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Design Document

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1 Introduction

1.1 Purpose

The aim of this document is to determine in a more detailed way which software requirements are going to be used for the development of the project, it is also expected that this document will serve as a model to follow for the development of the application.

The objectives that the project is expected to meet and the different services provided by TrackMe can be read in the **RASD** project document.

1.2 Scope

The expected scope of the system were presented in the **RASD** document.

The list of goals will be re-submitted for discussion throughout the document.

ID	Goal
GL1	The system should provide accounting and authorisation for users and clients.
GL2	The system should store the recollected data.
GL3	The system should recollect the data using the sensors available in the users' devices, asking the user directly the information when no sensor is available for recollecting the information (for example, weight).
GL4	The system should recollect the data from the users at time intervals.
GL5	The system should store and display the data in a time series format, allowing the client to consult the changes in the parameters along the time.
GL6	The system should allow the clients to easily query the already recollected data of the users.
GL7	The system should allow the clients to query the data of an specific user.
GL8	The system should allow the clients to subscribe to a query, providing new data as arrives.
GL9	The system should protect the privacy of the users. A data batch displayed to a client should not enable the differentiation between individuals.
GL10	The system should allow users to monitor some of their parameters, alerting the emergency system when any of these parameter gets out of a threshold.

Table 1: Goals

1.3 Definitions, acronyms, abbreviations

1.3.1 Definitions

1.3.2 Acronyms

- **XML:** Extensible Markup Language.

1.3.3 Abbreviations

1.4 Revision history

- **V 1.0:** First version of the document.

1.5 Reference documents

References used during the development of this document can be found at the bottom of the document on the page 14.

1.6 Document structure

The structure of this document is given in the table of contents (Page 3) but in this section we will take a closer look at everything contained in the document.

1. **INTRODUCTION**

   In the first section we will deal with the introduction. As in the RASD, the document that is being presented will be presented in an incoming form with references, an introduction to the objectives that the project is expected to achieve, definitions, abbreviations, and so on.

   You can start reading this section on page 5.

2. **ARCHITECTURAL DESIGN**

   The second section of the document presents the design of the architecture that will be followed throughout the development, this part is very important because it is the one that presents in a detailed way all the functioning that is behind and the different connections that are made.

   We present different schemes and designs from an external point to how the different parts of the systems interact with each other and what they use.

   You can start reading this section on page 7.

3. **USER INTERFACE DESIGN**

   The third section presents the designs of the user interface, at this point we will not go into depth since the designs and explanations have been given in the RASD.

   You can start reading this section on page 10.

   ► Acabar ◄

2 Architectural Design

2.1 Overview

An overview of the system is shown in figure 1. The dashed lines represents connections between elements of the TrackMe system while the solid ones corresponds to outside ones.

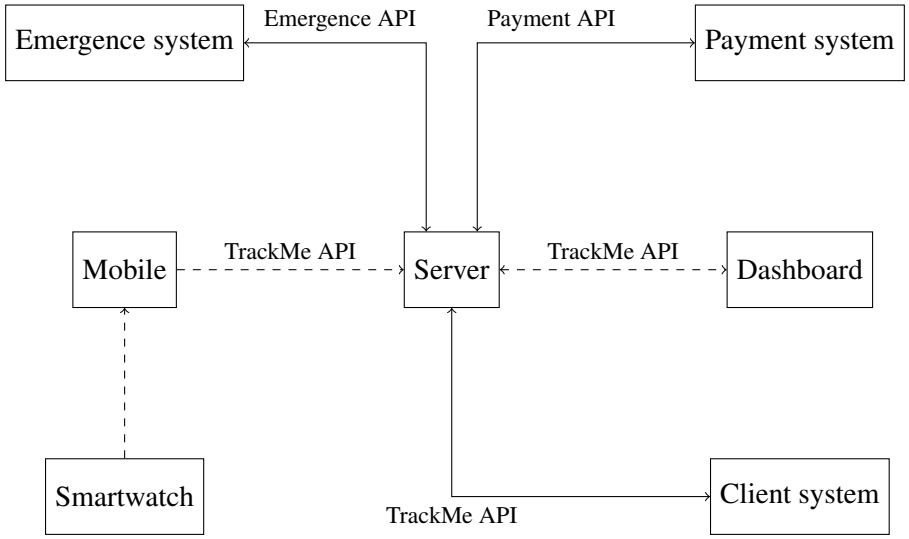

Figure 1: Overview of the system

The design of the architecture will present 4 layers (or levels) that relate to each other as shown in the figure ► Añadir ref. ◄ , these 4 layers will be the ones that generate the services of TrackMe.

