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The Modern Contents of the Russian National Olympiads in Informatics

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Abstract. The Russian Olympiads in Informatics (RusOI) had begun in 1988 a year before The International Olympiads in Informatics (IOI) started. Since the first Olympiad the most important issue was to build up understanding of the RusOI contents in particular for students of secondary school. This paper describes main stages of development of the RusOI contents, connecting it with requirements to studying informatics at secondary schools and the modern RusOI contents, allowing to select talented young people in the country and to create for them the necessary conditions for their further development in the field of computer science.

Key words: computer science, secondary school education, olympiads in informatics, contents of the olympiads, competition tasks.

1. Introduction

The contents of any Olympiads in informatics are entirely determined by those competition problems which are offered in Olympiads. When such Olympiads had started in the Soviet Union in 1988 (in that time Russia was one of the Republics of the Soviet Union) there was no experience of composing competition problems. The closer from the point of view of competition problems was model of Olympiads on mathematics. Namely it has been put in a basis of the contents of competition tasks on informatics.

Since then more than 19 years have passed, but at this time much has changed in definition of the contents of the Russian Olympiads in Informatics (RusOI). The form of carrying out the Olympiads has changed, the computer equipment was improved, there were new information technologies, and together with this, the RusOI contents was gradually formed and the technique and technology of development competition tasks were improved. Now for participants of modern RusOI the first competition tasks represent not such the big interest from the point of view of the contents, but they are those tasks which have determined an initial point and a vector of their further development.

2. Stages of Development of the Contents of Olympiads in Informatics

The development of the RusOI contents had evolutionary character and nevertheless it is possible to point to three basic stages of it [1]. The first stage has been connected with

the pioneer Olympiads when there was the Soviet Union. Then Olympiads passed in two competition days. The first competition day was theoretical (without use of computers) and the second one was practical (with use of computers). The first competition tasks were very close under the formulations to mathematical tasks and more reminded tasks of the raised complexity at school subject of informatics. The basic problems by their preparation were the problems connected with definition of basic distinctions between the competition tasks of theoretical and practical competition days, the representation form of participant solutions and criteria of their evaluation.

It was obvious, that on computer competition day the contestant should be required to produce only a single source file. That should be the competition task content of theoretical competition day and what should be produced by contestants as a result of solving of theoretical tasks, was rather vaguely. It was not clear, what kind of competition tasks and algorithms will be accessible to participants and that they should represent as a solution of this kind of tasks. To demand the proof of any properties of algorithm from participants would be not absolutely correct as not many secondary school students possessed corresponding mathematical skills, and in school informatics it practically was not considered.

For that case it was accepted the following decision. On theoretical competition day it was authorized to describe algorithms of the tasks solution both on the native language and on any algorithmic language known to the students. But there was a big problem how to evaluate theoretical tasks solution. Opinions were so much, how many was judges, but any more or less comprehensible solution for this problem was not. All of them had subjective character as without the participant it was very difficult to understand that has been presented as the solution. Moreover, if it was the description of algorithm in any programming language in the written form, it was not clear how to concern to syntactic errors available there.

The RusOI contents has essentially changed in 1990. From this year theoretical competition day has been replaced by computer competition day, that is, both competition days became with using computer. From this year the second stage in development of the RusOI contents had begun. Its basic feature – competition tasks became multilevel and participants were given only one task in the competition day. In particular, each such task contained some subtasks of a various degree of the complexity, incorporated by the common idea and located in ascending order of complexities. The main advantages of multilevel tasks were the opportunity to differentiate participants on a level of preparation and minimization of volume of the text of task statements. Thus weak participants could something solve and award by some points, and strong participants had an opportunity to prove to the full.

Use of only one multilevel task on each competition day has led to understanding that small number of competition tasks narrows a scope of computer science topics considered on Olympiads. Really, practically not probably to compose one or two tasks for which solution could capture many topics of computer science. In this connection, the number of tasks on each competition round had been increased gradually (see Table 1), and from 1995 up to now in Russia there are three competition tasks on each competition day. The same tendency was on the IOI.

Table 1
Number of the RusOI tasks from 1990 to 1995

Year of RusOI	Number of the first round tasks	Number of the second round tasks
1990	2	1
1991	1	1
1992	1	1
1993	1	2
1994	2	1
1995	3	3

It is necessary to note also, that at the second stage in development of the RusOI contents there were shown up restrictions on dimension in task statements. If before a competition task were evaluated only by means of small dimension tests then occurrence of more perfect computer equipment and information technology has led to more perfective methods of evaluation of participant solutions. It had became to evaluate efficiency of more stronger algorithms and gifted participants could prove themselves on Olympiad from the best side.

