Universidad Nacional del Altiplano

Facultad de Ingeniería Estadística e Informática

DEVELOPMENT STRUCTURE

Digital Platform for the Valuation and Commercialization of Alpaca Fiber to Empower Producers and Foster Business Success

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Project

Digital Platform for the Valuation and Commercialization of Alpaca Fiber to Empower Producers and Foster Business Success

Project Management

Scrum Agile Methodology

Scrum will be adopted due to its efficiency in managing projects through short and focused iterations, essential for AlpacaConnect's development. Scrum will facilitate the incremental delivery of features, ensuring the platform continuously evolves to meet user needs and enhance their direct marketing experience.

Project Objective

The objective of AlpacaConnect is to improve the economic situation of alpaca fiber producers by providing them with a comprehensive digital platform for direct valorization and commercialization. It will facilitate direct market access, ensure product quality, empower producers with production tracking tools and business training, promote producer autonomy, and foster transparency and economic development in alpaca communities.

Functional Requirements

Producers

1. Producer Registration: Allow producers to register on the platform by providing basic information and details about their products.

2. Product Catalog Management: Enable producers to add, edit, and delete products from their catalog, including descriptions, prices, and photos.

3. Production Tracking: Provide tools for producers to record and track the entire production process, from camelid breeding to the final product.

4. Statistical Visualization: Allow producers to access statistics on their product sales and market trends.

Buyers

1. Buyer Registration: Allow buyers to register on the platform by providing basic information.

2. Product Exploration: Enable buyers to search and explore alpaca fiber products in the catalog.

3. Shopping Cart: Allow buyers to add products to the shopping cart and complete transactions securely.

4. Product Details Viewing: Provide detailed information about products (from breeding to the final product), including prices and photos.
5. Ratings and Comments: Allow buyers to give ratings and comments on products.
6. Order Tracking: Allow buyers to track the status of their orders and receive notifications about the shipping process.

Administrators

1. User Management: Allow administrators to manage user accounts, including producers and buyers.
2. Content Moderation: Moderate and manage platform content, including products and comments.
3. Data Analysis: Provide tools for analyzing sales data, market trends, and user preferences.
4. System Maintenance: Perform system maintenance and updates to ensure optimal operation.
5. Customer Support: Provide customer support to resolve queries and issues reported by users.

Non-functional Requirements

1. **Security:** Implement robust authentication, encrypted communication, and secure data storage.
2. **Reliability:** Operate reliably under normal conditions, with minimal downtime or errors.
3. **Maintainability:** Facilitate maintenance and updates through well-structured code, clear documentation, and modular architecture.
4. **Scalability:** Be scalable to accommodate an increase in the number of users and data volume without significant performance degradation.
5. **Portability:** Be compatible with various operating systems, web browsers, and devices.
6. **Usability:** Be user-friendly with intuitive interfaces and clear navigation.
7. **Performance:** Operate efficiently with fast response times and minimal latency.
8. **Authentication and Authorization:** Enforce user authentication and authorization mechanisms to control access to sensitive functions and data.
9. **Data Integrity:** Ensure data integrity through measures to prevent unauthorized access, modification, or corruption of data.
10. **Compliance:** Comply with relevant regulations and standards, including those related to data protection, industry security, and accessibility.

Architecture Design

Microservices Architecture

Microservices architectures offer an updated, scalable, and distributed system. This means that the system can easily expand according to needs and be distributed into multiple independent components. It is compatible with PHP and Apache in XAMPP.

Each microservice can be developed and deployed independently, and Bootstrap can be used to design user interfaces.

Features

- Decoupling of components: Allows for the development, deployment, and operation of services independently, streamlining application management and minimizing impacts on other services in case of changes or updates.
- Ease of maintenance and testing: Facilitates experimentation with new features, their rollback if they don't work, and efficient identification and correction of errors, improving software development agility and quality.
- Small and agile teams: Encourages autonomous and multidisciplinary teams that can work independently, reducing bureaucracy and accelerating development processes.
- Organization around business capabilities: Teams focus on specific functionalities, optimizing efficiency and allowing better alignment with business needs.
- Infrastructure automation: Improves efficiency in development and deployment by allowing for automatic creation and deployment of services, ensuring fast and consistent delivery.

