

Software Implementation of the Approval Process of Industrial Activity of Workers of the Oil and Gas Industry on the Example of “RN-Uganskneftegaz”

Tatyana G. Kuzmicheva, Natalia P. Putivzeva, Svetlana V. Igrunova, Nina N. Gahova,
Tatyana V. Zaitseva, Olga P. Pusnaya, Elena V. Nesterova and Larisa F. Maslakova
Belgorod State University, Pobedy St. 85, 308015 Belgorod, Russia

Abstract: In study the development process of the system of the automated processing of requests for performance of work on the example of the enterprise of the oil and gas industry giving the chance is described it is essential to improve quality and speed of performance of work of the structural divisions operating and servicing the equipment. The system of a similar class allows solving the following problems: improve interaction among structural divisions; carry out transition to modern means of communication and upgrade of work of the enterprise.

Key words: Oil and gas industry, approval of a production activity, program system, database, website

INTRODUCTION

In modern economic conditions any downtime or breakdown of capital goods as a result of failure to comply with regulations on technical maintenance can lead to serious production problems for the company. Incidents in such vital system of the country as the oil and gas extraction industry can give extremely strong effects. It can be accident as a result of misuse of the oil and gas equipment that may cause to victims and get the reason of death. Also, the misuse can cause economic damage, both owing to destructions and because of downtime of gas-collecting systems.

Implementation of the system of the automated processing of requests for performance of work is an important step that increases significantly the performance of work of the structural divisions which are operating and servicing the equipment. The system of such class solves some problems: improvement of interaction among structural divisions; transition to more modern means of communication; possibility of upgrade; economic conditionality (Vendrov, 2008; Mishenin, 2007).

During the analysis of the subject area it has been revealed that there are quite good software products in the market which are capable to satisfy requirements of the enterprises in the field of automation, however, some of them possess the high price both of the license of the program and the DBMS and of services in implementation, others, owing to the functional implementation, cannot completely satisfy to necessary criteria (Rajaraman, 2004).

Technique: The developed software is intended for giving and approval of requests for performance of work. The management of requests is exercised according to three schemes depending on complexity of technical fault.

Block 1: The management of requests with the highest scale of carrying out of approval. There is an approval between chief engineers of crafts and the chief engineer of the enterprise in general at this level. When the request from subordinate structures is obtained, the chief engineer determines the level of decision-making and in case of his incompetence, sends the request further. The chief engineer of GDN, after processing the message which was sent to him, makes decision on carrying out the required works and sends the request back.

Block 2: Further requests among chiefs of services and the chief engineer of trade are agreed. Here, the chief engineer of trade receives applications from the services subordinated to it and or sends her further on hierarchy or makes decision on work on site. He sends the processed request back to service.

Block 3: At the third level, chiefs of services and operators informants interact. At this stage, the operator informant distributes the received applications on services. He also sends requests which are also processed by the supervisor to the domes (venues of works; reports result of the request).

Block 4: At the fourth level, the request between the operator informant and workers on domes is agreed.

Workers of dome having found any fault, register it and initiate filing of the application through the operator of the informant who in his turn sends request further taking into account specifics of fault.

Process of approval of activity of employees of the enterprise is carried out through the developed site that allows to decentralize the process of solution of the task and to increase productivity (Nielsen and Loranzher, 2007; Atre, 2010).

MATERIALS AND METHODS

Main part: The developed software is intended for automated system of processing of requests for performance of work at the gas enterprise. Use of this product will give such opportunities: storage of necessary information in the structured view; ensuring the confidentiality of data, owing to system of identification; viewing and processing of information in visual, clear view; the analysis of content of the database by means of convenient tools; increase of productivity of collective labor; decrease of risk of the financial and reputation losses connected with breakdown or disoperation of the equipment as a result of technical tinning or repair which was carried out of time (Kuznetsov, 2011). The system provides the following functions:

- Input, output, editing, storage of information about malfunctions which were found
- Input, output, editing, storage of information about requests for the works performed by the staff of the enterprise

Input information for the system is: information about malfunctions, accidents, need of maintenance; information about equipment which needs maintenance or repair; information about signs that are necessary for holding of work; venue of works.