The third stage in development of the RusOI contents has come in 1996 and proceeds to this day. This stage is connected with the advent of the automated evaluating systems. Use of such systems has essentially expanded the contents of Olympiads in informatics as there was an opportunity quicker and objective to evaluate solutions of participants. In particular, it had became to use three types of competition tasks: Batch tasks, Reactive tasks and Output-tasks.

The important feature of these tasks is the following. They are multilevel tasks too, but they do not consist of subtasks in task statement. They assume to use solution algorithms of various complexity which depend on dimension of the task. The smaller test case requires more simple solution while the bigger test case requires rather complex solution. Thus it is important, that are evaluated not only full solution, but also partial. It enables to evaluate a level of creative development of participants, instead of a level of computer science acquisition and training that is characteristic for competitions for higher school students.

3. Connection of Russian State Educational Standard in Informatics and the RusOI Contents

In Russia the Olympiad in Informatics for secondary school students is the official action of the Ministry of Education and Science and enters into system of certification of students. It includes five levels (school, municipal, regional, federal district and final), and students of the final stage acquire the right to enter to the university or institute without passing an examination. Such situation has influenced on the RusOI contents. On the one hand, it should meet all requirements shown by the Russian state educational standard

in informatics. On the other hand, it should promote search of talented secondary school students and creation of conditions for their further accelerated perfection in the field of computer science.

Now in Russia the basic document determining the contents of secondary school education in informatics is the state educational standard in informatics accepted according to the decision of the Government of Russia in 2001. According to this document teaching of informatics at the secondary school is directed on achievement of the following purposes [2]:

- familiarization and ordering of the knowledge concerning with mathematical objects of computer science; construction of descriptions of objects and the processes, allowing to carry out their computer modeling; means of modeling; information processes in biological, technological and social systems;
- acquisition of skills to describe mathematical objects of computer science, including logic formulas and programs in the formal language, to create programs in the programming language under their description; to use program tools and to adjust them for needs of the use;
- development of algorithmic thinking, abilities to formalization, elements of system thinking;
- education of feeling of the responsibility for results of the work; formation of intention on positive social activity in an information society, on inadmissibility of the actions breaking legal, ethical standards of work with the information;
- getting of experience of design activity, creation, editing, registration, preservation, transfer of information objects of various type by means of modern software; implementation of computer models, collective realization of information projects, an information work in the various spheres demanded on a labour market.

It is important to note, that the same purposes characterize RusOI. However many teachers till now consider, that the contents of Olympiads in informatics essentially fall outside the limits of the curriculum on informatics for ordinary secondary school. Actually it is not absolutely so. Comparing the RusOI contents with themes of this curriculum it is possible to draw a conclusion that this curriculum in a certain degree covers the RusOI contents. But, as experience has shown, for successful participation in RusOI, especially in the final level, familiarization of this curriculum is not enough. In addition to this it is necessary to use forms of individual teaching with help of top level teachers and also actively to develop at school profile training and various elective courses.

4. Approaches to Determining the RusOI Contents

At determining of the RusOI contents it is necessary to take into consideration that informatics is the same science as mathematics and physics. Secondary school students should not only perceive it as a tool for solving of numerous problems by using a computer, but also to concentrate in its conceptual bases. For example, to answer such questions, as: what principles is informatics based on?; what new concepts are introduced with computer science in our world?; what kind of questions are called attention by scientists

engaged in computer systems?; what methods are used for solving problems with use of computer equipment and information technologies?.

Proceeding from this, competition tasks should be composed so that to allow secondary school students:

- to get acquainted with fundamental knowledge of computer science;
- to promote development cognitive models of training to this knowledge;
- to encourage development of the skills which is necessary for application of conceptual knowledge on practice;
- to be prepared to the full for studying computer science at a professional level in higher school.

As most of RusOI participants after leaving secondary school become students of higher school at determining of the RusOI contents it is necessary to take into account experience of development of computer science curricula for higher education. The analysis of such programs [3] has allowed to allocate the following three approaches to development of the RusOI contents:

- programming-oriented approach;
- algorithms-oriented approach;
- breadth-oriented approach.

