**PONTIFICAL CATHOLIC UNIVERSITY OF MINAS GERAIS**

**PUC Minas Virtual**

**Lato Sensu *Post-graduation*  in Mobile Development**

**Integrated Project**

Technical Report

Techmedic

Ingrid dos Santos Moreira

Belo Horizonte

Junho de 2023.

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## Introdução

## Objective

This project focuses on remote medical care, which consists of providing health services remotely. The importance of this theme lies in the need to offer medical care remotely, without the need for physical displacement of patients to emergency medical centers, hospitals or health posts. This is especially relevant for patients with mobility difficulties, residents of remote areas or with time constraints.

In addition, in a context of a pandemic such as COVID-19, remote medical care can reduce the risk of transmission of the virus by avoiding unnecessary travel and crowding in health facilities.

## General Issues

Ao ponto de vista econômico e social, há a falta de recursos e acesso à tecnologia, limitando o direito das pessoas de receberem atendimento médico. Também existe a ausência de legislação clara e regulamentação adequada gera incertezas, especialmente no que diz respeito à prescrição de medicamentos e segurança dos dados médicos. Conforme mencionado no artigo "Desafios e oportunidades para telessaúde em tempos da pandemia pela COVID-19: uma reflexão sobre os espaços e iniciativas no contexto brasileiro" SANTOS *et al.*, 2020, a falta de sincronia entre conduta, padrões e ética também dificulta a organização e regulamentação da telemedicina no país.

É essencial superar esses desafios por meio de uma abordagem multidisciplinar envolvendo profissionais de saúde, legisladores, reguladores, tecnólogos e cidadãos, a fim de promover uma assistência médica remota eficaz e democratizada, garantindo qualidade, segurança e igualdade de acesso aos serviços de saúde.

## Motivation for remote medical assistance

The COVID-19 pandemic has driven the need to implement new laws for telemedicine in Brazil, as well as the creation of a bed counting system, integration of SUS data and training of health professionals in order to enable direct screening and classification of patients before they arrive at health services. It is also worth highlighting the potential to bring specialized care to needy and hard-to-reach regions and promote the exchange of experiences among professionals. In addition, the combination of technology and medical care shows promise for overcoming geographical barriers and ensuring equitable access. Brazil also has the country's robust telecommunications infrastructure, which includes a fiber optic backhaul/backbone network that covers most municipalities and extensive mobile phone coverage (ANATEL, 2021). With a high rate of internet access and more than 118 million active mobile phone users, Brazil is well-positioned to drive the development of telemedicine and promote the democratization of remote health services across the country.

## Overview

The focus of the project is to create a secure and user-friendly remote healthcare platform that enables virtual medical consultations, medical information sharing, and electronic prescribing efficiently. Also create a health care system that can be using cell phone or computer (Android, iOS and Windows), scheduling appointments on the calendar and that there may be patient monitoring. Name chosen for the project is Techmedic.



## Conceptual Definition of the Solution

## Functional Requirements

1. A user must be able to register their profile.
2. A user should be able to receive a choice between creating a new account or using an existing account.
3. A user should be able to search by the doctor's name or specialty.
4. A user should be able to access the list with all doctors.
5. A user must be able to access their own profile.
6. A user should be able to check the schedule with future schedules.
7. A user should be able to choose a date for queries.
8. A user should be able to choose a time on the date chosen in the doctor's schedule.
9. A user must be able to confirm the appointment in the chosen one.
10. A user should be able to cancel their scheduled times.
11. A user must be able to change from see push notification.
12. A user must be able to change their scheduled times.
13. A user must be able to receive notification of the latest appointments.
14. A user must be able to change their registration data.
15. A user must be able to share the schedules in the phone's address book.
16. A user must be able to receive notifications of cancellations.
17. A user must be able to access the camera to update the user's photo.
18. A user should be able to see the doctor's photo.
19. A user must be able to make a connection using the application.
20. A user should be able to save the doctor's name;

|  |  |  |  |
| --- | --- | --- | --- |
| **ID** | **Descrição Resumida** | **Dificuldade (B/M/A)\*** | **Prioridade**  **(B/M/A)\*** |
| RF01 | The user is able to decide the page they want to access using horizontal menu in the footer and return to the home screen. | A | A |
| RF02 | The user can share the schedule in the device's calendar. (Share the data in the calendar) | A | A |
| RF03 | The user will be able to delete scheduling | A | A |
| RF04 | The user will be able to delete notification. | A | A |
| RF05 | The user should be able to see push notification | A | A |

