Name of the Competition: International Olympiad in Informatics (IOI)

Area: Informatics

Style of the Competition:

A. IOI is an annual algorithmic style programming contest – the contestants have to solve each task with a corresponding program written in one of the programming languages C/C++ or Pascal.

B. IOI is an individual competition.

C. Each participating country is represented by no more than four contestants selected during a national contest (or system of contests) organized by a national organization officially recognized from IOI. Contestants have to be less than 20 years old and enrolled in secondary school during the school year of the contest. Each new country is accepted as participating country after a formal application and after proving that contestants will be elected in a national contest open for each eligible student. First year after accepting, the new country have to send only one observer (adult) to the contest and starting from the next year could send contestants. Country that missed three or more consecutive contests looses the status of participating country and becomes new country for IOI. Recently, it is a practice local organizer to propose an open on-line contest – in same time and with the same tasks as the official contests. So each programmer (not only secondary school students) of the world could check his abilities and compare her/his results with these of the selected contestants. Each participating country is paying a participation fee of 200EUR.

D. The contest is organized in two competition days (with one day off between them). Each day the contestants have to solve three tasks for five hours.

E. The competition needs attendance of the participants at an appointed time and place – the host country is nominated by International Committee of IOI (IC of IOI, more for IC see in H.) four years before the contest. The place and time of the contest (usually in third week of August) are chosen by the host country.

F. The way of evaluation: by grading system with mixed evaluation (part of evaluation is on-line and the other part is postponed). During the contest participants are submitting source codes to the system. Each task’s solution is tested with a set of tests that is unknown to the contestants. Some test cases could be composed for many runs of the submitted program. If all runs have finished with a correct result the contestant obtains the grading marks assigned for the test. Sum of grading marks for all test of one task is 100. For selected tasks (usually one per day, but the Regulations don’t fix the number of tasks that will be checked on-line) the grading system check the solution, immediately after receiving, with a part of the test cases (about the half of them) and return the result to the contestant in the form “For checked test cases your program obtained the following results…” After the end of the contests the grading system checks all submitted solutions with all test cases. Contestants are ranked by the sum of obtained marks.

G. The contest has no body that could be called Competition Jury. The tasks are prepared by the Host Scientific Committee (HSC) under the control of the International Scientific Committee of IOI (ISC of IOI, more for ISC and HSC see in H.). HSC is presenting tasks to the General Assembly of IOI (more for GA see in H.) for approval. If there are some “major objections” about some of the tasks (for example, the task was used in public contest, it is not appropriate because of required mathematical model etc.) the HSC is replacing it with another task. When the tasks are approved in principle by the GA some
“minor objections” are accepted, if aimed to ameliorate the formulation of the tasks (without changing its idea and algorithmics).

H. The most powerful body of IOI is the General Assembly. Only the GA could change the Regulations. It approves the tasks and medal allocation, elects IC of IOI and the ISC of IOI, etc. GA is composed of the Leaders and Deputy Leader of all participating in the current contest countries and is working during the days of the contest. For ruling the works of IOI between two contests GA elects President of IOI (PIOI), Executive Director (ED), IC of IOI and ISC of IOI. IC is composed of the President of IOI, presidents of IOI'\(n-1\), IOI'\(n\), IOI'\(n+1\), IOI'\(n+2\) and IOI'\(n+3\) (where \(n\) is the year of the current contest), plus 5 elected members (EM). ED is not voting member of IC. Presidents of contests are serving in IC for five years, PIOI, ED and EM’s are serving three years. ISC is composed of 7 members – presidents of HSC of IOI'\(n-1\), IOI’\(n\) and IOI’\(n+1\), three elected member and the Chair of the International Technical Work Group of IOI (ITWG of IOI) that is responsible for compilers, IDE’s and operational systems. Two more local representatives are serving in ISC only during the day of contest. All formal members are serving for three years.

For organizing the Olympiad each host country is electing Host Organizing Committee (HOC). HOC has to incorporate HSC and National Technical Work Group (HTWG). The rest of the structure (committees for fundraising, accommodation, meal supply, guides, publications, excursions etc.) and number of the people that will serve in each subcommittee of HOC is a responsibility of he national authorities.