Programming-oriented approach was used at the initial stage of development of the RusOI contents. Therefore very often Olympiads in informatics is named as programming Olympiads. Formation of such incorrect opinion was affected with the following practical and historical factors:

- knack of programming is necessary skills for the further training in informatics, and not only for those who is going to study computer science further;
- computer science became academic discipline late enough, and by this moment in the majority of educational institutions there are introduction courses on programming;
- in 1970–1980 many courses under the name ”Introduction to computer science” contained the most part of topics connected only with programming and not reflecting development of algorithmic thinking.

Use of programming-oriented approach at determining of the RusOI contents has the following weaknesses:

- the accent on programming due to exception of other topics of computer science gives the limited understanding of computer science as science;
- theoretical knowledge of computer science which should strengthen understanding of a practical skills fade into the background, that leads to biased opinion on supporting role of the theory in the further studying computer science;
- consideration of programming as bases of the RusOI contents leads to that secondary school students concentrate on coding more, instead of on development of algorithm, analysis and testing of solutions;
- orientation to programming can lead secondary school students to believe, that the writing of the program is the unique approach to the solution of problems with use of a computer.

Algorithms-oriented approach is focused on studying of the basic algorithmic concepts and logic structures irrespective of any programming language. From secondary school students here is required the substantiation and an explanation of algorithms which they create. It allows them to work with a wide range of types of data and logic structures needlessly to struggle with various specific features which inevitably are present at popular programming languages. Possession of students of the basic algorithms and data structures allows them to prosecute more productively subjects of effective programming, debugging and testing of programs. Moreover, this approach can include additional theoretical topics, such as estimations of efficiency and the rudiments of computability

At the same time, use on Olympiads in informatics only the approach with orientation to algorithms has some critical weaknesses. First of all, for the solution of such theoretical tasks the pseudo-code for designing algorithms is used, as a rule, and secondary school students always wish to realize the ideas and solution on a computer, instead of abstract language on a paper. As the algorithm which has been written down in the programming language - is written not for people.

Secondly, orientation to a pseudo-code or even any language of writing of algorithms relieves students of necessity to show, that their algorithms correctly work. While the process of getting a program to compile and execute correctly is sometimes frustrating, it is also a critical skill that students must master early in their education. Therefore students should have appropriate skills for this at the earliest stage of the computer science training.

Thirdly, using algorithms-oriented approach there are big problems at evaluation of competition task solution. Now in most cases evaluation of competition task solution of participants occurs by means of the automated evaluating systems. The evaluation of a pseudo-code on a correctness in this case is very difficult for realizing, and to do it manually is not a simple problem too since this demands to recruit a plenty evaluators and often it is subjective.

Breadth-oriented approach is the approach with the maximal scope of topics on computer science. It has arisen as alternative to the two approaches mentioned above. For many years experts in the field of Olympiad informatics worried that those both approaches gives student too limited sight at informatics This science is constantly developing science which determines many other kinds of activity, and it is impossible not to consider this. Otherwise, competition tasks will not allow secondary school students to prove themselves in many other fields of knowledge, being a part of modern computer science.

Use breadth-oriented approach in practice has appeared some problems too. Expansion of number of topics leads to necessity of development of a plenty various competition tasks. They should be such that students could show the creative abilities and thinking. It is very much a challenge for developers of competition tasks. However it becomes even more difficult for students as to capture a plenty of topics on informatics with demanded immersing on the necessary depth of their familiarization becomes for them practically not real.

Discussions about what approach should be put in a basis of determining of the RusOI contents have been debated on all extent of development of Olympiad movement in

informatics in the country. Each of the considered approaches has pluses and minuses, and nobody can tell unequivocally which is the better. Experience of carrying out of the RusOI has shown that true as always lays on the middle. Therefore at determining of the RusOI contents the new approach based on a harmonious combination all three mentioned above approaches has been used.

5. Structure and Short Description of the Modern RusOI Contents

The conclusions formulated in chapter 3 have allowed to allocate basic topics of computer science which determine the modern RusOI contents. In particular, as such topics the following have been chosen:

1. Mathematical Basis of Informatics.
2. Developing and Analyzing of Algorithms.
3. Programming Fundamentals.
4. Computer Literacy.
5. Operating Systems.
6. Basis of Programming Technology.
7. Fundamental Methods of Calculations and Modeling.
8. Introduction to Network Technologies.

The topic "Mathematical Basis of Informatics" substantially is connected with discrete structures and is a fundamental basis of computer science. It is especially important for participation in Olympiads in informatics as it is difficult to achieve success on competitions without good preparation in the field of set theory, logic, graph theory, combinatory theory and so on.

