# Development of ETP at concrete enterprises development tools and environment

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**Abstract**

The article is devoted to an overview of the advantages of electronic document management systems. It assesses the effectiveness of the implementation of these systems. The analysis and selection of software tools for the development of document management systems was carried out. Problems and ways of solving with the help of software implementation at the enterprise are studied. Examples of successfully operating electronic document management systems at individual enterprises are given.

**Keywords:** ETP development, Software, Document flow

There are various standards for electronic document management systems. In the USA, the main standard is DoD, in the European Union it is MoReq [1]. Compared to practical DoD, MoReq is designed in a more formal, "scientific" style and includes more topics.

A significant drawback is the fact that there is no certification under the MoReq program, and at the same time it is not mandatory in the line.

The workflow of the software is carried out, as a rule, with a client-server application architecture or using WEB technologies and XML. In any case, the system includes:

DBMS server;

WEB server (for systems using WEB technology);

Server part of the system;

File server (usually the implementation is different in different systems, but, as a rule, software is required to interact with the data warehouse);

Client side.

Mandatory tasks that any electronic document management system should provide are work directly with the registration card, execution control, input and output of documents, their search and the organization of a secure network connection.Below is a detailed classification of system functions for which a comparative analysis of workflow systems is carried out.

**Figure 1. Instrumental model of the EDMS**

We list the main functions of the software:

• Providing access rights to information in accordance with the real structure of the enterprise.

• Ensuring the entry of any documents of the enterprise into a single database with the creation of a document card and the placement of a file in a particular storage area.

• Ensuring the reflection of the composition of products.

• Ensuring the reflection of logical relationships between document files created in different applications.

• Thus, the document has one registration record and a card.

• Providing real-life logical links of documents belonging to different information flows.

• For example, a letter that arrives in an administrative or "service" flow to a secretary may have a logical connection with engineering and design documentation. Such a connection can be drawn and the letter file "added" to the drawing file(s).

• Providing a logical association of all documentation, regardless of the flow, into a folder or archive section belonging, for example, to one product, project.

• Ensuring interaction with all subsystems of the integrated solution - electronic archive and document management systems. The system provides interaction with scanning, duplication, storage devices and user applications adopted for working with documents of any streams in the enterprise.

• Ensuring the search for any document, given or generated by the user, inquiries.

• Ensuring interaction between users through the built-in e-mail system with the ability to distribute reports and attached documents.

• Providing the "status" of documents.

• Providing support for different versions.

• Providing a document signature. The system has a built-in electronic signature system. Information about the person who signed the document, as of the date, is registered in the system by the time of its signing.

• Ensuring document routing. The system allows you to plan routes, indicating this in the processing of a new document.

• Providing a reporting system.

Thus, the need for such programs is growing rapidly and due to this, manufacturers are creating more and more advanced, multifunctional systems to solve any production problems. Modern software development tools are characterized by a wide variety of criteria by which the developer has the opportunity to automate the application development process.

Thus, currently the tools allow:

Create an interface using standard components.

Transfer of control to various processes depending on the state of the system.

Create a shell for databases, as well as the actual database.

Develop more reliable software by handling exceptions that occur when the software does not work correctly.

Modern development tools are characterized by the following parameters:

Support for object-oriented programming style.

Ability to use CASE-technologies, for example, for designing the system being developed, as well as for developing models of relational databases.

Use of visual components for the design of the graphical interface.Database support.

Ability to use relational algebra algorithms to manage relational databases.

Possibility of synchronization of project components (subject to the development of large software systems). The above properties have high-level programming languages.

To select a development environment, use the method of substantiating options. This method is designed to select the best option and consists of the following steps:

Definition of criteria by which the comparison will be made and the degree of importance.

Each option is evaluated according to the received list of criteria. The numeric value is an estimate.

Finding the total number of points for each of the options (you can take into account the importance of the criteria.)

- The best option is the one with the most points.

To solve this problem, we use the list of characteristics given in Table 1.[2]. An example of an EDMS in the housing and communal services service. On the example of EDMS at Vodokanal - Department of Water Resources (Zaporozhye, Ukraine) system



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Figure 1. The main window of the program of the system "Registration and calculation of instrumentation"

EhLib 5.6 contains components and classes for Borland Delphi 5-8, \ 2005, 2006, C++ Builder 5-6, CodeGear Delphi 2007, CodeGear RAD Studio 2009, Embarcadero RAD Studio 2010, XE and RAD Studio XE2, and seeks to extend the interface base data when the user interacts with the application.

