

# Development of a web application to share hobbies activities

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## ABSTRACT

The widespread use of the web as a form of interaction has influenced the way people socialize. In this sense, this phenomenon has favored the development of web applications that offer user services aimed at sharing certain personal aspects such as photos, videos, or music. In particular, there is a growing demand for applications that allow users to search for other people who share the same hobbies intending to establish friendly relationships. The architecture for developing an application of this type is generally complex since it requires the manipulation of varied data, the storage of large amounts of data, or the possibility of communication between users in the application. This article presents an example of the design and development of a web application aimed at sharing activities among users who have common hobbies. For this, an ecosystem of different heterogeneous technologies has been used in a multilayer architecture, to optimize the management of the application information.

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## 1. INTRODUCTION

In recent decades, the use of tics has been applied in a large number of areas of society. One of these areas is the social relations of people [1]. In this sense, it is worth highlighting the applications that implement social networks. A social network [2] offers a set of services oriented [3] to facilitate communication between acquaintances through asynchronous or synchronous communication tools as well as the possibility of sharing different resources such as [4] videos, images, sounds, and documents. However, social networks can be classified by the objective of the established relationship [5]. Thus, there are social networks aimed at communicating with friends such as Facebook [6], getting romantic relationships like Tinder [7], selling products like Wallapop, to look for work like LinkedIn [8] A particular case of social networks are those that are aimed at sharing cultural and free-time activities with other people [9] that have common or similar tastes. Especially in large cities, demand for this type of application has arisen [10]. They normally have two types of users [11] leisure companies and clients. In this sense, companies specialized in organizing cultural and leisure activities publish proposals in the applications, and target users register to carry them out. In this way, the application serves as a meeting place for companies and people with similar tastes. In this model, there are variants [12] so that some applications allow users to propose activities, and others are specialized in specific activities such as [13] sports, cinema, theater, and travel. Some examples of these types of applications are [14] Meetup, Fever, Geokeda, or Timpik.

In general, the design of these applications follows a common structure by Salunke and Chaudhari [15]. In this sense, they present [16] a pleasant and intuitive user interface that allows access to services such as searching for activities, registering for activities, managing activities, evaluating activities, sharing activities with other users, or communicating with other users. Other characteristics of this type of

application [17] are the need to use a very varied and heterogeneous set of web technologies for their implementation [18] as well as requiring optimal solutions to manage and consult information [19] (information related to activities and users, search of activities according to different criteria).

This article presents an example of the development of a social network to share leisure activities in which two aspects have prevailed. On the one hand, ensuring easy extensibility and maintenance of the application's functions. For this, it has been chosen to use a multilayer architecture [20] where each layer has a specific responsibility and remains independent from the rest of the layers. And on the other hand, it has been prioritized that the management and consultation of the information will be carried out in the most optimal way [21]. That is why it has chosen to use a nonrelational database that offers flexibility regarding the different types of information that need to be managed. In addition, the database used, Firebase [22] offers efficient information query and manipulation services, and its maintenance is easy as it is an online database maintained and managed by Google.

The structure of the paper is as follows. Section 2 will show the architecture of the application. In section 3, the data model used is described. Section 4 presents the functionality of the application in detail. An evaluation of the usability of the application is briefly described in section 5. Lastly, the section presents the conclusions and future lines of work.

## 2. ARCHITECTURE

The implementation of the application has been done using Modugu and Farhat [23] through a multilayer architecture. Each layer is independent and decoupled from the rest in order to facilitate the change and the maintainability of the application. The architecture is shown in Figure 1. Five layers have been defined:

- Users layer. Represents the clients that interact with the application (people, companies, and administrators).
- Presentation layer. It represents the interface on which the users operate, making requests and receiving the results. It is made up of hypertext markup language (HTML) templates implemented with Bootstrap [24] that contain the interface structure whose style is defined using cascading style sheets (CSS) to offer a more attractive appearance to the application. Likewise, JavaScript is used to give dynamism to the web pages, using JQuery to integrate the different datatables, moment.js, and Mapbox libraries [25].
- Business layer. It is the layer that receives the requests from the frontend and using the controllers the implemented functionalities are invoked. Likewise, it is also responsible for returning the requested data.
- Integration layer. It is in charge of intercommunicating the business layer with the database. For this, application services are used that exposes the functionality of the application by implementing the create, read, update and delete (CRUD) operations to integrate this layer with an external database managed by Fire-base. In this way, the system can access and manage the stored information.
- Resource layer. It stores all the persistent data of the application and provides a series of methods and asynchronous operations to be able to manage and manipulate the data: authentication, users, activities, notifications, messages, and multimedia content. It has been implemented using firebase a multi-device development platform based on the cloud and managed by Google that provides developers with a series of application programming interfaces (APIs) to organize, save and synchronize the information of the applications in real-time. Figure 2 shows the Firebase organization.

