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V. Vysotska[1], Liliya Chyrun[1], Lyubomyr Chyrun[2]
Lviv Polytechnic National University,
[1]Information Systems and Networks Department,
[2]Software Department

MODERN TRENDS OF DEVELOPMENT AND ARCHITECTURE ANALYSIS OF ELECTRONIC CONTENT COMMERCE SYSTEMS

In the given paper the main problems of e-commerce and content function management services are analyzed. Content lifecycle model in electronic commerce systems is proposed. This model gives an opportunity to create an instrument of information resources processing in electronic commerce systems and to implement the subsystem of commercial content formation, management and support.

Keywords – information resources, content, content management system, content lifecycle, electronic content commerce system.

Introduction and the general problem formulation

Basic infrastructure of electronic content commerce system (ECCS) is extended by the more dynamic applications (interactive features): simple request form and content formation based on JavaScript for browser; API for Web-server (NSAPI and ISAPI), which allows the browser to execute the application on the Web-server; dynamic processing servers that convert content from databases in HTML-pages [1-2]. Effective use of database management system (DBMS) requires the following in architecture WebOLTP: support unstable loads with tracking properties such as queues and priorities request; high-speed connection of the application to DBMS; applications queue and resource management as a the total amount reducing means of resources in system order to achieve of stable performance within online transactions; securing, such as authorization (compliance) for WebOLTP- specific applications; distributed processing of query, taking into account various types of data in WebOLTP environment [1-2]. WebOLTP is managed dialog of requests processing (Online Transaction Processing OLTP), where the Web is a access means [1-2]. This applications suitable for data viewing, but also to operational content processing in real-time, such as banking transactions, orders taking and analysis, interactive work with clients [2].

Problems communication with important scientific and practical tasks

Theme actuality consists in rapid prevalence of Internet access; active development of e-business; information products/services set expanding; demand for information products/services growing; theoretical justification methods lack of information resources processing; needed to software unification for information resources processing and active development of research in e-business of Google, AIIM, CM Professionals organization, EMC, IBM, Microsoft Alfresco, Open Text, Oracle, SAP corporations and Lande D., Braychevsky S., Grigoriev A., Furashev V., McKeever S., Boiko B., McGovern G., Hackos J., Rockley A., Nakano R., Doyle B., Woods R., Halverson in scientific papers [1-15].

Recent research and publications analysis

The unsettled question is the best technology selecting for WebOLTP-architecture desinf and for business logic the implementation and management at the intermediate level [1-2]. Here are the basic requirements for intermediate level software [2]: scale and performance when working with large number of

users, sessions, transactions and connections with database; high performance connections of browser and back-end data store; support of rapid development and deployment WebOLTP-applications at an intermediate level; synchronous and asynchronous management of transaction through transaction servers of ECCS (Fig. 1).

