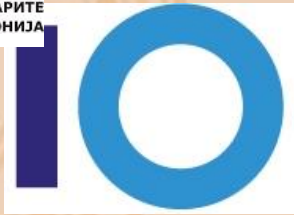


State competitions in informatics and the supporting online LCMS with collaboration and personalization features MENDO



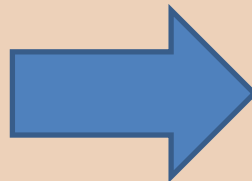
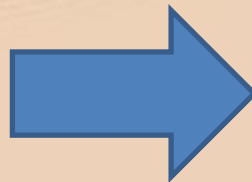
Mile Jovanov,
Emil Stankov,
Bojan Kostadinov,
Marija Mihova,
Marjan Gusev

Computer Society of Macedonia
Faculty of Computer Science and Engineering
Skopje, Macedonia

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The manager anecdote



The manager anecdote (2)

in debt



1 000 000 \$

in debt



4 000 000 \$

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Competitions in Informatics

- We usually talk about **algorithmic programming** contests
 - Other types include: architecture, design, development, specification, assembly, testing scenarios, etc.
- Usually, separate competitions are organized for *high school/primary school* pupils
 - Age boundaries determine where one can compete
- A perfect opportunity for pupils to introduce to the *art of programming* and create a very solid background for becoming *engineers in informatics*

International Olympiads in Informatics (IOI)

- The idea of initiating IOI for school students was proposed to the **24th** General Conference of UNESCO *in Paris*
- First Olympiad in 1989
- Each participating country typically sends a delegation of **4** pupils and **2** accompanying adults (a *Leader* and a *Deputy Leader*)
- The *pupils compete individually* and try to maximize their score by solving a set of informatics problems during two competition days
- The problems have been *algorithmic programming problems* to be solved on a personal computer

Balkan Olympiads in Informatics (BOIs)

- The initiative for the establishment of the **Balkan Olympiad in Informatics (BOI)** came from the host country of the 1st BOI – Romania
- The Olympiad is *organized by the Ministry of Education* and other appropriate institutions and organizations of one of the following countries: *Albania, Bulgaria, Bosnia and Herzegovina, Cyprus, Greece, Macedonia, Moldova, Montenegro, Romania, Serbia and Turkey*
 - According to the rules accepted by the initiators of the BOI, teams of these countries are invited as regular participants

Balkan Olympiads in Informatics (2)

- The BOI/JBOI aims at motivating secondary/primary school students of South East Europe to:
 - *get more interested in informatics* and information technology in general
 - test and prove their competence in solving problems with the help of computers
 - *exchange knowledge and experience* with other students of similar interest and qualification
 - *establish personal contacts with young people* of the East European region
 - provide *training* for the students participating in *the IOI*

Competitions in Informatics in Macedonia

- The **Computer Society of Macedonia (CSM)** is the main organizer of competitions in informatics for both *high school* (HS) and *primary school* (PS) pupils
- Every year, contestants go through many levels of competition until the best are selected
 - *Regional Competition* (HS)
 - *National Competition* (HS)
 - *National Olympiad* (HS)
 - *Qualifications + National Competition* (PS)
- The selected pupils represent themselves and Macedonia at the BOI/JBOI and at the IOI



Competitions in Informatics in Macedonia (2)

- Competitions in informatics have a long tradition in Macedonia
- So far:
 - **21** *Regional Competitions* (HS)
 - **24** *National Competitions* (HS)
 - **17** *National Olympiads* (HS)
 - **7** *National Competitions* (PS)

Brief history: the beginnings...

- The first steps of informatics in high school education were made in middle **1980s**
- Few years later (in **1990**), the **1st National Competition in Informatics for HS students** was held in ***Prilep***
- In **1993**, CSM started to organize **Regional Competitions in Informatics**
- The **1st National Olympiad in Informatics** was held in **1997**
- In **2007**, the **1st National Competition in Informatics for PS students** was held in ***Veles***

Brief history: HS competitions

- At first, all the contestants were given only one set of programming tasks
- Later, the contestants were divided into **2** groups (**A** and **B**), having a *different set of tasks* for each group
- Later, it was decided that it would be better to rename the **2** groups based on the *degree of difficulty*
 - The groups were named “**easier group**” and “**harder group**”

Brief history: HS competitions (2)

- At first: manual evaluation and grading of the contestants' solutions
- Later: semi-automatic evaluation and grading of the contestants' solution
 - Using an appropriate software