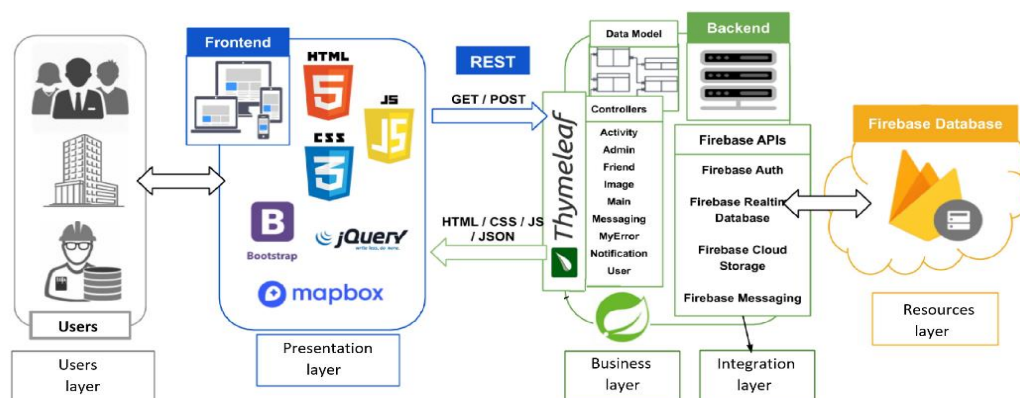


Figure 1. Application architecture

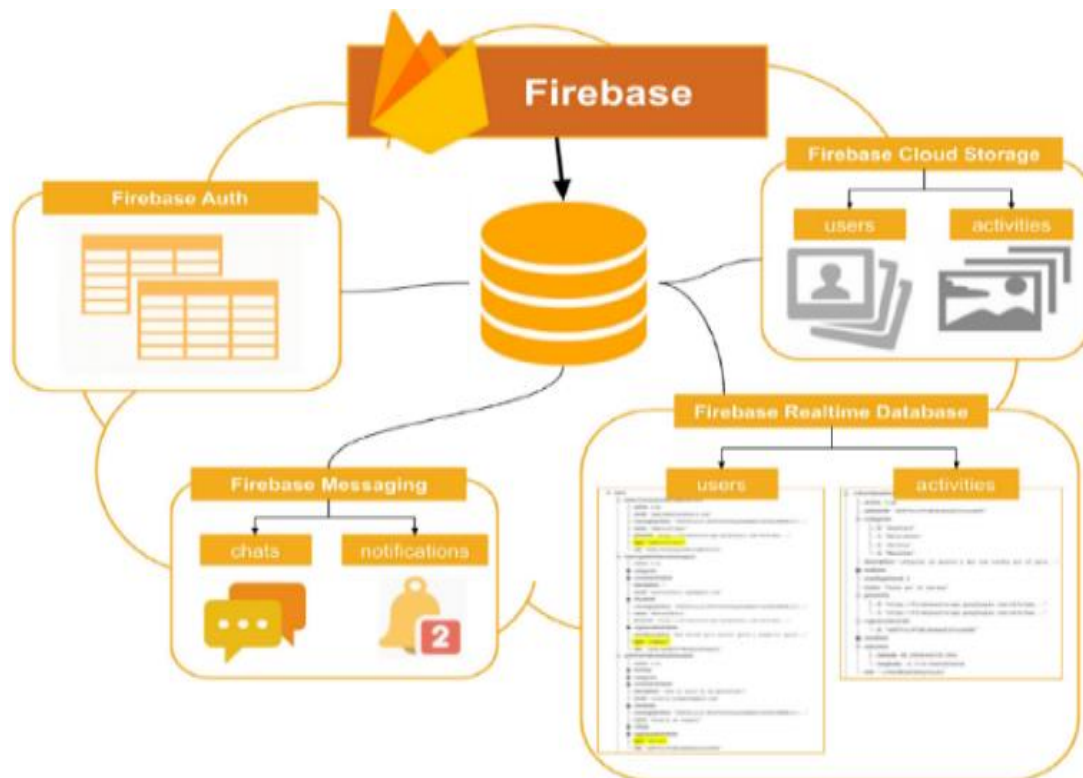


Figure 2. Firebase organization

### 3. DATA MODEL

In order to carry out the persistence of the application information, the entity-relationship model shown in Figure 3 has been defined. The defined conceptual model has been implemented using a non-relational database of the type Firebase [26]. This type of database is characterized in that no tables are used to store the information, nor is a fixed schema defined to organize the data. In this sense, information is organized using collections of documents that are stored as objects in JavaScript object notation (JSON) format. Each collection represents a different type of document that is appropriate to the information it stores.

Likewise, another characteristic is that the developer is in charge of designing the database and keeping it in a coherent state. In this sense, when making the different queries, it must make sure not to produce inconsistencies in the stored information. In this case, 4 document collections have been defined using the firebase real-time database tool:

- The users' collection contains documents that store information on the different types of users that interact with the application (administrators, people, and companies).
- The activities collection stores information about the activities proposed by users.
- The notifications collection stores information about the notifications associated with a user.
- The messages collection stores information about messages sent by users that can be destined for an activity, or another user.

Authentication has been implemented through the use of the Firebase auth tool, which allows managing a document that contains a row for each registered user, being distinguishable by means of a self-generated unique identifier, and an email. Finally, the multimedia content of the application (about users and activities) has been stored using the firebase cloud Storage tool. In this sense, all files are managed through folders. User content is organized using folders named the user-id about which the information is saved. In each folder, the user's files are stored, and in particular, there is a "profile pictures" folder that stores the profile image of the corresponding user. In the case of activities, a folder is created for each of the existing activities, which stores the associated images. Each image is named after the upload date (in the format "yyyy mm-dd-hh: mm: ss: ms"), guaranteeing that there will never be two photos with the same name since there is a certain delay, and at no time is the functionality of uploading more than one image offered at a time.