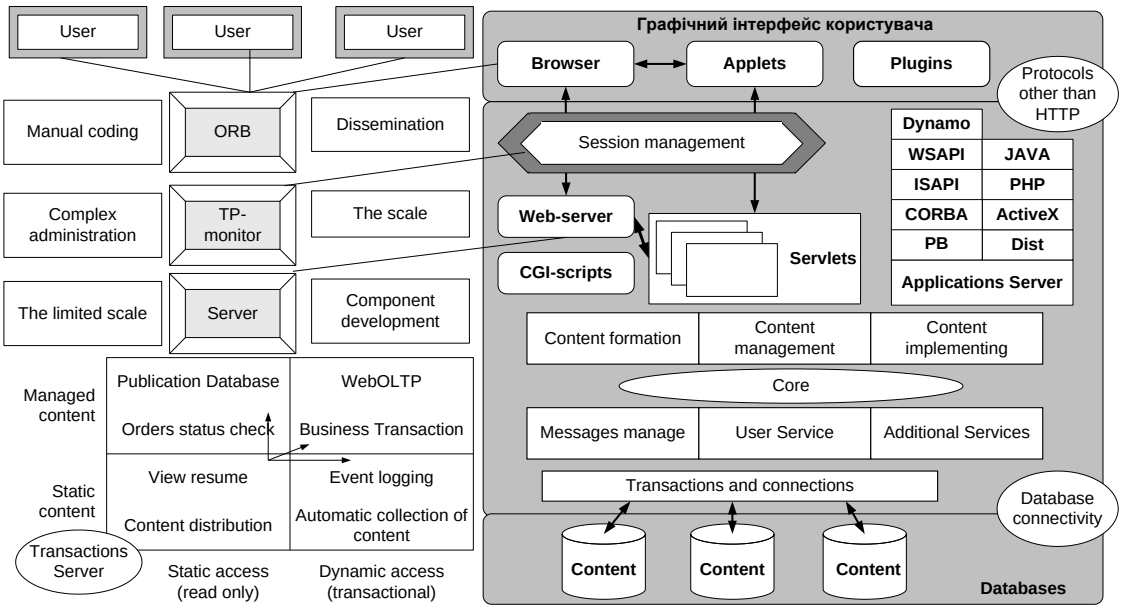

Fig.1. Basic infrastructure of electronic content commerce system

Transactions servers of ECCS characterize the following properties: they support built-in capabilities of transaction management; they provide a mechanism to execute and servlets management; they support the challenges of distributed objects for communication in multi-applications; they support rapid development tools of software for the intermediate level, including component development [1-2]. Basic indicators of connectivity include: generalized multiprotocol support for browsers and other network clients (HTTP, TDS for fast processing of content and protocol CORBA IIOP); connectivity with main DBMS, including Sybase SQL Server and SQL Anywhere, Oracle and MS SQL Server through ODBC, JDBC and Sybase Open Client standard; connectivity with the mainframe and other content sources through products of data access; high-speed connectivity with Java for applets and servlets; high-speed exchange of totals samples between all levels; efficient HTTP- tunneling to ensure compatibility with firewall [1-2].

Content distribution systems implement by client-server model, because the vast majority of operations carried on the server [2]. This makes universal ECCS. Also, it frees users from the need to place a required to work of the software on the computer. The process of data transferring between the client and the server and the user interface of these data presentation are based on generally accepted international standards. This allows the use of information technology and software with different architectures and different methodologies for information resources processing, such as regular expressions. Structural elements of software and information technology to ECCS build [2]: communication protocols between client and server (HTTP, FTP, IIOP); HTTP- server integration with content source (CGI, Perl, PHP and specialized API); hypertext capabilities implementation (HTML, WML, XML, XHTML, JavaScript); multimedia features implementation (Flash, audio/video formats, VRML); communication implementation and online interaction (POP, UDP, SMTP); payments support (PHP, Java),; content management systems and services (CMS, CMIS); network management protocol for network OSI (CMIP); mobile access and computing organization (GPRS, EDGE, UMTS, WAP); distributed objects implementation and development (CORBA, COM, DCOM, EML, ORB); data storage and processing (file systems , operating systems , database management systems, systems for group work).

Problems selection

Full-featured ECCS is characterized complex system of interrelated operations [1-2], methods, techniques that form the technological process of such systems (Fig. 2).