Brief history: HS competitions today (2)

- The contestants, depending on the level of acquired knowledge in the programming area, at the start of each competitions cycle have to choose between:
 - **Beginners group**
 - First time contestants with no experience, usually in their first or second year of high school education
 - **Basic group**
 - First or second time contestants, that consider themselves not to have enough experience to participate in international competitions
 - **Advanced group**
 - Contestants that consider themselves to have enough experience to solve complex algorithmic problems and to participate in international competitions (BOI, IOI)

Brief history: PS competitions

- Year **2007**
 - only skills in applications
- Year **2008**
 - skills in applications and
 - algorithmic skills
- Year **2011**
 - skills in applications
 - algorithmic skills – **beginners group**
 - algorithmic skills – **olympic group** (on MENDO)
- Year **2012**
 - skills in applications
 - algorithmic skills – **olympic group** (on MENDO)

Challenges in the Organization of the Competitions

- Computer Society of Macedonia, is a non-government, non-profit organization.
 - the organization of the competitions **is based solely on sponsorships** from companies, educational institutions, and sporadically from donations based on application in some calls for projects
- Having in mind the low finances, CSM has to **find as cost-effective** as possible **way** for the following:

Engaging pupils in the competitions

- We have to spread the information among the pupils and keep them informed
 - We have concluded that the best way to do that is to **build and maintain a ‘community’ of competitors**, and let them collaborate throughout the whole year
 - we also use some more traditional methods, e.g. **contacting and informing the schools**, contacting the computer science teachers, but there are obstacles in that regard too

Motivating teachers and school authorities

- The most important thing
 - motivate the teachers to inform and mentor the pupils
- With years of our experience, we have found that the
 - computer science teachers, mainly, **do not want to spend extra time** for tutoring gifted pupils
 - the greatest reason for this is that they are **not familiar enough with the curriculum** of the programming competitions

Motivating teachers and school authorities

- The best solution consists of two things:
 - **Provide online materials, training and q/a support** for the pupils, in every stage of their training for the competitions, and
 - **Inform the teachers for this convenience** and put **additional pressure directly through the pupils**
- The school authorities can also be an obstacle for the participation of the pupils
 - mostly with ridiculous reason in mind like not spending money for the trip of the pupils to the contest venue
 - On this issue, we can only hope on the pressure of the pupils and the teachers on them

Keeping the participants informed, and 'in condition'

- **Publically present the information** for the next steps in the competitions (dates, rules, procedures, results, etc.) in order to directly inform the pupils
 - the most reliable way to spread information (opposite to informing through the teachers)
- The greatest challenge of all is to **motivate pupils to constantly prepare** (work on solving problems) for the competitions, with public sets of tasks that can be solved at any time

Better conditions for fulfilling our goals

- we had a dramatic improvement in the area of **internet penetration** in Macedonia, and nowadays we have similar conditions for internet access as most EU countries
- The government project “Computer for every pupil” allowed easy **access to internet content from every classroom**

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The need for CMS

- Historically, in Macedonia
 - a few separated systems (evaluation program, contest website, forum page called “Communication window”...)
- A lot has changed since the first competitions
 - the computer equipment has improved, new IT have been introduced,
 - the technique and technology of development and judging competition tasks has improved
- The best solution
 - integrate all the required functionalities mentioned above in a single automated system for complete contest management.

MENDO (<http://mendo.mk>)



Mendo Online Judge

Систем за натпревари по информатика 2012

Тренинг Натпревари Понош

Дома Линкови Пријави Грешка Помош

► Дома ► Добродојдовте во Mendo Judge

Најава

Корисник

Лозинка

☐ Запомни ме

Забравена лозинка?

Навигација

- Регистрација
- Тренинг
- Натпревари
- Форуми
- Вики
- Помош
- Пријави Грешка

За нас

Овој сајт (проект) е пуштен во употреба како дел од напорите за популаризирање на натпреварите по информатика во Македонија. Иако целта на

Добродојдовте во Mendo OJ 2012

Државен натпревар 2012

Поканети натпреварувачи на Државниот натпревар

На веб-сајтот на Здружението на информатичарите на Македонија се објавени конечните резултати од регионалниот натпревар ([\[ЛИНК\]](#), [\[ЗА ПЕЧАТЕЊЕ\]](#)), како и листата на поканети учесници на Државниот натпревар по информатика 2012 ([\[ЛИНК\]](#), [\[ЗА ПЕЧАТЕЊЕ\]](#)). Сите ученици за да може да учествуваат на Државниот натпревар мора да бидат пријавени од нивните ментори (или од некој професор од училиштето во кое што учат) на адресата [natprevar AT cs.org.mk](mailto:natprevar@cs.org.mk) најдоцна до 19.04 до 15 часот (повеќе детали [ТУКА](#)).

