Deadline for Application : 11 March 2018  
[www.cern.ch/csc](http://www.cern.ch/csc)



<http://indico.cern.ch/e/tCSC-2018>

# Lectures and exercises



# Social events





# Sport afternoon



# tCSC 2017 participants



Applications to **Thematic CSC 2018**  
open until this Sunday March 11  
at <http://indico.cern.ch/e/tCSC-2018>

**HELP US SPREAD THE WORD!**

**APPLY!**

*Thematic*  
CERN  
School of Computing

*High Throughput Distributed Processing of Future HEP Data*

3-9 June 2018  
Split, Croatia




Deadline for Application : 11 March 2018  
[www.cern.ch/csc](http://www.cern.ch/csc)



<http://indico.cern.ch/e/tCSC-2018>

1-14  
October 2018  
Tel Aviv,  
Israel



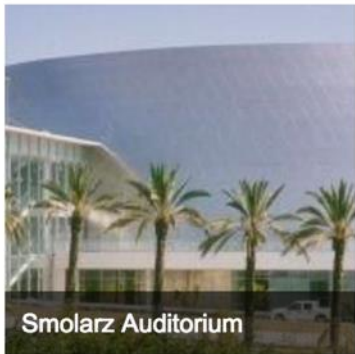
# CERN School of Computing

Organised in collaboration with Tel Aviv University (TAU)



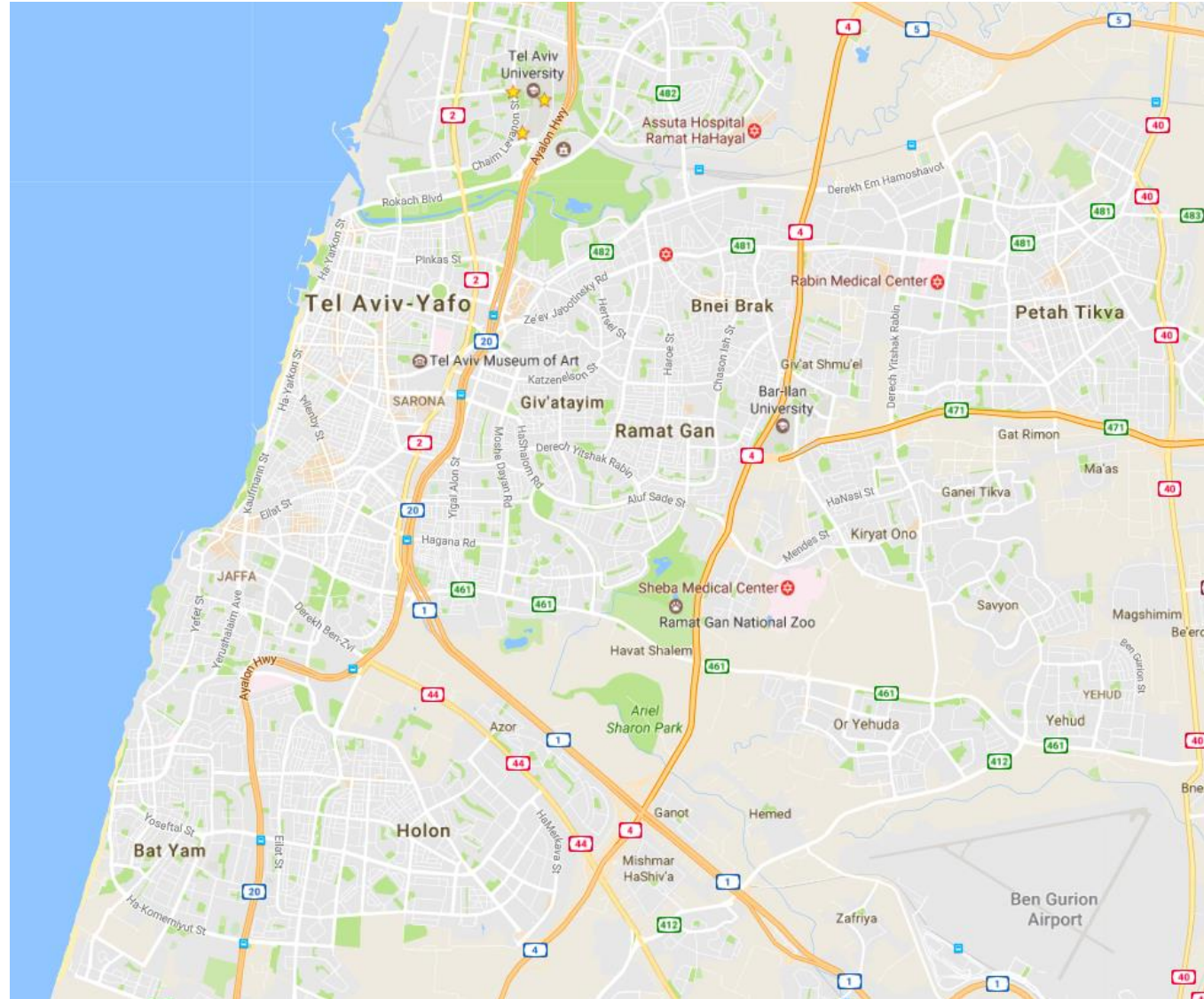
**Deadline for Application : 6 May 2018**  
**<http://cern.ch/csc>**

