2022 - 2023

READERS GUIDE PORTFOLIO

S3

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1 Version control

Version	Changes	Author	Date
V0.1	Initial version.	Nick Welles	19-10-2022
V0.2	Added parts of Individual project & group project.	Nick Welles	02-11-2022
V0.3	Added UX Design Added Data Persistence Added UX Design (Group)	Nick Welles	03-11-2022

2 General information

- For course: S-DB-IPS3 and S-DB-GPS3
- Class: S3-DB03
- Coaches: Marc M.H. van Grootel, Hans J.B.H.M Heumen
- Date: November 3th 2022
- Version: 0.3

Portfolio for semester 3 of the bachelor's program of IT from Fontys University of Applied Sciences.

3 Table of content

4 Introduction

This document fills in as a reading guide for my portfolio from semester 3 of the Four year certification program in Information Technology at Fontys University of Applied Sciences. The portfolio contains the items that I have created during the semester, demonstrating that I have acquired adequate information to meet the set necessities in the last fulfilment levels. This guide gives a concise outline of every item and segment, and points the reader towards the files which contain the fully worked-out versions of the subject.

5 Learning outcomes

#			
1	Web application	You design and build **user-friendly**, **full-stack** web applications.	**User friendly**: You apply best practices when creating user interfaces and basic user experience testing and development techniques. **Full-stack**: You design and build a full stack application using a commonly accepted front end JavaScript framework and back end application implementing relevant communication protocols, persistence of data by usage of ORM and addressing asynchronous communication issues.
2	Software quality	You use software **tooling and methodology** that continuously monitors and improve the software quality during software development.	**Tooling and methodology**: Carry out, monitor and report on unit integration, regression and system tests, with attention for security and performance aspects, as well as applying static code analysis and code reviews.
3	Agile method	You **choose** and implement the most suitable agile software development method for your software project.	**Choose**: You are aware of the most popular agile methods and their underlying agile principles. Your choice of a method is motivated and based on well-defined selection criteria and context analyses.
4	CI/CD	You **design and implement** a (semi)automated software release process that matches the needs of the project context.	**Design and implement**: You design a release process and implement a continuous integration and deployment solution (using e.g. Gitlab CI and Docker).
5	Cultural differences and ethics	You **recognize** and **take into account** cultural differences between project stakeholders and ethical aspects in software development.	**Recognize**: Recognition is based on theoretically substantiated awareness of cultural differences and ethical aspects in software engineering. **Take into account**: Adapt your communication, working, and behaviour styles to reflect project stakeholders from different cultures;

			Address one of the standard Programming Ethical Guidelines (e.g., ACM Code of Ethics and Professional Conduct) in your work.
6	Requirements and design	You analyse (non-functional) requirements, elaborate (architectural) designs and validate them using **multiple types of test techniques**.	**Multiple types of test techniques**: You apply user acceptance testing and stakeholder feedback to validate the quality of the requirements. You evaluate the quality of the design (e.g., by testing or prototyping) taking into account the formulated quality properties like security and performance.
7	Business processes	You analyse and describe **simple** business processes that are **related** to your project.	**Simple**: Involving stakeholders, predominantly sequential processes with one or two alternative paths. **Related**: Business processes during which the software that you are developing will be used (business processes that the software must support by fully or partially automating them). or Business processes needed for the success of your software development project (e.g., product release, market release, financial assurance).
8	Professional	You act in a **professional manner** during software development and learning.	**Professional manner**: You develop software as a team effort according to a prescribed software methodology and following team agreements. You are able to track your work progress and communicate your progress with the team. You actively ask and apply feedback from stakeholders and advise them on the most optimal technical and design (architectural) solutions. You choose and substantiate solutions for a given problem.

6 Research

Over the span of this semester, I have carried out a ton of groundwork into new innovations, business cycles and strategies.

6.1 Security

When you develop and publish a Web application, you expose it to a potentially malicious environment. There are those who scour the Internet looking for security vulnerabilities in order to exploit them and cause damage or steal sensitive data. When you are developing a Web application, you naturally want to make sure that your application has as few security problems as possible, preferably none at all! the assignment for this research was to properly research exactly which security problem fits your project. My answer to that, all of them. you obviously don't want your application to have vulnerabilities if you don't pay attention to such security problems.

In this research document I have done research to a lot of available risks given, and how to prevent them. This research relates to learning outcomes 2 and 8: Software Quality and Professional.