Регионален натпревар 2012

Регионалниот натпревар ќе се одржи на 08.04.2012 (недела). За сите учесници натпреварот започнува во 12:00 и трае до 15:00 часот – значи вкупно 3 часа. Натпреварот ќе се одвива електронски - преку овој веб-сајт. Повеќе информации за регионалниот натпревар можете да најдете на веб-сајтот на ЗИМ - директен линк [ТУКА](#) (задолжително прочитајте!). ВАЖНО: Доколку се случи прекин на интернет врската до mendo.mk во текот на натпреварот, информации како продолжува натпреварот ќе може да добиете на [Facebook страната на ЗИМ](#). Не мора да сте Facebook корисник за да ги следите објавените соопштенија.

Натпревари по информатика 2012

Информации за 23-тиот циклус натпревари

Chat ONLINE AI

Статистика

На овој систем има вкупно 1778 регистрирани корисници; 25 од нив биле активни во последните 5 минути.

Системот ги поддржува сите 4 јазици кои се користат на IOI и ACM (Pascal, C, C++ и Java).

Поддржувачи



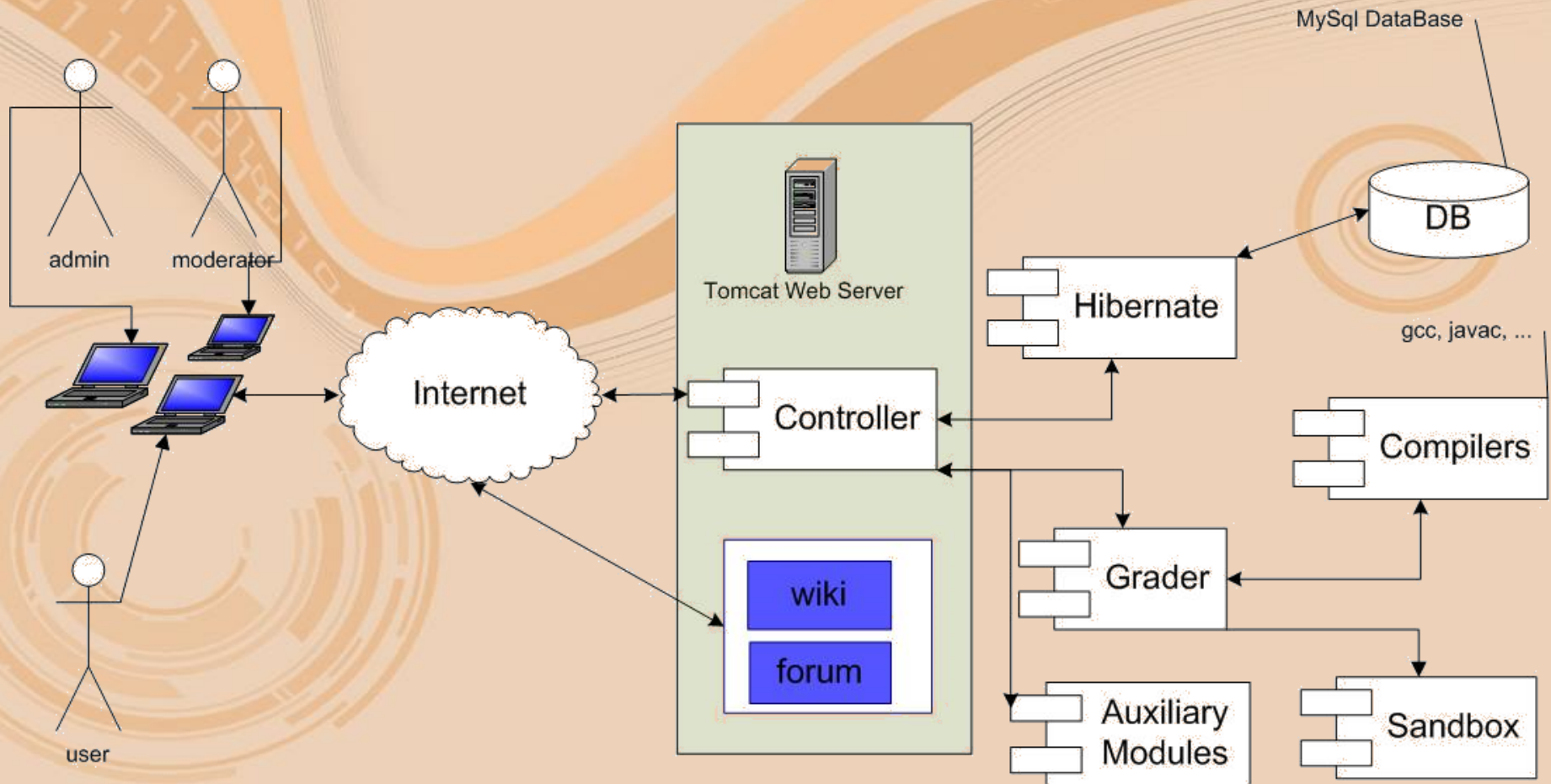
Дали знаете?

