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**SECTION 4. Computer science, computer engineering and automation.**

## DEVELOPMENT OF ELECTRONIC LIBRARY OF OPEN ACCESS TO SCIENTIFIC AND EDUCATIONAL RESOURCES FOR THE VILLAGES OF ORENBURG REGION

**Abstract:** *The work shows the urgency of creating open scientific and local lore electronic libraries both for the Russian Federation in general and for the Orenburg region in particular. Technical features of the development of an open electronic library of a regional scale are described: the requirements for the selection of hardware and software are defined. The platforms Dspace, EPrints, Greenstone are considered. The choice of the Dspace platform for the development of an open electronic library of scientific and educational resources for the villages of Orenburg region is substantiated.*

**Key words:** *Dspace, electronic libraries, local lore materials, village library.*

**Language:** *English*

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### Introduction

The creation of open scientific and local lore electronic libraries has become one of the central directions of information industry development and a priority task for the Russian Federation as a whole and for the Orenburg region. In the whole world, millions of documents and other products of intellectual activity are digitized and organized in the form of public electronic resources.

### Materials and Methods

Open electronic libraries are widely used, and their number is growing rapidly. Currently, there are more than two thousand public repositories around the world. One of the most famous of these is the Registry of Open Access Repositories (ROAR) [1], owned by Southampton University (UK). In the Russian Federation there are 21 electronic libraries of open access, including the electronic library of the OSU. Despite this, among them there is not a single electronic library of regional scope providing free access to modern scientific and educational resources and resources of local lore for residents of small towns and rural areas.

The open electronic library of scientific and educational resources for the rural areas of the Orenburg region [2] should provide access to information and knowledge for the population of the rural areas of the Orenburg region, create favorable conditions for the growth of publicity, status and public significance of rural libraries by presenting electronic resources on the Internet in real time.

The development of an open electronic library of regional scope imposes certain limitations and makes special demands on the choice of hardware and software.

Thus, the purpose of this work is to describe the technical features of developing an open electronic library of regional scope by the example of an open electronic library of scientific and educational resources for rural Orenburg region.

As the hardware and technical equipment for the implementation of the open electronic library of scientific and educational resources for the rural Orenburg region, the optimal server configuration was selected (Table 1).



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**Table 1**

### Server Features

Device	Characteristic
Platform	Supermicro with rack-mountable (2U), or on the floor
CPU	2 processors IntelXeon E5-2620 v4 (2.1GHz, 20M cache, 8 cores)
Memory	RAM DIMM DDR4 (2133) to 16GB (only 32GB)
Disk space	4 hard drives with a capacity of 2TB each (only 8TB)
RAID controller	RAID controller with support for levels 0/1/10/5/50
Drive unit	DVD-RW drive
Net	3 LAN 1Gbps

The chosen server configuration is the optimal ratio of price and quality, and also allows to fully meet the necessary requirements for hardware and hardware for the next 7 years, namely:

1) Supermicro platform, 2 IntelXeon E5-2620 processors, as well as 32 GB of RAM allow to withstand tens of thousands of page views per day, while ensuring uninterrupted download of digital content;

2) 4 hard drives with a total capacity of 8TB, as well as a RAID controller with support for levels 0, 1, 10, 5, 50 will allow to organize an effective data storage system, which in case of failure of any of the hard disks will allow hot swapping of the disk without data loss;

3) DVD-RW drive will allow to install the necessary software (software) from disks;

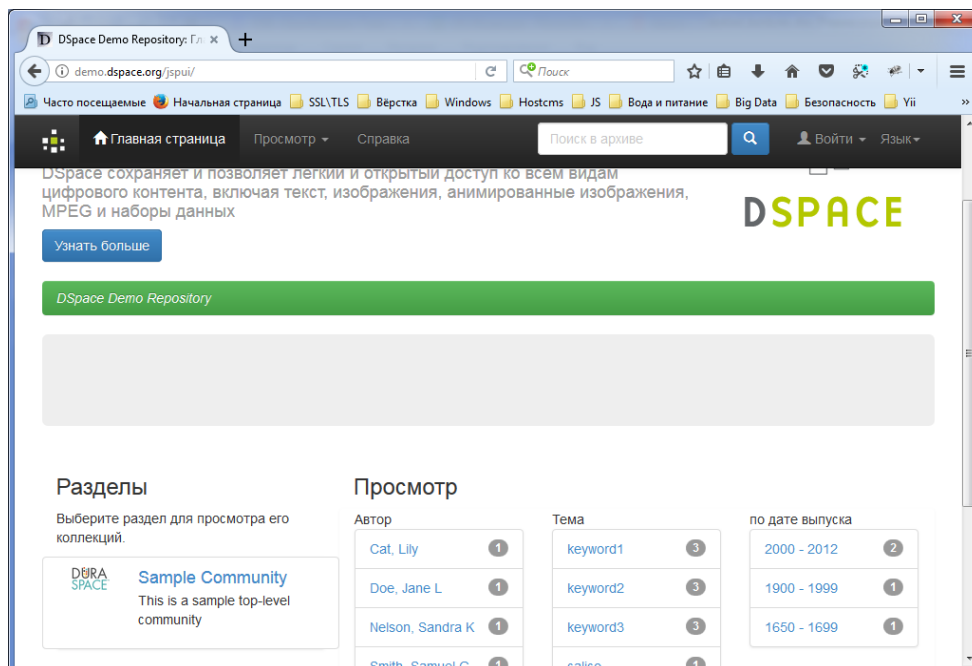
4) 3 network connectors will allow you to organize the necessary network configuration with a bandwidth of up to 1Gbit / s with the ability to access the server through a dedicated channel for recovery.