It is also important for the students to continue education in higher school. Moreover, escalating complexity of computer science methods influences the solution of practical professional problems. To solve this problems in the future for today's students are extremely necessary to have stable knowledge and skills in the different fields of mathematics especially discrete structures.

At successful familiarization of topic "Mathematical Basis of Informatics" secondary school students should:

know/understand:

- fundamental notions of functions, relations and sets;
- permutations, arrangement and combinations;
- formal methods of propositional logic;
- basis of construction of recurrent expression;
- the basic proof techniques;
- basis of numbers theory;

be able:

- to carry out the operations connected with sets, functions and relations;
- to calculate permutations, arrangement and combinations of set and also to interpret their values in a context of a specific task;

- to solve typical recurrent expression;
- to carry out formal logic proofs and a logic reasoning for modelling algorithms;
- to determine what kind of the proof approaches for the solving of a specific target is better;
- to use the basic algorithms of theory of numbers.

use the above-mentioned knowledge and skills at solving of practical tasks.

The basic themes of the topic "Mathematical Basis of Informatics" are:

1. Relations, Functions and Sets.
2. Basic Geometry.
3. Basic Logic.
4. Basics of Counting.
5. Proof techniques.
6. Basis of Theory of Numbers.
7. Basics of Algebra.
8. Basics of Combinatorial Calculus.
9. Basis of Graph Theory.
10. Basis of Probability Theory.
11. Basics of Game Theory.

The topic "Developing and the Analyzing of Algorithms" is very important for Olympiads in informatics and determines a basis of productive activity of students, their creative self-expression. In this field of computer science participants of Olympiad in informatics have an opportunity to show the best creative qualities at the solution of competition tasks.

Importance of algorithms theory is difficult to overestimate. Actual value of any program or program system depends on two factors: applied algorithms and efficiency of their implementation. Therefore development of good algorithm has crucial importance for productivity of any program system. Besides studying of algorithms allows to penetrate more deeply into a current task and can prompt methods of the solution which are not dependent on the programming language, a paradigm of programming, hardware maintenance and other aspects of implementation.

Studying of algorithms theory helps to develop at student's ability to choose the algorithm most suitable for the solution of the given task or to prove, that such algorithm does not exist. This ability should be based on knowledge of algorithms which are intended for the solution of the certain set of known problems, their understanding strong and weaknesses, applicability of various algorithms with an estimation of its efficiency.

At successful familiarization of topic "Developing and the Analyzing of Algorithms" secondary school students should:

know/understand:

- elements of theory of algorithms;
- basic data structures;
- basic notions of graph theory and graph properties;
- relate graphs and trees to data structures, algorithms and counting;
- properties inherent in "good" algorithms;
- big O notation for the description of the amount of work done by an algorithm;

- determining the time and space complexity of simple algorithms;
- computing complexity of the basic algorithms of sorting, search and hashing;
- concept of recursion and the general recursively presented problem statement;
- hash function and its assignment;
- simple numerical algorithms;
- basic combinatory algorithms;
- basic algorithms of computing geometry;
- the most widespread algorithms of sorting;
- the most important algorithms of string processing;
- representations of graphs (adjacency list, adjacency matrix);
- fundamental algorithms for graphs: depth- and breadth-first traversals, shortest-path algorithms, transitive closure, minimum spanning tree;
- basic algorithmic strategy: brute-force algorithms, backtracking, ”greedy” algorithms, ”divide-and-conquer” algorithms and heuristic algorithms;
- basis of dynamic programming;
- elements of game theory;

be able:

- to choose suitable data structures for the solution of problems;
- to use the above-mentioned algorithms during solving of problems;
- to determine memory and run-time complexity of algorithms;
- to determine computing complexity of the basic algorithms of sorting, search and hashing;
- to use big O notation for the description of the amount of work done by an algorithm;
- to implement recursive functions and procedures;

use the above-mentioned knowledge and skills at solving of practical tasks.

The basic themes of the topic “Developing and the Analyzing of Algorithms” are:

1. Algorithms and their properties.
2. Data Structures.
3. Basic Algorithmic Analysis.
4. Algorithmic Strategy.
5. Recursion.
6. Fundamental Computational Algorithms.
7. Numeric Algorithms.
8. String Processing.
9. Graph Algorithms.
10. Dynamic Programming.
11. Algorithms of Game Theory.
12. Geometrical Algorithms.