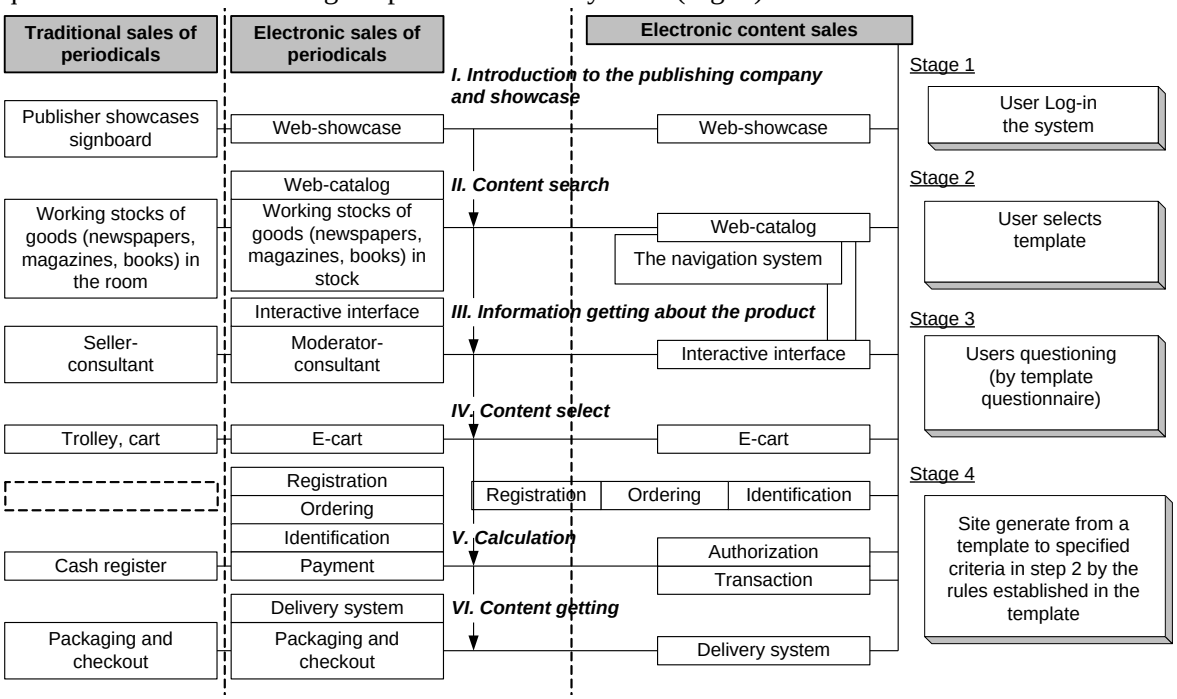

Fig.2. Фази та етапи технологічного процесу роботи систем електронної контент-комерції

New platform of Internet development significantly reduces the loss risk, content duplication or re-creation of the search/find impossibility [1-10]. The control means of content versions ensures that the Internet portals content will not be lost or accidentally overwritten [2]. Editors can easily find the required version of the content and/or information resource. In business processes are not acceptable chaos and delays. A business process building based on user roles and groups imply their independence from delays of individual persons execution [1-2]. Roles and the processing of various information resources (eg, pictures and legal documents) are usually quite different.

Goals formulation

The aim of ECCS creation is to establish a common approach for the design, construction and implementation of similar systems. The project implementation promotes methods generalization of information resources processing in ECCS through the stages of commercial content formation, management and maintenance to the time reduce when typical e-business systems building. The project implementation of ECCS development is aimed: time reduction in the production of its own commercial content [1-2, 11]; external commercial content analysis from other sources [2-4, 6-9, 11]; the dynamics analysis of the commercial content lifecycle [2, 3, 4, 6-9]; the statistical analysis of ECCS functioning [5, 10]; statistical analysis of users activities of information resources in the ECCS [1-2, 5]; the target audience increasing of information resources [2, 10] and the functional possibilities expanding of the ECCS [1-2, 10, 12-15].

The project drafting result of ECCS construction is a set of functional requirements and standardized specifications for the similar systems creation [1-2, 10, 12-15]. The purpose of these requirements creating is to provide a generalized approach for ECCS developing as online newspaper, online magazine, online publishing, distance learning systems, online shop for content selling in the form of e-books, photos, video, audio, etc. [2]. Functional requirements standardization for ECCS building provides a generalized approach

creating for such systems in order to time reduce in process of such systems implementation and introduction with the phase avoiding of the respective project development [1-2].

Research results analysis

ECCS technology supports full or partial automation of business process. Content and tasks are transferred to the appropriate action from one participant to another according to a procedural rules set. ECCS describes, creates and manages the workflow (business process) using the software. It interprets the process description and interacts with workflow participants. Also, it causes a relevant software applications and tools as required. ECCS automates the business process rather than function. It implements the interaction rules of the process participants, These aspects are the main centers of losses due to its vagueness. This article is intended to create a common functional requirements and standardized specifications for the ECCS development. This is done by the stages optimizing of information resources processing in similar systems (Fig. 3). Functional requirements develop for the subsystems of content formation, management and maintenance facilitates the realization of typical architecture for ECCS.

