DIGITAL PLATFORM FOR THE MANAGEMENT OF INFORMATION PROVIDED BY THE NATIONAL RETROSPECTIVE BIBLIOGRAPHY OF ROMANIAN LITERATURE

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Rezumat: Sistemul SIMBNR este un instrument bibliografic de interes naţional, care oferă posibilitatea de acces on-line la informaţiile cuprinse în bibliografia naţională retrospectivă a cărţii româneşti, utilizând sisteme de baze de date şi tehnici multimedia. Pornind de la fondul de informaţii obţinute în procesul de digitizare al celor două tipuri de bibliografii - Bibliografia Românească Veche (BRV) şi Bibliografia Românească Modernă (BRM) - componente ale Bibliografiei naţionale retrospective a cărţii româneşti, SIMBNR este un sistem integrat destinat administrării, regăsirii şi valorificării acestui fond de informaţii culturale. Sistemul dispune de două componente principale: componenta de creare, încărcare şi gestionare a bazei de date bibliografice şi componenta on-line de regăsire după diferite criterii şi consultare a informaţiilor bibliografice.

Cuvinte cheie: platforma digitală, bibliografie naţională retrospectivă, BRV, BRM, baze de date, portal WEB.

Abstract: The SIMBNR system is a bibliographic tool of national interest, which enables online access to information contained in the National Retrospective Bibliography of Romanian Literature, using database systems and multimedia techniques. Based on background information obtained in the process of digitizing the two types of bibliographies - *Old Romanian Bibliography* (BRV) and *Modern Romanian Bibliography* (BRM) - components of the National Retrospective Bibliography of Romanian Literature, SIMBNR is an integrated system designed for administrating, retrieval and capitalisation of this cultural information fund. The system has two main components: one for creation, loading and management of bibliographic databases, and an on-line component, for retrieval, based on different criteria, and consultation of the bibliographic information.

Keywords: digital platform, national retrospective bibliography, BRV, BRM, databases, Web portals.

1. Introduction

Bibliography is "the thread designed to guide us along the maze of many writings", is "a universal language between libraries and scholars of scientific and literary world".

New information technologies, studied and theorized by the information and communication science make it possible to eliminate all barriers of space and time which saddle the use of information and to bring us much closer to the concept of global library.

Through the *i2010 initiative*, continued with the *2020 Digital Agenda*, there were envisaged the stimulation of European economic development, encouragement in creating digital content, improvement of preservation and expansion of public access to organized collections of digital material.

Creation of digital content has become a necessity in the information society. Undertaking this activity, in a coherent way, is one of the determining factors in an effort to impose Europe as "*the most competitive and dynamic knowledge-based economy*".

Romania, as an EU member state, can enrich the cultural collective memory with a valuable cultural and scientific heritage, offered to users worldwide, in a consistent manner, in accordance with European standards.

The library system in Romania, through its collections, infrastructure and computer system, through the specific services offered to users, represents the appropriate environment for implementation of the national policy for digitization, preservation, digital preservation and on-

line accessibility to information resources.

Capitalisation and dissemination of the information contained in the very valuable bibliography of Romanian literature, old and modern, required the creation of an on-line alternative to consult this information, using multimedia technologies in order to obtain a faster user access to it.

New digital technologies make the access, storage and transmitting of information increasingly easier and more accessible.

Any information can be accessed using built-in search engines, that allow easy retrieval based on a particular category, content or Web page.

Through a portal, information can be managed and accessed more easily; therefore, one can say that a portal is the first step towards a better management of information.

Portals are meant to guide users to areas that are interesting from everyone's point of view, and to manage the information more efficiently. They group together several services that make the research activity easier and more enjoyable; this is why we can acknowledge their presence in all domains.

2. Description of the SIMBNR System

The Integrated On-line System for the Management of the National Retrospective Bibliography - SIMBNR offers, for the first time, integrated access to a project of national interest that describes and systematizes texts that were printed in the Romanian territories, all books published in Romanian language, regardless of author and publishing location, and also, all works by Romanian authors, regardless of publishing language and publishing location, written during the 1508 - 1918 period, opening new ways for exploration of the national cultural heritage.

SIMBNR is designed as a relational database that manages descriptions and images of pages contained in the two bibliographies: Old Romanian Bibliography - BRV (1508-1830), elaborated by Ion Bianu and Nerva Hodos, which includes books published in Romania or elsewhere, the only conditions being to be written in Romanian, or by Romanian authors in other languages [6], and the Modern Romanian Bibliography (BRM), representing the 1830-1918 period, which chronologically continues the Old Romanian Bibliography, and includes works by Romanian authors, regardless of the publishing language or location (including translations from other languages), as well as, all books that were published – in their entirety or partially – in Romanian language, regardless of the author and the publishing location [7].

