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Bachelor's Thesis

Title Title Title Title Title

This is a subtitle. It subs titles. Revisiting titles from the ancient Greek.

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Abstract

Project driven organisations have to face the problem of constantly needing to put teams together based on the members' skills, experience and preferences. In many businesses, there is no sophisticated source of information about those data which makes finding the right person with a specific ability even more complicated. A central tool keeping track of all employees' competencies and important metadata such as soft skills would come in handy. As part of this thesis, a prototype of a web application fulfilling sinnerschrader's individual needs regarding will be contrived and partly implemented. The process of analysing those specific requirements with respect to the end users' needs and designing a technical architecture capable of fulfilling them will be documented. Furthermore, the backend part of said application will be implemented using state-of-the-art web technologies. It's internal structure will be explained and substantiated. The frontend components will also be implemented, but this will happen independently from the backend and thus cannot be part of this thesis.

Contents

1 SinnerSchrader

The SinnerSchrader Group is a full service web agency based in Hamburg aggregating the subcompanies SinnerSchrader Deutschland, SinnerSchrader Content, SinnerSchrader Commerce and SinnerSchrader Swipe. The broad spectrum of expertise,including, but not limited to, digital communication strategies, visual and interaction design, technical architecture, full stack development, editorial services, content production, E-Commerce, mobile app development, hosting, and maintenance, allows SinnerSchrader to serve all needs regarding their customer's digital transformation. The combination of all said competencies under one single roof reduces organisational friction between the discipline-specific teams because they all share the same vision of the big picture they are creating. This does not only lead to faster development cycles, but also to a more coherent and unified product.

1.0.1 Project-Driven Business

As a web agency, it is clear that SinnerSchrader has to operate in a project-driven way. This means there no continuous stream of recurring work repeating constantly, but many different projects for different clients, each one dealing with varying challenges and questions. From a technical point of view, the diversity of know-how needed for each project is extremely huge since every application uses its own dedicated stack of technologies. As a consequence, the developers' skill sets are based on the combination of projects they have worked on and their general field of interest. This results in one problem: Managers frequently have to put teams together based on the members' skills with respect to the individual requirements of the project.
This thesis will cover the creation of a tool helping managers with that problem by providing a centralized source of data about each employee's professional abilities.

2 Concept

The application should be accessible to all employees of SinnerSchrader. Due to the heterogeneity of the people's computer setups running Windows, macOS and Linux, creating a native application supported by everyone's system is a rather complicated task. A web application using standard technologies does not only solve this problem, but can also be used from mobile devices such as smart phones and tablets. Furthermore, there is no need to manually install and update the software so that it can be assumed that all users use the latest version of the application. This is not only a positive factor regarding the overall usability of the system, but also assures bugs and security issues are eliminated the moment a fixed version of the software is deployed. All those advantages compared to native clients and the fact that SinnerSchrader's expertise lies in the development of web applications made the decision that this tool should be realized as such. (TODO: wording as such)

2.1 Commercial Solutions

2.1.1 Skills Base

Skills Base[1] offers the required features, but also includes a large number of functionality SinnerSchrader does not need and ist not willing to use. This includes assessments, the categorization of skills and a role model for advanced access rights configuration. The search function does not provide searching for multiple skills. Furthermore, the sorting of results found cannot be customized. A central point of the application are dashboards displaying information about the most popular skills in the organisation and long term statistics.

2.1.2 Talent Management (engage!)

Talent Management[2] is a module for Infoniqa's management software engage!. It offers advanced features for managers such as a powerful search function controlled via a special query language. It also includes data about the employees' salaries, feedback protocols and certificates. It can only be used in combination with engage!, an complete human resources management solution including features like time tracking, e-learning, applicant management and payroll accounting.

[1] http://http://www.skills-base.com/
[2] http://www.infoniqa.com/hr-software/skill-management