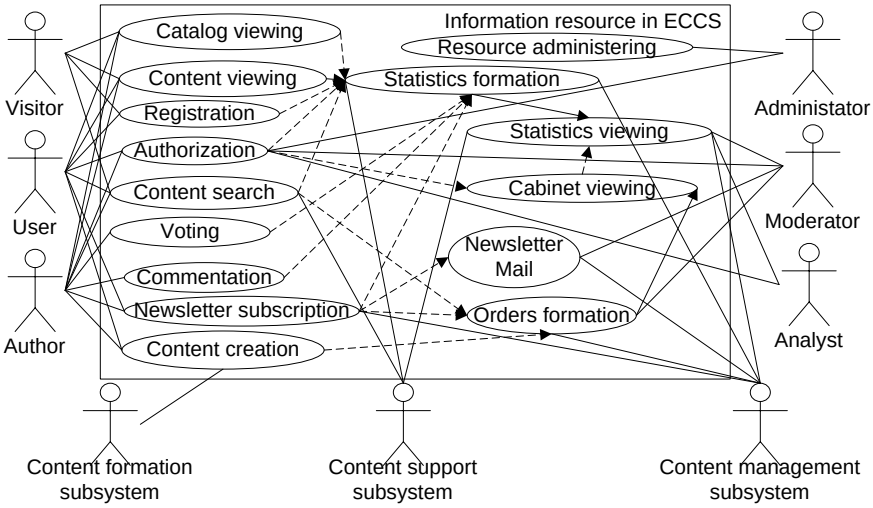

Fig.3. Use Case Diagram for the development project of electronic content commerce system

ECCS is actively used for the e-business implementation in information services with the active use of the Internet technology advantages. ECCS is designed to provide of information services as Internet newspaper, online magazine, online publishing, online market for content and more. It is proposed to apply the ECCS to services promote of publishers, newspapers, magazines, news agencies, educational institutions, firms of software development or контенту sales content without carrier.

The logical model of ECCS must not be changed until such time as the events in the real world will not change it some definition, so that the model continued to reflect the subject area. The necessary information seeks through the DBMS in the database based on physical models of data. Since the specified access is carried out by a particular DBMS, then the models should described by data description language in this DBMS. The process of official content management in e-business sold on the developing concept of their own ECCS. User and/or moderator must pass a certain number of steps to obtain the desired commercial content (articles, books, etc.) with the desired parameters. This steps implement a sequence of information resource management process (Fig. 4).

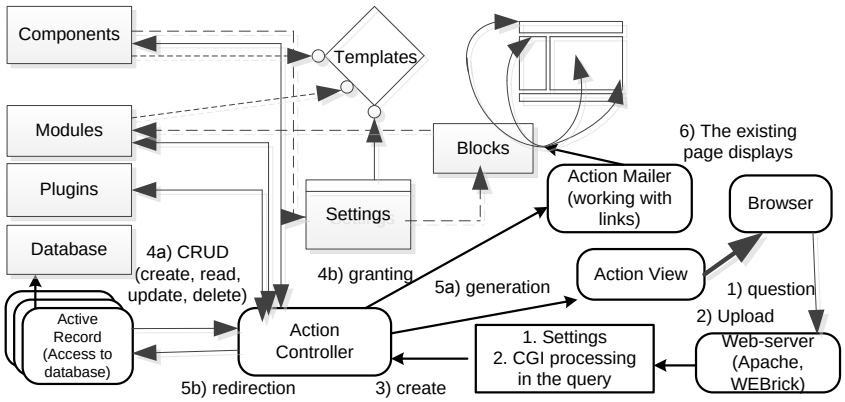

Fig.4. Diagram of content management diagram in electronic content commerce system

Stages of the content management process in ECCS:

1) URL-request with GET-parameter
2) page code receiving with GET-parameter
3) CPO (current page object) initialization
4) request for record receiving with source
5) query of fields initialization for recording
6) beginning of HTML-document structure formation
7) the header forming query
8) output in <title> title from CPO
9) start of content publishing
10) request for records receiving
11) request for cyclic processing of query
12) menu items output
13) method invocation of content publishing from CPO
14) query for content formation
15) process of content formation
16) Completion of HTML-document formation
17) the process of content implementation
18) content image recording
19) page output
20) a pages viewing

When creating of ECCS used object-oriented model of programming. In Fig. 5 describes the created abstract objects with properties and methods. Interaction with objects is realized through encapsulation. For this are implemented interface methods in class that are designed for specific manipulations within the object of its data and properties. The database is implemented in an environment of MySQL. System administration is the administrative part. Access to it is limited and it is implemented using login and password. In this part moderators make adjustments in the structure of an information resource, modify the content, change the static pages content, exercise messages mailing and content sharing between the parties to the business process, analyze visits to the ECCS and demand for thematic content. Software system administrator has unrestricted access to all parts and all the functionality in ECCS.