Microservices Architecture for Alpaca Fiber Platform

General Description:

The microservices architecture divides the platform into several independent services, each responsible for specific functionality. These microservices communicate with each other via RESTful APIs. The platform will be developed in PHP with Visual Studio, deployed in a XAMPP environment (Apache, MySQL), and Bootstrap will be used for the frontend.

Microservices Architecture Components

1. **User Management Service**
   - **Functionality:** Registration, authentication, profile management.
   - **Technologies:** PHP, MySQL.
   - **Endpoints:**
     - POST /register
     - POST /login
     - GET /profile

   - PUT /profile

2. **Product Management Service**
   - **Functionality:** Add, edit, delete alpaca fiber products.
   - **Technologies:** PHP, MySQL.
   - **Endpoints:**
     - POST /products
     - GET /products
     - PUT /products/{id}
     - DELETE /products/{id}
3. **Sales Management Service**
   - **Functionality:** Purchase processing, sales statistics.
   - **Technologies:** PHP, MySQL.
   - **Endpoints:**
     - POST /sales
     - GET /sales
     - GET /sales/stats
4. **Customer Support Service**
   - **Functionality:** Management of queries and customer support.
   - **Technologies:** PHP, MySQL.
   - **Endpoints:**
     - POST /support
     - GET /support/tickets
     - PUT /support/tickets/{id}
     - DELETE /support/tickets/{id}
5. **Advertising Service**
   - **Functionality:** Management and display of advertising related to alpaca fiber.
   - **Technologies:** PHP, MySQL.
   - **Endpoints:**
     - POST /ads
     - GET /ads
     - PUT /ads/{id}
     - DELETE /ads/{id}
6. **Notification Service**
   - **Functionality:** Sending notifications to users about their products and purchases.

- **Technologies:** PHP, MySQL.
- **Endpoints:**
  - POST /notifications
  - GET /notifications