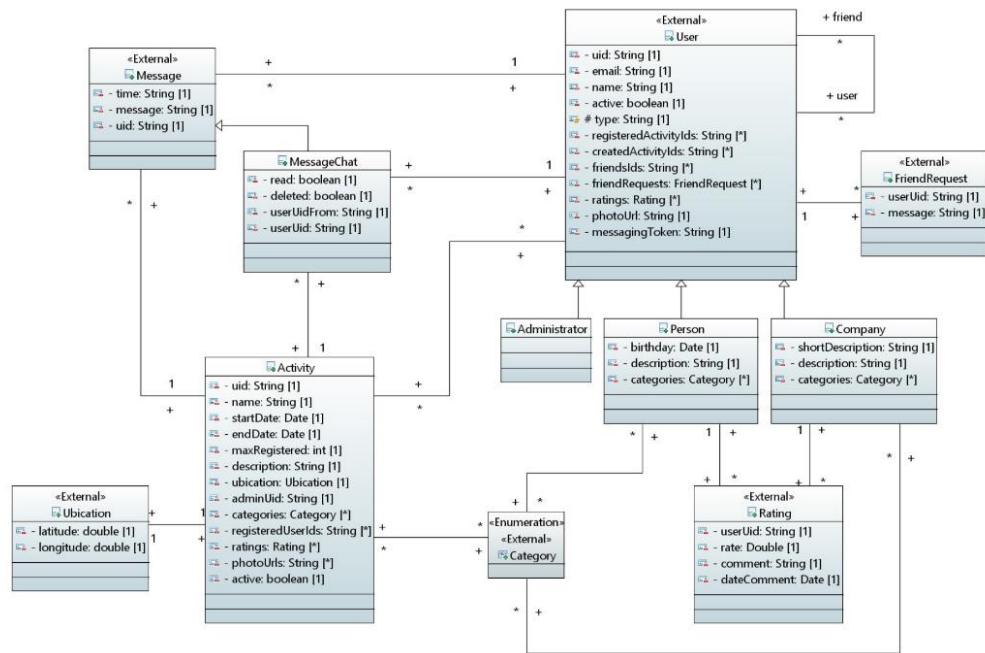


Figure 3. Firebase structure

## 4. FUNCTIONALITY

In order to use the application, it is necessary to be registered. In this sense, the application offers a link to register people and companies (although the application allows there to be more than one administrator, their registration must be done by an administrator) using a form Figure 4(a). Registered users access the application using an authentication page where they enter the username and password Figure 4(b). In addition, all users can consult their profile or modify it, cancel the account, or log out. Next, the specific functionality of each type of user will be described.

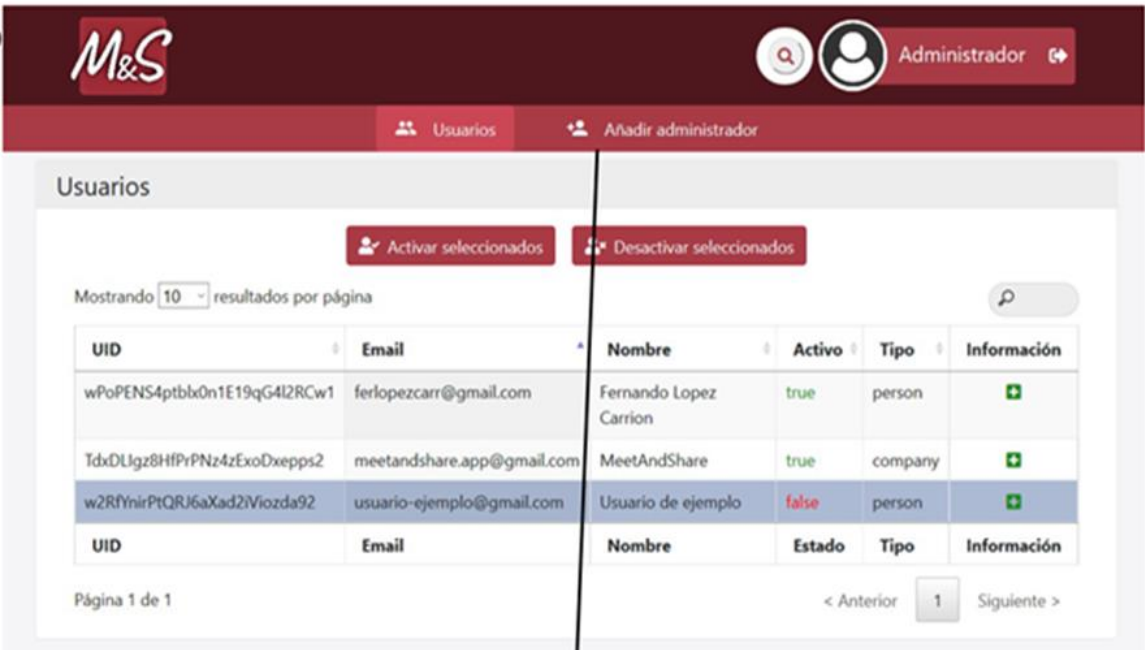
(a)

(b)

