SOFTWARE FOR EXPERT INFORMATION PROCESSING DURING CARRYING OUT THE EXAMINATIONS

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Abstract: The system of the automated carrying out of examinations is described. Opportunities of system, its architecture and structure of communications between functional subsystems are resulted. Features of the subsystems making system are described. Types of questions which can be used at carrying out of examination are listed. In the near future the working version of system will be ready to input in commercial operation.

Keywords: Examination, decision-making, ranging of the answers, the automated carrying out of interrogation, types of questions, correlation of answers, registration of participants.

Introduction

All human life can be counted by a line of examinations. Some of them are complex, others - are simpler. Some examinations are rather easily formalized; the some people in general cannot be modeled adequately.

In ability to live of the person there are spheres which should be automated with the purpose of prevention of possible subjectivity in estimations, reinsurances from abusings, disposals of nominal carrying out of examinations, etc., in particular, it is possible to rank carrying out of examinations As the specified categories on examination of " Rules of traffic » which are easily enough formalized and give ample opportunities for abusings; regular examinations by representatives of separate trades of "Safety precautions regulations" which frequently have formal character, are routine, but are necessary in view of the current legislation; carrying out of examinations for specialities which it is possible to find room in narrow frameworks of possible variants of examination cards; and a plenty of other real situations of preparation and carrying out of examinations.

Lack of the majority of the examinations spent today in different spheres of human ability to live, the impossibility of unification of requirements to their results is. It speaks that, first, the given procedure is carried out as a rule by different teachers and, second, in view of subjective factors as even in activity of one examiner significant deviations in criteria of an estimation of knowledge of students both aside overestimate of requirements are possible, and aside unjustified overestimate of estimations. It, certainly, entails an opportunity both "diligent" mistakes, and abusings at carrying out of examinations, let alone the order of results of examinations which thus become beforehand known and procedure of examinations gets only formal value, etc.

With the purpose of the automated decision of the specified problems and preparation of the user for carrying out of the specified class of examinations the automated system "Іспит" is developed. The system functions in MS Windows environment and is written in programming language Delphi. The program complex is intended for operation in the organizations and establishments where activity is connected to situations of carrying out of examinations which can be substantially formalized.

Problem Definition

At carrying out of many types of examinations the collective of experts which is engaged in organizational - methodical maintenance of carrying out of examination, as a rule is too much time and resources is compelled to give works on gathering and processing of the information. In particular, it is possible to name the following kinds of activity:

- Registration of teachers and participants of examinations;
- Distribution of teachers and participants of examinations in places of their carrying out;
- Enciphering works before check by their teachers with the purpose of increase of objectivity of check;
- Distribution of works for check and preservations of the information on the one who from teachers checked what works;
- Gathering the information on check and exhibiting of estimations, its processing, decoding of works, formation of various accounting documents and other.

Also the significant amount of other questions, which decision demands a lot of time: check of a correctness of the entered information on participants of examination and teachers, a choice of the works which have received a maximum quantity of points, for more diligent check and other important questions.

It is necessary to develop the software which fully automates process of preparation, carrying out and checks of results of a significant amount of types of examinations, and also provides conducting databases (DB) about participants of examinations and formation of accounting documents.

Opportunities of System «Іспит»

The automated system "Іспит", developed by the author, has ample opportunities:

- Allows carrying out preparation of the user for passing examinations in the automated mode, i.e. carries out training functions.
- Reduces time of carrying out of examination in a case when it is the essential factor, and procedure of examination - rather formal process to which should subject a significant amount of people.
- Practically does not change the circuit of examinations stipulated by traditional approaches.
- In case of need plays only a consultative role and the final decision on estimation is accepted by the teacher.
- Provides full anonymity of the student in case of need, i.e. excludes an opportunity for the teacher to identify answers with their author before summarizing.
- Supports unification of requirements to students within the limits of one examination as in mutual relations between people, in particular interaction the teacher - student, necessarily there are value judgment which sometimes bring undesirable factors of inadequacy in process of an estimation of results of examination.
- Excludes an opportunity of intervention of factors of bias in a course, check of results and process of calculation of estimations by results of examination.
- Provides preparation of the future participants of examination for its carrying out: testing in a mode of training.