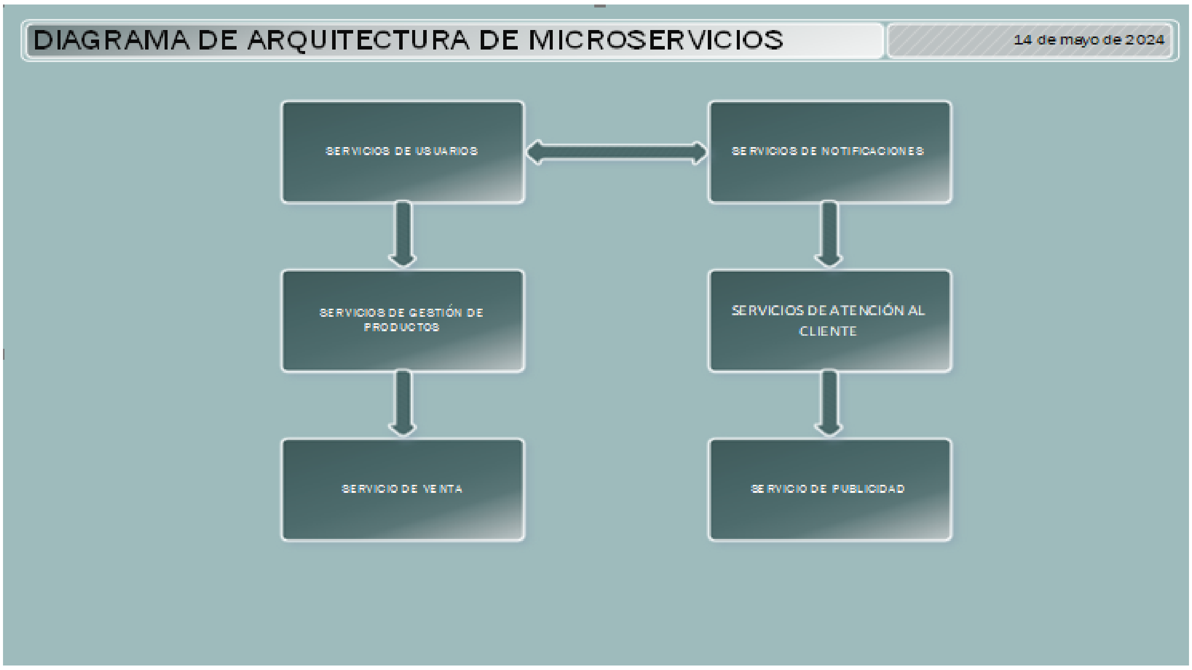


DIAGRAMA DE ARQUITECTURA DE MICROSERVICIOS
14 de mayo de 2024
SERVICIOS DE USUARIOS
SERVICIOS DE NOTIFICACIONES
SERVICIOS DE GESTIÓN DE PRODUCTOS
SERVICIOS DE ATENCIÓN AL CLIENTE
SERVICIO DE VENTA
SERVICIO DE PUBLICIDAD

(a) Microservices Architecture Diagram

Technologies and tools

Programming languages

- **PHP:** Main language used for server-side development, handling business logic and database interaction.
- **JavaScript:** Used for client-side programming, providing interactivity and dynamism to the user interface.

Frameworks and Libraries

- **Bootstrap:** CSS framework used to design a responsive and modern user interface.
- **Laravel:** PHP framework (optional if chosen) that facilitates web application development through an MVC structure and integrated tools for common tasks.

Web server

- **Apache:** Web server used to host the application, included in the XAMPP distribution.

Development Environments

- **XAMPP:** Software package that includes Apache, MySQL, PHP, and Perl, facilitating the setup of the local development environment.

- **Visual Studio Code:** Source code editor used to write, debug, and maintain project code.

Databases

- **MySQL:** Relational database management system used to store application data, included in XAMPP.

Version control

- **Git:** Distributed version control system used to manage source code history and collaborate with other developers.

- **GitHub:** Web-based platform for hosting Git repositories and facilitating collaboration in project development.

Automation Tools

- **Composer:** Dependency manager for PHP, used to install and manage packages and libraries.

- **npm (Node Package Manager):** Used to manage JavaScript dependencies and frontend build tools.

