

Web Application DYAC

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Abstract

DYAC is a web application that uses some theoretical notions from the linguistics of documentation and the scientific documentation. For the development of the software, we used the Yii2 framework and the database engine with GNU / GP open code license MariaDB. In 2018, the Universidad del Azuay (UDA) signed an agreement for Scientific and Technological Cooperation between seven Universities of Latin American; for that reason, the LIDI team of researchers from the Universidad del Azuay, as a contribution to the aforementioned agreement, proposes the development of the application for DYAC Scientific Documentation and Archives. The objective is design and develop the web application to store, and publish research files. A systematic literature review identified eleven websites, which allowed determining the most relevant and significant attributes to model in the design of the database of the web application. We combined the methodologies GORSHCHEK, SCRUM, and OOHDM. The most results show that DYAC has application administrator, researcher, registered user and visiting; in its structure, the application evidence of two sub-applications: the Backend and the Frontend web application. Finally, there is a strong commitment to socio-diversity, cultural diversity and linguistic diversity. Documentation and scientific archives take on importance.

Keywords

Web application, scientific archive, scientific documentation, research publications and digital repository

1. Introduction

1.1 Theoretical framework

To build this theoretical framework, we merged some notions from the linguistics of documentation and scientific documentation. To develop the software, we incorporated features from the Yii2 framework and the MariaDB server with GNU / GP open license code.

According to Himmelmann (1998), linguistic documentation is a constant and multifunctional record of a language in which the creation of a corpora facilitates the analysis of different semantic, syntactic, discursive, anthropological, pragmatic, and sociolinguistic features of a language over the years. Also, Himmelman states that documentation, as a field of research and linguistic activity, is considered as the final objective and not only as a procedure that belongs to the linguistics investigation. On the other hand, Baiget (2007), describes scientific documentation as the activity that collects and stores knowledge to facilitate its retrieval; in this way it contributes to the preservation of knowledge over time. Bird and Simons (2003) point out that the information obtained through research processes can serve several purposes, among them, its storage on platforms and websites in multiple electronic formats, in which documentation and digital preservation play an important role in keeping resources (files of different formats) over time.

The information collected in documents is known as documentation or as data file. Documentation is recognized as a tool for descriptive linguistics whose objective is to store and maintain writings and primary information of linguistic, anthropological, archaeological, and humanistic research (Verdugo et al. 2020).

On the other hand, the Yii2 software development tool is a framework based on the open-source PHP programming language made of high-performance components that allow the creation of all types of web applications on a small or large scale (Gudiño Quinteros, 2019). Some of the advantages of Yii2 include the software design pattern known as Model-View-Controller (MVC), ease of connection to relational and non-relational databases, usage patterns consistent with practices from other PHP frameworks that facilitate learning, and extensibility to expand functionality to the framework (Framework, 2020). However, as a disadvantage, to use MVC the developer may need to learn its operation and functions, which will require an additional effort and considerable time. Nonetheless, Yii2 provides features, such as Yii2 templates, to help developers use the framework and simplify the process. On the other hand, a great advantage of Yii2 is that it is based on PHP, a widespread programming language for the development of web applications that ensures access to documents and sites, which will reduce the learning curve of the language, and thus, of Yii2.

MariaDB is an open-source GNU / GP database engine derivative of MySQL. This software is fast, robust, and offers wide scalability between applications. MariaDB is implemented as a relational DB and provides an SQL interface to access stored data. It also includes GIS and JSON features.

1.2 Objectives

The objective of this project is to design and develop the web application "Scientific Documentation and Archives" to store and publish research files.

1.3 Background

In 2018, the Universidad del Azuay (UDA) signed an agreement for Scientific and Technological Cooperation between CONICET Argentina, the Peruvian Amazon Research Institute, the University of Chile, the National University of Formosa, the Center for Anthropological Studies of the Catholic University of Paraguay, the National University of San Juan, Argentina; and the Pontifical Catholic University of Peru to contribute to the documentation, preservation, and dissemination of linguistic and cultural heritage. As a contribution to this project, the team of researchers from the Universidad del Azuay offered to develop an application for DYAC Scientific Documentation and Archives.