Architecture of System «Іспит»

Architecturally the system "Іспит" will consist of the several interconnected subsystems.

SS enciphering and option of work of system it is intended for:

- Preparations of structure of system for concrete group of participants (creation of a folder and a file which identify the participant, creation of structure of folders according to each round, copying of additional files, etc.);
- Enciphering examination works with the purpose of increase of objectivity at their check;
- Options of the following parameters of system:
  - o A disk and a working folder in which the database (DB) is created, works of participants of examination and files of reports;
  - o Quantity of computers for check of works;
  - o Maximal time of check of work of the participant for the current test.

SS data input provides:

- Input, accumulation and preservation of the information on participants of examination and teachers;
- Input and preservation of the information on "workplaces" (the name of the organization, number of a cabinet or an audience, quantity of computers, data on periphery);
- Input and preservation of the information on distribution of participants of examination and teachers in places of carrying out of examinations;
- Importation of the data from files and a DB, not descending in system "Іспит";
- Transformation of the data on examinations which are used in system "Іспит", in formats which are used by other systems.

SS checks and the analysis it is intended for:

- Formalizations of procedure of exhibiting of estimations that allows to raise objectivity of process of carrying out of examination;
- Automation of work analytics: calculation of statistics of examination, i.e. distribution of results of examination on quality as sometimes examination will consist in ranging students, instead of in definition of

absolute points (estimations always are subjective to some extent) which adequately correspond to the knowledge shown at examination;

- Selection of criteria of an estimation of knowledge by results of examinations;
- Achievements of desirable distribution of results of examination on group due to a corresponding variation of criteria of an estimation if the task of examination will consist in classification of group to some attributes;
- Input, editing and revision of results of check;
- Realizations of the mechanism of interaction with the checking program, automatic record of results of check in a DB;
- Checks of the data on completeness and consistency;
- Formations of the integrated data by results of processing the primary information;
- The analysis of changes of parameters (results of examinations) separate participants or groups of participants depending on the name of examination or during some period of time.

Service SS allows the user:

- To see while in service systems "Іспит" not only the coded data, but also the full decoded information which corresponds to these codes if this information is not confidential;
- To conduct system magazine of changes in a DB;
- To renew the data in case of emergency stops of system on fault of the user;
- To operate archive of the data.

SS preparations of reports it is intended for:

- Promulgations of the full information on a course and results of examination concerning each student in case of need its illumination;
- Creations of accounting documents: lists of participants, distribution of participants and teachers on "workplaces", the report of an encryption, the report of results of check of works;
- Generation of a regular information and reports;
- Seales of results of examination and all necessary accompanying documentation as, despite of routinism and formality of process of examination, its results frequently have great value in human life and should be reliably are documentary.

SS archive carries out the following functions:

- Copying works of participants in a DB with creation of corresponding structure of folders for each round of examination and with use of codes of participants;
- Reservation of the information from a DB for its operative use in an operating time with system.

Structure of System «Іспит»

The basic components of system "Іспит" and functional communications between them are resulted on fig. 1.

Practically from each top in which the user can have misunderstanding or ambiguity, the opportunity of the reference to help SS is stipulated; after reception of the instruction or an explanation about the further actions management from help SS is transferred in a point, the reference to it whence has been initiated.

From each top where it is possible without loss of logic of dialogue or uncontrolled change of the information, the opportunity of "recoil" on a step is stipulated back. Thus, in case of need the user has an opportunity to fulfil some steps of dialogue some times and to come back to the beginning of a dialogue session, to fulfil, for example, the branch of the dialogue which is distinct from chosen it earlier.

The system "Іспит" contains SS recordings and documenting of the information which carries out unconditional record of a course of each examination in corresponding files. This important element of a dialogue session is stipulated with the purpose of avoidance of abusings during carrying out of examinations.

The structure of system "Іспит" is resulted on fig. 2.