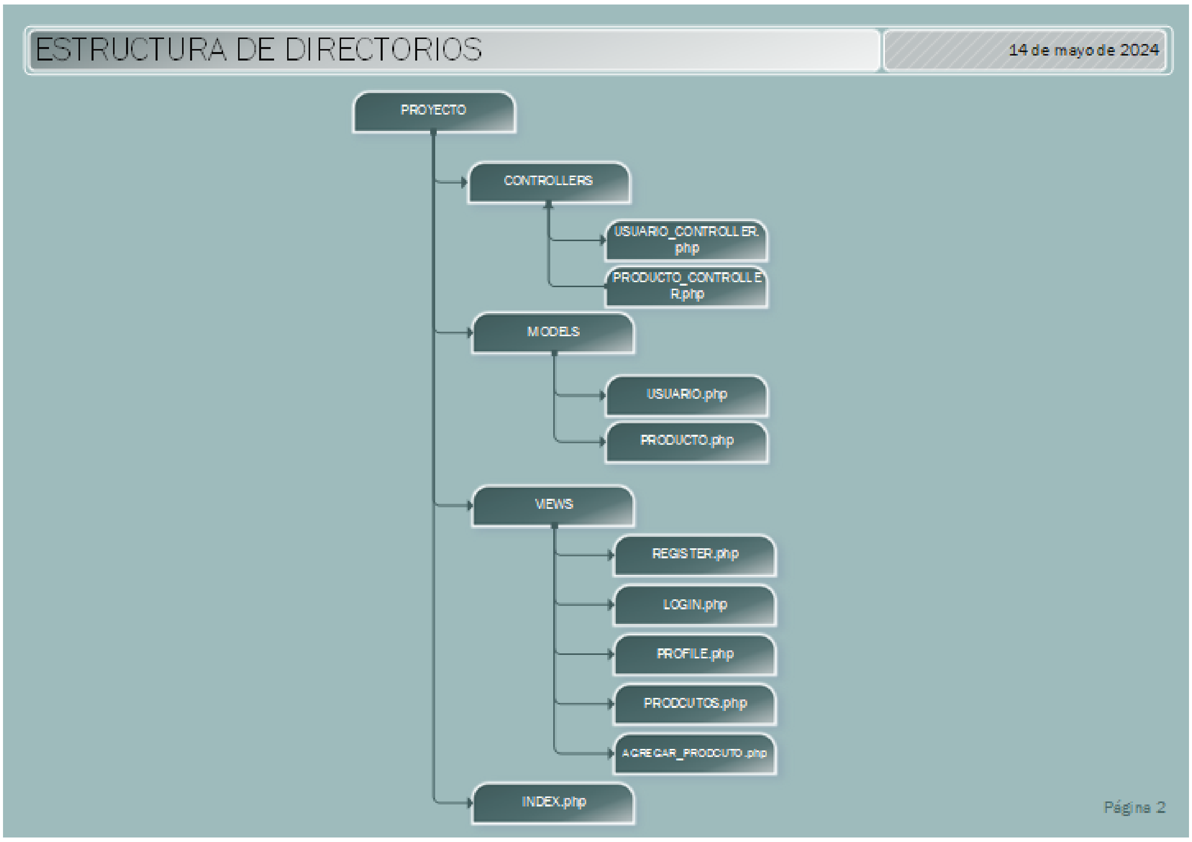
Development Methodologies

- **Agile:** Methodologies adopted to promote collaboration, continuous integration (CI), continuous delivery (CD), and continuous deployment (also CD), improving the efficiency and quality of development.

Security

- **HTTPS:** Security protocol used to secure communication between the client and server.

- **Implementation of security measures:** Authentication, authorization, and data encryption to protect users' sensitive information.



(a) Directory structure

Security for AlpacaConnect

Security Practices

- **Authentication:** Implement secure authentication using JWT tokens to handle user sessions. Each user must authenticate before accessing any protected resources on the platform.

- **Authorization:** Define clear roles and permissions (e.g., producers and buyers) and use access control policies to ensure that users can only access resources they are allowed to.

- **Data Encryption:** Ensure that all sensitive data, such as passwords and payment details, is encrypted both in transit (using HTTPS) and at rest (using database encryption techniques).

- **API security:** Implement security measures in the API, such as input validation, rate limiting, and protection against common attacks (e.g., SQL injection, XSS).

Security Tests

- **Vulnerability scan:** Conduct regular vulnerability scans using automated scanning tools (e.g., OWASP ZAP) to identify and mitigate potential security weaknesses in the code and infrastructure.

- **Penetration tests:** Hire security experts or use penetration testing services to simulate real attacks and discover vulnerabilities that could be exploited by attackers. These tests should be performed periodically and after significant changes to the system.

AlpacaConnect Maintenance

Corrective maintenance

- **Error detection and resolution:** Establish an error tracking system to detect and fix any issues on the platform quickly. Use tools like Sentry to monitor and log errors in real-time.

- **User support:** Implement a technical support channel for users to report issues and receive timely assistance. This may include a ticketing system and live chat.

Preventive Maintenance

- **Software updates:** Keep the Apache server, MySQL database, and other platform components (PHP, XAMPP, etc.) up to date to avoid known vulnerabilities and improve performance.

- **Proactive Monitoring:** Use monitoring tools like Nagios or New Relic to monitor system health, server performance, and database activity, identifying potential issues before they affect users.

Evolutionary Maintenance

- **Implementation of new functionalities:** Plan and develop new features and enhancements on the platform, such as integration with new payment methods, multilingual support, and UI improvements.

