

Creation of an online library of qualifying works of students of the SCIA department

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Abstract. The purpose of the article is to develop an information resource for the placement of qualification papers of students of the Department of Education and Research. The research methodology is based on the methods of analysis and synthesis, as well as on the use of informational, system-structural, and functional approaches. The scientific novelty of the work lies in the development of informational and functional models of the process of creating an online library of qualifying works of students of the SCIA department. Conclusions. A goal tree has been developed, the general purpose of which is to create an online library of qualifying works of students of the SCIA department. In order to achieve the set goal, a division was made into three first-level goals, which in turn are divided into smaller goals and sub-goals, each of which has an individual means of achieving the goal. An information model of the problem was built in Peter-Chen notation, which contains 6 entities related to each other with connections. The notation presents the "Supervisor" (as the student's mentor), who manages the "Student" (the author of the qualification work). "Student" performs "QW" (study carried out by the student), which is reviewed by "Reviewer" (critic of qualification work). "QW" is contained in the "Online Library" (website of qualifying papers), which is visited by the "User" (interested person). A functional model of the given task is provided in the form of context diagrams and detailed processes. The first context diagram shows the process of "Filling the online library of the QW" and four external entities: "Secretary of the examination board", "Manager", "Reviewer" and "Student". The second context diagram shows the process "Organisation of the work of the online library" and two external entities: "Administrator" and "User". Three systems for managing site content are considered, namely: Drupal, Joomla and WordPress. After a detailed analysis of each CMS, WordPress was chosen as the ideal solution for the task, due to its simplicity, flexibility, and the ease of use and management

Keywords: online library; electronic library; qualifying papers; student's scientific work; library web resource

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The relevance of the research topic lies in the significance of a qualification work as one of the most crucial means of enhancing the quality of specialist training. It is mandatory for each student and encompasses various forms of educational work, including writing scientific papers, performing practical and laboratory work, and undertaking independent tasks. As such, the storage and dissemination of these works among students, lecturers, and employers can help demonstrate the professional maturity of the graduate, showcasing their overall scientific, theoretical, and specialised training, as well as their ability to apply the knowledge acquired at the university to solve specific scientific and practical problems. This ultimately equips them for independent professional activity.

Libraries are experiencing a decline in popularity in the current era; however, this does not indicate a decrease in people's interest in reading. Given the current level of development and popularisation of information technologies, libraries must adapt to retain readers and actively encourage people to read. Consequently, online libraries have gained prominence, offering electronic copies of documents that can be easily accessed. The vast majority of these online libraries provide access to books, allowing readers to download or read them entirely or partially. The online library can rightfully be called the library of the 21st century, having established a network that connects it with the world through advanced electronic technologies. It is a social institution that aims to ensure equal access to information, provide quality information, and cater to educational information needs, all within an open, humanised, and informatised environment. Access to technical, social, and educational information is an integral part of the online library's offerings. We invite you to join the online library revolution, which provides the convenience of reading from anywhere in the world.

Analysis of research and publications

In developed countries, information holds paramount significance in the domains of production and consumption. It significantly influences the progress and outcome of various fields such as science, technology, and culture. The creation of online libraries is being actively pursued as they serve as a crucial addition to the digital learning environment. Many countries are working towards the development of electronic libraries, with the United States initiating the trend in the 1980s, followed by Great Britain in the early 1990s. Japan is currently executing the "Electronic Libraries of the 21st Century" project, while Germany is implementing the "Global-Info" project, among others (Mendel, 1999).

It is important to take note of global initiatives that aim to establish an online library, foremost of which is the "World Digital Library" project (2024). The World Digital Library (WDL) provides free online access to a vast collection of materials that represent the cultures of various countries in multilingual formats.

The "World Digital Library" has set forth its primary objectives as promoting international and intercultural understanding, expanding the number and variety of cultural content available on the Internet, providing resources for lecturers, scholars, and other interested individuals, bridging the digital divide within and between countries, and collaborating with partners possessing culturally significant collections and digitisation capabilities to enhance the site and broaden the range of available materials.