Figures (fig. 2) designate numbers SS which names are resulted below. A design **«→#<figure>»** designates numbers of tops to which management is transferred in case of activization of the corresponding instruction. If the figure after a position is absent, it means, that the corresponding position is a sheet of a tree of dialogue.
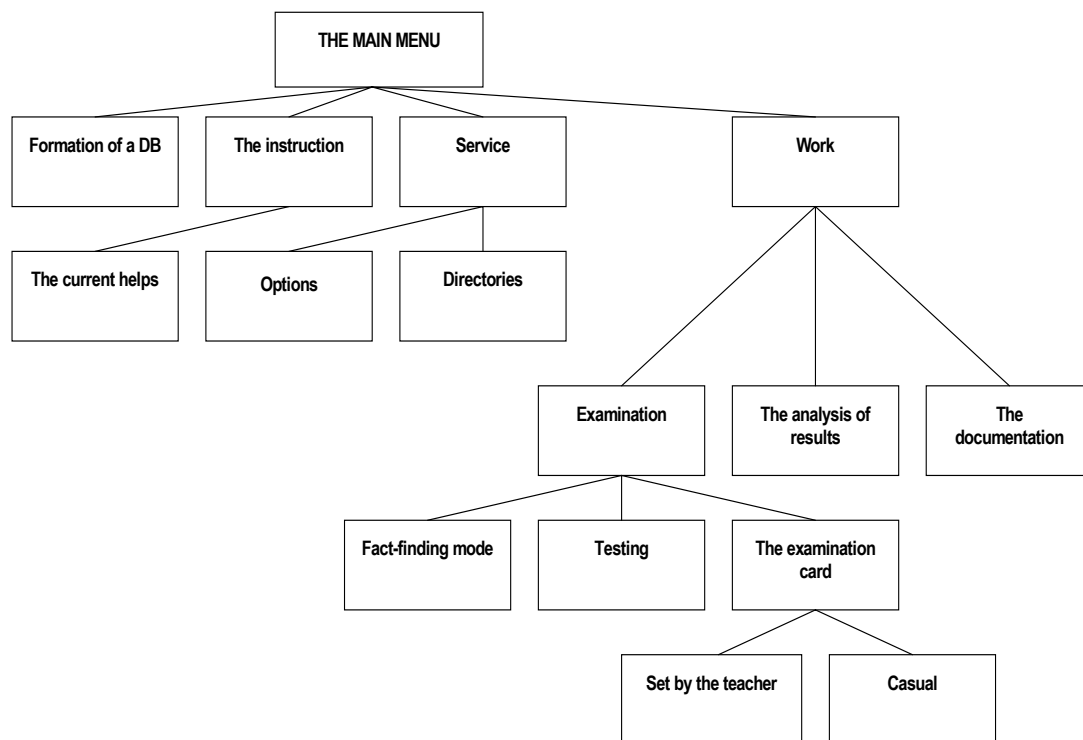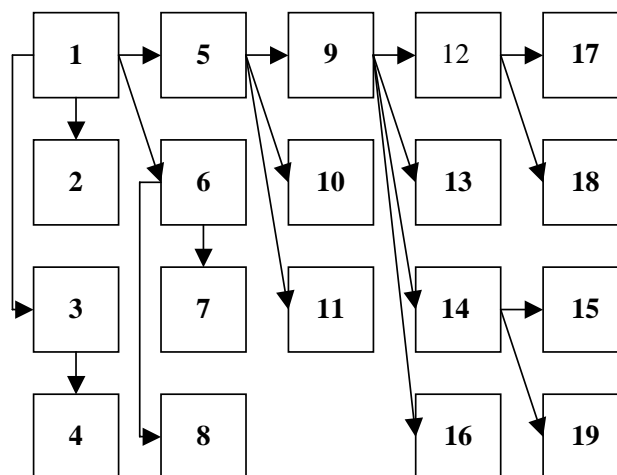
Fig. 1. The basic components of system «Іспит»

Fig. 2. The structure of system «Іспит»

#1. The main menu of system containing the following positions:

- Work → #5;
- Service → #6;
- Instruction → #3;
- Archiving → #2.