SIMBNR is in the same time, a free Web service providing integrated access to digital copies of documents contained in the two types of bibliographies, made available both on the Romanian Academy Library server, an institution holding the National Retrospective Bibliography, and also on a server of the National Institute for Research and Development in Informatics - ICI Bucharest, designer and developer of the system.

SIMBNR aims to create a clear, real and accessible on-line image of the National Retrospective Bibliography of Romanian Literature, a handy tool for professionals working in the field, but also within the reach of other researchers concerned with the history of Romanian science and culture.

3. Description of Digital Platform of SIMBNR System

Browsing of the national retrospective bibliography over the Web implies creating a Web-oriented system that will have at its core a client-server application called bibliographical platform or integrated on-line system.

A - Basic principles

The digital platform is a complex Web solution, integrating advanced technologies for saving and up-dating information, in order to interactively offer information to the visitors / users..

By platform we mean software and hardware environment in which programs are running. A computing platform [4] consists of:

- A computer network composed of a server and a number of workstations (depending on the platform type). Add to this the printer, scanner, microphones and headphones, as well as the equipment connecting to the Internet, and through it, to the communication Web portal;

- Software, consisting of the basic software needed to run the network and its connection to the Internet;

- Modules that provide users with effective and modern ways to access specialized information.

The platform consists of technical resources and software products that allow interconnection of existing support entities, which have information and ensure access to it over the Internet.

The platform must provide the following functionalities: application integration, management of roles and profiles, personalization, security, protection against the threats over the Internet, data exchange formats.

The main objective of the technological platform of the SIMBNR system is to sustain university and academic research communities in the field of bibliographical documentation, in order to coordinate and direct their research based on the principles of modern librarianship.

The SIMBNR technology platform is implemented as a Web portal [1], [2]. It offers registration, authentication and authorisation services, granting access to resources, securing and protecting information, according to the user's access rights

B - Hardware and software architecture of SIMBNR digital platform

In designing Internet applications a *client - server architecture* is used, because it allows effective implementation of Internet services.

The *client - server* technology is a way to separate an application into two distinct parts and an effective way of communication between modules.

The proposed architecture is open, flexible, extensible, scalable, based on open standards.

From the point of view of hardware, the SIMBNR system implies a platform comprising of a *server* (powerful and reliable computer that can work both as a database server and as a Web and application server) and a limited number of local stations for off-line data administration / processing.

The client - server architecture on three levels that we used in designing our system, emerged due to the complexity of applications that could be deployed for more than three users.

For implementation of the *server-side* at least one dedicated computer is required. The rough minimum requirements are: servers with Intel Dual Core processors over 2 GHz, 2GB RAM and available HDD storage space of at least 120 GB.

For implementation of the *client-side*, there are needed hardware platforms capable of running Internet applications in good conditions. The architectures required fit wide ranges from P4, 1.5 GHz with 1GB RAM (recommended). Interface should be designed for 1024x768. The optical unit is a DVD-RW. An Internet connection is needed (TCP/IP communication support).

In terms of software, the architecture of the SIMBNR technological platform is a multi-layer architecture, with three levels (three-tier), namely the data layer, the application layer and a layer that displays the data to the user.

At level 1, **the data layer**, we took into account using for data management the **MySQL** server, a reliable and quick, moreover an Open Source-type server, which provides portability of applications on different operating systems (Windows, Linux, UNIX, Mac OS X). Also, the MySQL server is equipped with mechanisms for data backup and restore, leaving it for the application developers to define a coherent and reliable strategy for periodically saving the data.

At level 2, **the application layer**, a **PHP** environment is used for software development, given the great degree of interoperability with other environments and the interfaces that it offers for all types of database servers. In addition, for scheduling certain functions we also take into consideration using **JavaScript** modules.

The application level makes the link between the data layer and the display layer, giving SGBDR a dynamic character. Is the layer where the following operations are completed: data processing, retrieval and storage of data into the database, formatting data for presentation, user management, data collection through on-line forms, files uploads, etc., management of resources made available to the application, execution of other applications resident on the same server or on remote machines, local and remote administration of the database.

Level 3, **the display layer**, provides the user interface. This is done using *HTML* (direct, completed with JavaScript or *PHP* applications). Style control for Web pages displaying information will be made through *CSS* (Cascading Style Sheets).

