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TECHNOLOGY OF CREATION
OF THE ELECTRONIC MULTI-PURPOSE DATABANK

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Abstract: This article describes a technology for creation of electronic multi-purpose databank. The structure of the database is considered as an example database of chemical equipment. The possibility of rendering graphics using COM-object Volo View Control is considered. The article describes the structure of web-interface to access electronic databanks on the basis of technology AJAX.

Computers and information technology are well established in various areas of modern life. These technologies are also used in education. Electronic textbooks, multimedia aids are developed and used everywhere. Another equally important trend among electronic educational resources is the development of the electronic equipment databanks.

The study of various technical disciplines, as well as the work of specialists of various levels requires a large amount of reference materials. Using electronic databanks makes the work with a lot of the material faster and more convenient. Their purpose – the structuring and provision of information in a convenient form for experts [1]. In this case, information about equipment includes not only the parameters of the equipment, its description and other textual information, but also a set of graphical information, which includes 2D drawings and 3D parametric models of equipment. Such systems enable to have quick access to all the necessary information about any equipment that is stored in the catalog, view the drawings, which can be used in the project documentation later. Also, information from the electronic databanks are used for aided solution of problems of the designing [2].

Electronic databanks can have a wide range of applicability, if they satisfy the following requirements:

- provide quick selection of information in a convenient form and satisfy the needs of a wide range of specialists;
- do not contain contradictions within a single catalog, and between different catalogs;
- should be as complete as possible in the relevant field;
- provide expansion and changes in the content at constant principles of organizing information.

In analyzing these requirements and the specific of the information that is contained in databanks we developed a technology of creation of the electronic multi-purpose databank.

At the initial stage of development of electronic databanks it's necessary to select the database structure that provides complete information about equipment and fast access to stored information. The structure depends on the specificity of the information stored in the database. To use the graphical information the structure of the database contains an attribute that specifies the directory that contains graphic images of the equipment.

Let's consider the structure of database of the electronic databank of chemical equipment, which is shown in Fig. 1.

The table presents the data on types of equipment. Each record corresponds to a table of the sizes units of equipment. Also in the table of types of equipment stores the addresses of graphic files. The table of the sizes contains the name modification of equipment, overall dimensions, as well as the basic dimensions that define the position of the main structural elements and connections. A list of connections is stored in table «Connections». The records of this table contain the name, designation, description, and location specified by the deviation from the center of the device for each connection.

It's useful to store graphic images of equipment in the vector graphics formats DXF to 3D models and DWF to 2D drawings. Formats are chosen due to their widespread availability for the developers of the specifications.

In the next step, the database of the selected structure is created and filled with the collected information, which reflect information about the equipment. Format DB is used to store the database. To work with the database of this format there is a large number of common editors (eg MS Access).

The ability to work with databases and graphic images is provided by the core. The core of the system is a program that allows the user to view, edit and add information to electronic databanks.

Let's consider the structure of the system, which is shown in Fig. 2.

The design of the user-friendly interface is aimed to maintain an interactive dialogue with the user of the system. The main functions of the user interface include mapping of current information, such as the technical parameters of the selected equipment, and convenient graphical display of the image of equipment.

The functions of the visualization include the formation of a graphical representation of a 3D object and 2D drawings according to the information received from the DBMS. In this case, the actual size of the selected equipment is important. As a result parameterized constructing of a 3D object is performed according to the standard sizes, contained in the database. 2D drawings serve to illustrate the chosen unit of equipment with corresponding sizes. This approach enables to provide the user with the corresponding to the selected standard size 2D and 3D images of equipment. You do not need to keep a separate drawing and 3D model for each size, which for each specific unit of equipment can be quite a lot. This avoids data redundancy and reduces the volume occupied by the catalog memory.

