



D4.3.2 APPLICATION/ SOFTWAREDEVELOPMENT

(Software Engineer -Developer)

«Healthcare Monitoring System Design»

Reporting period: 06/12/2018 – 05/05/2019WP

4 Joint Monitoring System project

IMPROVING HEALTHCARE ACCESS THROUGH A PERSONAL HEALTH MONITORING SYSTEM

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Summary

According to the contract (14/09/2018, Ref. No: 44956) for the project APPLICATION/ SOFTWARE DEVELOPMENT, the current report of the deliverable «Healthcare monitoring system design» that is being implemented within the frame of WP 4 Joint Monitoring System of the project IMPROVING HEALTHCARE ACCESS THROUGH A PERSONAL HEALTH MONITORING SYSTEM under the INTERREG V-A Greece – Bulgaria 2014-2020 Programme, describes the activities that have been carried out within the period 06/12/2018 – 05/05/2019.

The deliverable describes the design of an integrated system for record and analysis of biosignals that facilitate effective patient monitoring at home. The main contributions of the system are the standardization of biosignals collection and the introduction of Cloud Computing concepts and tools for data managements and analysis utilizing point-of-care decisions. The deliverable also describes the methodologies for the effective management of health data and of the infrastructure, as well as the overall architecture of the system and the database model.

Table of Contents

Summary	2
Table of Contents	3
Table of Figures	3
1 Introduction.....	4
2 System Architecture.....	5
3 The Database.....	6
4 References.....	8

Table of Figures

Figure1 Biosignal Logging Platform	5
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1 Introduction

Direct provision of healthcare and follow-up services, or the so-called point-of-care service, is seen as a key issue for improving the quality of life, especially for older people [1]. Mobile penetrating healthcare technologies can support a wide range of applications and services, including mobile telemedicine, independent living, site-based medical services, emergency response, personalized monitoring and access to healthcare information, providing significant benefits to both patients and medical staff. However, implementation of the management of health-related information via mobile and wireless devices involves several challenges, such as data acquisition, storage and management (e.g. different devices, different communication protocols, physical storage issues, availability and maintenance), interoperability and availability of heterogeneous resources, security and privacy protection (e.g. controlling license, data anonymity, etc.), unified and generalized.

The trend in modern personal monitoring systems is the use of Cloud Computing Template [2]. Cloud Computing provides access to shared resources and shared infrastructure in a generalized and diffused manner, offering on-demand services over the network to perform functions that respond to the changing needs of electronic healthcare applications. In this context, we have developed an integrated homeowner health monitoring system that uses the Cloud Computing infrastructure to manage and analyze data. The proposed solution focuses on the functionality of system decision support, which is implemented both in the smartphone application for temporary analysis and Cloud.

2 System Architecture

The basis for the proposed decision-making approach is illustrated in Figure 1. The proposed platform allows the creation of a patient-centered health care support network and also provides the framework and required services for the effective communication and management of a wide range of device and sensor wearers that allow for the continuous monitoring of patient's activities.

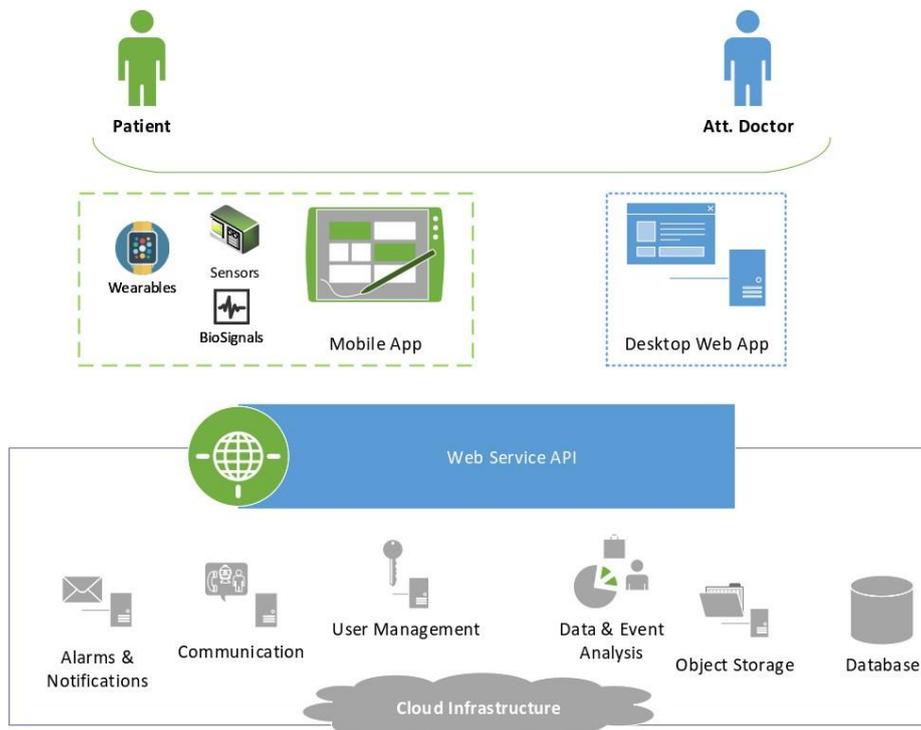


Figure1 Biosignal Logging Platform



3 The Database

The platform implementation includes a database which was designed and operate on top p a MySQL server. In order to cover the requirements of the involved users and stakeholders as well as the management and persistency of the health related data, the database has the following structure:

- BA_CLIENTS: The users registered in the system
- BA_CLIENTSERVICES: Information regarding user registration
- BA_DEVICES: The users' devices
- BA_DRUG_USAGE: The users' medication
- BA_EXAMS: The users' exam results
- BA_INVITATIONS: Invitations between the different users
- BA_ISSUES: Issues/Tickets (to be) resolved
- BA_PATIENT_ALLERGIES: The users' allergies
- BA_PATIENT_CONDITIONS: Notes about users' medical condition
- BA_PHOTOGRAPHS: Metadata of photos uploaded by the users
- BA_PREMIUM_CODES: Registration codes for users
- BA_READINGS: The biosignal measurements of the users
- BA_SESSIONS: Video call log
- BA_STATISTICS: Video call statistics
- BA_THRESHOLDS: Alarm thresholds for measurements as defined by the doctors
- BA_USERACTIONS: Records of the users' interactions with the platform
- JP_AUTHTOKENS: The authentication tokens of the users for accessing the platform
- JP_CONTACTS: The contacts of each user
- JP_DBOBJECTS: Internal use
- JP_EOBJECTS: Metadata for uploaded files
- JP_FILEDATA: The user's pictures
- JP_GROUPS: The groups that each user belongs to
- JP_LOOKUPDATA: Data for forms autocomplete
- JP_NOTES: Notes for each user
- JP_PROCESSES: Record of platforms technical issues
- JP_STREAMDATA: Link between users and their data
- JP_TABLEACTIONS: Log of platform's internal
- JP_TABLELINKS: Links between documents



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- JP_TASKS: Users' reminders
 - JP_USERACTIONS: User registration changelog



4 References

- [1] World Health Organization mHealth: New Horizons for Health through Mobile Technologies: Based on the Findings of the Second Global Survey on eHealth. Available online at: http://www.who.int/goe/publications/goe_mhealth_web.pdf
- [2] Doukas, C., Pliakas, T., & Maglogiannis, I., Mobile healthcare information management utilizing Cloud Computing and Android OS. In Engineering in Medicine and Biology Society (EMBC), 2010 Annual International Conference of the IEEE (pp. 1037-1040). IEEE.