The main considerations that the configuration of the SIMBNR technological platform is based on were:

- the platform should fall within the usual range, and do not require expensive maintenance, training, etc.;

- it should allow installation and proper functioning of the required basic software;

- it should enable the expected functionality of the application, in terms of both speed and connectivity;

- it should ensure operational reliability and availability.

The minimum software requirements for implementation of the SIMBNR system are:

- for the database server: Windows 2003 Server / Linux OS, TCP/IP protocol, MySQL

- for the application server: Windows (2000, 2003, XP) / Linux OS, MySQL, Access 2007, Microsoft Visual Studio 2005

- for workstations running components of the database management software: Windows 2000/2003/XP OS, Internet Explorer, Mozilla, Firefox, Microsoft Office 2007

4. Components of Digital Platform of SIMBNR System

The functional architecture of the SIMBNR system takes into account a set of characteristics that define a modern and efficient system such as: modular structure, opened, flexible and

scalable, use of multimedia tools and Web technologies that allow on-line access to the bibliographical information [3].

The main functional components of the platform are:

- the administration module related to users' access rights to the content of the database;
- system's database;
- the component that displays the information stored in the database

A - Registration / authentication component

The system allows different levels of access (with selective access to information and functionality) based on user type.

The **SIMBNR** system offers a security mechanism, based on system administrator's definition of users' information access rights, in relation with the role they have inside the system.

The main categories of system users are: technical manager, manager of content, personnel that has the right to update the data on-line, regular user.

Access of the first three categories of users will be on basis of personal identification / authentication elements (user name and password).

Access to information is differentiated: full access - granted by the administrator to those working in the field - which implies that all system modules and sub-modules are to be updated in real time, and limited access - giving the user only the right to consult the information in the system.

In terms of management and data management, SIMBNR system users fall into three categories:

- *Content manager* - will be recorded in the system through an independent application by the system itself. He will have the following rights: free access to view the provided information, information structuring and completion, validation of users that require the right to complete information.
- *Authorized users* - have permission to access the database, to view and modify the data based on selective criteria.
- *Regular users* of information system - can only see the information contained in the database.

Right of access to the information provided by the **SIMBNR** system is determined by the system administrator. These rights are set when the user accesses the system's Web portal.

The system administrator will have access to all system resources both through a special Web interface where identifies himself with *username* and *password* and directly into the system (back-end).

B - SIMBNR system database

In the process of designing the **SIMBNR** system database we adopted a relational-hierarchical model for data management that would ensure:

- flexibility: changes in definitions of entities and relationships among them will not require significant changes in the database structure;

- scalability: there will be no performance issues when increasing the amount of data that is being processed;

- abstraction: the model has to provide data management for any Web application employed to publish information

Within the chosen model, relations of any degree are represented as a tree. All relations are stored in one database table, and relationship management interface is the same for all relationships regardless of their degree.

The **SIMBNR** on-line system for managing the National Retrospective Bibliography data, manages the "*simbnr*" metabase that consists of two components: "*brv*" - the database for the Old Romanian Bibliography, and "*brm*" - the database for the Modern Romanian Bibliography

The *"brv"* and "*brm*" components are relational-type databases, this model of organization enabling implementation of advanced functions for information management, search and display

The functional diagram of the **SIMBNR** system data metabase is illustrated in Figure 1.
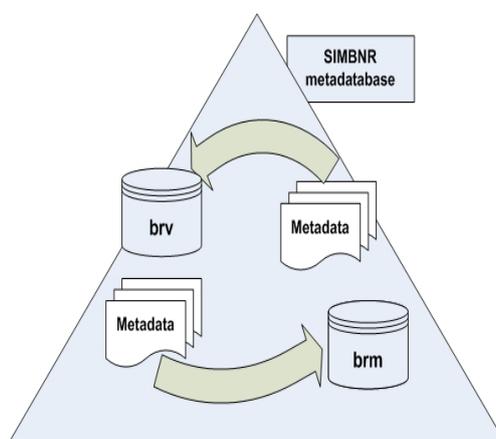
Figure 1. SIMBNR system data metabase.

The functional diagram of the **SIMBNR** system data metabase is an aggregation of the schemes of the two components. This will allow uniform management of the data contained in the two databases. Access to information will be quick and efficient from any location that has a computer connected to the Internet.