An interactive uninterruptible power supply will allow to organize the uninterrupted operation of the server in the event of an unexpected power outage for up to 1 hour.

As a virtualization system, the VMWare ESXi 6.0 hypervisor was chosen [3]. The selected software allows you to organize and flexibly configure the necessary virtual network, is highly reliable, and also has a free license.

As the operating system (OS), Ubuntu 14.04 was chosen [4], since this OS is distributed under a license that does not require financial expenses, it has extensive documentation on the Internet and great support for the network community. This OS has proven itself the best way when working with the servers of Web applications Apache and Tomcat.

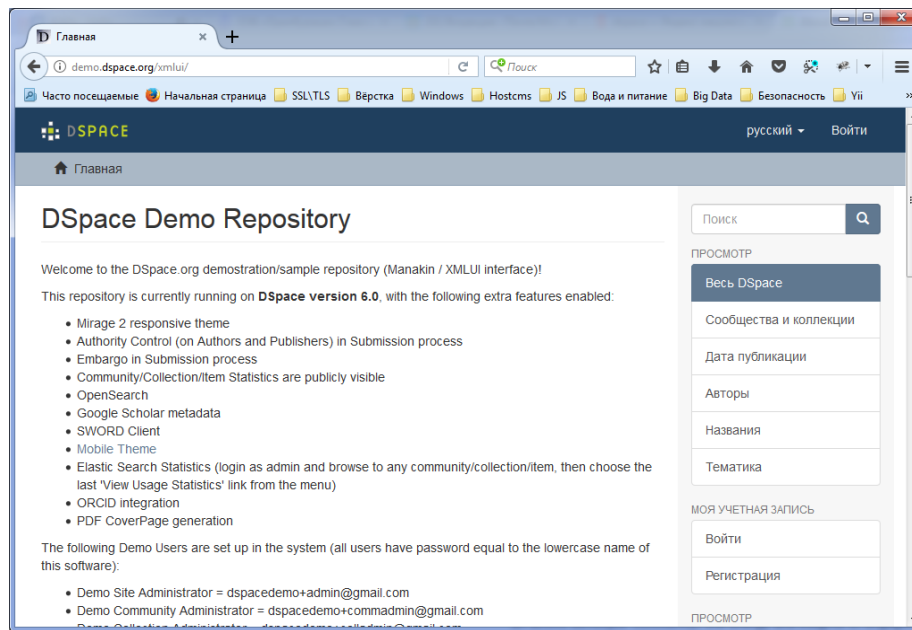
As a software platform for creating an open electronic library of scientific and educational resources for rural Orenburg region, the Dspace platform was chosen [5]. The appearance of the web application Dspace (jspui) is shown in Picture 1 (jspui) and Picture 2 (xmlui).