The top *1 contains also the software of advertising prompt, option of date, a soundtrack of a dialogue session and other auxiliary functions.

#2. SS "Archiving" will consist of group of programs which carry out functions of archiving, compressions, recyclings (controlled destruction) corresponding data if these actions are stipulated by the manager of system.

Archiving is carried out on a command of the user or the manager of a DB, and archiving - is unconditional, each time after the next start of system "Іспит".

#3. SS "Instruction" will consist of a DB containing all instructive materials on system, and the program managing this DB. The DB of instructions contains the full data on system as a whole and features of its functioning. SS it is intended for a selective conclusion to the screen or to a seal of the information necessary for the user in a present situation, and also for tracking a point from which the input in SS is carried out, and returnings in a point of interruption. SS "Instruction" will consist of four sections:

- The instruction on work with system ();
- The instruction on option of system;
- The instruction on archiving results;
- Current helps $\rightarrow$ #4.

#4. The program, allowing to carry out selective reading a DB "Instruction" depending on a point of dialogue, whence it is caused by the user. There is also a mode of the program, allowing to change and supplement the contents of a DB "Instruction".

#5. SS "Work" contains the following positions:

- SS "Examination" $\rightarrow$ #9;
- SS «The Analysis of results » $\rightarrow$ #10;
- SS "Documentation" $\rightarrow$ #11.

#6. Service SS allows to leave on the following operating modes:

- SS "Directories" $\rightarrow$ #7;
- SS "Option" $\rightarrow$ #8;
- Check of a correctness of a DB;
- Copying;
- Repeated indexation;
- The calculator.

The program of check of a correctness of a DB in case of its activization checks all possible connections between the DB accessible to it. In case of infringement of connections or other discrepancies there is a record in the report of dialogue. Is the preventive program which the manager of a DB uses as a rule.

Copying - a mode, allowing to speed up filling some fields in a DB or completely to copy a DB in case of their identity or when it is easier and more expedient to user to correct a DB, than to create new. Allows to copy also a DB on devices of external memory with the purpose of their preservation or operation by other program.

Repeated indexation of a DB - auxiliary function which the manager of a DB uses, and sometimes and the non-privileged user of system with the preventive purpose.

The calculator - the built - in function for the current calculations.

#7. SS "Directories" access to a DB which are directories for the user allows to provide. The reason of this action can be desire to receive the information, to create a new DB, to change the information in existing DB, to destroy some DB, etc. Clearly, that performance of these actions depends on a priority of the user, its level of access. There is an opportunity of access to the following directories:

- The information on examinations;
- Names of examinations;
- Teachers;
- Groups;
- Students;
- Circuits of examinations;
- Structures of the screen;
- The contents of questions.

«The information on examinations» will consist of references to examinations which already surrendered and to which there can be a necessity of the repeated reference. To this information concrete values from directories of "The Name of examinations», "Teachers", "Groups", «Circuits of examinations», «The Contents of questions» belong also.

Directories of "the Name of examinations», "Teachers", "Groups", «Circuits of examinations», «The Contents of questions», "Students" contain the listed data which are available in corresponding DB of system "Іспит".

#8. SS "Option" is intended for a choice from the DB listed in SS "Directories", concrete values for option for the current session of dialogue. SS "Option" contains the following positions:

- The information on examination;
- The name of examination;
- The teacher;
- Group;
- Students;
- The circuit of examination;
- Structure of the screen;
- Questions;
- Formation of examination cards.

#9. SS "Examination" allows the user to set one of such types of examination:

- Fluent interrogation $\rightarrow$ #16;
- Testing $\rightarrow$ #13;
- Examination cards $\rightarrow$ #12;
- Casual choice $\rightarrow$ #14.

#10. SS «The Analysis of results» it is intended for calculation of the following sizes:

- Correlations of answers of users in various metricss with use, in particular, the mathematical device described in works [Волошин, 1997], [Гнатієнко, 1997], [Гнатієнко, 2000];
- Classification of results by a technique described in article [Гнатієнко, 2001];
- Calculation of an estimation of the user for its answers, etc.

