

AUTOMATED INFORMATION SYSTEM FOR INVENTORY ACCOUNTING OF A CAR DEPOT WAREHOUSE

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ANNOTATION:

The paper deals with the issues of optimal placement of inventory items in the car depot of the Joint-Stock Company "Uztemiryulyulovchi". The structure of the warehouse is presented, reflecting the main elements of the technological sections, consisting of an unloading section, a cargo reception area, a storage area (temporary and main), a complete set section, and a service and technical room.

Monitoring of components and spare parts in the production structures of the car depot performing repair and equipment work is carried out by using information placed in the database of the availability of spare parts, inventory items.

The positive aspects of using the database when performing accounting operations with material values are shown. A diagram of the accounting operations of the car depot database has been developed.

Keywords: database, automated information systems, optimization of warehouse accounting operations, ER diagram, object-oriented modeling language.

INTRODUCTION:

Justification of the warehouse automation problem Railway transport (RT) of the Republic of Uzbekistan has a fairly extensive network of lines located throughout the territory.

With the acquisition of independence, a number of new railway lines were built and put into operation:

- Navoi-Uchkuduk-Sultanuvays-Nukus with a length of 355 km;
- TashGuzar-Boysun-Kumkurgan, a unique railway line laid in a mountainous area consisting of 223 km.;
- Angren-Pap with a total length of 129 km, the first railway tunnel is former post-Soviet space laid in a mountainous area (length 19 km).

Thus, the railway workers of the republic provided full economic, customs, etc. independence from the passage of mobile units on the territory of neighboring states. But along with this, passenger and cargo traffic naturally increased, and the load on locomotives and wagons increased.

Today, the RT connects all regions and regions with the center, i.e. Tashkent. It should be noted that the share of housing and communal services accounts for the largest

percentage of passenger traffic compared to other modes of transport. The timely organization of equipment, repair and adjustment works performed by employees of car depots (ICP) has a significant impact on the uninterrupted, high-quality passenger service. In this chain, an important role is played by the ICP warehouse, which stores the main components of passenger cars that quickly wear out and fail. Based on the above, the problem of automation of the ICP warehouse based on the use of modern technologies and information systems is very relevant.

It should be noted that such scientists as B. A. Anninsky, S. N. Brilliantov, V. V. Golubkov, E. L. Gokhbom, G. P. Grinevich, P. S. Gruntov, G. M. Demichev, A. T. Deribas, A. Kablukov, V. N. Kustov, S. I. Loginov, O. B. Malikov, Yu. A. Perten, V. V. Povorozhenko, V. M. Semenov, A. A. Smekhov, A. G. Usov, V. A. Frolova, V. P. Yaroshevich, etc. were engaged in this problem [1]. But these works do not address the issues of optimal placement, the search for the necessary goods and materials, components by using a QR code.

Automation of the warehouse management of the ICP should include a set of measures:

- * Equipping the warehouse with the necessary technical means to search for the necessary inventory items (goods and materials);
- * Development and implementation of a comprehensive information system that automates warehouse activities.

Taking into account the possibilities and the need to automate the warehouse activities of the ICP, at the initial stage, it is proposed to develop an information system for accounting for goods and materials of the car depot using a QR code and creating a corporate network based on Internet technologies, which will also cover the management of JSC "Uztemiryulyulovchi". In this case, the management of the passenger service, in the

online mode, will have reliable information about the availability of goods and materials spare parts, necessary inventory in the ICP warehouse and timely adjust the replenishment of the warehouse with acutely scarce parts of the rolling stock.

MAIN PART:

Consider the development of an automated information system for the warehouse of logistics for mobile units.

Improving the processes of monitoring components and spare parts in production structures is carried out by creating a database (DB) on the availability of spare parts, goods and materials [2]. A database is a collection of data organized in accordance with certain rules and maintained in the computer's memory, which characterizes the current state of a certain subject area and is used to meet the information needs of users.