From 2006 to 2008, the "European Digital Library" project (2020) was implemented. The project aims to integrate the bibliographic catalogues and digital collections of the national libraries of Belgium, Greece, Iceland, Ireland, Liechtenstein, Luxembourg, Norway, Spain, and Sweden into European libraries. The main tasks of the project are to improve the multilingual capabilities of European library portals, to find effective ways of cooperation between European libraries and non-library cultural initiatives, and to expand the marketing and communication activities of European libraries.

Another global project is Europeana (2024). Europeana and the World Digital Library are separate initiatives. Europeana focuses on Europe and European collections within European libraries, archives, and museums. Institutions participating in the Europeana project are also invited to contribute to the World Digital Library project. Europeana offers access to digital resources from museums, European libraries, electronic archives, and audiovisual collections. This facilitates the development of open access and networking opportunities for users (Ivanova, 2011).

Creating an online library system is an invariable requirement of the era of transition of world society from industrial to information society. Only a plan to create and provide information resources for mass users based on the latest information technologies of the country can bring Ukraine to the level of advancement in the protection of digital heritage. There are thousands of online libraries and millions of electronic publications in the Internet environment. Several very interesting branch online libraries have appeared in Ukraine in recent years. One of such libraries is "Ukrreferat" (2024). There are the following main sections: Ukrainian abstracts, Ukrainian textbooks and questions and answers. Each section contains smaller subsections for convenient use of the library. Thus, the first two sections of the library are structured according to the alphabetical index by subjects. The main page contains Quick Document Search and interesting selections such as Most Popular and New Documents. Documents can be downloaded to a computer or read together on the website. The website also contains a separate section for users who did not find the necessary document and want to order work from specialists, the developers note that the work will be affordable and professional. Prices for services are indicated on the website.

Next, you should consider the website of the "Student's site" electronic library. The website contains course and thesis papers that can be downloaded only after payment has been made. The purpose of this library is to help students carry out their unique scientific research, and the works posted on the site guide them in the sequence of tasks. The menu contains the following sections: "Main page", "Courses and diplomas", "Our blog on the website", "Diplomas to order", "Search", "Recommend", "FAQ", and "Contacts". According to research areas, the "Course and Diploma" section contains 14 categories. After choosing the desired work, the user sees the content of the work, conclusions, and a list of used sources. To download a file with the full text of the study, you need to pay UAH 50, as indicated on the site's main page, a symbolic fee for secretarial services. The site also contains a separate section for users who did not find the required document and wish to order work. In the "FAQ" section, the user will receive answers to frequently asked questions, and by turning to the "Contacts" section, they can write a letter to the e-mail box. The evolution of libraries from conventional to electronic ones is an important step in building an information society. There are many such online libraries, their existence is now an integral part of everyone's life.

The purpose of the research is to develop an information resource for the placement of qualification papers of students of the Department of Social Communications and Information Activities (SCIA).

Presenting main material

One of the most important means of improving the quality of training and education of specialists in the "Information, library and archival studies" specialty is students' qualification papers. The gradual increase in the amount of knowledge, abilities, and skills that students acquire in the process of performing scientific work ensures the solution of such basic tasks as the formation of a scientific worldview, mastery of methodology and scientific research, the ability to solve practical tasks, and the skills of independent research work. Qualification papers of the Lviv Polytechnic National University include bachelor's and master's theses (Qualification Work, 2022). When writing the qualification paper, the branch standards of higher education of Ukraine regarding the training of specialists with the assignment of the educational qualification level "bachelor" or "master" are taken into account. Consideration and approval of scientific content should be unified and reflect the process of development and achievement of topic selection (Methodological guidelines, 2017).

It is worth noting that every work of a student, in the absence of plagiarism, is an object of copyright. Dissemination of works on the site is possible only with the consent of the authors, the scientific supervisor, as a general rule, is not a co-author of such works (Copyright on Scientific Work, 2021). Each qualifying paper posted on the created website must contain the follow-

ing information: name of the qualifying paper; information about the author (author's name, academic title); subtitle data (information explaining the title, type of publication, etc.); annotation; Keywords; information about the scientific supervisor (supervisor's name, academic title).