I. During the IOI’\(n\) IC of IOI is electing among applying counties the Host Country of IOI’\(n+4\). The host country is immediately announced to the community, so in each moment each people that is interested about IOI could know where each of the next four contests will take place. Date of the contest is announced usually at least one year before the start of the competition.

J. Each IOI contest is maintaining own web-site where all materials connected with the contest (tasks, competition results, competitor’s works, photo and video galleries, different statistics etc.) are published.

K. IOI has no subdivision of the competition by age groups, sex, regions or by some other attributes.

L. Like most of other international scientific Olympiads, IOI is awarding half of the participants with medals – golden, silver and bronze – in ratio 1:2:3. All other participants are obtaining certificate for participation. If there is an absolute winner (a single student with max number of points) she/hi is obtaining the Special Award of IOI. The youngest medal winner of the contest is awarded the Special Prize of IFIP. Awards of IOI don’t give some formal advantages to the students that obtained them but, as a mater of fact, open doors of some of the best world universities for awarded students.

M. IOI is an event that attracts many high level professionals – school teachers, university professors and scientist – interested in (early and not so early) education of programming. Being an sophisticated and extremal form of programming the contest is really an unique Lab for experiencing with teaching methods, automatic testing, developing advanced abstract data types and algorithms, as well as implementing it in data structures and programs etc. It is possible to say that a new academic discipline is appearing around IOI and the other similar contest (see ICPC of ACM too)– “competitive” programming (“top coding” in the slogan of the contestants). Since IOI’2007 a Scientific Conference of IOI dedicated to competitional programming and related topic is organizing by IC of IOI and the Host Country [2].
**Target Group:** IOI is a world contest attracting talented secondary school students with strong mathematical culture and algorithmic thinking.

**Age of Participants:** less than 20 years

**School level of Participants:** Participants have to be enrolled in secondary school in the school year of the contest. Students of any form of tertiary education (post-secondary qualifications, colleges, as well as universities) are not allowed. Some deviation of the rule is made for the students from South hemisphere that finished secondary school after the end of the previous Olympiad (for example in December) and since January/February was accepted in some tertiary form of education.

**Number of Participants and the number of editions of the competition in the Last 3 Years:**
The first edition of the contests was in 1989 and in 2007 IOI had its XIX-th edition. The number of participating countries/contestants for some characteristic years are summarized below:

- 1989, Pravetz, Bulgaria – 13/37 (three contestants from country, 9 unofficial)
- 1990, Minsk, Belorussia – 25/about 100 (four contestents from country)
- 1992, Bonn, Germany – 51/171
- 1996, Veszprém, Hungary – 57/220
- 2000, Beijing, China – 72/278
- 2004, Athens, Greece – 81/286
- 2005, Novi Sac, Poland – 72/276
- 2006, Merida, Mexico – 74/282
- 2007, Zagreb, Croatia – 76/285

**History of Competition:** In 1987 Sofia – the capital of Bulgaria – hosted the International Conference of IFIP and UNESCO “Children in Information Age”. Prof. Blagovest Sendov, member of the Academy of Sciences and President of the Organizing committee proposed to the Team from the Union of Bulgarian Mathematicians which was organizing for some years a National Olympiad in Informatics (see the corresponding article for NOI) to organize during the Conference an international programming contest for school students. The contest was organized in two age groups (younger and older than 14 years). Students from 7 countries took part in this event (Check-Slovak Republic, Federal Republic of Germany, German Democratic Republic, Poland, Rumania, Soviet Union and Bulgaria).

The results of this experiment were fantastic. All participants were very enthusiastic about the future of programming contests for school students. They shared their experience in preparation of teams and some ideas about organization of the future contests. The idea of initiating international Olympiads in Informatics for school students was proposed to the 24-th General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris by Professor Sendov in October-November 1987. This plan was included into the Fifth Main Program of UNESCO for the biennium 1988-1989 (Section 05 215). In May 1989, UNESCO initiated and sponsored the first International Olympiad in Informatics (IOI).