#11. SS "Documentation" is intended for preparation of the data on a course of examination, record in corresponding DB and seales in case of need. The majority of functions of this SS is carried out certainly, irrespective of the teacher, students and other users.

#12. "Examination cards" - the mode specifying type of examination at which on the screen there are numbers of examination cards and is simulated a choice by the user of the ticket "dropped out" to it. This mode has the following positions:

- «Set by the teacher» $\rightarrow$ #17;
- «The Casual ticket» $\rightarrow$ #18.

#13. "Testing" - a mode at which the circuit of examination such as sociological, psychological or other testing (questioning) is realized, i.e. is offered to answer the user all set of questions which contains in a corresponding DB and appears on the screen.

#14. « The Casual choice » - a mode during which a quantity of questions gets out of a corresponding DB depending on a choice of the user:

- The limited quantity of questions $\rightarrow$ #15;
- Any questions $\rightarrow$ #19.

#15. «The Limited quantity of questions» - is offered to answer the user the set quantity of questions from a corresponding DB.

#16. «Fluent interrogation» - a mode during which in the casual image from any concrete DB the significant amount of questions gets out. This mode differs from previous the casual order of a conclusion of questions.

#17. «Set by the teacher» - a mode at which the teacher in the beginning of examination forms examination cards on themes, to own representations about complexity of questions and to the other criteria. The user is offered to answer not the casual ticket, and on one of generated by the teacher.

#18. «The Casual ticket» - a mode at which examination cards are formed not by the teacher, and casual image. Thus the requirement of presence in the ticket of questions on various themes of examination is kept only.

#19. «Any questions» - the mode allowing the user to answer casually initiated questions from an any sphere of activity (or a concrete DB) without restriction of quantity of questions before compulsory end of a dialogue session.

Types of Questions

For expansion of opportunities and spheres of application of system "Іспит" various types of questions have been developed and realized as the corresponding software. We shall result their brief description.

T#1. <Variants_of_answers> <A_degree_of_importance_1> <A_degree_of_importance_2> ... <Number_of_a_"corresponding"_question>.

The type of a question admitting answers on such format, belongs to a class of examinations such as « the Rule of traffic » and a little more difficult. To each variant of the answer the degree of importance and a degree of reliability of the answer is put in conformity. After a choice the user of a variant of the answer calculates the integrated estimation as product: <Degree_of_importance>* <A_degree_of_correctness>.

T#2. Values: <fixed>, <bottom>, <top>.

Questions of this type are characteristic for examinations such as "Safety precautions regulation". In some cases any from the values above mentioned, act as variants of answers.

T#3. An insert of symbols. It is used in a case when examination will consist in testing the student for knowledge of some rules or laws. Necessity for use of such type of questions arises in case of examination, for example, grammatic rules during modelling a dictation. The student should enter or not enter in the specified fields the missed either unreasonably changed letters or other symbols, words, word-combinations and so forth. To Test texts there correspond variants of right answers with which the answers received from the student are verified. The metrics for definition of a mark estimation of answers of the student is entered.

T#4. Test questions. In this case variants of answers are verified with test. The teacher sets (chooses from the menu) criterion (or criteria) correctness of answers to the test as a whole. In concrete cases it can be some formulas or the whole algorithm of calculation of the integrated estimation of the test. If the integrated estimation is calculated by the unique formula this formula is interpreted by the special block of system "Іспит".

T#5. Complicated questions. The opportunity to generate the answer as the offer is given the user. Correctness of the answer is checked by comparison of this offer to patterns.

T#6. Ranging of answers. The user should enter variants of answers by way of reduction of their correctness. The distance from the set ranking answers up to correct is calculated in various metricss. The estimation of the student is generated under the formulas chosen the teacher.

Clearly, that the resulted types of questions do not cover all variety of situations of carrying out of examinations and decision-making by their results. In this connection the system "Іспит" is open for addition with other functions which model situations of carrying out of the examinations, admitting formalization.

Conclusion

The demonstration prototype of system "Іспит" which passes check in the several organizations is developed. The technology of the automated preparation for carrying out of examinations is constantly improved. In the near future the working version of system will be ready to input in commercial operation.

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