2. Literature Review

We analyzed eleven websites, whose results are described in the following paragraphs, to understand their scope and to identify the initial requirements to develop the web application. Two of these websites stand out because of their level of standardization and the structure of their data: DILA-CONICET and the Archive of the Indigenous Languages of Latin America (AILLA), which show a categorization of a collection.

The DILA Archive Digital Repository preserves collections of documents and primary data from research on linguistics, anthropology, and history, among other disciplines of social sciences and humanities. DILA defines a collection as research conducted on any subject. In turn, a collection includes all documents obtained through the investigation process and classifies them into audio, video, photographic material, graphic material, and text (CAICYT - CONICET: Repositorio Digital Archivo DILA, 2019).

The Archive of the Indigenous Languages of Latin America (AILLA) is a repository for the preservation of languages through recordings, texts, and other multimedia materials in and about indigenous languages of all Latin America. Its mission is to preserve these materials and make them available to all interested users (The Archive of the Indigenous Languages of Latin America, 2020).

Ethnologue (2020) is a website geared to describing the world's languages by giving thorough specifications of each. At first, this website presents a list with all the available languages arranged alphabetically.

The SOAS digital repository of the University of London (2020) offers a free database with the results of research carried out by their own faculty members and doctoral students. This site presents classified information into three categories: latest research, most popular research, and the latest SOAS thesis.

The Academic Repository of the University of Chile (2020), displays theses, journal articles, and books from their university. The repository presents these documents classified by author, subject, date, and discipline.

The IIAP repository aims to gather, describe, preserve, and disseminate digital publications resulting from the research projects carried out in the institution. It covers topics such as biodiversity, the ecosystem, and the Amazonian populations of Peru (Instituto de Investigaciones de la Amazonía Peruana: Repositorio Digital, 2020).

The editorial of the National University of Formosa presents the publications as news; that is, it does not present a description of the publication as such, but directly its content (Editorial de la Universidad Nacional de la Formosa, 2020).

The Paraguayan Studies Magazine (CEADUC-UC) is an open-access indexed portal of scientific nature that presents scientific social studies on Paraguay. However, it accepts articles on multiple topics of a philosophical, sociological, historical, pedagogical, and political nature, among others. Its publications are addressed to researchers, teachers, and students of social sciences (Centro de estudios Antropológicos: Revista Estudios Paraguayos (CEADUC-UC), 2020).

The Pontificia Universidad Católica del Perú (2020) PUCP directory of researchers presents a list of academics that belong to the Catholic University of Peru.

The UDA Institutional repository aims to preserve and give visibility to the academic and scientific content produced in the institution. Additionally, this repository is indexed by various harvesters, including RRAAE, La Reference, and REDI. This repository presents publications classified by graduation projects, thesis, and publications; in addition to classifying them by author, title, release date, and by publications that contain a multimedia file (Universidad del Azuay: Repositorio Institucional de la UDA, 2020).

The page “Essentials of Language Documentation” includes multimedia materials for distribution. The first page in this site presents a list of titles and their links to multimedia files (Department of Empirical Linguistics: Essentials of Language Documentation, 2020).

After analyzing the most significant properties from the eleven websites, the main candidate attributes were selected to be included in the design of the data base for the application “Documentation and Scientific Archive,” as can be seen on Table 1.

Table 1. Candidate attributes

Attributes	C AI C YT - C O NI CE T: Re po sit ori o Di git al Ar chi vo DI LA	Th e Ar chi ve of the Ind ige no us La ng ua ges of Lat in A me ric a	Et hn olo gu e: La ng ua ges of the W orl d	SO AS Un ive rsit y of Lo nd on	Ac ad em ic Re po sit ory of the Un ive rsit y of Ch ile	Re sea rch Ins titu te of the Per uvi an A ma zo n: Di git al Re po sit ory	Ed ito rial of the Na tio nal Un ive rsit y of Fo rm osa	Ce nte r for An thr op olo gic al Stu die s: Par ag ua ya n Stu die s Ma ga zin e (C EA D U C - U C)	Po nti fici a Un ive rsi da d Az ua y: Ca tóli ca del Per ú: Dir ect ory of PU CP res ear ch ers	Un ive rsi da d del Az ua y: Ins titu tio nal Re po sit ory of the U D A	De par tm ent of E mp iric al Li ng uis tic s: Es sen tial s of La ng ua ge Do cu me nta tio n
Title	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Author	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ID	✓	✓	✓	✓	✓						
Place	✓	✓		✓							
Keywords					✓	✓				✓	
Relation	✓										
Cited by	✓								✓	✓	
Source Type	✓	✓		✓	✓	✓		✓	✓	✓	✓
Domain	✓	✓				✓					
File type	✓										
Language	✓	✓	✓								
Editor	✓									✓	
Rights	✓										
Source	✓										
Support	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Collection	✓	✓			✓					✓	

