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Towards An Application Architecture For A Smart Online Service Network Platform For The Elderly

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Abstract

Online Social and Service Network Platforms for supporting elderly people with respect to their health and well-being have been discussed on the conceptual level by various authors. Here, in particular the so-called transition age between 55 and 75 is important and therefore has also been addressed, e.g. with respect to user interface (UI) requirements. As a logical next step, in this paper an application architecture for such a kind of online service network platform is proposed, designed consequently using state-of-the-art concepts like server-side JavaScript, NoSQL databases and machine learning. Since only few studies about such kind of modern software architectures exist in the literature, this is a first step towards analyzing their implications for web application development.

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1. Introduction

The demographic change due to a constantly aging society provides a challenge for Germany, similar to most other developed countries. In the year of 2060, more than 33% of the German population will be over the age of 65¹. Since the age of 65 also determines the transition from working life to retirement, which is associated with various changes in a person's life (change of social environment etc.), this demographic change rises many important issues for the individuals, the health care system as well as the society in general^{2,3}. Therefore, the transition age between 55 and 75 years has become a focus of research in the social and health care sciences in recent years⁴.

Online Social Networks (OSN) or Online Service Networks and e-health technology in general have been proposed as one solution to address these challenges of the transition age^{2,5,3}. However, while the conceptual and usability

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aspects of such platforms have been discussed by various authors already^{6,7,8,9,10,11}, their implementation-related and architectural implications remain still an open issue.

In addition, scientific literature on modern, web-based software architectures in the health care sector is generally scarce. In particular, the use of popular web technologies such as server-side JavaScript or NoSQL databases¹² has rarely been discussed in the context of real-world applications in the healthcare sector^{13,14}.

Therefore, in this paper a proposal for an application architecture for a web-based Online Service Network Platform is made, addressing the needs of people in the transition age and based on state-of-the-art web technologies and design principles such as server-side JavaScript and NoSQL databases.

The rest of this paper is organized as follows: In section 2 the related work is discussed in detail. The requirements for the prospective online service network platform are outlined in section 3. Section 4 describes the proposed tentative software architecture for the platform. We conclude with a summary of our findings.

2. Related Work

While server-side JavaScript using Node.js has become a hot topic in web development in recent years¹², only few studies on related software architectures exist. Performance implications of Node.js-based web applications have been analyzed by some authors^{15,14,16}.

Some suggestions for general architectural approaches to develop server-side JavaScript applications also exist^{17,18,19,20}.

However, case studies about developing real-world applications are scarce^{21,14}, which becomes even more true for the field of health-related applications¹⁴. Here, JavaScript is still mainly used on the client side of either web- or mobile applications^{22,23}, while on the server side still PHP or other traditional web development platforms are used¹³.

Therefore, in this paper a first attempt is made to design an application architecture based on JavaScript and Node.js for the FISnet platform¹, an integrated online social and service network platform for supporting elderly people in the transition age from work life and retirement (55-75 years old)^{4,10,3,11}. While another approach for a related platform exists from the Netherlands^{8,9}, architectures built around server-side JavaScript have not been studied in this context so far.

3. Platform Functionality

The basic idea of the functionality of an integrated online social and service network platform for people in the transition age³ is outlined in Fig. 1. It shows the different parties involved as well as their interactions. Users of the platform therefore will be service providers, professional network coordinators (such as corporate health care management staff) and people in the transition age asking for help.

These different user groups result in the following UI-related requirements to the platform, which have to be reflected by the software architecture proposed in section 4:

- UI1: A UI in particular suitable for elderly people in the transition age¹⁰, usable on desktop as well as mobile devices,
- UI2: A more enterprise-like desktop UI for the service providers and professional network coordinators,
- UI3: A web-based application to provide easy and ubiquitous access to the platform and avoid client-side software installation.

To address the needs of the three user groups described in Fig. 1, the prospective platform is intended to offer the functionality illustrated in Fig. 2. In its final state, it should cover the full process of taking care of the respective needs of transition agers, divided into functional units (FU), namely the:

- FU1: Initiation phase covering the search for individual services and service networks (including support for the semi-automatic formation of individual, customer-specific service networks),

¹ <http://www.fisnet.info>

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