**Picture 1 – Dspace (jspui).**

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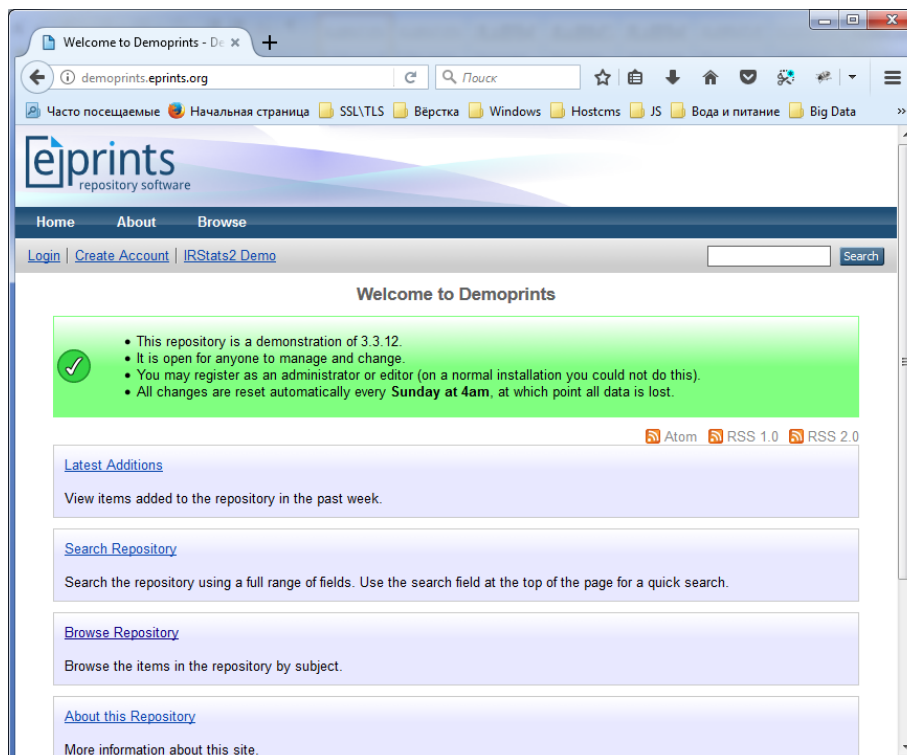
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Picture 2 – Dspace (xmlui).

In addition to Dspace, such platforms as EPrints [6, 7] and Greenstone [8, 9] are common. The Dspace platform has several advantages over other platforms designed to create open archives of electronic publications. For example, in Dspace, unlike EPrints, there is a more elaborate system of partitions and collections. As weaknesses of the

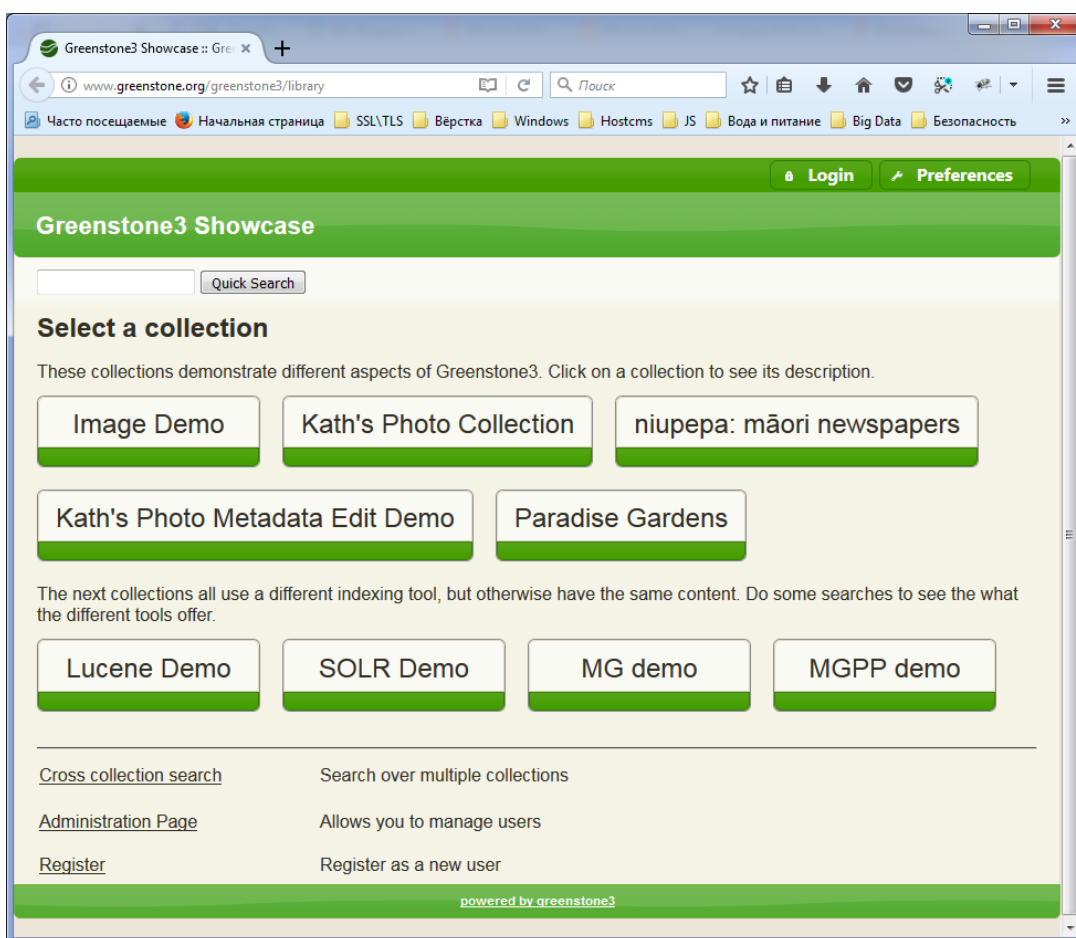
Greenstone platform, it is possible to distinguish bad conversion of mathematical texts into the internal format of Greenstone, as well as the need to recompile the source code in case of making significant changes to the platform code. The appearance of EPrints is shown in Picture 3, the appearance of Greenstone is shown in Picture 4.