Classification			✓								
Autonomous			✓								
Location			✓								
Alternative			✓								
Level				✓							
Created in				✓							
Gender		✓		✓							
Specification		✓			✓	✓					
Online date	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3. Methods

The web application development process combined the methodologies GORSHCHEK (Gorschek, et al. (2006)), SCRUM (Scrum, 2020), and OOHDM (Schwabe and Rossi (1996)). The steps are illustrated in figure 1.

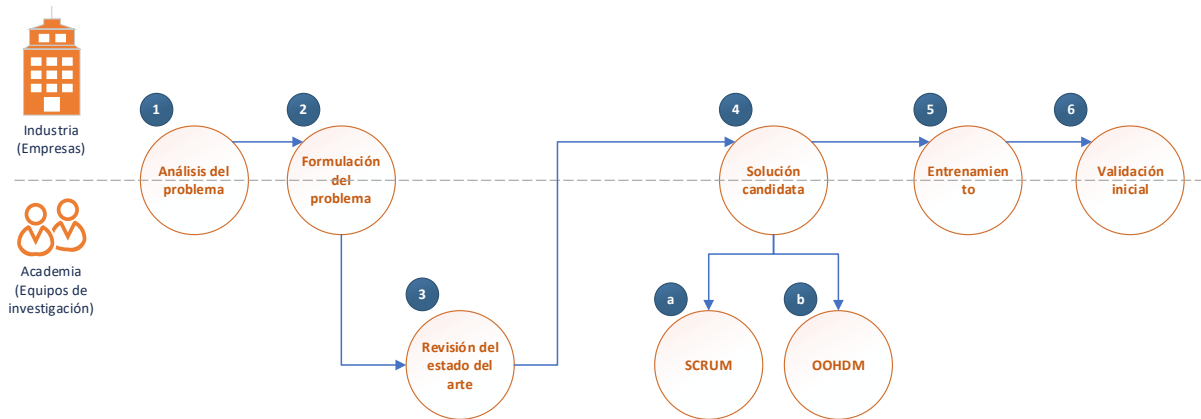


Figure 1. Gorschchek methodology

- 1) **Analysis of the problem:** Locally and regionally, it is not too common to find web applications that compile, store, preserve, and exchange research resources. Because of this, it is necessary to develop such an application to fulfill this need.
- 2) **Formulation of the Problem:** After analyzing the problem, the problem of study must be clearly and precisely formulated: A web application in which it would be possible to compile and distribute data produced by researchers in linguistics and humanistic areas is nonexistent.
- 3) **Review of the state of the art:** Through a systematic literature review 11 websites have been identified:
 - CAICYT - CONICET: DILA Archive Digital Repository
 - The Archive of the Indigenous Languages of Latin America
 - Ethnologue: Languages of the World
 - SOAS University of London
 - Academic Repository of the University of Chile
 - Research Institute of the Peruvian Amazon: Digital Repository
 - Editorial of the National University of Formosa
 - Center for Anthropological Studies: Paraguayan Studies Magazine (CEADUC-UC)
 - Pontificia Catholic University of Peru: Directory of PUCP researchers
 - Universidad del Azuay: UDA Institutional Repository
 - Department of Empirical Linguistics: Essentials of Language Documentation

- 4) **Candidate solution:** After an analysis, it was decided to propose, in addition to the Yii2 framework and the database MariaDB, a methodology to develop software consisting of two phases: SCRUM for the agile development of software, which is used to elicit the requirements that each user needs within the web application, and OOHDM for the development of interface design.
- 5) **Training:** It is an incremental activity aimed at providing the necessary knowledge to professionals in this area to obtain an overall picture of the proposed solution. In this stage, it was considered to work with one researcher.
- 6) **Initial validation:** The initial validation of the proposed solution will be carried out in a laboratory with the same researcher that received the training.