After the introduction of the system, it became convenient to view and edit information on a specific instrumentation.
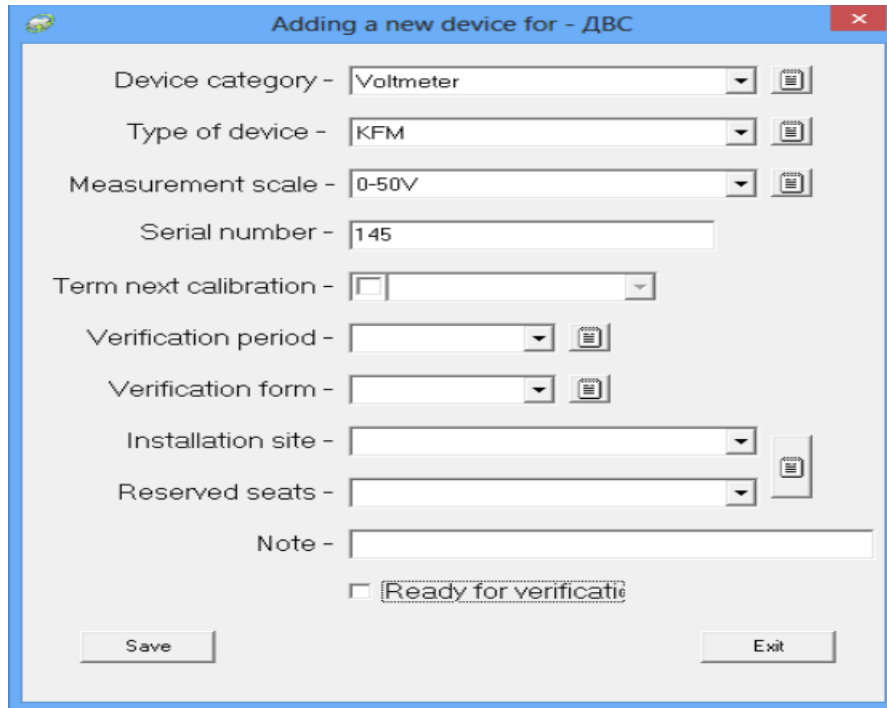


Figure 2. Tooling Details

The search for the necessary device has become fast and convenient, it is possible to clarify its location on the territory of the enterprise. The software informs the user in time about the need to replace, remove to check some devices.

Automatically generates an electronic document with the name of devices that have passed the verification period. There is no need for papers/accounts for moving the location of the device around the enterprise.

Using electronic documents in the system, Vodokanal made it possible to structure the cash registers, effectively use the time of employees to search for and take out the necessary devices for mandatory verification. Thus, the quality of treated wastewater has been improved, which has a positive impact on the environment.

An example of an EDMS in the field of trade. Using the example of an EDMS, the company TransLis LLC (Zaporozhye, Ukraine) introduced the Accounting Document system. On fig. 4 shows the main window of the program.
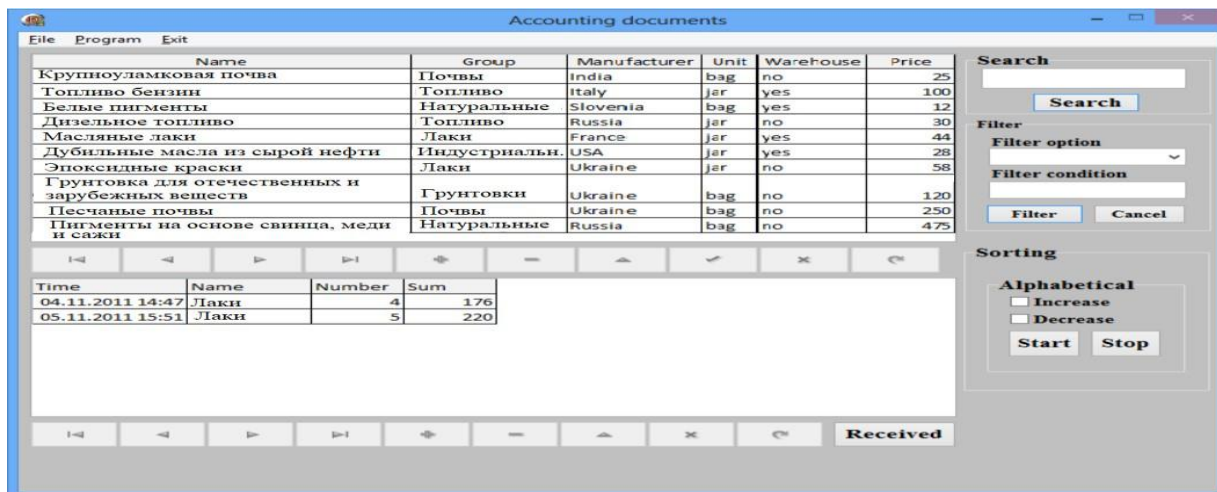
Figure 3. The main window of the program of the system Accounting document