The Old Romanian Bibliography - BRV (1508-1830), elaborated by Ion Bianu and Nerva Hodos includes books published in Romania or elsewhere, the only conditions being to be written in Romanian, or by Romanian authors in other languages [6].

The work, of great scientific value, is completed with numerous historical and literary notes, references, information and observations concerning the existence of these copies in Romania, reproductions of high graphical quality of some fragments from the recorded works, dedications, forewords, epilogues, title pages and illustrations.

To highlight the content of this work and make it accessible for on-line consultation, the "*brv*"database contains three tables: *brv*, *brvcarti* (books) and *brvpagini* (pages).

They are in a 1→n relationship. The relationships between these tables are tree type (see Figure 2), set through the *IDvol → IDcarte → IDpagina* identifiers.
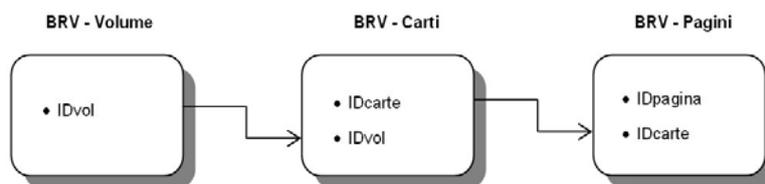
Figure 2. Relationships between tables - BRV

Following this structure, the *BRV* database offers to the end-users the possibility of conducting complex and rapid searches through the Old Romanian Bibliography.

The Modern Romanian Bibliography (**BRM**), representing the 1830-1918 period, which chronologically continues the Old Romanian Bibliography, and includes works by Romanian authors, regardless of the publishing language or location (including translations from other languages), as well as, all books that were published – in their entirety or partially – in Romanian language, regardless of the author and the publishing location [7].

The four volumes also include works of foreign authors living in Romania temporarily or definitively, which, through their activity, were integrated into the Romanian culture.

The work is organized in a single alphabetical series, comprising literature with entries by author, and also anonymous creations.

BRM is made according to ISBD (M) norms, mainly based on the book funds of the Romanian Academy Library. The 73,473 positions that exist in the volumes that compose the Modern Romanian Bibliography are organized alphabetically (according to the Latin alphabet even in the case of titles in other languages and alphabets) including both the works described according to the author as well as the anonymous ones described in the title (first word from title).

BRM is realized according to ISBD (M) standards, based mainly on book fund from the Romanian Academy Library. The 73.473 entries, comprising the Modern Romanian Bibliography are structured alphabetically (based on the Latin alphabet even for titles from other languages or alphabets), recording both, works by author and also anonymous works by title (the first word of the title).

Because the project allowed scanning and OCR-ing pages into **BRM**, the database corresponding to this bibliography will mainly contain, textual information grouped in tables: *Volume* (volumes), *Autori* (authors), and *Descriere* (description).

The relationships between these tables are tree type (see Figure 3), established through identifiers *IDvol* → *IDautor* → *IDdescriere*.
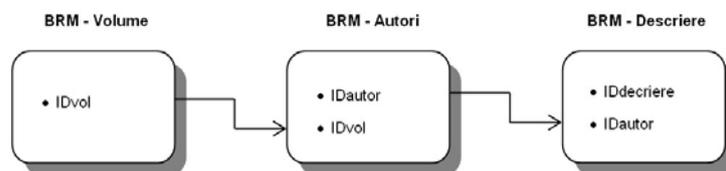

Figure 3. Relationships between tables – BRM

The only searching criterion into this bibliography is the alphabetical one, by author or the first character of the title, in case the author is anonymous, method that is being used in all major libraries throughout the world.

C - The component that displays the information stored in the database

In any Web application, the user interface is the component that allows the dialogue between the user and the application via an almost natural language, transmitting user requests to the

inference mechanism and processing results to the user.

The main goal of the user interface is to ensure a simple, logical and intuitive interaction, as user-centred as possible.

In designing and developing the user interface we took into account the following important requirements: usability, functionality, visual communication, aesthetic elements and accessibility.

To implement these requirements, Web application developers must use a series of standards. Web standards allow uniform access to information for all users and also provide rapid Web development.

The use of standards to design and construct Web applications ensures that they can be easily adapted to future changes of the Web. In addition, these standards allow a separation between content and display, with implications regarding accessibility.

In designing the user interface for the **SIMBNR** [4] system, we took into account that it should be unitary and ergonomic, easy to understand and intuitive to use, allowing the user easy access to databases and information and needing only minimal computer skills.

The Web interface of the **SIMBNR** system will allow users to communicate with the application, using for this various graphical objects on the screen - windows, buttons, check boxes, context menus, etc. - which will be operated using the keyboard or the mouse.

