STRUCTURE OF CLOUDING SERVICE FOR ELECTRONIC MEANS RELIABILITY ENSURE

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The main idea of the article is to demonstrate the structure of a software system for electronic means reliability ensure working as a "cloud" service, with the aim of better understanding the functioning of all the software components of the developed software. The article describes basic algorithms of software modules interaction, as well as software interface management.

Keywords: "cloud" service, ensuring the reliability of electronic means

The concept of "cloud" computing was the result of an evolutionary development of information technology over the past few decades, as well as the response to the challenges of modern business. The basis of the concept for Software as a Service (SaaS) is the lack of need for permanent use of the software (SW) on enterprises. [1] All the necessary computing resources, including software, provide the provider's server on user's demand. User must have a "thin" client with a minimal set of hardware modules and preinstalled web browser while working in a SaaS model. All calculations are made after the user submits the form to the server, what is called the calculations "in the clouds". [2] This approach allows the company to save on maintenance and the updating of expensive software licenses, providing access to the resources they need at any convenient time, from anywhere in the world with Internet access.

Described techniques have already benefited for many Western software developers, including developers of Computer Aided Engineering (CAE) - systems. However, "cloud" approach has not been applied for programs that provide calculation for the reliability of electronic means [3].

As for the practical Clouding service for electronic means reliability ensure (CSEMRE) realization, the idea of client-server applications using thin clients and providing on-demand access is not new and has already been used in a number of applications developing projects. User-side thin client indeed is any internet browser. Requests from the client are sent to the server over the Internet. The server, which may be physically located anywhere in the world, in turn, executes scenario on the user's request and sends the appropriate response to the client. The structure of interactions is shown on Figure 1.
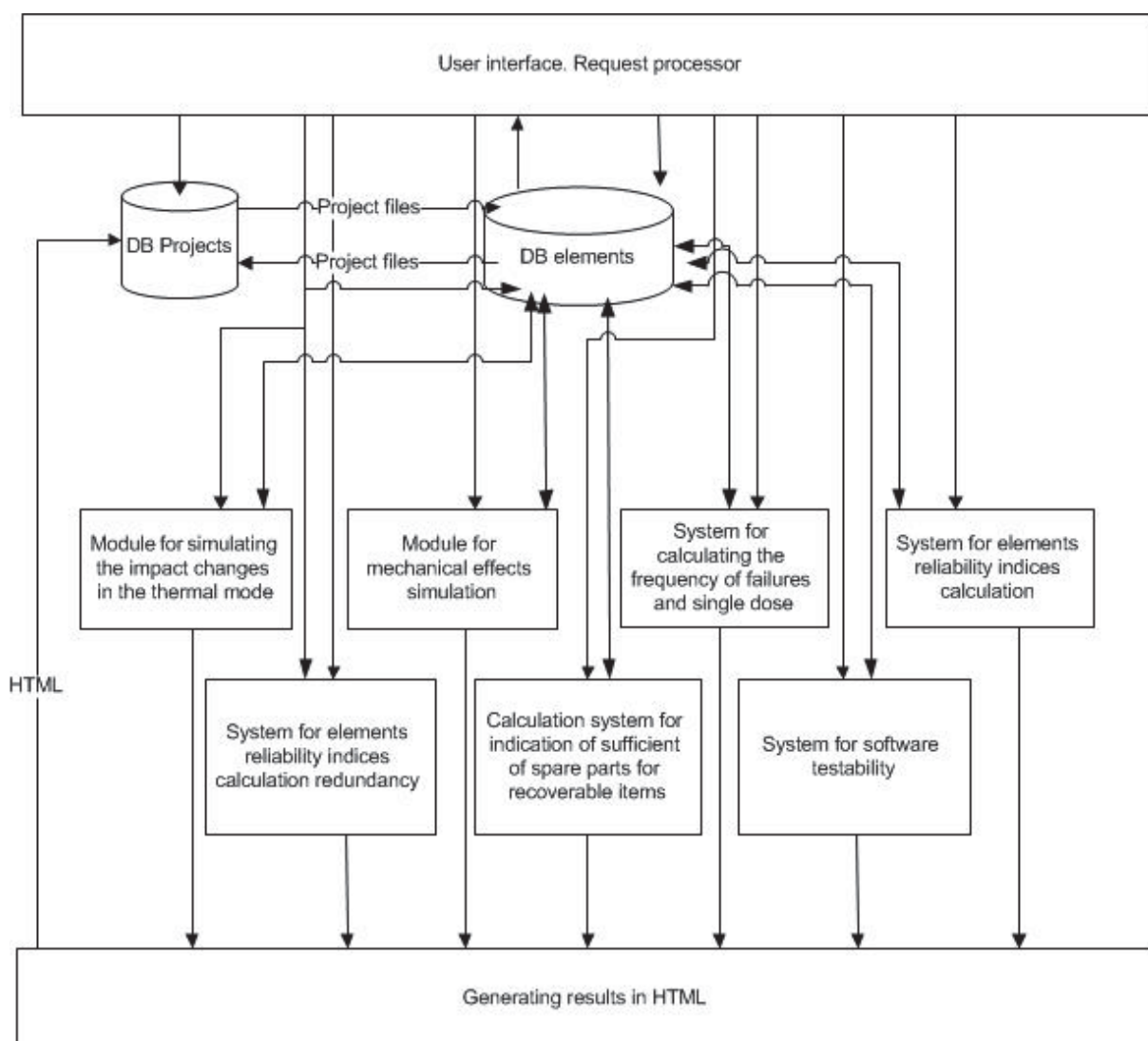
Figure 1 - The structure of CSEMRE interactions