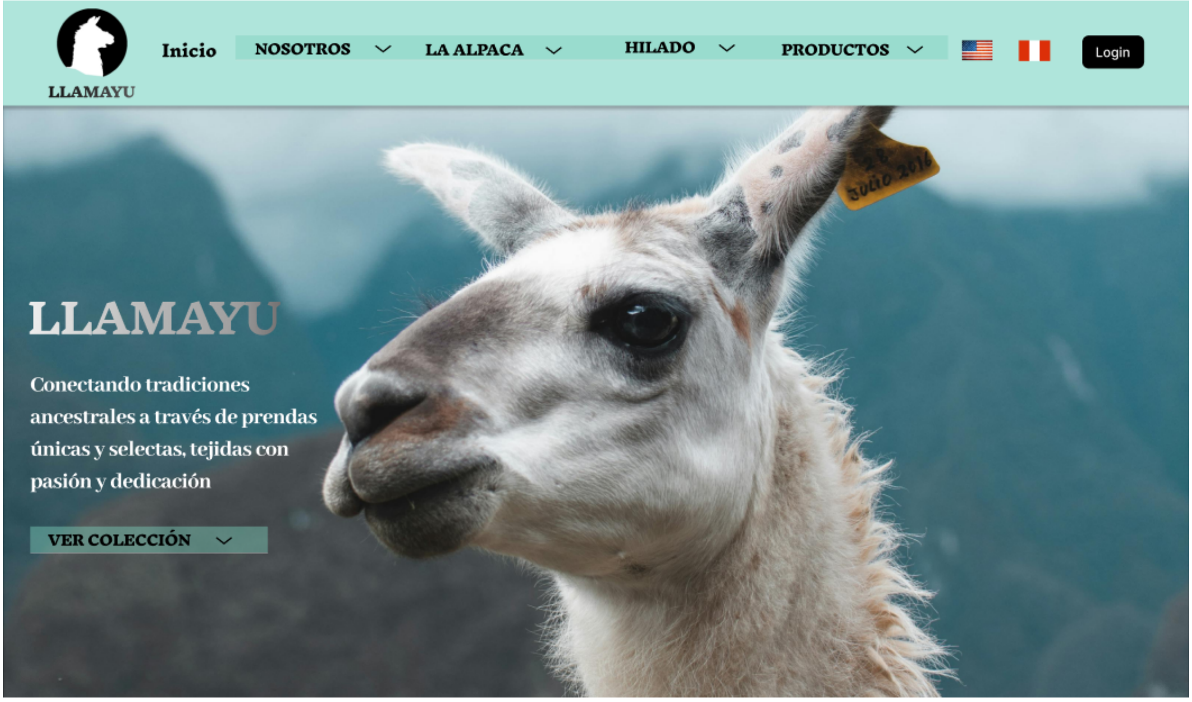
- **Continuous optimization:** Continuously review and improve code and database queries to ensure optimal performance. Conduct regular code reviews and optimize SQL queries to enhance speed and efficiency.

Adaptive Maintenance

- **Adaptation to new technologies:** Stay updated on new technologies and trends in web development, and adapt the platform to leverage these innovations. This may include using new versions of frameworks and libraries.

- **Normative compliance:** Ensure that the platform complies with local and international regulations.