Web interface pages of the SIMBNR system are structured into four distinct zones (see Figure 5):

- **Zone 1**: contains the header page;

- **Zone 2**: contains the main menu list and the search module;

- **Zone 3**: dynamic content zone, depending on the selected option;

- **Zone 4**: contains the page footer that shows information on terms and usage conditions, copyright or XHTML standards
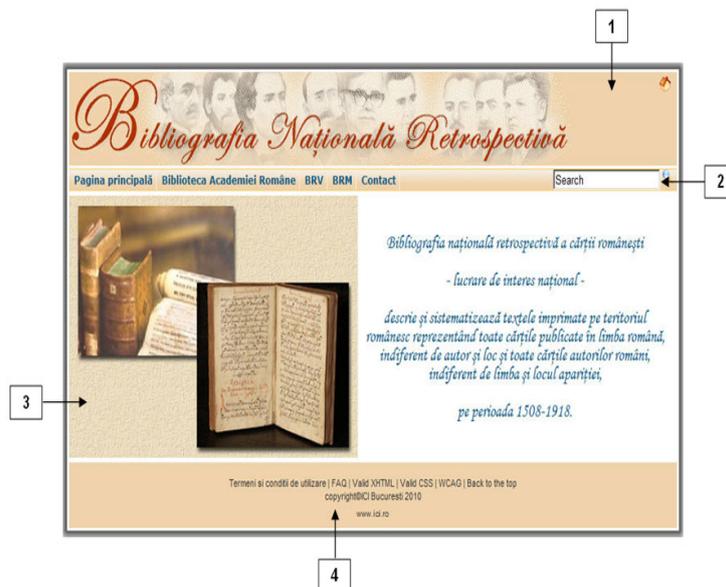

Figure 4. Main page structure of system interfa*ce*

1) Web Interface For Brv

To display the information contained in the *"brv"* database there were designed three types of Web pages.

BRV homepage contains a brief description of the four comprising volumes. The format of this site is presented in Figure 5.

Figure 5. BRV Home page

By activating the link corresponding to a **BRV - Vol. I**, it is opened the **second type of page** in which there is displayed, in order of occurrence years, a range of information about the books printed during the period 1508-1717 presented in a tabular form which has the following structure:

By activating the BRV – Vol. I link opens a second-type page which displays ordered by year of publication, information on books printed during the 1508-1717 period; they are presented in tabular form with the following structure:

Book No.	Year	Book	Language	Place

The information is displayed in subsequent pages, 10 records per page, with the possibility of navigating "previous - next" among pages.

The **third type of page** was designed to allow users to view and navigate through pages of a book, selected from the list above.

Thus, Zone 3 of such a page is divided into two columns: the *first column* contains icons of pages from the selected book, and the second column shows the complete picture of the contents of a selected icon.

2) Web interface for BRM

The structure of the Web interface that displays information contained in Romanian Modern Bibliography (BRM) is similar to the structure of Web Interface for BRV. Thus, it includes three types of pages designed for:

- a brief description of the four comprising volumes;
- displays the alphabetical index of authors;
- display of bibliographic description corresponding to a selected author

The format of the first page (brief description of the four comprising volumes) is shown in the figure [6].
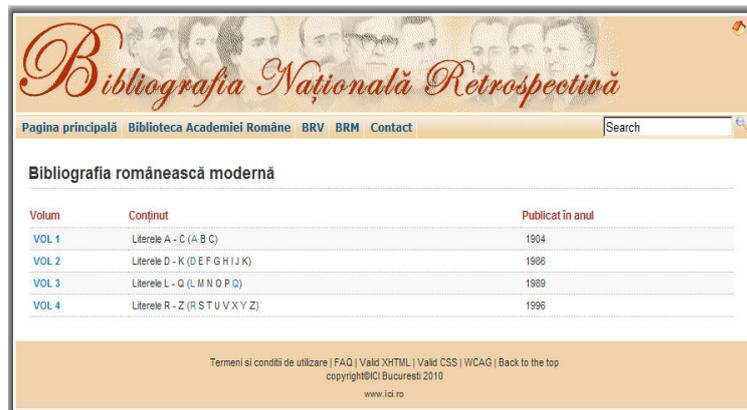
Figure 6. BRM Home page

Activating the link corresponding to a letter, e.g. **A**, opens the **second-type page** (displays the alphabetical index of authors). The **third-type page** displays the bibliographic description corresponding to a selected author.