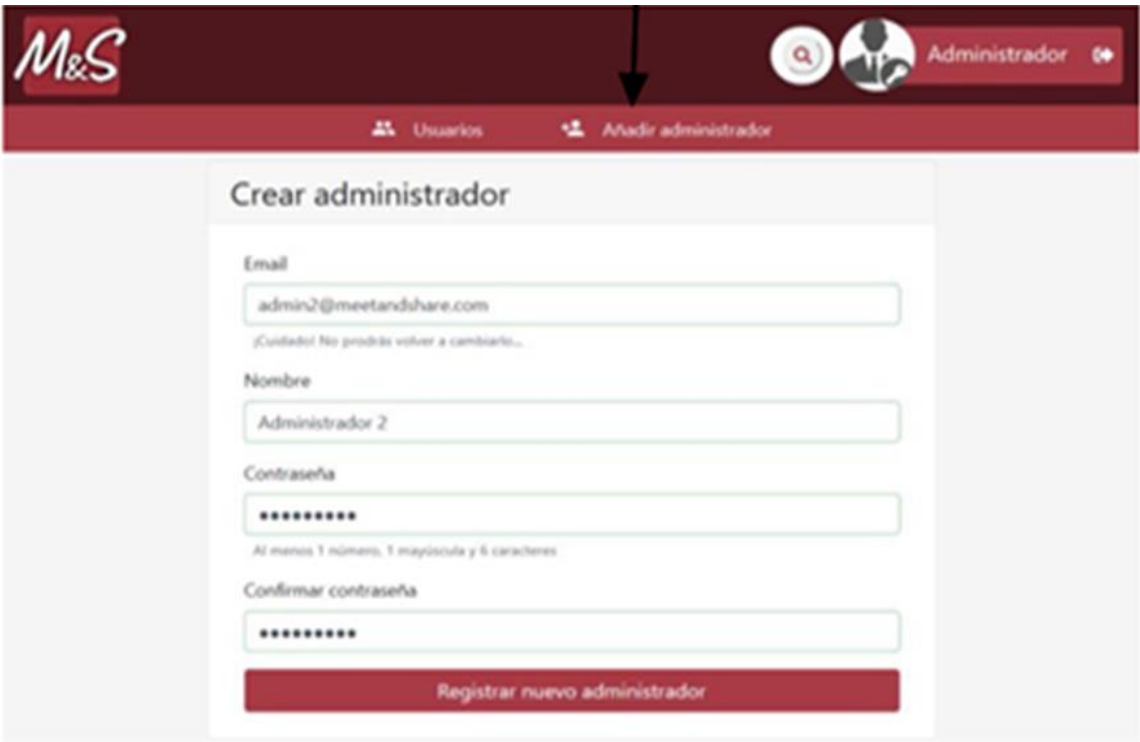
Figure 4. The functionality page display (a) Login, and (b) User registration

4.1. Administrator

The application defines a set of functions for the administrator of the application. These functions are aimed at managing the users of the application (activating and deactivating them) and registering new administrators in it. Figure 5(a) shows the administrator function that allows users to be activated and deactivated from the application. On the other hand, Figure 5(b) shows the screen to register a new administrator in the application.



(a)



(b)

Figure 5. The administrator page display (a) Activate/deactivate users and (b) Register a new administrator

#### 4.2. Person and company user

The functions available to a company-type user (creating, modifying, or canceling an activity) are included within the functions of a person-type user. That is why only the functions of a person-type user will be described. When a person type user authenticates, he accesses an interface with several links associated with the available functions:

The "Main page" ("página principal") link in Figure 6 shows the possibility to manage the activities that a user creates as well as the registration of an activity. To create an activity, click on the blue "+" button, and a form is displayed where the descriptive data of the activity are filled in: proposed location, name, start date and purpose, participants, categories, and description.

In Figure 7 a user can register for an activity to carry it out. To do this, there is a search engine where it will be written search keywords. Likewise, in the upper right part, there is a set of filters by date of completion, by the distance of the activity with respect to a defined place, by categories, and by free places. The search result will show a set of activities that meet the search criteria. Then, the user can click on each activity to see the details of the activity (which will be displayed in a pop-up window), and register if they wish. Each activity in which the user is registered will be listed in the "my activities" ("mis actividades") link.

"My activities" ("mis actividades") link is shown in Figure 8. It is a page that shows the activities that a user has organized as well as those in which they are registered, allowing in both cases to share them with other users who are friends. For this, each activity is associated with a button that allows selecting the friends with whom it will share an activity, being notified.