The main advantages of DB-based warehouse accounting automation are:

- * Improving the quality of service of the company's workshops, preventing interruptions in the supply of goods and spare parts;
 - * Reduces The probability of errors, minimizes the impact of the human factor, reduces the risk of loss or damage to property;
 - * The Logistics service operates smoothly, increasing the ability to make management decisions when performing automated management and logistics tasks;
 - * Warehouse accounting is optimized by monitoring the condition of material goods placed in the warehouse in real time.
- Creation of the software for the purpose of automation of warehouse accounting on icp-2 consists of the following stages::
- * Creation of a database based on modern high-speed computers that provide inventory accounting of goods and spare parts;

* Development of software based on advanced high-level languages to provide warehouse accounting monitoring.

Providing the cars with the necessary spare parts for the purpose of their repair will ultimately ensure the timely delivery of passengers to their destination, improve passenger service and facilitate the movement of trains. Information about stocks in modern

information systems is stored in a database, which should be developed taking into account all parameters: the name of goods, their quantity, order frequency, users, etc. When creating a database of the account of components and spare parts placed in the warehouse, an ER diagram of the database for spare parts and other components of the ICP-2 car depot is proposed (Fig. 1) [3].

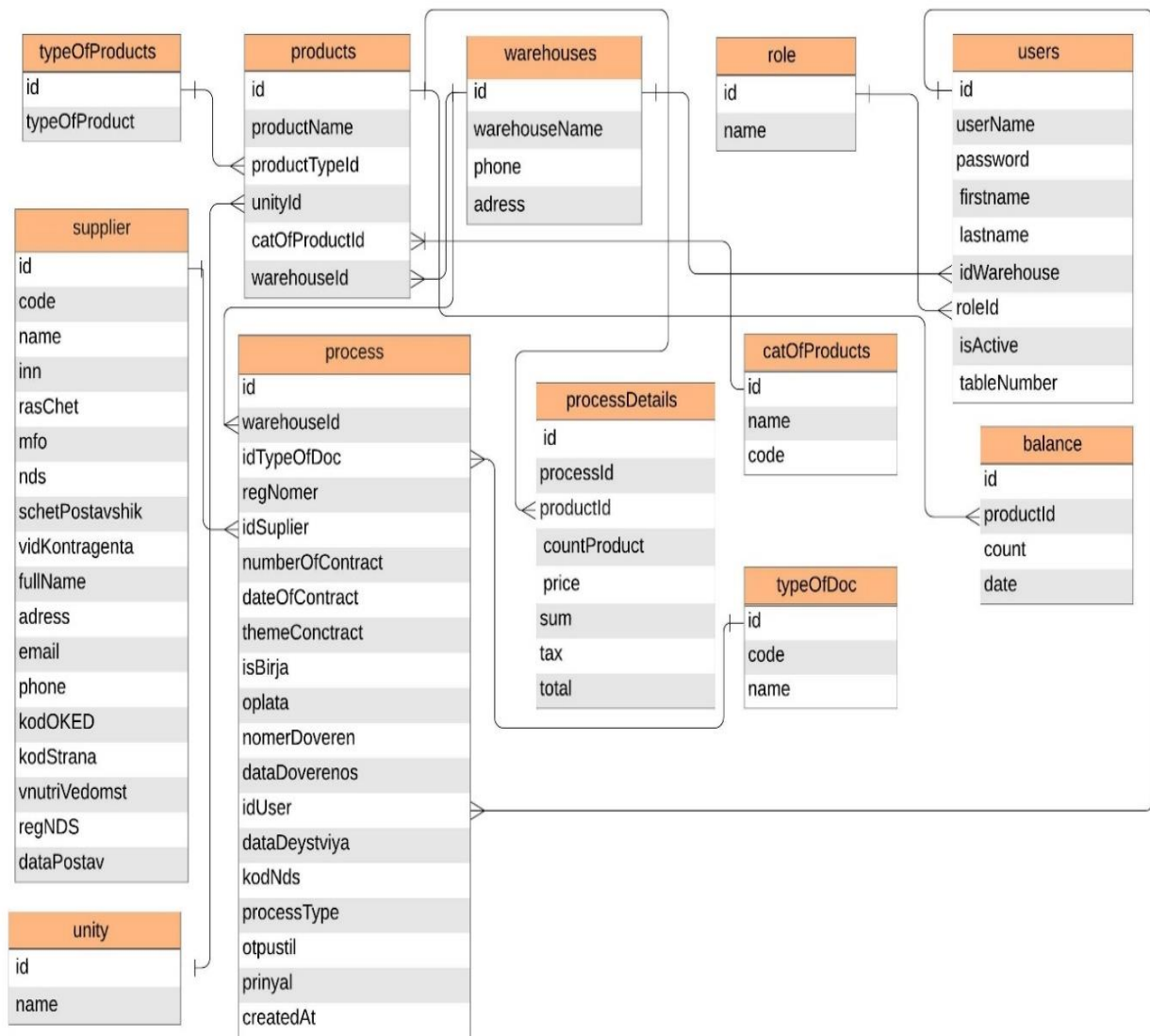


Figure 1: ER diagram of the car depot warehouse database.

The development of an information system for inventory accounting of depot goods and materials, diagrams and tables, and database design are performed using the object-oriented modeling language UML [3, 4].

The information system of accounting for the movement of goods and materials of the

warehouse is aimed at effective storage management, rational use of warehouse space [5, 6]. The participants of the developed information system and the order of their work are presented in Tables 1-3.

Table 1: The main part

The actors ' action	System response
1. The user links to the home page of the information system	2. The information system sends the user to the login page of the automated information system
3. Enter the username / password to access the user. Exception: If the user enters an incorrect username / password, the information system will resend the user to step 2.	4. The system recognizes the user and offers access to the system according to their role (warehouse manager, responsible personnel, and management).
5. The warehouse manager uses the function of the arrival of goods and materials to the warehouse	6. The system offers to fill out a form that reflects information about incoming goods.
7. The warehouse manager enters data about the goods arriving at the warehouse in the form provided by the system.	8. The system checks the validity of the data. If the fields are filled in correctly, the database will be entered and reported to the warehouse manager.
9. The warehouse manager uses the system's inventory asset withdrawal function.	10. The system requests information about the product being issued.