4. Results

The web application is targeted to four groups of users, identified as: application administrator, researcher, registered user and visiting user, who, according to their role, will have a specific interaction with the application. Also, in its structure, the application is made up of two sub-applications: i) the administration or Backend application, aimed at administrator users and ii) the DYAC or Frontend web application, aimed at researchers, registered users, and visitors, as shown in figure 2.

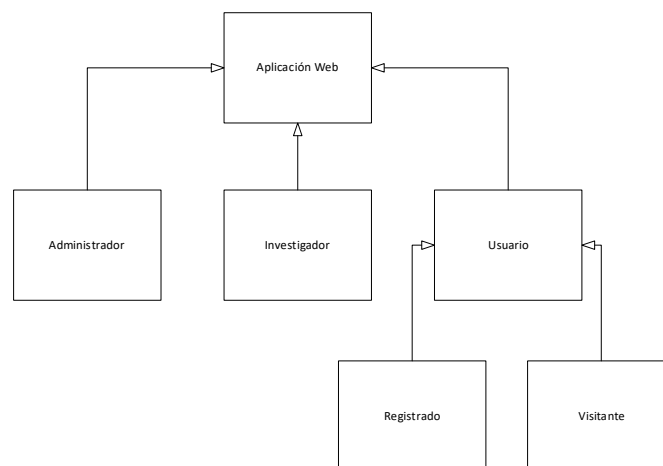


Figure 2. User classification

4.1 Administration application: Backend

The Backend administers the necessary aspects for the proper operation of the application. Within this sub application are the features user management, collections and files, definition of attributes, types of archives, terms and conditions, and frequent asked questions. Each of these options allows to list, add, see, and modify previous registers in the data base. The interface with access to these options can is shown in Figure 3.