Македонија освои четири бронзени медали на БОИ 2011, и два бронзени

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Architecture Outline



MENDO features

- It uses cookies to support SSO – Single Sign On across multiple applications (the main system, the wiki, and the forum)
- One of the rare systems that operate on MS Windows
- Easily distributes load (plugging more graders is easy)
- Controls the entire system of the Computer Society of Macedonia (by providing automatic backups & self-tests)
- Multilingual support
- Managed by several administrators and moderators, each with his own privileges and responsibilities
- Heavy use of AJAX to simplify user interface operations
- Designed and created by using free software (java, apache commons, hibernate, struts, jcs), and runs entirely on free software (tomcat, mysql, jforum, jspwiki)

Employment and performances of MENDO

- MENDO is used as:
 - a learning and training system (contains tasks from past contests, both national and international)
 - a contest management system (for organizing official national competitions and open online tournaments)
 - Macedonian algorithmic programming gateway, containing a news page, a lot of programming related materials (organized in a wiki), and a public forum

MENDO as a Training System

- The MENDO's training system *can be used 24/7*
- Every time a user logs
 - he can view all the tasks that are available for training, and he can submit a solution
- After a solution has been submitted, the submission is added to a queue and judged as early as possible
- After a submission has been judged, the results of every test case are shown to the user in a form of detailed feedback
 - There is no limit to the number of submissions a user can make during a time period

MENDO as a Training System (2)

- Special section consisting of organized materials that present an online step by step introduction to algorithmic problem solving and programming (with C++ as the programming language)
 - number of lessons, combined with executable sample codes and proposed tasks connected to the information presented in the lesson in question
 - Every user has a personal view of the lessons, showing her current progress



MENDO

System for competitions in informatics 2013

English

Македонски



Home

Training

Competitions

Help

» 89324 tested submissions | 3304 users «

» Home » Training

Chat OFFLINE AI

Login

Username:

mile

Country:

Macedonia

Activity:

1 solved tasks

Navigation

Training

Competitions

Forums

Wiki

Submissions

(M) Tasks

(M) Contests

Log Out

Learn programming...

[Learn C++] [Beginners] [National] [International]

The C++ programming language

	Name	Source	Activity
1.	Вовед. Структурирано програмирање		lecture
2.	Бинарен броен систем		lecture
3.	Типови на програмски јазици		lecture
4.	Креирање на вашата прва програма		lecture
5.	Анализа на првата програма		lecture
6.	Здраво	вовед '12	task
7.	Податочни типови. Променливи		lecture
8.	Читање и печатење на податоци		lecture
9.	Оператори - прв дел		lecture
10.	Квадрат и куб	оператори	task
11.	Математика	оператори	task
12.	Средна цифра	оператори	task
13.	Оператори - втор дел		lecture
14.	Условно извршување (if-else, switch)		lecture

Specific MENDO Features

- ***Simple analysis of the source code***
 - the system automatically analyses the program output and the source code of the uploaded solution
 - If a simple mistake of not following specific rules is detected (printing additional data, using commands like `system("pause")`, writing to files instead of standard input/output, etc.), the system notifies the user
- ***Downloading a test case in training mode***
 - After a student submits a wrong solution to a task, he is presented with an option of potentially downloading one of the test cases that his solution does not correctly solve
 - Users are limited in the number of tests that they can download

Specific MENDO Features (2)

- ***Virtual contest***
 - contest that is created on a user request and is based on the user's performance history in training section of the system
 - simulation of a contest, seen only by the user that demanded it
 - the system automatically determines the "best" tasks that should be included in the contest
 - After the contest the system automatically presents to the user a virtual scoreboard
 - The scoreboard consist names of other contestants, and the most important information on it is the ranking of the contestant that took the contest
 - The scoreboard is fictional but based on various system information from other actual competitions