For the tools, the Delphi development environment, the Object Pascal programming language, used.

Advantages of this EDMS:

Quick order placement

Leakage of information about exceptions;

Reduce the cost of paper documents;

Save staff time;

☐ Automatic calculation of the scope of delivery subject to> 1 order;

☐ Reduced risk of losing documents;

☐ Improving performance discipline;

☐ Acceleration of information flows;

☐ Improving the quality of information;

☐ Significant acceleration of the selection of documents by various attributes;

☐ Creation of a single information space in distributed organizations;

☐ The most efficient use of software already installed in the company;

☐ There will never be an error in the order of dates (since the program has a special calendar).
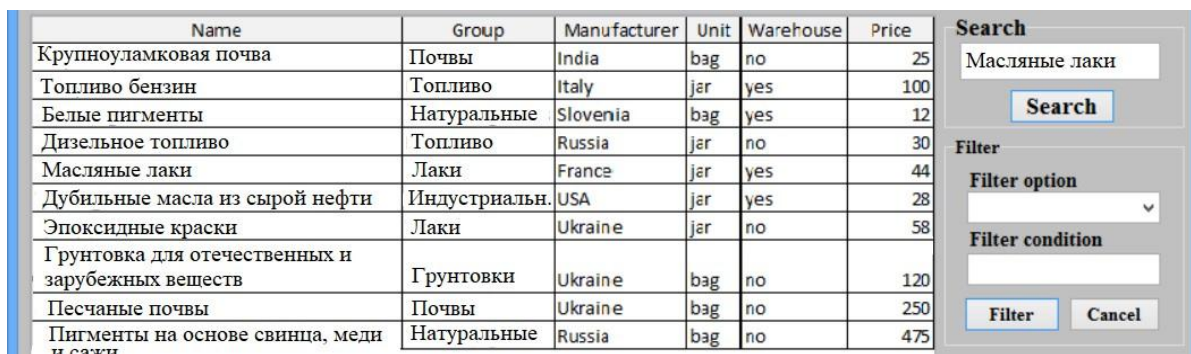


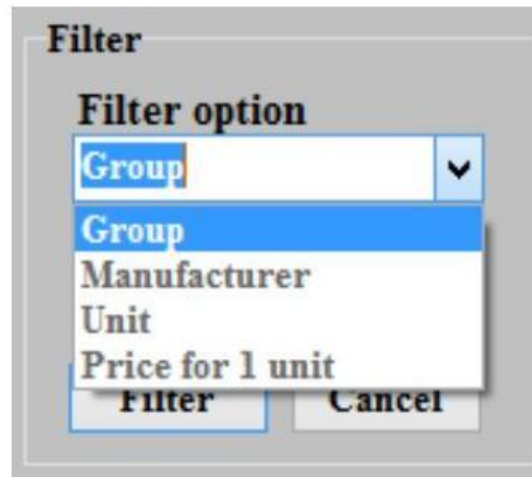Figure 4. Result of the "Search" function