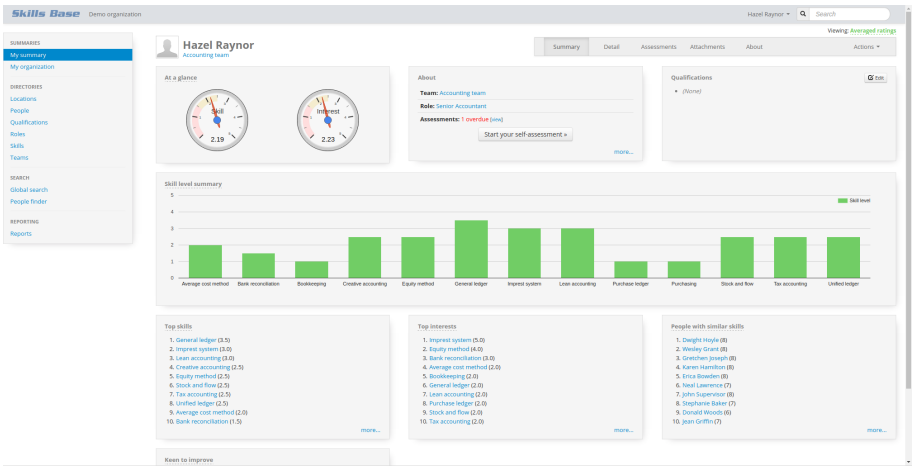

Figure 2.1: SkillsBase Dashboard

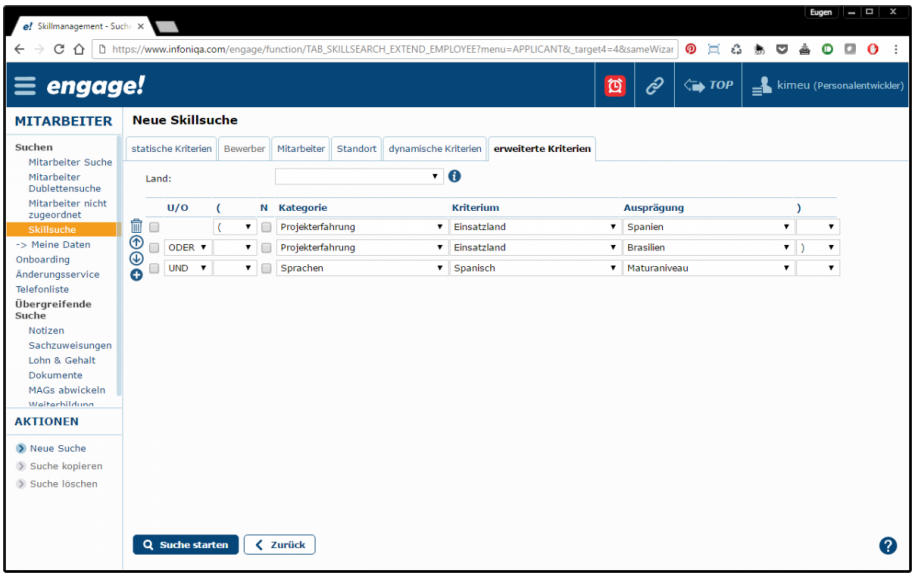

Figure 2.2: Talent Management Search

2.1.3 SkillsDB Pro

SkillsDB Pro[3] is an application designed to serve as a database in an organization providing an overview about every person's own skills and and trainings only to themselves and their manager. The search function is capable of searching for multiple skills combined with different logical operators which enables users to enter very sophisticated queries. Not only can users provide information about their skills, but managers can also do this with the limitation that no employee can see their manager's rating about themselves. Furthermore, only managers can search for persons. Taking into consideration that SinnerSchrader needs a tool to enable everyone to find someone with a specific skillset, this is a serious disadvantage. SkillsDB also offers features SinnerSchrader does not intent to use including, but not limited to the automatic generation of project reports

[3]http://www.skillsdbpro.com

based on plan succession and demands for assessments.

2.2 Requirements

2.2.1 Functional Requirements

- User Profiles
  Anyone can see another user's profile consisting of basic information about the user such as Name, Location, E-Mail and personal skills. Personal skills are composed of a name, a knowledge level and a will level, both on a scale from one to four.
- Provide/Edit skills
  Users can add new skills from a pool of known skills to their own profile. Already added skills can be edited and removed from the profile.
- Search
  A search function can be used to find people who have added one or more specific skills to their profile. When searching for multiple skills, only persons matching all of them will will be displayed.
  - Ranking
    By default, the search results order should be defined by a score aggregating the individuals knowledge and will levels. Employees willing to enhance their knowledge about a searched skill should be preferred to others having the same knowledge but a lower will.
  - Sorting
    The user should be able to sort the search results not only by said score, but also solely by knowledge and will level.
- Management of known skills
  New skills can be added to the set of known skills in the application. Existing skills can be edited and removed. Users personal skills are automatically updated when a skill has been edited so that the integrity of the user profiles is maintained at all times.