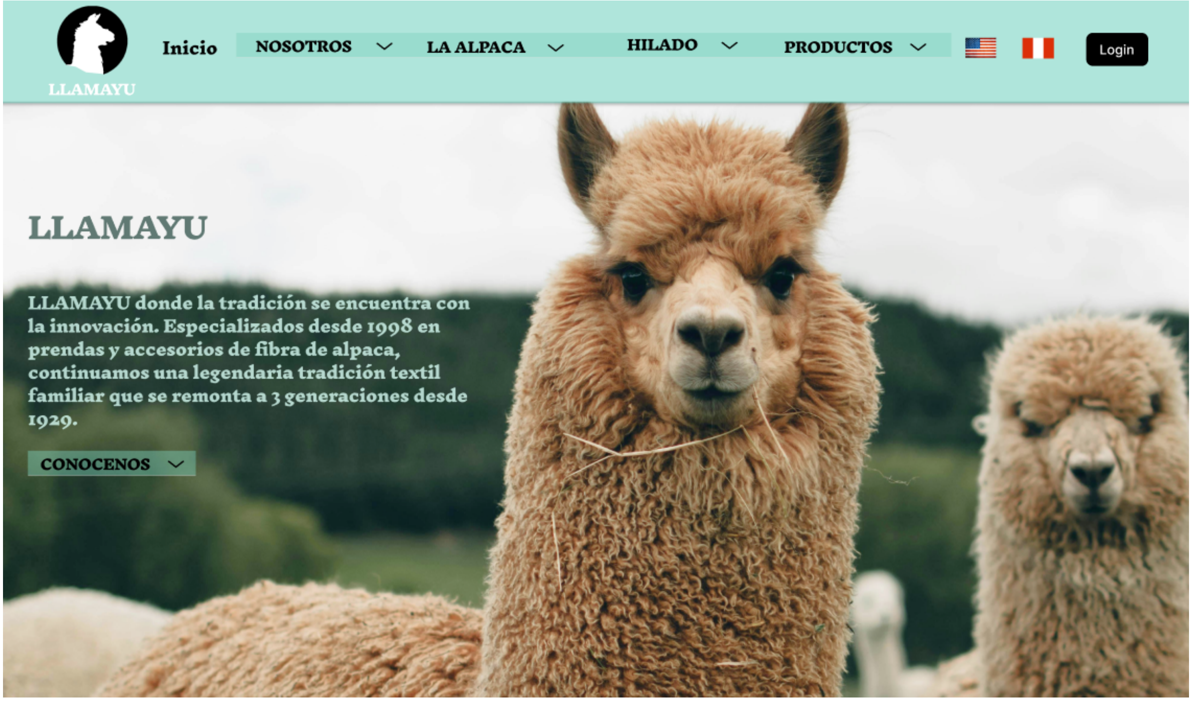
Digital platform previews



LLAMAYU

Conectando tradiciones ancestrales a través de prendas únicas y selectas, tejidas con pasión y dedicación

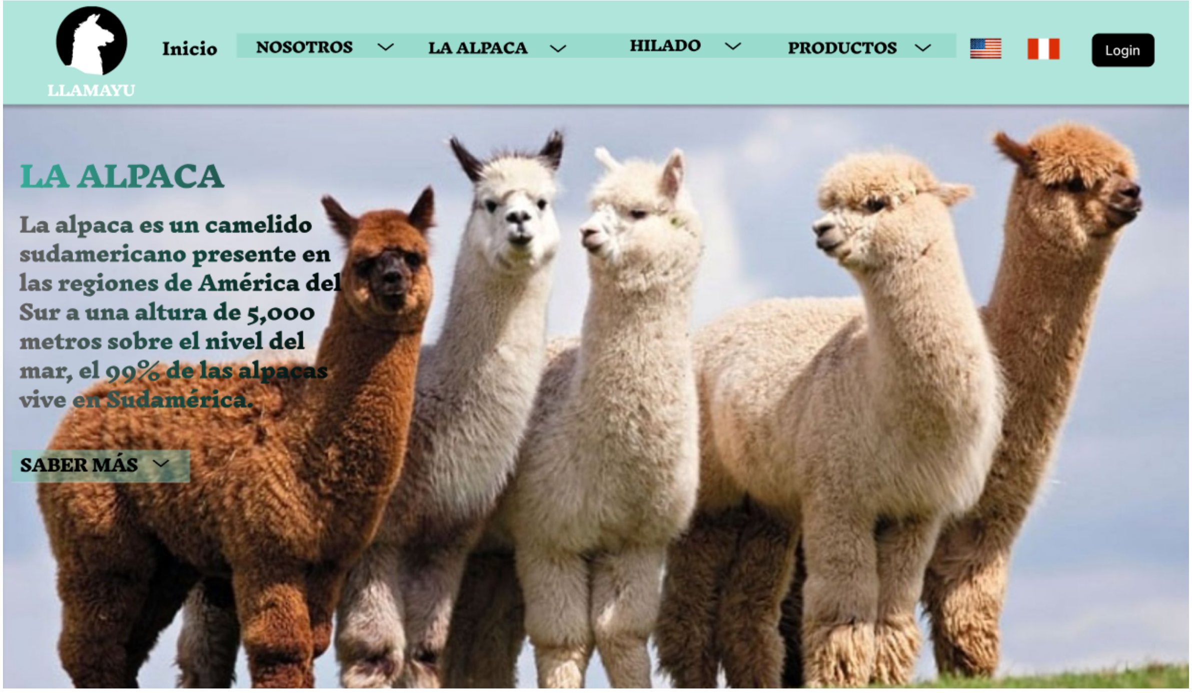
(a) Digital platform previews



LLAMAYU

LLAMAYU donde la tradición se encuentra con la innovación. Especializados desde 1998 en prendas y accesorios de fibra de alpaca, continuamos una legendaria tradición textil familiar que se remonta a 3 generaciones desde 1929.

(a) Digital platform previews



LA ALPACA

La alpaca es un camelido sudamericano presente en las regiones de América del Sur a una altura de 5,000 metros sobre el nivel del mar, el 99% de las alpacas vive en Sudamérica.

(a) Digital platform previews