

Davos Camp Introduction

February 13 – 18



Johannes Kapfhammer

Swiss Olympiad in Informatics



Switzerland

- 24 participants
- 9 leaders

Slovakia

- 4 participants
- 2 leaders

Lecturers

- 3 from Google

Everything will be held in English!
Feel free to ask if you have trouble understanding.

Schedule



	Monday	Tuesday	Wednesday	Thursday	Friday		
7.30 – 8.00		Breakfast at Youth Hostel	Breakfast at Youth Hostel	Breakfast at Youth Hostel			
8.15 – 8.55		Warmups A19	Dynamic Programming	Warmups A19	Breakfast at Youth Hostel		
9.00 – 10.35		Graph Theory		Geometrie, Convex Hull	Advanced Graph	I-Cup Davos Contest (9:00–14:00) B1&A19	
10.40 – 12.15				Segment Tree	Discrete Mathematics		Searching and Sorting
					Scanline		Stringology
				Lunch at SAMD			
12.15 – 13.00	Lunch at SAMD	Lunch at SAMD		Lunch at SAMD			
13.00 – 17.00	Camp Intro	Contest B1&A19		Tensorflow Deep Learning	Group Photo and Break		
	Youth Hostel Check In				Solution Presentations (15.00–17.00) A19		
17.00 – 18.00		Solution Presentations A19		Solution Presentations A19	Solution Presentations A19		
18.15 – 19.00	Dinner at SAMD	Dinner at SAMD	Dinner at SAMD	Dinner at SAMD	Closing Dinner at SAMD		
19.00 – 22.00	Contest B1&B2	Optional at 19.45: HC Davos–EHC Kloten	Contest B1&B2	Contest B1&B2			



- Camp introduction
- Icebreaker game
- Code riddles
- Youth hostel check in
- Free time until dinner

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Breakfast is your own responsibility.

Be at 8.15 in this room for the Warmups. We'll leave together at 7:50 from the Youth Hostel.

Line	Davos Dorf, Schiabach	Davos Platz, Schatzalpbahn
3	07:57	08:01
1	08:04	08:08

If you miss the bus, let us know!



Lunch and dinner is at SAMD. Please be on time so their students won't be delayed.



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3 hours, 4 tasks each, 19.00-22.00 (or 13.00-17.00)



Don't expect to be able solve all tasks. If you are stuck, you can ask us for help or discuss the tasks with your neighbour.



Contest ends at 22:00.

Leave the rooms quietly!

Bus connections:

Line	Davos Platz, Schatzalpbahn	Davos Dorf, Schiabach
1	22:02	22:06
4	22:17	22:21
1	22:32	22:36
1	22:47	22:51



On Friday: “Real contest”. 5 hours, 5 tasks.



The winner will receive an I-Cup medal and we distribute small prices in order of the ranking.

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On Tuesday and Thursday at 8.15.

- 2 short tasks in 35 minutes
- Pen & paper, no computers
- Instructions:
 - describe the idea for an algorithm that solves the problem
 - argue about the correctness of the approach
 - indicate asymptotic running time and additional memory usage (you are not allowed to change the input data in-place)
 - write an implementation in pseudo code

The write ups will be handed in and we will grade them to give you a bit of individual feedback.

Warmup Teaser



You are given an array of $2^n - 1$ distinct bitstrings of length n each.

Note that exactly one possible bitstring is missing.

Write a program that prints the missing one.

Optimize for asymptotic running time first,
and asymptotic space usage second.





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Example:

$$n = 3$$

$A = (001, 100, 101, 111, \\ 110, 011, 000).$



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- The XOR of all bitstrings is the answer.
- Why is this correct? In the set of all bitstrings of a given length, at each index exactly half the bits will be set (why?).
The XOR of a set of bits is 1 precisely when there is an odd number of 1's.
- The only additional memory is the array X . It has size n , so the overall memory usage is $\mathcal{O}(n)$. The running time is $\mathcal{O}(n \cdot 2^n)$ because the whole input needs to be traversed.
- $X = \{0, 0, 0, \dots, 0\}$ // length N
for B in A :
 $X[0] = X[0] \text{ XOR } B[0]$
 $X[1] = X[1] \text{ XOR } B[1]$
 ...
 $X[n-1] = X[n-1] \text{ XOR } B[n-1]$
print X



There is a faster solution that runs in $\mathcal{O}(2^n)$ (instead of $\mathcal{O}(n \cdot 2^n)$).

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Standard and advanced track. Topics will be shortly explained in the morning. The standard tracks contain implementation.



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- Tuesday: HC Davos–EHC Kloten or free evening.
- Wednesday: Earlier lunch, you can go skiing 12.00–17.00.
- Thursday: Can go skiing from 13.00–17.00.



Can also relax, play games and practice coding.



<https://soi.ch/s/davos>

- Grader for Upsolving
- General Documents (Schedule, Cheatsheet)
- Lecture Notes
- Solutions
- Updated regularly



If you have any problem, call us:

- Joël: 077 445 88 24
- Benjamin: 079 660 34 78

Now:

- Hand in participation confirmation/Teilnahmebestätigung
- Retrieve your personal Wifi Password
- Retrieve your personal Travel Ticket