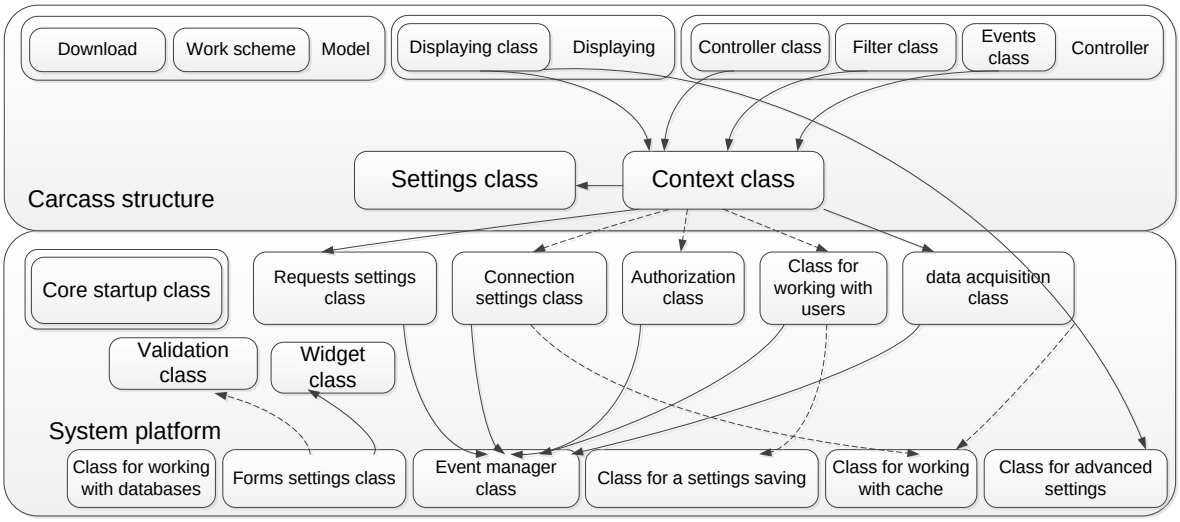

Fig.5. Diagram of the core structure in the electronic content commerce system

In system use relational communication system when the database structure constructing. In Fig. 6 is presented the database structure in ECCS with the basic set of entities. The main relevant of database in ECCS are: attachments (new connected relevant), categories (information on the category to settings select), content types (information about content types settings), email_messages (messages email), file_blocks (information about uploaded files), group_sections (information about section structure of content group), group_types (information about number and types of content groups), groups (information about content group), html_blocks (information about Web- templates), page_routes (information about content in Web- templates), pages (information about created Web-pages), sites (information about the Web site structure), users (information about users and their preferences).