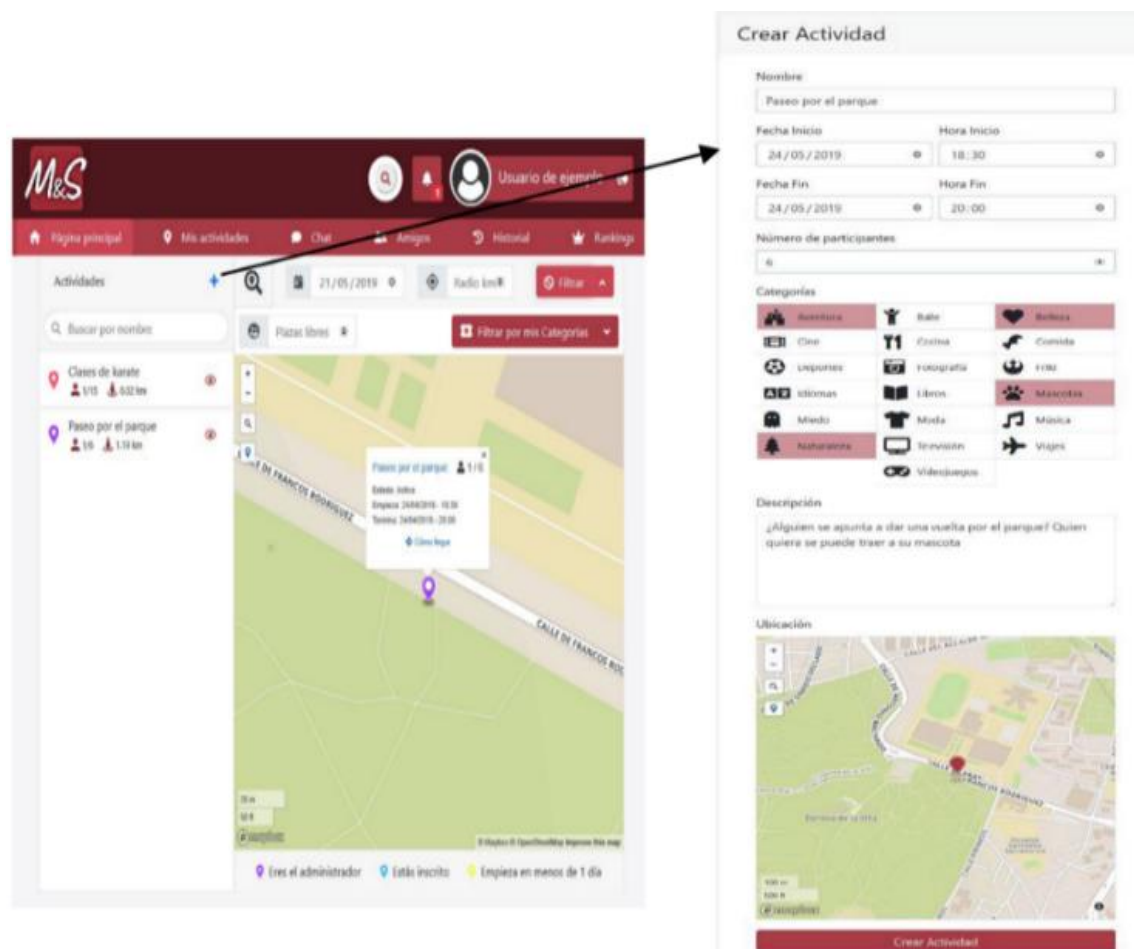


Figure 6. Main page

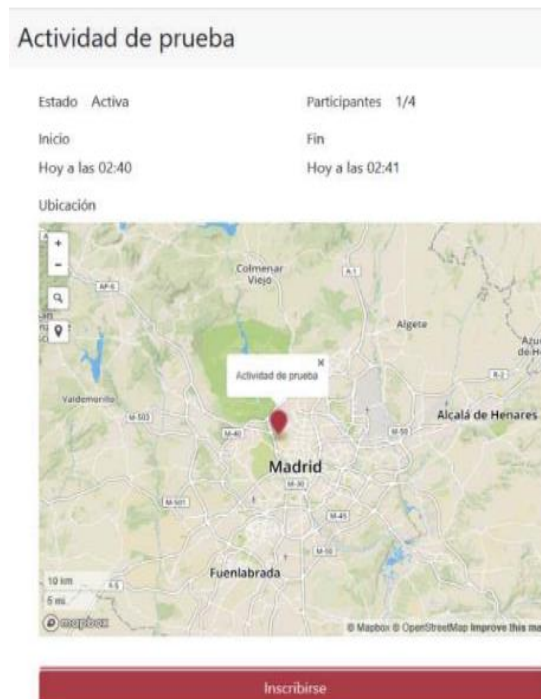


Figure 7. Activity register

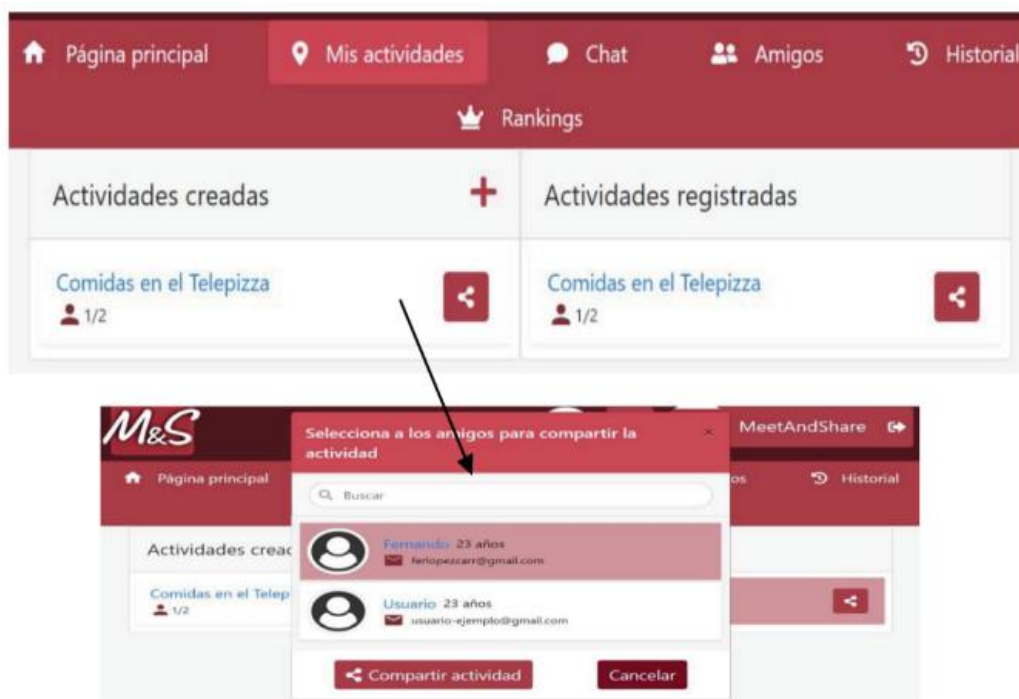


Figure 8. Share activity

Figure 9 shows "Chat" link allows to keep in touch with friendly users or to send messages to activities in which the user has registered. When clicking on the link, an interface appears that lists the activities registered, and the friends with whom it has been previously communicated. To send a message, select the activity or the friend from the list. Also, it is able to use a search engine included on the page to locate a friend who does not appear on the list. Once the user has been selected, on the left side of the page there is a text box from which messages can be sent and received.