Figure 5. Filter parameter

After the introduction of software for document management, some tasks became unclaimed, such as:
- Registration of orders;
- Archives;
☐ The process of transferring information about the order from hand to hand.
An example of an SED in inventory. On the example of EDMS, the company "Buklet" (Zaporozhye, Ukraine) introduced the system "Warehouse accounting of printed products in a bookstore.
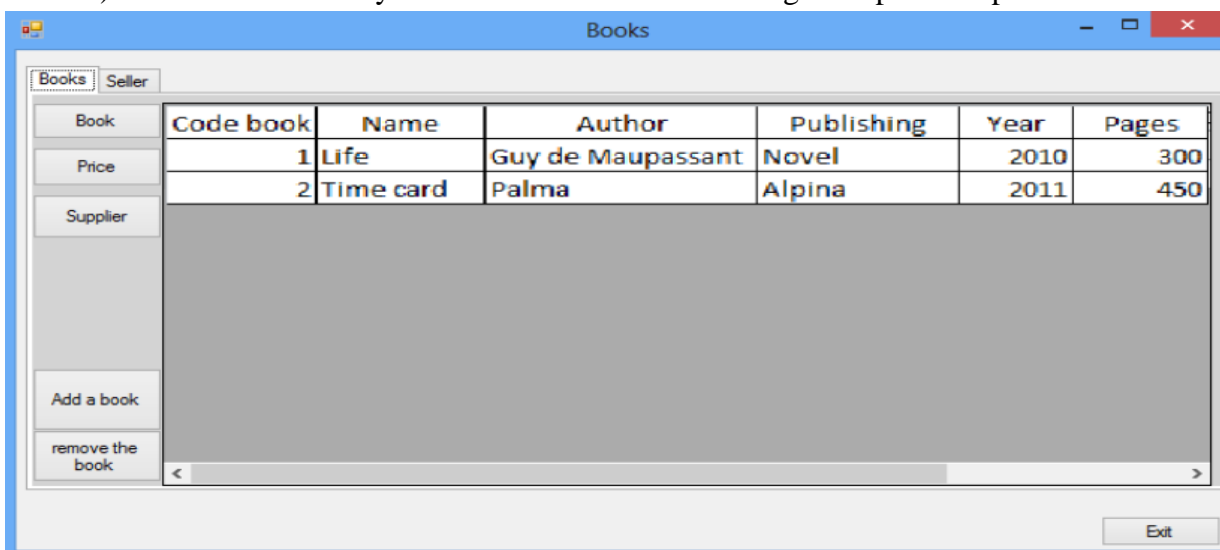


Figure 6. The main window of the program of the system "Warehouse accounting"

To write the program, the C# programming language, the Microsoft Visual Studio programming environment, was chosen. Proposal Software allows you to quickly find, view and edit information about any book
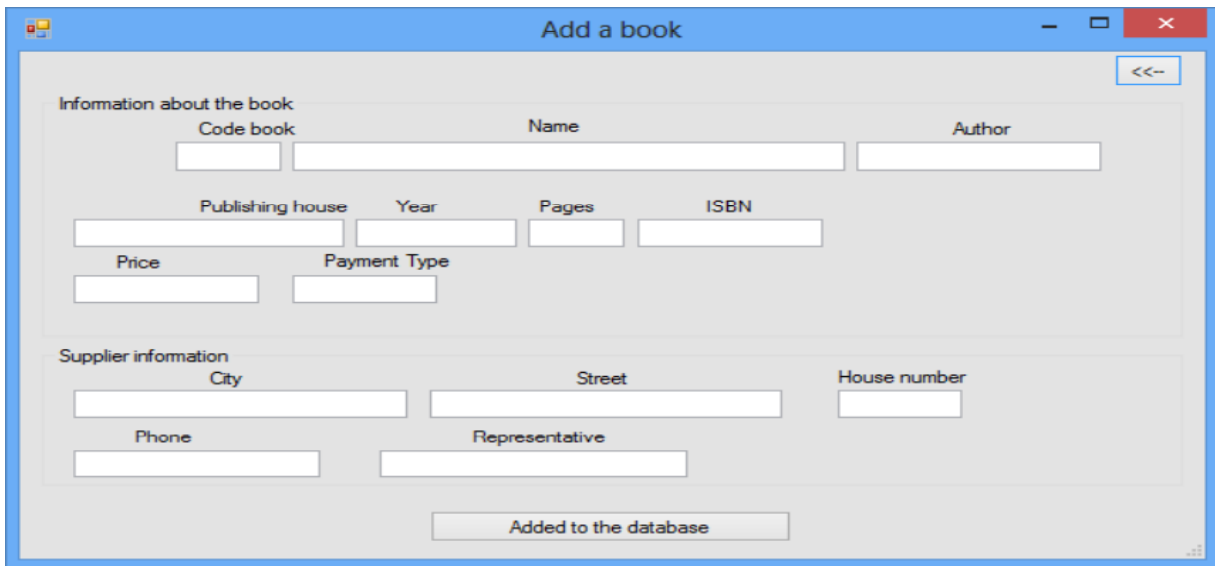
Figure 7. Book editing window