For optimal interaction technology it is appropriate to use Asynchronous JavaScript and XML (AJAX) and secure Hypertext Transfer Protocol Secure (HTTPS) with support for Transport Layer Security (TSL) to ensure complete confidentiality of data transmitted when using the service. [4] Also a base for electronic means is needed to be represented by its own module, from which any user will be able to select required data to implement calculations according to the circuit. Formulas for calculating are also stored in the same database, which are the basis for the model from the handbook [7]. Also a billing system that controls access to the calculations upon payment by the user is needed. CSEMRE structure is shown on Figure 2 [5]. Such an approach is a cross-platform that is applicable for all types of operating systems that provide access to the Internet through any browser, including mobile devices. Whole load lies on computing server, so the performance of any device that supports the browser will suffice. Thus, any user can access old projects or create a new project and execute calculations from anywhere having a mobile phone (tablet, laptop) with access to the Internet.
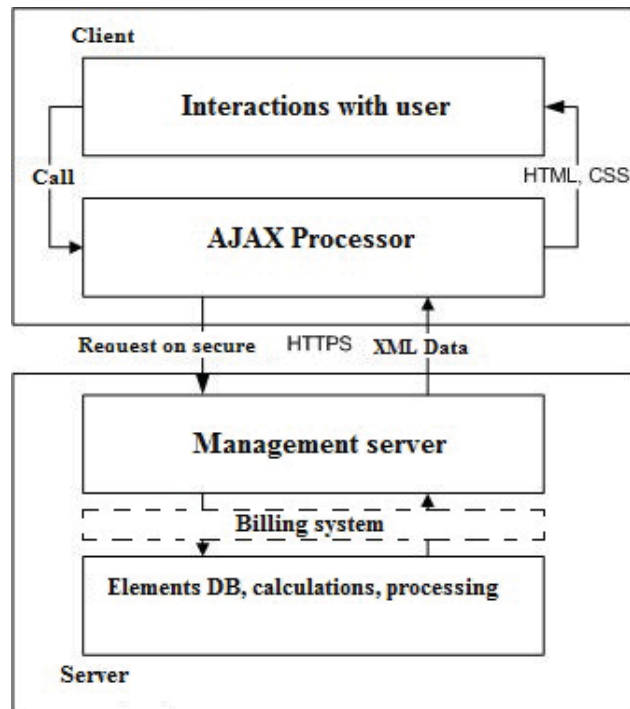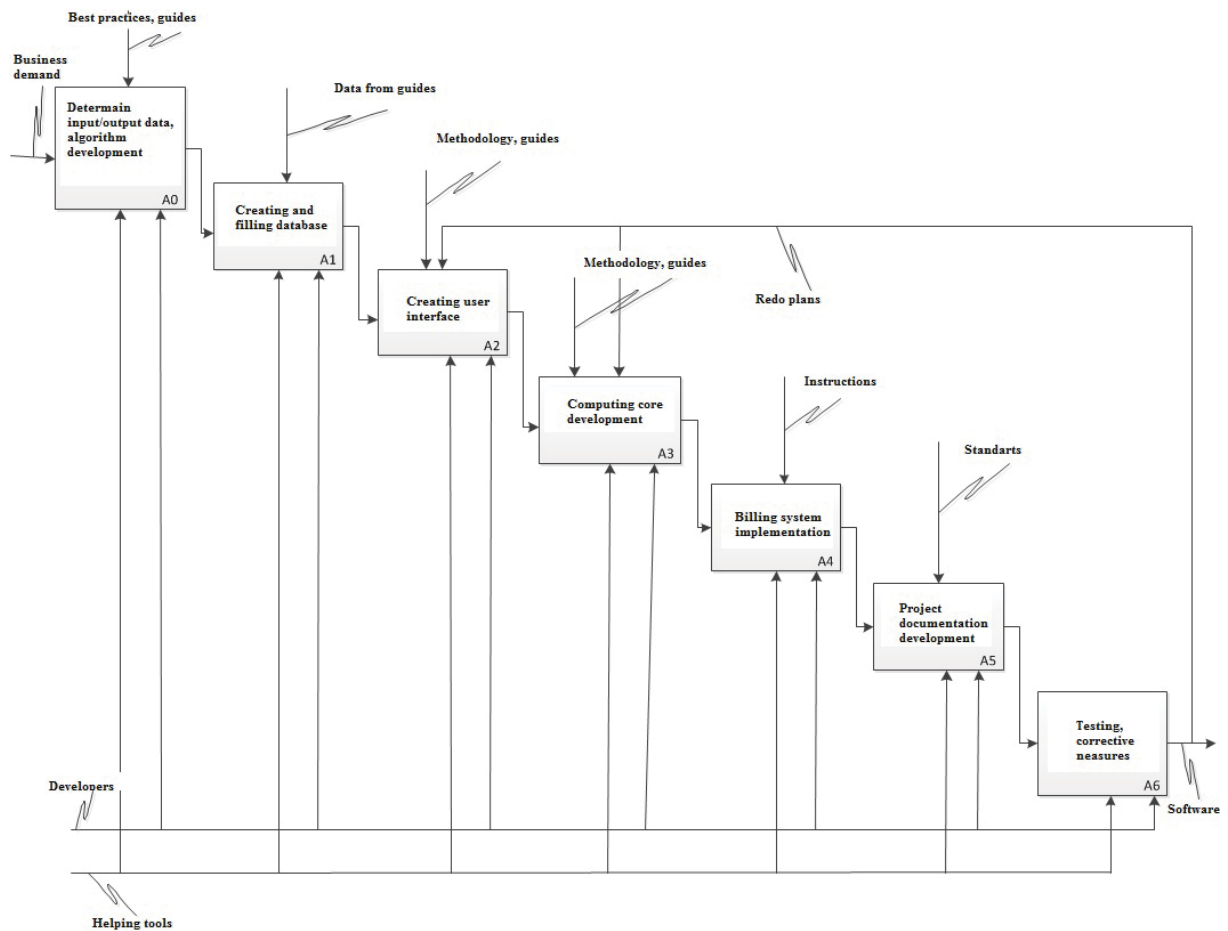
Figure 2 - CSEMRE structure