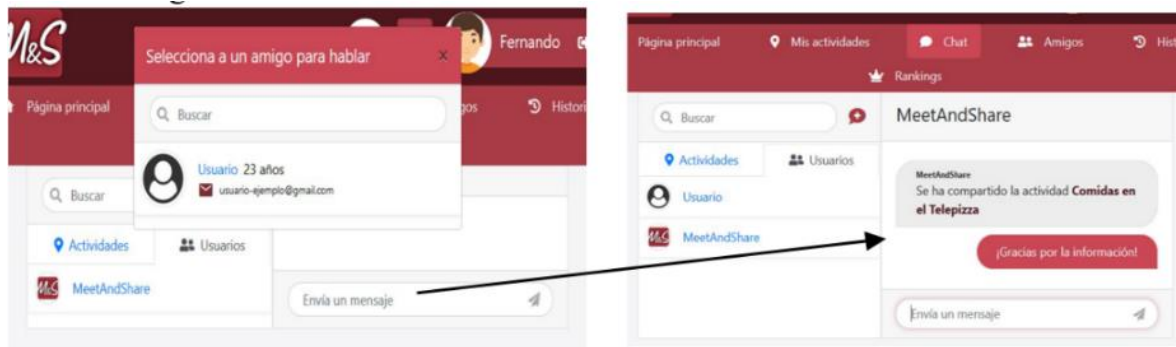


Figure 9. Chat function

The "Friends" ("amigos") link is shown in Figure 10. A page is accessed that shows a list of user friends of a user and a list of friend requests that can be accepted or rejected. To add a friend, the target user is searched for using the search engine that appears at the top of the user's page. If the user exists, a window will be displayed with the profile of the searched user that includes a link "Add friend-addr". When it is clicked on this link, a window is displayed that allows adding a presentation message and a "Send request" button. Once sent, the request will appear in the target user's friend requests list.

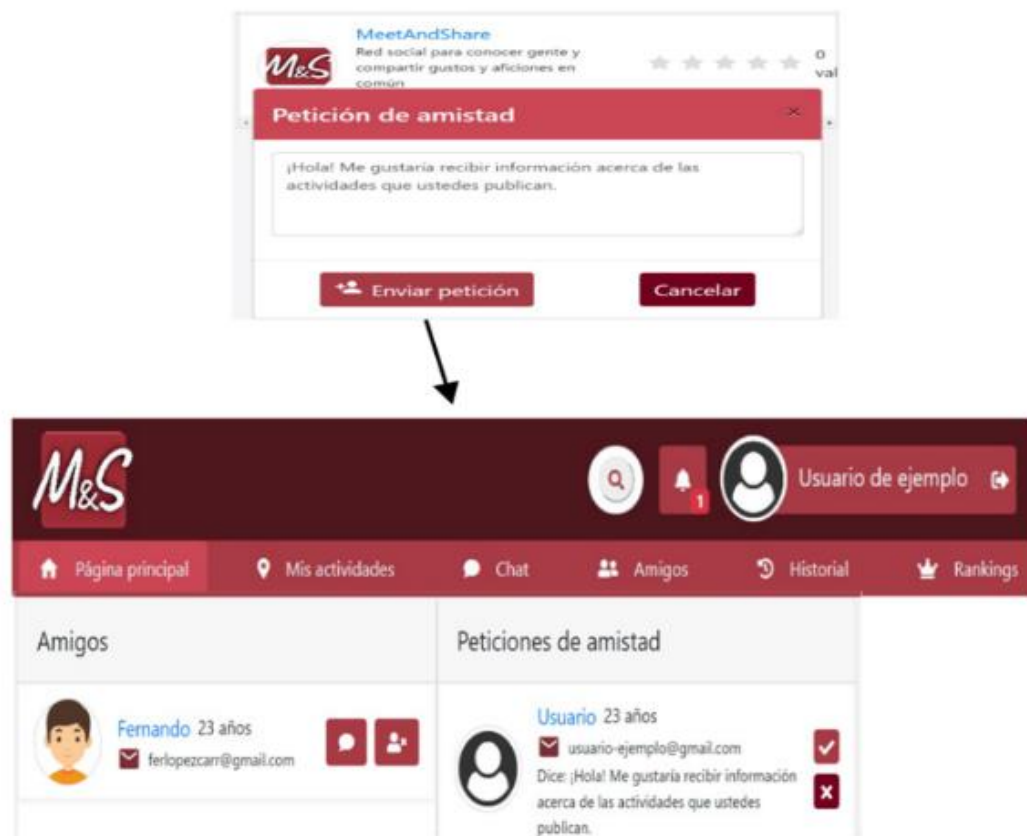


Figure 10. Link "friends"

The "History" ("historial") link is shown in Figure 11. It shows a page with all the activities in which the user has participated as well as the activities that the user has created. In the case of the activities in which the user has participated, it is able to rate the activity and its organizers, and leave comments. Once the valprayer is done, its effect can be seen through the link "rankings".

