

CLIS



The 2019 ICPC World Finals
hosted by University of Porto,
Sponsored by JetBrains

CLIS Schedule

Tuesday, April 2, 2019, 20:00-22:00

Casa da Música - Sala Suggia

- 20:00-20:20 iRunner: an educational platform of Belarusian State University
Sergei Sobol
- 20:25-20:45 OnlineJudge.app - Publish your Problem Sets
Felix Halim
- 20:50-21:10 Learning by Competing
Cathrine Linnes, Ph.D.
- 21:15-21:35 CP-Connect
(Competitive Programming Connect)
AmirReza PoorAkhavan
- 21:40-22:00 Cooperating Programming Contest
Training with Education
Yonghui Wu



Sergei Sobol,
Assistant Professor,
Department of Discrete Mathematics
and Algorithms,
Faculty of Applied Mathematics and
Computer Science,
Belarusian State University

iRunner: an educational platform of Belarusian State University

iRunner ('Insight Runner') is a multifunctional web platform that has been developed at the Faculty of Applied Mathematics and Computer Science of Belarusian State University. It is an online judge, a course and contest management system.

We use iRunner to teach programming and computer science. There are 340 academic problems along with 6.5K test cases that cover different topics of algorithm design and implementation ('Binary Search Trees,' 'Dynamic Programming,' etc.). Solutions are judged automatically; students get instant feedback.

iRunner can also handle programming competitions of different kinds. Western Subregional Collegiate Programming Contest (a stage of ICPC organized in Minsk) is annually held on iRunner. Moreover, the platform is used for training secondary school students and serving local Olympiads in informatics. Our product has a rich history since 2004. Now it stores about 250K solutions and 100+ GB of data.



Felix Halim has been involved in the ACM ICPC since 2003. First as competitor, then as problem setter and judge committee for Jakarta Regionals. He created uHunt for UVa Online Judge to help users find the next problems to solve. Together with his brother, published the Competitive Programming books. He currently works at Google as a Senior Software Engineer.

OnlineJudge.app - Publish your Problem Sets

Online judges proliferate in competitive programming landscape.

Each online judge contains problem sets. Typically, a newly created problem set is first used for a rated competition and then archived for online practice. Sadly, the latter is true only for a few contests where the organizers donate the problem set to an existing online judges. For example, the Live Archive online judge is where the ICPC regional contest organizers donate their problem sets too. Unfortunately, this is at the mercy of the admins who host the online judge (e.g., when the admins are busy, or the problem set is not up to some minimum standards, the problem set won't be added to the online judge).

After a contest ends, the cost of keeping the contest system running for practice is prohibitive. Only those who have the resources to build and host their own online judge can keep the archived problem sets online for practice. Many universities have built their own online judge for this purpose. Nevertheless, creating and maintaining an online judge is hard, costly, and takes a lot of time. Wouldn't it be great to have an "open" online judge where anyone can publish their problem sets without the mercy of the online judge admins, publish them online on their own website for everyone to practice, without having to maintain it? This is what OnlineJudge.app is built for.

OnlineJudge.app empowers problem authors / contest organizers to manage their own problem sets (with test data) and publish them online on their own websites. Users will be able to submit solutions to the website (or via API) and get real-time

feedback on the correctness.

With OnlineJudge.app, one can focus on building a great problem sets instead of spending time maintaining an Online Judge. This presentation will demo how easy it is to create problem sets, publish a contest, and embed them in your own website for others to solve.

OnlineJudge.app uses DomJudge's runguard and its tests for sandboxing. The judge system is "dockerized" and orchestrated using Google Kubernetes Engine that can auto-scale (horizontally) within a few minutes, offering tremendous cost savings when idle. Firebase Realtime Database is used as the communication layer, giving a delightful real-time feedback for the users to see their submission status.

The main disadvantage of OnlineJudge.app is submission runtimes may vary because the submissions may be run on different machines, thus it may not be suitable for runtime-sensitive problems. Currently, OnlineJudge.app is in prototype and would like to get feedback from the community.