Figure 3 - CSEMRE software system development steps

CSEMRE software system development consists of steps presented on Figure 3. At the first stage the structure of the software system, as well as rules of interaction modules (client, computing core, the base of elements, and billing) according to the semantics of the language are determined. On four subsequent stages the issue of implementation modules and combining them according to the rules described in the first step is solved. After that, testing and corrective measures, as well as the creation of project documentation for the software package are obligatory.

The client application is an online portal which can be accessed by signing-up.

At the entrance to the portal after registration user have access to his personal account, which is providing a management console for new or ongoing projects. When creating a new project, the user can select required items from already completed database of electronic elements, or contact the administrator via a special application form for adding a new item to the database. After creating and providing payment, the user can send his project for calculations. Input data is processed and sent to the host computer to the computing core. The server sends calculation results back to the user and attaches it to the project. The results are available for reviewing through users' personal cabinet. Interface draft is shown on Figure 4.

CLOUDING SERVICE FOR ELECTRONIC MEANS RELIABILITY ENSURE

| USER CABINET | FAQ | CONTACTS |

List of projects

NAME	STATUS	CALCULATIONS
Prj1	Completed	Download
Project_2	New	
MyPrjct	Completed	Download
Project	New	

| New project | Top up the balance |

Balance: 100 USD

Figure 4 - Interface draft

Any electronic circuit can be represented as a tree in which branches are elements and vertices are nodes. This approach is very useful when creating the project through the web interface of the program. [8].