Output information for system is: result of the processing of requests; outfits on carrying out of work; reports. The minimum list of the reports which are created in the system is following:

- The report on the requests expecting approval
- The report on the coordinated requests
- The report on the rejected requests

The system provides:

- Possibility of submission of requests within the level of the competence
- Viewing of the status of the applications submitted under the accounting entry

- Viewing of requests for approval for heads of this level with the possibility of decision-making of approval or deviation
- Possibility of addressing of requests for higher level
- Prohibition for users of removal of the information
- Opportunity for users to edit the data which were entered only under the own accounting entries, thus the system exercises the control of correctness of the entered information and also possibility of blocking of incorrect actions of the user during his work with the program is provided in it (Putivzeva *et al.*, 2012)

Division of access to the information according to roles is the cornerstone of security system. Depending on his role, user gets access to different functions of the system (filing an application, approval of the request of the level, etc.), the help information. The work with application means distribution of users on the following roles:

- The administrator of users (adds/deletes users, assigns access rights, etc.)
- The administrator of reference books (edits information on reference books of the equipment)
- The head of the 1st level (the chief engineer of GDN) approves requests for execution of complex works and abnormal works
- The head of the 2nd level (the chief engineer of craft) approves requests for carrying out planned not complex works; sends if it necessarily, the request to the 1st level
- The head of the 3rd level (operator-informant) accepts the processed requests of the highest levels and addresses them on the 4th level (domes)
- The head of the 4th level (workers of dome) accepts the processed requests from the operator informant and sends them to back to him in the case of necessity (the abnormal works, planned works demanding permission in the form of the work permit)

The model of the developed program system with the use of CASE means of the top level AllFusion Process Modeler r7.1 has been constructed (Vendrov, 2008).

Fragments of infological and physical model of the developed database of the program system are given below (Fig. 1) (Copeland, 2008; Connolly and Begg, 2007).

Web pages of the public part of the website include some elements: upper part of the page, lower part of the page, central part of the page (Mateu, 2010).

The main page contains the main data about the enterprise. This information is available to any not authorized user.

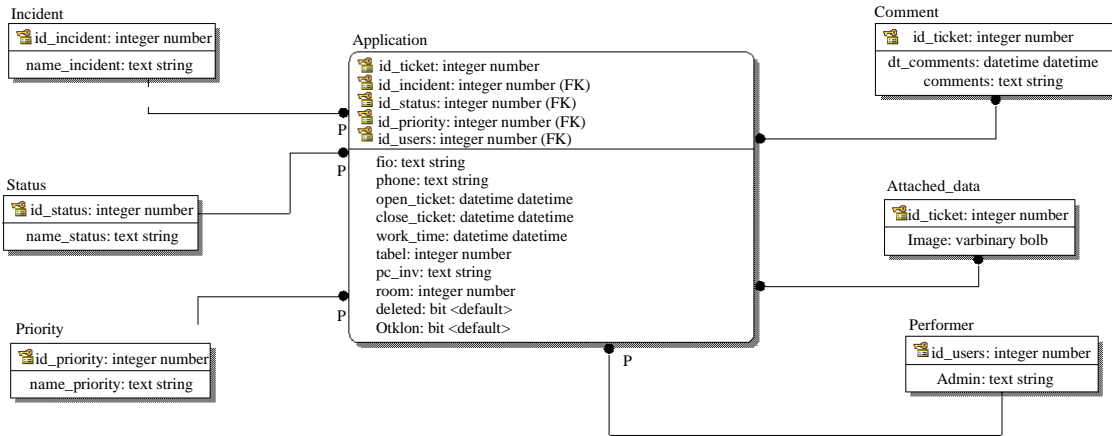


Fig. 1: Physical model of database (fragment)