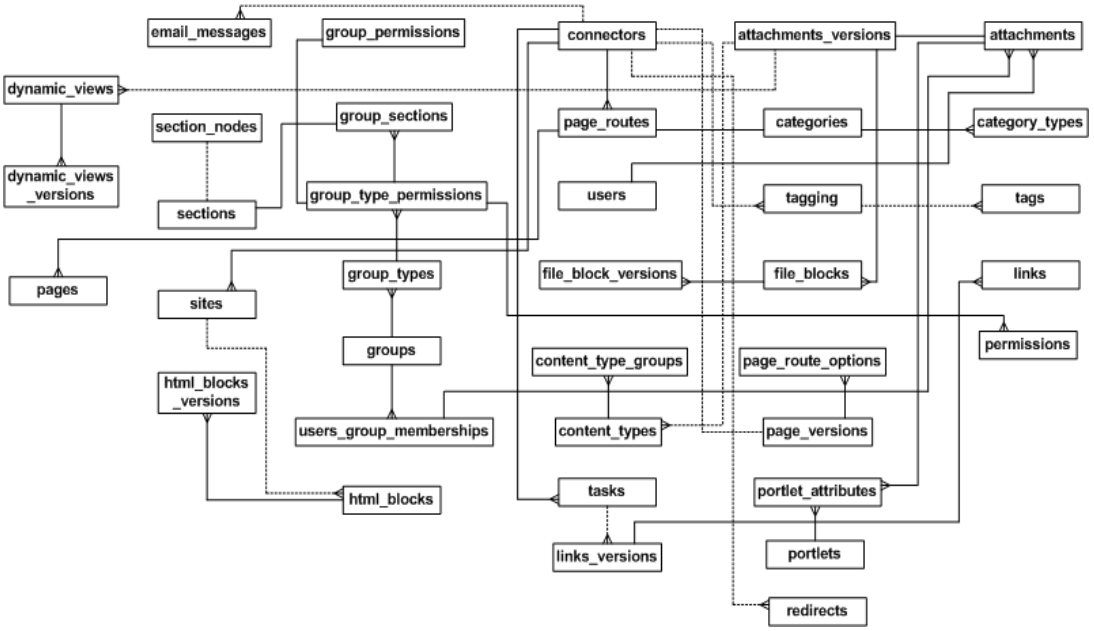

Fig.6. The database structure of the electronic content commerce system

Template group are intended for an interface creation between the user and the system. It contains HTML-pages layouts and/or their individual components using operators. ECCS transmits data of parser in representation of the desired content to the user. So, it executes the command to a one or another template display. Parser replaces operators on the values of thematic content when the template processing.

In Fig. 8 presents *Newsletters* chapter of administration module in ECCS.

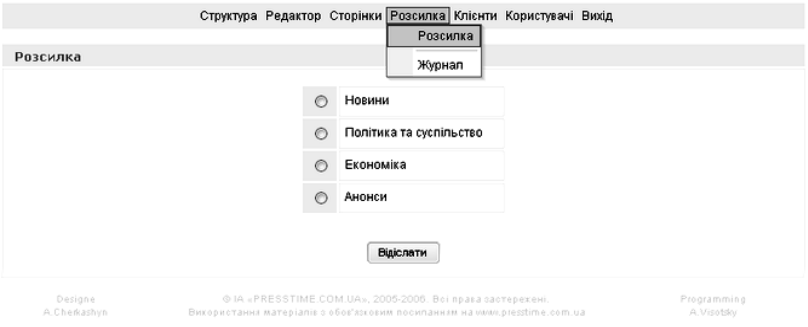

Fig.7. Newsletter chapter of administrative part in the electronic content commerce system

Basic scripts are from the group mods in ECCS: mod_index (user interaction with publicly available information), mod_inside (user/subscriber interaction of the closed section), mod_admin (administration), mod_admin_structure (provides the structure manipulation of some components), mod_admin_news_edit (providing of content manipulation), mod_admin_news_search (provides content search in the archive for selection criteria), mod_admin_news_day (allows to select content for a time period), mod_admin_clients_edit

(providing of customer data manipulation), mod_admin_clients_search (s provides clients search according selection criteria), mod_admin_delivery (provides content mailing), mod_admin_users (provides administrators data manipulation), mod_admin_pages (providing of statistical data editing), mod_admin_test (in this module is new scripts debugging).

In Figure 8 presents editorial section page of the administrative module in ECCS.