The master's or bachelor's thesis must be designed following the established requirements and saved in PDF format. Placing the full text will reduce time spent on searches if necessary (Shulzhenko, 2007). According to the need, you can consider 2 distribution methods: paid or free. In case of payment for the work, the buyer will be able to receive the full text of the qualification work only after making the payment. The creation of an online library of qualifying works of students of the SCIA department requires information modelling, which involves the use of diagrams, schemes, and graphs to describe the processes of the assigned task. The creation of models (informational and functional) will help to structure the available information and display each process for further execution. Formal problem model. The implementation of the process of creating an online library involves the development of a goal tree (Fig. 1), which demonstrates the division of the general goal into sub-goals, tasks, and individual actions. Creating an online library of qualifying works of students of the SCIA department is the general goal of the goal tree, which involves explaining the process of creating an online library at the department.

The overall goal of the goal tree is divided into three first-level goals:

1. Defining the main aspects of creating an online library, which demonstrates the process of preparing for the creation of a library.

The goal is divided into two sub-goals of the second level:

- Preparation of documentation support – collection of necessary documents without which the creation of an online library is impossible. The goal is divided into two sub-goals of the third level:

- Obtaining consent for publication – the student's consent to distribute their work to individuals. The means of achievement is a statement.

- Plagiarism check – the report of the qualification work check for academic plagiarism, the originality of the text should be at least 70%. The means of achievement is anti-plagiarism.

- Verification of compliance with the requirements for writing the QW – carrying out the review of the QW following the established requirements for writing the QW. The means of achievement are methodical guidelines for writing the QW.

2. Formation of a set of data on QW, which involves the collection of necessary data on qualification works.

The goal is divided into three sub-goals of the second level:

- Formation of individual data of qualification works – processing of data about QW, in particular

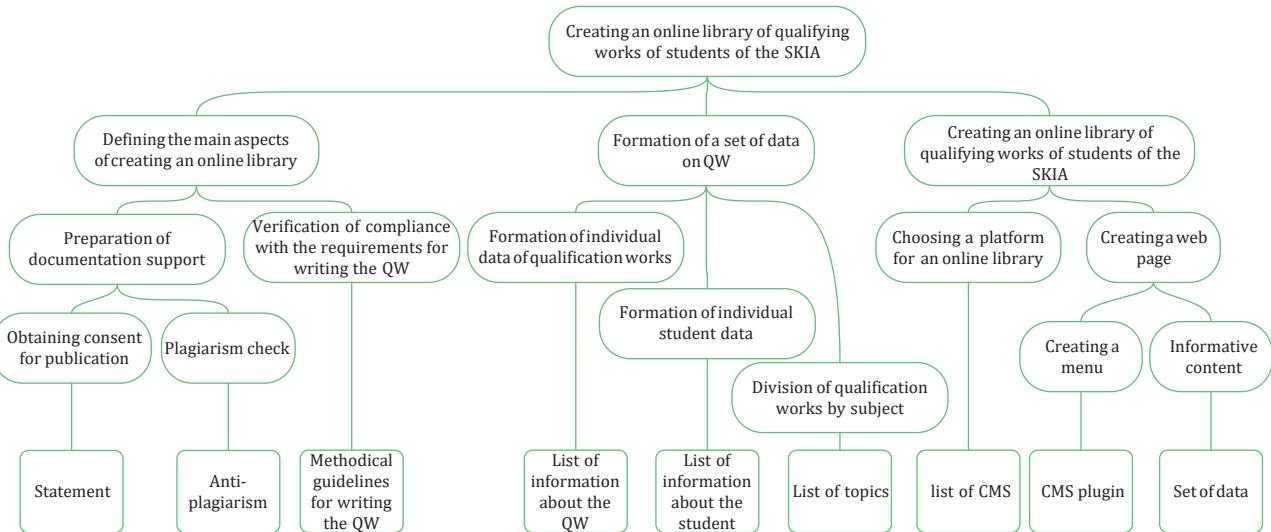


Figure 1. Tree of goals for creating an online library

Source: developed by the authors

topics, annotations, keywords, feedback, reviews, etc. The means of achievement is a list of information about the QW.