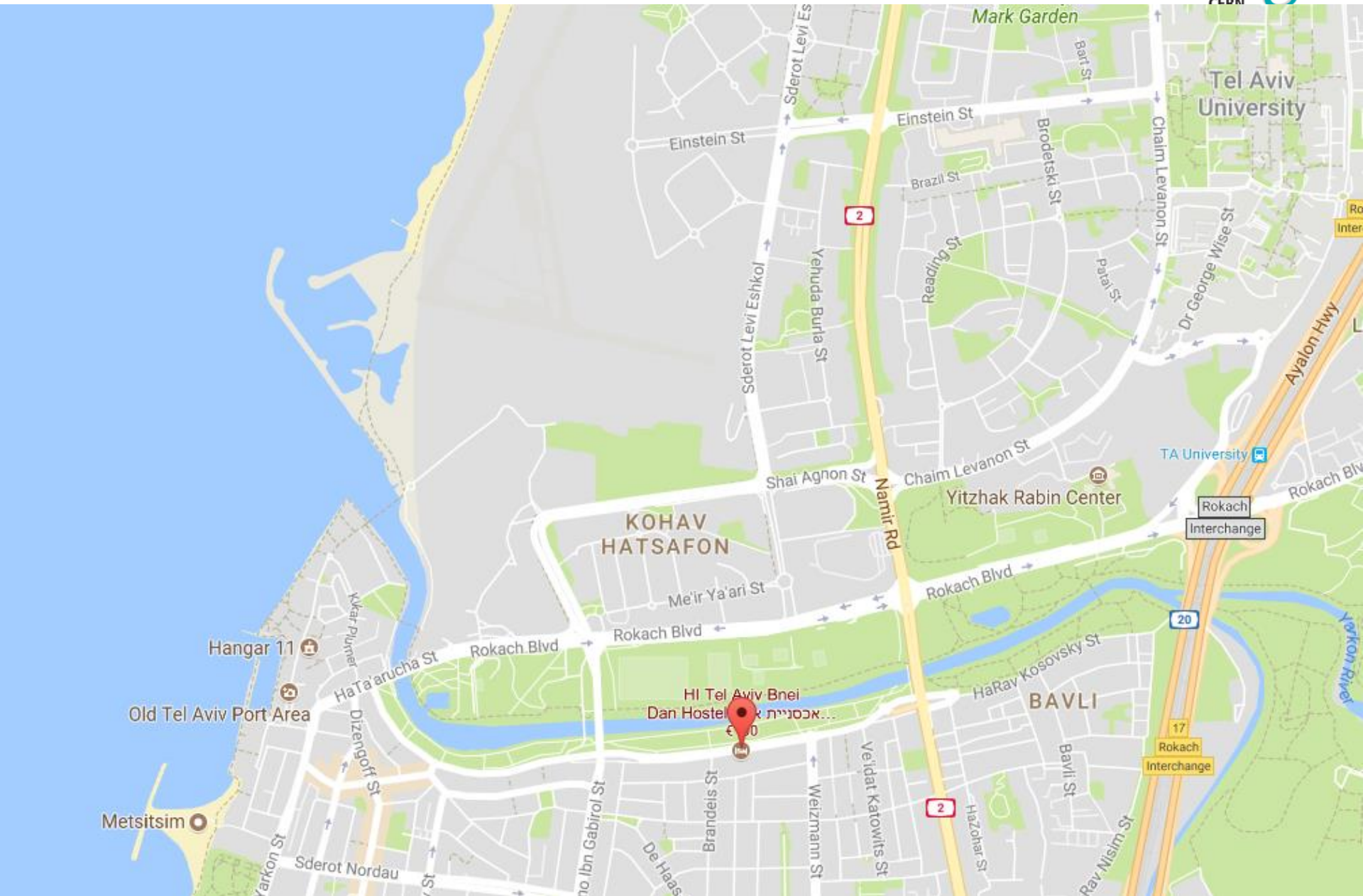
# Tel Aviv University (TAU)



- largest in Israel: 30'000 students
- **various faculties:** engineering, arts, law, life sciences, exact sciences, social sciences, humanities, music, medicine, business administration etc.)
- **rich and modern campus** (museums, galleries, sports etc.)

# Israel







Applications to CSC 2018 open very soon  
at <http://cern.ch/csc>

**HELP US SPREAD THE WORD!**

**APPLY!**

1-14  
October 2018  
Tel Aviv,  
Israel



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**Deadline for Application : 6 May 2018**  
<http://cern.ch/csc>

*iSc*  
**CERN**  
School *of* Computing **2018**

**Thanks to...**

# Lecturers

<https://indico.cern.ch/event/671879/page/11702-speakers>



**Alejandro Avilés**  
*Bity SA*  
*(Switzerland)*



**Lennaert Bel**  
*Nikhef*  
*(Netherlands)*



**Plácido Fernández**  
*CERN, and*  
*University Carlos III*  
*of Madrid (Spain)*



**Gabriele Fronzé**  
*INFN Torino (IT),*  
*Subatech Nantes (FR)*



**Christian Graf**  
*Max Planck*  
*Institute (Germany)*



**Hannah Short**  
*CERN*



**Victoria Tokareva**  
*JINR (Russia)*



**Georgios Voulgarakis**  
*CERN*

# Conveners (session chairs)



Julio Calvo



Daniel Campora



Stefan Chitic



Michael Davis



Eva Hansen



Miguel Hermo



Benedikt Wurfner

# Mentors (providing advice&feedback to lecturers)



Danilo Piparo



Nikos Kasioumis



Sebastian Lopienski



Alberto Pace



Sebastien Ponce



Are Strandlie



Enric Tejedor



Ivica Puljak

# CSC Organizers



**Joelma Tolomeo**  
(CSC Administrative Manager)



**Nikos Kasioumis**  
(CSC Technical Manager)

Thank you all for  
attending the School!