Specific MENDO Features (3)

- ***Additional test case options***
 - ***Including hint(s) for a test case.***
 - slows the process of task preparation (but, the problem maker almost always has in mind what part of the task (i.e. of the solution) is checked by each particular test case)
 - ***Hint for a test case by a competitor***
 - ***Complete test case by a competitor***

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BOIs organized by CSM

- The **8th** BOI in **2000**
 - Date: June **15 – 20**
 - Venue: ***Ohrid, Macedonia***
 - Number of participating countries: **9** (including USA and Georgia)
 - Number of contestants: **36**



BOIs organized by CSM (2)

- The **16th** BOI in **2008**
 - Date: October **2 – 8**
 - Venue: ***Bitola, Macedonia***
 - Number of participating countries: **9** (including Croatia and Poland)
 - Number of contestants: **34**

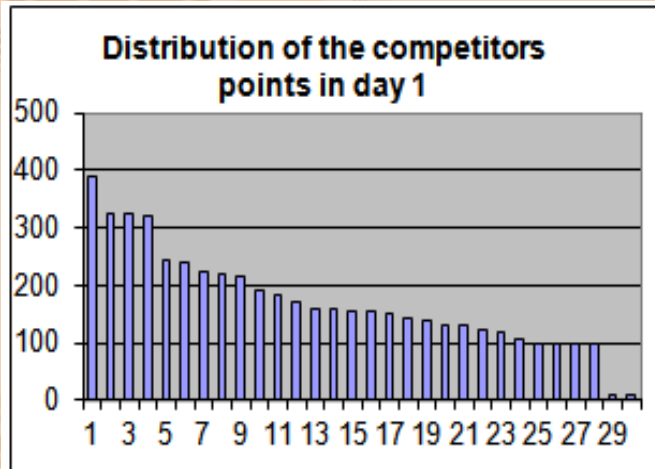


JBOI organized by CSM

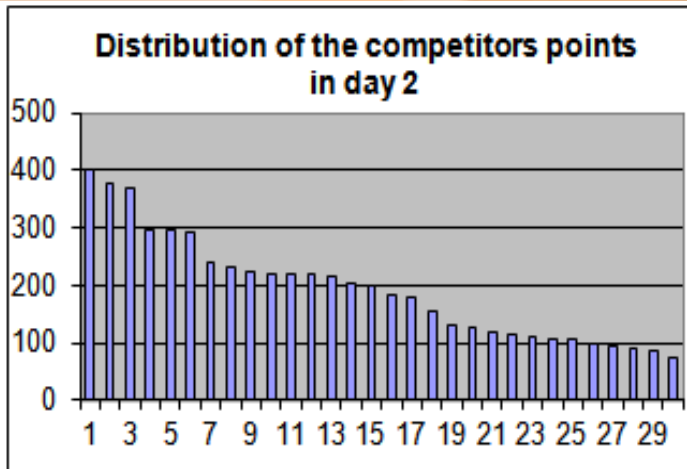
- The **7th** BOI in **2012**
 - Date: August **9 – 15**
 - Venue: ***Ohrid, Macedonia***
 - Number of participating countries: **7** (including Croatia)
 - Number of contestants: **30**



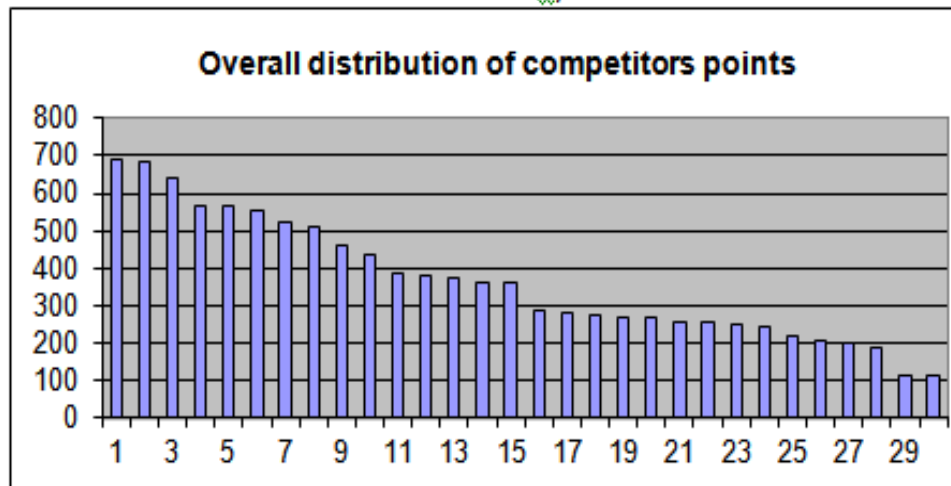
MENDO's Employment in JBOI 2012



a)



b)



c)