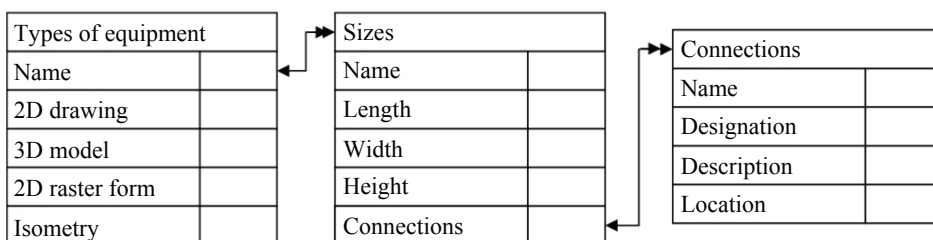


Fig. 1. The structure of the equipment database

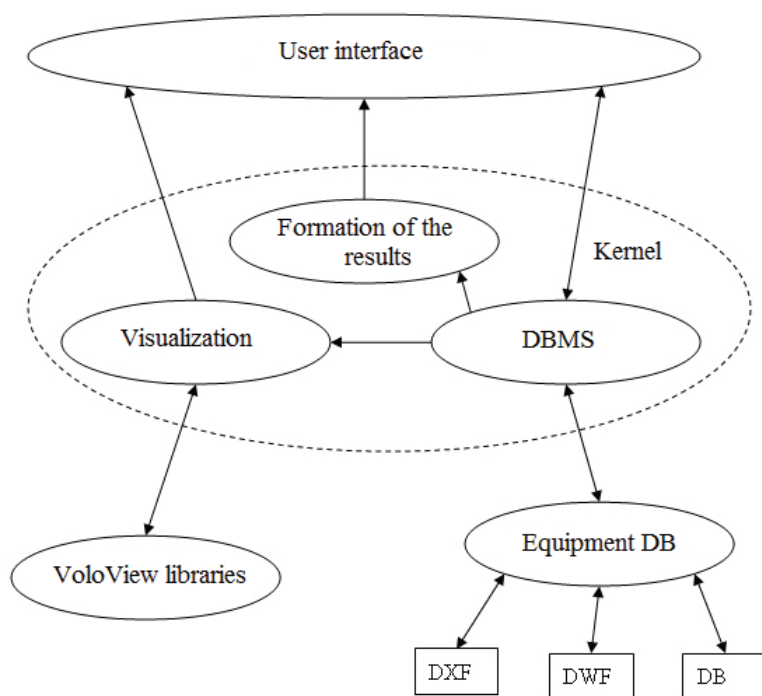


Fig. 2. The structure of electronic databanks

For visualization of vector graphics we use Autodesk Volo View Control COM-object. The choice of COM-technology frees the developer of the databank from the creation your own rendering UI. In this application Volo View is free and publicly available for download from Autodesk. The capabilities of this interface can display both 2D drawings and 3D objects with convenient control display options. Among them there is the possibility of rotation of the camera in any plane, which allows to consider the equipment. It is also possible to select 3 display options: wireframe model, flat shaded mode, Gouraud shaded mode. The use of interface Volo View to render graphic images provides the user with the information about equipment in the most convenient form.

Let's consider the creation of 3D graphic images on the information obtained from the equipment database. The database stores a reference to the program in AutoLISP language, this allows to form a new drawing with the desired dimensions. When you select record from the catalog the repeated reference to a DB of the equipment for the purpose of carrying out of initialization of parametrical variables by final values of standard sizes for the chosen equipment is carried out. Then the construction of 3D images is carried out by means of AutoLISP language. It should be noted that database contains the information about the title of the parametric variables, which are in presented in the LSP file that is connected to create a graphical image.

The system of electronic databanks must have instruments to edit, add and delete entries. Consequently, the user interface of the system contains the elements needed to manage the contents of the database. You do not need to have knowledge about the system, you just need to fill in the database and specify the path to the directory containing the 2D drawings and 3D models of the equipment. Being able to edit and update the records allows them to be timeless.

The form of the output information can be a DB file, which contains a list of information about the selected equipment, as well as links to the directory where files containing graphic images of the equipment are located.