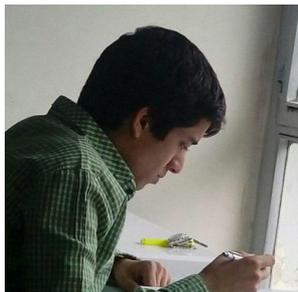


Cathrine Linnes, Ph.D., is an Associate Professor at the Computer Science Department of Østfold University College, Norway. She has also worked for several years at Hawaii Pacific University, Southern New Hampshire University, and Kapiolani Community College, USA. She holds several years of industry experience.

Learning by Competing

Every semester faculty are faced with determining how to present course material so that students not only grasp the material being taught, but also become self-motivated and independent learners who develop problem-solving skills they can apply in their degree program and in their future careers. We have seen that blended learning is replacing the traditional face-to-face education and that the learning process is being redesigned to support flipped classroom or gamification strategies. This is transpiring both in online and in face-to-face courses.

Worldwide, universities have opted to have its students participate in various competitions depending upon their major. One can frequently find programming, investment, analytical, cyber, business plan, innovation competitions among many others being held yearly. There is project-based learning for business schools (Stinson & Milter, 1996), problem-based learning for medical schools (Norman & Schmidt, 1992; Albanese & Mitchell, 1993; Major & Palmer, 2001), puzzle-based learning for engineering and computer sciences (Parhami, 2009; Falkner, Sooriamurthi, Michalewicz, 2010). All of the above examples have something in common; they all involve realistic problems and situations based on educational goals, are appealing and motivating, and improve students' learning, research and critical thinking skills and their ability to work in teams. Universities are driven by peer, community and donor recognition they gather, and ought a student team win one or more of the many prestigious competitions available this can certainly help the university gain additional recognition.



AmirReza is studying Computer Science, Amirkabir UT, Islamic Republic of Iran. He started Competitive Programming when he was 12, and started problem setting when I was 16.

When he was 17, he prepared a contest for codeforces and that was a very amazing experience for me. he was preparing

for Iran National Olympiad of Informatics at first, after entering college, he continued CP for ICPC.

He joined Quera just before entering university. Quera is an amazing Iranian startup that holds contests to help other companies hire. He worked as the Contest Coordinator. After 1.5 years, in February 2019, he joined HackerEarth as the Contest Coordinator.

he spends his time solving, testing, and, approving problems and enjoys this routine.

CP-Connect (Competitive Programming Connect)

We solve problems every day, training for ICPC, IOI, or just for fun. Nowadays competitive programming includes almost all of Computer Science, from Linear Algebra to Componential Geometry, even including approximation tasks.

I, personally, found more than 150 categories in problems that I've solved. Maybe there are some pairs of them that have similarity, but they are different in many ways.

But if we consider a specific category and person, we can somehow sort problems in that category and combine it with other categories (step by step) that he knows, help him grow in that category.

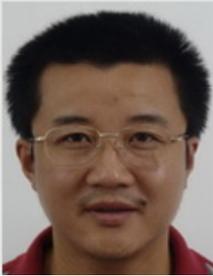
So, I'm talking about a system that uses the help of the community and helps the community. So, after you solve a problem, you tell the system about its tags, and maybe the similarity of this problem with others, and about the hardness of this problem. It uses this data plus:

The data that online judges contain, e.g. codeforces has simple tags. The data from blogs.

The data from codes. e.g. codes with dp tag have an array “dp” in 95% of cases.

Hardness data come from contest scoreboard, e. g. when in some contest only 10 people solve a problem, the problem must be hard. The system can learn the abilities of coders and become better in suggesting hardness of a problem.

This system can help coders know their abilities, suggesting good problems and tags, again learn from the results of its suggestions. Thanks and regards.



Yonghui Wu

Associate Professor, Master

School of Computer Science, Fudan University

Cooperating Programming Contest Training with Education

Now programming technologies are not only fundamental courses for computer science and technologies, but also implementation technologies for information society. Programming contests are contests solving problems by programming. A large number of programming contests' problems from all over the world can be gotten, analyzed and solved by us. These contest problems can be used not only for programming contest training, but also for education. Therefore, we cooperate programming contest training with education, to polish students' programming skill solving problems. Our work constitutes two aspects: publishing a book series for collegiate programming contests and education and constructing courses based on the series; and setting up a system organizing systematic programming training and improving programming education cross region.