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6.2 Agile

Software development is in many cases upheld by Agile practices. During this semester I have utilized an Agile method called Scrum for my individual project and my group project. Yet, there are numerous other Agile methods accessible to utilize and each has their own utilization cases and advantages. I have carried out some analysis into the meaning of Agile, the various methods that are accessible, and the way things are utilized by and by. This item demonstrates my capability at learning outcome 3: Agile method.

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6.3 Techstack

Of course, a Web application does not spring up out of nowhere. For this, you use various languages to build the most complete application possible. Since we had a number of workshops concerning possible choices for a front-end and backend framework, I researched what would possibly be the best choice for a front-end framework, backend framework, in what database the data would be stored and possibly an API in between. This product helps prove my proficiency at learning outcome 6: Requirements and design.

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7 Individual project (Instruweb)

Inspired by: Bax-shop

7.1 Description

Instruweb is my individual project. It is a web-based shop for purchasing music instruments or things that musicians need to play their gigs or what not.
The goal for me was to learn how to build a web shop from the ground up without using a pre-build content management system. This seemed like a good challenge to me for semester 3.

I've made use of the Agile method while working on this project. Since GitHub has various tools that use the Agile method I chose this. from the Agile method, I used the Scrum form because I was already familiar with this and it complements the learning outcomes.

View Scrum board on GitHub

A good software engineer can easily adapt to new programming languages, techniques and frameworks. This is also something I always strive for. As an ICT person, you never stop learning!

Having used .NET, C# and as frameworks ASP.NET a lot in recent years, in this semester I have chosen to build the front-end with Angular, and build the API/Back-end with Java with the framework Quarkus (REST API)

Since I had no previous experience with Java, I was informed by my subject teachers by what are the advantages and disadvantages of the framework Quarkus and Java in general. To get started with the knowledge, there was an online workshop to get acquainted with Java. This workshop had been given by an outside company. In addition, our subject teacher Hans gave another online workshop explaining how to write simple API calls within Quarkus.

As described above, I chose Angular as the frontend framework. After doing some research, this framework seemed to fit best with my way of programming, especially the SOLID principles and the description of my assignment. Although Angular is less popular than Vue and React, I still had a better feeling about Angular. I have worked with Angular before in 2018 when I was an intern at an IoT company in Arcen.

Angular didn't have a lot of examples but fortunately enough can be found on the Internet and the documentation is well written.

7.2 Software design

For this project, I created such user stories. To make it a little easier for me in terms of layout also a concept diagram and some images related to the software architecture.

These diagrams/models and related information can be found in the software design document for Instruweb. This section is part of proving my proficiency at learning outcome 6: Requirements and Design.

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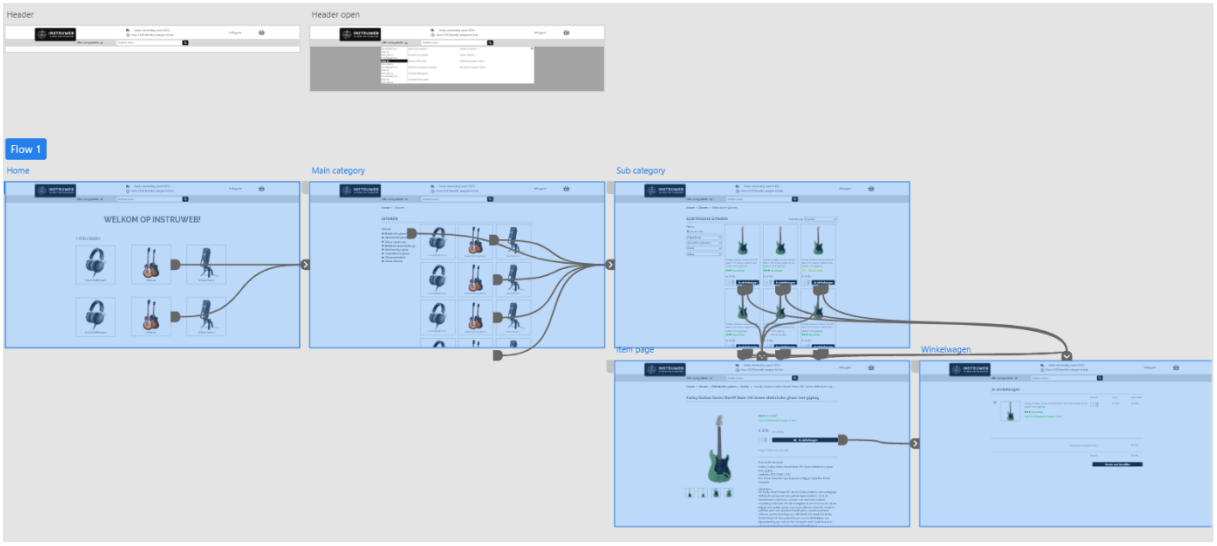
7.3 UX Design