11. The warehouse manager enters information about the QR code and the quantity of exported goods into the system.	12. The system receives information about the issued goods and makes the necessary changes to the database.
13. The warehouse manager, executive director, management requests information from the information system about the movement of inventory in the warehouse.	14. The system provides users with the database information in the requested form.

Table 2: The course of events when using the information system

Use case	Using the warehouse accounting information system
The actors	Warehouse manager, responsible person, management
Brief description	The warehouse manager completes inventory, registers and disposes of inventory. The movement of goods is recorded in the database of the information system. The warehouse manager, responsible personnel, and management receive real-time information about the turnover (inventory) of the warehouse and use it to improve reporting and processing.

Table 3: Exceptions when using AIS

The actors ' action	System response
Exception 1. Invalid username / password	
3. The user re-enters the login / password to log in	2. The system informs the user about an error in the system. This does not allow access to the system. The information system sends the user to the login page
Exception 2. The warehouse manager enters incorrect information into the system when receiving the goods and materials	
7. The warehouse manager registers the incoming inventory.	6. The information system offers a form for filling in information about the goods received.
Exception 3. The warehouse manager enters incorrect information into the system when releasing goods and materials	
9. The warehouse manager will send back the QR code and the quantity of the product that the user sends to the system.	10. The system requests information about the exported product.

The class diagram is made on the basis of the data given in the tables, which is used in the design of the information system for accounting for goods and materials, spare parts and necessary inventory of the depot warehouse.

CONCLUSIONS:

Automation of the warehouse work of the VCHD-2 car depot, organization of the database of accounting for spare parts and other components will allow:

1. On the basis of the developed ER-diagram, the study of the receipt and release of spare parts and other components of rolling stock, goods and materials of the car depot was performed.
2. The information on the quantity, condition and availability of goods and materials in the depot was investigated, the analysis of the movement of material values in the warehouse for a certain period of time (quarter, half-year, year) was carried out. This data is used in the development of the database of goods and materials of the car depot.
3. The information system being developed will allow you to fulfill requests for the necessary spare parts and goods and materials in advance. As a result, timely delivery to the warehouse of goods and materials, components, spare parts and other equipment necessary for timely and high-quality maintenance of mobile road units will be achieved.
4. The scheme of using the information system, its operating scenarios, as well as classes and their relationships are the basis of object-oriented programming. These diagrams serve as a technical task in the programming process.

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