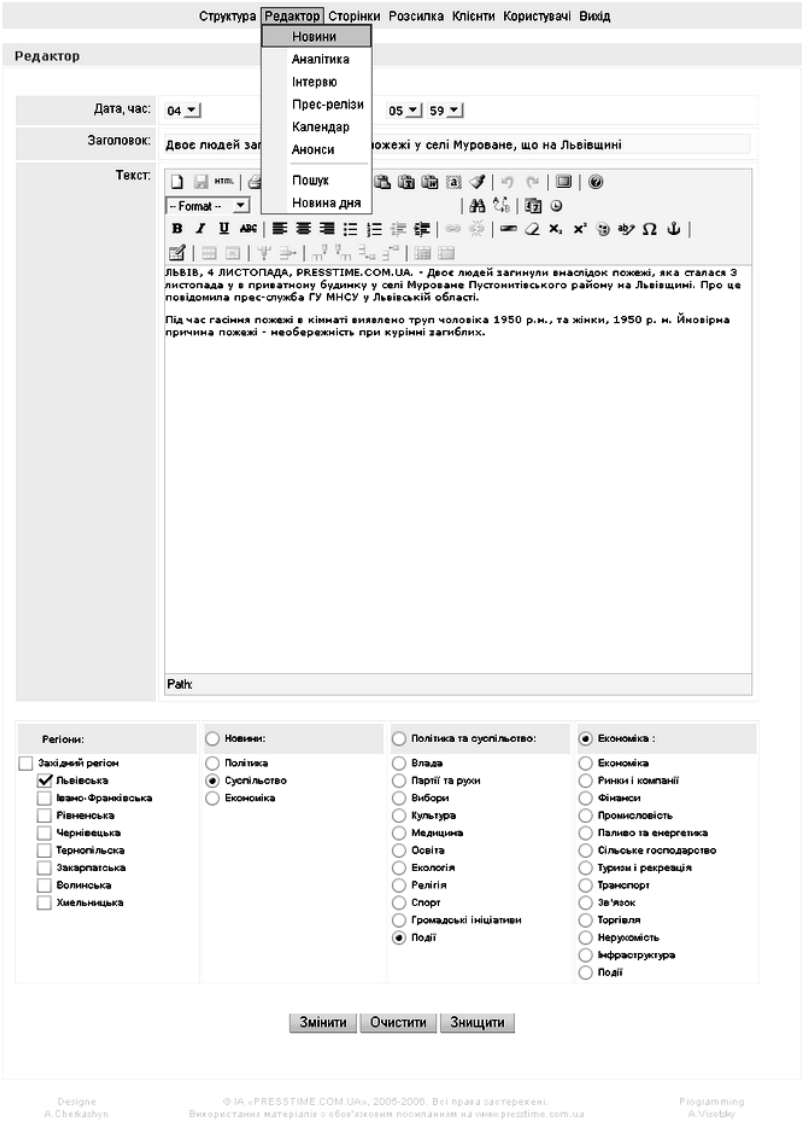

Fig.8. Editorial section of the administration module in the electronic content commerce system

Group of libraries (libraries) script are designed to work with certain objects in ECCS. They are divided into three categories: created by the author, created by other developers and JavaScripts language scripting. Appeal to these scripts is mods scripts group. The scripts description from the libraries group: _class_lib (set of various auxiliary functions), _class_news (for manipulating of the *content* object), _class_clients (for manipulation of an *client* object), _class_users (for manipulating of the *administrator* object), _class_pages (for manipulating of *static pages* object), _class_tree (for manipulating of *tree* object), _class_mail (for manipulating of *mail* object), _class_message (for manipulating of *message* object), _class_mysql (for manipulating of *MySQL database* object), _class_debug (for manipulating of *debugging* object), _class_error (for manipulation of an *error* object), pear (a set of diverse classes and PHP Extension and Application Repository functions), smarty (parser to convert template into a static page), js_cook_menu (scripts to work

with a dynamic menu in the administrative part), tiny_mce (WYSIWYG text editor), jscalendar (calendar). The scripts description from the templates group: mod_index (templates for working with the total/outer part), mod_inside (templates for working use with closed/paid part), mod_admin (templates for working with the administrative part), html (various templates as many common components). Content can add, edit and delete about users in the *Clients* part (Fig. 9). In the *User* part registers ECCS moderators.