UX design is a field of work devoted to assisting a user with clearing their path through a digital process or product with insignificant exertion and greatest worth. Since the UX design field is consistently advancing and somewhat new, we could hold returning to this definition and changing it — users, their concerns, and how visual developers tackle them will change that rapidly.



As seen in the image above, I created a fairly simple (UX) design with a flow in it. The user is instructed in advance where to navigate to and only when the user finds it clear enough they agree to the design and it is built in as a web application.

The design together with the flow was made using the Adobe XD program. There are various design tools (like Figma) that offer almost the same functionality. This section helps prove my proficiency at learning outcome 1: Web application.

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7.4 Data Persistence

Persistence in computer science is defined as ‘the characteristic of state that outlives the process that created it’. Take, for example, writing code to write data to external files for future use. The code which wrote these files has since stopped running, but the files that were created still exist. That is persistence.

7.4.1 ORM

Object-Relational Mapping (ORM) is a technique that lets you query and manipulate data from a database using an object-oriented paradigm. When talking about ORM, most people are referring to a library that implements the Object-Relational Mapping technique, hence the phrase "an ORM".

An ORM library is a completely ordinary library written in your language of choice that encapsulates the code needed to manipulate the data, so you don't use SQL anymore; you interact directly with an object in the same language you're using.

In the case of Java and Quarkus, I used the Hibernate function. Quarkus has a library on this called Panache. Our subject professor Hans also gave a short online workshop on this at the time.

```
@ApplicationScoped
public class MainCategoryRepository implements
PanacheRepository<MainCategory> {}
```

Described above, this class (MainCategoryRepository) implements the PanacheRepository part with the MainCategory object as reference. In it, all the properties of the table are defined. (see image below)

```java
@Entity
@Table(schema = "main_category")
public class MainCategory {
    2 usages
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Integer id;
    3 usages
    private String name;

    Nick Welles
    public MainCategory() {}

    Nick Welles
    public MainCategory(Integer id, String name) {
        this.id = id;
        this.name = name;
    }

    Nick Welles
    public Integer getId() {return id;}
    Nick Welles
    public String getName() {return name;}
    Nick Welles
    public void setName(String name) {this.name = name;}
}
```

This section helps prove my proficiency at learning outcome 1: Web application.

7.4.2 Database

For my project, I researched different forms of storing data in databases. I was already familiar with MySQL, but since I have been working with these for several years, I thought it would be a better challenge to go for another way. I researched PostgreSQL and MariaDB. It came out that PostgreSQL was just a little too complex for the application I wanted to build so I chose MariaDB.

Research can be found in the Techstack document under the Database section.

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7.5 Quality Assurance

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7.6 Software Release Management

7.6.1 CI

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7.6.2 CD

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8 Group project (World of Content web- scraper/crawler)

World of Content is driven by innovation. When they started, they were driving the e-commerce industry by introducing smart content management services that were easier, faster and more flexible than what the unwieldy, conventional providers could deliver. Now, a not-too-long period

later, World of Content continues to work at a breakneck pace on innovative products that bring them closer to the dot on the horizon; automated global delivery of the perfect content tailored to the individual.

World of Content came to Fontys explaining what kind of product they wanted that would make the work of a brand easier.

They were looking for a web scraper or web crawler that searched for information from a brand (e.g., Red Bull) on a retailer's website (e.g., Jumbo). Once this information was found, they wanted to see if this data found on the website also matched the data that the brand (i.e., Red Bull) provided to the retailer (i.e., Jumbo).

We were asked to make a maintainable and scalable application that they could use.

We made use of the Agile method while working on this project. Since GitHub has various tools that use the Agile method we chose this approach. from the Agile method, we used the Scrum form because we where going to use that in our individual project and we were already familiar with this and it complements the learning outcomes.