\* B = low, M = medium, A = high.

## Non-Functional Requirements

1. The app must be compatible with any Android app;
2. The system must be accessible at any time of the day;
3. The system must be highly reliable, minimizing the occurrence of unexpected failures or interruptions;
4. User passwords must be stored using a hashing algorithm;
5. The system should show only available dates, preventing double scheduling at the same time;
6. The system should have a quick response in the push notification as soon as it has new changes.
7. The system must be optimized to minimize the consumption of server resources such as memory and processing.

|  |  |  |
| --- | --- | --- |
| **ID** | **Description** | **Priority**  **B/M/A** |
| RNF01 | The application should have an average response time of no more than 2 seconds for any user interaction. | A |
| RNF02 | User passwords must be stored using a hashing algorithm. | A |
| RNF03 | State management to manage the application data and not use the webserver or the user data anymore. | A |
| RNF04 | Application in angular standalone.js. | A |

## Architectural Pattern

The architectural pattern chosen was the MVP, where the architecture was modularized using BDD. MVP allows for better code organization and easy application maintenance.

Technologies used:

* Backend
  + Typescript;
  + Node.js;
  + Express;
  + Jest;
  + MYSQL;
* Frontend
  + Typescript;
  + Angular.js;
  + Sass;
  + Jest;
  + Ngx – bootstrap;
  + Capacitor;
  + Angular material;
* Infra
  + Nginx;
  + Github;

## Application Wireframe

1. Application splash screen. **Homepage**.
2. On the home screen you can choose the doctors by the icons in circles or by the boxes with suggestion of doctors;
3. One can choose the doctors by the search box either using the name of the doctor or specialty;
4. You can view scheduled appointments;
5. In the horizontal menu, the user can click on My Profile which will be directed to the My Account screen. (section 3);
6. On the My Account page (section 3) you can see all scheduled appointments;
7. On the My Account page (section 4) the user can change the registration data;
8. In the horizontal menu, the user can click on the chosen doctor who will be directed to the appointment booking screen (section 5)
9. In the horizontal menu, the user can click on the calendar that will show all scheduled appointments.

A screenshot of a cell phone

Description automatically generated with low confidence

1. Screen of registration of the new user using name, phone, Email and password.
2. When the user opens the application will show the login screen and the option to create an account.
3. When the user clicks on new account, he is directed to the page to add the registration data.

A screenshot of a phone

Description automatically generated with medium confidence

1. My Account screen with "My Appointments" menu open showing when the next appointment will be with date, time, name, specialty and photo of the doctor.

* If the user clicks the + button, the query is added to the device's calendar and the user is redirected to a confirmation screen.

A screenshot of a phone

Description automatically generated with medium confidence

1. "My Account" screen with "My Account" menu open showing the option for the user to edit the registration data.

A screenshot of a phone

Description automatically generated with medium confidence

1. Medical scheduling with available times and days.

* When the user finishes choosing the options, they are redirected to a confirmation screen.

A screenshot of a phone

Description automatically generated with medium confidence  
  
Link to the [Figma](https://www.figma.com/file/DW0w44ZKIVxe2AnKgRPVIp/Wireframe-baixa?type=design&t=0ShcwI7qUg20J76U-1)

Link to video [Wireframe de baixa fidelidade.mp4](https://1drv.ms/v/s!AgtL3E25TBKgggQo7xP-fCckua0O?e=0oUPWB)

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