- Formation of individual student data – processing of data about the author of the QW. The means of achievement is a list of information about the student.
- Division of qualification works by subject – formation of lists of QW and division according to the research topic. The means of achievement is a list of topics.

2. Creating a library web page – filling and preparing an online library website.

The goal is divided into two sub-goals of the second level:

- Choosing a platform for an online library – analysing the existing management systems and making a

choice according to the needs. The means of achievement is the list of CMS.

- Creating a webpage – preparing a website for use. The goal is divided into two sub-goals of the third level:
 - Creating a menu involves creating a navigation in the online library. The means of achievement is a CMS plugin.
 - Informative content – dissemination of all processed data about the QW. The means of achievement is a set of data.

Information model of the problem. An entity-relationship model is a data model that can be used to describe conceptual schemas developed using common building blocks. For “Creating an online library of qualifying works of students of the SCIA department” the Peter-Chen notation was chosen (Fig. 2).

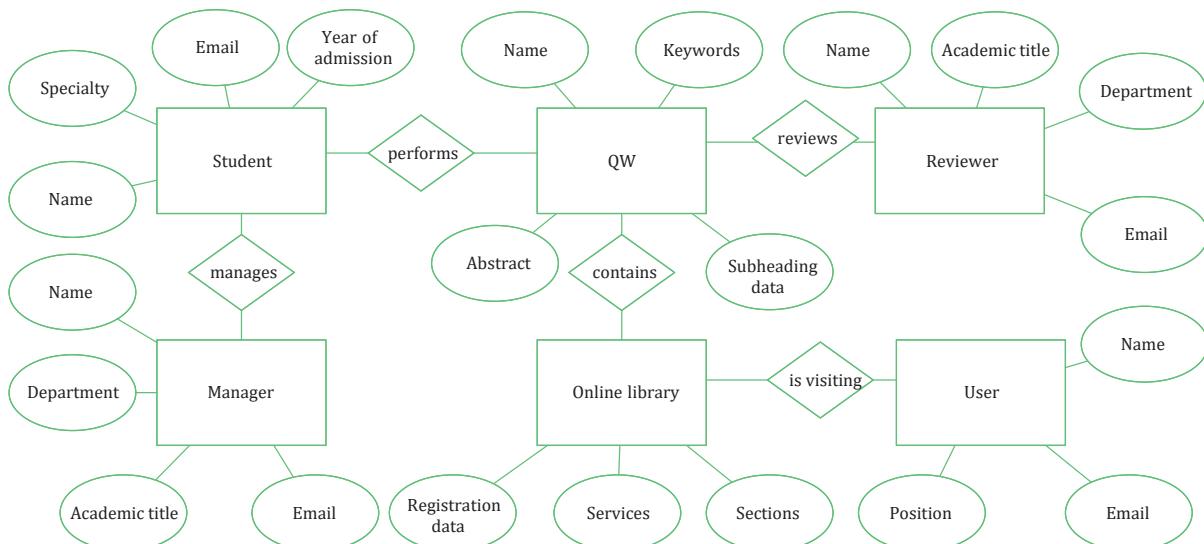


Figure 2. Information model in Peter-Chen notation

Source: developed by the authors

In the notation of Peter-Chen, the information model of the task contains 6 entities, displayed in the form of rectangles: "Manager", "Student", "QW", "Online library", "User", "Reviewer" and related links tongues displayed in the form of rhombuses. Each entity, respectively, contains attributes. "Student" – the author of the qualifying paper, which will be placed in the online library, contains 4 attributes:

- Name – surname, first name, and patronymic of the student;
- Specialty – the name of the specialty chosen by the student, where they studied during the period of writing the qualification work;
- Email – corporate e-mail address;
- Year of admission – the year of starting studies in the chosen specialty.