The 4 layers [1] will be divided from the form:

Layer	Objective
1	INFORMACION SOBRE CAPA

Table 2: Layers and objectives of each layer (Architecture of the system)

2.2 Component view

2.3 Deployment view

Figure 2 shows the deployment of the server side components. The use of Docker introduces an isolation layer between the Operating system and the source code, which enables portability across all operating systems that supports Docker.

Furthermore, the inclusion of Dockers facilitates a future deployment in which the containers ► Añadir container a definiciones ◄ are distributed. Kubernetes can handle the orchestration ► Añadir orchestration, Docker y Kubernetes ◄ while Docker will tackle the containerisation.

[1] The user is not considered as a layer.

The connection between containers is specified in a Docker Compose file, which will provide IP connectivity between the different containers as shown in the figure 2.

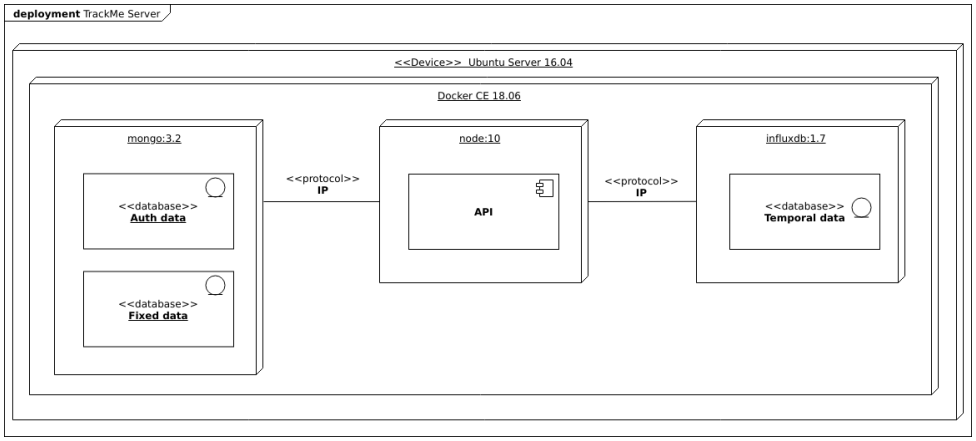

Figure 2: Deployment of the server side components

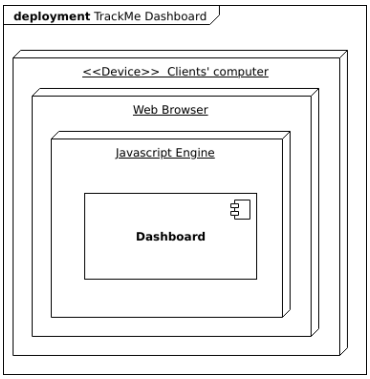

Figure 3: Deployment of the dashboard components

In the figure 2 we present the deployment diagram of the server used for TrackMe services in which you can see the different components that work and how they relate to each other.

2.4 Runtime view

2.5 Component interfaces

2.6 Selected architectural styles and patterns

The general architecture will be discussed first. Later on, the styles and patterns used in each part of the whole system will be introduced.

2.6.1 General architecture

As shown in figure 1, the system follows the client-server paradigm. There are two *clients*[2] in the platform, the Android application used by users and the Dashboard used by the clients. The server is

[2]The italic is used to differentiate the *client* in client-server paradigm from the clients of TrackMe platform.

composed by an application which responds to the requests of the *clients* and two servers which store the data.

Client-server architecture is a widespread style, used in almost all the mobile applications which requires interaction between systems. Moreover, the usage of applications based entirely in the browser, and therefore client-server, is common.

2.6.2 Android application

The android application is presented in Android Studio, a tool with a lot of potential that allows to develop it in the best possible way. For this we use two programming languages that are JAVA and XML.

JAVA and XML combine very well providing each other the needs that the other presents and giving a final set with a lot of potential.

2.6.3 Server application

2.6.4 Dashboard application

The dashboard is written in React, and therefore the component-based and declarative styles are embraced. To maintain and distribute the state across the React application, Redux paradigm will be use.

Redux paradigm plays well with React providing a single source of truth for the entire application which unleash the declarativeness of React.