- a) MIN = 10,
MAX = 390,
AVG = 166
(out of 400 p.)
-
- b) MIN = 75,
MAX = 400,
AVG = 191,5
(out of 400 p.)
-
- c) Overall
distribution
MIN = 115,
MAX = 693,
AVG = 357,6
(out of 800 p.)

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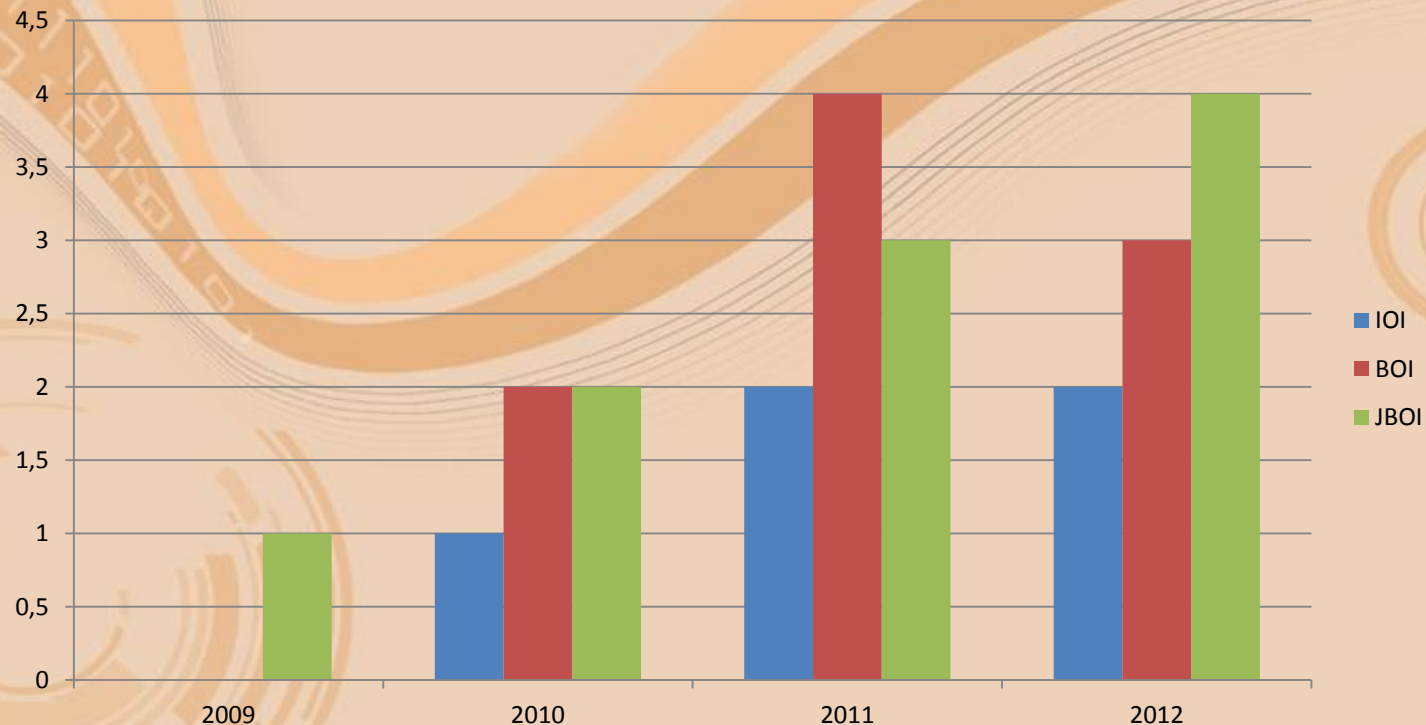
Interest in the competitions

Year	Regional Competition	National Competition	National Olympiad
2010	55	45	23
2011	118	68	19
2012	209	95	21
2013	290	118	21

Results of Macedonian Teams at International Contests



Results of Macedonian Teams at International Contests



Number of medals won at IOI, BOI and JBOI in the last 4 years