"QW" – research carried out by a student, designed following the requirements, contains 4 attributes:

- Topic – the name of the study;
- Keywords – a list of research keywords;
- Abstract – a short abstract of the research;
- Subheading data – information explaining the title, type of publication, etc.

"Manager" – the student's mentor during the qualification work, contains 4 attributes:

- Name – surname, first name, and patronymic of the manager;
- Department – the name of the department where they teach;
- Academic title – the academic title of the manager;
- Email – corporate email address.

"Reviewer" – a critic who reviews the qualification work, contains 4 attributes:

- Name – last name, first name and patronymic of the reviewer;
- Department – the name of the department where the reviewer teaches;
- Academic title – the academic title of the reviewer;
- Email – corporate email address.

"User" – a person interested in viewing or using the qualification work, contains 3 attributes:

- Name – last name, first name, and patronymic of the user;

- Email – corporate e-mail address;

- Position – place of work and position of the user.

"Online Library" – a website on which qualification papers are posted, has 3 attributes:

- Registration data – data of the user who sends a request to review the qualification work;

- Services – special features of the online library;

- Sections – pages of the online library.

Functional model of the problem. The data flow diagram (DFD) is a useful tool for modelling the functional requirements of a designed system. It helps in selecting the elements that collect information, that is, the data that carry an information flow in the system.

The context diagram (Fig. 3) provides an overview of the process of "Filling the online library of the QW" along with four external entities: "Secretary of the examination commission", "Manager", "Reviewer", and "Student". The student sends their qualifying work with all the data necessary for publication to the secretary of the examination board for verification. The secretary checks for errors and the presence of all necessary files. After that, according to the performed check, the secretary forms the result and sends a confirmation to the student. The supervisor sends feedback on the student's qualifying work for review. The secretary checks for errors and the availability of all necessary data. After that, according to the performed check, the secretary forms the result and sends a confirmation to the manager. The reviewer sends a review to the student's qualifying work. The secretary checks for errors and the availability of all necessary data. After that, according to the performed check, the secretary forms the result and sends a confirmation to the reviewer.

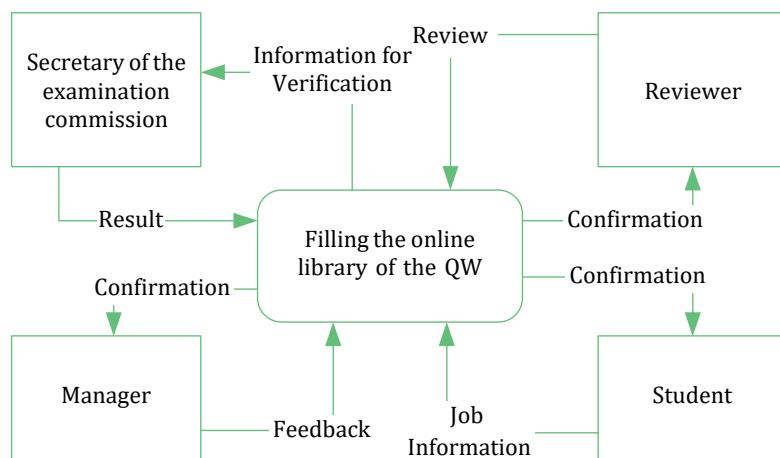


Figure 3. Context diagram of the process of "Filling the online library of the QW"

Source: developed by the authors

The next stage involves detailing the main process of “Filling the QW online library”, breaking it down into sub-processes. This results in the decomposition of the main function into sub-functions (Fig. 4). The input information includes “Data set about the QW”, “Feedback” and “Review” – necessary data to populate the online library. Accordingly, this information is processed in three processes: “1.1. Processing information from the student”, “1.2. Processing feedback from the manager” and

“1.3. Processing review from the reviewer”. At this stage, information received from external sources is prepared. From process 1.1. the information “Data set about the QW” is stored in the “QW” data repository. From process 1.2, information “Formed feedback” is stored in the “Feedback” data store. From process 1.3, information “Created review” is stored in the “Reviews” data store. These data repositories will store all the information received by the online library for further analysis and publication.