2.6.5 Protocols

2.7 Other design decisions

3 User Interface Design

All user interfaces (mobile application, web application and smartwatch) were presented in the RASD.

There is no need to provide more.

► Mirar si hace falta alguna interfaz de usuario más ◄

4 Requirements Traceability

In the following points we will treat that objectives (those presented in the RASD that have also been presented in the Scope of this document) that have been fulfilled through the implementations treated in this document.

- **GL1:** The system should provide accounting and authorisation for users and clients.
    1.
- **GL2:** The system should store the recollected data.
    1.
- **GL3:** The system should recollect the data using the sensors available in the users' devices, asking the user directly the information when no sensor is available for recollecting the information (for example, weight).
    1.
- **GL4:** The system should recollect the data from the users at time intervals.
    1.
- **GL5:** The system should store and display the data in a time series format, allowing the client to consult the changes in the parameters along the time.
    1.
- **GL6:** The system should allow the clients to easily query the already recollected data of the users.
    1.
- **GL7:** The system should allow the clients to query the data of an specific user.
    1.
- **GL8:** The system should allow the clients to subscribe to a query, providing new data as arrives.
    1.
- **GL9:** The system should protect the privacy of the users. A data batch displayed to a client should not enable the differentiation between individuals.
    1.
- **GL10:** The system should allow users to monitor some of their parameters, alerting the emergency system when any of these parameter gets out of a threshold.
    1.

5 Implementation, Integration and Test plan

6 Effort Spent

Person	Task performed	Time spent

Table 3: Effort spent in Section 1 (page 5)

Person	Task performed	Time spent

Table 4: Effort spent in Section 2 (page 7)

Person	Task performed	Time spent

Table 5: Effort spent in Section 3 (page 10)

Person	Task performed	Time spent

Table 6: Effort spent in Section 4 (page 11)

Person	Task performed	Time spent

Table 7: Effort spent in Section 5 (page 12)

References

Appendix A Parameters

ID	Parameter	Units	Type	Query	Individual search
PM1	Codice fiscale	String	Fixed, manual	×	✓
PM2	Name	String	Fixed, manual	×	✓
PM3	Surname	String	Fixed, manual	×	✓
PM4	Birth date	dd/mm/yyyy	Fixed, manual	year	✓
PM5	Genre	M/F	Fixed, manual	✓	✓
PM6	Residence	Latitude, longitude	Fixed, manual	Searchable, not shown	✓
PM7	Location	Latitude, longitude	Temporal, automatic	✓	✓
PM8	Hearth rate	bpm	Temporal, automatic	✓	✓
PM9	Weight	Kilograms	Temporal, manual	✓	✓

Table 8: List of parameters and its type

Appendix B Inputs and intervals associated to parameters

Parameter	Interval	Motivation
PM7	5 minutes	Necessary interval for a correct control of the state of health.
PM8	5 minutes	Since AutomatedSOS is build on top of the data recollected by TrackMe, 5 minutes allows the system monitor the health state of the user.
PM9	7 days	Since this parameters is entered manually by the user, 7 days is a period long enough to not disturb users and to collect enough data to be useful.

Table 9: Intervals at which recollection is performed

Parameter	Input	Description of input
PM4	Slider (8 to 100)	An slider with a minimum of 8 and a maximum of 100 years. The client will be able to select two numbers using two handlers. The input will formulate a query in which all the dates between the 1º of January of the actual year minus the second number and the 1º of January of the actual year minus the first number are included.
PM5	Dropdown	A dropdown with two options. The first option is M and the second F. The input will formulate a query in which if the first option is selected, the query will return data from male users. If the second option is selected, the query will return data from female users.
PM6	Map	An interactive map centred in the city of Milan. The map should allow the drawing of an area. The input will formulate a query in which all the points inside the aforementioned area are include.
PM7	Map	An interactive map centred in the city of Milan. The map should allow the drawing of an area. The input will formulate a query in which all the points inside the aforementioned area are include.
PM8	Slider (40 to 120)	An slider with a minimum of 40 and a maximum of 120 bpm, these values are based on [**?**]. The client will be able to select two numbers using two handlers. The input will formulate a query in which all the numbers between the first number and the second number are included.
PM9	Slider (40 to 300)	An slider with a minimum of 40 and a maximum of 300 kg. The client will be able to select two numbers using two handlers. The input will formulate a query in which all the numbers between the first number and the second number are included.

Table 10: Inputs to be displayed to the clients