View Scrum board on GitHub

Jorn and I were mainly responsible for creating the web crawler and scraper. First, we created a crawler that will look by product name on a website for all existing URLs with that product name in them. Then we store those URLs in a small text file. Next, we are going to scrape these URLs. We then look at certain elements on the page. From those, we retrieve the bare text and compare this retrieved bare text with the data in the database. All this was written with Python version 3.10.

8.1 Software design

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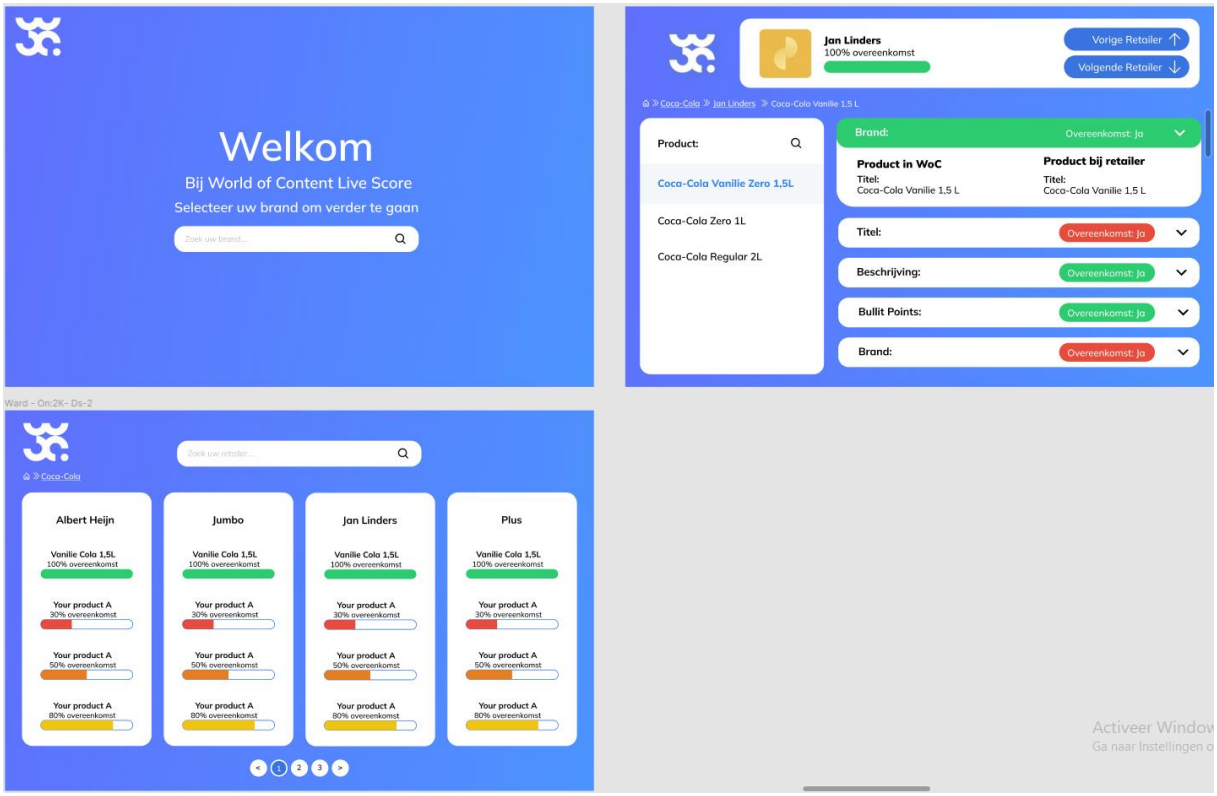
8.2 UX Design

In the group project, we spent a fair amount of time making all the designs and the process involved. Below in the image are all the designs we created, and below that is the final design we continued development with.

View design file



Tom (who was our contact during development) reviewed the designs and also the design department at WoC gave us tips, as well as compliments on the designs they liked the most. Ward was the one in charge of making the most of the designs. Jarno and I each made our own iterations so that we would have more options for the final result/iteration.

This section helps prove my proficiency at learning outcome 1: Web application. And helps to prove my proficiency at learning outcome 8: Professional.

8.3 Data Persistence

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8.4 Quality Assurance

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8.5 Software Release Management

8.5.1 CI

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8.5.2 CD

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9 Reflection

9.1 What I have learned

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9.2 What went well

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9.3 What can be improved

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