In order to make calculation, user has to add the elements of the database in a tree like elements according to the location in the diagram. Then user has to select the calculation. Changing user settings is granted dynamically based on the previous selection. During the simulation the AJAX technology maximally uses to ensure fewer loads on the server. After all the settings the user press the enter button on the form, thereby sends https request to management server. The server receives a user request and in turn generates the necessary database query to select the desired calculation formulas, as well as the characteristics of user-selected items. After dispatching the necessary information from the database, the server performs necessary calculations, saves the results in the project database and sends the required notice of the operation success and displays the calculation using the html response

on the screen. The user after receiving the response from the server can scan and upload the results from the database projects. This interaction process is shown on Figure 5.
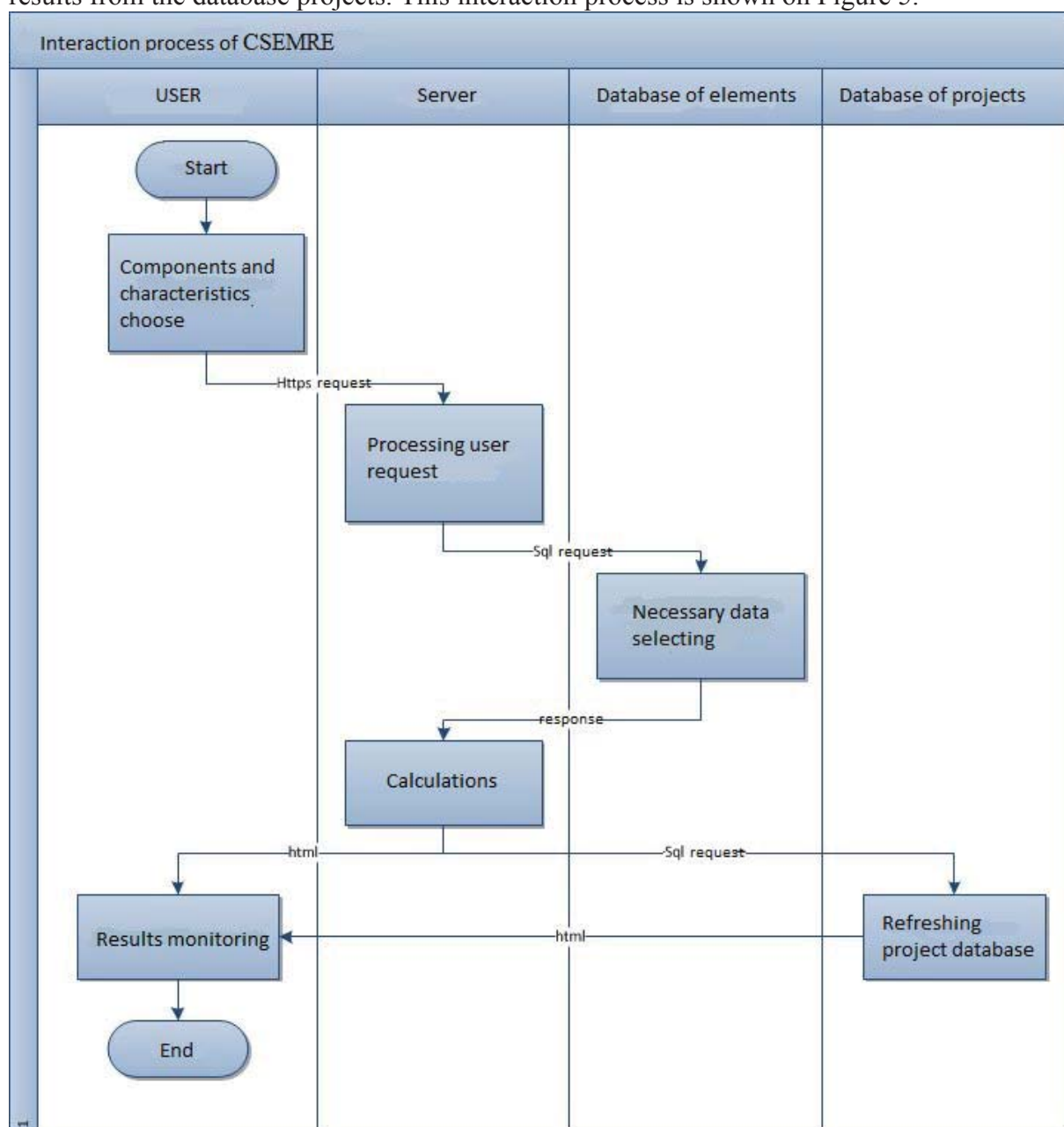

Figure 5 – Interaction process of CSEMRE

Thus, we can say that the structure of clouding service for electronic means reliability ensure is quite typical client-server model, and does not cause problems in the integration of software modules to each other. The idea of creating CSEMRE with structural evidence for its implementation has a great practical value and novelty, allowing you to make payments from any device at any time on users demand.

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