On the other hand, from this page, it is possible to modify and cancel activities that have been created by the user. Once the activity has been created and while no user has registered in it, any of their data can be modified. For this, the activity must be accessed from the "history" link. In particular, images associated with an activity can be added using an "Add image" ("añadir imagen") button from the modification page of the activity as shown in Figure 12.

Finally, it is possible to cancel an activity if it has not started its development. To do this, click on the delete icon that contains each of the activities created by a user can be seen in Figure 13. As a result, each user will receive a notification. Link "rankings". It shows the evaluations made of the activities and their organizers Figure 14.

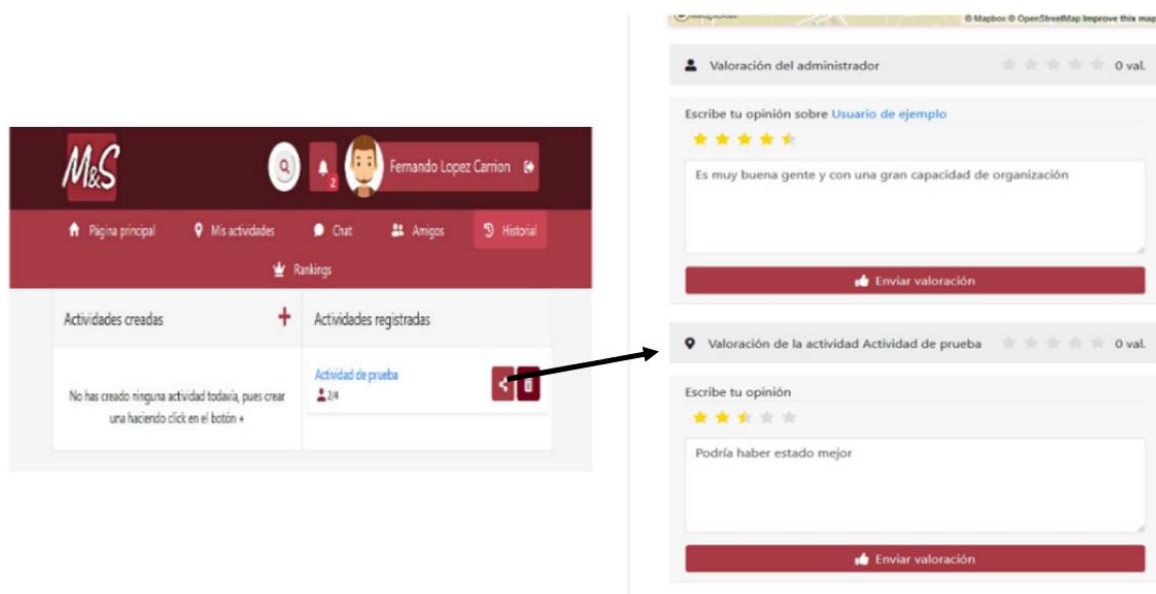


Figure 11. Carry out assessments

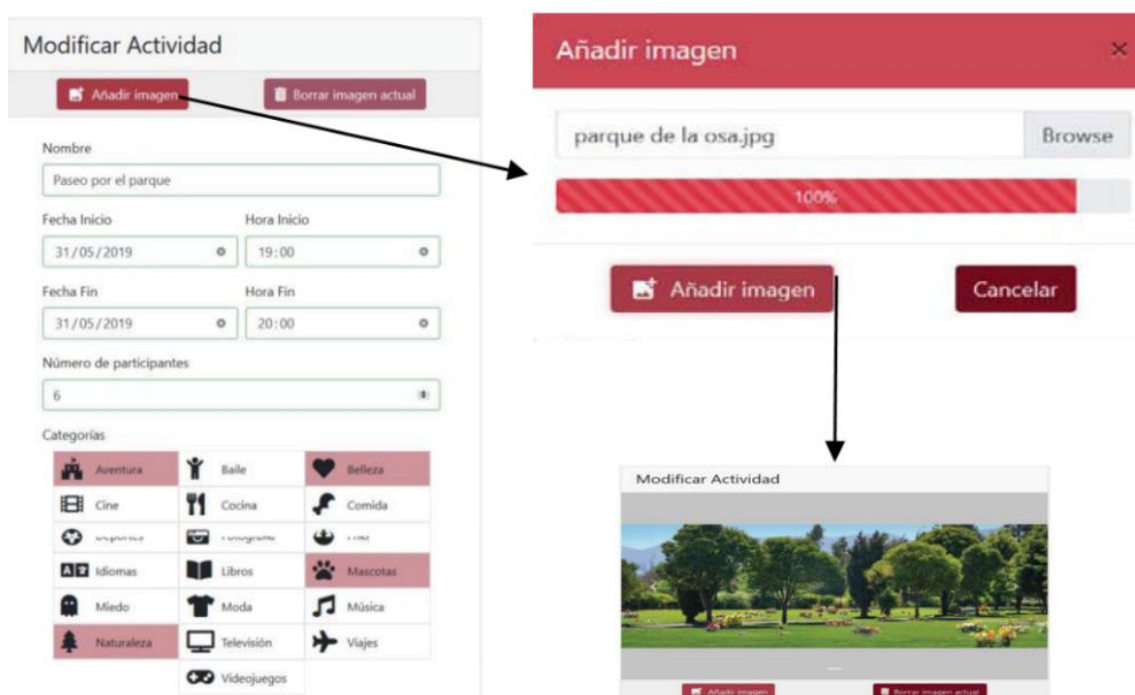


Figure 12. Add an image to an activity

Notifications icon. This icon in Figure 15 alerts users to messages they have received. Clicking on the icon displays the messages and once read they can be deleted by clicking on the cross-shaped icon, or they can be marked as read by clicking on the crossed-out eye icon.