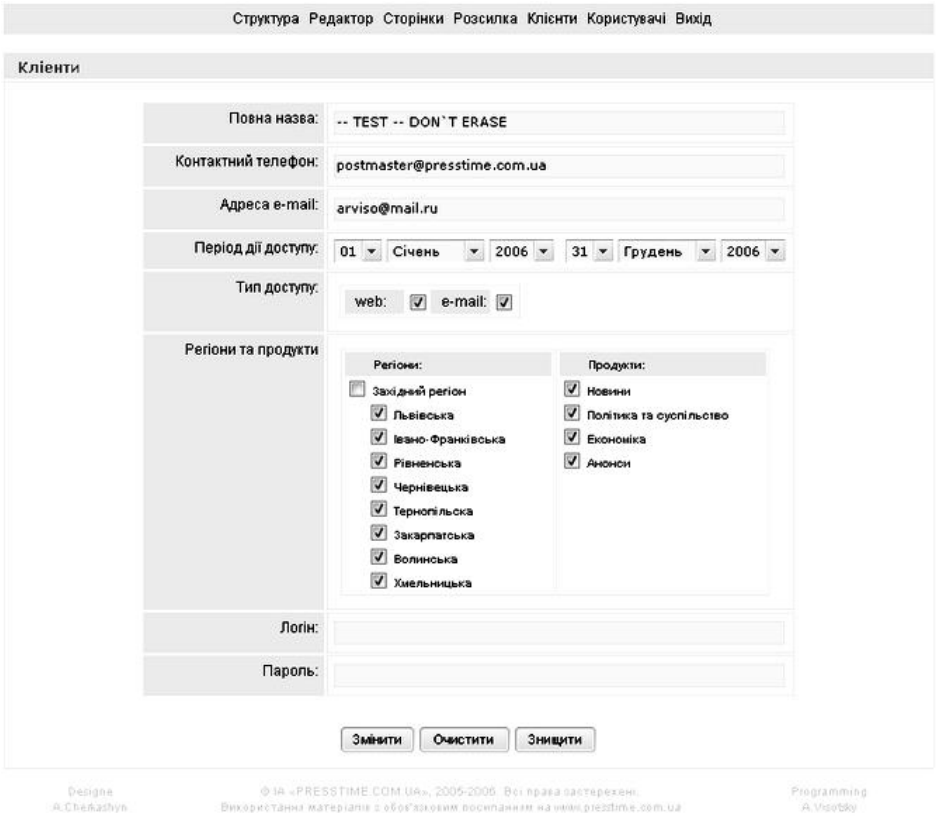

Fig.9. Client part of the administrative module in the electronic content commerce system

ECCS design process is interactive. It flows from analysis to prototype and test trials creation. Also etpamy process is to specifications develop, layout, content formation and its subsequent placement under information resource structure. When ECCS developing is concentrates on business goals solving and the needs meeting of end users. Initially moderators analyze the end-users needs through poll letters, alternatives design and varying degrees prototypes to the functional requirements defining and the development process beginning. They also gather valuable operational / commercial content. At the same time it is causing people a sense of participation in the design process and their trust is won.

Then the moderators determine information about workgroups, past/future conferences and all members of the community to the information architecture determine by regular/potential users. On the reverse reactions of users provide a clear and simple architecture of information resource and ECCS. There are several classes of information resource users (characters) in the ECCS: regular/potential customers/consumers, working groups managers, moderators, commercial content authors, ECCS operation analytics and administrators that define information resource design, ECCS structure and decision-making in typical systems. The next step is to identify important operational content and how it relates to the main classes of users. Then create the content architecture of the information resource in ECCS, its hierarchy, presentation methods and interaction methods of each user class with this content. For example, the conference content includes the agenda and session question, these questions planning, conference topics and issues.

During the analysis form additional functionality ECCS. For example, to support of active community added discussions and comments form on the information resources content, support for the contextual reverse

reaction and interact interaction with users, use of the unique, but neutral brand or visual identity of proper e-business. Since the information resource is a neutral place of interaction between different users, strongly pronounced visual connection to the competitive and/or well-known company or environment causes adverse reactions.

There are several requirements for the ECCS development environment: the ability to make changes to the code and test amendments autonomously. After changes testing this code should be fully or partially accessible to the group of developers, moderators, administrators and/or working groups managers according to the degree of confidence in them. This interactive cycle of developing makes using a remote version control system CVS. It allows synchronizing with team members of developing and manages the source code database of sharing. By a centralized environment creating of development and testing work to optimize code with other members of the group (time should to spend on code writing and testing, not on files and other system resources managing). The CMS model choice affects the need to use other tools. For example, in the case of Joomla! this means PHP, HTML and Cascading Style Sheets (CSS) using to develop pages and MYSQL for database.

Conclusions and recommendations for further scientific studies

In the article analyzes and summarizes the tools, information technologies and software based on basic tasks analysis in ECCS, are used in such systems constructing. The functional scheme of ECCS develop, which uses the module of information resources processing. Detailed descriptions are the modular architecture elements of the ECCS functioning, their objectives and principles of implementation. And in the article discuss the major functional elements of the system and presents the ECCS scheme of the most significant mechanisms. The authors develop software tools of the content formation, content management and content support. Design and implementation are software of developed ECCS for the electronic content commerce organization with modules using of information resources processing. General recommendations are elaborated for architecture design of electronic content commerce systems. They are different phases in more detail and the modules availability of information resources processing from the existing systems. This made it possible to efficiently implement an information resources processing at the developer level (time and resources decrease to the development, the quality improve of the electronic content commerce systems). The modules architectures are elaborated in the electronic content commerce systems for the stages realization of the commercial content lifecycle. Authors have developed and implemented a software application of commercial content formation, management and support to achieve the effect of the work at the owner level (profitability improving, interest users increasing) and user level (clarity, the interface simplification, standardization, choice expanding) of the electronic content commerce systems.

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