2.2.2 Non Functional Requirements

TODO: Klären und formulieren

- Desktop/Devices
- Browsers
- Scalability
- Load/Response Times

2.2.3 Revisiting Commercial Solutions

(TODO: Featurematrix aufstellen) As shown in (TODO: verweis auf matrix), none of the analyzed softwares (TODO verweis) offers all features required, but all of them include various functions SinnerSchrader does not intend to use, which brings undesired complexity into the applications. One of the most critical features, sorting the search results by best match, is not offered by any of the commercial solutions. Furthermore, all those systems differentiate between employees and their supervisors and thus restrain transparency. Instead of a solution for monitoring employees and rating them, we want a tool for everyone to find another person who offers the skills needed to solve a concrete problem.

2.3 Visual Concept & Wireframes

The application should be as simple as possible and usable for everyone, in order to provide an efficient and fast tool. Thus, it will be designed as a single page application based around a people search that provides a way to input the skills needed and returns all persons offering said skills. After entering a search, the user can select any of the found colleagues and view their personal profile showing extended information like contact details, more skills the user did not search for, and the employee's location. This profile will also include links to directly contact the inspected person via Email or Google Hangouts(TODO: footnote). Unlike the considered commercial solutions, this tool will not include features like creating statistics, assessments, applicant management, or any dashboard other than the basic search view. Furthermore, there will not be any different roles with different access rights for employees and their managers, since this application is meant to be a tool enhancing collaboration, not supervision.

TODO: Put UML/BPMN here

2.4 Matching Algorithm

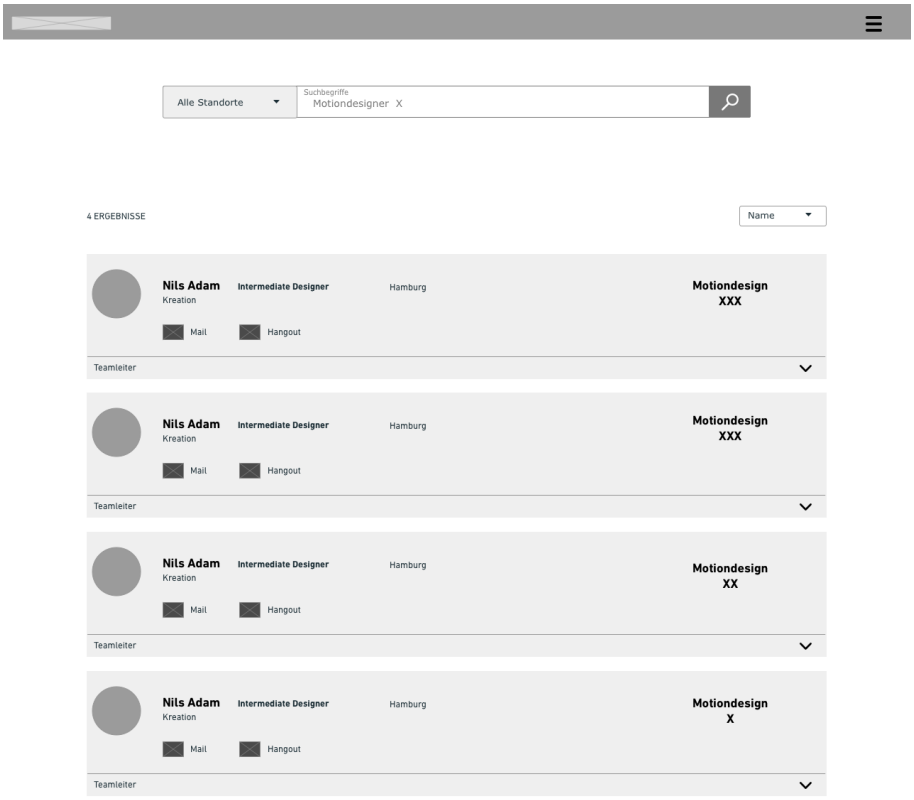

Figure 2.3: Wireframe

3 Implementation

3.1 Application Structure

3.1.1 MongoDB

BSON

Data Structure

Queries

3.1.2 LDAP

3.1.3 Reverse Proxy

3.1.4 API

3.2 Infrastructure

3.2.1 Maven Build

Frontend Build

3.2.2 Gitlab CI

3.2.3 Deployment

3.3 Backend

3.3.1 Spring Boot MVC

3.3.2 Spring Data

3.3.3 Spring LDAP

3.3.4 Swagger

3.3.5 Testing

3.4 License

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