Before the introduction of the EDMS, one of the problems of the company was the large amount of information and the waste of time searching for it. After the introduction of the EDMS, the search and sorting time has been significantly reduced. An example of a document management system in the area of inventory management. As an example of an EDMS, "household inventory and digital accounting equipment in an electronics store" was introduced in the company "Q-Tech". On fig. 9 shows the main window of the program.
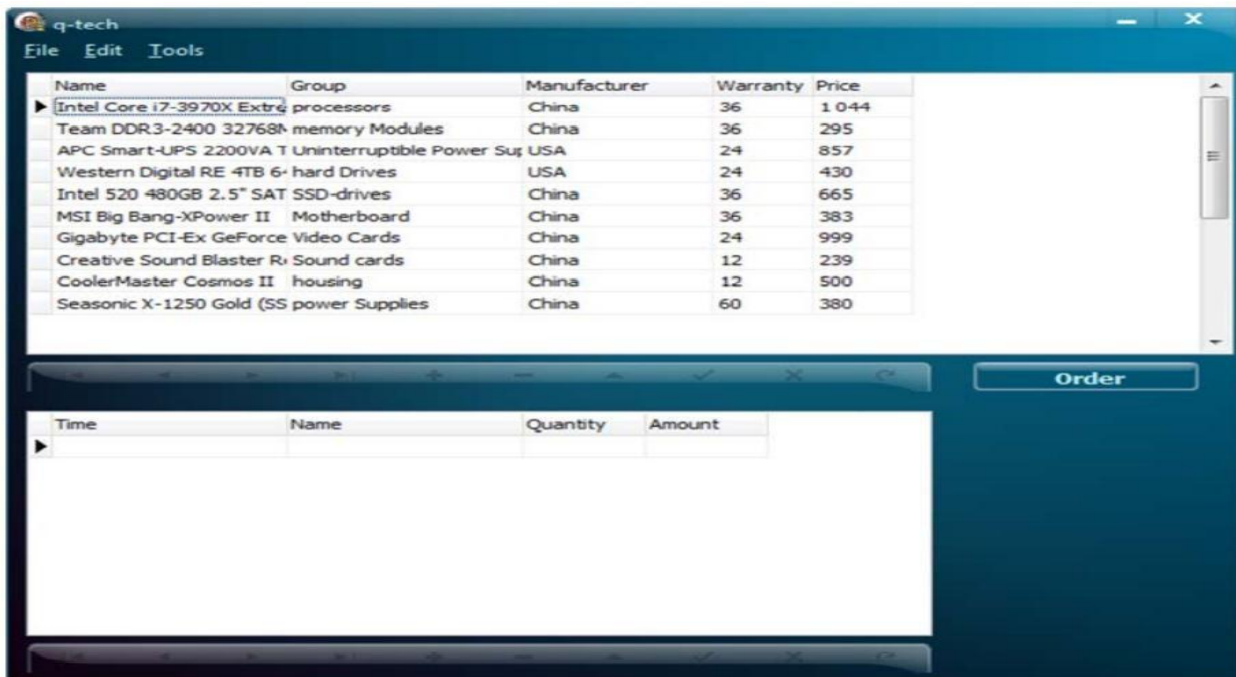


Figure 8. Main window "Inventory of goods"

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For execution, the Delphi development environment and the Object Pascal programming language were used.

This software helps to speed up the work on the product data to add them to the database. Benefits of this program:

• Friendly interface;

• Quick search;

• No data loss;

• Decrease in expenses of time;

• Limited access.

**Conclusion**

Registration of electronic documents gives a significant economic benefit to the enterprise, but its quantitative assessment is a complex process, since many factors have to be taken into account. The economic effect is largely determined by the correct choice of the system and implementation process. It is very important to choose the right system and not to compromise during the implementation process. The price of the system is primarily determined by its belonging to a particular class. The duration of the implementation process depends on the complexity of the system and can range from one week to a year or more.

**References**

[1] Model Requirements for Electronic Records Management: Moreq Specification (INSAR Supplement), European Community Official Publications Authority, 2002.

[2] Galchenko VG, System programming with WIN32. Creating an application for Windows, Tomsk: TPU, 2009