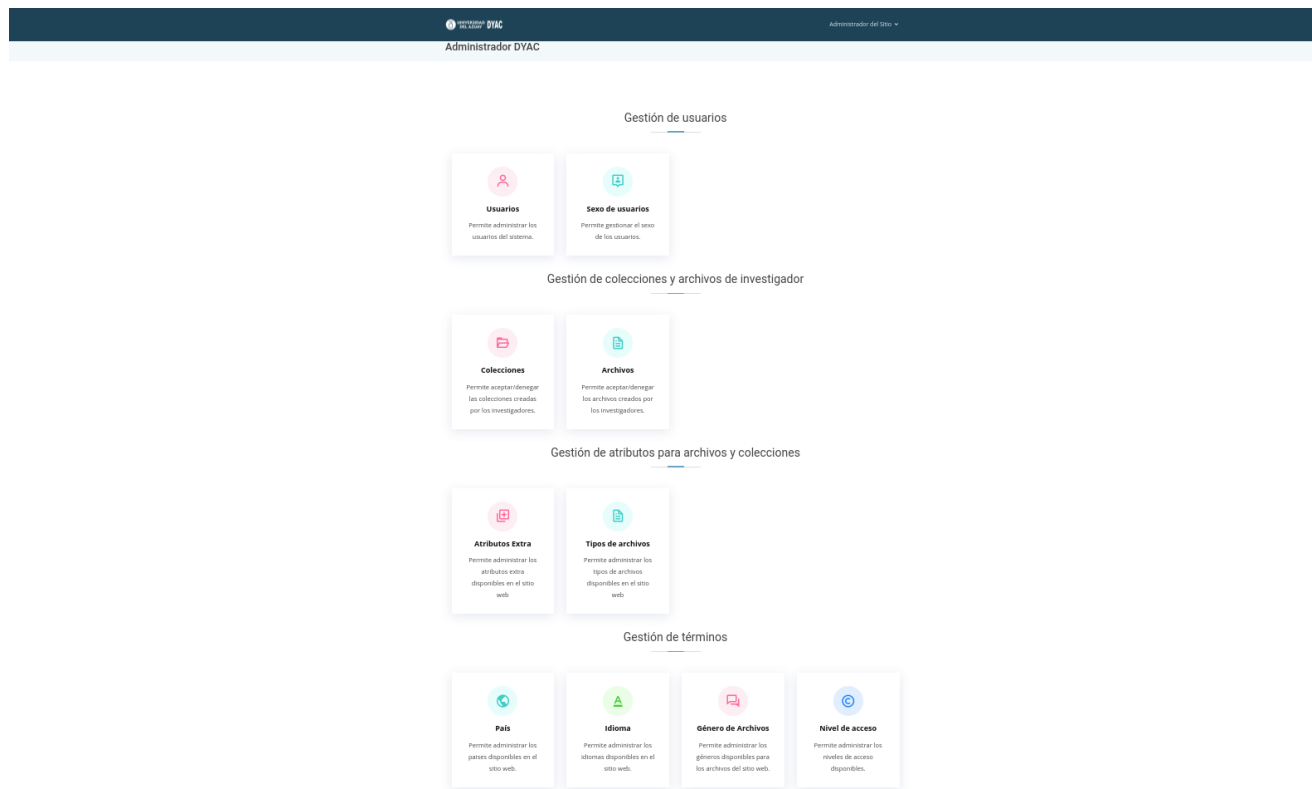


Figure 3. Management application

User management allows the administrator to approve or deny requests from users who want a researcher account. It also allows to block any user who presents inappropriate behavior within the application. The function *administrator* allows to create users of any type. *Collection and file management* permits the administrator to approve or deny requests for collections and files that are added or modified by researchers; thus, controlling the information to be shared and increasing security in the Frontend application.

The management of attributes and types of archives allow the administrator to provide maintenance to both the collections and the archives to give researchers more options when detailing or modifying previous entrances. The types of files are the digital document formats can be uploaded in the application.

The management of terms allows the administrator to maintain all the terms of different taxonomy groups, as well as the list of frequent asked questions, which can be seen later on the corresponding webpages.

4.2 The DYAC web application

The Frontend allows the user to view previously approved collections or files. The visiting user can either register on the site or log in if they already have an account. However, this user is restricted from viewing the files in a collection.

The registered user has access to the administration of their own profile. They can also view all the collections and their own previously approved files.

The researcher user has access to the administration of their profile information. In addition, the option enables them to create collections and upload files related to each collection. However, before this information is published in the web application, it must be approved by an administrator. Once the collection or file is reviewed by the administrator, the researcher will be notified by email if their request was approved, denied, or blocked.

Some examples of the display of the DYAC website are presented in Figures 4, 5 and 6.