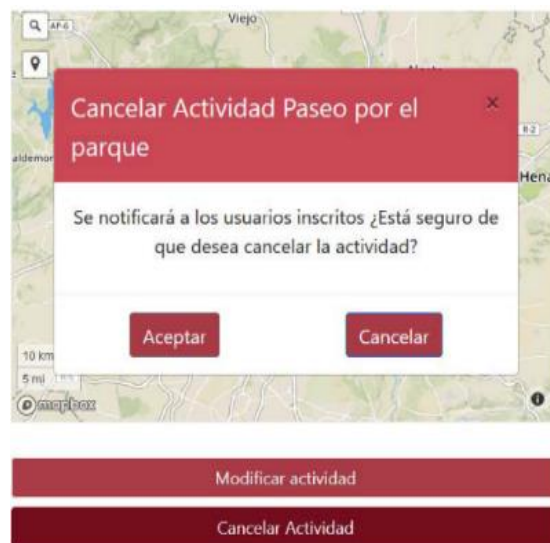


Figure 13. Cancel an activity

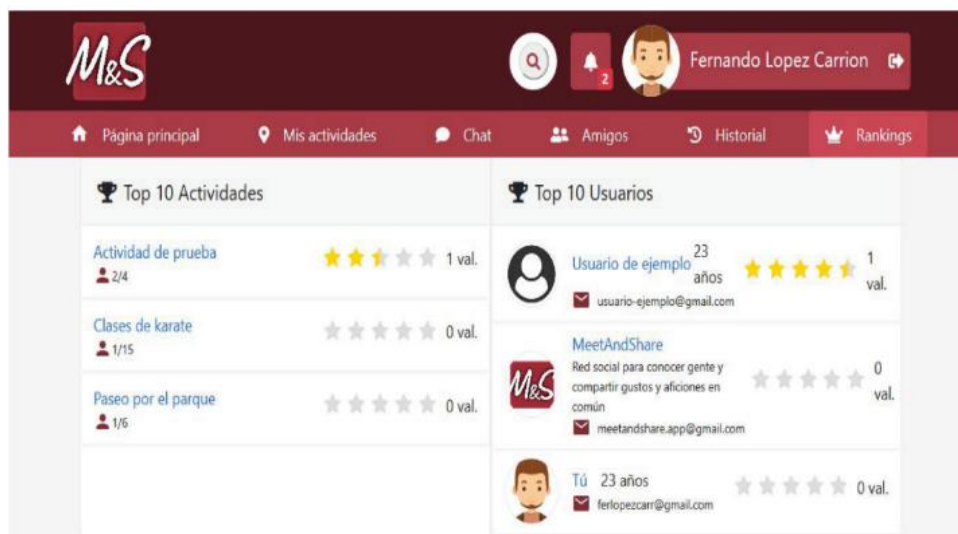


Figure 14. Rankings



Figure 15. Notification icon

## 5. EVALUATION

The application has been evaluated with a group of 25 people from this field aged between 25 and 50 years. The evaluation consisted of carrying out a set of tasks using the tool: register in the application, create/modify and cancel an activity, register in an activity, request a friendship from a user, share with a friend a created or registered activity, evaluate the activity and check the rankings of an activity. Next, the people took a test done using a Google form. In the test, they had to answer 11 questions about the usability of the application, valued using a liker scale from 0 to 5 where 0 represents not being satisfied and 5 is very satisfied. The results of the test were as follows:

- Utility of the application. 17 have responded that their satisfaction level is 4, on the other hand, 7 people have given a score of 3 and the remaining 6 have been assessed with the highest score.
- Ease of use of the application. The maximum score has been voted by 15 of the total, while 8 people have scored 5. The remaining 7 answers have given a rating of 4 points.
- Application design. 75% of respondents find it an aspect that is "very good". 15% have responded that the design is "good", while the remaining 10% have rated with the highest score.
- Global assessment. 65% of respondents responded, "very well". The percentage of scored "excellent" was 20% and the remaining percentage has rated the application as "good".

## 6. CONCLUSIONS AND FUTURE WORK

In this article, a web application oriented to the sharing of leisure activities among users has been presented. The application allows users to propose activities, register in activities proposed by other users, establish friendships with other users to chat with them and share activities in which a user participates, assess activities in which they have participated as well as view the rankings of evaluations of the activities. It has been designed using a multilayer architecture that allows each layer to be kept independent and that offers the advantage of being easy to extend its functionality as well as to perform its maintenance. The implementation has been carried out with different web technologies such as HTML5, JavaScript, CSS, Bootstrap, JQuery, Spring, MapBox, Moment.js, asynchronous JavaScript, XML (AJAX), and Thymeleaf. Likewise, to carry out the persistence of the information, Firebase has been used. As it is a non-relational online database, it offers flexibility with respect to the type of information stored since there are no restrictions regarding its structure, and on the other hand, it offers the advantage of being an online database with what it does not install or maintenance is required. The application fulfills the objective of facilitating the sharing of leisure activities between users.

The application supports enhancements such as; i) Expanding the information on the proposed activities such as price, showing other registered users; ii) Showing the status of a user to the chat (connected, last connection, busy) as well as the possibility of deleting messages or sharing files; iii) Implement a function to create groups of users who want to share activities; iv) Develop an intelligent service that proposes activities according to the history of activities in which it has participated and the profile of the user; v) Develop a version of the application for mobile devices.

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