Implementation of a Progressive Web Application to Access the Backend Developed in Django: Experience in his Development for File System Information in Legal Matters

Lic. José NéstorMeneses García [1], M.C. Juan Ramos Ramos[2], M.C. Elizabeth Cuatecontzi Cuahutle[3], Dr. José Juan Hernández Mora[4]

[1, 2, 3, 4]Tecnológico Nacional de México/Instituto Tecnológico de Apizaco, Carretera ApizacoTzompantepec, esquina con Av. Instituto Tecnológico S/N, ConurbadoApizaco – Tzompantepec, Tlaxcala, Mex. C.P. 90300

Abstract: *Through this publication, the details of planning, design and development of a web application for file management are presented, in addition to its corresponding progressive web application. The application was developed for the managementof government's files books of the Judicial Power of the Tlaxcala state to guarantee the location, administration, availability and management of each one. It should be noted that a technological research and development methodology was used, since the progressive web application implies a solution through the innovation of a new computer system, likewise, the agile methodology of extreme programming was used for the development of the Project, adapting it to the user needs. On the other hand, the results showed that the methods and techniques used in the development allowed to obtain an application that adapts to the needs of the users satisfactorily, and at the same time, a caching strategy was developed that improved the user experience. With the development of a progressive web application for a web application developed using the Django Framework, a solution was obtained that efficiently manages requests to the server, improves performance and availability for users, and can be installed on any platform.*

Keywords: Progressive web application, Service worker, Manifest

1. Introduction

For organizations, software is a tool that allows to optimize processes, so it is important to guarantee quality according to the needs through norms, standards, guides, models and methodologies that support development [2].

In general, this set of tools seeks to strengthen the implantation of computer systems process, that is, the software implantation carried out through the activities and necessary tasks that allows thesoftware transfer to its use environment by the users [7].

Ultimately, software development support is important to create quality applications, however, development has focused on generating applications for mobile devices, since most people use these devices as the main means to access information. Given the demand of users, different types of applications have been developed such as native applications, web applications and hybrid applications, however, these applications have certain disadvantages, which is why a new type of applications have emerged that seek to provide a solution and are called Progressive Web Applications (PWA) [9].

PWAs are a new type of applications that combine the best features of web applications and native applications and increase their functionalities according to the capabilities of the device. They have the following characteristics: multiplatform, they work without an internet connection, they synchronize in the background and it is possible to install them through the web browser [1].

Developing an application through the Django Framework saves time by creating and maintaining high-quality web applications with minimal effort. At the same time, it mitigates the stress of repetitive parts. It provides a high level of abstraction of common patterns in web development, shortcuts for frequent programming tasks and clear conventions on how to solve problems [5].

On the other hand, the files management through a web system represents an advantage, not only in the administration and control of files, but also in the availability for users, although there are limitations such as only offering a web application accessible on mobiles , since there is generally a need for a stable internet connection and consequently, they do not offer a good user experience as a native mobile application would, since web applications are limited to being used from a web browser with an internet connection stable for proper operation.

The conversion of a website to PWA, allows to make the application more accessible from any mobile device, which represents an advantage over desktop computers, since a PWA provides an interactive, fast and reliable experience, in addition, the importance and impact that mobile applications have in users and the recurrence of the use of a mobile device is higher. Consequently, the conversion of a website to a PWA for the management of legal files provides a mobile application that provides a useful computing tool for users, accessible and with greater usability impact.

2. Methodology Used

The technological research process proposed for this research proposes the following phases:

Problem definition. This stage was established with the purpose of solving a problem, specifically, the need for file management, likewise, the objectives of the investigation, the scope, the goals and the justification were identified.

Theoretical framework. In this stage, the research is oriented to study, prevent errors and innovate new strategies for the application development.

Research Question. It shows in a declarative way what was tried to achieve in the investigation.

Methodology. A technological research and development methodology was used, since the generation of a PWA adapts to the characteristics of this type of research, since it seeks to solve a problem through technological innovation [4].

Preparation of the intervention project. In the preparation of the Intervention Project, a plan was formulated to carry out an intervention in reality, that is, the development of a PWA [3].

Software Development Methodology. The development process was carried out using the extreme programming methodology based on a series of values and practices that favor an increase in the productivity of software development [8]. It should be noted that the stages used for the project development are: Planning, design, development and testing.

Planning. In this phase, the exploration of the methods used in the management of files was carried out, likewise, user stories were generated through the system requirements elaborated through interviews and, in this way, the necessary details were obtained for the application development.

Design. UML diagrams of the structure and the system behavior were made, and prototypes of the user interface were designed to create a test simulation of the user interface.