3) The Search module

The search module is the implementation of the most important feature of the SIMBNR site. This allows two types of searches: *simple search* and *advanced search*

The *simple search module* allows rapid search in the BRV database by "*work title*" (the title of one single work), and in BRM database by "*author name*" (name of one single author). These two operations are executed independently of each other, the user sending the inquiry by activating one of two buttons: **Search title in BRV** or **Search author in BRM**

Figure 7. Simple search in „brv" and „brm"

The system requires the completion of at least one criteria field. When initiating a search without completing criteria fields, the system returns error messages.
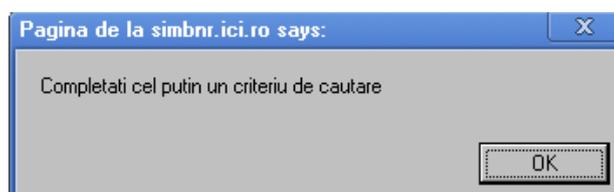
Figure 8. Error message

The search criteria in the advanced search module are:

- *Period of time* - allows searching works published in one year or during a period of years. The system does not allow invalid filling of year's data and warns through error messages.
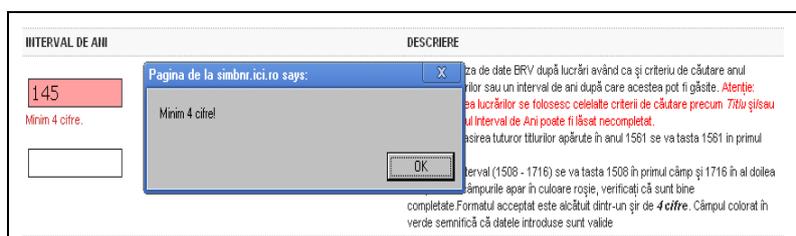
Figure 9. Error message when filling in erroneous years

- *Title or Author* - allows searching by one of these criteria in the "BRV" database. The "Author" criterion in this section does not apply to the "**brm**" database.

- *Publishing place* - is a drop down list that allows searching by publishing place certified by historical records, or searching by the suspected publishing place, the latter being followed by a question mark.

- *Language* - is a drop down list that allows searching for works based on the language they were published

The "BRV" advanced search module (Figure 10) allows a refinement of search results according to several criteria, yielding more accurate results.
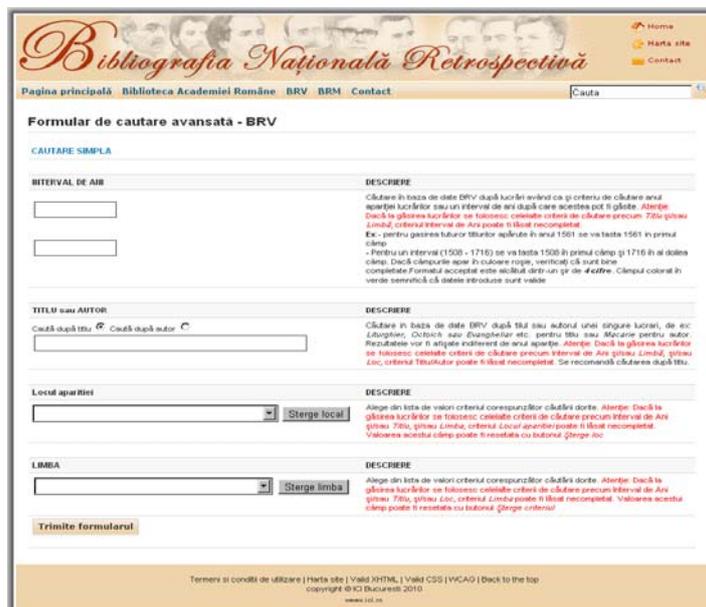

Figure 10. Advanced search in database„brv"

5. Conclusions

The main objectives of the On-line Integrated System for the Management of the National Retrospective Bibliography of Romanian Book were:

- Saving of the written cultural heritage by transferring it onto electronic media, reducing direct physical access to the original papers and performing of special works for restoration, conservation and preservation;

- Providing open access to all digitized national written heritage, using this heritage in cultural, education and research activities;
- Capitalizations of documents from the national written or printed heritage.

The main functions of the Web platform for conservation and capitalisation of information from the Romanian National Library refer to:

- Information management (gathering information, processing information, storing, delivering information to the user in a useful and attractive manner);
- User management (registration, granting access rights, personalization, interactivity, securing private data);
- System administration.

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