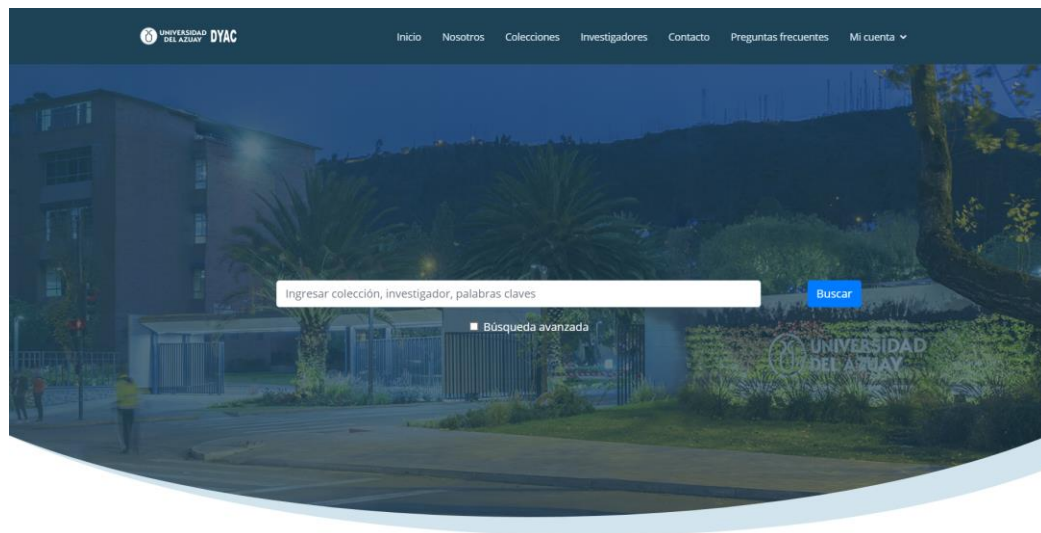


Figure 4. DYAC Web Application Home Page

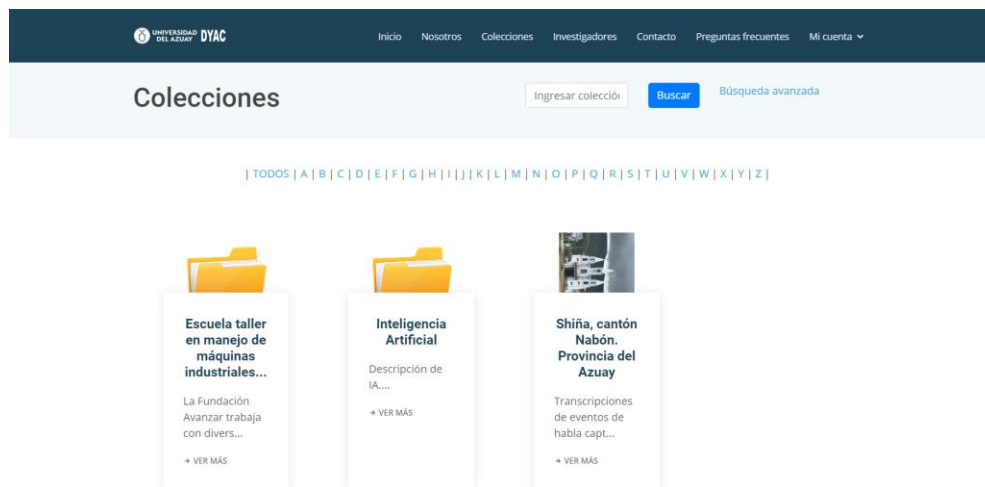


Figure 5. Collections Page

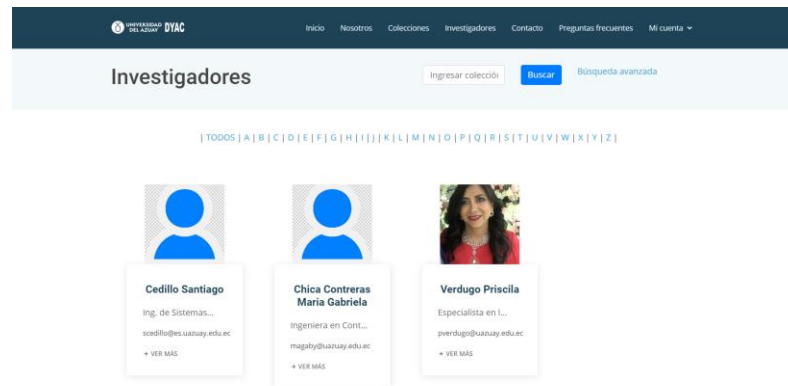


Figure 6. Researchers Page

6. Discussion and Conclusion

In Ecuador, as in other Latin American countries, there is a strong compromise with socio diversity, cultural diversity, and linguistic diversity, which represent an intangible heritage to these regions. In these circumstances is where documentation and scientific records gain importance because they become the ideal means to protect and preserve heritage.

The application DYAC was created to help with the documentation and preservation of linguistic and sociocultural resources captured naturally through audio, video, photography, maps, and other formats, so they can be catalogued in an adequate way. They could also serve as sources for linguistic and educational policy that could be used to preserve and revitalize endangered languages.

Additionally, DYAC has considered the possibility of interacting and exchanging these resources among researches, archivers, and users in the region. We are convinced that through this activity, we will contribute to socially validate these cultural and linguistic intangibles of the country and the region.

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