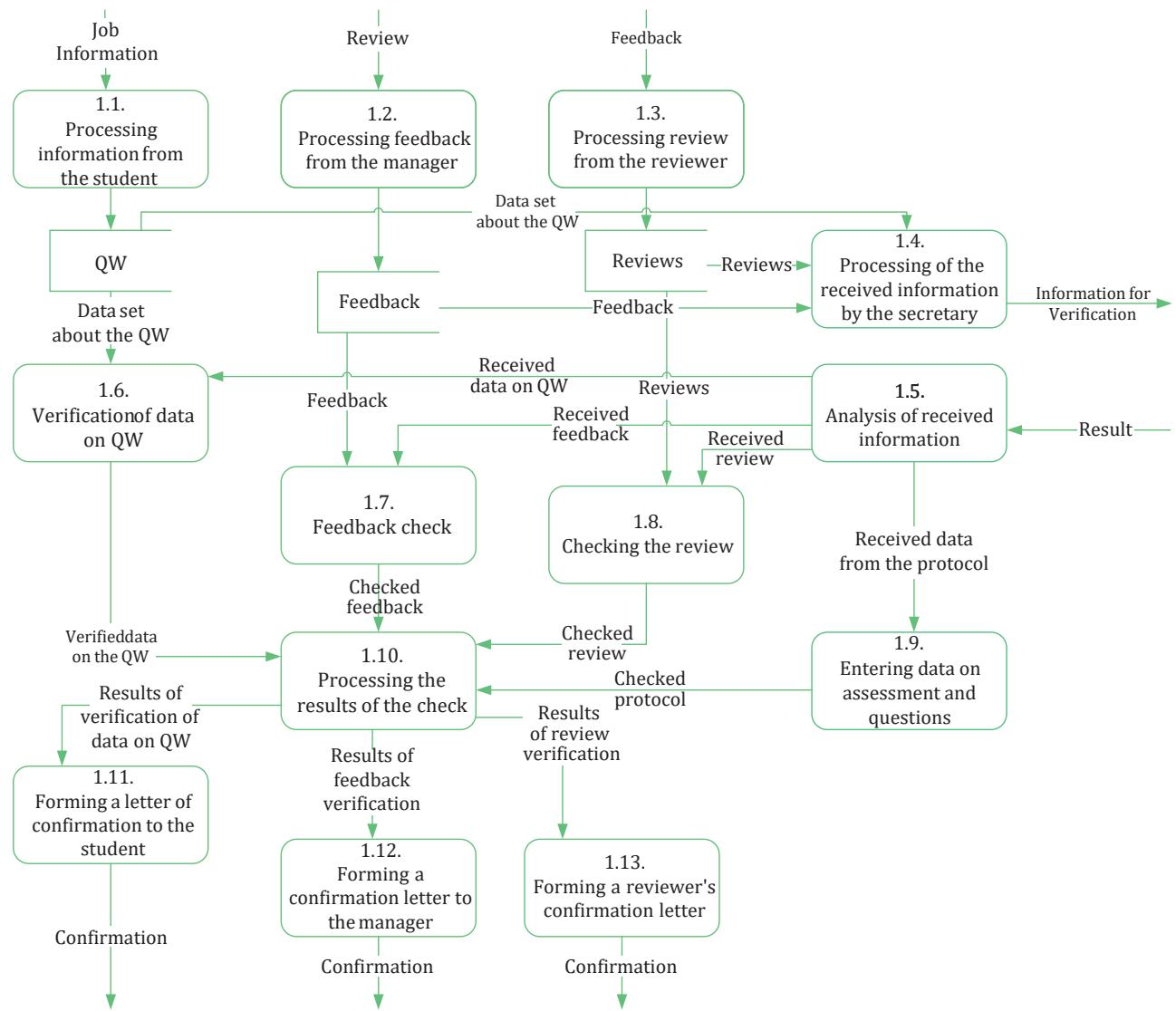


Figure 4. Detailing the main process of “Filling the QW online library”