The first International Olympiad in Informatics was held in June 1989 in Pravetz, small town, placed about 50 km north-east from Sofia. The town was not only the center of Bulgarian computer industry, but a birth place of the Head of State Council (equivalent to President) of Bulgaria in that time, too. The term Informatics, not so popular in English-speaking countries was chosen, after long discussions, to replace Computer Science or Programming because of very good looking abbreviation IOI (not simply palindrome, but a graphical palindrome, too).

First IOI was organized using the model of the other scientific International Olympiads for school students and especially the model of International Olympiad in Mathematics. The President of First IOI was Prof. Peter Kenderov, a mathematician with huge experience from mathematical Olympiads.
Students from 13 countries took part. The teams were composed of a Leader and 3 students. Contest was organized in one day. The students had to solve the following task (here is a simplified version of the statement):

**Task.** A sequence of $2N$ boxes is given. In $N–1$ of the boxes white pieces are placed, in other $N–1$ of the boxes – black pieces, an 2 consecutive boxes are empty. The following movement is permitted – to take pieces from two consecutive boxes and to move them, conserving the order, into empty boxes. Write a program to arrange, with minimal number of movements, white pieces leftmost of black pieces (the place of two empty boxes in the end does no mater).

The absolute winner of the contest was 15 year old student from the Second Bulgarian Team - Teodor Tonchev. He had a very precisely planned BFS and solved the largest test case. For more details about the proposed tasks, the contests, and results of the First International Olympiad in Informatics see [1]. New edition of this brochure will appear for the celebration of 20-th anniversary of the First Olympiad during IOI'2009.

In the next years the popularity of the contest was growing extremely. Now a day IOI is (may be) the second by popularity international scientific contest for secondary school students after IO in Mathematics.

**Financial Basis of the competition:** Host Country is responsible for financing all events of the Olympiad – contest (halls, computers, network, etc.), accommodation, meal and recreation time for official delegations (Leader, Deputy Leader and 4 contestants) and international bodies. The participating countries and bodies members have to pay their travel expenses to the site of Olympiad and back. Each non official participant in IOI has to cover her/his own expenses. Some IOIs are financed by the country government and some are sponsored totally by the business. Usually some part of the expenses is covered by the government and some part is covered by sponsor(s).

**Competition Problems:** "в отделен *.zip съм сложил материалите от трите последни олимпиади".

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**Official site of IOI** (still in development):  

**Non official site of IOI** (very well maintained; with links to web-sites of all IOIs):  

**Photo Gallery:** many photo and video materials are published in the web-sites of specific IOIs. Materials in Bulgarian could be find on Bulgarian portal for competitive programming [3].

**Participation of Bulgaria:**

G-S-B
Pravetz, Bulgaria (3 con.) 1-2-0 (Em. Todorov – 2-nd) (II team 1-0-0, T.Tonchev -1-st)
Minsk, Belorussia, USSR 2-0-0 (Tz. Petrov – 1-st, T.Tonchev – 3-rd)
Athens, Greece 1-0-2 (Sv. Bonev – 6-st)
Bonn, Germany 0-2-1
Mendoza, Argentina (2 con.) 1-1-0 (Tz. Petrov - 2-nd)
Hanige, Sweden 0-3-1
Eindhoven, The Netherlands 1-1-2 (D. Petkov – 4-th)
Veszprem, Hungary 0-1-3
Kapetown, South Africa 0-1-2
Setubal, Portugal 0-1-3
Antalya-Belek, Turkey 0-0-2
Beijing, China 0-2-1
Tampere, Finland 2-1-1 (V. Tzanov – 14-th, J. Ganev – 22-nd)
Yong-In, Korea 1-2-1 (V. Tzanov – 3-rd)
Kenosha, USA 1-1-2 (Iv. Riskov – 2-nd)
Athens, Greece 1-3-0 (Vl. Nedev – 24-th)
Novi Sac, Poland 0-3-1
Merida, Mexico 1-1-1 (R. Roumenov – 6-th)
Zagreb, Croatia 2-1-0 (I. Chernev- 14-th, R. Roumenov – 23-rd)

Total: 73 participation, 63 medals – 14 Golden, 26 Silver, 23 Bronze
First Place: 1989, 1990
Third place: 1990, 2002
Fourth place: 1995
Sixth place: 1991, 2006

REFERENCES:


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