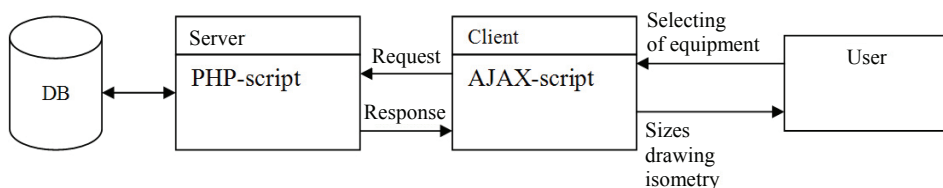


Fig. 3. The scheme of the web interface

A distinctive feature of modern databanks is their accessibility, providing an opportunity to work with their content via the Internet. For optimal performance with electronic databanks on the Internet it is advisable to use AJAX technology. It allows updating only the changed portion of a page for the response to a user request that allows saving web traffic and increasing download speed of the content. This makes the system work more quickly and conveniently, even on computers with slow Internet connection. However, the functionality of the online catalog is somewhat narrower than the local version. The user can access the tables of equipment, choice of sizes. For the convenience of searching it is possible to filter records and search various attributes. When you select records of interest 2D drawings of equipment and its isometry are displayed. To ensure this capability in the database the attributes that refer to raster image files in bmp, gif, jpg are provided. If a user needs a drawing or model of equipment in a vector format for use in different design systems, it should be possible to download it from the server.

Let's consider the scheme of the Web interface (Fig. 3). The user selects the equipment on the web page. AJAX-script on the client side generates a request to the server to obtain the required information. On the server the request is being processed by PHP-script that accesses the database and sends a response to the client. The answer is processed on the client using AJAX-script that updates the page, giving the user interesting information [3].

The electronic databank of the equipment described in this article meets all requirements imposed on such systems. The ability to display 3D models of equipment allows detailed study of equipment construction. The developed system of electronic databanks is used for both training purposes and for purposes of design industries, with the ability to import entries of the catalog into the computer-aided design engineering. The described system is used in the learning process to familiarize with the equipment, its types, function, and as a reference material when performing laboratory work, curriculum development projects.

The proposed approach is implemented in the development of electronic databank of technological equipment used in the design of multiassortment productions and in the learning process.

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Технология создания электронного банка данных многоцелевого назначения

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Ключевые слова и фразы: базы данных; удаленный доступ; COM-технология.

Аннотация: Описана технология создания электронного банка данных (БД) многоцелевого назначения. Структура БД проанализирована на примере БД химического оборудования. Рассмотрена возможность визуализации графической информации с помощью COM-объекта Volo View Control. Описано устройство Web-интерфейса доступа к электронным банкам данных на основе технологии AJAX.

Technologie der Schaffung der elektronischen Datenbank der mehrfunktionalen Zweckbestimmung

Zusammenfassung: Es ist die Technologie der Schaffung der elektronischen Datenbank der mehrfunktionalen Zweckbestimmung beschrieben. Die Struktur der Datenbank ist am Beispiel der Datenbank der chemischen Einrichtung betrachtet. Es ist die Möglichkeit der Sichtbarmachung der graphischen Information mit Hilfe des SOM-Objektes Volo View Control betrachtet. Es ist die Einrichtung des Web-Interfeses des Zutrittes zu den elektronischen Datenbanken auf Grund der AJAX-Technologie beschrieben.

Technologie de la création de la banque électronique de données de la destination aux multiples buts

Résumé: Est décrite la technologie de la création de la banque électronique de données (BD) de la destination aux multiples buts. La structure de la BD est examinée à l'exemple de la BD de l'équipement chimique. Est examinée la possibilité de la visualisation de l'information graphique à l'aide de COM-objet Volo View Control. Est décrit le dispositif du web-interface de l'accès aux banques électroniques de données à la base de la technologie AJAX.

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