Source: developed by the authors

From the above-mentioned repositories, three data flows into the process “1.4. Processing of the received information by the secretary” information about the “Data set about the QW”, “Feedback’ and “Review” are received. At this stage, all information about the qualification work is collected for further analysis. The output from the process is “Information for Verification”. Information about the “Result” of the check is included in the

process “1.5. Analysis of received information”, where the provided information is studied to identify errors or inconsistencies.

Information on "Received data on QW" together with information on "Data set about the QW" from the data repository "QW" is sent to the process "1.6. Verification of data on QW". Here, the received information is compared with the information from the data

warehouse. "Verified data on the QW" flows through the information flow to the process "1.10. Processing the results of the check", where compliance with the requirements for filling the online library of data on the QW is determined.

Information about "Received feedback" together with information about "Feedback" from the "Feedback" data store is sent to the process "1.7. Feedback check". Here, the received information is compared with the information from the data warehouse. "Checked feedback" flows through the information flow to the process "1.10. Processing of inspection results", where compliance with the requirements for filling the online feedback library is determined.

Information about the "Received review" together with information about the "Review" from the "Reviews" data store is sent to the process "1.8. Checking the review". Here, the received information is compared with the information from the data warehouse. "Checked review" flows through the information flow to the process "1.10. Processing of inspection results", where compliance with the requirements for filling the online review library is determined.

Information about "Received data from the protocol" is sent to the process "1.9. Entering data on assessment and questions", which involves recording information from the protocol in the online library. In the process "1.10. Processing the results of the inspection" is the formation of a general result on the data of the QW, feedback, and review. Three streams of information about "Results of verification of data on QW", "Results of feedback verification" and "Results of review verification" are respectively received in three processes, namely "1.11. Forming a letter of confirmation to the student", "1.12. Forming a confirmation letter to the manage" and "1.13. Forming a reviewer's confirmation letter". In these processes, letters are generated for the student, supervisor, and reviewer with confirmation and/or comments about the provided information. Output information from processes is "Confirmation".

An important stage in the creation of an online library is the organisation of its work, so it is necessary to consider this process in detail. The context diagram (Fig. 5) shows the process of "Organisation of online library work" and two external entities: "Administrator" and "User".

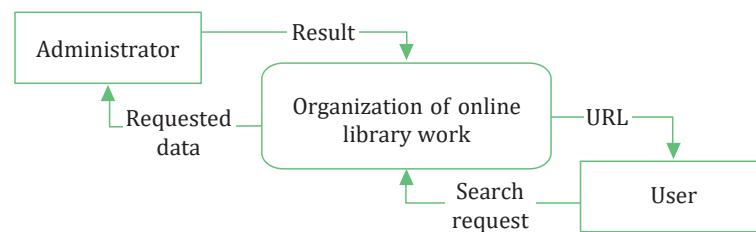


Figure 5. Context diagram "Organisation of online library work"

Source: developed by the authors

The user of the online library sends a search request, where they indicate all the necessary data about themselves and the qualification work. The administrator receives the requested data and forms the result according

to the processed data. The administrator generates a URL link containing the qualification work file and sends it back to the user. We will consider the details of the process of "Organisation of online library work" (Fig. 6).