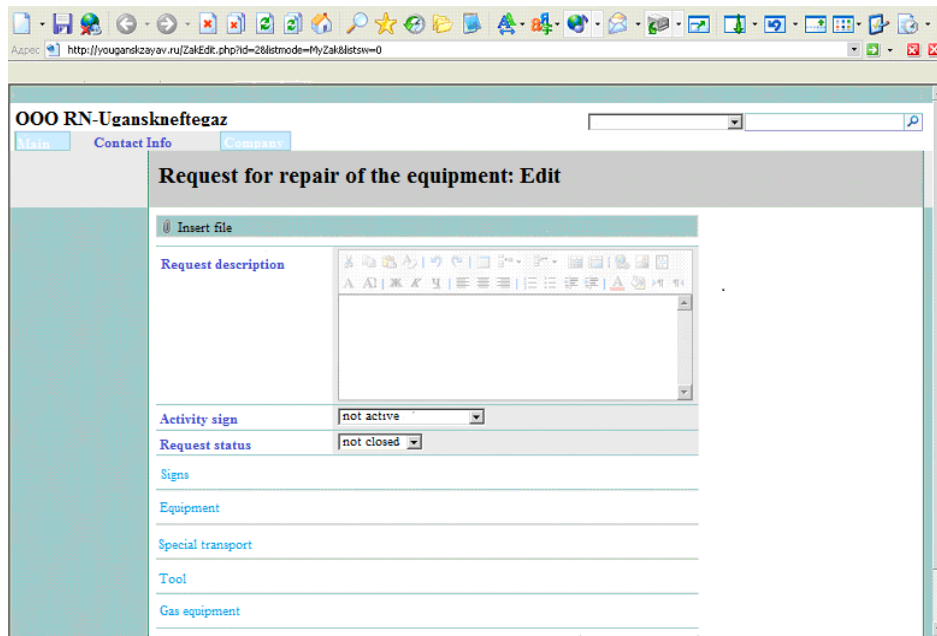


Fig. 2: Application for repair of the equipment

RESULTS AND DISCUSSION

After authorization in the menu of navigation links which are permitted to the user according to his rights will appear. At entrance with the rights “The administrator of reference books” menu items for processing of information by reference books appear. Only information about users is available to the system administrator.

At entrance with the rights of the supervisor all menu items which are responsible for management of worker processes appear.

The supervisor gets access to the list of outfits to performance of work for example, he can edit outfit or create new outfit.

For more visual description of works the interactive editor of the text with marking and special effects with the possibility of its saving in HTML format is used.

The form of filing an application for repair of the equipment also possesses the editor of the text with possibility of interactive formatting (Fig. 2).

For minimization of the form of editing lists of signs, the equipment, special transport, the tool and the gas equipment are performed in the form of hidden by default. For the choice of data from the corresponding tables the user needs to make a click by the left button of mouse on appropriate section. After that the list will unfold. That to turn off it, it is necessary to select repeatedly the link with the name of this list. This mechanism has been executed

by means of the client JavaScript which is performed in the form of call of the function that changes property display for the element DIV. Thus, change of appearance of the form does not demand the request of the information from the server (callback).

CONCLUSION

The description of the developed automated system for the processing of requests for performance of work on the example of the JSC RN-Uganskneftegaz enterprise that allows coordinating issues among services and managing structure in the shortest terms with the help of the Internet is provided in this study.

IMPLEMENTATIONS

Implementation of this system of the automated processing of requests for performance of work has allowed the enterprise to solve the following problems:

- To improve interaction among structural subdivisions
- To pass to more modern means of communication
- To provide possibility of upgrade

REFERENCES

Atre, Sh., 2010. Structural approach to the organization of databases. Moscow: Finance and Statistics, pp: 320 (In Russian).

- Connolly, T.M. and C.E. Begg, 2007. Teaching Database Analysis and Design in a Web-Based Constructivist Learning Environment. Springer Berlin Heidelberg.
- Copeland, R., 2008. Essential SQLAlchemy. O'Reilly Media, pp: 215.
- Kuznetsov, S.D., 2011. Design of databases. Moscow: Internet University of information technologies; BINOMIAL. Laboratory of knowledge, pp: 279 (In Russian).
- Mateu, C., 2010. Introduction to Web Applications Development Free Technology Academy: Fundació per a la Universitat Oberta de Catalunya.
- Mishenin, A.I., 2007. Theory of economic information systems. Moscow: Finance and Statistics, pp: 240 (In Russian).
- Nielsen, J. and H. Loranzher, 2007. Web design: Convenience of use Web sites. Moscow: "Williams", pp: 368 (In Russian).
- Putivzeva, N.P., S.V. Igrunova, T.V. Zaytseva, O.P. Pusnaya and R.A. Mamatov, 2012. Software choice for support method of "360 degrees": International Journal of Advanced Studies. <http://journals.org/index.php/ijas/article/view/5/55-7-1-PB.pdf>.
- Rajaraman, V., 2004. Analysis and Design of Information Systems. Prentice-Hall of India.
- Vendrov, A.M., 2008. CASE technologies Modern methods and design tools of information systems. Moscow: Finance and Statistics, pp: 176 (In Russian).