The topic “Programming Fundamentals” and a high technological level of its possession are necessary conditions of successful performance of any students on Olympiads in informatics. To participate in Olympiad in informatics, each secondary school student should know and put into practice even one programming language. Moreover, it is also

desirable to master by participants of Olympiad at least two paradigms of programming because in RusOI is permitted to use three programming languages: C/C ++, Pascal, Visual Basic.

It is important to notice, that knowledge and skills in the field of programming, which are important for practice of programming, irrespective of an applied paradigm of programming. Therefore the given topic includes sections under fundamental concepts of programming, the basic structures of data and algorithms and also actually programming languages. Programming languages are the basic means of dialogue of the student and a computer during solving of competition tasks. Students should not simply be able to write the program in any one language, they should understand the various styles of programming inherent in different languages. The understanding of a variety of programming languages and various paradigms considerably facilitates fast study of new languages by them.

As a result of successful study of topic "Programming Fundamentals" secondary school students should

know/understand:

- basic structures of programming;
- concept of data type as sets of values and operations above them;
- basic data types;
- basic data structures: arrays, records, strings, stack, queues and hash tables;
- data presentation in memory;
- bases of input/output;
- operators, functions and parameter transmission;
- static, automatic and dynamic memory allotment;
- memory management during execution of the program;
- methods of realization of stacks, queues and hash tables;
- methods of realization graphs and trees;
- mechanism of parameter passing;
- features of realization of recursive solutions;
- useful strategy at program debugging;

be able:

- to analyze and explain behaviour of the simple programs including fundamental structures;
- to modify and expand the short programs using standard conditional and iterative operators and functions;
- to develop, realize, test and debug the program which to use all the most important structures of programming;
- to apply methods of structural (functional) decomposition to divide of the program into parts;
- to realize the basic data structures in high level language;
- to realize, test and debug recursive functions and procedures;

use the above-mentioned knowledge and skills at solving of practical tasks and confidently to program even on one of programming language permitted to use in RusOI (C/C ++, Pascal, Visual Basic).

The basic themes of the topic “Programming Fundamentals” are:

1. Programming Languages.
2. Basic Programming Constructions.
3. Variables and Data Types.
4. Data Structure Types.
5. Mechanisms of Abstraction.
6. Fundamental Programming Species.

The topic “Computer Literacy” plays an important role in studying of computer science because a computer is the integral tool which students use during competition in informatics. Secondary school students should not perceive a computer as a black box executing the programs by means of unknown magic. All students during solving competition problems should know the main components of which the computer consists and understand how they operate, their main characteristics, productivity and interaction between them. The understanding of the computer and its organization allows also to write more effective programs.

At successful familiarization of topic “Computer Literacy” secondary school students should:

know/understand:

- logic variables, operations, expressions;
- scale of notations;
- formats of representation of numerical data;
- presentation of data with fixed and floating point and connection with accuracy;
- internal representation of non-numerical data;
- internal representation of symbols, strings, records and arrays;
- instruction representation at a machine level;
- basis of input/output;
- basic types of memory;
- bases of memory control
- access to data on hard disk;

be able:

- to convert numbers from one scale of notation in another;
- to use mathematical expressions for the description of functions of simple consecutive and combinational schemes;
- to transform numerical data from one format to another;
- to adjust the programmer’s workbench for solution of competition tasks;

use the above-mentioned knowledge and skills at solving of practical tasks so that the students feels themselves confidently at work with a computer at solving of competition tasks.

The basic themes of the topic “Computer literacy” are:

1. Digital Logic.
2. Data Representation.
3. Computer Engineering Principles.

4. Memory.
5. Communications.

The topic "Operating systems" gives to students convenient abstraction of hardware maintenance of a computer. For many years operating systems and their abstraction became more and more difficult in comparison with usual applied programs. Nevertheless, for successful performance on Olympiad in informatics secondary school students should know:

- functions of modern operating systems;
- difference of primitive batch systems from complex multi-user operating systems;
- understanding of a logic level;
- page and segment organization;
- various ways of economy of memory;
- distinctions between the mechanisms used for communications with devices of a computer;
- advantages and shortcomings of direct memory access;
- requirements to recovery from failures.

Acquired knowledge of this topic should provide to students for the confident work with operating system at implementation of solution of competition tasks by means of a computer.

The basic themes of this topic are.

1. Operating Systems Basics.
2. Basic Functions of Operating Systems.

The topic "Basis of Programming Technology" is a part of software engineering, considering the application of corresponding knowledge and skills to effective implementation and operation of programs and program systems. Software engineering studies all phases of life cycle of program system: analysis of requirements, development of specifications, designing, implementation, testing, operation and support. Though on Olympiads in informatics there is no speech about development of program system, nevertheless, this topic plays a big role in solving of competition tasks and demands from students of quite certain knowledge and skills.