Picture 3 – EPrints.

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Picture 4 – Greenstone.

For the functioning of Dspace, the following companion software was installed:

- JAVA 8;
- DBMS PostgreSQL 9.6;
- Tomcat 7 web application server;
- Nginx proxy server.

DSpace functions as a centralized service [10]. Different libraries can have their own separate areas within the system. Registered employees of libraries can directly contribute content through the web user interface, which is designed so that making an entry is as simple as possible. Alternatively, the system provides for importing a plurality of items for batch downloading of content. In each library, you can also assign people who can view and edit contributions before they are included in the main repository. DSpace then indexes the metadata that comes with the electronic document, and makes them available according to the access privileges defined for the particular library.

DSpace supports a large number of different file formats: AdobePDF, AIFF, audio / basic, BMP, FMP3, GIF, HTML, image / png, JPEG, LaTeX, MARC, Mathematica, MicrosoftExcel, Microsoft

PowerPoint, Microsoft Project, MicrosoftVisio, MicrosoftWord, MPEG, MPEGAudio, PhotoCD, Photoshop, Postscript, RealAudio, RTF, SGML, TeX, TeXdvi, Text, TIFF, VideoQuicktime, WAV, WordPerfect, XML, and others.

In Dspace, the export and import functions are implemented with the help of transition plugins. These are program modules that translate between the metadata of DSpace objects and a specific external view. Typically, this pair of plug-ins for import and export. For example, from the MODS metadata format to the internal format of DSpace and vice versa.

DSpace has an advanced system of rights for the user. Many DSpace functions, for example, browsing and searching documents on the system, can be performed anonymously, but you need to register to perform the documents submission to the user.

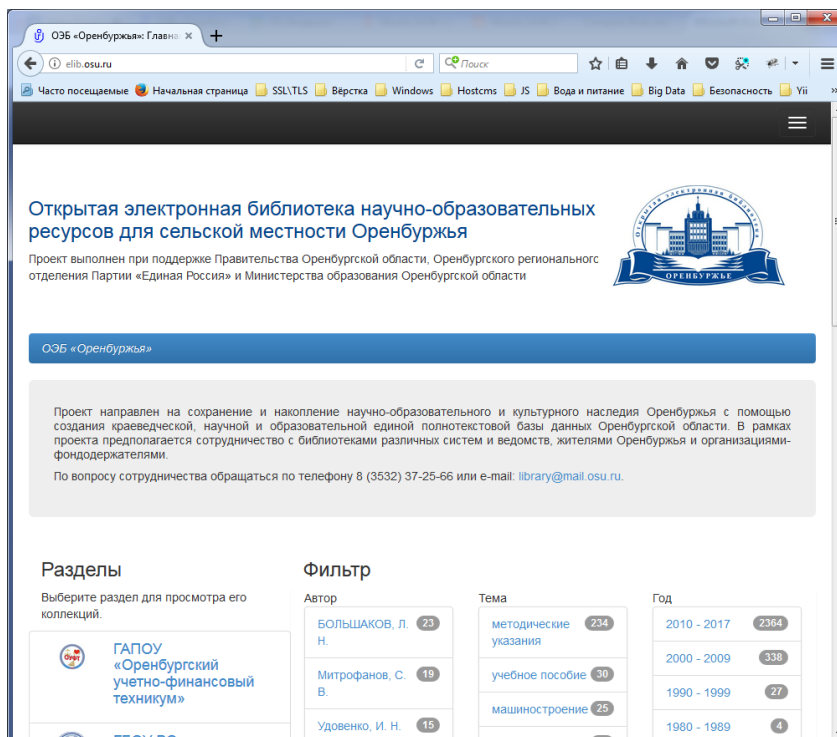
The appearance of the open electronic library of scientific and educational resources for rural Orenburg region on the basis of the Dspace platform is shown in Picture 5.

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Picture 5 – Electronic library of open access to scientific and educational resources for the villages of Orenburg region.

### Conclusion

Thus, in this paper, the technical features of the development of open electronic library of a regional scale are described using the example of open access

to scientific and educational resources for the villages of Orenburg region. The choice and justification of hardware and software, as well as other features of the development, were made.

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