Development. Each module programming was developed according to the obtained user stories. The programming was supported through the Django web framework and the conversion was carried out through the Django-pwa application, which allowed converting the project into a progressive web application with the ability to navigate the site through mobile and install on the screen. start as a native application would [6].

Tests. The code tests were carried out to verify correct operation and detect possible errors that may exist in the application and thus correct them.

Evaluation. The design was checked for the application developed complying with the diagrams and the graphic interface design, in addition to checking the development using the Lighthouse tool and statistical techniques for the evaluation of the results obtained with the PWA.

3. Results

The file management system was developed using user stories as a guide for Development. In addition, the user interface was designed using UML diagrams, which allowed the system to be represented graphically. Also, the layout of the graphical interface was developed using templates that allowed to organize the visual elements of the application.

The design of the PWA was carried out by observing the main attributes that make up the application, in order to obtain the essential ones for Development. In this way, the attributes that best suit the records management system were considered.

The implemented strategy in the application's cache management was carried out through the service worker. This strategy seeks to obtain the resources, first from the network, that is, it tries to obtain the resources through the network as a priority and caches them. Although there is a version in the application, it is updated. On the other hand, if the response from the network fails, the resources are obtained from the cache stored in the Storage of the web browser.

Figure 1 shows the process carried out by mobile device means through the application.
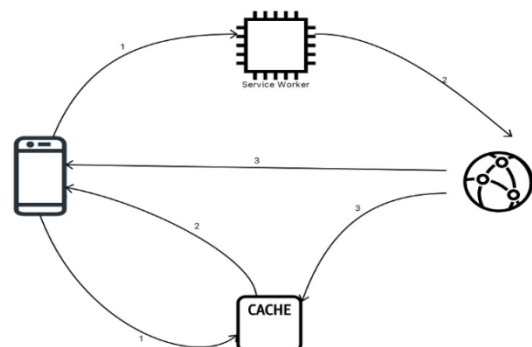

Figure 1: Cache strategy diagram
(Own source)

The system programming was developed with the help of the Django web framework that allowed to implement the system in an easy, fast and secure way. On the other hand, the development was carried out using the Django-pwa application which allowed us to convert the project into a PWA as shown in figure 2.
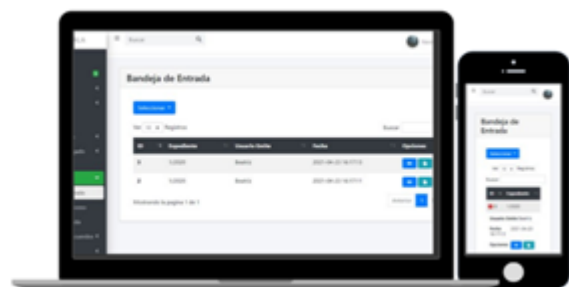

Figure 2: User interface screen
(Own source)

4. Conclusions

A web tool was planned, designed, developed and implemented through the Django Framework for the files management of the Judicial Power of the Tlaxcala state. The most important thing in the development was the technological development methodology implementation for the research and the agile development methodology for the software project, since they helped determine the best solution and application development, adapting it to the needs of the system.

A multiplatform PWA was developed similar to a native application that can be installed on any platform through the web browser, capable of being executed on any existing device and platform with the help of a browser with support for the service worker.

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Author Profile

José NéstorMeneses García, he is a graduate of the technological institute of Apizaco with a degree in computer science. He is currently a student of the master's degree in computer systems at the same institute.

Juan Ramos Ramos has a degree in Computer Science from the Instituto Tecnológicode Apizaco, from 1993. He is also a Master in Computer Science and Telecommunications from the Institutode Estudios Universitarios, A.C.; he works as a full-time professor at the TecNM/ Instituto Tecnológicode Apizaco in the area of Systems and Computing, teaching at the under graduate and post graduate level, in the areas of Programming and Software Engineering.

Elizabeth Cuatecontzi Cuahutle, she graduated with a degree in Computer Science from the Apizaco Technological Institute in 1992, obtained a master's degree in Software Engineering Management from the Institute of University Studies A.C. He is currently a full-time professor in the Systems and Computing department, in the career of Engineer in Information Technology and Communications and in the master's in computer systems in the line of Research of Software Engineer.

José Juan Hernández Mora has a Doctor of Teaching Excellence degree from the University of Los Angeles, 2019. He also has a degree in Computer engineer from the Universidad Autónoma de Tlaxcala, from 1994. Master in Computer science at the National Center for Research and Technological Development of the TecNM, 2003. Research professor at the Tecnológico de Apizaco del TecNM. Teacher of the Master of computer systems of the Instituto Tecnológico de Apizaco.