At successful familiarization of topic "Bases of Programming Technology" secondary school students should:

know/understand:

- purpose and structure of programming facilities and environments;
- role of program tools during development of the software;
- properties of designing of the "good" software;
- basic methods of program testing and debugging;

be able:

- to choose and prove a set of programming facilities for support of development of the software;
- to use programming facilities and environments in development of software product;

- to compose tests;
- to test and debug of programs;
- to develop the program in the form of ready software product;

use the above-mentioned knowledge and skills at solving of practical tasks.

The basic themes of the topic "Bases of programming technology" are:

1. Programming facilities and environment.
2. Program Testing and Debugging.

The topic "Fundamental Methods of Calculations and Modeling" represents the area of computer science closely connected with calculus mathematics and numerical methods. As computers began capable to solve more and more challenges, similarly to computer science as a whole this area got the increasing value and importance. Moreover, by the end of the twentieth century scientific calculations have affirmed as the independent discipline having close connections with computer science, but, nevertheless, not identical with it.

In pure form methods of calculus mathematics and numerical methods are practically not used on the RusOI, exception is made only with methods of modeling. Nevertheless, the certain topics in this area play the important role in training of student for Olympiads in informatics. Their knowledge allows to approach more substantially to solving of competition tasks by students.

At successful familiarization of topic ""Fundamental Methods of Calculations and Modeling"" secondary school students should:

know/understand:

- notion of precision loss, computational stability, machine accuracy and error of calculus of approximations;
- sources of errors in calculus of approximations;
- basic algorithms of solving calculus mathematics tasks (calculation of value and roots of function, calculation of perimeter, square and volume, calculation of a point of crossing of two segments etc.);
- notions of model, modeling and simulation, basic types of models;
- specifications of computer model (input, output and state variables, state change functions, output function, time advance function) and ways of their description;
- basic phases and features of implementation and use of computer models;

be able:

- to calculate error estimation of calculus of approximations;
- to use basic methods of calculus mathematics at solving tasks;
- to formalize objects of modeling;
- to develop computer models of the elementary objects;

use the above-mentioned knowledge and skills at solving of practical tasks.

The basic themes of this topic are:

1. Basics of Computational Mathematics.
2. Modeling Basics.

The topic "Introduction to Network Technologies" is came into the RusOI contents in connection with last achievements in the field of networks and the telecommunications.

On Olympiads in informatics it is necessary for students not only the nobility that such computer networks, but also directly to carry out competition tasks in local computer network environment and the corresponding software. Possession of network technologies includes both theoretical knowledge, and practical skills. Students have to get basis of this knowledge and skills to feel during competition more confidently. The same situation and with wireless and mobile computers which actively start to be used on the RusOI, and an example to that - the final stage of the RusOI in 2006.

As a result of successful study of topic "Introduction to Network Technologies" secondary school students should

know/understand:

- basic structure of network architecture;
- most important network standards;
- roles and the responsibility of clients and servers for various applications;
- problems of networks safety arising because of viruses and the attacks directed on initiation of refusals in service;
- basis of wireless computer networks;

be able:

- to customize programmer's workbench in client- server network;
- effectively to use a number of the widespread network applications, including web-browsers and automated evaluating systems;
- to work with applications using mobile and wireless communications;

use the above-mentioned knowledge and skills for solving competition tasks in the environment which is installed for conducting RuOI.

The basic themes of the topic "Introduction to Network Technologies" are:

1. Basis of Networks and Telecommunications.
2. Introduction to Wireless Networks.

6. Conclusion

Short description of the RusOI contents presented in this paper is a result of longstanding experience of carrying out the Olympiads in informatics in The Russian Federation. The basic idea of these contents is to give all that are interested in participation in Olympiads in informatics a guiding line for development of an individual trajectory of training in Olympiad field in computer science. Moreover it gives good possibility for secondary school students, teachers, and composers of competition tasks to achieve a better common understanding of the knowledge and skills assumed of contestants of the RusOI.

The RusOI contents do not restrict the actual content of the RusOI and a process of deciding about the appropriateness of candidate competition tasks. It constantly develops, as well as computer science. Therefore to speak about any restrictions on this process it is not necessary.

The author hopes that the experience of Olympiads in informatics in Russia will be interesting to representatives of other countries.

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