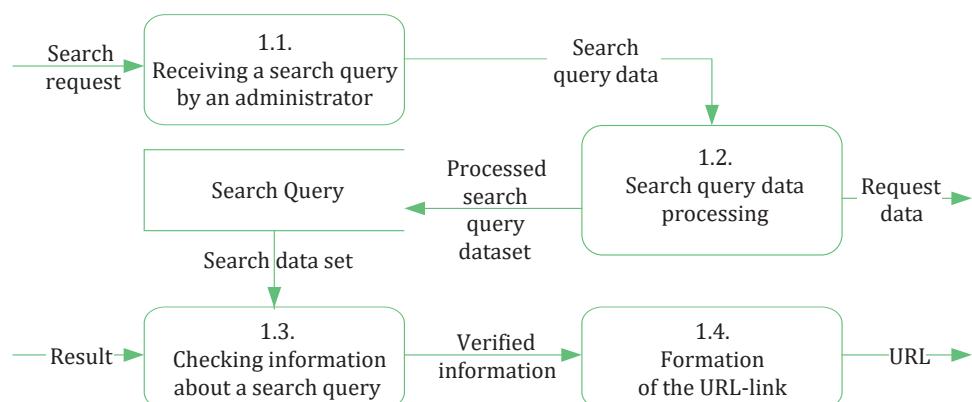


Figure 6. Details of the process of "Organisation of online library work"

Source: developed by the authors

Input information is "Search request" – a filled-in form with all the necessary information for processing. The information is included in the process "1.1. Receiving a search query by an administrator". "Search query data" is included in the process "1.2. Search query data processing", where the received information is processed. Information about the "Processed search query dataset" is written to the "Search query" data store. The output information from the process is "Request data".

After processing the search query in the process "1.3. Checking information about a search query" the data stream "Result" is received, as well as information from the repository "Search query" – "Search data set". Here, the received information is compared with information from the data warehouse. "Verified information" is included in the flow of information in the final process of "1.4. Formation of the URL-link". At this stage, the administrator creates a response letter for the user. The output from the process is a "URL".

Selection of technological solutions to the problem. The process of creating an online library of students' qualification works involves choosing a system in which all the necessary stages from creation to its further use will be implemented. Therefore, we need to determine which system is most suitable for this. The choice must be made based on the analysis of the data obtained during the construction of models of the given task, and it is also necessary to ensure compliance with the goals and tasks set. You can create an online library on the website of the CMS system. The content management system is software that allows you to create your website or other information resource. Today, such systems have a wide range of functions, such as plugins (extensions), each of which is responsible for its elements. To create an online library website, you need to choose from a variety of systems available, the most popular of which are Drupal, Joomla, and WordPress. After analysing three systems, CMS WordPress was chosen to create an online library of students' qualifying papers. The system is an ideal solution for performing tasks, as it includes simplicity, flexibility of use, ease of publication, the ability to manage users, and a Ukrainian-language interface.

Conclusions

The development and implementation of the project on the creation of an online library of student' qualifying papers made it possible to solve a number of important tasks, in particular, formal models of the process of creating an online library of students' qualifying papers of the SCIA department were created. A goal tree has been developed, the general purpose of which is to create an online library of qualifying works of students of the SCIA department. To achieve the set goal, a division was made into three first-level goals, which in turn are divided into smaller goals and sub-goals, each of which has an individual means of achieving the goal. An information model of the problem was built in the Peter-Chen notation, which contains 6 entities connected by connections. Each entity, respectively, contains its attributes. The notation presents the "Supervisor" (as the student's mentor), who manages the "Student" (the author of the qualification work). "Student" performs "QW" (study carried out by the student), which is reviewed by "Reviewer" (critic of qualification work). "QW" is contained in the "Online library" (website of qualifying papers), which is visited by the "User" (interested person). A functional model of the given task is provided in the form of context diagrams and detailed processes. The first context diagram shows the process of "Filling the online library of the QW" and four external entities: "Secretary of the examination board", "Manager", "Reviewer" and "Student". In the process of detailing the main process, it was divided into 13 sub-processes and displayed in the diagram. The second context diagram shows the process of "Organisation of the work of the online library" and two external entities: "Administrator" and "User". The detailing process contains 4 sub-processes shown schematically. The selection of technological solutions for the creation of an online library of qualification papers was made. Three systems for managing website content are considered, namely, Drupal, Joomla, and WordPress. After a detailed analysis of each CMS, WordPress was chosen as the ideal solution for the task, due to its simplicity, flexibility, and ease of use and management.

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